Migration of
MASTERDRIVES to
SINAMICS G/S

Units for Supply Voltage 400V

Units for Supply Voltage 500V / 690V

Electronics and Software

Migration Advantages

Units for Supply Voltage 400V

Converters – 1Q / 6 pulse

Compact PLUS Units

0.55 - 15 kW

Compact Units

2.2 - 37 kW

Inverters

G120 Power Modules, Blocksize

0.37 - 90 kW

Converters

G130 Power Modules, Chassis

45 - 400 kW

Chassis Units

110 - 560 kW

Regenerative Units

S120 PM, Chassis + CU310

0.37 - 250 kW

Active Front End
Units for Supply Voltage 400V
Converters – 1Q / 12 pulse

Cabinet Units / 1Q - 12 pulse

250 - 710 kW

160 - 550 kW
G150 Single Converter, 6 pulse system + Line Harmonics Filter

630 - 900 kW
G150 Parallel Converter, 12- pulse system

400 - 800 kW (Parallel Circuits up to 3200 kW)
S120 Cabinet Unit is built of:
- Line Connection Modules LCM +
- Basic Line Modules BLM +
- Motor Module(s) MoMo

Units for Supply Voltage 400V
- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
Electronics and Software
Migration Advantages
Units for Supply Voltage 400V
Converters – 4Q / 6 pulse

- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
Electronics and Software
Migration Advantages

Cabinet Units / 4Q - 6 pulse
45-710 kW

250 - 800 kW (Parallel Circuits up to 3200 kW)
S120 Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- Smart Line Module(s) SLM +
- Motor Module(s) MoMo

Units for Supply Voltage 400V
Converters – 4Q with AFE

- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
Electronics and Software
Migration Advantages

Cabinet Units with AFE self-commutated pulsed rectifier/regenerative unit
45-710 kW

110 - 800 kW
S150 Converter Cabinet Unit with self-commutated rectifier/regenerative unit (Active Infeed = AFE)

132 - 800 kW (Parallel Circuits up to 3200 kW)
S120 Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- ALM(s) plus AIM(s) +
- Motor Module(s) MoMo
Units for Supply Voltage 400V

Inverters

Units for Supply Voltage 400V
- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
Electronics and Software
Migration Advantages

Compact PLUS Units
Compact Units
Chassis Units

- 0.75 - 37 kW
- 2.2 - 37 kW
- 45 - 710 kW (a)

a) Multi-parallel Circuits up to 3200kW
b) Parallel Circuits (4x) up to 3200kW

110 - 800 kW (b)

S120 Motor Modules, Chassis

Cabinet Modules

Units for Supply Voltage 400V

Rectifier Units – 1Q

Units for Supply Voltage 400V
- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
Electronics and Software
Migration Advantages

Compact PLUS Units
Compact Units
Chassis Units

- 15 - 37 kW
- 15 - 100 kW
- 75 - 800 kW (a)
- 200 - 710 kW (b)
- 200 - 900 kW (c)

a) Parallel Circuits up to 2400kW
b) Parallel Circuits up to 2800kW
c) Parallel Circuits up to 3600kW

S120 Basic Line Modules, Chassis

S120 Basic Line Modules, Cabinet Modules

SIEMENS
Units for Supply Voltage 400V

Rectifier – 4Q Regenerative Units

**Compact Units**
- 7.5 - 37 kW
- 5 - 36 kW
- S120 Smart Line Modules, Booksize

**Chassis Units**
- 75 - 800 kW (a)
- 250 - 800 kW (b)

*Parallel Circuits up to 2400kW
Parallel Circuits up to 3200kW*

---

Units for Supply Voltage 400V
- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
- Electronics and Software

Migration Advantages

---

Units for Supply Voltage 400V
- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

