

SIEMENS



SINAMICS G180: The specific drive solution

For oil & gas, the chemical and process industries

siemens.com/sinamics-g180

Answers for industry.

The intelligent response to special demands

With the SINAMICS G180, Siemens offers a drive solution specifically designed to address applications in oil & gas, the chemical and process industries.

The ongoing development of what has been well proven: SINAMICS G180

The ongoing development of the well-proven LOHER DYNAVERT T inverter seamlessly fits into the SINAMICS family of drives. As a result of its sector-specific properties such as du/dt filter, line filter and ATEX-certified PTC evaluation for motors in hazardous zones, this efficient drive is ideally suited for pump, fan and compressor applications – also in conjunction with explosion-protected motors.

The sector specialist

SINAMICS G180 is the first choice for complete system solutions, from the infeed up to the motor shaft, from engineering in the quotation phase up to commissioning on-site. All of this from a single source: Transformer, inverter and motor are specifically adapted to the application, and set themselves apart as a result of the outstanding price-performance ratio. In addition to customized drive systems, we also offer a whole raft of inverter solutions. These are based on a standard range of accessory kits, which have enabled us to establish ourselves in the widest range of sectors.

Additional accessories allow the system to be adapted to difficult line supply conditions, extremely long motor cables or various control and communication concepts, even in hazardous zones.



SINAMICS: first choice for all drive applications

SINAMICS offers the optimum drive for every application. All members of this comprehensive system family can be configured, parameterized, commissioned and operated in the same standard way.



SINAMICS – the drive family at a glance

- Can address each and every application: wide range power ratings from 0.12 kW to 120 MW
- Available in low-voltage and medium-voltage versions
- Standard and unified functionality as a result of the common hardware and software platform
- Standard engineering using only two tools for all drives: SIZER for engineering and STARTER (or IMS for G180) for parameterizing and commissioning
- High degree of flexibility and combinability

Low voltage								DC voltage	Medium voltage
Basic Performance	General Performance				For basic servo applications	High Performance		For DC voltage applications	For applications with high power ratings
V20	G120C/G120P/G120	G110D/G120D	G130/G150	G180	S110	S120	S150	DCM	GL150/GM150/SM150/SL150
0.12 – 15 kW	0.37 – 250 kW	0.75 – 7.5 kW	75 – 2,700 kW	2.2 – 6,600 kW	0.12 – 90 kW	0.12 – 4,500 kW	75 – 1,200 kW	6 kW – 3 MW	0.8 – 85 MW
Pumps, fans, compressors, conveyor belts, mixers, crushers, textile machines	Pumps, fans, compressors, conveyor systems, mixers, crushers, extruders, single-axis positioning applications (G120)	Conveyor systems, single-axis positioning applications (G120D)	Pumps, fans, conveyor belts, compressors, mixers, crushers, extruders	Industry specific e.g. pumps, fans, compressors, extruders, mixers, crushers, kneaders, centrifuges, separators	Single-axis positioning applications in machinery and plant building	Packaging, textile and printing machines, machine tools, plants, process lines and rolling mills	Test stands, cross cutters, centrifuges	Rolling mill drives, wire drawing machines, extruders, kneaders, cable railways and lifts, test stand drives	Pumps, fans, crushers, rolling mill lines, mine hoist drives, excavators, test stands, ship's drives, conveyor belts, blast furnace blowers

Common Engineering Tools

DT Configurator – selection and configuration | SIZER – for simple planning and engineering | STARTER und Startdrive – for fast commissioning, optimizing and diagnostics*

*Exception: V20 – does not require a selection and configuration tool; G180 is commissioned using the IMS software (Inverter Management Software)

The experts when it comes to explosion-protected drives

Danger of explosion, aggressive atmospheres or extreme temperatures: Drive technology in the chemical industry must fulfill the highest safety demands in order to protect man, the environment and the equipment. SINAMICS G180 represents a comprehensive drive portfolio that is designed for the widest range of applications.

Maximum safety and the highest productivity

Whether low-voltage variable-speed drive with inverter up to 690V from 2.2 kW up to 6600 kW as standard product – or customized special solution including industrial switchgear for drive applications: Your requirements define our solution.

