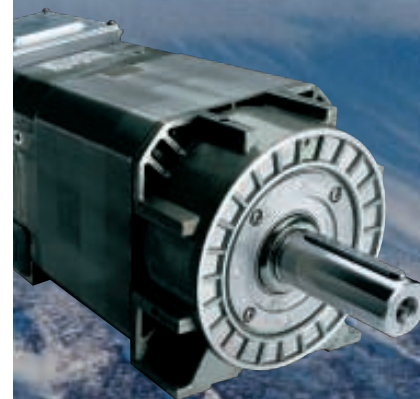


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**MASTERDRIVES Vector Control.**  
For demanding  
continuous processes



# drive solutions

## VECTOR CONTROL



**The standard for productive drive solutions**

- 0.55 kW to 6000 kW
- Voltages up to 690 V
- Fully certified to IEC/EN/UL/CSA
- Single and multi-motor drives
- For all induction motors, all industry sectors, all applications
- With and without encoder
- Comprehensive, integrated intelligence
- Perfect logistics, worldwide service



## SIMOVERT MASTERDRIVES Vector Control: The drive system which distinguishes your machine from the rest

If continuous processes, with power ratings up to 6000 kW, place high demands on the automation and drive technology, then the right choice for you has to be SIMOVERT® MASTERDRIVES Vector Control – the worldwide successful AC drive. You will be selecting a drive system which, like no other, is dynamic, efficient and flexible across the complete range.

MASTERDRIVES Vector Control is unique in its philosophy:

- A single engineering tool is used from the process control level through the automation level up to the drive – Drive ES
- From 0.55 kW to 6000 kW, a single control principle, a single parameter and operator control concept

MASTERDRIVES Vector Control leaves the competition behind when it comes to control accuracy and reliability – with Active Front End for clean line supplies. It is also second to none when it comes to compactness with Vector Control Compact PLUS. Comprehensive, integrated intelligence creates the flexibility required for optimum machine concepts and highest productivity. In short – a consequentially unified system resulting in reduced engineering costs, the ability to be used worldwide, high precision, flexibility and performance – and of course, perfectly harmonized with Totally Integrated Automation.

### The universal drive with which to tackle all drive problems

MASTERDRIVES Vector Control can be used universally and can supply any three-phase induction motor for all of the relevant voltages up to 690 Volt. Modular, plug-in option cards such as fieldbus interfaces, terminal expansions or technology boards can be used to solve every task - fast and reliably. Integrated "free function blocks" make your drive solutions significantly more flexible.

### MASTERDRIVES – a complete program which is unique in the world

Our range of drives comprises two continuous series which are ideally harmonized with one another: Vector Control (VC) for demanding continuous processes and Motion Control (MC) for cyclic highly dynamic machines.

Whether for single or multi-motor drive applications, in compact, chassis or cabinet unit design – MASTERDRIVES Vector Control are precisely the right fit for every industry sector and are internationally certified to IEC, EN, UL, CSA.

Modularity, which creates security for every drive concept

- Unified system
- Always the right fit
- Space saving
- Highest productivity through high availability
- Water cooling for IP 65

## The modular system that's got it all: So that your solution shines

MASTERDRIVES Vector Control offers highly efficient drive solutions for all industry sectors – whether in the packaging, printing and paper industries, or in wood-working, textile processing, manufacturing, conveyor technology and high bay racking vehicles.

This is because all of the industry sectors are served from a modular system which is completely orientated to provide cost-effective solutions. No matter what the demand and drive quality required – MASTERDRIVES Vector Control offer the fitting modular and flexible solution. For stand-alone as well as coordinated drive applications – and extremely simple for the user.

### High power density in the smallest space: Compact PLUS

MASTERDRIVES Vector Control, with their extremely compact design, are a perfect fit in every situation. They have the ideal dimensions – for example, for the 0.75 kW Compact PLUS these are 45 mm wide, 260 mm deep and 300 mm high. This makes them suitable for 300-mm-deep cabinets.

