



SIEMENS

SIMOTICS FD – looks different, offers more

The new definition of the asynchronous motor

[siemens.com/simotics-fd](https://www.siemens.com/simotics-fd)

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Power, flexibility and efficiency redefined

A motor is not always a motor. The requirements placed on the performance of plants and machines is continually rising and motors must keep pace with this development. They must be energy-efficient, versatile, quiet and optimally adapted to converter operation. The SIMOTICS FD motor series was developed to precisely address these issues.

In the power range from 200 kW up to 1,800 kW, SIMOTICS FD low-voltage motors set new standards when it comes to cost effectiveness and performance. A unique design is the basis for a whole raft of compelling advantages: A well-conceived cooling concept cools the motors directly at the source of the heat – the active part – with reduced thermal transfer resistance and protection against dust and dirt. As a result of the internal cooling ribs, the motor has a smooth outer surface and is easy to clean. A flexible, modular system with a wide range of options allows SIMOTICS FD motors to be optimally configured to address a wide range of requirements and application conditions. Various cooling types are available as well as explosion-protected designs Ex *nA* and Ex *tc* (Zones 2 and 22). The terminal box is diagonally split to facilitate better accessibility and the position can be changed as required.

SIMOTICS FD motors are perfectly coordinated and harmonized for operation with SINAMICS converters. As a consequence, especially cost-effective and high-performance overall drive systems are created. This is because expensive overdimensioning of converters is consequentially avoided – and the voltage is optimally utilized with low associated noise emission. The assignment of motor and preferred SINAMICS converter makes it easy and transparent when selecting the ideal motor-converter combination.

As part of the comprehensive range of SIMOTICS motors, SIMOTICS FD motors stand for innovative, efficient and well-proven motor technology. SIMOTICS FD motors are the perfect choice to address the high demands, which are placed on flexible drives today.

SIMOTICS FD Flexible Duty motors – your advantages

- Increased degree of flexibility as a result of the modular principle
- Increased system approach as they are optimized to operate with SINAMICS
- Increased efficiency through variable-speed operation
- Increased reliability through global service concepts
- Increased number of applications can be addressed as a result of the wide range of different formats





The modular system allows SIMOTICS FD motors to be optimally adapted to address different requirements and application conditions.

For an even higher degree of efficiency: integrated drive systems

Efficiency, productivity and availability in industrial processes can be boosted by using integrated drive systems with harmonized and coordinated components. The Integrated Drive System comprising SINAMICS converter and SIMOTICS FD motor play a decisive role here.



Integrated Drive Systems is Siemens' leading-edge response to the high degree of complexity that today characterizes drive and automation technology. With Siemens, the core elements that make up this real complete drive solution are consequentially from a single source – and are optimally coordinated with one another. This is what makes it so unique worldwide. Horizontal, vertical and life-cycle integration guarantee that every drive component can be seamlessly integrated into every drive system, every automation landscape and even in the complete lifecycle of a plant or system.

The result: an optimum workflow from engineering through to service – and a noticeably shorter time to market and time to profit.

SIMOTICS FD motors are designed as core elements of integrated drive systems, and have therefore been specifically optimized for operation with SINAMICS S and G converters. The rated motor currents are adapted to the converter output currents, the motors to the rated converter pulse frequencies.

The result of this seamless integration:

- An especially cost-effective overall system comprising SIMOTICS FD motor and SINAMICS converter
- Optimized from an investment perspective as expensive converter overdimensioning is avoided
- Low losses through operation at the optimum operating point
- Quiet operation
- Faster engineering as the system can be simply selected

The new European eco design standard EN 50598

- The new standard defines eco design requirements for drive systems used for an electrically driven machine. Therefore, the energy efficiency requirements have been expanded from just the individual drive components to include the system as well as the electrically driven machine – for example, pump systems.
- By combining SIMOTICS FD and SINAMICS G120P, Siemens is offering a high-performance drive system with high energy efficiency optimized for the pump and fan market. It fulfills the requirements of system efficiency class IES2 with more than 35 % lower losses than the reference system of the standard.

