

vari **motion**

*high performance
motion technology*



promicon
SYSTEMS

Easy integration

In order to integrate Varimotion into leading control technologies, interfaces for various networks are available. This allows Varimotion to be connected directly to control systems and computers.



TCP/IP

Scalable architecture

- Digital and analogue I/O
- Communication
- Encoder inputs
- Servo controller for small motors
- Servo controller with mains connection



vNET Technology

With its outstanding properties, the vNET drive network forms the backbone of the high-performance Varimotion multi-axis system.

In designing vNET priority was placed on a high data transfer rate and rapid response times as essential for exploiting the pronounced dynamic properties of modern servo drives.

The key to precision in networked control technology resides in highly accurate timing. In this process special telegrams are transmitted by the master with an invariable raster and the connected slaves use them to determine the times at which their activities are conducted. The temporal fluctuation in these synchronization telegrams is called jitter. The performance figures achieved by vNET are exponentially superior to those of other systems.

vNET Highlights

- Cycle time: 250 μ s
- Data rate: 80 Mbit / s
- Jitter: < 20 ns

Parameterisable motor feedback

- EnDat 2.1
- EnDat 2.2
- Hiperface
- BiSS
- SSI
- Incremental
- Sine-cosine
- Resolver

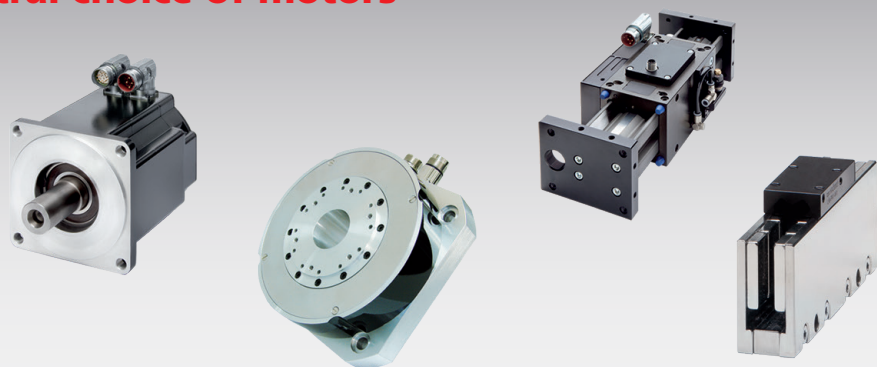
Uncompromising for demanding tasks

Challenging assignments in modern mechanical engineering have consistently shown that solutions using standard components are either extremely difficult to execute, diluted by compromise, or simply impossible to implement. Limits that can only be transcended with refined closed-loop control technology and minuscule response lag arise with particular frequency during application of highly dynamic servo drives. The answer to this challenge is provided by Varimotion from Promicon. This motion-control system has been specifically conceived for applications in which compromise simply can't be considered.



Manufacturer-neutral choice of motors

- AC servo motors
- Linear motors
- Torque motors
- Direct drives
- Tubular motors
- Voice-coil motors
- DC motors
- 2- and 3-phase winding



Excellent dynamics and precision

Modern servo motors are characterised by high concentrations of force density combined with high-resolution feedback systems. Closed-loop control systems incorporating agile hardware components and high-performance algorithms are essential for translating these properties into dynamic response and precision at the highest levels. With many years of experience in high-speed applications, Promicon is ideally placed to offer outstanding fulfilment for these demand criteria with Varimotion.

Speediness through tight coupling

Varimotion combines the disciplines of motion, logic and communications in a closely intertwined synthesis. As a result, information and events are transferred very fast between the functional units and delays are minimized to a minimum.

Virtual axes

Varimotion offers virtual axes for implementing complex motion patterns featuring one or several axes with cam profiles. This function can be used to define desired motion curves for axes relative to a virtual axis. Instead of the individual axes only the virtual axis is repositioned to control the overall motion pattern, while the dependent axes proceed in concert with the predefined motion curves.

