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Maximum Functionality on Minimum Space

Gas-Insulated Switchgear 8DJH Compact for
Secondary Distribution Systems up to 24 kV

Answers for infrastructure and cities.

Proven technology, consequently optimized to save space

The sustained growth of megacities makes surface area increasingly scarce and expensive. For this reason, the consequent reduction of space requirements is meanwhile also in the focus of development for switchgear of the secondary distribution level. At the same time, it is necessary to conciliate personal safety and operational reliability with the full scope of functions.

8DJH Compact from Siemens, the youngest member of the 8DJH family, provides the optimal response to these requirements. It sets new standards with regard to the compactness of medium-voltage switchgear. Thanks to its compact dimensions, it can be easily installed in new local transformer substations, and is the ideal retrofit switchgear for existing compact substations. Offering the proven functionalities of the 8DJH family, the switchgear can be integrated in Smart Grids if equipped with the corresponding options.



The ideal compact solution for the secondary distribution level

Where space saving is an important criterion, 8DJH Compact makes full use of its strength, thus guaranteeing a high degree of cost-efficiency – maximum functionality on minimum space. It is installed in public and industrial power systems of the secondary distribution level, for example, in local transformer substations of the power supply companies, or in medium-voltage infeeds of infrastructure projects.

Proven functionalities combined with optimum use of space

8DJH Compact offers the proven functionalities of switchgear from the 8DJH product family. The product range comprises the panel block with two ring-main feeders and one transformer feeder, the so-called RRT scheme, and up to the double panel block RRT-RRT with an overall height of 1,400 mm or 1,700 mm. Transformer cables are optionally connected from the rear, from the top, or from the side.

Due to the small mounting surface compared with similar block-type or extendable switchgear types, 8DJH Compact

leaves more space for additional low-voltage feeders, medium-voltage feeders, or Smart Grid functionalities.

Shorter transformer cables and reduced expenses for laying these cables inside the compact substation prove to be further advantages, reducing the investment costs.

Perfectly suitable for retrofitting compact substations

With its very compact dimensions, the 8DJH Compact is optimally suitable for retrofitting compact substations. Existing switchgear can easily be replaced by 8DJH Compact. This even provides additional free space, which can be used for further functionalities such as low- or medium-voltage feeders.

High personal safety and operational reliability

For switchgear operators, personal safety has the highest priority. Here, the 8DJH Compact switchgear sets standards. Tested for resistance to internal faults in accordance with the latest version of the IEC 62271-200 standard (2nd edition) of 2011, it offers maximum personal protection.

Mechanical interlocks installed in the operating mechanisms reliably prevent maloperation. Safe operation is guaranteed by the fact that, due to the system design, the switchgear can only be actuated with closed front.

The hermetically sealed primary enclosure is safe to touch, and conforms to degree of protection IP 65 according to IEC 60529 for all high-voltage parts of the primary circuit. The switchgear enclosure conforms to degree of protection IP 2X as a minimum.

The combination of hermetically tight, welded stainless-steel switchgear vessels and integrated maintenance-free switching devices provides a long service life, even under adverse environmental and climatic influences.

Your advantages at a glance

- High cost-efficiency by perfect utilization of existing mounting space. As a result, additional space for further systems in the compact substation
- Protection of investment by future-proof technology: Integration in Smart Grids is possible
- Cost-efficient retrofitting of compact substations
- High personal safety and operational reliability by internal arcing test in accordance with the latest IEC/EN 62271-200 standard



Integration in Smart Grids – 8DJH Compact with telecontrol unit (overall height: 1,700 mm)