A perfect team – motors ...



Self-ventilated SIMOTICS FD, ideal for driving pumps, fans and compressors with square-law characteristic



Forced-ventilated SIMOTICS FD, quiet or with increased power for constant load torque applications, for instance conveyor belts



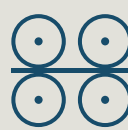
Water/wastewater



Energy



Steel



Paper



Mining

SIMOTICS FD air-cooled, enclosed

Self-ventilated SIMOTICS FD: high efficiency, low energy consumption, low lifecycle costs

Reliable, self-ventilated SIMOTICS FD motors with a long service life are attractive as a result of some very concrete advantages – for example, their rugged enclosure and cast-iron bearing shields. Various efficiency levels are available to optimize the energy consumption.

Forced-ventilated SIMOTICS FD: quiet or with increased power

Forced-ventilated SIMOTICS FD motors are the perfect choice for applications with a constant load torque. Various forced ventilation units allow either quiet operation or operation with increased power.

The forced ventilation unit can be axially mounted in different versions – or also radially mounted. This noticeably increases the degree of flexibility when planning plants and systems.



SIMOTICS FD with water jacket cooling



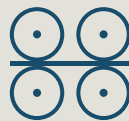
SIMOTICS FD with air-water heat exchanger



Marine



Plastic



Paper



Steel



Oil & gas

Water-cooled SIMOTICS FD

Water-cooled SIMOTICS FD motors are extremely versatile. The motors can be optimally adapted to the particular application as a result of the extensive range of power ratings – and the flexibility when designing around the existing water quality.

SIMOTICS FD with water jacket cooling: especially adaptable

The water jacket cooling using copper, or optionally stainless steel, means that SIMOTICS FD motors can be optimally adapted to the actual application conditions and the prevailing water quality. Heat can be retrieved and used as process heat.

The cooling water connection is axial at the NDE. Optionally the cooling water connection can be brought out at the top or at the side.

SIMOTICS FD with air-water heat exchanger: for challenging cooling water qualities

The top-mounted air-water heat exchanger ensures the necessary degree of ruggedness if the cooling water has a high mineral content.



SIMOTICS FD, open version with self-ventilation: optimum for pumps, fans and compressors with square-law characteristic



SIMOTICS FD, open version with forced ventilation: quiet or with increased power for constant load torque applications, for instance cranes



Compressors

+



Cranes

+



Energy

SIMOTICS FD air-cooled, open

SIMOTICS FD with open-circuit ventilation: power packs that can be flexibly utilized

SIMOTICS FD motors with open-circuit ventilation set themselves apart as a result of their high power density with low envelope dimensions and weight. These motors are especially suitable for driving pumps, fans and compressors with square-law load characteristic in applications where an IP23 degree of protection is sufficient. Whether for planning plants and systems – as well as for retrofit projects: The extensive motor range offers the optimum cost-effective solution for each and every application.

SIMOTICS FD with forced ventilation: versatile and adaptable

Open SIMOTICS FD motor versions are also available with various forced ventilation units. They are either quiet, or can be operated with increased power rating. Just the same as for the enclosed versions, the forced ventilation unit can be mounted axially or, in some versions, radially.

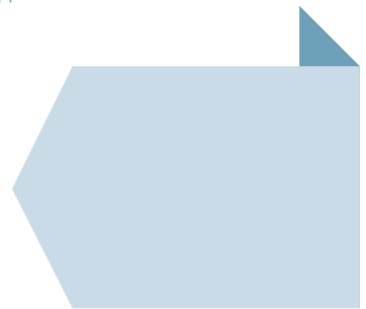
... and converters



The functionality of SINAMICS G converters from 0.12 kW up to 2,700 kW means that they are perfectly tailored to address single-motor drives with basic and medium requirements regarding the dynamic performance



SINAMICS S converters from 0.12 kW to 4,500 kW are predestined for complex applications in plants, systems and machines – as well as for a wide range of motion control applications



SINAMICS frequency converter

Converters can address an almost unlimited range of applications: It is great that there is a drive family with which each and every requirement can be perfectly satisfied: SINAMICS.