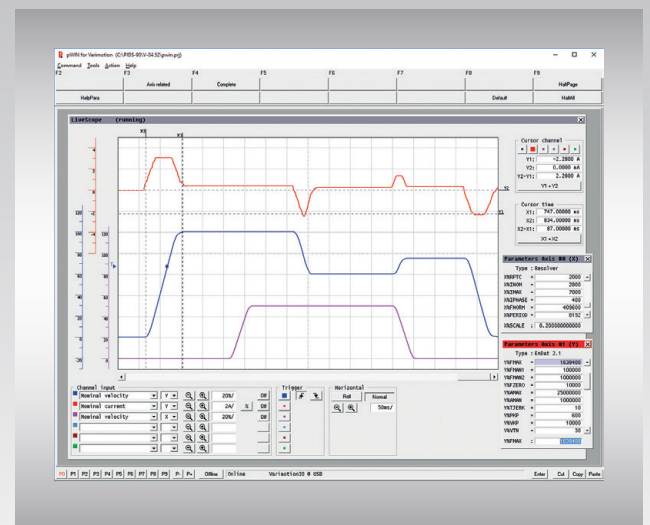
Parallel programs

A particular characteristic is the ability to process up to 8 user programs in parallel and independently of each other. An advantage of programs executing in parallel resides in the ability to disassemble tasks into logically segregated software components, achieving higher levels of transparency with simultaneous reductions in development times.

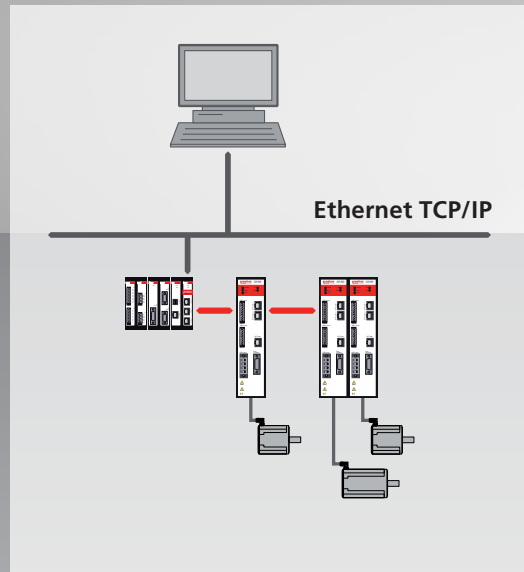
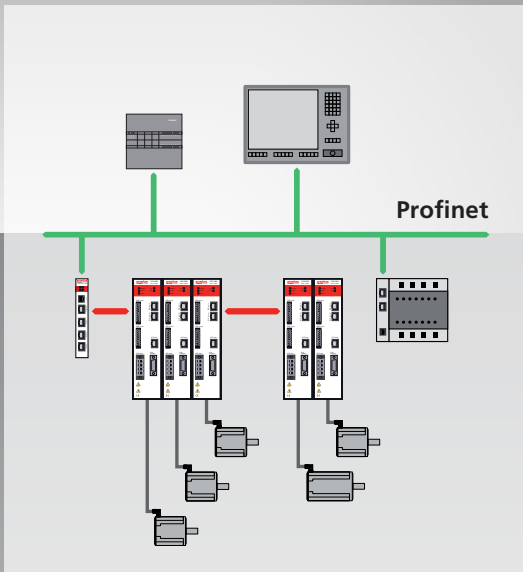
Technology functions

A key element of Varimotion are the extensive technology functions. With appropriate programming technology these can be combined to form complex functional routines. Defined operational requirements such as synchronous operation, flying saw, speed profiles, position detection with trigger input, force monitoring and obstacle detection can all be implemented with ease. The technology functions can also be employed to influence motion patterns with signal inputs, for instance, to cancel a motion pattern or initiate a subsequent process once a specified pressure is reached.

