NATUS

INDUSTRIAL SOLUTION SYSTEMS

SO **PRECISE!**

AS **MANUFACTURER**

NES / NES-H Medium voltage switchgear systems
withdrawable unit technology

NATUS AS MANUFACTURER

SO **PRECISE!**

Why we focus on custom work…

Our customers have specific requirements. They need low- and medium voltage switchgear systems that are manufactured to their specifications. NATUS plans and develops the right, high-quality solution for any requirement – flexibly, quickly and individually. In doing so, our customers benefit from our patented technologies.

Fine yet robust mechanical systems form the basis of solid technology. For this reason, we independently manufacture mechanical sheet metal parts for cell framework and withdrawable units. Thanks to the high level of vertical manufacturing, “Made in Germany” becomes “Really made in Germany” at NATUS.

FRANK NATUS
Managing Partner

AS **MANUFACTURER**

NATUS switchgear systems are developed to the highest quality standards and manufactured in our plants in Trier/Germany.
They are factory-made and type-tested in accordance with the applicable standards and regulations.

NATUS BENEFITS

- Maximum personnel safety with high operational safety
- Highest quality standards
- Customer-oriented, flexible engineering and project management with state-of-the-art tools
- Modular design, can be easily scaled up
- Use of high-quality, manufacturer-independent, standard components
- Highest level of vertical manufacturing at Trier site
- Factory Acceptance Test via remote access possible
- Interface optimisation through integration of medium voltage switchgear into an electrotechnical turn-key-project
- Sustainable and future-oriented thanks to SF6-free air insulation

TYPICAL AREAS OF APPLICATION

- Automotive industry
- Cement industry
- Chemicals and petrochemicals
- E-mobility
- Foodstuff industry
- Glass industry
- Hydrogen production
- Mining industry and steel mills
- Municipal utilities and distribution system operators
- Oil and gas industry
- Pharmaceutical industry
- Plant construction
- Power generation and supply
- Pulp and paper industry
- Steel and metal industry
- Substations
- Waste disposal
- Water management
- and many more

NATUS MEDIUM VOLTAGE SWITCHGEAR SYSTEMS

SAFE, RELIABLE, SUSTAINABLE

Decades of experience in research, development and manufacturing make NATUS one of the largest manufacturers of air-insulated SF6-free medium voltage switchgear systems. Our systems set benchmarks: the highest personnel and operational safety, mature, reliable technology, plus ease of use and high cost-effectiveness. All this while taking special sustainability aspects into account.

NATUS switchgear systems are air-insulated, metal clad, 4-fold partitioned and arc-fault resistant. On request, we can supply you with a wide range of circuit breaker types and innovative technical solutions for standard or special applications.

Take our word for it! Our engineers provide competent support and advice, and assist you with your project from planning to commissioning.

ENSURING SAFETY SMART DETAILS

Safe operation and operation thanks to reliable protection concepts:

- All electrical and mechanical control operations with the enclosure closed
- Maximum operational safety thanks to complete mechanical switching error protection fitted as standard
- Retracting contacts are automatically covered by shutters when the drawer unit is extended
- High availability due to quick replacement of the drawer units by means of the universal transport carriage
- Earthing switches protected against switching on
- High ease of maintenance thanks to easy accessibility to all partition spaces
- Fully partitioned withdrawable switchgear creates generous space conditions for cable connections
- Remote control by motorised switchgear possible

RELIABILITY IS THE RESULT OF TOP QUALITY

- State-of-the-art production methods, including high-precision punching laser machines, ensure perfect dimensional accuracy
- Use of high quality materials
- Torsion-resistant housing made of high-quality zinc-magnesium-coated sheet steel parts screwed together
- Arc-fault resistant double steel sheet panelling from cubicle to cubicle
- Cross-partitioning of the main busbar cubicle-by-cubicle
- Partitioned functional spaces
- Electrostatic powder coating of the front doors and side end walls
- Application of certified management processes according to DIN EN ISO 9001 (quality), DIN ISO 45001 (occupational safety management), DIN EN ISO 14001 (environmental management) and DIN EN ISO 50001 (energy management)