Units for Supply Voltage 500V / 690V
- Electronics and Software

Migration Advantages

---

Units for Supply Voltage 400V

Active Front End Units AFE

**Compact Units**
- 6.8 - 49 kW (a)
- 16 - 120 kW

**Chassis Units**
- 63 - 250 kW
- 250 - 800 kW (b)

*AFE with Supply Connection Module*

---

*Supply Connection Module = Basic Interference Suppression + Clean Power Filter*

*Parallel Circuits up to 3600kW*
Units for Supply Voltage 400V

Units for Supply Voltage 500V / 690V

Electronics and Software

Migration Advantages

- Active Front End
- Rectifier / Regenerative Units
- Rectifier Units
- Inverters
- Chassis Units
- 1Q / 6-pulse
- Power Modules
- G130 Power Modules + CU320
- Use isolating transformer and converters 400 V
- G130 Power Modules, Chassis
- 3 AC 500...600 V
- 110 - 560 kW
**Units for Supply Voltage 500V / 690V Converters 500V**

- **Converters 500 V**
  - **Cabinets 1Q / 6-pulse**
    - **G150**
      - Cabinets 1Q / 6-pulse 500 V
    - **S120**
      - Cabinet Modules 500 – 690 V

- **Cabinet Units / Single-quadrant operation**
  - 6-pulse system

- **Units for Supply Voltage 400V**
  - Converters
  - Inverters
  - Rectifier Units
  - Rectifier / Regenerative Units
  - Active Front End

**Electronics and Software**

- **Migration Advantages**

---

**Units for Supply Voltage 500V / 690V Converters 500V**

- **Converters 500 V**
  - **Cabinets 1Q / 12-pulse**
    - **G150**
      - Cabinets 1Q / 6-pulse + LHF 500 V
    - **S120**
      - Cabinet Modules 500 – 690 V

- **Cabinet Units / Single-quadrant operation**
  - 12-pulse system

- **Units for Supply Voltage 400V**
  - Converters
  - Inverters
  - Rectifier Units
  - Rectifier / Regenerative Units
  - Active Front End

**Electronics and Software**

- **Migration Advantages**
Units for Supply Voltage 500V / 690V
Converters 500V

- Cabinets
4Q / 6-pulse

Cabinet Units / Four-quadrant operation
6-pulse system

- 37 - 1100 kW

S120 Cabinet Modules
500 – 690 V

- 325 - 900 kW @ 500 V (Parallel Circuits up to 3600 kW)

Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- Smart Line Module(s) SLM +
- Motor Module(s) MoMo

Converters 500V

Units for Supply Voltage 400V

Units for Supply Voltage 500V / 690V
- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End

Electronics and Software
Migration Advantages

Units for Supply Voltage 500V / 690V
Converters 500V

- Cabinets
500 – 690 V

Cabinet Units with AFE self-commutated pulsed rectifier/regenerative unit

- 37 - 900 kW @ 500V

S150 (4Q) Cabinet Units with Active Infeed
500 – 690 V

S120 Cabinet Modules
500 – 690 V

- 55 - 900 kW @ 500V

S150 Converter Cabinet Unit with self – commutated rectifier/regenerative unit

- 400 - 1000 kW @ 500V (Parallel Circuits up to 4000 kW)

Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- ALM(s) plus AIM(s) +
- Motor Module(s) MoMo
Units for Supply Voltage 500V / 690V
Converters 690V

- Chassis
1Q / 6-pulse

G120 Power Modules + CU240

G130 Power Modules + CU320

690 V
(3 AC 660...690 V)
Chassis Units

- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

7.5 - 37 kW
G120 Power Modules,
Blocksize

75 - 800 kW
G130 Power Modules,
Chassis

3 AC 660...690 V

Cabinet Units / Single-quadrant operation
6-pulse system

55 - 1500 kW

G150 Converter, Single Circuit

75 - 800 kW

G150 Converter, Parallel Circuit

1000 - 1500 kW

250 - 1200 kW @ 690 V (Parallel Circuits up to 4800 kW)

Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- Basic Line Module(s) BLM +
- Motor Module(s) MoMo

Units for Supply Voltage 400V

Units for Supply Voltage 500V / 690V

- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

55 - 1200 kW

G120

75 - 1500 kW

G150

250 - 1200 kW @ 690 V (Parallel Circuits up to 4800 kW)

Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- Basic Line Module(s) BLM +
- Motor Module(s) MoMo

S120 Cabinet Modules
500 – 690 V
Units for Supply Voltage 500V / 690V
Converters 690V

Convertisers 690 V
- Cabinets
  1Q / 12-pulse

Cabinet Units / Single-quadrant operation
12-pulse system

G150
Cabinets
- 1Q / 6-pulse + LHF
- 1Q / 12-pulse 690 V

S120
Cabinet Modules
500 – 690 V

< 500 - 1200 kW @ 690 V (Parallel Circuits up to 4800 kW)
Cabinet Unit is built of:
- Line Connection Modules LCM +
- Basic Line Modules BLM +
- Motor Module(s) MoMo

55 - 1500 kW

Parallel Converter, 12-pulse system

Electronics and Software
Migration Advantages

Units for Supply Voltage 400V
Units for Supply Voltage 500V / 690V
- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End

S120
Cabinet Modules
500 – 690 V

650 - 1200 kW @ 690 V (Parallel Circuits up to 4800 kW)
Cabinet Unit is built of:
- Line Connection Module(s) LCM +
- Smart Line Module(s) SLM +
- Motor Module(s) MoMo

55 - 1500 kW

Parallel Converter, 6-pulse system

Electronics and Software
Migration Advantages

Units for Supply Voltage 400V
Units for Supply Voltage 500V / 690V
- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End
Units for Supply Voltage 500V / 690V
Converters 690V

- Cabinets with AFE (4Q)

S150 (4Q) Cabinet Units with Active Infeed 500 – 690 V

S120 Cabinet Modules 500 – 690 V

Units for Supply Voltage 400V
- Converters
- Inverters
- Rectifier Units
- Rectifier/Regenerative Units
- Active Front End

Electronics and Software
Migration Advantages

Cabinet Units with AFE self-commutated pulsed rectifier/regenerative unit

55 - 1200 kW

75 – 1200 kW @ 690V

650 - 1400 kW @ 690V (Parallel Circuits up to 5600 kW)

Cabinet Unit is built of:
- Line Connection Module(s) LCM
- ALM(s) plus AIM(s)
- Motor Module(s) MoMo

Units for Supply Voltage 500V / 690V
Inverters 500 – 690V

- Booksize - Chassis

500 V (3AC 500…600 V) Compact Units

2.2 - 30 kW

500 V (3AC 500…600 V) Chassis Units

37-900 kW 1a)

690 V (3AC 660…690 V) Chassis Units

55 – 1200 kW 1b)

Use isolating transformer and 400V rectifiers/inverters

S120 Motor Modules + CU320 500 – 690 V

1a) Multi-parallel Circuits up to 4500kW @ 500V
1b) Multi-parallel Circuits up to 6000kW @ 690V
2a) Parallel Circuits (4x) up to 3600kW @ 500V
2b) Parallel Circuits (4x) up to 4800kW @ 690V

Motor Modules, Chassis
3 AC 500…690 V

55 - 900 kW @ 500V 2a)

75 – 1200 kW @ 690V 2b)

Motor Modules, Cabinet
3 AC 500…690 V
Units for Supply Voltage 500V / 690V
Rectifier Units 500 – 690V

Units for Supply Voltage 400V

- Converters
- Inverters
- Rectifier Units
- Rectifier / Regenerative Units
- Active Front End

Electronics and Software
Migration Advantages

Rectifier Units (1Q)
500 V / 690V

- Booksize
- Chassis

500 V (3 AC 500…600 V)
Compact Units

22 - 55 kW

Use isolating transformer and 400V rectifiers/inverters

S120 Basic Line Modules
BLM
500 – 690V

1a) Parallel Circuits up to 3300 kW @ 500V
1b) Parallel Circuits up to 4500 kW @ 690V
2a) Parallel Circuits up to 3200 kW @ 500V
2b) Parallel Circuits up to 4400 kW @ 690V
3a) Parallel Circuits up to 4400 kW @ 500V
3b) Parallel Circuits up to 6000 kW @ 690V