Live Scope

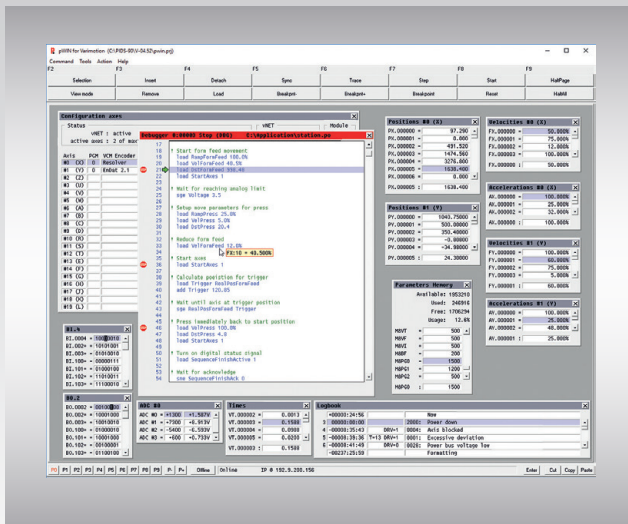


To simplify the drive tuning, the real-time debugger provides a Live Scope to monitor and analyze the behavior of the drive on the computer. One of Live Scope's special features is to display in real-time mode like an oscilloscope, which allows immediate observation of events in the drive system.



Real-time debugger

The pWIN real-time debugger is available for operation and programming. This can be operated through industrial networks, Ethernet or USB. Any desired selection from among various tools can be opened on multiple screens for subsequent mutual combination. This provides an optimal overview of operating status, process signals and variables for the specific situation.



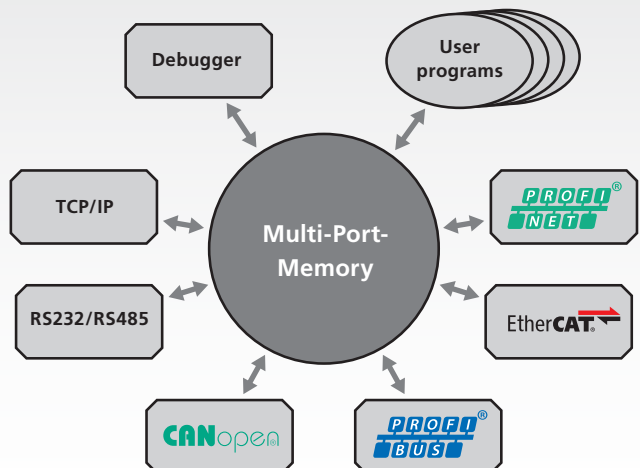
- Editors for multi-port variables and system parameters
- Teach-In of positions
- Inspection of digital and analogue signals
- Optimize and adjust axes
- Source code debugger with single-step operation and breakpoints
- Monitoring of variables and resources
- Spot monitor for quick inspection of values

Multi-port memory

All of the variables saved in the memory can be accessed using a multi-port process. This means that each variable can be read and written by various instances at any time. As memory modules MRAMs are used, which represent a technology offering extraordinary levels of reliability. All variables are provided with checksums for added enhancement of data security.

The multiport memory can be applied for a varied array of tasks:

- Data exchanges between user programs
- Communications of user programs with external computers and devices
- Inspection and modification of variables during user program testing and in active operation



Central administration

The parameters and firmware for the controller modules are stored in the head module and then automatically loaded to the controller modules when the unit is switched on. A particular asset of this arrangement is how it eases commissioning and maintenance, a convenience stemming from the fact that no special technical skills or computers with suitable software are required. Simplified system diagnosis remains available because messages from the controller modules are registered in the head module and recorded in a central diagnosis logbook.

Modular head module

The head module forms the central point of the drive system. It is from this location that control for the overall function and coordination of axis motion patterns is executed. There are various interface modules available for connection to the established networks. These are consistently generously designed to be able to transport even large amounts of data in a very short time.

- Profinet
- Profibus
- EtherCAT
- CANopen
- Ethernet TCP/IP

Depending on the requirements, a head module can be extended by modules with different functions.

- Digital and analogue I/O
- Data interfaces
- Encoder inputs
- Control of external speed controller



Smart head module

In addition to the modular head modules, smart head modules are also available. These are characterized by high cost efficiency and are particularly suitable for applications in which the motion control in the foreground and the signal processing is performed entirely by the higher-level control.