Based on our products and systems, you create an efficient basis for your plant or system to achieve maximum safety, reliability and the highest degree of productivity. When all is said and done, our energy-efficient drive systems help to significantly reduce your operating costs.

You can completely depend on us: whenever important requirements regarding explosion protection are placed on drive systems. We look after the complete drive package. Our inverters are designed to feed explosion-protected motors with types of protection EEx n, EEx e, EEx p and EEx d, and with the PTC thermistor evaluation, are certified according to ATEX.

The thermal motor protection is realized using temperature sensors, which are directly evaluated in the inverter. As a result of the ATEX-certified PTC thermistor input at the inverter, no additional accessories are required, such as main contactor or PTC relay.

We are there to help and support you

We can answer all of your questions – for instance:

- What is the correct inverter clock cycle frequency?
- What is the maximum permissible terminal voltage in the motor terminal box?
- What voltage peaks does the motor see when long motor cables are used?
- What winding insulation must the motor have?
- Mush winding or preformed winding?
- Should the motor be protected using PTC and/or PT100?
- etc.



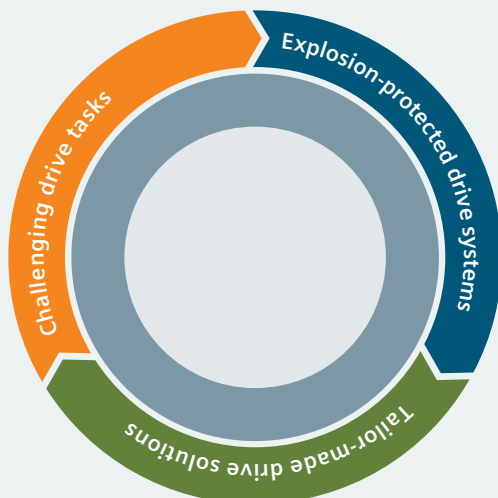
The optimum solution for you

Our strengths, your advantages

- Especially quiet and compact through the use of state-of-the-art IGBT power semiconductors and an innovative cooling concept
 - System losses are minimized through the optimized clock cycle frequency
 - Additional motor noise is significantly reduced through the "Random Pattern" function
 - Plant and system availability is increased through power components that can be quickly and simply replaced
 - User-friendly "SparesOnWeb" Internet tool that can be used to call up spare parts for any particular inverter worldwide at any time, ensuring a reliable supply of spare parts
 - Minimum cabinet dimensions through optimized use of components
 - Can be simply integrated into all automation solutions using analog and digital interfaces, which can be additionally expanded using an I/O board
 - Seamless data transfer via the established bus systems (PROFIBUS DP, CANopen or Modbus RTU bzw. Modbus TCP)
 - Short, straightforward commissioning and parameterization, menu-prompted at an operator panel with lit, graphics-capable LCD display and plain text display or PC-supported using the free-of-charge IMS commissioning tool (Inverter Management Software).
 - Quality management according to DIN EN ISO 9001
- SINAMICS G180 fulfills the highest quality demands. Comprehensive quality assurance measures in all development and production processes secures a consistently high level of quality. It goes without saying that our quality management system has been certified by an independent body according to DIN EN ISO 9001.

SINAMICS G180 applications

- Chemical Industries
- Oil and gas industries
- Power stations and utilities
- Petrochemical
- Basic materials industry
- Test stands
- Conveyor technology
- Applications in general plant and machinery construction



The standard SINAMICS G180 device series provides the perfect solution for demanding industries such as oil & gas, chemical, petrochemical, energy and test stands thanks to specially developed features

SINAMICS G180 with ATEX certificate are perfectly tailored to the requirements for operation of explosion-proof motors

The modular SINAMICS G180 device platform provides an excellent basis for tailored customer solutions, such as special environmental conditions, compact dimensions, etc.