An especially attractive feature: drive converter and two inverters in one, making multiple axis systems even more compact. You can connect two inverters to an autonomous drive converter unit of the Compact PLUS design – fully functional without a rectifier unit. And here's a piece of genius: DC link busbars ensure fastest possible installation. Higher rating rectifier modules are available for more complex multiple-axis systems.

### For the highest productivity demands: MASTERDRIVES Vector Control with Active Front End

In every industry sector and every application, MASTERDRIVES Vector Control are the optimum solution. For instance, they can also be supplied with Active Front End.

No matter what the line supply characteristics are: Active Front End always supplies the drive with a precisely regulated DC link voltage and also optimally protects the drive using active and passive safety functions. This significantly increases the availability of your production systems.

### Always our goal: the cost-effectiveness of your plant

MASTERDRIVES Vector Control offer the security of system components which are harmonized with one another – for example:

- Radio interference suppression filters, line reactors
- Braking units and matching braking resistors
- Output reactors, output filters
- Encoder and motor cables, also available preconfigured

### Functional safety using Safety Integrated

The "Safe STOP" function has been certified for the MASTERDRIVES series by a German regulatory group for safety at work. This means that you can be certain that your drives will only start when you want them to.

### Motors – perfectly matched to the drive system

MASTERDRIVES Vector Control are optimally matched to the compact and highly dynamic Siemens induction motors – they control them perfectly. It goes without saying that standard and trans-standard induction, reluctance and SIEMOSYN® motors can also be used.

### Water-cooled versions to keep

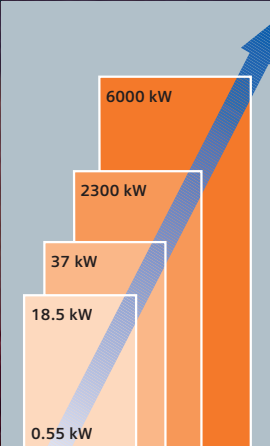
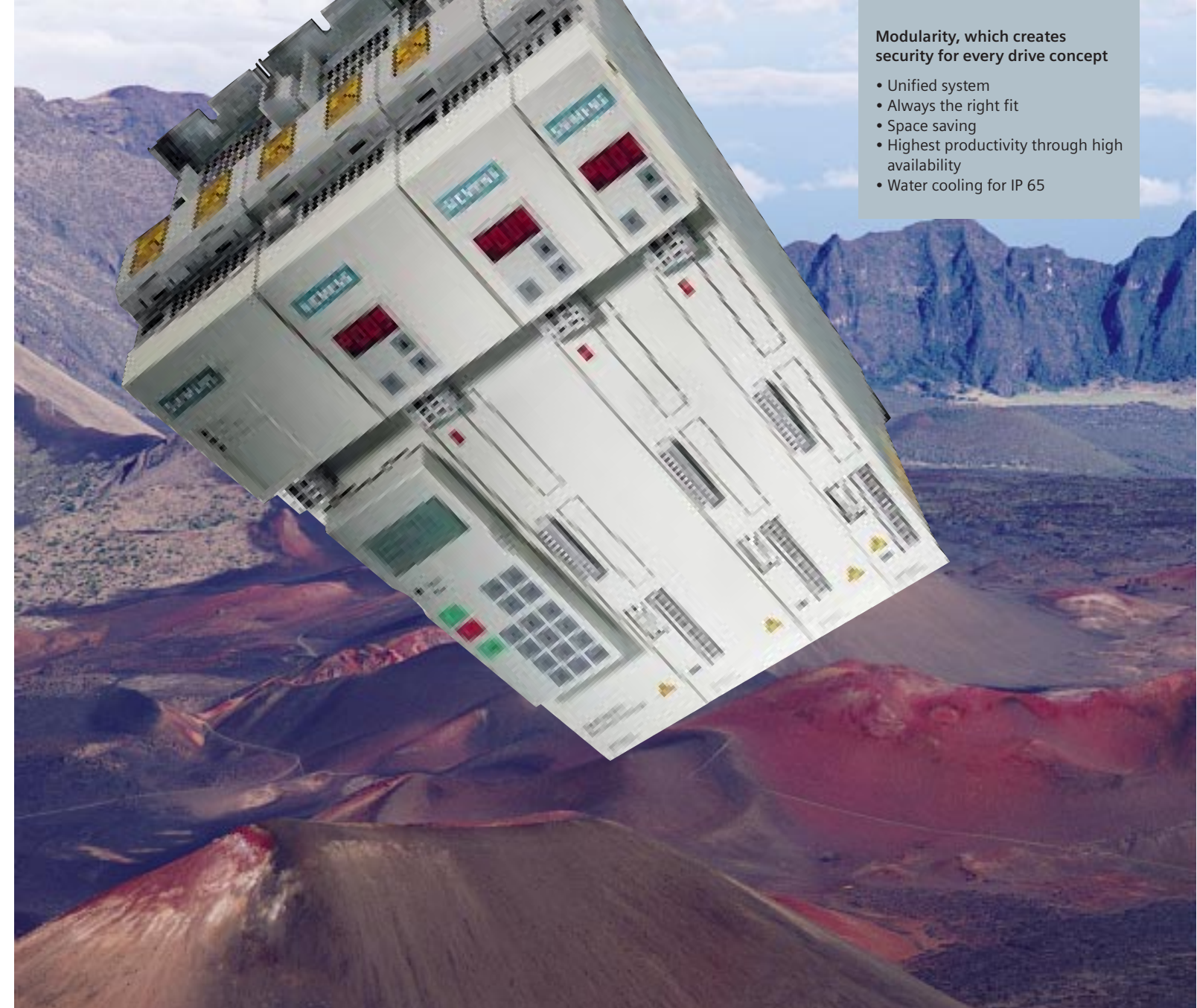
### your production running cool

