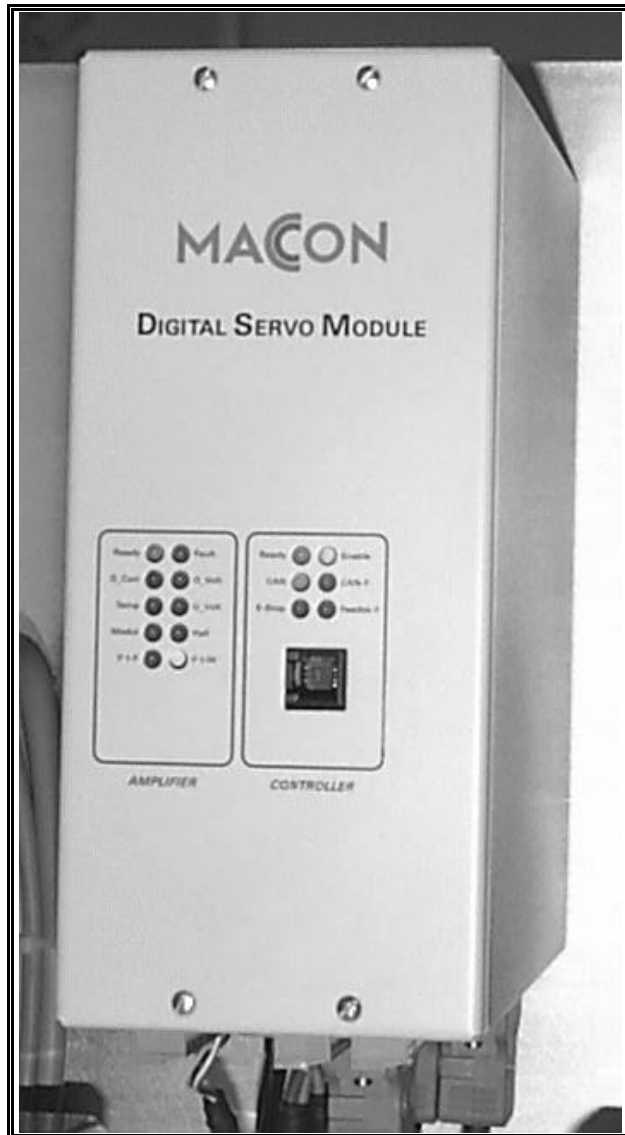


MACCON DSM - Family

The Universal Servo- and Stepper Motor Drive up to 3kW



- for DC-brush and brushless Servomotors, 2- and 3-phase
 - for Stepper motors, 2- and 3-phase
 - for Torque- and Linear-servomotors, 1-, 2- and 3-phase
 - controls torque and force
 - controls velocity and position
 - up to 32 axes can be controlled via a CANbus network (CANopen)
 - many options and application profiles available for high performance servo-applications as well as for general industrial automation
 - operating voltages from 24 to 300V
 - continuous power rating 3kW, 6kW peak
 - supplied in a housing with industrial connectors
 - CE-conform
- **THE COMPREHENSIVE SOLUTION FOR ALL LOW POWER DRIVE APPLICATIONS**

Fig: DSM3 - Digital Positioning Drive for Servomotors

General

The DSM (Digital Servo Module) family offers the user comprehensive opportunities to configure low power servo- and stepper motor systems. The DSM-Drives are the result of many years of development and application experience of the partner companies **Maccon** and **port** in the fields of power electronics, electronic motor commutation, advanced servo-control (analog and digital), positioning control, industrial field-bus technology, real-time software and Motion Control Systems.

These drives are suited for both low and high volume applications. Their specifications

meet the demands of high-performance servo- and multi-axis automation applications. Maccon/*port* are able to implement customer modifications both at hard- and firmware level to provide the optimum solution to any production application.