SINAMICS G180 – overview of power ratings:



SINAMICS G180			
	Compact unit (chassis units)	Cabinet systems	Cabinet units
Power range	2,2 – 200 kW	2.2 – 200 kW	200 – 6,600 kW
Input voltage	230 – 690 V AC, 50/60 Hz	230 – 690 V AC, 50/60 Hz	400 – 690 V AC, 50/60 Hz
No. of pulses	6-pulse	6-pulse	6- / 12- / 24-pulse
Cooling type	Air cooled	Air cooled	Air and water cooled

SINAMICS G180 – voltage ranges and power ratings																																
SINAMICS G180 Chassis units	690 V	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600
	500 V	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600
	400 V	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600
SINAMICS G180 Cabinet systems/ cabinet units	690 V	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600
	500 V*	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600
	400 V*	2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600
kW →		2.2	3	4	5.5	7.5	11	15	22	30	37	45	55	75	90	110	132	160	200	250	315	400	500	550	630	710	800	900	1000	1200	...	6 600

* higher power rating on request

Compact and complete from 2.2 kW to 6,600 kW



Equipment:

- **Radio interference suppression**

The line filter according to DIN EN 61800-3 category C2 (compact units) and C3 (cabinet units) respectively, allows the use in industrial and public (only C2) line supplies. Category C1 filters are available for higher demands.

- **Harmonics fed back into the line supply**

The integrated line reactor reduces the line-side harmonics on the customer side. Line harmonic filters are optionally available to address higher requirements.

- **Long motor cables**

The du/dt output filter permits long motor cables to be used. This provides a high degree of flexibility when designing plants and equipment – especially for drives located in hazardous zones 1 and 2.

- **Filter technology**

The filters allow overvoltage limit values to be maintained for the motor insulation as well as air and creepage distances without requiring any additional measures.

- **Shutdown concept (option)**

The ATEX-certified shutdown concept allows the drive system to be shut down without requiring a main contactor. This also applies when operating motors in hazardous Zone 1. This provides extensive cost-saving potential on the plant side.

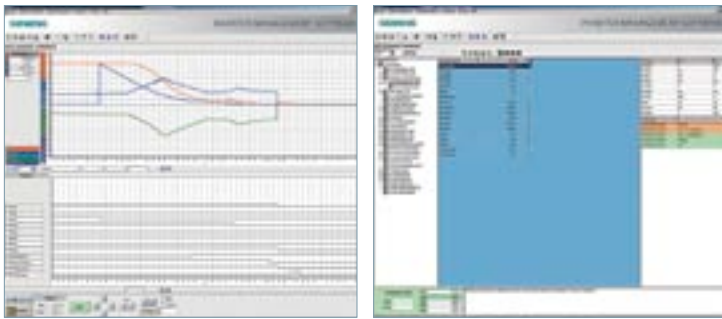
- **Dual processor technology**

The dual processor technology means that there is sufficient computational performance to optimally harmonize the pulse pattern. This reduces the motor noise and reduces inverter and motor losses.

- **Insulation monitoring**

The 500 V and 690 V units (optional, when the units are connected to an IT line supply) have insulation monitoring for non-grounded line supplies. This reliably protects the inverter, the cabling and motor if insulation faults occur. The 400 V units and the 690 V units for TN line supplies are equipped with a ground fault monitoring with the same functionality as for grounded line supplies.

Simple commissioning software for the complete series of inverters



All of the SINAMICS G180 versions are based on a standard platform concept. Common hardware and software components as well as standard tools for dimensioning, engineering and commissioning guarantee a high degree of uniformity and standardization between all of the components. SINAMICS G180 have the same properties with identical possibilities.

