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UNIDEX 511

Stand-Alone, Multi-Axis Motion Controller

- Enhanced four-axis, DSP-based PIDF$_V$F$_A$ motion engine
- On-board autotuning
- Advanced multi-processor design
- Integral linear, brushless servo, DC servo, and microstepping drives
- Complete motion capabilities include: Point-to-point; linear, circular,helical interpolation; electronic gearing; velocity profiling
- Program in native G-code or AeroBASIC™ command set, C, C++, Visual Basic® or LabVIEW™
- Front panel displays and keypad for convenient menu-assisted programming
- Remote interface via two standard RS-232 ports and optional IEEE-488
- Advanced Windows™-based remote diagnostic software



The UNIDEX 511 is the latest in Aerotech's long line of stand-alone multi-axis motion controllers. State of the art technology coupled with an intuitive interface make this an ideal controller for use in wafer fabs, laser machining/marking, test instrumentation, and general-purpose positioning applications.

Simplified Multi-Axis Control

By combining an advanced motion engine with the simplicity of a menu-driven interface, the UNIDEX 511 easily tackles the most complex motion applications.

Unlike most controllers on the market today, there is no need to understand a cryptic command set to generate motion. The intuitive interface allows a user to begin programming with just a few presses of the keypad. And with on-line help, writing parts programs could not be easier.

System diagnostics are easily read from the built-in display, and an optional Windows™-based remote software package is included with each unit. This package allows the user to upload/download programs, modify parameter files, and analyze motion with Aerotech's advanced graphical tuning package, all from the convenience of a remote PC.

Whether operated in stand-alone mode via the front panel or by remote control with RS-232/IEEE-488, the full functionality of the UNIDEX 511 is available. On-board configuration and monitoring utilities simplify remote communications. The UNIDEX 511 is populated with two RS-232 ports and an optional IEEE-488 port. The UNIDEX 511 can address all three ports simultaneously, a testament to the true power and flexibility of this controller.

Powerful Programming Features

As easy as the UNIDEX 511 is to operate, it is equally powerful for advanced applications. The 40 MHz DSP motion engine is capable of point-to-point motion, linear and circular interpolation, multi-axis error correction, 3D error mapping, direct commutation of linear and rotary brushless servomotors, and on-board servo autotuning. High-speed interrupts and data logging capabilities provide a real-time link to external systems. Whether the application requires simple point-to-point motion or complex velocity profiled contours with output on the fly, the UNIDEX 511 is capable of meeting the most advanced motion requirements.

WORLD HEADQUARTERS: Aerotech, Inc., 101 Zeta Drive, Pittsburgh, PA 15238, USA +1-412-963-7470 Fax: +1-412-963-7459
Aerotech Ltd., Jupiter House, Calleva Park, Aldermaston, Berkshire RG7 8NN, UK +44-118-9409400 Fax: +44-118-9409401
Aerotech GmbH, Südwestpark 90, 90449 Nürnberg, Germany +49-911-9679370 Fax: +49-911-96793720

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UNIDEX 511 INTRODUCTION

Integral Drives

Linear motor, brushless servo, DC servo, and micro-stepping drives are housed internally. The UNIDEX 511 can control any combination of up to four integral drives. Servomotor and microsteppers can be run from the same unit and, since all motor connections are made via standard connectors at the rear of the unit, starting up a system is as simple as plug-and-go.

Input/Output with Expansion

Designed as a complete motion controller, the UNIDEX 511 has 48 digital I/O; four 8-bit (12-bit optional) A/D inputs; dedicated home, overtravel and E-Stop inputs; and configurable brake output. Two full-length ISA expansion slots are available for Aerotech expansion cards or third-party peripherals.