Water-cooled MASTERDRIVES are especially at home in applications such as wire and cable machines, printing units, injection molding machines and marine drives. The power losses are easily and reliably dissipated. Systems with degree of protection up to IP 65 can be achieved by mounting these drives in suitable cabinets.

## New: also in the Compact PLUS design

Whether as Compact PLUS, compact, chassis or cabinet version: the MASTERDRIVES Vector Control program is unified from 0.55 kW to 6000 kW – for all worldwide voltages:

- 3-ph. 380–480 V AC
- 3-ph. 500–600 V AC
- 3-ph. 660–690 V AC



## Excellent communicator: Completely open

First-class drives should be in the position to be flexibly integrated into every automation solution. MASTERDRIVES Vector Control are such first-class drives.

### Best connections in every automation environment

MASTERDRIVES Vector Control create the best connections in any automation environment. No matter whether communication is established via PROFIBUS®-DP or CAN, whether integrated in SIMATIC or another automation system, whether data is transferred at the speed of light via SIMOLINK or menu-prompted operation with DriveMonitor®.

### Communication via PROFIBUS-DP

MASTERDRIVES Vector Control drives can be simply connected to a PROFIBUS-DP bus, the most successful fieldbus standard worldwide with data transfer rates of 12 Mbit/s: thanks to slave-to-slave communication, communication between slaves functions perfectly using the CBP2 board. This enables setpoints to be routed from drive to drive without loading the automation system. It is also extremely easy to integrate them into the SIMATIC automation environment using Drive ES (more information on this is provided on the next page).

### Serial interfaces with USS protocol

MASTERDRIVES have as standard a serial interface (USS interface). You can use this as RS232 for point-to-point couplings or as RS485 for bus operation. This can be used to connect DriveMonitor – the commissioning and diagnostics tool – to commission your drives.

### DriveMonitor: astonishingly simple commissioning using PC or SIMATIC

DriveMonitor is a PC-based tool running under Windows 95/98/ME/NT/2000 and which supports drive commissioning and drive-related diagnostics. DriveMonitor is used for menu-prompted operator control and visualization; reading, writing, managing and printing parameter sets, both online and offline.

