

# What's New in Motion Control

Fabrizio Galbiati and Rudy Hauser | Oct. 24, 2019

# Sinamics Portfolio Drive Systems



Extra low voltage DC	Low voltage AC			DC voltage	Medium voltage AC
General Performance	Basic Performance	General Performance	High Performance	For basic and demanding applications	For demanding applications with high power ratings
<p>24 V DC / 48 V DC</p> <p><b>SIMATIC MICRO-DRIVE</b></p> <p>PDCxxx(F)</p>	<ul style="list-style-type: none"> <li>• SINAMICS V20</li> <li>• SINAMICS V90</li> </ul>	<ul style="list-style-type: none"> <li>• SINAMICS G120C</li> <li>• SINAMICS G120P</li> <li>• SINAMICS G120</li> <li>• SINAMICS G110D/G120D / G110M</li> <li>• SINAMICS G130 / G150</li> <li>• SINAMICS G180</li> <li>• SINAMICS S110</li> <li>• SINAMICS S210</li> </ul>	<ul style="list-style-type: none"> <li>• SINAMICS S120</li> <li>• SINAMICS S150</li> </ul>	<ul style="list-style-type: none"> <li>• SINAMICS DCM</li> </ul>	<ul style="list-style-type: none"> <li>• SINAMICS GL150 / SL150</li> <li>• SINAMICS SM120 CM / SM 150 / GM 150</li> <li>• SINAMICS GH150 / GH180</li> </ul>
50 – 1000 W	0.05 – 30 kW	0.12 – 6,600 kW	0.12 – 5,700 kW	6 kW – 3 MW	6 kW – 14.2 MW

## Some Facts about Sinamics

- Drive Factories in Germany, England, China and the USA
- Not Brand Named! – Made by Siemens & Innovations by Siemens
- Complete FAMILY offering
- Common programming architecture
- Common Programming & Commissioning Tools
- Ready for a Totally Integrated Automation Solution
- High reliability, flexibility, compact and accessible
- Common Selection & Engineering Tools

**SIEMENS**  
*Ingenuity for life*



UnRestricted © Siemens 2019  
Page 3

# Sinamics Drives and Simotics Motors

**SIEMENS**  
*Ingenuity for life*



S120



G120X



Simotics SRM



S210



MicoDrive



S120M



SAM



IOP-2



Products that we will talk about today.

## SINAMICS G120

The general performance drive for many applications

**SIEMENS**  
*Ingenuity for life*

### G120X



**1 – 700HP** (0,75 – 630 kW)  
**The pumps, fans and compressors drive from Siemens**

### G120



**$\frac{3}{4}$  - 400HP** (0,55 - 250 kW)  
**The modular system**

### SINAMICS G – inverter family

Whether it's a matter of efficient pumping, ventilating and compressing, or precise movement, processing, or machining, the number of application areas for frequency inverters is almost endless. One family of drives for all of these areas that perfectly fulfills every requirement: SINAMICS. Our portfolio represents uniform engineering, extremely high efficiency and convenient operation.



**SIEMENS**  
*Ingenuity for life*

# SINAMICS G120X

Unrestricted © Siemens AG 2019

[www.siemens.com/sinamics-g120x](http://www.siemens.com/sinamics-g120x)

# SINAMICS G120X: The seamless Pump, Fan and Compressor drive for the Infrastructure market

**SIEMENS**  
*Ingenuity for life*



**FSC, IP20**  
**UL open type**



The new **SINAMICS G120X System** is developed with enhanced features for the **water industry** and **Air Handling** applications.



The **G120X** offers wide power range from **1 to 700HP** (**0.75 to 630 kW**).



The optimum solution due to its **out-of-the-box** concept for **fast setup time** and **extremely simple operation**

## SINAMICS G120X X marks the spot!

A simple, seamless and easy-to-use drive right out-of-the box for pumps, fans & compressors

**SIEMENS**  
*Ingenuity for Life*

### Simple selection and ordering

- one order number only
- use it now - “out of the box”
- communication integrated



### Simple and intuitive setup

- improved usability with new IOP-2 & SAM setup and built-in P&F functions
- no PC or software required & no training required!



### Cost & Energy Efficient

- integral DC choke (FSA-FSG)
- compact design saves cabinet space
- long motor cables & works with any standard motor incl. PMSM & SRM



### Robust & Reliable

- new UL61800-5-1 design (100kA)
- certified SIL3 Safe Torque Off (STO)
- class 3C2 & 3C3 coating for corrosive environment



**NEW design for  
Water and Air**

**G120X 460V and 575V and very shortly 230V!**



## Compliant 3C2 / 3C3<sup>3</sup> coating on circuit boards

(Look where these gases appear)

Environment parameters IEC 60721-3-3	Units	Class			
		3C2		3C3	
		Mean	Max	Mean	Max
Sea salt	mg/m <sup>3</sup>	Salt mist			
Sulphur dioxide (preservative)	mg/m <sup>3</sup>	0.3	1	5	10
Hydrogen sulfide (seen at W/WW sites)	mg/m <sup>3</sup>	0.1	0.5	3	10
Chlorine (disinfection)	mg/m <sup>3</sup>	0.1	0.3	0.3	1
Hydrogen chloride (cleans metals)	mg/m <sup>3</sup>	0.1	0.5	1	5
Hydrogen fluoride (cracking O&G)	mg/m <sup>3</sup>	0.01	0.03	0.1	2
Ammonia (mining extraction agent)	mg/m <sup>3</sup>	1	3	10	35
Ozone (destroys bacteria/virus)	mg/m <sup>3</sup>	0.05	0.1	0.1	0.3
Nitrogen Oxides ( mfg stainless steel)	mg/m <sup>3</sup>	0.5	1	3	9

- **FSA ... FSG:**  
Protected according to **3C3** to EN 60721-3-3
- **FSH/FSJ:**  
Protected according to **3C2** according to EN 60721-3-3

<sup>1</sup> The values refer to a temperature of 20° C and a pressure of 101.3 kPa

<sup>2</sup> Mean values are expected long-term values. Maximum values are limit or peak values, occurring over a period of time no longer than 30min/day

<sup>3</sup> In preparation

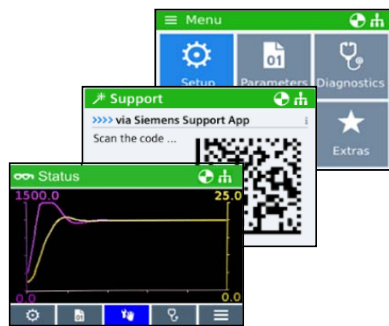
# Operator Panels IOP-2 and BOP-2



## Intelligent operator panel (IOP-2)

### Intelligent commissioning & configuration tool

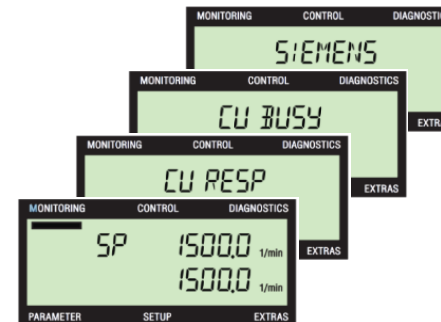
- **Easy commissioning** of standard applications via various assistants
- **Knowledge of parameter structure not necessary**
- **Serial commissioning** through clone function
- **Diagnosis** due to clear text display, usable on-site
- **Integrated support function** to troubleshoot errors
- Simplified Update of languages, assistants and FW via USB