Dual Processor Design

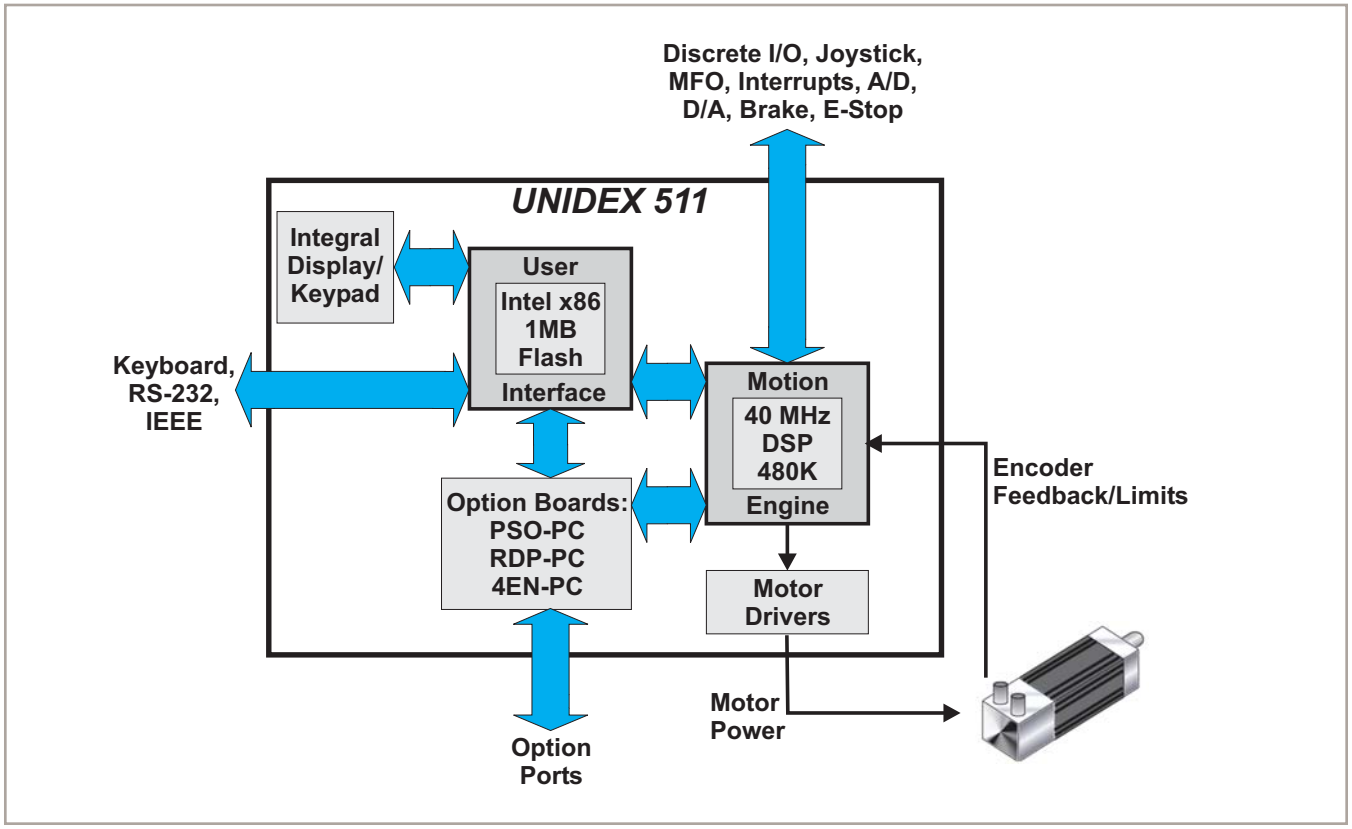
The UNIDEX 511 represents the ultimate in high-end motion control by implementing a unique dual architecture design. This dual architecture allows the UNIDEX 511 to provide a sophisticated motion platform in an easy-to-use package. A high-performance DSP serves as the motion engine. The sole purpose of this processor is to handle real-time motion related functions such as servo loop closure, trajectory generation, and fault handling. An x86 processor handles the less time-critical tasks such as user keypad and display, serial communications, and file management.

Built on a Platform of Success

When we set out to design the UNIDEX 511, the goal was to retain the successful simplicity of the UNIDEX 11 and 12, while adding the raw horsepower of the UNIDEX 500. The motion engine of the UNIDEX 511 is identical to the UNIDEX 500. Not only is the firmware and motion kernel the same, but the entire command interpreter was ported over to the UNIDEX 511 as well. Leveraging the field proven software of the UNIDEX 500 is an example of the intrinsic migration capability of all UNIDEX controllers. As new, advanced control schemes are developed they become immediately available to all UNIDEX controllers, resulting in a robust product family.

Compatible with UNIDEX 11/12

Recognizing the worldwide acceptance of the UNIDEX 11/12 series controllers, the UNIDEX 511 front-end interface software was modelled after both of these successful controllers. While the command interpreter is now based on AeroBASIC™, we have provided existing users of the UNIDEX 11 and 12 controllers a simple migration path to the UNIDEX 511. A standard software option is available that will allow the UNIDEX 511 to accept the UNIDEX 11 and 12 remote command set. For users who are currently utilizing the UNIDEX 11 or 12, this is an immediate method to upgrade their technology platform with a minimal learning curve.