Members of the DSM Family

In order to fulfil development objectives it was necessary to create 6 different units within the DSM-Family:

- | | |
|------|---|
| DSM4 | Drive module with analog feedback control and digital positioning for a 2 Phase- and 3 Phase-Stepper motor, a 3 Phase DC-brushless or 2 DC-brush Motors in servo-mode. The unit offers the most options and supports sine-commutation and microstepper operation. This drive is the natural choice for high performance servo- and positioning tasks. |
| DSE4 | Eurocard drive module with analog feedback control and digital positioning with the performance characteristics of the DSM4 (in preparation). |
| DSM3 | Drive module with analog feedback control and digital positioning for DC- and BL-Motors. Commutation is block current. This drive is the economic choice for standard industrial positioning tasks and multi-axis systems. A two axis version of this drive DSM30 is in preparation, which will only be available with CANbus interface. |
| DSM2 | Drive module with analog feedback control and digital positioning for 2 x 2-Phase Stepper motors (in full and part step mode) or 2 x DC-brush motors. Mixed operation with a DC- and a stepper motor is possible. |
| DSM1 | Servo-positioning module without a power stage, supporting the digital positioning of 2 servo- or stepper motor-axes. The module is suitable for the control of external motor amplifiers and drives with higher power. A mixed operation mode with one servo- and one stepper motor-drive is possible (in preparation). |
| DSM0 | Power supply and regeneration module for all DSM- and DSE-Drives. Auxiliary supplies are generated within each drive module for the main bus voltage. |

The most important functions and interface characteristics this family can be identified in the block diagram at the end of this datasheet. The diagram was based on the DSM4/DSE4; with a few exceptions it is also valid for the other types.

Analog and Digital:

The DSM family offers the benefits of both modern digital and the classical analog technology. Depending on the application either the advantages user-programmability

at digital level (Option -D) - including the optimization of the current loops - or the advantages the infinite resolution and sampling-free performance of analog circuitry (Option -A) can be exploited.

The DSM and its options meet the expectations of both the system-programmer and the demanding servo-engineer.

Multiphase Capability:

A special characteristic of the DSM-family is the capability of using the same module to drive different motor types: DC-brush as well as 2- or 3-phase brushless motors -servos and steppers (see drawing):