Integrated drive systems with SIMOTICS FD motors and SINAMICS converters are especially powerful and cost-effective.

SINAMICS G converters:

The ideal solution for standard applications with induction motors

SINAMICS G converters with a standard and straightforward operating concept in the power range from 0.12 kW to 2,700 kW are especially convincing. This functionality minimizes service and training costs. And last but not least, SINAMICS G set themselves apart as a result of their optimum price-performance ratio.

Our recommendation:

SINAMICS G120P – the specialist for pumps, fans and compressors. SINAMICS G130 and SINAMICS G150, the universal drive solution for high-rating, single-motor drives.

SINAMICS S converters:

For demanding drive applications with induction and synchronous motors

SINAMICS S converters for complex applications in plant and machinery construction as well as for motion control tasks, in the power range from 0.12 kW up to 4,500 kW are available in the widest range of formats and sizes.

Our recommendation:

SINAMICS S120 and SINAMICS S120 Cabinet Modules – the flexible modular drive system for demanding drive applications - also with liquid cooled versions.

SINAMICS S150, the drive solution for demanding single-motor drives with a high power rating

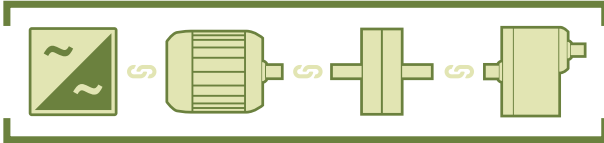
Additional details are available on the Internet at:

siemens.com/sinamics

Horizontal integration

Integrated drive portfolio:

All converters, motors, couplings and gearboxes are from a single source. Perfectly integrated, perfect interoperation. For all power classes. As standard or completely customized solution.



Increase energy efficiency and reduce losses by up to

10%

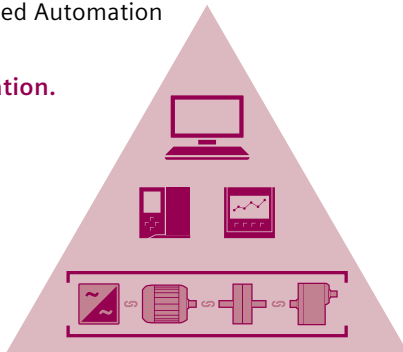
IES 2

IES 1

Vertical integration

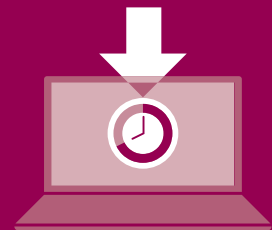
Integrated in the automation technology: from the field level to the controller level to the MES, thanks to Totally Integrated Automation (TIA).

For every application.



Using the TIA Portal, reduce engineering times by up to

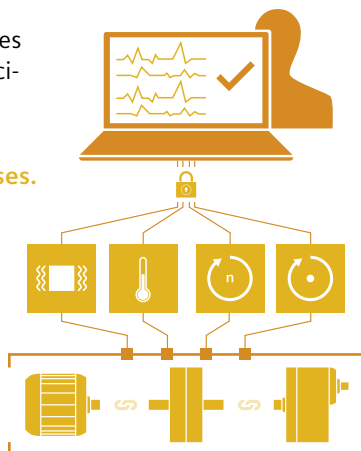
30%



Lifecycle integration

Software and services help to leverage decisive optimization potential.

In all lifecycle phases.