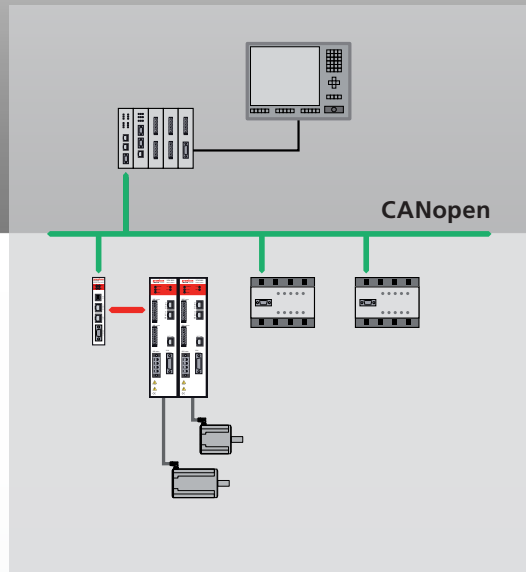
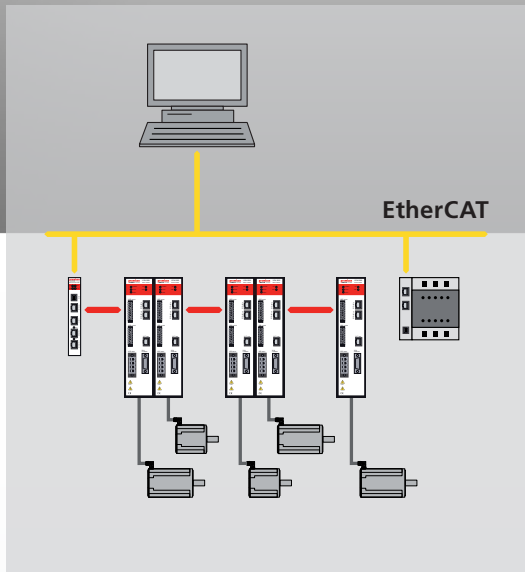


Parameterisable motor feedback

The universal feedback interface represents a special feature in this servo controller. It allows direct connection of various motor feedback systems without the need for any special auxiliary modules. The specific system is simply selected with the parameter definitions for the drive.

- EnDat 2.1
- EnDat 2.2
- Hiperface
- BiSS
- SSI
- Incremental
- Sine-cosine
- Resolver