SUSTAINABILITY REQUIRES FUTURE ORIENTED SOLUTIONS

- Air insulated and thus SF6-free
- Minimal use of insulation material
- Very high life cycle with low life cycle costs
- Optimal assembly possible from a technical and economic point of view, with modern low-maintenance vacuum switching devices from leading manufacturers
- Simple parts procurement through the use of standard supports and standard transformers, standard switchgear and commercially available copper profiles
- Continuous adaptation to new market and customer requirements
- Local production with short transport distances

STANDARDS SERIAL

Design of the switchgear cubicles according to IEC 62271-200 or VDE 0671 part 200. IAC AFLR arc fault qualification according to IEC 62271-200 or VDE 0671 part 200, App. AA, criterion 1-5, earthquake test UBC 1997, zone 4.

NATUS medium voltage switchgear cubicles have "loss of service category" LSC2B according to IEC 62271-200 by default. Partition classes can be PM or PI, depending on the design.

OPERATING CONDITIONS

In the standard version the switchgear systems are designed for:

- Ambient temperatures:
  Highest value: + 40°C
  Highest value (24h average): + 35°C
  Lowest value: – 5°C
- Installation altitude: max. 1,000 m above sea level
- Max. Humidity (24h average): 95%

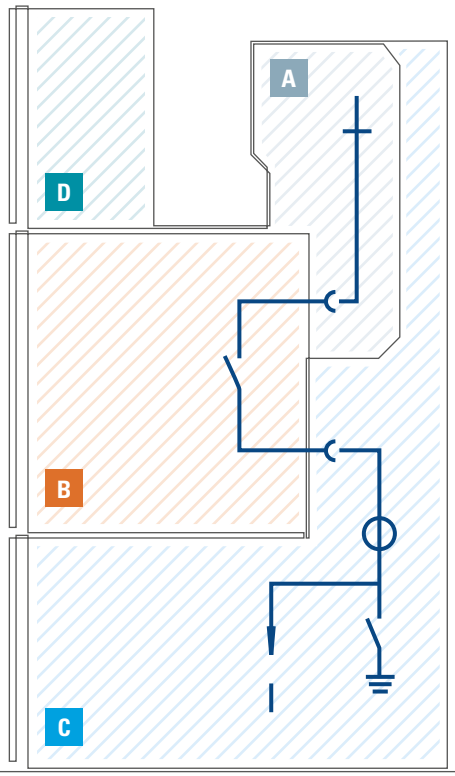
NES

MEDIUM VOLTAGE SWITCHGEAR SYSTEM

The type-tested medium voltage switchgear in withdrawable unit technology is used for many primary distribution applications.

Thanks to future-oriented air insulation, it is suitable for indoor installation. The switchgear is optionally available as a single busbar system or as a duplex system, the drawer units and earthing switches can optionally be supplied with motor drive.

There are numerous cubicle variants, which can be used to provide the optimal solution for the requirements of customers in industry and energy supply companies. Pressure relief channels, single or collective absorbers and deflector plates are used to discharge hot gases arising in the event of an internal arc.



Technical data: **NES**

Rated voltage		**up to**	**Unit**
Rated voltage	Ur	12	kV
Rated frequency	fr	50 / 60	Hz
Rated power-frequency withstand voltage	Ud	28	kV
Rated lightning impulse withstand voltage	Up	75	kV

Rated currents		**up to**	**Unit**
Rated busbar current	Ir	2,500	A
Rated current Operating current		2,500	A
Rated short-time withstand current	Ik	40	kA
Rated short circuit period	tk	3	s
Rated impulse current	Ip (50Hz)	100	kA