### The intelligent operator panel for fast local commissioning and diagnostics

The OP1S operator panel has a plain text, alphanumeric display in German, English, French, Italian and Spanish. This means that commissioning, operator control and diagnostics are always fast and straightforward using the keypad and easy-to-understand menu prompting. The OP1S can save up to six parameter sets and, using upload and download operations, these can then be copied to other drives.



### Full communication capability

- Menu-prompted operator control and monitoring
- For all popular interfaces
- For all popular bus systems
- For all automation systems
- Powerful engineering tools
- Optimum degree of user-friendliness for commissioning, communication and service



# Totally Integrated Automation: MASTERDRIVES Vector Control fit seamlessly into your automation environment – also in the future

Do you require integrated data management, integrated communication and integrated engineering? Thanks to Drive ES, with MASTERDRIVES you have made the right choice. This is because it makes things a lot easier for you. There is nothing comparable when it comes to simply integrating drive technology into the SIMATIC and SIMOTION environments – straightforward, time-saving and cost-effective!

## Totally Integrated Automation: everything is straightforward with Drive ES

Drive ES – Drive Engineering System – has been especially developed for Siemens drives and integrates MASTERDRIVES perfectly into the SIMATIC and SIMOTION environments via PROFIBUS-DP – just as you want it.

## Drive ES Basic: the entry into the world of Totally Integrated Automation

Commissioning, parameter editing, tracing and fault evaluation: Using the basic package Drive ES Basic, you can work with your automation and drives via the SIMATIC Manager interface. Drive ES Basic is the starting point for common, shared data archiving of complete projects and also for using SIMATIC Teleservice for your drives. And if you have to replace the drive, then you no longer have to program it: you can simply download the settings from the SIMATIC-CPU!

## Drive ES Graphic: freely configure your drive functions

The Drive ES Graphic operator interface is optional and is based on Drive ES Basic. Drive ES Graphic allows the functions of Siemens drives to be tracked in a user-friendly fashion – online, offline or in test mode. For example, if you manually changed parameters

in the drive, then you can read back these changes and simply correct the generated charts.

Using Drive ES Graphic, you can

- save all of the charts in SIMATIC format
- configure the drive functions in BICO technology using CFC
- fully utilize the online and offline functionality.

## Drive ES SIMATIC: parameterize communication

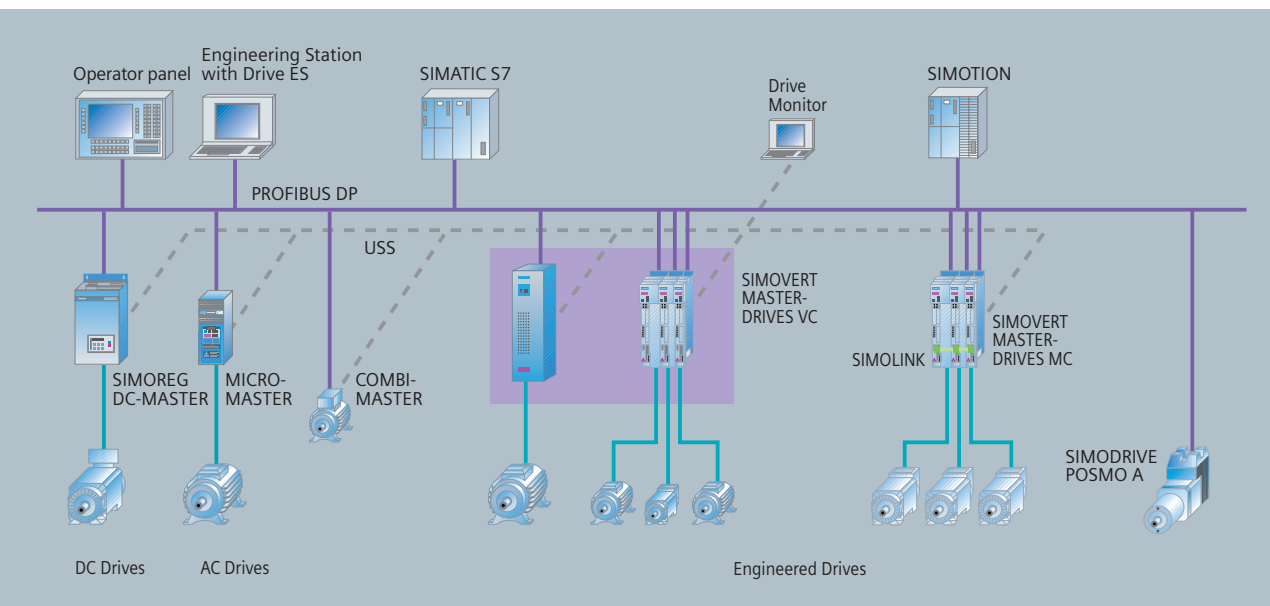
Drive ES SIMATIC provides function blocks and typical projects for the SIMATIC CPU. These can communicate with Siemens drives via PROFIBUS or USS. The decisive advantage: you no longer have to program the complete communication – parameterization is sufficient.