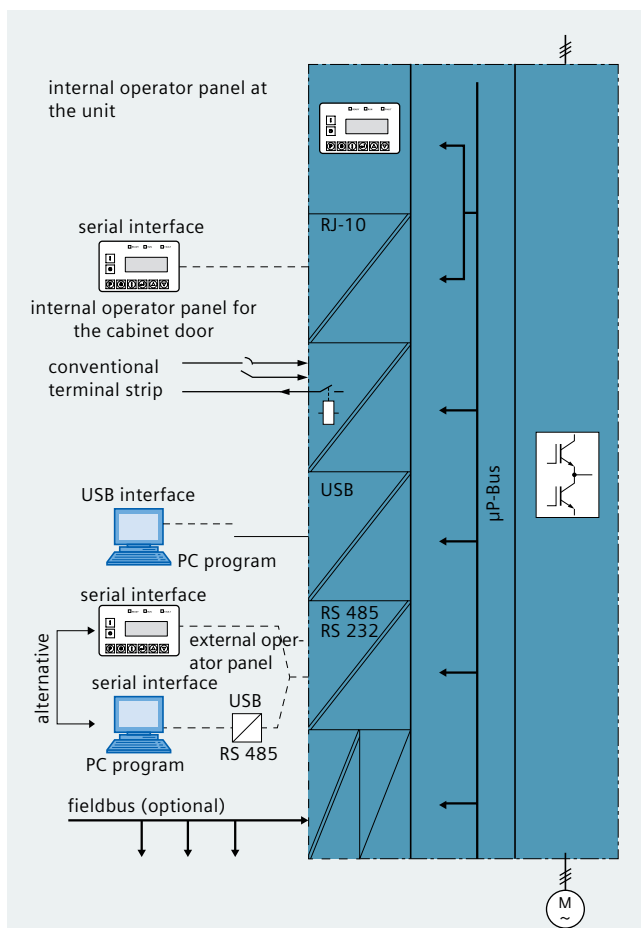
Terminal strip in compliance with NAMUR Recommendation NE37

Already in the basic versions, SINAMICS G180 units fulfill the terminal designation specifications according to NAMUR, Edition 2010, and are therefore ideally suited for use in the chemical industry.

Well thought-out communications

Communication via conventional terminal strip with freely programmable digital and analog inputs/outputs:

- Parameterizable limit value signals
- Parameterizable timers
- Parameterizable damping elements
- Parameterizable inverter behavior when inputs/outputs respond
- Parameterizable logic elements
- Communication and parameterization via PC using IMS (Inverter Management Software) via USB interface
- External operator panel via RS485 bus systems such as Ethernet (PROFIBUS board with Ethernet – PROFIBUS converter



Versions and design



SINAMICS G180 is consequentially aligned to achieve the highest degree of user-friendliness and simple commissioning – and is very attractive as a result of its features that have been thought through in detail.

Principle inverter design

- dU/dT filter at the inverter output (reduces voltage peaks at the motor)
- Line filter at the inverter input (THD I 5th < 40 %)
- Main switch (option)
- Main contactor (option)
- Customer terminal strip (e.g. Namur)
- Customized open-loop control (option)
- Bus connection (PROFIBUS, Modbus) (option)
- Standard user interface
- Generously dimensioned space in the unit to connect power cables in compliance with EMC according to NAMUR NE 37
- Protective separation (PELV) according to IEC / EN 61800-5-1
- PTC (thermistor) evaluation (option)
- ATEX-certified shutdown concept according to Directive 94 / 9 EC for safe motor operation in hazardous Zones 1 and 2 (option)
- Functional safety (option) according to:
 - SIL 2 according to EN 61508
 - Category 3 according to DIN ISO 13849-1
 - Performance Level (PL) d according to EN ISO 13849-1

SINAMICS G180 cabinet systems

SINAMICS G180 cabinet systems comprise SINAMICS G180 compact units, which are accommodated in Rittal TS8 cabinets together with customer-specific control accessories, to create customized cabinet systems. The standard cabinet width is 600 mm. Many special dimensions are optionally available.



