MVP® Command Set

Motion Related Commands:

Command	Function	Example Address	Instruction	Argument
M	Initiate Motion	4	M	
LA	Load Absolute Target Position	4	LA	100000
LR	Load Relative Target Position	4	LR	100000
SP*	Load Max. Command Velocity	4	SP	4000
AC	Load Profile Acceleration	4	AC	100
AS	Report Actual Speed	4	AS	
DC	Load Profile Deceleration	4	DC	100
V	Select Velocity Mode	4	V	4500
DI	Disable Drive	4	DI	
EN	Enable Drive	4	EN	
LL	Load Position Range Limits	4	LL	300000
SA	Select Range Limit Action Code	4	SA	0=Servo off 1=Hard stop 2=Soft stop
T	Set Percentage Trajectory Parameter	4	T	45
HO	Define "Home" Position	4	HO	2000 (opt.)
HA	Home Arming Enable	4	HA	0=Disabled 1=Enabled
HP**	Define Home Arming Polarity	4	HP	0= +Logic 1= - Logic
HS	Query Home Arming Status	4	HS	
HF	Set home sequence action code	4	HF	0=Servo off 1=Hard stop 2=Soft stop
AB	Abort Motion Command	4	AB	
LP	Define Limit and emergency stop Polarity	4	LP	0= +Logic 1= - Logic
AD	Abort Deceleration Parameter	4	AD	
AA	Abort action codes	4	AA	0=Servo Off 1=Hard Stop 2=Soft Stop
FD	Set Max. Dynamic Following Error	4	FD	3000
FDT***	Set Following Error Delay	4	FDT	1000
FA	Set Following Error Action Code	4	FA	0=Servo off 1=Hard stop 2=Soft stop
LS	Limit Sequence Enable: 0=Disable drive upon limit activation 1=Permit motion only opposite of limit direction until input is cleared	4	LS	0 1

*Velocity as defined by the SP command dependant on encoder resolution:

Encoder Resolution	Quadrature	Rpm/unit	Example
1000	4000	0.50	2000/4000= 0.50 rpm/step
500	2000	1.0	2000/2000= 1.0 rpm/step
200	800	2.5	2000/800= 2.5 rpm/step
100	400	5.0	2000/400= 5.0 rpm/step
16	64	31.25	2000/64= 31.25 rpm/step
15	60	33.33	2000/60= 33.33 rpm/step
10	40	50.0	2000/40= 50.0 rpm/step

**Important note: The LP polarity selected above also sets the polarity for "emergency stop", "negative hard limit", and "positive hard limit". The HP command determines the event input polarity.

***Standard Delay for the FDT command is 500µsec/1 unit FDT

Configuration Related Instructions:

Command	Function	Example Address	Instruction	Argument
POR	Set Proportional Loop Gain	4	POR	12000
I	Set Integral Loop Gain	4	I	50
DER	Set the Derivative Loop Gain	4	DER	60000
AE	Auto enable on Boot	4	AE	1= active 0= inactive
AV	Auto Velocity on Boot	4	AV	1000
RN	Reset Node	4	RN	1= active 0= inactive
RE	Reverse Encoder Phasing	4	RE	1= active 0= inactive
RD	Reverse Operational Direction	4	RD	1=Enables 0=Disables
SR	Set MVP Loop Sample Period	4	SR	500
PWM	Set Min. PWM duty Cycle	4	PWM	10 (0-100%)
X	Synchronize Nodes	0	X	

Flash EEprom Related Commands:

Command	Function	Example Address	Instruction	Argument
EEPSAV	Save all parameters in EEprom	4	EEPSAV	
EEBOOT	Use Configuration from EEprom on Boot	4	EEBOOT	1= read all 0= disable
EEADDR	Write/Read EEprom Memory Address	4	EEADDR	1024=read 1024,C=write
EEDAT	Data from EEprom	4	EEDAT	
EEWR	Write data to EEprom	4	EEWR	
EERD	Read Data from EEprom	4	EERD	

Parameters for Local (Analog) Control:

Command	Function	Example Address	Instruction	Argument
O	Local/Remote Mode Flag	4	O	0=Remote Position Active 1=Local Velocity Mode
J	Velocity Range	4	J	0=250 rpm (default) 1=1000 rpm 2=5000 rpm 3=10,000 rpm 4=20,000 rpm
JM	Select Joystick Midpoint	4	JM	512 (default value)
JW	Select Joystick Center Window	4	JW	10 (default value)
JH	Set Joystick Hysteresis Window	4	JH	1 (default value)
K	Set Continuous Integration (integral term on digital filter)	4	K	1= enable 0= disable
N	Define the "In Position" range	4	N	1
W	Define the open loop PWM duty	4	W	0 to 2047 = 0 to 100% 4095 to 2048 = 0 to –100%