## Drive ES PCS 7: for user-friendly integration into the PCS 7 system

You can simply integrate MASTERDRIVES Vector Control into the PCS 7 process control system using Drive ES PCS 7 – it's child's play. In this case, Drive ES PCS 7 provides the control block for the automation station and also a harmonized faceplate for the operator station.

## Consequentially unified: Drive ES

- For simple configuring and process optimization
- For fast diagnostics
- For simple, prompted commissioning
- Unified data management
- Perfect integration into the automation and process environment





# Distributed intelligence inside: With function blocks for every task

The automation system is significantly relieved if the drive handles technological and control functions. It simplifies the configuring, service and reduces the system and engineering costs.

## MASTERDRIVES Vector Control for the highest dynamic response and distributed intelligence

The control software is the core of Vector Control. This ensures the best dynamic response, excellent control characteristics and high flexibility. It handles all of the motor-related control tasks with or without encoder and has an exceptionally large number of free function blocks, which can be used to flexibly implement drive-related control systems.

## Comprehensive BICO library for open-loop and closed-loop control and logic functions

The control structure of MASTERDRIVES Vector Control is pre assigned in the factory and can be selected using parameters. Furthermore, the signals can be injected and picked off at specified points. This means that you can interrupt connections established in the software and establish new connections. BICO technology makes this all possible. This is used to freely connect closed-loop and open-loop control blocks – just the same as for programmable logic controllers. This means no longer having to program the system – it just has to be parameterized. Not only this, MASTERDRIVES Vector Control has the same functionality as a basic SIMATIC PLC.

In this case, the advantage is that you always use the optimum functional scope. Simply select a structure from the permanently installed standards and commissioning has been completed and the drive is ready to be powered up.

The frequently required standard functions in the package can be immediately used:

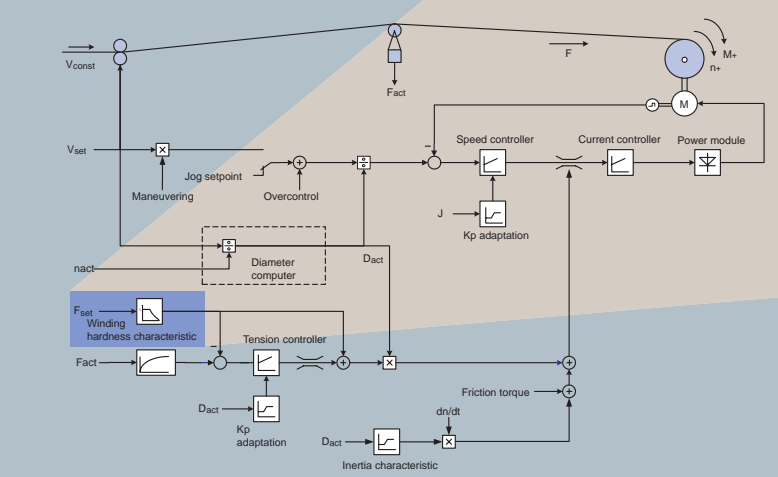
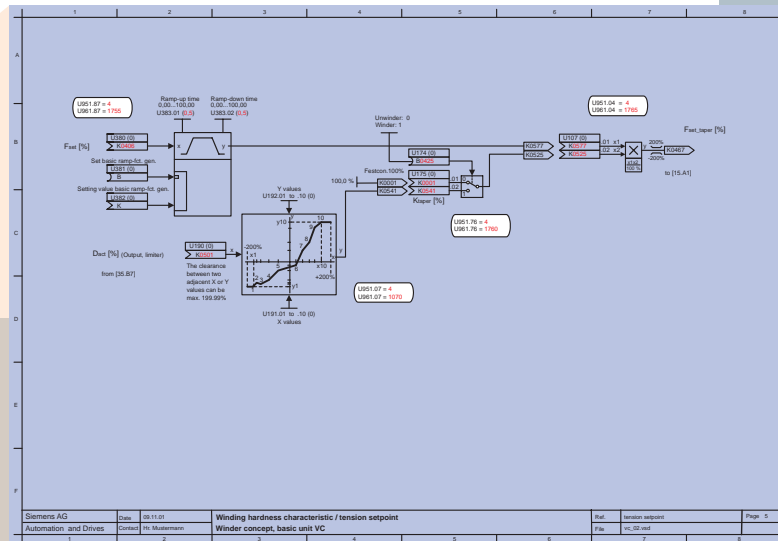
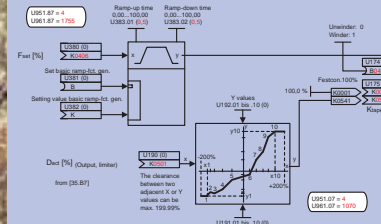
- User-friendly ramp-function generator
- Wobble generator
- Technology controller
- Arithmetic blocks and many more.

This means that you can implement practically any function – from simple, technological functions up to complex applications, for example a winder (refer to the diagram).

The blocks are simply interconnected using binectors and connectors. Binectors connect binary signals, connectors, connect 16-bit or 32-bit data.

### Distributed intelligence inside

- For high dynamic response
- For excellent control characteristics
- For high flexibility
- Free function blocks
- BICO library for open-loop and closed-loop control and logic functions



Example: direct closed-loop tension control with tension transducer using torque limiting

## Comprehensive range of boards: No restrictions – no matter what the application

### Complex technology functions with T100/T300/T400 boards

These boards offer a wide range of versatile functions for foil-making and paper machines, coating plants, textile, printing and wire-drawing machines and more: these boards can be used to implement electronic shafts, axial winders, position controllers, etc.

### CBP2 and CBC boards for universal communication

The CBP board for PROFIBUS-DP and CBC for CAN guarantee universal, open communication for MASTERDRIVES Vector Control.