690 V (3 AC 660…690 V) Chassis Units

160 – 1500 kW 1b)

1a) Parallel Circuits up to 3300 kW @ 500V
1b) Parallel Circuits up to 4500 kW @ 690V
2a) Parallel Circuits up to 3200 kW @ 500V
2b) Parallel Circuits up to 4400 kW @ 690V
3a) Parallel Circuits up to 4400 kW @ 500V
3b) Parallel Circuits up to 6000 kW @ 690V

140 - 1500 kW 1b)

Use isolating transformer and 400V rectifiers/inverters

S120 Smart Line Modules
SLM
500 – 690V

1a) Parallel Circuits up to 3300 kW @ 500V
1b) Parallel Circuits up to 4500 kW @ 690V
2a) Parallel Circuits up to 4400 kW @ 500V
2b) Parallel Circuits up to 5600 kW @ 690V

325 – 1000 kW @ 500V 2a)
450 – 1400 kW @ 690V 2b)

Smart Line Modules, Chassis
3 AC 500…690V

325 – 1000 kW @ 500V 2a)
450 – 1400 kW @ 690V 2b)
Units for Supply Voltage 500V / 690V
Active Front End Units AFE 500 – 690V

- AFE Inverters + AFE Supply Connection Modules
  - 500 V / 690 V
  - Chassis

- S120 Active Line Module (ALM)
  - Active Interface Module (AIM)
  - 500 – 690 V

- 690 V (3 AC 660…690 V)
- Chassis Units
  - 51 - 192 kW
  - 70 - 245 kW

- 500 V (3 AC 500…600 V)
- Chassis Units

- Use isolating transformer and 400V rectifiers/inverters

- 1a) Parallel Circuits up to 4000kW @ 500V
- 1b) Parallel Circuits up to 5600kW @ 690V

- ALM and AIM, Chassis
  - 3 AC 500…690 V
  - 400 – 1000 kW @ 500V 1a)
  - 560 – 1400 kW @ 690V 1b)

- ALM and AIM, Cabinet Modules
  - 3 AC 500…690 V
  - 560 – 1400 kW @ 690V

Industry Sector: MC PM BD / LD IM PD

Migration Advantages
- Electronics and Software
- ALM and AIM, Chassis Modules
- 3 AC 500…690 V
- 400 – 1000 kW @ 500V 1a)
- 560 – 1400 kW @ 690V 1b)

Units for Supply Voltage 500V / 690V

Electronics and Software

Migration Advantages
Electronics and Software
Drive Control Modes

Units for Supply Voltage 400V
Units for Supply Voltage 500V / 690V

Electronics and Software
- Drive Control
- Communication
- Interface and I/O Boards
- Sensor Modules
- Technology
- Engineering Tools

Migration
Advantages

Conductors
Vector Control
Motion Control

SINAMICS G
Power Sections G120 / G130
Control Modes VC, VC(V/f)

SINAMICS S
Control Unit CU310 + CF-Card
Control Mode VC, VC(V/f), S120 CM

Control Modes VC, VC(V/f), MC

1) SINAMICS S120 Cabinet Modules

Electronics and Software
Drive Control Modes

Units for Supply Voltage 400V
Units for Supply Voltage 500V / 690V

Electronics and Software
- Drive Control
- Communication
- Interface and I/O Boards
- Sensor Modules
- Technology
- Engineering Tools

Migration
Advantages

Inverters
Vector Control
Motion Control

SINAMICS S
Power Sections S120
Control Unit CU320 + CF-Card
*) for multiple axes

Control Modes VC, VC(V/f), MC

1) SINAMICS S120 Cabinet Modules

Industry Sector MC PM BD / LD I M PM1
Unrestricted
Electronics and Software
Drive Control Boards

**MASTERDRIVES VC**
- Drive Control Board VC (V/f)
- Drive Control Board VC+ (V/f)

**SINAMICS G**
- Drive Control Mode Vector (V/f)
  
  Replaces the VC(V/f) control mode of MASTERDRIVES with focus on sensorless vector control and also vector control with incremental encoder.