IAC Arc fault qualification		**up to**	**Unit**
Degree of accessibility		AFLR	
Arc fault test current		40	kA
Duration of arc fault test current		1	s

Dimensions					**Unit**
Cubicle height	C1			2,400*	mm
Cubicle depth	B1			1,300**	mm
Cubicle width	A1	Contactor cubicle	... 350 A	500***	mm
		Circuit breaker cubicle	... 1,250 A	650	mm
		Circuit breaker cubicle	... 2,000 A	800	mm
		Circuit breaker cubicle	... 2,500 A	1,000	mm

Protection class	
External housing	IP4X
between functional compartments	IP2X

Functional compartments

- **A** Busbar compartment
- **B** Circuit breaker compartment
- **C** Cable connection compartment
- **D** Low voltage compartment

* plus pressure channel · ** plus 92 mm for front door and rear wall · *** 500 mm contactor panel tested to 25kA (1s) or 40kA (0.1s)
Other values available upon request

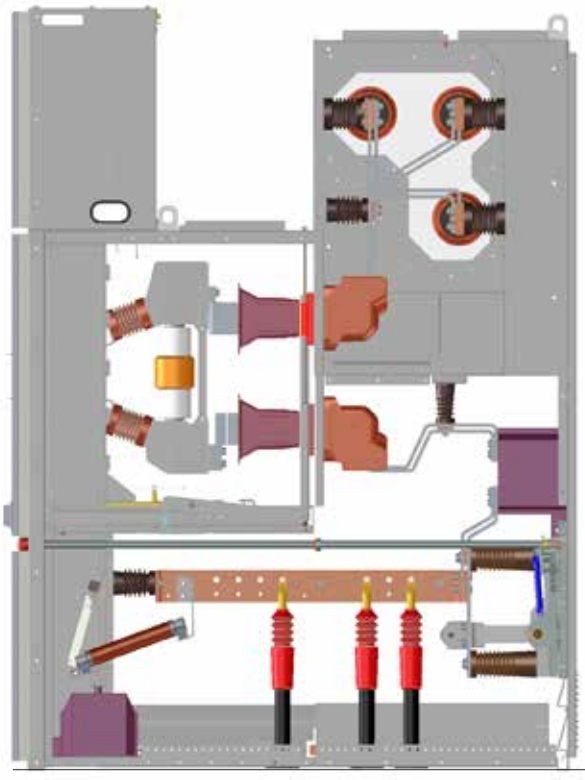
NES-H

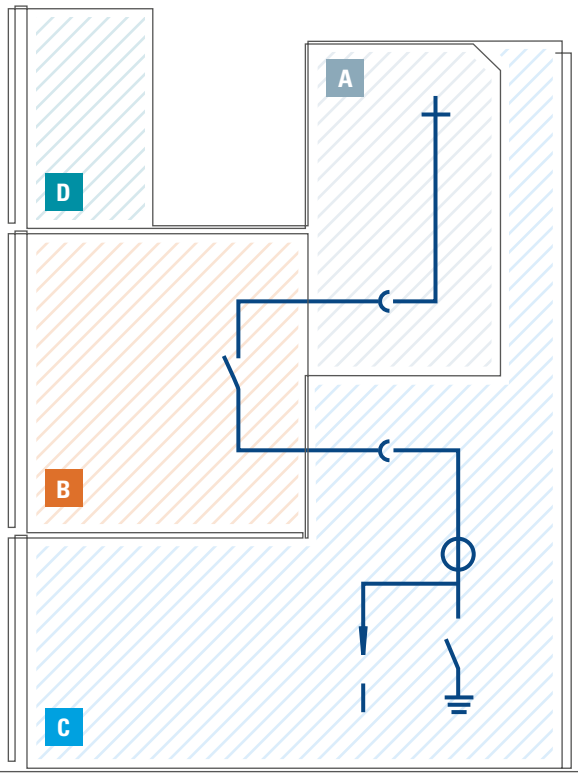
MEDIUM VOLTAGE SWITCHGEAR SYSTEM

The type-tested medium voltage switchgear enhances the product family for our withdrawable switchgear systems for higher rated value requirements.