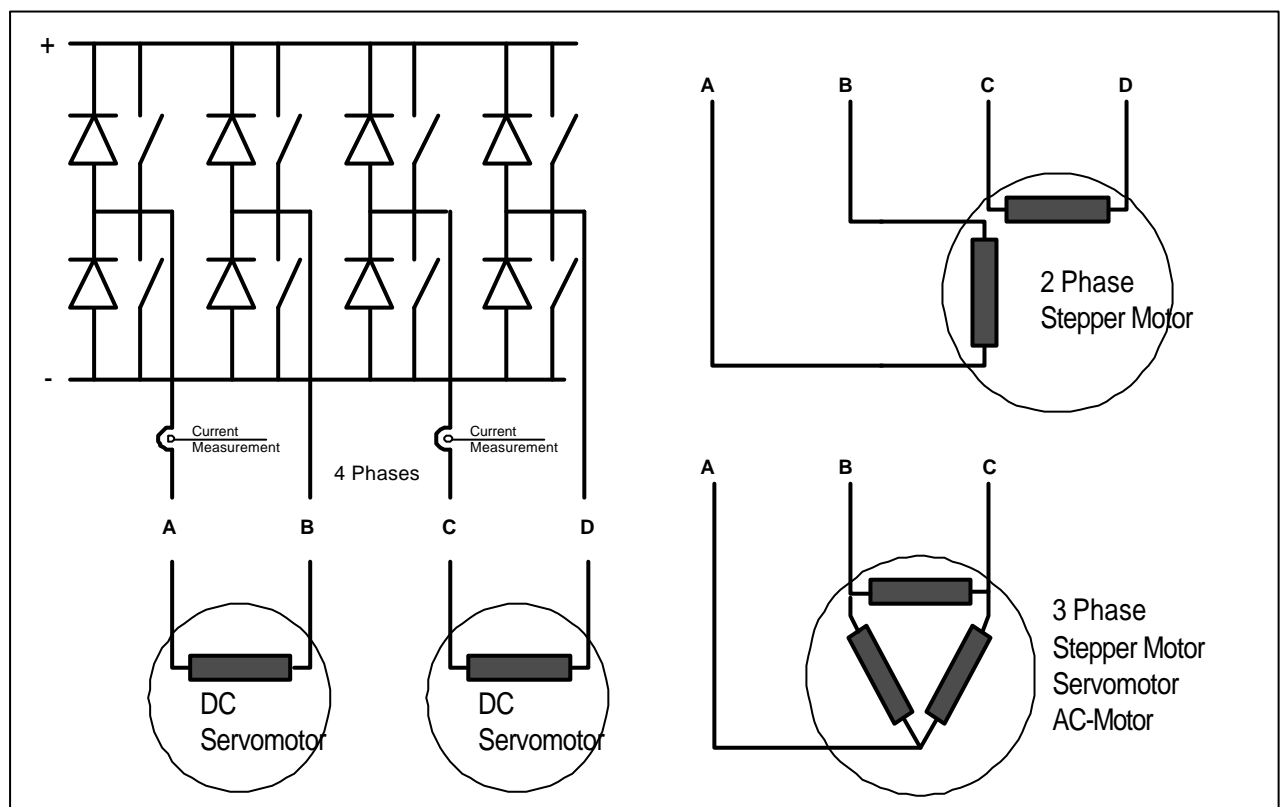


Fig: DSM/DSE4 Power Stage Configuration

Mechanics

The DSM modules are supplied in an closed housing, which ensures EMC. The dimensions are as follows:

- Height: 190 mm
- Depth: 174 mm
- Width: 83 mm for DSM0, DSM1, DSM2 and DSM3/30
125 mm for DSM4

The design allows for several alternative mounting configurations:

- in control cabinets
- direct assembly in the machine

- direct assembly close to the motor
- integration of several axis units together with a power supply (DSM0)

Operating Voltages and Currents, Designations

The basic voltage versions of the DSM units is as follows:

48V (DSM2, DSM3/30, DSM4/DSE4)	12-60V
120V (DSM3)	60-160V
160V (DSM4/DSE4)	80-200V
300V (DSM4/DSE4)	150-350V

Continuous phase current ratings of up to 20A RMS are available, depending on model and voltage rating. Peak current is two-times continuous (1.5 times for DSM2). All drives have I²t-protection.

The units can be supplied in a basic configuration (-00) or with digital (-D) and analog (-A) option cards:

- 00 *Basic unit*
- D0 *Digital option card with CANbus interface and CANopen Drives Profile, 2-axis*
- DA *Digital option card (-D0) with analog input option*
- A0 *Analog option card with velocity feedback control, single-axis*
- AE *Analog option card (-A0) with high-resolution encoder option (sine-commutation)*
- AR *Analog option card (-A0) with R/D-converter option (sine-commutation)*

The units are designated as follows, e.g.

DSM3-120-05-D0-xx

DSM3-	Basic unit
120-05-	Nominal voltage and - current
D0-	Option card
xx	Mechanical and customized options

Feedback Options

The DSM Family supports all the common feedback sensors used in servodrive applications:

- H-E sensors
- Incremental encoder up to 1 MHz (4 MHz counting frequency)
- Incremental measuring systems (Sin/Cos, 1Vss)*
- ENDAT (Heidenhain)*
- SSI*
- Hyperface (Stegmann)*
- Resolver*
- Analog values (e.g. DC-tachs and potentiometers)*

* A-Option only

Hardware Interfaces

In addition to the supply-, motor- and feedback connections the DSM modules offer the user further hardware interfacing both on the base and option cards:

- current- and velocity command signals (+/-10V and 5V PWM)
- Enable and error signals
- Remote configuration of velocity/current control (from option card)
- Limit and reference switches
- non-allocated, programmable I/Os (3 of each)
- RS232 auxiliary- and diagnostic interface

Power Supply

The DSM drives receive power through a DC-bus. Several units can be driven from a non-stabilized voltage supply. The internal auxiliary voltages are also derived from this source. For example, it is possible to run a number of units simply from one 24V DC-supply and one CANbus cable. The DC-bus can be generated by a DSM0 power supply module with an additional isolating transformer and mains filter. The DSM0 also has an overvoltage clamp circuit in order to be able to absorb braking energy.

The DSM0 has the same mechanical form and dimensions as the DSM1, 2 and 3 amplifiers and can thus be easily mounted together with the motor amplifiers.