**MASTERDRIVES MC**
- Drive Control Board MC
- Drive Control Board MC+
- Drive Control Board MCPM
- Drive Control Board MCP2
- Drive Control Board MCP2+

**SINAMICS S120**
- Drive Control Mode Servo
  
  Replaces the MC control mode of MASTERDRIVES 1:1 and offers even more functionality.

Electronics and Software
- Drive Control
- Communication
- Interface and I/O Boards
- Sensor Modules
- Technology
- Engineering Tools

Migration Advantages
**Electronics and Software Communication**

**MASTERDRIVES Basic Unit**
- **Standard:**
  - USS-Protocol
  - CAN Bus
  - Simulink
- **Options:**
  - Peer-to-Peer
  - PROFIBUS
  - PROFIBUS on-board
  - Profibus or Profinet

**SINAMICS G130 / G150**
- **CU320**
  - PROFIBUS on-board
  - Profibus or Profinet

**Units for Supply Voltage 400V**
- **Units for Supply Voltage 500V / 690V**

**Migration Advantages**
- Electronics and Software
  - Drive Control
  - Communication
  - Interface and I/O Boards
  - Sensor Modules
  - Technology
  - Engineering Tools

---

**Electronics and Software Communication**

**MASTERDRIVES Basic Unit**
- **Standard:**
  - USS-Protocol
  - CAN Bus
  - Simulink
- **Options:**
  - Peer-to-Peer
  - PROFIBUS
  - PROFIBUS on-board
  - Profibus or Profinet

**SINAMICS S120**
- **CU320**
  - PROFIBUS on-board
  - Profibus or Profinet used for axes synchronization

**Units for Supply Voltage 400V**
- **Units for Supply Voltage 500V / 690V**

**Migration Advantages**
- Electronics and Software
  - Drive Control
  - Communication
  - Interface and I/O Boards
  - Sensor Modules
  - Technology
  - Engineering Tools
Electronics and Software
Communication / Operator Panel

- MasterDrives
- Operator Panel
- OP1S

For single-axis converters
SINAMICS G130 / G150 / S150:
Advanced Operator Panel
AOP30

Comfortable operator panel for
Commissioning
Monitoring
Fault processing

Electronics and Software
I/O Boards

- MasterDrives Basic Unit
- Expansion board EB1 (-Z5x)
- Expansion board EB2 (-Z6x)

- Interface board SCI1/SCB1
  10 Binary inputs,
  1 Binary outputs,
  3 Analog inputs,
  3 Analog outputs

- Interface board SCI2/SCB1
  16 Binary inputs,
  5 Binary outputs
  7 Relay outputs

- Terminal Board TB30
  4 DI, 4 DO, 2 AI, 2 AO

- Terminal Module TM31
  8 Binary inputs,
  4 Binary inputs / outputs,
  2 Relay outputs,
  2 Analog inputs,
  2 Analog outputs,
  1 Temperature input (KTY/PTC)
**Electronics and Software**

**I/O Boards**

- **MASTERDRIVES Basic Unit**
  - Expansion board EB1 (-Z5x)
  - Expansion board EB2 (-Z6x)

- **SINAMICS S120 mit CU320**
  - Terminal Board TB30
    - 4 DI, 4 DO, 2 AI, 2 AO
  - Terminal Module TM31
    - 8 Binary inputs, 4 Binary inputs / outputs, 2 Relay outputs, 2 Analog inputs, 2 Analog outputs, 1 Temperature input (KTY/PTC)
  - Terminal Module TM15
    - 24 Binary inputs / outputs

**Units for Supply Voltage 400V**

**Units for Supply Voltage 500V / 690V**

**Electronics and Software**
- Drive Control
- Communication
- Interface and I/O Boards
- Sensor Modules
- Technology
- Engineering Tools

**Migration Advantages**

- **Interface board SCI2/SCB1**
  - 16 Binary inputs, 5 Binary outputs, 7 Relay outputs