I/O Related Instructions:

Command	Function	Example Address	Instruction	Argument
POS	Query Present Position	4	POS	
ANI	Request Analog Input Data	4	ANI	
DACA*	Control DACA (connector J2 pin 10	4	DACA	1=+5V 0= 0V
ANO	DAC Output	4	ANO	100
ANM	Analog Input Mode (Status reported in MVP status mask bit 3)	4	ANM	1= analog input is digital input
VLIM	Control Output Voltage	4	VLIM	650 (6.5V)
ERR	Query for Actual Position Error	4	ERR	
SD**	Set Serial Response Delay	4	SD	2
OK	Set Serial "OK" Response	4	OK	1= enables "OK" 0= disable
CK	Set CHECKSUM Calculation Mode	4	CK	1= enable 0= disable
ST***	Query Present Node Status	4	ST	see below

*The DACA command is used only with the PWM version of the MVP

**The standard delay for the SD command is 500µsec/1 unit SD

***The query present status command (ST) should be accompanied by the user desired status mask value in the argument field when implemented within the MVP® demo software package. The demo program uses the mask to allow the user to make determinations relating to program flow and error handling. See Status Response Bit Map.

Macro Related Commands:

Command	Function	Example Address	Instruction	Argument
ME	Macro Execute	4	ME	1
MS	Macro Status	4	MS	

Position Capture Commands:

Command	Function	Example Address	Instruction	Argument
CA	Capture A Input	4	CA	1= active 0= terminate
POSCA	Report Capture Position A	4	POSCA	
CB	Capture B Input	4	CB	1= active 0= terminate
POSCB	Report Capture Position B	4	POSCB	

Indexing Commands:

Command	Function	Example Address	Instruction	Argument
ID	Index Destination	4	ID	200000
IS	Indexing Velocity	4	IS	2000
IA	Indexing Acceleration	4	IA	100
IDC	Indexing Deceleration	4	IDC	100
IC	Index Counts	4	IC	50 (0-65000)
IO	Index Destination (final)	4	IO	100000
IE	Indexing Enable	4	IE	1= enable 0= disable
ITR	Index Serial Trigger	4	ITR	
ITD*	Index Destination Delay	4	ITD	2000
ITZ*	Index Zero Delay	4	ITZ	2000
IM**	Single/Limited/Continuous Indexing	4	IM	(X)

*Standard Delay= 500µsec/1 unit ITD or ITZ

**IM Argument	Indexing operation	Mode
X=0	Single	single step absolute
X=1	Continuous	continuous absolute
X=2	Limited	specified number of absolute cycles
X=3	Single	single step relative
X=4	Continuous	continuous relative
X=5	Limited	specified number of absolute cycles

NOTE: In response to an external pulse applied to J2, pin 8, or the invocation of the ITR serial index trigger command.

Status Response Bit Map:

The MVP® provides you with 16 status bits when you monitor or request the system's status. This feature cannot be used in DeviceNet™ Mode. They are read from right to left with the following values and meanings:

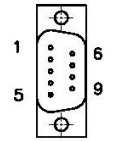
Bit 0:	1=	Move in progress
	0=	Not commanded to move
Bit 1:	1=	Motor is in position
	0=	Motor is not in position
Bit 2:	1=	MVP® is in Velocity Mode
	0=	MVP® is in Position Mode
Bit 3:		This bit indicates the logic state of the analog input when ANM Mode 1 is selected. If ANM Mode=0 is selected this bit will always be set to 1.
Bit 4:	1=	Indicates trajectory percentage defined by the T-command is complete
	0=	Trajectory complete percentage not yet achieved
Bit 5:	1=	DeviceNet™ connection active
	0=	DeviceNet™ connection is not active
Bit 6:	1=	A DeviceNet™ message error has occurred in one or more packets.
	0=	The DeviceNet™ message packets are o.k.
Bit 7:	1=	The current move is off its program trajectory by more than the allowed amount (which is set by the FD command)
	0=	Current move is on trajectory
Bit 8:	1=	The motor is not enabled or has been disabled by some other error.
	0=	The motor is enabled.
Bit 9:	1=	You have reached the program range limit (set by the LL command)
	0=	The current position is within the range limits
Bit 10:	1=	Local Mode is active
	0=	Remote Mode is active
Bit 11:	**	Emergency stop flag (1=active)
Bit 12:	**	External Event #1 (1=active)
Bit 13:	**	Positive Limit Flag (1=active)
Bit 14:	**	External Event #2 (1=active)
Bit 15:	**	Negative Limit Flag (1=active)