Reduce non-scheduled downtimes by up to

15%



Technical data

SIMOTICS

	 <p>SIMOTICS FD – air-cooled, enclosed version</p>	 <p>SIMOTICS FD – water-cooled version</p>
Power range	200 to 1,200 kW	Water jacket cooling: 200 to 1,300 kW Air-water heat exchanger: 200 to 1,500 kW
Shaft height/ type of construction	315, 355, 400, 450	315, 355, 400, 450
Version	Motor optimized for operation with SINAMICS drives	Water jacket cooling: Motor optimized for operation with SINAMICS converters – or motor for line operation Air-water heat exchanger: Motor optimized for operation with SINAMICS converters
Line voltage	50 Hz line supplies: 400/500/690 V 60 Hz line supplies: 460/575 V (additional voltages on request)	50 Hz line supplies: 400/500/690 V 60 Hz line supplies: 460/575 V (additional voltages on request)
Degree of protection	Standard: IP55, optional: IP56 non-heavy sea, IP65	Standard: IP55, optional: IP56 non-heavy sea, IP65
Sound pressure level	Low-noise, standard version: 79 dB(A) Increased power version: 85 dB(A)	Water jacket cooling: 78 dB(A) Air-water heat exchanger: 79 dB(A)
Cooling method	Self-ventilated (IC411); forced-ventilated (IC416)	Water jacket cooling (IC71W); Air-water heat exchanger (IC86W)
Temperature classes	180 (H) - 155 (F); optional: 180 (H) - 130 (B)	Water jacket cooling: Converter operation 180 (H) – 155 (F) Optional: 180 (H) – 130 (B) Line operation 180 (H) – 130 (B) Optional: 180 (H) – 155 (F) Air-water heat exchanger: 180 (H) – 155 (F) Optional: 180 (H) – 130 (B)
Efficiency classes	System efficiency class IES2 when SIMOTICS FD are operated with SINAMICS G120P/G130/G150	Line operation: IE2 and IE3 up to 375 kW Converter operation: system efficiency class IES2 when SIMOTICS FD are operated with SINAMICS G120P/G130/G150
Primary load characteristic	Self-ventilated motors $M \sim n^2$; forced-ventilated motors $M = \text{constant}$	$M \sim n^2$; $M = \text{const}$,

SINAMICS



SIMOTICS FD – air-cooled, open version

200 to 1,800 kW

315, 355, 400, 450

Motor optimized for operation with SINAMICS drives

50 Hz line supplies: 400/500/690 V
60 Hz line supplies: 460/575 V
(additional voltages on request)

IP23

Low noise standard version: 79 dB(A)
increased power version: 85 dB(A)

Self-ventilated, open-circuit-cooled (IC01);
forced-ventilated, open-circuit-cooled (IC06)

180 (H) – 155 (F);
optional: 180 (H) – 130 (B)

System efficiency class IES2 when
SIMOTICS FD are operated with SINAMICS G120P/G130/
G150

Self-ventilated motors $M \sim n^2$;
forced-ventilated motors $M = \text{constant}$



SINAMICS G120P/G130/G150

SINAMICS G120P: 110 up to 400 kW
SINAMICS G130: 75 up to 800 kW
SINAMICS G150: 75 up to 2,700 kW

SINAMICS G120P: Chassis/Cabinet
SINAMICS G130: Chassis
SINAMICS G150: Cabinet

SINAMICS G120P Cabinet: Type A or C
SINAMICS G150 Cabinet: Type A or C

G120P: 380 to 480 V
G130: 380 up to 690 V

Cabinet: IP20 to IP54
Chassis: IP20

Dependent on the power

Air cooled

CDM efficiency class IE2



SINAMICS S120/S150

S150 (Cabinet): 75 up to 1,200 kW
S120 (Chassis/Cabinet Modules):
1.6 up to 4,500 kW

SINAMICS S120: Chassis/Cabinet Modules
SINAMICS S150: Cabinet

380 up to 690 V

Cabinet: IP20 to IP54
Chassis: IP20

Dependent on the power

S150 (Cabinet) air-cooled;
S120 (Chassis/Cabinet Modules)
air/liquid-cooled

Find out more:

siemens.com/ids

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sector.

The
advantages of
Integrated
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at a glance



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