- **Interface board SCI1/SCB1**
  - 10 Binary inputs, 1 Binary outputs, 7 Relay outputs, 3 Analog inputs, 3 Analog outputs

---

**Electronics and Software**

**Sensor Modules**

- **MASTERDRIVES Basic Unit**
  - with optional boards:
    - Option board for resolvers SBR1/2
    - Option board for encoders SBM/SM2
    - Option board for incremental encoders SBP (-Z1x)

- **SINAMICS G / DRIVE-CLiQ Components:**
  - **Sensor Module Cabinet-Mounted**
    - SMC30 for HTL- and TTL-encoders

**digital Tachometer Interface DTI** for HTL- and TTL-encoders
Electronics and Software
Sensor Modules

MASTERDRIVES Basic Unit
with optional boards:

- Option board for resolvers SBR1/2
- Option board for encoders SBM/SBM2
- Option board for incremental encoders SBP (-Z1x)

Digital Tachometer Interface DTI for HTL- and TTL-encoders

SINAMICS S / DRIVE-CLIQ Components:

- Sensor Module Cabinet-Mounted SMC10 for Resolvers
- Sensor Module Cabinet-Mounted SMC20 für Incremental encoders, Absolute-value encoders EnDat, SSI-encoders
- Sensor Module Cabinet-Mounted SMC30 for HTL- and TTL-encoders, SSI-encoders without increments

As an alternative to these cabinet mounted modules, the motor integrated sensor modules SMI10, SMI20 or SMI30 may be used.

Electronics and Software
Technology

MASTERDRIVES Basic Unit

Free Function Blocks

- EPoS
- Technology board T100 Control, arithmetic and logic software modules
- Technology boards T300 / T400 Positioning, synchronous operation, center winders, multi-axes-drives
- Technology SW F01 (only for MASTERDRIVES MC)

1) If only a minor part of the Free Funktion Blocks of MASTERDRIVES was used
2) If a mayor part of the Free Funktion Blocks of MASTERDRIVES was used
Migration

Advantages

Electronics and Software
Technology

- Engineering Tools
- Technology
- Sensor Modules
- Interface and I/O Boards
- Technology
- Engineering Tools

- Electronics and Software
  - Drive Control
  - Communication
  - Interface and I/O Boards
  - Sensor Modules
  - Technology
  - Engineering Tools

- Units for Supply Voltage 400V / 690V
- Units for Supply Voltage 500V / 690V

- MASTERDRIVES Basic Unit
  - EPoS
- Free Function Blocks
  - Technology board T100
    - Control, arithmetic and logic software modules
- Technology boards
  - T200 / T400
    - Positioning, synchronous operation, center winders, multi-axes-drives
- Technology SW F01 (only for MASTERDRIVES MC)

- SINAMICS S120
  - Positioning Software (EPoS)
  - SINAMICS DCC
    - Drive Control Chart = Function block library plus CFC Editor

- SIMOTION D
  - SIMOTION DCC
  - Motion Control Programming

- Engineering Tools
  - Pfad PLUS
  - DriveMonitor
  - Drive ES Basic
  - Drive ES SIMATIC/PCS7
  - Drive ES SIMATIC/PCS7

- SIZER
- STARTER
- Drive ES Basic
- Drive ES SIMATIC/PCS7
- DCC SINAMICS

Free Fct. Blocks + Drive ES Graphic
### Migration Advantages Overview

<table>
<thead>
<tr>
<th>Units for Supply Voltage 400V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units for Supply Voltage 500V / 690V</td>
</tr>
<tr>
<td>Electronics and Software</td>
</tr>
</tbody>
</table>

**SINAMICS Advantages**

**Hardware Characteristics**
- SINAMICS units are in general more compact
- Power Block concept of Chassis Units simplifies repair of power sections
- New cooling options (external air, cold plate) allow for new cabinet designs
- 100% output voltage of Rectifier/Regenerative Units omits autotransformer

**Wiring**
- Significantly less Profibus cabling thanks to the central Control Unit CU320
- Unified and easy wiring with Drive-CLiQ