## Basic operator panel (BOP-2)

### Enhances the interface & communication capabilities

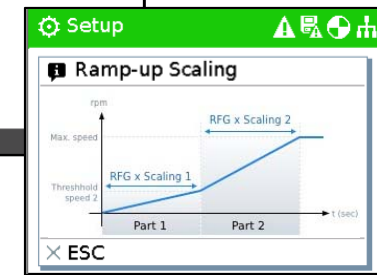
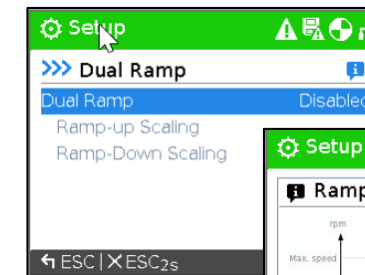
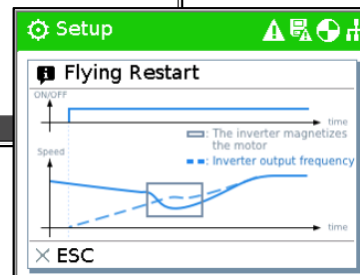
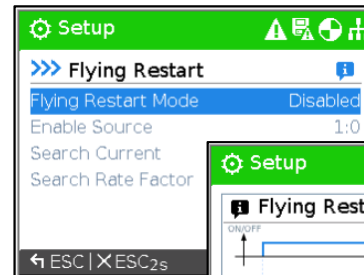
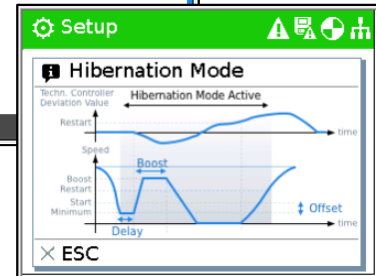
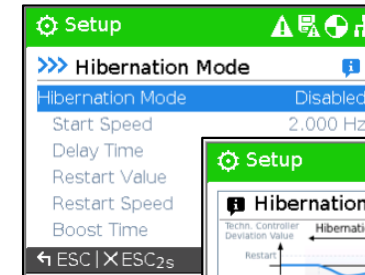
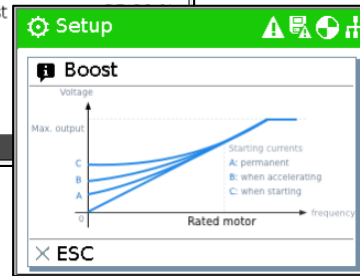
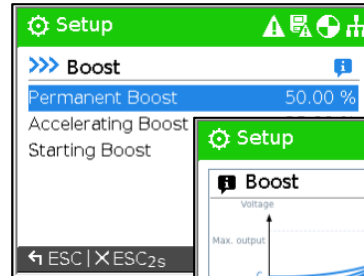
- **Commissioning wizard**
- 2-line display with text display
- **Diagnostics** for parameter display without auxiliary function
- **Serial commissioning** through clone function
- Key operation with menu structure
- Door mounting available



# IOP-2

## Available functionalities

- Automatic Restart
- Boost
- Bypass mode
- Cavitation protection
- Condensation protection
- Pump clean Deragging
- Dual ramp
- First pipe filling
- Flying restart
- Frost protection
- Hibernation mode
- Skip frequencies
- PID Controller
- Adapting Kp and Tn
- Programmable timers
- Cascade control
- Load monitoring
- Efficiency optimization



New FW can be downloaded here: <https://support.industry.siemens.com/cs/ww/en/view/109762019>

# Smart Access Module Webserver via Wi-Fi



## Smart Access Module (SAM)

### Faster setup with improved wizards

- A **faster setup mode** is presented for the G120X to fulfill the **branch applications** (Pump, Fan, Heavy-duty)
- In parallel, the classic quick setup is kept for the rest of the G120 family

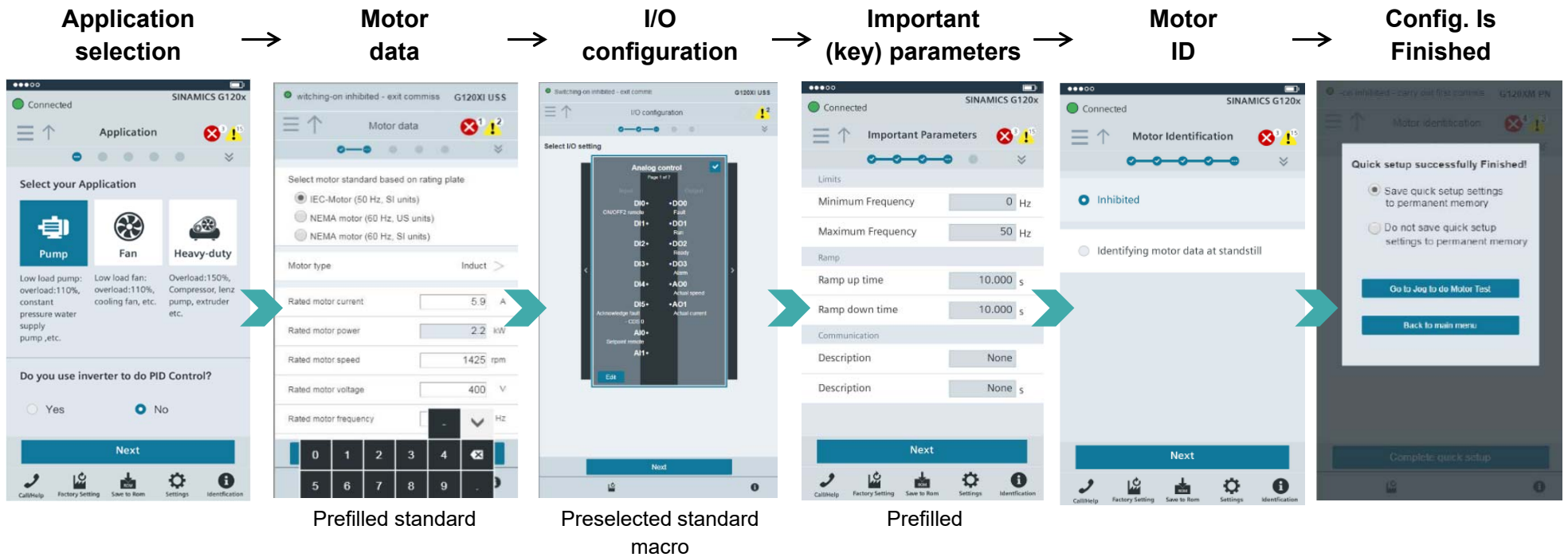


Up to 50m away!  
164 feet!

### Mobile Device View (Additional WLAN Access Point required)



# Smart Access Module Presents a new quick setup mode

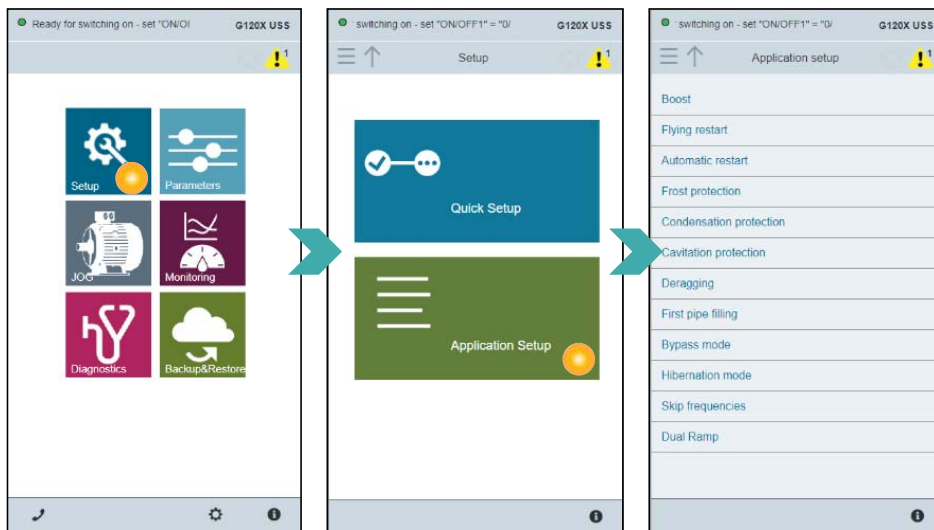


The new G120X SAM' setup mode enables a faster P&F setup solution

# SAM includes the application setups for G120X



## New application setup menu



## New user interface improvements



- Additional I/O terminals are included in the I/O configuration and diagnostic
- New guidance information is provided in JOG mode
- Improved 87 Hz selection is available on motor data page
- Hints for motor connection are provided for Star and Delta

## The new SAM FW supports the G120X specialized P&F application setup

New FW can be downloaded here: <https://support.industry.siemens.com/cs/ww/en/view/109769429>

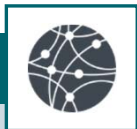
# SINAMICS G120X

## Top highlights – Infrastructure Fans & Air Handling market



### Ease of use

- Out-of-the-Box: **ready to switch on**
- One part number ordering (**1 PN # w IOP as std.**)
- Powerful diagnostics
- One supplier – **bundling of the system components**
- **Easy and simple commissioning via IOP/SAM**



### Connectivity and integration

- **Analog process control signals & stop/start control w HOA**
- **Modbus RTU<sup>1</sup>, BACnet MS/TP<sup>1</sup>, USS<sup>1</sup> as a standard**
- Specific drive based functionality like **“Emergency Fire Mode”**
- **Real time clock** for control and diagnostics with time stamped faults and alarms