Local transformer substation – compact design for new compact substations



Retrofit – optimum design for effective utilization of switchgear rooms

Low space requirements, full scope of functions

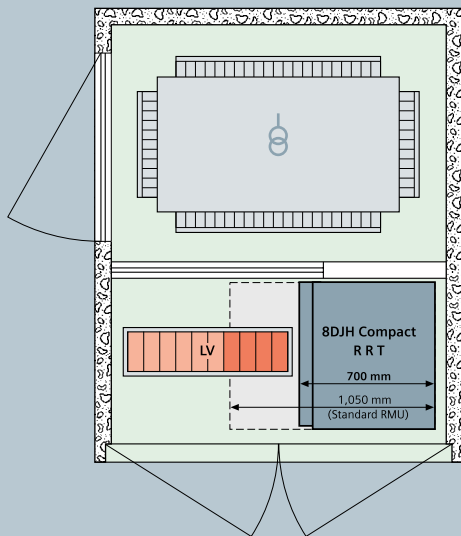
Mastering new challenges with existing compact substations

Today, compact substations are mostly equipped with gas-insulated switchgear. Under normal operating conditions, the expected service life of this equipment is at least 35 years, probably even 40 to 50 years. At the end of the life cycle of such switchgear, or if new functionalities become necessary on the same standing area, 8DJH Compact – with its very compact dimensions – offers itself as the ideal retrofit solution.

The space gained by the switchgear's compactness permits the installation of additional feeders in the medium-voltage or in the low-voltage system, for example, for connecting additional consumers or energy producers. Thus, 8DJH Compact switchgear creates the basis for successful retrofitting of compact substations.

Perfectly prepared for the future

In a time of intelligent power systems, so-called Smart Grids, compact substations must also be prepared to integrate themselves smoothly into the new system control structures. The necessary Smart Grid functionalities, however, require additional space in existing compact substations. Replacing an existing medium-voltage switchgear in a local transformer substation by 8DJH Compact, optionally equipped with motor operating mechanisms and compact telecontrol devices, is a future-proof investment in such cases. Depending on the degree of equipment of the Smart Grid functionality, more benefits will result, such as high availability, fast localization of faults, early detection of overload situations, safe operational management, and the possibility to both regulate decentralized power supplies and minimize losses in the distribution system. Apart from that, load characteristics can be recorded and used for optimal planning of system expansions.



The illustration shows the space gained for four low-voltage feeders by installing 8DJH Compact in a compact substation, compared with a ring-main unit with a width of 1,050 mm



Compact telecontrol unit for integration in Smart Grids

Tested and safe according to the latest standard

During the development of 8DJH Compact, particular attention was paid to personal safety, the same as in all other medium-voltage switchgear from Siemens. The results of the tests performed are documented in type-test reports from independent testing institutes.

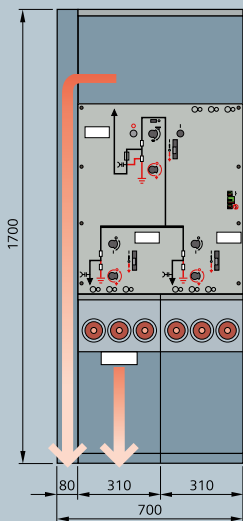
The switchgear is tested for resistance to internal faults in accordance with the latest version of the IEC 62271-200 standard (2nd edition) of 2011. In this context, resistance to internal faults was

also proved for the transformer cable compartment by removing the solid insulation and igniting an arc at the bushings of the gas vessel, upstream from the fuse. This test simulates the very improbable case of failure of these bushings.

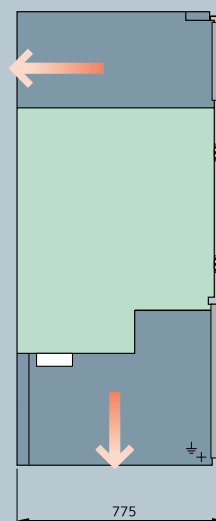
To safely control the high pressures arising during an arc, the complete transformer cable compartment, which also contains the fuses, features an extremely solid design.



Principle of pressure relief for designs with internal arc classification according to IEC/EN 62271-200, IAC A FLR or IAC A F



In designs with internal arc classification IAC A FLR, the pressure of the vessel, the ring-main feeders and the transformer feeders is relieved downwards.



In designs with internal arc classification IAC A F*, the pressure of the vessel and the ring-main feeders is relieved downwards, and the pressure of the transformer feeders is relieved to the rear.