The NES-H series is designed for very high-energy applications in power plants or industry and meets all the technical characteristics of a powerful system for primary power distribution at all voltage levels. It is suitable for indoor installation as an air-insulated factory-made switchgear.

Pressure relief channels, single or collective absorbers and deflector plates are used to discharge hot gases arising in the event of an internal arc. The drawer units and earthing switches are optionally available with motor drive.





Technical data: **NES-H**

Rated voltage		**up to**	**up to**	**up to**	**Unit**
Rated voltage	Ur	12	17.5	24	kV
Rated frequency	fr		50 / 60		Hz
Rated power-frequency withstand voltage	Ud	28	38	50	kV
Rated lightning impulse withstand voltage	Up	75	95	125	kV

Rated currents		**up to**	**up to**	**up to**	**Unit**
Rated busbar current	Ir	4,000	4,000	2,500	A
Rated current Operating current		4,000	4,000	2,500	A
Rated short-time withstand current	Ik	50	50	31.5	kA
Rated short circuit period	tk		3		s
Rated impulse current	Ip (50Hz)	125	125	80	kA

IAC Arc fault qualification	**up to**	**up to**	**up to**	**Unit**
Degree of accessibility		AFLR		
Arc fault test current	50	50	31.5	kA
Duration of arc fault test current		1		s

Dimensions							**Unit**
Cubicle height	C1				2,400*		mm
Cubicle depth	B1				1,700**		mm
Cubicle width	A1	Contactor cubicle	... 350 A	2 x 500	2 x 500		mm
		Circuit breaker cubicle	... 1,250 A		800		mm
		Circuit breaker cubicle	2,500 A	800	800	1,000	mm
		Circuit breaker cubicle	4,000 A	1,000	1,000		mm