### Reliable, flexible & efficient

- Integrated drive protection (**belt break protection, condensation protection, frost protection**)
- **Limited harmonics level with built in DC Choke** – Grid Friendly
- Flexible & efficient operation w. **Synchro Reluctance Motors**– energy efficiency



### Tailored for HVAC applications

- **110% OL with 135% for 3 seconds**
- **EMC conformity C1 + C2 for public communities**
- **Emergency STOP** via **STO SIL3 HW** as a standard
- Advanced Functionalities: **Hibernation, energy calculator standard**

# SINAMICS G120X

## Top highlights – Water market

**SIEMENS**  
*Ingenuity for life*



### Ease of use / maintain

- One part number ordering (1 PN # w IOP as std.)
- **User friendly interfaces**
- One supplier - one system responsibility (motors + controls + Autom.)
- **SMART ACCESS MODULE** with 50m distance range for easy set-up
- Intelligent Operator Panel (IOP) **Bright Hi resolution HMI.**

### Connectivity and integration



- **PROFINET/EIP, PROFIBUS<sup>1</sup> and Modbus<sup>1</sup>** as a standard
- Scalable **4-20mA and 0-10VDC Process Control Signals**
- Supports Siemens **PCS7 and S7 systems**
- **TIA Portal network mapping via GSD**



### Reliable, flexible & efficient

- Integrated drive protections (**dry running protection, cavitation, frost protection**)
- **Limited harmonics level with built in DC Choke** – Grid Friendly
- Operation in **harsh environments** - standard **3C2** and optional **3C3** coating<sup>2</sup>
- Extended operating temperature ratings **45 to 60C with derating**



### Tailored for the water industry



- Advanced functionalities (**pipe filling mode, multi-motor control, de-ragging function**)
- **Emergency STOP** via **STO SIL3 HW** as a standard
- Segment specific overload characteristic + **power boost**
- **300/450m long cable distances w/o load reactors**



**SIEMENS**  
*Ingenuity for life*

**SINAMICS G120**  
The modular inverter.  
Energy-efficient, safe and rugged

Unrestricted © Siemens 2019

[Siemens.com/sinamicsg120](https://www.siemens.com/sinamicsg120)

# SINAMICS G120

## Flexibility and cost saving as a result of the modularity



Function
Power Unit and Control Unit can be combined depending on the application
System can be changed over and expanded simply
Service friendly SINAMICS System
Economic benefits

Benefits
▶ <b>Optimized asset management</b> means that only the required functions are actually paid for.
▶ <b>Power Modules and Control Units can be upgraded independently of one another.</b> This results in a high degree of flexibility at any time.
▶ <b>If a part has to be replaced, only the defective module has to be replaced and not the complete system.</b> Further, the Control Unit can be replaced under voltage without requiring reconfiguration, which in turn reduces plant downtimes.
▶ <b>Lower costs for the initial purchase,</b> for maintaining stocks and when a part has to be replaced.

# SINAMICS PM240-2 Push Through

## Innovative cooling concept for 230V and 460V applications

**SIEMENS**  
*Ingenuity for life*



### Feature / Function

**Innovative cooling concept** (push-through technology). The cooling fins of the Power Module are pushed through the rear panel of the control cabinet.

SINAMICS PM240-2 Push Through are **part of the modular system** SINAMICS G120 and SINAMICS S120. Free combination of the Power Module and the needed Control Unit.

Innovative and **robust design**. Coated circuit boards.

The power modules are available with a **DC-choke as standard** and can be ordered with an integrated line filter class A for installations according to Category C2 and in accordance with EN 618003.

Part of **Totally Integrated Automation** and Integrated Drive Systems.

### Benefit

Mounting in compact cabinets with especially high requirements in terms of control cabinet cooling.

Lower costs for the initial purchase, for maintaining stocks and when a part has to be replaced. Power Modules and Control Units can be upgraded independently of one another. This results in a high degree of flexibility at any time.

Use with ambient temperatures between -10° and 60° C (over 40° C with current reduction). Long cable length up to 300/450m\* (screened/unscreened) can be reached without output options.

Space saving mounting in the cabinet due to integrated options.

Intuitive, graphical Engineering. Simplified, central commissioning / maintenance. Preconfigured macros.

\* For frame size FSF. FSD-FSE=300/400m (screened/unscreened)  
UnRestricted © Siemens 2019  
Page 19

# SINAMICS G120

## Easier machine implementation due to standard-conforming functions

**SIEMENS**  
*Ingenuity for life*



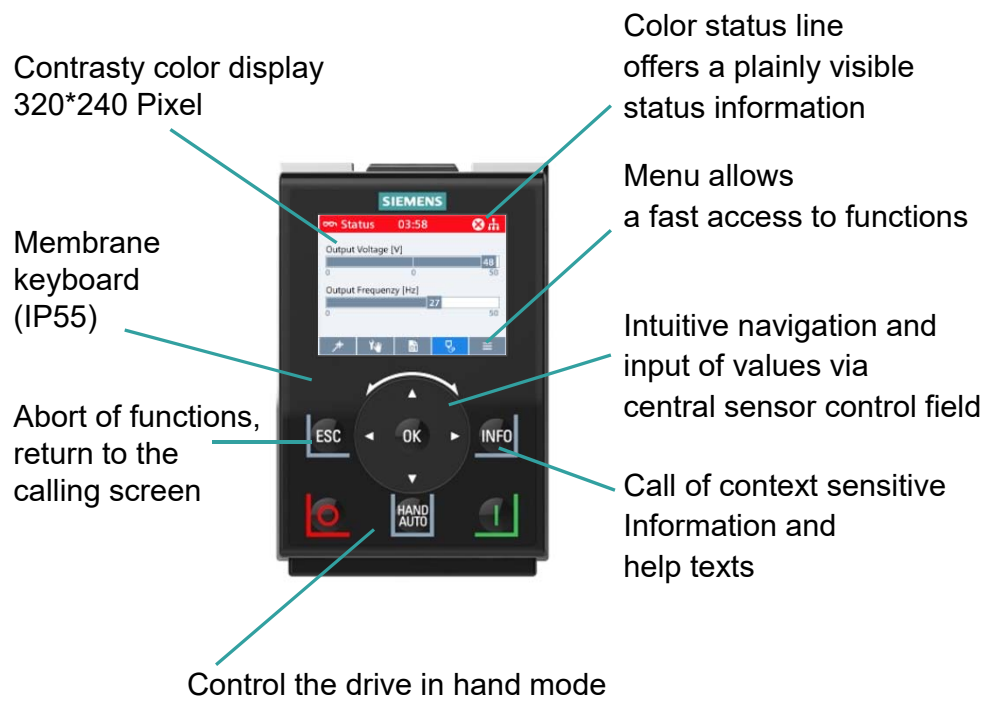
### Function

Safe Torque Off - STO  
Safe Stop 1 – SS1  
Safely Limited Speed – SLS  
Safe Brake Control– SBC  
Safe Speed Monitor – SSM  
Safe Direction – SDI

### Benefit

- For standard converters, the **integrated Safe Stop and Safe Limited Speed functions without encoder** are unique worldwide!
- **Certified safety function** without external components.
- **Less wiring** expenditure
- **Fewer external components** such as the speed monitor. Shortened downtimes.