* IAC A F tested with wall distance at the rear $\geq 3\text{m}$.
Use in substations only in connection with internal arcing test according to IEC 62271-202.

Features

› Type of switchgear

8DJH Compact switchgear is a factory-assembled, type-tested, three-pole metal-enclosed single-busbar switchgear for indoor installation.

› Environmental independence

Hermetically tight, welded switchgear vessels made of stainless steel make the parts of the primary circuit under high voltage of 8DJH Compact switchgear insensitive to certain aggressive ambient conditions, such as

- saline air,
- humidity,
- dust and
- condensation,

as well as tight to ingress of foreign objects, such as

- dust,
- pollution,
- small animals and
- humidity.

› Compactness

Thanks to the use of SF₆ insulation, compact dimensions are possible. This provides an efficient utilization of existing substation rooms for switchgear, new buildings are less expensive, and surface area in cities is used economically.

› Maintenance-free design

Switchgear vessels designed as a sealed pressure system with maintenance-free switching devices and enclosed cable plugs ensure:

- Maximum supply reliability
- Personnel safety
- Sealed-for-life design according to IEC 62271-200 (sealed pressure system)
- Installation, operation, extension, and replacement without SF₆ gas work
- Reduced operating costs
- Cost-efficient investment
- No maintenance cycles.

› Service life

Under normal operating conditions, the expected service life of gas-insulated switchgear 8DJH Compact is at least 35 years, probably 40 to 50 years, taking the tightness of the hermetically welded switchgear vessel into account. The service life is limited by the switchgear devices installed. The maximum number of operating cycles is defined by the standards:

- IEC 62271-102 for three-position disconnectors, earthing switches
- IEC 62271-103 for three-position switch-disconnectors, earthing switches.

› Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- Standard degree of protection IP 65 for all high-voltage parts of the primary circuit, at least IP 2X for the switchgear enclosure according to IEC 60529 and VDE 0470-1
- High resistance to internal arcs by logical mechanical interlocks and tested switchgear enclosure
- Panels tested for resistance to internal faults up to 21 kA
- Capacitive voltage detecting system to verify safe isolation from supply (option for transformer feeders)
- Due to the system design, operation is only possible with closed switchgear enclosure
- HV HRC fuses and cable sealing ends are only accessible when outgoing feeders are earthed
- Feeder earthing via make-proof earthing switches.

› Security of operation

- Hermetically sealed primary enclosure independent of environmental effects (pollution, humidity and small animals)
- Welded switchgear vessels, sealed for life
- Maintenance-free in an indoor environment (IEC-62271-1 and VDE 0671-1)
- Operating mechanisms of switching devices accessible outside the primary enclosure (switchgear vessel)
- Complete switchgear interlocking system with logical interlocks
- Mechanical position indicators integrated in the mimic diagram
- Minimum fire load.

› Reliability

- Type and routine-tested
- Standardized and manufactured using numerically controlled machines
- Quality assurance in accordance with DIN EN ISO 9001
- SF₆-insulated switchgear panels of Siemens in operation worldwide for more than 30 years.