### SLB board for drive-to-drive data transfer via SIMOLINK

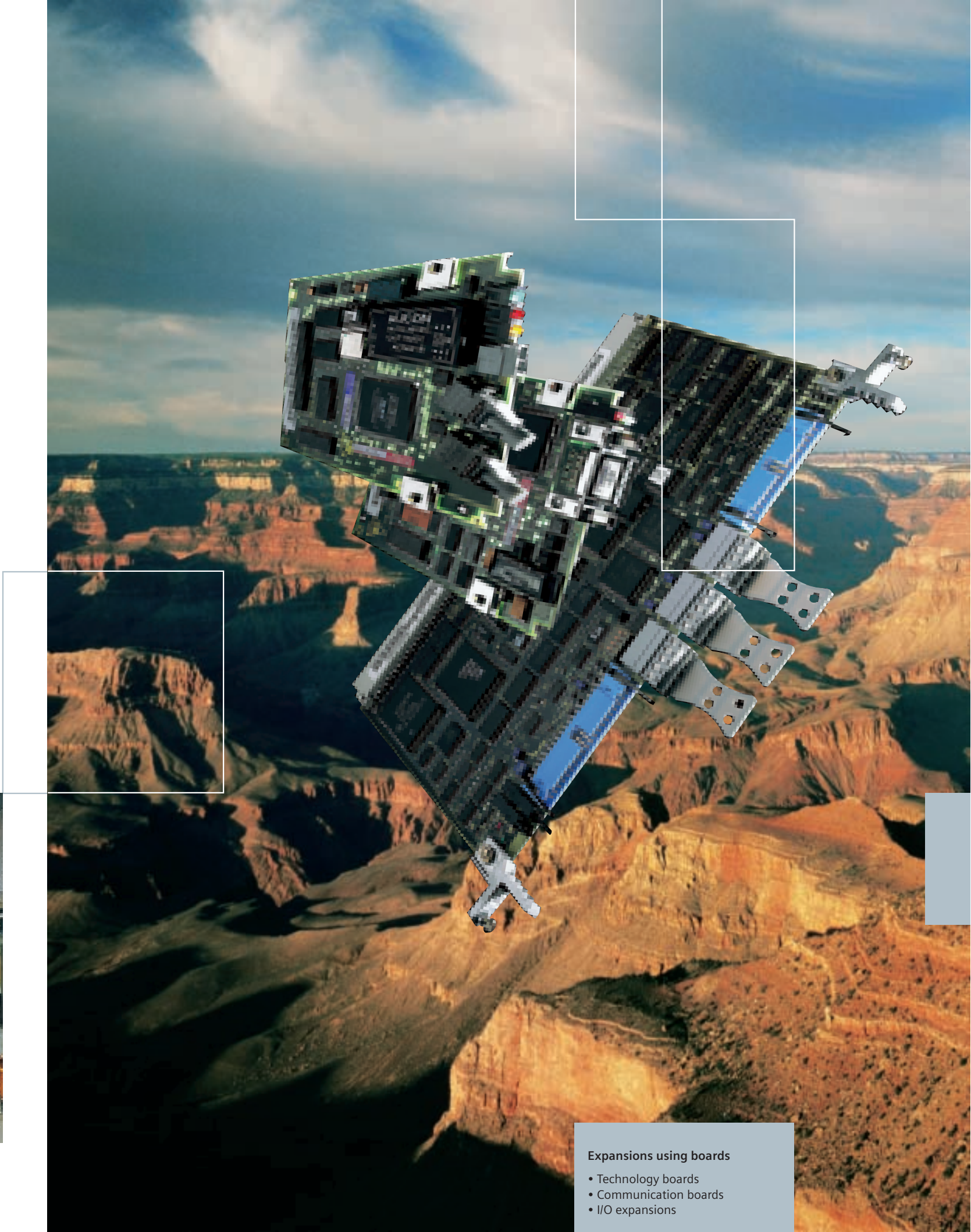
This is an option board for fast data transfer between the various drives via SIMOLINK.

### EB1 and EB2 boards to expand the inputs and outputs

The digital and analog I/O of MASTERDRIVES Vector Control can be expanded using these boards – to provide even more possibilities. Additional option boards such as SCB1 and SCB2 supplement the modular range.

### SBP board for setpoint input using an external pulse encoder

This board allows a pulse encoder or a frequency generator to be connected, e.g. to input a frequency or speed setpoint for MASTERDRIVES Vector Control.



#### Expansions using boards

- Technology boards
- Communication boards
- I/O expansions

## The technology: Unique integration capability, unique flexibility, unique high performance

### Technology which you can depend on – around the globe

We provide a sophisticated supply and logistics system so that MASTERDRIVES Vector Control arrives where you require it. The result: Shortest delivery times and straightforward order-

ing for every product. We have a comprehensive worldwide service network, we provide training for personnel and we support you wherever and whenever you require us so that your drive is always up to speed. We can support you locally or immediately by telephone.