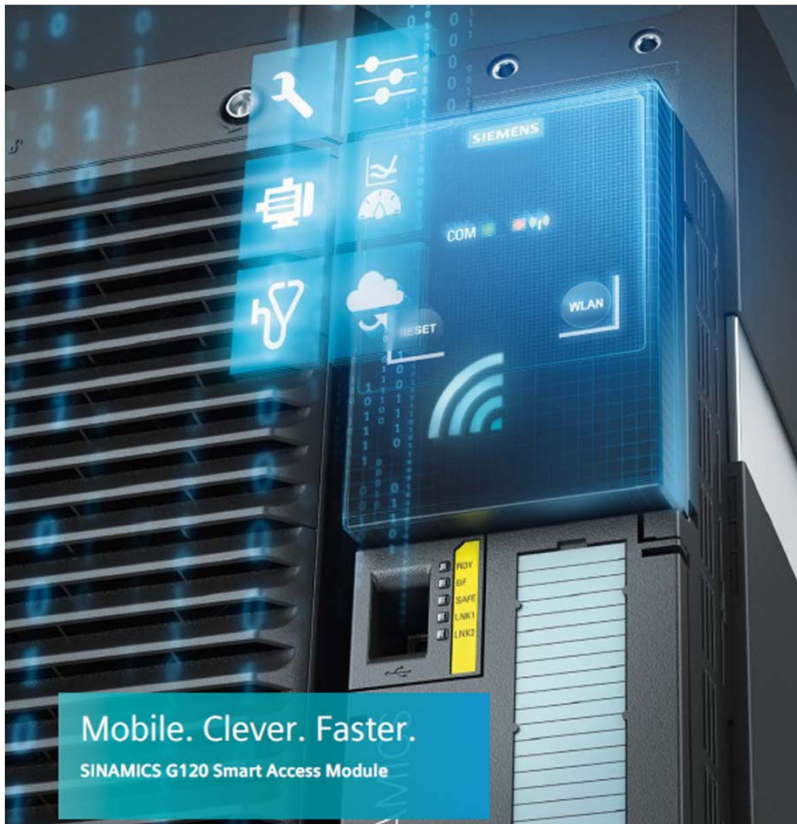
# Intelligent Operator Panel IOP-2



- Core messages:**
- Hardware innovation increases system performance and usability
    - **Color** display with an increased resolution (320\*240)
    - Membrane keyboard allows protection class **IP55**
    - **Intuitive and fast operation** through central sensor control field with integrated arrow keys
    - Open for **future expansions** based on a powerful system platform
  - Revised user interface
  - **Accelerated commissioning** of SINAMICS G drives via **wizards**
  - Easy upgraded to a new function state (firmware, wizards, languages) **via USB interface**
  - Only one order number for all languages (incl. Chinese)

# Smart Access Module for G120

**SIEMENS**  
*Ingenuity for life*



1.

Mount Smart Access Module onto SINAMICS G120 series and switch on the module.



SINAMICS G120C  
PNI/US/DP



SINAMICS G120  
+ Control Unit CU230P-2  
+ Control Unit CU240E-2  
PNI/US/DP



SINAMICS G120P  
+ Control Unit CU230P-2  
PNI/US/DP

2.

Detect SINAMICS G120 Smart Access in your Wi-Fi networks on your mobile device. Enter the default password\* and press "Connect."



\*) Password has to be changed when logging in the first time.

3.

Open web browser to access the home page (<https://192.168.1.1>).



## SINAMICS G120: Modularity for versatile applications

**SIEMENS**  
*Ingenuity for life*



### Benefits SINAMICS G120 Modular

- Cost reduction through modularity
- Flexible & Robust
- Easy usability
- Safety Integrated
- Integration into automation – TIA
- Can be power matched to Siemens motors

▶ **The customer saves time and money**



**SIEMENS**  
*Ingenuity for life*

# SIMOTICS reluctance motors and SINAMICS converters

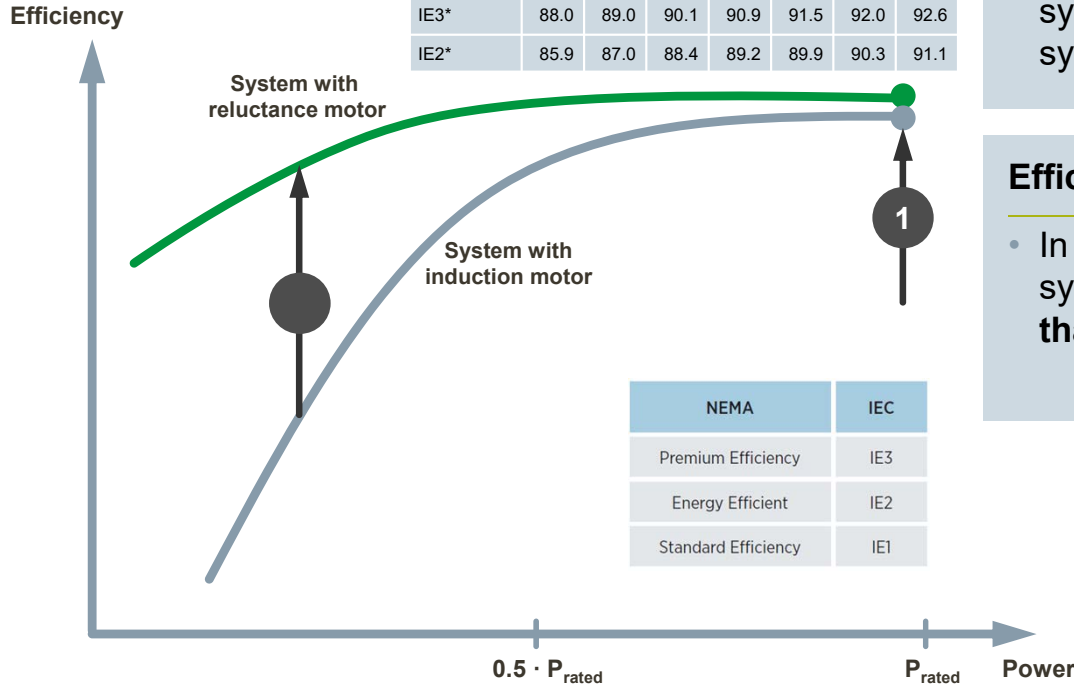
UnRestricted © Siemens 2019

[siemens.com/reluctancedrivesystem](https://www.siemens.com/reluctancedrivesystem)



# System attributes – Energy efficiency at the rated operating point and in the partial load range

kW	5.5	7.5	11.0	15.0	18.5	22.0	30.0
Reluctance*	91.9	92.6	93.5	93.9	94.2	94.5	94.9
IE4*	90.7	91.5	92.3	93.0	93.3	93.7	94.1
IE3*	88.0	89.0	90.1	90.9	91.5	92.0	92.6
IE2*	85.9	87.0	88.4	89.2	89.9	90.3	91.1



## Efficiency at the rated operating point



- At the rated operating point, the efficiency of a drive system with reluctance motor is higher than a drive system with **IE4** induction motor

## Efficiency in the partial load range



- In the partial load range, the efficiency of a drive system with reluctance motor is **significantly higher than a drive system with IE4** induction motor

\*) Minimum efficiency according to IEC 60034-30-1. Converted over to converter operation according to DIN EN 50598-2 (Section 5.3.2.6: Harmonic-dependent supplementary losses)

IE4 efficiency is likely to be from a technology other than an AC induction motor, such as a permanent-magnet rotor or a switched-reluctance motor, both of which require a drive for operation.

**IE4 = Above NEMA Premium efficiency.**

# SIMOTICS reluctance motor and SINAMICS inverter

## Drive systems with the highest efficiency

**SIEMENS**  
*Ingenuity for life*

### SIMOTICS reluctance motors and SINAMICS G120

#### Drive system with the highest energy efficiency +

- Highest efficiency using synchronous motor technology
- State-of-the-art control algorithms for best efficiency, especially in partial load range
- Energy saving with a flying restart where the load is still rotating

#### A cost-effective system +

- Optimized system costs through standard Power Modules harmonized and coordinated for reluctance motor technology
- High control dynamic performance in encoderless operation
- Extremely simple commissioning as the controller does not have to be parameterized



#### System efficiency class IES 2 +

- Highest energy efficiency in the IES 2 Class
- Lowest lifecycle costs (lower energy costs)

#### Can be universally used +

- Suitable for all load torques
- Special synchronous motor control allows high starting and accelerating torques

#### Guaranteed motor power when operated with an inverter +

- System-tested data are stamped on the rating plate

The image features a Siemens SINAMICS S210 Servo Drive System in a dark, industrial environment. The drive system is a large, grey, rack-mounted unit with three main modules. It is connected to various cables, including green and orange ones. In the background, there is a computer monitor displaying a graph with a blue line, and a person is visible working at a workstation. The overall scene is illuminated with blue and green light trails, suggesting a high-tech, automated manufacturing process.

**SIEMENS**  
*Ingenuity for life*

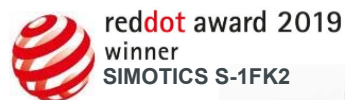
# SINAMICS S210 Servo Drive System

Unrestricted © Siemens 2019

[www.siemens.com/sinamics-s210](http://www.siemens.com/sinamics-s210)

# SINAMICS S210 servo drive system, Easy, High Performant, Safe & Perfect together with SIMATIC.

**SIEMENS**  
*Ingenuity for life*



## Advantages of S210 servo drive system

- High performance of drive and motor
- **Fast installation** of drive and motor via one cable connection (OCC)
- Integrated basic & extended safety functions
- Easy engineering commissioning because now fully integrated into the TIA-Portal<sup>\*)</sup>, “One Button Tuning” and web server.
- **Optimal together with SIMATIC** controller like SIMATIC S7-1500/T-CPU/ ET200 SP Open Controller.