Technical data

Electrical data of the switchgear, classification

Rated insulation level		Rated voltage U_r	kV	7.2	12	15	17.5	24
		Rated short-duration power-frequency withstand voltage U_d						
		– phase-to-phase, phase-to-earth, open contact gap	kV	20	28	36	38	50
		– across the isolating distance	kV	23	32	39	45	60
		Rated lightning impulse withstand voltage U_p						
		– phase-to-phase, phase-to-earth, open contact gap	kV	60	75	95	95	125
		– across the isolating distance	kV	70	85	110	110	145
Rated frequency f_r			Hz	50/60 →				
Rated normal current $I_r^{2)}$		for ring-main feeders	A	400 or 630 →				
		for busbar	A	630 →				
		for transformer feeders	A	200 ³⁾ →				
50 Hz	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	25	25	25	25	20
		for switchgear with $t_k = 3$ s (design option)	up to kA	20	→			
	Rated peak withstand current I_p		up to kA	63	63	63	63	50
	Rated short-circuit making current I_{ma}	for ring-main feeders	up to kA	63	63	63	63	50
		for transformer feeders	up to kA	63	63	63	63	50
60 Hz	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	21	21	21	21	20
		for switchgear with $t_k = 3$ s (design option)	up to kA	21	21	21	21	20
	Rated peak withstand current I_p		up to kA	55	55	55	55	52
	Rated short-circuit making current I_{ma}	for ring-main feeders	up to kA	55	55	55	55	52
		for transformer feeders	kA	55	55	55	55	52
Filling pressure (pressure values at 20 °C)		Rated filling level p_{re} (absolute)	kPa	150 →				
		Minimum functional level p_{re} (absolute)	kPa	130 →				
Ambient air temperature T		without secondary equipment	°C	–25/–40 ¹⁾ to +55/+70 ¹⁾ →				
		with secondary equipment	°C	–5/–40 ⁴⁾ to +55/+70 ^{1), 4)} →				
		for storage/transport including secondary systems	°C	–40 to +70 →				
Degree of protection		for gas-filled switchgear vessel	IP65	→				
		for switchgear enclosure	IP2X/IP3X ¹⁾	→				

8DJH Compact switchgear is classified according to IEC/EN 62271-200/VDE 0671-200.

Design and construction

Partition class	PM (partition of metal)
Loss of service continuity category	LSC 2
Accessibility to compartments (enclosure)	
– Busbar compartment	– Non-accessible
– Switching-device compartment	– Non-accessible
– Cable compartment	– Interlock-controlled

Internal arc classification

Designation of the internal arc classification IAC	Rated voltage 7.2 kV to 24 kV
IAC classification	IAC A FLR IAC A F (tested with wall distance at the rear ≥ 3 m; use in substations only in connection with internal arcing test according to IEC 62271-202)
Type of accessibility A	Switchgear in closed electrical service location, access "for authorized personnel only" (according to IEC/EN 62271-200)
– F	Front
– L	Lateral
– R	Rear
Arc test current	up to 21 kA
Test duration	1 s

1) Design option.

2) The rated normal currents apply to ambient air temperatures of max. 40 °C. The 24-hour mean value is max. 35 °C (according to IEC/EN 62271-1/VDE 0671-1).

3) Depending on HV HRC fuse-link.

4) Depending on the secondary equipment used.

Installation

Shipping data, transport

Packing types (examples)

For size and weight of the transport units, see the following tables.

Place of destination and means of transport	Examples for packing
Germany/Europe by rail and truck	Type: Open PE protective foil pulled over switchgear, with wooden base
Overseas by seafreight	Type: Seaworthy crate (standard) Welded PE protective foil, with closed wooden crate, with desiccant bag
	Type: Open for container PE protective foil pulled over switchgear, with wooden base
Overseas by airfreight	Type: Open PE protective foil pulled over switchgear, with wooden base and lattice or cardboard cover

Transport

8DJH Compact switchgear is completely delivered in transport units. Please observe the following:

- Transport facilities on site
- Transport dimensions and weights
- Size of door openings in building.

Transport dimensions

for Europe and overseas

Max. width of switchgear unit TU	Transport dimensions				
	Europe			Overseas	
	Width B	Height H	Depth T	Height H	Depth T
mm	m	m	m	m	m
850	1.10	A + 0.20	1.10	A + 0.40, min. 2.00	1.15
1,200	1.45				
1,550	1.80				

A = Switchgear height

Transport weight

The transport weight results from the switchgear weight per transport unit and the packing weight. The packing weight results from the transport dimensions and the type of transport.

Packing weight

Max. width of switchgear unit	Packing weight for Europe	Packing weight for overseas
mm	Approx. kg	Approx. kg
850	30	90
1,200	40	120
1,550	50	150

Switchgear weights

The weight of the switchgear unit results from the sum of the weights per functional unit. Depending on the design and the degree to which it is equipped, different values will result. The table shows mean values.