CANopen Profile

The DSM with a digital controller (Option -D) conform to the CANopen Drives Profile standard. These units are thus compatible with drives and other CAN nodes from other manufacturers, who support this standard. All specified base functions of this standard are supported:

- Homing Mode
- Profile Velocity Mode (Velocity control)
- Profile Position Mode (Positioning control)
- Test Mode (for commissioning and configuration)
- Halt-Bit (emergency stop)

The compatibility of the DSM controller with the future development of the CANopen Drives Profile is assured by the active participation of **port** in the standards committee.

Special Operational Profiles

In addition to the basic CANopen functionality as drives and position controls, the DSM can offer a number of special application profiles, depending on project requirements. These profiles in particular take account of multi-axis configurations, e.g.:

- 2-axis interpolation
- Master/Slave - electronic gearing

- Master/Slave - electronic camshaft
- PLC-Slave
- Stand-alone operation mode
- Dual-Loop feedback control
- Torque-offset for zero-backlash gearing
- Gantry operation mode

Host Software etc.

In order to control our DSMs the following options are available at bus and host level:

- CAN interface cards (PC, VMEbus, PC104) and LPT-Adapter
- CANbus cable, terminators, repeaters
- CANopen I/O-nodes
- CANopen Configurator
- CAN Network analyzer
- CANopen Test-master

Availability

Expected availability is as follows:

- DSM0 - ex stock
- DSM1 - mid 2000
- DSM2 - April 2000
- DSM3 - ex stock
- DSM30 - late 2000
- DSM4 - mid 2000
- DSE4 - late 2000
- DSM D-Option - ex stock
- DSM A-Option - mid 2000

January 2000, EH

List of DSM Units and their Properties:

TYPE	DSM1 -Dx	DSM2 -00	DSM2 -Dx	DSM3 -00	DSM3 -Ax	DSM3 -Dx	DSM4 DSE4 -00	DSM4 DSE4 -Ax	DSM4 DSE4 -Dx
PROPERTIES									
MOTOR TYPE									
DC-brush DC1	2	2	2	1	1	1	2	2	2
DC-brushless 3 Phase DC3	2			1	1	1	1	1	1
Stepper 2-Phase ST2	2	2	2				1	1	1
Stepper 3 Phase ST3	2						1	1	1
AC 3 Phase AC3	2			1			1		
POWER STAGE									
V/A Cont..	none	48/2.5	48/2.5	48/2.5	48/2.5	48/2.5	48/5	48/5	48/5
		46/4	48/4	48/7.5	48/7.5	48/7.5	48/10	48/10	48/10
				48/15	48/15	48/15	48/20	48/20	48/20
				120/2.5	120/2.5	120/2.5	160/5	160/5	160/5
				120/5	120/5	120/5	160/10	160/10	160/10
							300/5	300/5	300/5
							300/10	300/10	300/10
Peak Current		1.5xC.	1.5xC.	2xCont.	2xCont.	2xCont.	2xCont.	2xCont.	2xCont.
COMMUTATION									
Stepper, Full Step		ST2					ST2/ ST3		
Stepper Microstep							ST2/ ST3		
H-E				DC3	DC3	DC3	DC3	DC3	
Encoder Sine								DC3	
Resolver Sine								DC3	
CONTROL									
Pulse/Direction		ST2						ST2/ ST3	
Analog Torque		DC1		DC1/ DC3	DC1/ DC3		DC1/ DC3	DC1/ DC3	
Analog Velocity, with analog Tach					DC1/ DC3			DC1/ DC3	
Analog Velocity with digital Tach								DC1/ DC3	
CAN Torque digital command	DC1/ DC3		DC1			DC1/ DC3			
CAN Velocity digital command	DC1/3 ST2/3		DC1 ST2			DC1/ DC3			DC1/3
CAN Position digital command	DC1/3 ST2/3		DC1 ST2			DC1/ DC3			DC1/3

DC1 stands for single phase DC-brush motors

DC3 stands for 3-phase DC-brushless motors

ST2 stands for 2-phase hybrid Stepper motors

ST3 stands for 3-phase hybrid Stepper motors

AC3 stands for 3-phase AC-motors (not yet supported)