**Drives, motors and controllers.  
All from a single source.  
Matching perfectly.**



The image shows a Siemens SINAMICS S120 drive unit installed in a control cabinet. The unit is a modular drive system with a grey metal cabinet and a light blue top section. It features a digital display and various control buttons. The unit is connected to a network of cables, including green Ethernet cables and black power cables. The background shows a software interface for configuring the drive, with a tree view on the left and a main workspace on the right. The interface includes a menu bar, a toolbar, and a project tree. The project tree shows a hierarchy of devices and networks, with the SINAMICS S120 drive unit selected. The main workspace displays a network diagram with various components and connections. The Siemens logo and the SINAMICS S120 branding are visible on the unit.

**SIEMENS**  
*Ingenuity for life*

# SINAMICS S120

The flexible and modular drive for demanding applications

Unrestricted © Siemens 2019

[www.siemens.com/sinamics-s120](http://www.siemens.com/sinamics-s120)

## SINAMICS S120 – the modular drive system for applications at the highest level

**SIEMENS**  
*Ingenuity for life*

SINAMICS S120 offers solutions for high-performance single and multi-axis drives

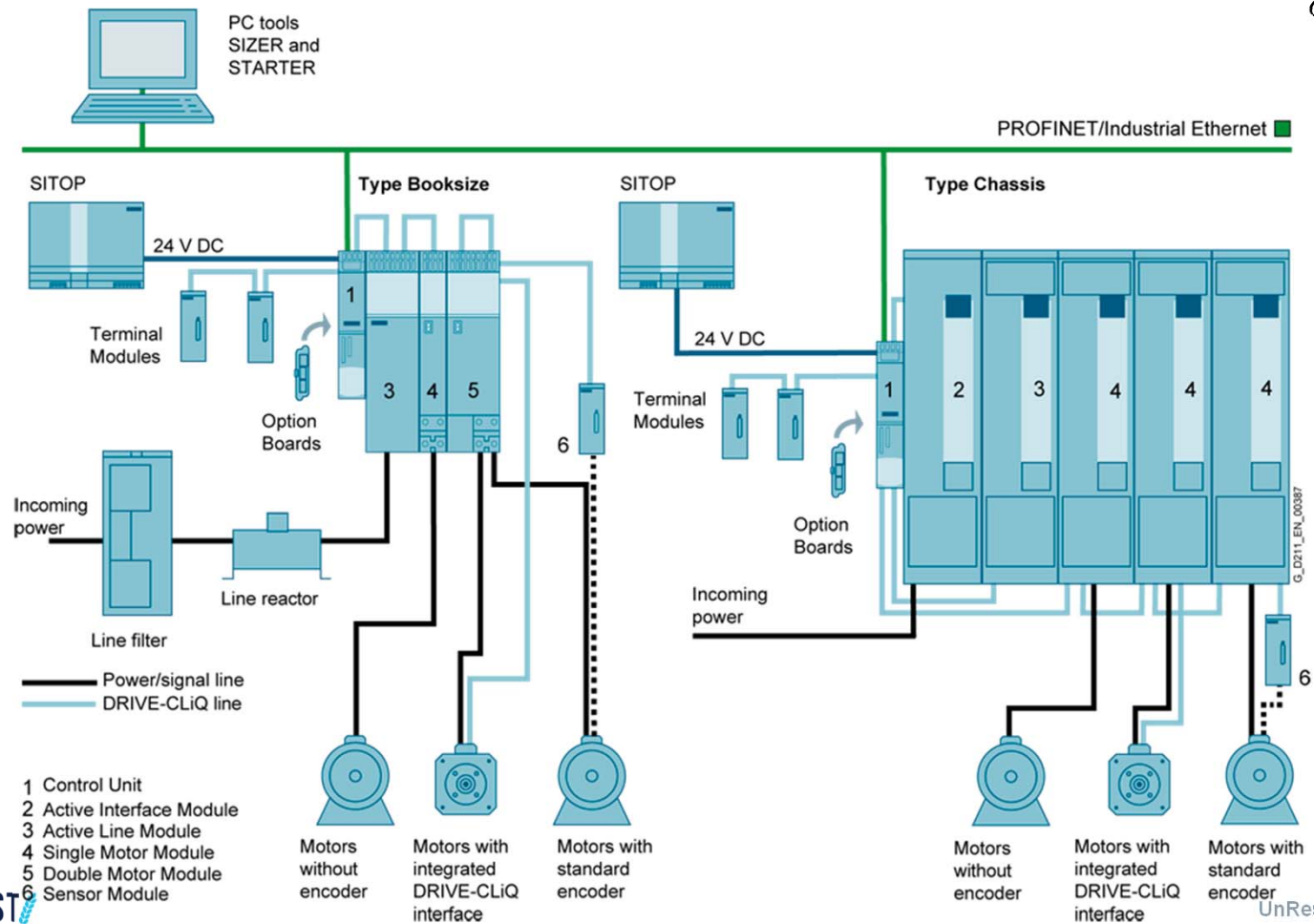
### Detailed description:

- Power range: 1/6<sup>th</sup> to 7600HP (0.12 kW – 5700 kW)
- Servo, vector control, V/f control
- Integrated safety and positioning functions
- Additional motion control functions
- High degree of scalability, flexibility and combinability
- Energy efficiency as a result of the energy recovery capability and/or common DC link
- Communication: PROFIBUS / PROFINET / EtherNet/IP / CANopen / Modbus TCP
- Advanced Technology Functions
- SINAMICS web server for efficient diagnostics and maintenance



# Machine configuration for multi-axis applications

## Example



## CU320-2 Control Units

### CU320-2 Control Unit + SINAMICS S120 for positioning tasks and closed-loop speed control



#### Detailed description:

- The communication, open-loop and closed-loop control functions for one or several Motor Modules and the Line Module are executed in a CU320-2.
- For the closed-loop control of multi-axis drives
  - **12x drives in V/f control – or 6x drives in servo or vector control possible**
- CU320-2 PN with integrated PROFINET interface or CU320-2 DP with PROFIBUS DP connection are available.
- The CU utilization level can be determined in SIZER.
- CompactFlash card for CU320-2 Control Units:
  - The **CompactFlash card contains the firmware, the set parameters and the license key.**

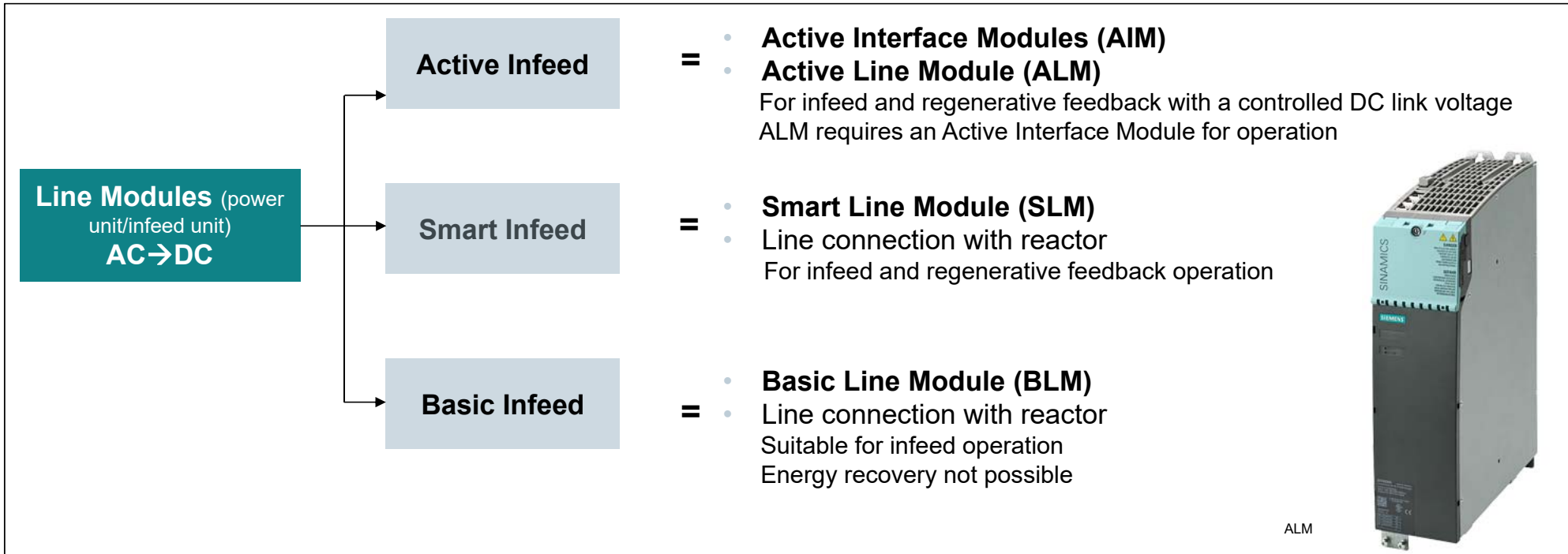




# Line Modules

## Various principles for an efficient solution

Line Modules generate a DC voltage from the line voltage. They supply the Motor Modules with power via the DC link.