Compact PLUS drives booksize IP 20

- Extremely compact design with the ideal dimensions 45 x 260 x 360 mm (WxDxH) e.g. for 0.75 kW
- Drive units can be lined up without any intermediate spaces
- Extremely simple wall mounting
- Mounting in 300-mm-deep cabinets
- Can be directly lined up with MASTERDRIVES MC Compact PLUS units



Compact drives booksize IP 20

- Small footprint
- Drive units can be lined up without any intermediate spaces
- Simple mounting on G rails



Chassis units IP 00/IP 20

- Compact design
- High power density
- Shockproof according to VDE 0106 Part 100/VBG4
- Extremely simple wall mounting in IP 20 panels (option kit required – possible for drive units up to size G)
- Drive units can be lined up without any intermediate spaces



Cabinet units IP 20/IP 21/IP 23/IP 43/IP 54 prepared

- Ready to connect up for single and four-quadrant operation, 6- and 12-pulse
- Small footprint
- Standard dimensions: 2000 mm high, 600 mm deep
- Operator control and parameterizing unit in the cabinet door

Voltage		Rated output	Design		
3-ph. 660 V–690 V AC DC 890 V–930 V	3-ph. 500 V–600 V AC DC 675 V–810 V	0.5	Compact PLUS	Compact units	Inverter cabinets
		1.1			
		1.5			
		2.2			
		3.0			
		4.0			
		5.5			
		7.5			
		11			
		15			
		18.5			
		22			
		30			
		37			
3-ph. 380 V–480 V AC DC 510 V–650 V	3-ph. 500 V–600 V AC DC 675 V–810 V	45	Compact PLUS	Compact units	Inverter cabinets
		55			
		75			
		90			
		110			
		132			
		160			
		200			
		250			
		315			
		400			
		500			
		630			
		710			
800					
3-ph. 660 V–690 V AC DC 890 V–930 V	3-ph. 500 V–600 V AC DC 675 V–810 V	900	Compact PLUS	Compact units	Inverter cabinets
		1000			
		1100			
		1200			
		1300			
		1400			
		1500			
		1700			
		1900			
		2300			
		Higher output ratings as drive application			
		Drive cabinets			
		Drive cabinets			
		Drive cabinets			

General technical data		
MASTERDRIVES Vector Control	Without AFE*	With AFE*
Rated supply voltage	Up to 690 V (refer to the adjacent table)	Up to 690 V (refer to the adjacent table)
Rated frequency	50/60 Hz +/- 6%	50/60 Hz +/- 10%
Output voltage	3-ph. 0 V AC up to max. supply voltage	3-ph. 0 V AC up to max. 550 V for 400 V units 680 V for 500 V units 815 V for 690 V units
Power factor (at rated load)		
• Fundamental	> 0.98	1
• Total	0.93 to 0.96	> 0.99
Efficiency	0.96 to 0.98	0.96 to 0.97
Maximum output frequency		
• V/f textile	500 Hz	500 Hz
• V/f characteristic	200 Hz in the constant flux range	200 Hz in the constant flux range
• Vector Control types	300 Hz or 5 x Rated motor frequency in the field weakening range	300 Hz or 5 x Rated motor frequency in the field weakening range
Permissible ambient temperature or cooling medium temperature in operation	0 degrees up to 45 degrees Celsius	0 degrees up to 45 degrees Celsius
Degree of protection	IP 20	IP 20
Radio interference suppression		
• Standard	No radio interference suppression	No radio interference suppression
• Option	Class A1/B1 (conducted)	Class A1/B1 (conducted)

\* AFE stands for Active Front End - a self-commutated, pulsed rectifier-regenerative feedback unit – which supplies the inverter with a precisely controlled DC link voltage using step-up operation, independent of the line supply voltage.

More information is available online under:  
<http://www.siemens.com/machine>