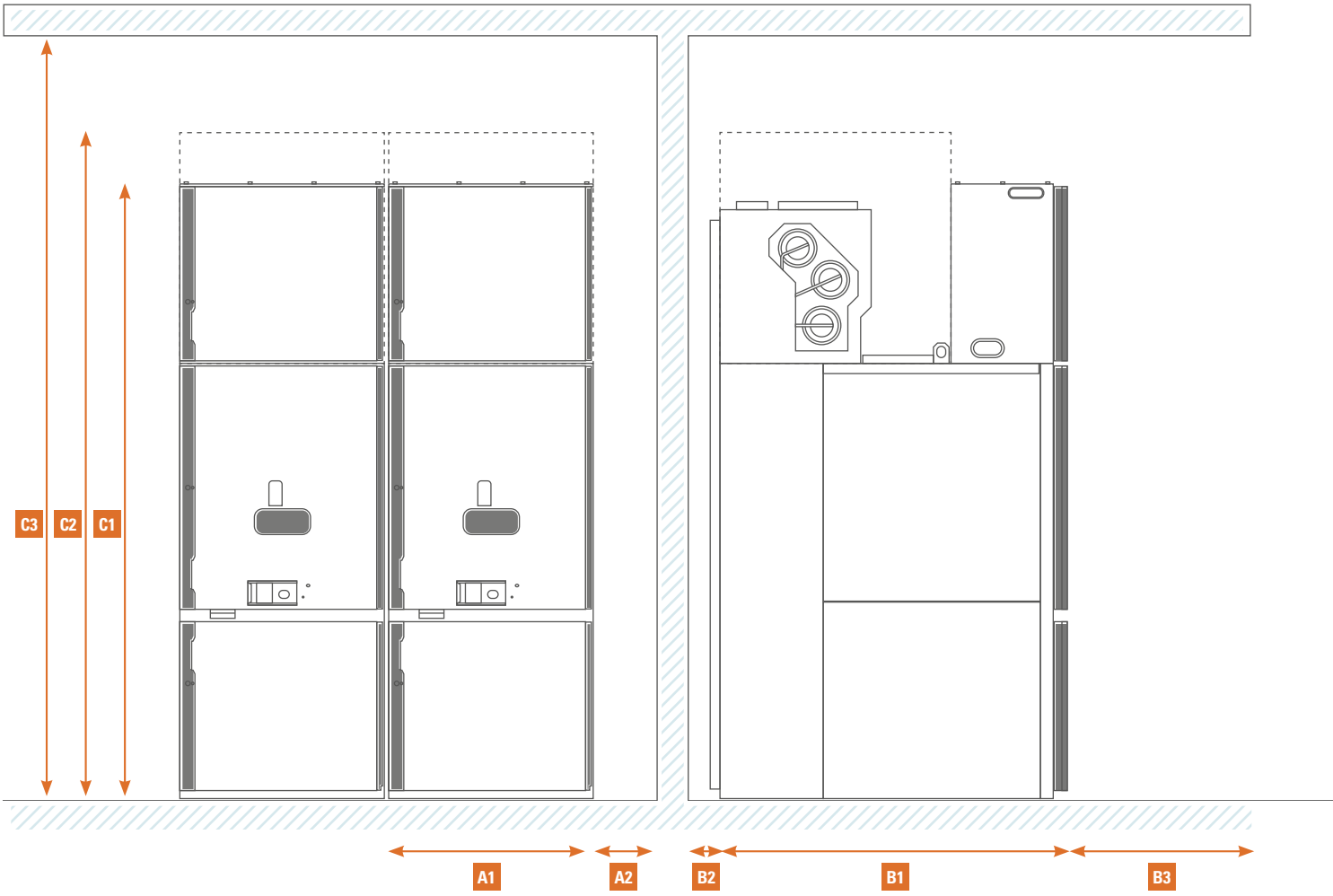
Protection class	
External housing	IP4X
between functional compartments	IP2X

Functional compartments

- **A** Busbar compartment
- **B** Circuit breaker compartment
- **C** Cable connection compartment
- **D** Low voltage compartment

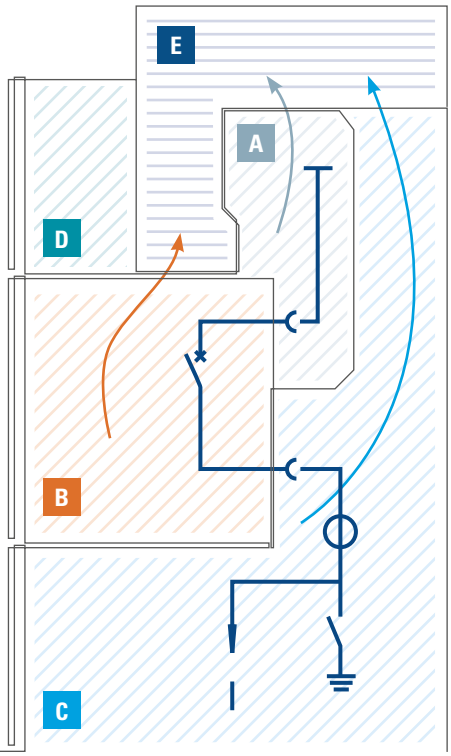
* plus pressure channel · ** plus 92 mm for front door and rear wall · *** 500 mm tested to 25kA (1s) or 40kA (0.1s)
Other values available upon request