ALM

## Motor Modules C/D type in the Booksize format Double Motor Modules

### Motor Module: The DC-AC inverter in the drive lineup (power unit)

#### Detailed description:



2x 18A unit, Width:100mm

- **Motor Modules provide the power for the motor** – they draw their power from the DC link of the drive lineup.
- A Motor Module must be connected to a Control Unit via DRIVE-CLiQ. The open-loop and closed-loop control functions for the Motor Module are located in the CU.
- Rated output currents of **2 x 3 A to 2 x 18 A**
- C/D types are **innovative devices with 200% or 300% overload** (continuous/discontinuous motion).



# Distributed servo drive

## SINAMICS S120M

Unrestricted © Siemens 2019

[www.siemens.com/sinamics-s120](http://www.siemens.com/sinamics-s120)

# SINAMICS S120 with distributed servo drive technology S120M



**Control Unit  
(SINAMICS)**

**Line Modules  
AC/DC  
(infeed unit)**

**Motor Modules  
Adapter Modules  
600 (AM600)**

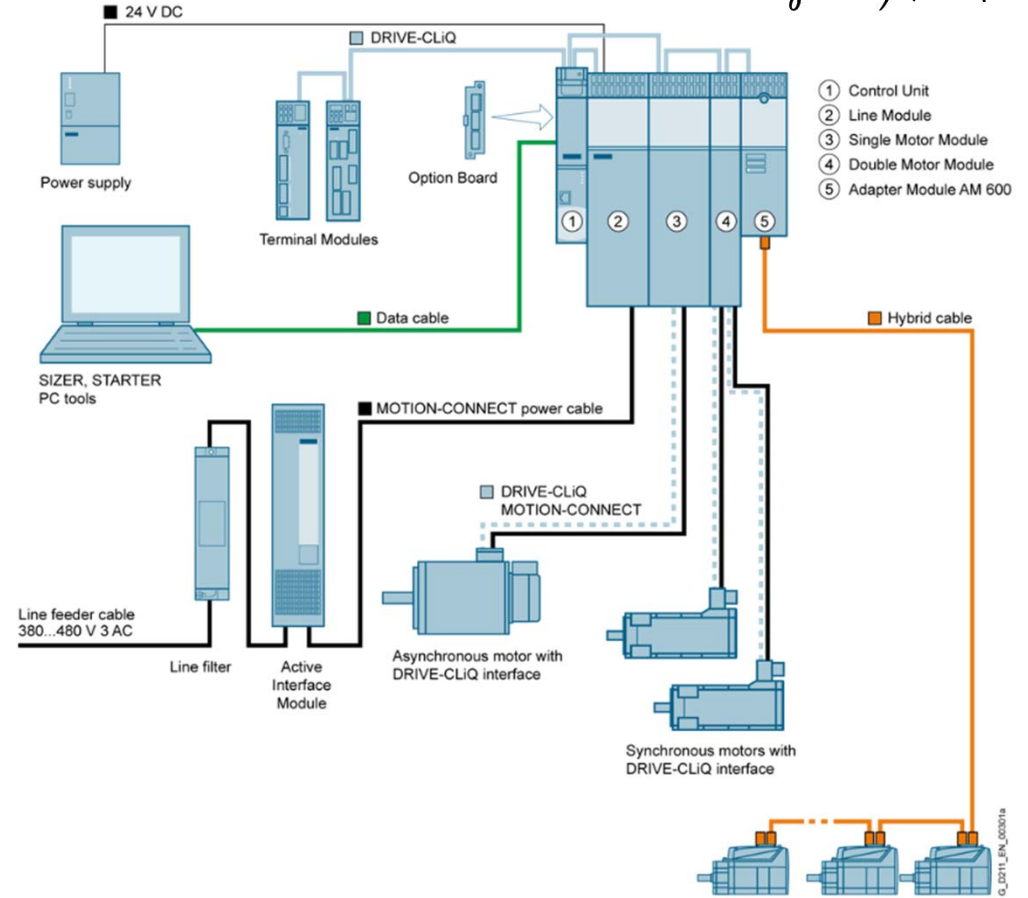
**S120M  
DC/AC**

**Centrally in the  
control cabinet**

**Decentrally in the  
machine**

SINAMICS S120M distributed comprises the following units:

- **Hybrid Cable** (connection system)
- **DRIVE-CLiQ Extension** (DQE)
- **Hybrid Cabinet Bushing** (HCB)



Distributed drive units

UnRestricted © Siemens 2019

Page 36

## System overview – SINAMICS S120 with distributed servo drive technology S120M

### Line reactors and line filters reduce line disturbances and loads

#### Detailed description:



- S120M is a synchronous motor with integrated power unit (DC/AC). **New machine concepts can be addressed as a result of the distributed integration into machines.** Advantages include less space required in the control cabinet, longer power cables and **modular machine concept**, for example.
- Adapter Module 600 (AM600) is the interface between the central SINAMICS (Booksize) components and the S120M.
- The **AM600 feeds the DC link voltage**, generated by a central infeed unit (Line Module), into the hybrid cable of the S120M.
- The DC link voltage is distributed to the S120M devices **connected in the drive lineup via the Hybrid Cable.**



Coming  
in 2020!

**SIEMENS**  
*Ingenuity for life*



# SIMATIC MICRO-DRIVE

DC/EC extra low voltage drive system with Safety Integrated

# SIMATIC MICRO-DRIVE 24V/48V DC&EC Drive System



## Focus Industries & Function

### Focus Industries

- Logistic (AGVs, Shuttles)
- Electronics
- Battery
- Handling
- Packaging
- Automatic assembly
- Metal forming
- Printing
- Winders, etc.

### Function

- Secondary & Auxiliary drive
- Actuator  
(one-time mechanical adjustments)
- None dynamic requirements
- Speed axes
- Positioning
- Synchronous axes
- AGV (auto. guided vehicle)
- Shuttle
- Conveyors, etc.

# SIMATIC MICRO-DRIVE

## Features and Benefits: The top highlights of the system

**SIEMENS**  
Ingenuity for life



NEW



### Feature / Function

- Flexibility & combinability of system components\*
- **PROFINET IRT (1ms)**
- Safety Integrated: STO, SS1, **SLT**, SLS, SBC, SSM via **PROFIsafe**
- **TIA Portal** integration
- **“One Button Tuning”**
- One cable to motor\*\*
- Integrated C1 EMC-Filter
- 24-48 V: 0,05-1kW
- **Battery supply** incl. energy recovery
- UL & Marine certification\*\*\*

### Benefit

- 
  - Universally applicable
  - Increased performance
- 
  - Fulfills high demands for safety
- 
  - Easy engineering
- 
  - Saves time on installation
- 
  - Ready for various markets

\* Product partner: Dunkermotoren & ebm-papst (motors)/ HARTING & KnorrTec (connecting cables)