**Functionality SINAMICS S**
- Positioning: More functionality and graphical parameter setting
- Free function blocks: Expanded functionality, graphical parameter setting
- High End Motion Control with Simotion D
- Numerous Safety Functions

**Commissioning**
- Electronic rating plates allow for an automatic initial commissioning
- Fast comm.: for serial machines: One Memory Card for multiple drives
- Efficient trouble shooting with central diagnostics for all components
- Faster component swapping with Memory Card
- Rectifier/Regenerative Units are protected against commutation faults

**Availability**
- Many HW components are omitted, such as optional boards, Profibus cables and connectors, external safety components
- Cost savings through optimized configurations for multi-axes-drives

**Cost Savings**
- Positioning: More functionality and graphical parameter setting
- Free function blocks: Expanded functionality, graphical parameter setting
- High End Motion Control with Simotion D
- Numerous Safety Functions
Migration Advantages
Reduced Size (SINAMICS G drives are usually more compact)

- Example 1: Chassis 110 kW
  - Chassis Unit FSG
  - Converter 110 kW
  - 400 V / 210 A
  - Power Module G130
  - Converter 110 kW
  - 400 V / 210 A
  - 100% 64%

- Example 2: Chassis 250 kW
  - Chassis Unit FSK
  - Converter 250 kW
  - 400 V / 510 A
  - Power Module G130
  - Converter 250 kW
  - 400 V / 490 A
  - 100% 40%

- Example 3: Cabinet Unit 315 kW
  - Cabinet Unit
  - Converter 6-pulse 1Q
  - 315 kW / 400 V / 590 A
  - Power Module G130
  - Converter 110 kW
  - 400 V / 210 A
  - 100% 60%

- Example 4: Cabinet Unit 800 kW
  - Cabinet Unit
  - Converter 6-pulse 1Q
  - 800 kW / 690 V / 860 A
  - Power Module G130
  - Converter 110 kW
  - 400 V / 210 A
  - 100% 60%

Remark: SINAMICS volume might be increased if cabinet-mounted sensor modules (SMC) are used.
Migration Advantages
NEW with SINAMICS: S120 Cabinet Modules

SINAMICS S120 Cabinet Modules: A modular cabinet unit system
- Standardized Modules (Rectifiers 1Q/4Q, Inverters, System Components)
- High degree of variety regarding options and system design
- High quality and reliability due to system tested components
- Short delivery times due to standardization
- High availability
- Low variety of components
- Low variety of spare parts
- Low space requirement
- Transparent design & layout
- Application-optimized design & layout
- Service & maintenance optimized design & layout

Migration Advantages
- Overview
- HW Characteristics
- Wiring
- Functionality
- Commissioning
- Reliability
- Cost Savings

Units for Supply Voltage 400V
Units for Supply Voltage 500V / 690V
Electronics and Software

Wiring at SINAMICS S120 multi-axis systems
Significantly less Profibus cabling thanks to the central Control Unit at S120
Up to: 6 x Profibus cable and connectors
6 x Profibus board CBP
6 x Cabling
Communication Programming

1 x Profibus cable and connector
Profibus interface is on-board
1 x Cabling

Major savings:
- HW costs
- Wiring

Unified and easy wiring with Drive-CLiQ
Terminal Module Connection
Axes Synchronization Connection of all encoder types

All components of the drive system are connected using the same cable:
- Unified cabling (DRIVE-CLiQ)
- Reduction of components
- Pre-assembled cables
- Fast, simple plug-in-connection
**Migration Advantages**

**Extended Functionality at SINAMICS S120**

### Positioning: More functionality and graphical parameter setting

- **MASTERDRIVES**
  - Positioning functionality
  - EPos
  - Travel Commands

- **SINAMICS S120**
  - Positioning Functionality
  - EPos S120

- **SIMODRIVE 611U**

### Technology: Extended functionality and graphical parameter setting

- **DCC**
  - Logics, Arithmetics, …
  - Blocks have multi-instance-capability
  - Block connection: Graphically, with CFC-Editor: Drag, Drop & Connect

- **Higher Functionality**
  - Multi-instance-capability, i.e. every block can be used as often as necessary
  - Central processing, with direct access to all drive signals within the CU. This simplifies the application and reduces the complexity.