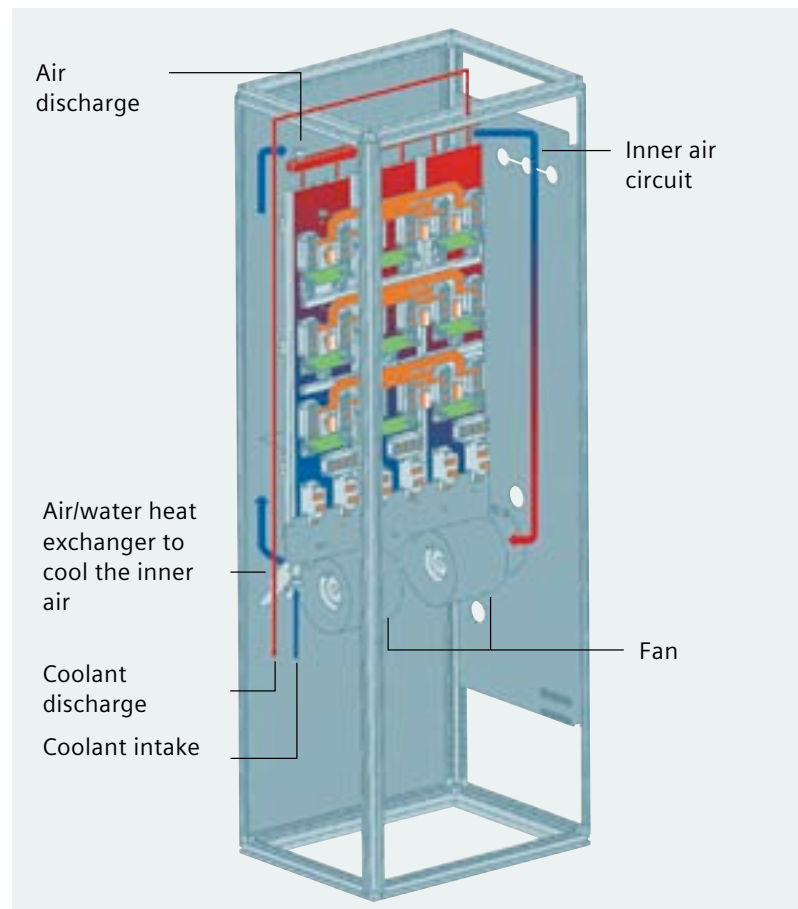
Optimally installed – also with liquid cooling

When compared to air cooling, water cooling offers numerous advantages. This is reflected in the trend to water-cooled motors and inverters. In the past, water cooling was restricted, with only some exceptions, to motors. In the meantime, it is being increasingly used for inverters. Decisive factors: The possibility of realizing increasingly larger power ratings, space-saving and the fact that it is simpler to dissipate the heat from the electrical room.

Coolant flows directly through the power unit heat sinks. The complete assembly comprises one or several aluminum cooling plates, in which stainless steel pipes are embedded. The power range extends from 200 kW up to 6,600 kW.

- Heat can be easily dissipated from the electrical room
- High cabinet degrees of protection can be implemented
- Therefore allowing installation in polluted environments
- Lower noise level
- The efficiency can be increased through heat recovery

The solenoid valve integrated in the inverter (-Y1) controls the coolant dependent on the temperature of the ambient air, therefore effectively protecting the inverter against condensation.





Made for oil & gas and the chemical industry: sector-specific optional accessories



We can offer a multitude of options for the SINAMICS G180 – in the following categories:

- Auxiliary power supply
- External control voltage power supply
- Radio interference suppression filters
- Line harmonics filter
- Output filter
- Package of standard accessories
- PT100 evaluation unit
- Degrees of protection
- Cabinet options
- Control and display instrument
- Cable conductor and equipment markings
- Wiring options
- I/O boards
- Supplementary boards to connect to field buses
- Plant marking
- Inverter acceptance tests
- Additional documents
- Inverter display language
- Inverter documentation

Engineering

To supplement the standard options, with SINAMICS G180 you also have the possibility of “Engineering To Order” (ETO). ETO is intended to address individual customer requirements. It cannot be selected using electronic ordering tools – which means that it can only be ordered through your Siemens contact person:

X30 mechanics

e.g. cabinet dimensions with a special height =1800 mm

X40 parameterization

e.g. the parameterization of additional monitoring functions: overspeed, underspeed