\*\* Dunkermotoren up to 200W & ebm-papst up to 400W

\*\*\* only for PDC

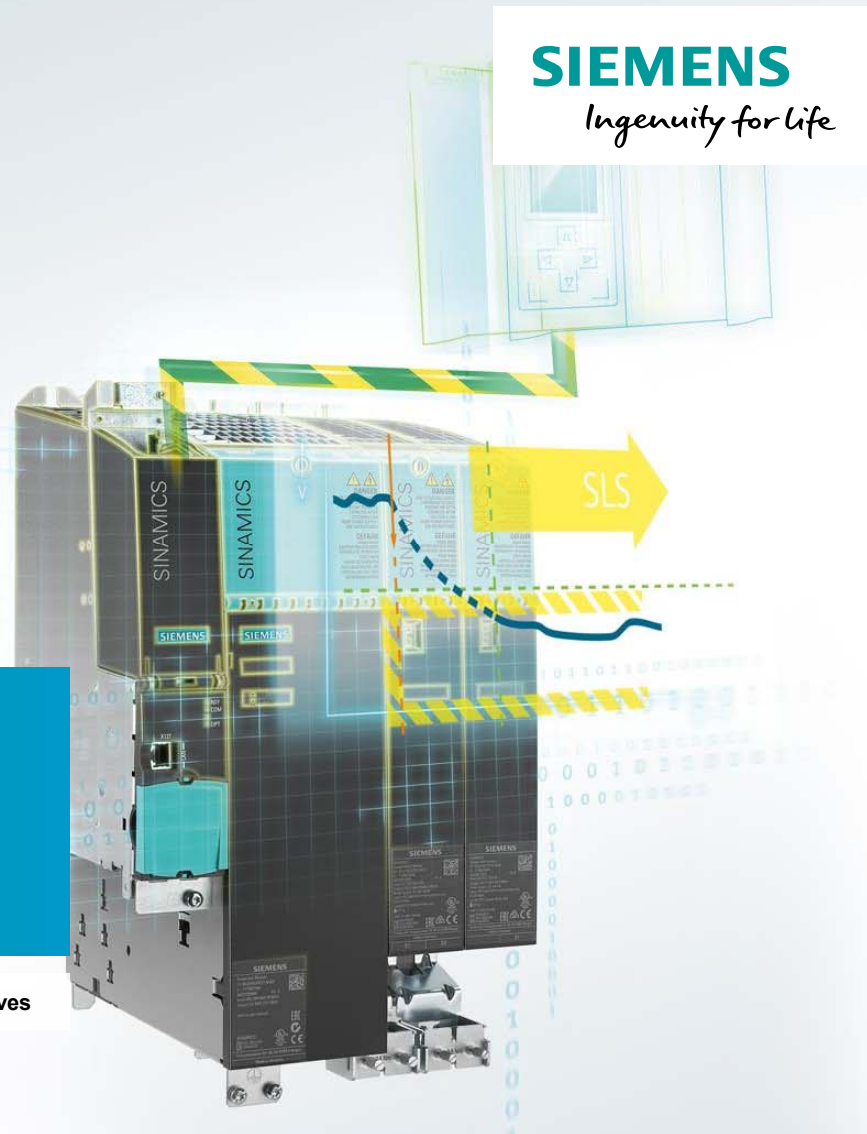


**SIEMENS**  
*Ingenuity for life*

# SINAMICS Safety Integrated

Unrestricted © Siemens AG 2019

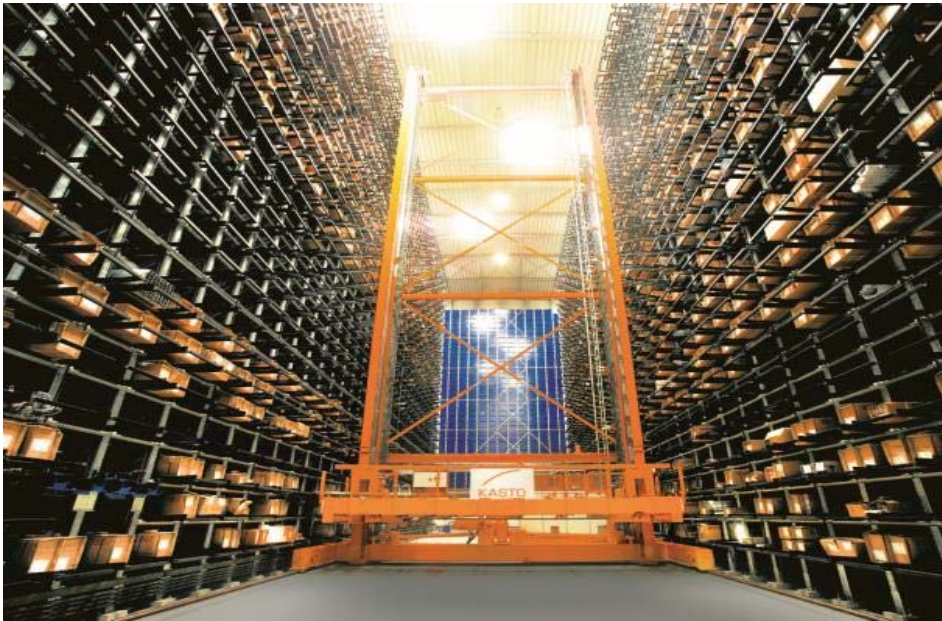
[siemens.com/safety-drives](https://www.siemens.com/safety-drives)