Unlimited motor selection

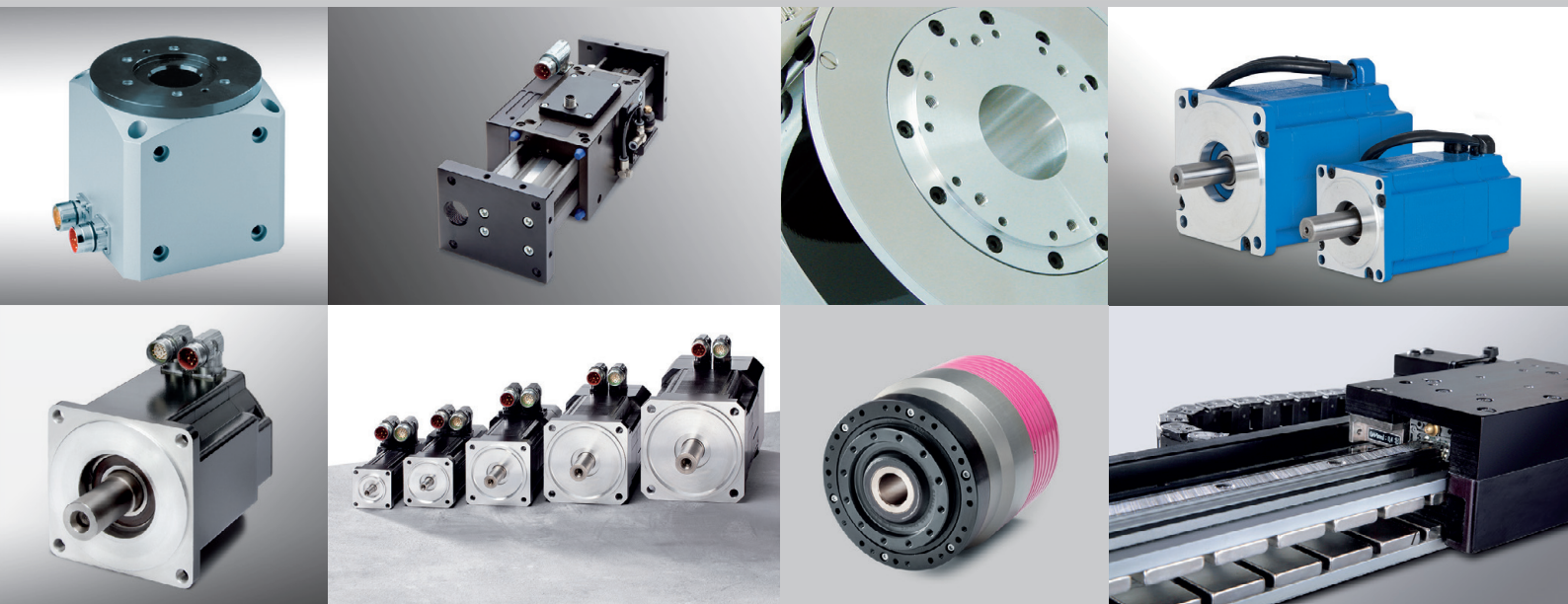
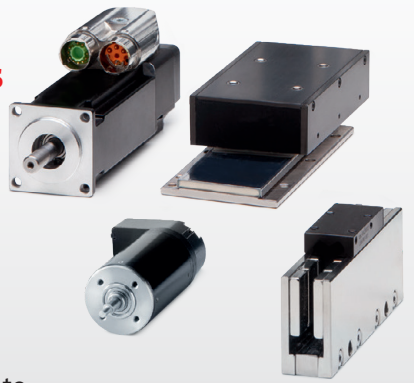
The system's universal structure allows application and operation of servo motors from any manufacturer in an unrestricted and highly variegated range of designs. This endows engineers with the latitude to select the optimal motors for their specific applications. The modalities of parameter definition allow adaptation of a motor with no need for special and time-consuming implementations. The motor is ready to assume operation at once.

- AC servo motors
- Linear motors
- Torque motors
- Direct drives
- Tubular motors
- Voice-coil motors
- DC motors
- 2- and 3-phase winding

Servo controllers for small motors

The range supplements servo controllers for direct connection to the electrical mains with devices designed for low DC link voltages. This allows design engineers to specify motors with extremely small dimensions, of the kind frequently employed to handle small components. Further benefits are:

- Simplification of the electrical installation
- Power supply through 24V control voltage
- Small design of the servo drive





Configurable head modules

	Type	Function
	CPU-240	Central unit in variable performance classes
	PNS-25	Profinet device, Ethernet
	ECS-26	EtherCAT slave, Ethernet
	PBS-22	Profibus slave, Ethernet
	SDC-23	2 RS232 interfaces
	DIO-26	8 digital inputs and 8 digital outputs optional pulse counter and position trigger
	DI-27	16 digital inputs
	DO-28	16 digital outputs
	VI-23	4 analogue inputs, 14 bit
	VO-24	4 analogue outputs, 14 bit
	MPX-25	Encoder input, incremental, EnDat 2.2, BiSS
PCX-24	External speed controller	

Smart head modules

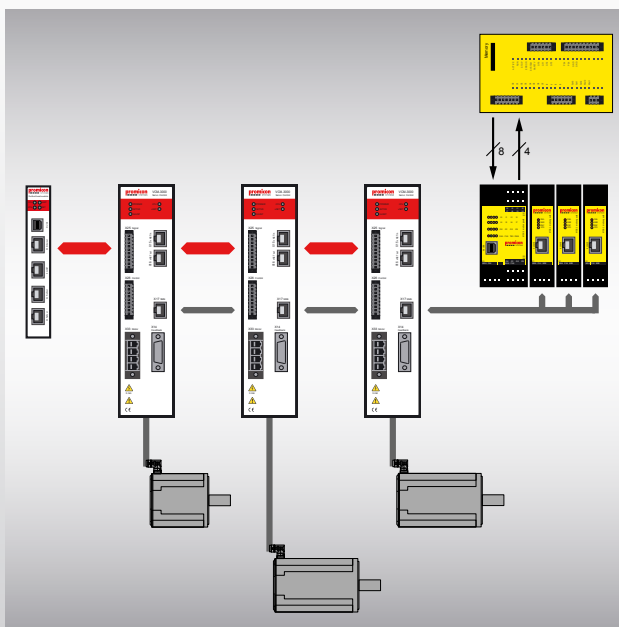
	Type	Network	Interfaces	Memory
	VCU-70-PN	Profinet	USB Ethernet TCP/IP vNET	256 kByte ... 2 MByte
	VCU-70-EC	EtherCAT		
	VCU-80-PB	Profibus		
VCU-80-CO	CANopen			