STRUCTURAL DETAILS* FOR NES / NES-H



Wall distances				
Lateral (L)	A2	lateral without pressure relief		min. 115 mm
		lateral with pressure relief		min. 520 mm
Rear (R)	B2	rear		min. 110 mm
Front (F)	B3	Service aisle in front of cubicle	Cubicle width <= 800 mm	min. 1,400 mm
			Cubicle width > 800 mm	min. 1,600 mm
Heights				
Cubicle height**	C1	without pressure duct		2,400 mm
Cubicle height**	C2	with pressure duct		2,600 mm
Ceiling height	C3	with pressure relief duct without busbar attachment		min. 2,800 mm
		with pressure relief duct with busbar attachment		min. 3,200 mm
Pressure relief duct				
required wall opening				min. 900 mm (width)
				min. 500 mm (height)
		Bottom edge opening		min. 2,150 mm (height)
Weight				
		Area load		700 kg to 1,400 kg

* Structural details are standard · ** Other heights possible upon request due to variable LV compartment. Special cubicles or special dimensions available upon request



PARTITION SPACES ACCORDING TO "LOSS OF SERVICE CATEGORY" LSC2B

A: Busbar compartment

The busbars are manufactured from flat E-copper with rounded edges. The main busbars are screwed on cubicle-by-cubicle and are partitioned from cubicle to cubicle using cast resin bushings. The dielectric strength of the main busbar is guaranteed without additional insulation. The busbars can be optionally nickel-plated, silver-plated or insulated.

B: Cable connection compartment

The generously dimensioned cable connection compartment is easily accessible from the front via its own pressure resistant front door. It offers sufficient space over the entire cubicle depth for the installation of current and voltage transformers, earthing switches, surge arresters and cables. It is possible to connect single conductor cables up to 5 x 1,000 mm² in the NES cubicle type or else up to 7 x 1,000 mm² per phase in the NES-H cubicle type. Alternatively, a connection to the switchgear cubicles can be made by means of a busbar.

C: Low voltage compartment

The low voltage compartment is available with a height of either 700 mm, 900 mm or 1,050 mm and provides ample space for the necessary devices for control, protection, measurement, signalling and counting. The position switch for the drawer unit is also easily accessible and can thus be accessed without having to reach into the high voltage section. The torsion-resistant door is ideally suited for the installation of protective relays, measuring instruments, control and signalling devices.

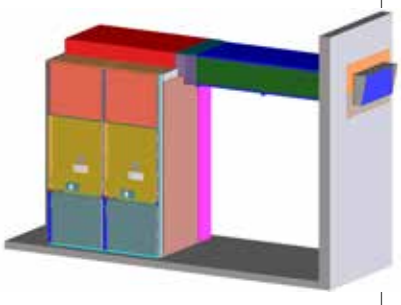
D: Circuit breaker compartment

The drawer units can be equipped with vacuum circuit breakers or vacuum contactors from various manufacturers according to your requirements. Our delivery program includes further designs such as measuring drawer units, disconnecting drawer units, earthing or short-circuit drawer units. The drawer unit is moved with the door closed. Extensive and safe mechanical interlocks prevent operating errors. When the drawer unit is racked out, the live parts are automatically covered by shutters.

E: Pressure relief

Generally, the pressure relief of our switchgear cubicles takes place upwards and not into the cable basement.

In order to ensure the highest level of personal safety and for targeted relief of the switchgear building, we recommend pressure relief by means of a pressure duct. In this case, the hot gases that occur in the event of a fault are directed out of the switchgear building via the duct. Depending on the type of switchgear cubicle, pressure relief can alternatively be implemented via absorbers or arc deflector plates.



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AS **MANUFACTURER**

SO **PRECISE!**

NATUS plans and develops the right, high-quality solution for any requirement – flexibly, quickly and individually.

AS **SERVICE PARTNER**

SO **RELIABLE!**

We provide a comprehensive service package to ensure that your NATUS products always deliver the maximum in performance.

AS **AUTOMATION SPECIALIST**

SO **SMART!**

As experts in automation technology, we provide the full spectrum of smart solutions.

AS **PROJECT PARTNER**

SO **COMPLEX!**

Many of our customers have complex projects. This means that NATUS is not just a manufacturer, but also a project partner.

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