## Why safety?

### Introduction to Safety Integrated

Where ever human health and machine functionality need to be protected



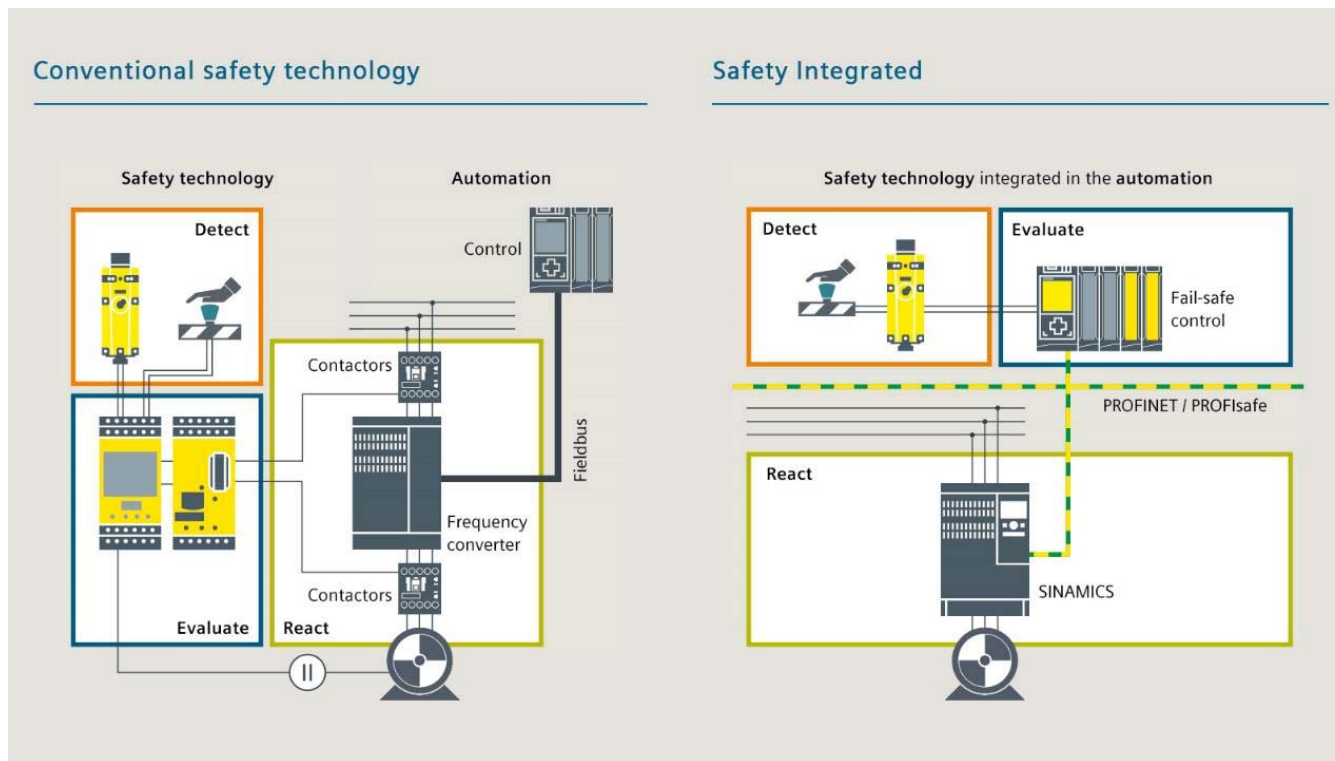
**SIEMENS**  
*Ingenuity for life*



# Your advantages when using SINAMICS Safety Integrated



## Introduction to Safety Integrated



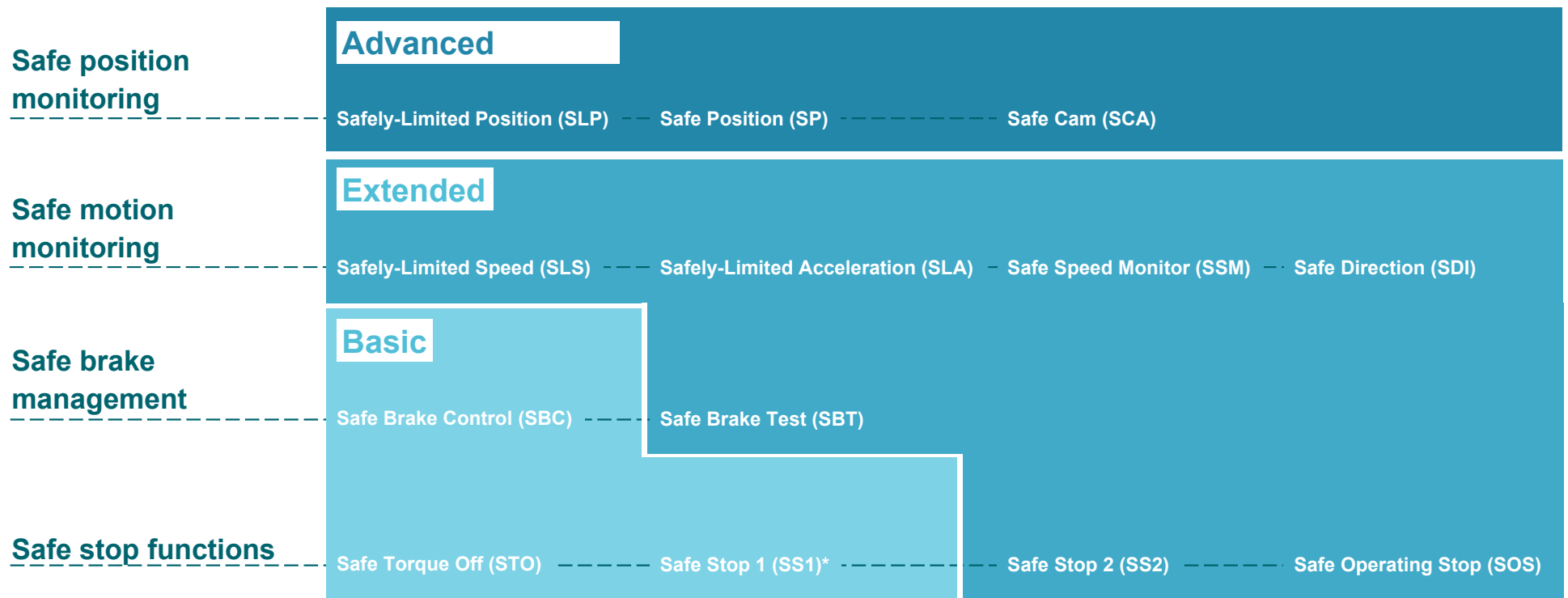
## Integrated Safety

- Less hardware
- Reduced wiring effort
- Perfect interaction of sensors, control and drives

# Overview according to EN 61800-5-2 functional safety



## Overview of safety functions in the drive



# Acceptance test for Safety Integrated

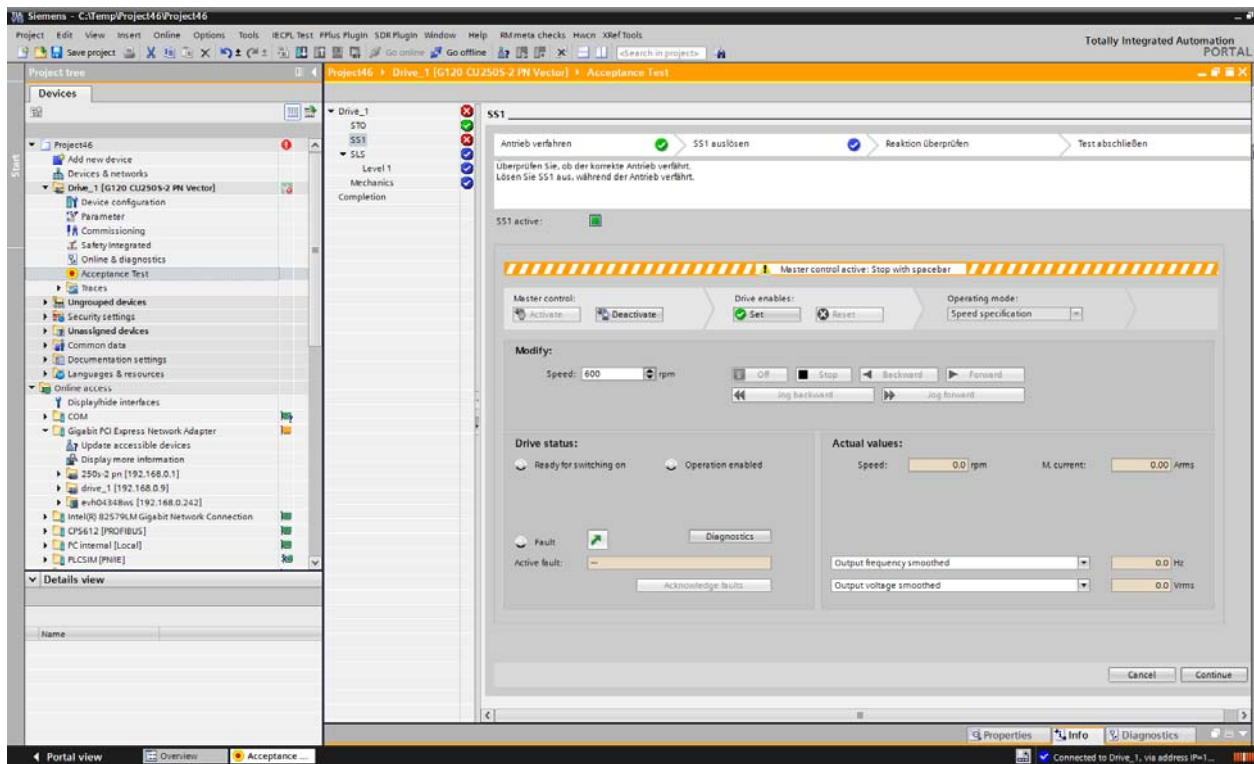
## Benefits

- A **check is made that the safety functions have been correctly parameterized**
- The configured safety functions are subject to a **plausibility check** based on
  - Measuring response times
  - Monitoring stop responses when limit values are violated
  - **Detecting potential configuring errors**
- Automated and **standard-compliant documentation** of parameterized and tested safety functions

**The acceptance test and its documentation are important elements for the CE marking!**

# Acceptance test for Safety Integrated in Startdrive Advanced V15.1

**SIEMENS**  
*Ingenuity for life*



- Guided assistant with clear instructions
- Simple transfer of the test to drives of the same configuration
- Automated creation of a standard-compliant test protocol

# SINAMICS in TIA Portal V15.1 Startdrive V15.1

# SINAMICS drive in TIA Portal ... the optimum drive system for every application

**SIEMENS**  
*Ingenuity for life*



## SINAMICS S120 and Large Drives<sup>1</sup>

The flexible, modular drive system over a large power range for sophisticated and demanding applications in the production industry

Dec. 2017 w/ V15 general release

Dec. 2018 w/ V15 .1 new functions



## SINAMICS S210

Single axis AC/AC drive with high dynamic and performance for motion applications in the mid range segment

Dec. 2017 via GSD

Dec. 2018 w/ V15.1



## SINAMICS G120

Drive system for general performance applications and distributed drive system for conveyor applications

Dec. 2018 w/ V15 .1 new functions



**All SINAMICS can already be used in TIA Portal**



**StartDrive Advanced  
Coming soon V16!**

**SIEMENS**  
*Ingenuity for life*

V16 will include the block size (PM240-2) format for  
Single Axis Block Size S120

## TIA Portal drive integration with SINAMICS Startdrive



### SINAMICS Startdrive commissioning software

The Totally Integrated Automation Portal (TIA Portal) is the engineering software for industrial automation. TIA Portal contains SINAMICS Startdrive for intuitive integration of SINAMICS drives in automation. The same operator control concept, the elimination of interfaces and a high degree of user-friendliness make it possible to quickly integrate SINAMICS into an automation process and start it up with the TIA Portal.

Coming  
in 2020!

Thank you!

**SIEMENS**  
*Ingenuity for life*



**Fabrizio Galbiati and Rudy Hauser**

Siemens Industry, Inc.

5300 Triangle Parkway, Suite 100

Norcross, GA 30092 USA

[usa.siemens.com/motioncontrol](http://usa.siemens.com/motioncontrol)