Servo controllers

	Type	Continuous current	Supply	Miscellaneous
	VCM-3100	2.5 ... 10.0 A _{rms}	DC voltage 20 ... 70 V _{DC}	Parameterisable feedback 8 digital signals Safe stop (STO) Motion-based safety Integrated line filter Ballast resistor DC bus coupling
	VCM-3200	6.0 A _{rms}	1-phase 40 ... 100 V _{AC}	
	VCM-3400	4.0 ... 8.0 A _{rms}	1-phase 100 ... 230 V _{AC}	
VCM-3600	3.0 ... 24.0 A _{rms}	3-phase 160 ... 480 V _{AC}		

Functional safety

Today in mechanical engineering functional safety is a focal topic. For optimal compliance with this sector's demands, Varimotion is equipped with a sequential safety system. The servo controller always incorporates a „Safe Torque Off“ (STO) function capable of cancelling forces at the drive.



When additional requirements in the realm of travel motion monitoring arise (Safely Limited Speed serves as an example), a plug-in connection can be used to expand every servo controller to include an appropriate safety module. This modular architecture furnishes flexibility and optimal costs in designing safety technology to reflect the defined demands. The safety modules incorporate all of the functions required for real-world operation and are suitable for applications conforming to Performance Level d and respectively SIL 2.

- SS0 (Safe Stop Category 0, Safe Torque Off)
- SS1 (Safe Stop Category 1)
- SS2 (Safe Stop Category 2)
- SLS (Safely Limited Speed)
- SOS (Safe Operation Stop)
- SDI (Safe Direction)

Rapid response times

Because an axis with high dynamic response can achieve extreme velocities within a very short time, the reaction time required for recognition of potentially hazardous travel motion assumes exceptional significance in monitoring servo drives. Acceleration rates in excess of 5 g (50 m/s^2) are no rarity. This means that a velocity of 1 m/s is reached in less than 20 milliseconds. To master such situations the safety modules boast the ability to detect motion errors within a mere 2 milliseconds. This offers latitude for reducing safety clearances to a minimum during machine design.

Easy integration

Special emphasis was placed on the fact that the coupling with safety control systems from various suppliers is characterized by maximum ease and efficiency. This is achieved by compiling groups in the bridge module consisting of multiple axes.

For example, only one input is needed to apply the SLS safety function at 5 axes.



vari motion *A class of its own*

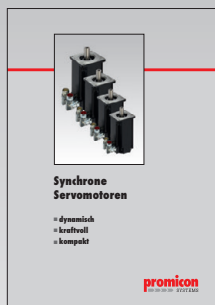
Applications

Its outstanding range of assets renders Varimotion suitable for a wide variety of applications, ensuring that difficult challenges are mastered to create the conditions for optimal performance.

- Assembly technology
- Handling systems
- Automatic coiling machines
- Semiconductor production
- Special-purpose machinery
- Packaging machines
- Bending machines
- Automated pick-and-place machines
- Palletizing units
- Automated testers



Brochures



Technology of passion

Since its inception in 1984 Promicon has remained firmly focused on electrical drive technology with servo motors. Even then the emphasis was directed toward creation of closed-loop control systems for high-speed applications, always in pursuit of one ultimate objective: evolving the ideal solution. Despite the metamorphosis in technologies that has accompanied the passage of the years, Promicon's primary commitment to implementing high-performance drive systems for difficult and demanding applications has never wavered. This intense commitment combines with years of experience to guarantee reliable and real-world cutting-edge technology. Now and in the years to come.

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