---

**NEW with SINAMICS S120: Safety Integrated**

- **Safe Standstill (STO, Option)**
- **STO (Standard)**
- **SS1 (Standard)**
- **SS2 (Option)**
- **SOS (Option)**
- **SLS (Option)**
- **SLS (Option)**
- **SSM (Option)**

### Advantages:

- **New Functions:**
  - New and intelligent safety concepts
  - External safety components are no longer necessary

### SINAMICS S120 integrated into SIMOTION D

- **Machine control**
  - Communication
  - Drive-related control functionality
  - Technology
  - Motion Control

- **SIMOTION D SINAMICS S120**

- **One powerful system, programmable (graphical and high level languages)**
- **Reduced complexity, easier programming and error tracking**
- **Higher flexibility**
Migration Advantages
Improved Commissioning for SINAMICS G and S due to Starter Tool

Automatic Initial Commissioning using Electronic Rating Plates
- DriveMonitor: Manual input of motor data, encoder data and speed control loop parameters
- Starter: Motor and encoder are automatically identified, when motors with integrated DRIVE-CLiQ interfaces (SMI) are used. The speed control loop is also automatically optimized.

Advantages: Automatically, faster, reduction of errors

Central Memory Card simplifies the Commissioning of Serial Machines
- DriveMonitor: script needs to be downloaded n-times
- CF card is loaded (PC), then plugged into the CU
- 1 CF for up to 6 drives

Advantages:
- multiple axes are commissioned with one step
- No PC with Engineering Tool necessary
- Peer-to-peer connection or bus configuration not necessary

Efficient trouble shooting with central diagnostics for all components
- DriveMonitor: Every error buffer (i.e. per drive) needs to be read individually
  - No further details on motor or encoder errors
  - Trace recording and monitoring have to be individually performed for each drive
- Starter: One error buffer (the central CU) must be read
  - The CU provides also details on motor and encoder errors (with DRIVE-CLiQ)
  - Central trace recording & monitoring for all drives connected to one CU

Faster component swapping with Memory Card
- Parameters are stored in the drive control unit.
  - In case of HW failure:
    - Swap components,
    - Find the actual Backup,
    - Download parameters to the new component (requires DriveMonitor)
- Parameters are stored on the CF-card.
  - In case of HW failure:
    - Swap components,
    - Re-plug the CF-card
  - Fast,
  - Secure
Migration Advantages

Direct Cost Savings

- Major potential savings for multi-axes-drives:
  - One control unit for up to 6 drives
  - Only one Profibus cable for up to 6 drives, the Profibus interface is on-board
  - Double Motor Modules are available in the lower power range
- Safety Integrated Functions replace external safety components and their wiring
- Rectifier / Regenerative Units no longer require an autotransformer
- Simplified DC-link connection up to 100 kW (Booksize)
- Reduced cabinet size
- Modular system design in formats: Booksize, Chassis, Cabinet Modules

Further Savings

- For the OEM:
  - Reduced Engineering:
    - Reduction of components and complexity
    - A higher and flexible functionality simplifies the application and increases the re-usability
    - Reduced wiring
    - Shorter commissioning phase, e.g. with Electronic Rating Plates
    - Easy diagnostics and maintenance worldwide via the Internet, with no additional tools (if SINAMICS is used with SIMOTION D)
- For the End User:
  - Reduction of spare parts through a reduced component variety
  - Reduction of machine downtimes:
    - Efficient error tracking and diagnostics
    - Fast and secure swapping of components
    - Optimized safety concepts
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tran Vu Thanh</td>
<td><a href="mailto:tran-vu.thanh@siemens.com">tran-vu.thanh@siemens.com</a></td>
</tr>
<tr>
<td></td>
<td>(+84) 914.295.764</td>
</tr>
</tbody>
</table>