Switchgear weights

Panel block	Width	Gross weight for a switchgear height of	
		1,400 mm	1,700 mm
	mm	Approx. kg	Approx. kg
RRT ⁵⁾	700	365	380
RRT	620	340	345
RRT-R ⁵⁾	1,010	475	490
RRT-R	930	450	455
RRT-RRT ⁵⁾	1,400	730	760
RRT-RRT	1,240	680	690

5) With lateral pressure relief duct.

Catalog HA40.2

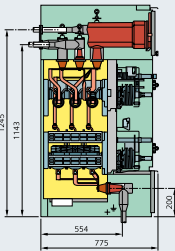
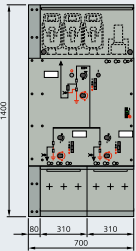


The catalog HA40.2 describes the components and technology of 8DJH switchgear in a general way, and offers selection criteria for the indicating and measuring equipment used. This equipment is also applicable to 8DJH Compact.

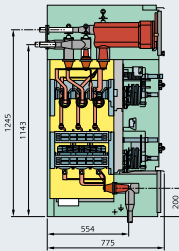
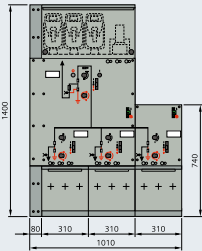
Product range

Product range overview of scheme versions

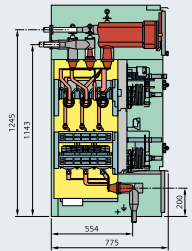
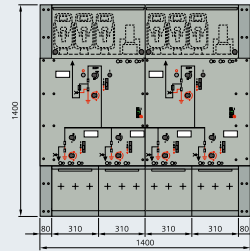
Versions with an overall height of 1,400 mm¹⁾



Scheme RRT

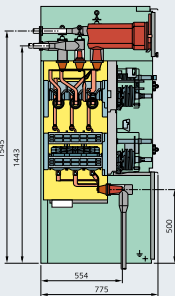
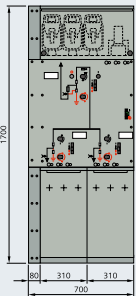


Scheme RRT-R

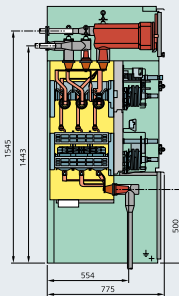
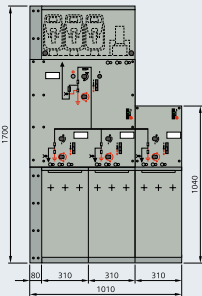


Scheme RRT-RRT

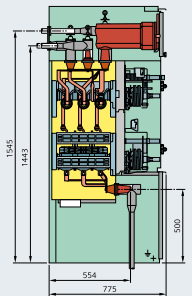
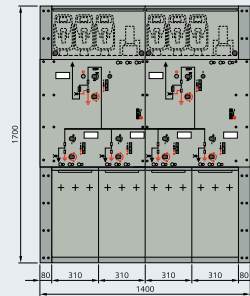
Versions with an overall height of 1,700 mm¹⁾



Scheme RRT



Scheme RRT-R



Scheme RRT-RRT

Scheme	Installation dimensions			
	Width (design with IAC A FLR) mm	Width (design with IAC A F) mm	Depth mm	Height mm
2 ring-main feeders, 1 transformer feeder	700	620	775	1,400 1,700
3 ring-main feeders, 1 transformer feeder	1,010	930	775	1,400 1,700
4 ring-main feeders, 2 transformer feeders	1,400	1,240	775	1,400 1,700

1) Illustrations show design with IAC A FLR.

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Siemens AG
Wittelsbacherplatz 2
80333 Munich
Germany

Siemens AG
Infrastructure & Cities Sector
Low and Medium Voltage Division
Medium Voltage & Systems
Mozartstr. 31 C
91052 Erlangen
Germany

www.siemens.com/mediumvoltage

For more information,
please contact our
Customer Support Center.
Phone: +49 180 524 8437
Fax: +49 180 524 2471
(Charges depending on provider)
E-mail: support.ic@siemens.com

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