X50 electrical (power, control)

e.g. special monitoring units, extended overvoltage range

X60 test stand inverter

e.g. engineered engine test stand

X70 special tests

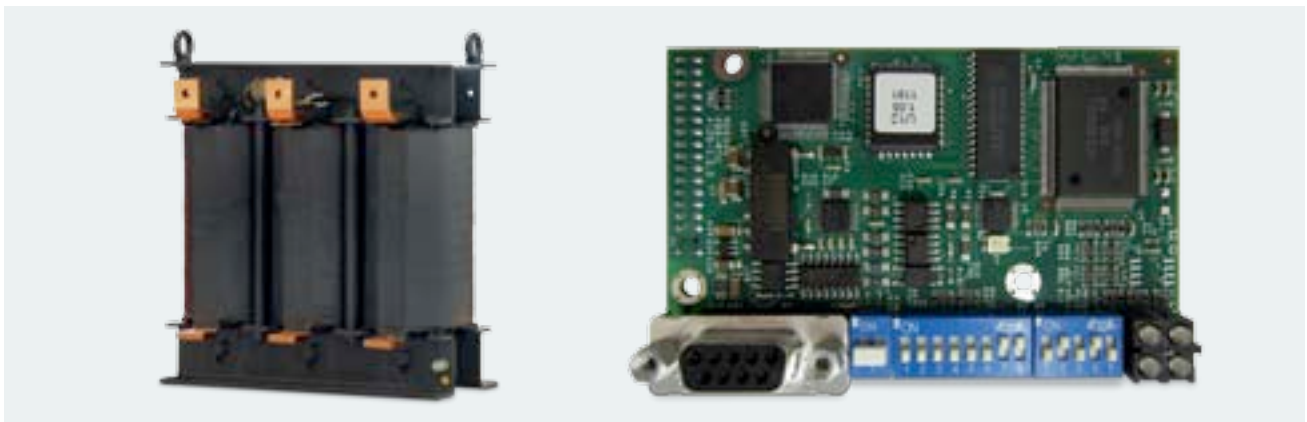
e.g. special tests, for example, vibration

X80 special documentation

e.g. documentation in a special CAD system

X90 special version

If the scope cannot be clearly allocated to one of the previously implemented options



General technical data

Electrical data			
	Line supply voltages	Line supply type	Power range
	230 – 400 V 3 AC – 500 V, –15 / +10 %	TN/TT systems	2.2 – 160 kW (at 400 V)
	230 – 400 V 3 AC – 415 V, –15 / +10 %	TN/TT systems	200 – 630 kW (at 400 V)
	230 – 500 V 3 AC, –15 / +10 %	IT line supply	2.2 – 200 kW (at 500 V)
	230 – 500 V 3 AC, –15 / +10 %	TN/TT/IT systems	250 – 800 kW (at 500 V)
	3 AC 230 – 690 V 3 AC, –15 / +10 %	TN/TT/IT systems	7.5 – 200 kW (at 690 V)
	400 – 690 V 3 AC, –15 / +10 %	TN/TT/IT systems	250 – 6,000 kW (at 690 V)
Line frequency	47 – 63 Hz		
Line frequency	Netz cos phi cLine cos phi approx. 0.99		
Output frequency	0 – 120 – 250 Hz		
Voltage rise at the motor	1,500 V / μ s		
No. of pulses	6 / 12 / 18 / 24		
Overvoltage category	III acc. to EN 61800-5-1		
Closed-loop control modes	For motors: field-oriented control FOC with encoder and vector control (SVC) with/ without encoder (speed, process-n, torque, hoisting gear1), line synchronization1		
	Closed-loop current or voltage control independent of the motor (current, processl, voltage, processU,)		
Fixed speeds	4 fixed speeds + 1 minimum speed, can be parameterized		
Skippable speed ranges	2, parameterizable		
Braking operation	Braking torque using oversaturation control without supplementary equipment for lower or average speed up to 50 %, at high speeds up to 10 % without supplementary braking module, with associated braking resistor		
Motor cable lengths (shielded or unshielded)	With standard filter 100...350m, with optional filters, also longer motor cables		

Mechanical data	
Degree of protection	Compact units: IP20 Cabinet units / systems: IP21 (higher degrees of protection, optional) / with water cooling IP54
Cooling type	Forced cooling AF according to EN 60146
Paint finish	RAL 7035; Rittal TS8 cabinet frame: Nano ceramic and eloxal layer, approx. 10 – 0 μ m

Only for water cooling	
Water quality	Industrial water
Permissible coolant temperature	+10 °C – 28 / 35 °C (dependent on the power)
Coolant	water or a mixture (H2O + Antifrogen N with 45 % Antifrogen N)



Further information:
www.siemens.com/sinamics
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