**These flags signal the status of input event

External Connections:

Connections Common to Both PWM & Linear Versions:

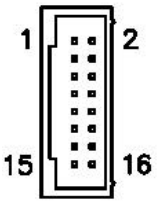
J1 RS-232C/485 Remote Communications Interface



Pin 1	Not Connected
Pin 2	RxD/RS485-
Pin 3	TxD/RS485+
Pin 4	Not Connected
Pin 5	Ground
Pin 6	Not Connected
Pin 7	Not Connected
Pin 8	Not Connected
Pin 9	Not Connected

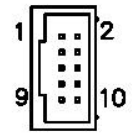
Serial Interface:
N - No Parity
8 - 8 bits
1 - 1 stop bit

J2 External Interface Connector



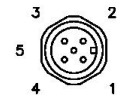
Pin 1	Analog Input Signal (0 to 5 VDC, 10 bits)
Pin 2	Analog Reference Ground
Pin 3	External Opto Power (+5 VDC)
Pin 4	Emergency Stop Input
Pin 5	Positive Hard Limit Input
Pin 6	Negative Hard Limit Input
Pin 7	External Event #2
Pin 8	External Event #1
Pin 9	External Drive Enable 0 = disable 1 = enable
Pin 10	DAC A Output (External Amplifier Command Signal)
Pin 11	DAC B Output (Programmable Analog Output)
Pin 12	PWM Sign 0 = forward 1 = reverse
Pin 13	PWM A Output (0-100% Duty Cycle PWM Command)
Pin 14	PWM B Output (50% Duty Cycle PWM Command)
Pin 15	+5 VDC
Pin 16	Ground

J3 Encoder Interface



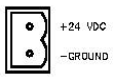
Pin 1	Encoder Channel A Input
Pin 2	Encoder Power (+5 VDC)
Pin 3	Encoder Return (Ground)
Pin 4	Not Connected
Pin 5	Encoder Return (Ground)
Pin 6	Encoder Return (Ground)
Pin 7	Encoder Power (+5 VDC)
Pin 8	Encoder Channel B Input
Pin 9	Encoder Power (+5 VDC)
Pin 10	Encoder Channel Z (index) Input

J4 DeviceNet™ Interface



Pin 1	Drain (Case)
Pin 2	V+ (Power Input)
Pin 3	V- (Power Return)
Pin 4	CAN_H (Communications Interface)
Pin5	CAN_L (Communications Interface)

J5 Main Power



Pin 1	+24 VDC
Pin 2	Ground

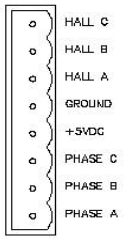
Linear Version Only:

J6 Motor Drive

Pin A	Motor (-)
Pin B	Motor (+)

PWM Version Only:

J6 Motor Drive



Grey	
Blue	
Green	
Black	
Red	
Yellow	
Orange	
Brown	

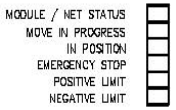
J7 PWM Mode

0–100% MODE

50–50% MODE

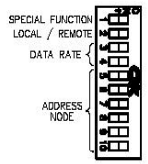
Front Panel Indicators & Configuration Options:

LED Status Indicators:



Module/Net Status	Flashing Green = Not Initialized/Allocated Steady Green = Initialized/Allocated Flashing Red = Recoverable Comm. Error Steady Red = Unrecoverable Comm. Error
Move In Progress	= Active Position or Velocity Profile
In Position	= Motor is in the commanded position
Emergency Stop	= ESTOP Input has been activated
Positive Limit	= PLIM Input has been activated
Negative Limit	= NLIM Input has been activated

Configuration Switches (Remote Mode):

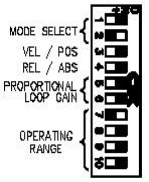


1. Special Function	ON= Special functions disabled OFF= Special functions enabled
2.Local/Remote	ON = Remote Mode is selected OFF = Local Mode is selected
3. and 4. Data Rate	

Switch:		Remote Data Rate	
3	4	RS232/485	DeviceNet
OFF	ON	57.6	--------
ON	OFF	19.2	250
OFF	ON	38.4	500
ON	ON	9.6	125

5.-10. Address Node	Is determined by the binary coding of these switches.

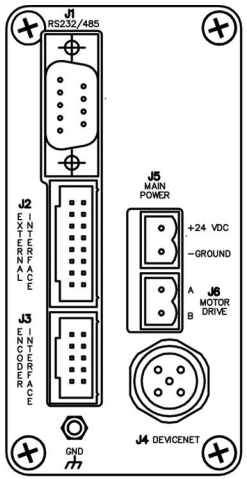
Configuration Switches (Local Mode):



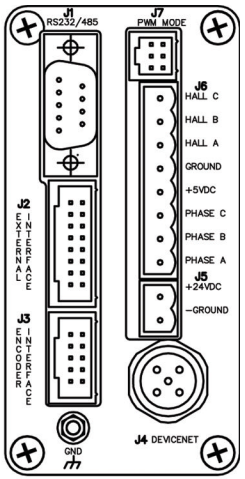
1. & 2. Mode Select	For Local Mode Set 1=ON, 2=OFF
3. VEL / POS	ON= Position control OFF = Velocity control
4. REL / ABS	ON= Absolute mode OFF= Relative mode
5. & 6. Proportional Loop Gain Control	Selected by binary encoding Lowest= 5. & 6. ON Highest= 5. & 6. OFF
7. – 10. Operating Range	Velocity Range Multipliers:

7	ON	OFF	ON	ON	ON
8	ON	ON	OFF	ON	ON
9	ON	ON	ON	OFF	ON
10	ON	ON	ON	ON	OFF
Multiplier	1	4	20	40	80

NOTE: The DIP switch labels on this diagram are functional labels and do not correspond to the labels printed on the front of the module.



LINEAR OUTPUT
REAR VIEW



PWM OUTPUT
REAR VIEW

FAULHABER GROUP
We create motion

MicroMo Electronics, Inc., Miniature Drive Systems
14881 Evergreen Avenue Clearwater 33762-3008, Florida, USA
Phone: (727) 572-0131 · Fax: (727) 573-5918 · Toll-Free: (800) 807-9166
Email: info@micromo.com · Web Address: www.micromo.com

FAULHABER

MVP® 2001 QUICK REFERENCE GUIDE

Summary of Features:

- Easy to Use Plug and Play Operation
- Completely custom versions available
- Very Compact—only 2x4x3.6 inches
- Linear Drive Amplifier Supplying 10 Watts Continuous @22°C Ambient, or
- PWM Drive Amplifier Supplying 50-200 Watts Continuous @22°C Ambient
- Optically Isolated Inputs Including Encoder, Over-travel Limits, External Event (Home) Inputs, and Emergency Stop
- One Analog Input (10 bit)
- One Analog Output (12 bit)
- +/- 10 Volt DC Linear plus 0-100% and 50/50 PWM Control Outputs
- Programmable Position Range Limits
- Programmable Maximum Allowable Following Error
- RS-232C or RS-485 Operation May be Specified
- Panel, Rack, or Optional DIN Rail Mounting
- Stand-alone, Terminal, PC Compatible, or DeviceNet™ Operation
- Interface Software Demo and Example Code Included
- Fully Compliant DeviceNet™ Interface
- Flexible Configuration Through Software

Communication: RS-232C and RS-485 (Commands as ASCII), DeviceNet™ (CAN).

Controller Inputs:

Encoder: Two channel, single-ended +5VDC TTL compatible, 4MHz max. frequency, optically isolated
Analog: One analog input (0-5VDC, 10 bit)
General Purpose: Two hard limits, one emergency stop, two external event inputs. All optically isolated

Controller Outputs:

Analog: One analog output (+/-10VDC, 12 bit DAC)
Motor Command: One 12-bit DAC (+/-10VDC), one 0-100% PWM, one 50/50 PWM output (for higher inductance applications)

Drive:

Linear Amplifier Outputs +/-10VDC @ 1.0A continuous; 3.5A peak
PWM Amplifier 32kHz switching frequency, 3A continuous; 10A peak @22°C (72°F)
HPD Amplifier Enhanced PWM amplifier with 9A continuous and 35A peak

The MVP comes ready for addition of a larger external amplifier for drivi ng large motors

Environmental:

Controller Operating Temp: 0 to +70°C (32°F to 158°F)
Ambient Operating Temp: 0 to +40°C (32°C to 104°F)
Storage Temp: -25°C to +85°C (-13°C to +185°F)