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UNIDEX 511 SPECIFICATIONS

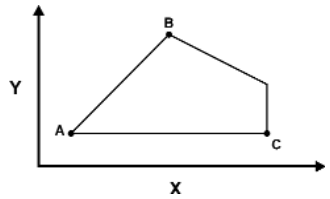
Feature	Details	
Axes	1 to 4 axes (programmable as X, Y, Z, or U)	
Processors	Axis	40 MHz DSP
	User Interface	Intel x86
Axis Loop Type/Update Rate	PID with velocity and acceleration feedforward, notch and low-pass servo filters ≤250 µs total update for all four axes	
On-Board Memory	Operating System	640 KB flash memory for operating system and utilities
	Program Storage	360 KB flash memory for user programs, parameters, misc. storage
	Motion Queue	480 KB for motion firmware, execution buffer
Driver Type Compatibility	Brushless (linear or rotary) servo with on-board commutation DC brush servo Stepper/microstepper (on-board commutation)	
Position Feedback	4-channel encoder interface, differential RS-422 signal, sine, cosine, and marker; 20 MHz input data rate	
Position Modes	Absolute, incremental, dynamic trajectory correction	
Motion Types	Independent Motions	Point-to-point incremental; target position or velocity; velocity profiles; time based; free run
	Coordinated Motions	Advanced queuing and deferred execution features for simultaneous command execution
	Interpolated Motions	Four-axis linear, circular, and helical interpolation
	CNC Functionality	RS-274 standard G-code
	Digitally Geared Motions	Dedicated gantry mode; gearing with synchronization to high-speed input
	Advanced Features	Automatic PID loop gain computation (autotuning)
	Enhanced CNC	Cutter radius compensation, parts rotation, scale factor including mirroring
	Contouring	Cubic spline curve-fitting; velocity profiling; corner rounding
	Error Mapping	2D error mapping, orthogonality correction, backlash compensation
Range Limits	Position (2^{47}-1 counts); Velocity (2^{23} steps/ms); Acceleration (2^{15} steps/ms^2)	
Acceleration Profiles	Linear, modified sine and custom profiles (1 ms to 32.768 seconds)	
Programmable Multitasking	1 ms task execution and switch; up to 4 independent tasks	
Programming	Command Set	Native G-code programming (RS-274) or AeroBASIC™ command set; optional software to emulate UNIDEX 11/12 command set
	Interface	On-board menu-driven or remote (RS-232 or IEEE-488); optional LabVIEW™ drivers
Command Execution Modes	AUTO	Program runs complete upon entry of execute command
	SINGLE	Program executes one block per execute command
	MANUAL	Commands are executed upon entry
	JOG	Axes controlled via jog pad on front panel
	REMOTE	Command execution controlled by remote host via communications port
Process Time	Command execution ≅1 ms (from command sent to motion start); read request ≅1 ms	
Input/Output	Drive Command	8 servo command output channels, 16 bit, ±10 V D/A
	Dedicated	CW, CCW and Home limits; Hall effects, E-Stop, MFO, brake and joystick
	User Definable	48 total I/O points: 16 inputs/8 outputs; 24 configurable I/O points; configurable in banks of 8
	Analog	Inputs: 4 channels of 8-bit, 5 V A/D (12-bit, ±10 V A/D optional) Outputs: Up to 8 unused servo output channels, 16 bit, ±10 V D/A
	Position Latch	50 ns position capture
Interfaces	Serial	Two RS-232 ports with programmable baud rate, length, parity, stop bits
	Parallel	One optional GPIB (IEEE-488)
	ISA Slots	Two full-size AT slots for Aerotech expansion cards (PSO, 4EN, RDP, etc.) or third-party peripherals
	Local Bus	Local bus interface for high-speed connection to Aerotech expansion cards (PSO, 4EN, RDP, RMX, etc.)
	Intel iSBX Port	One iSBX site for compatible expansion cards (encoder inputs, I/O, A/D, etc.)
	Display	Backlit, 8 x 40 character LCD
	Keypad	Sealed membrane, 5 function keys, 19 program keys, 4 jog/cursor keys
	Keyboard (Optional)	QWERTY compatible keyboard port on front-panel
Environmental Limits	Operating temperature 0 to 50ºC (32 to 122ºF); Humidity: 10 to 85% non-condensing	
Weight	12 kg (25 lb)	
Power Input	100, 115, 208, 230 VAC nominal input voltage (50/60 Hz)	

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UNIDEX 511 CAPABILITIES

The UNIDEX 511 family of motion controllers are ideal for precision, multi-axis motion applications. A dual processor design results in a controller with sophisticated motion capabilities, and an easy-to-use interface.

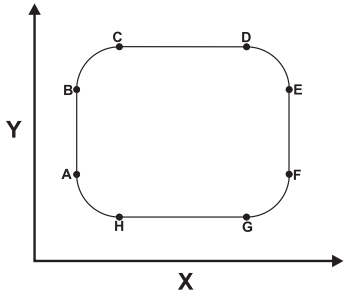
Point-to-Point Motion




```
; INDEX independent axis motion
INDEX X3 XF100 Y3 YF100      ;  AB
INDEX X3 XF200 Y-3 YF100     ;  BC
INDEX X-6                    ;  CA
```

Users can program absolute or incremental moves or jog at constant speed with programmable accel, decel, and feedrate. Accel and decel can be linear or sinusoidal.

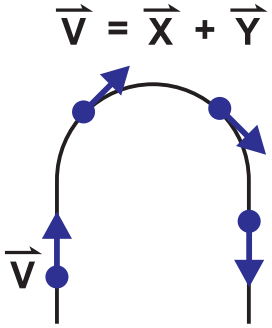
Interpolated Motion




```
;  LINEAR interpolated motion and
;  CIRCULAR interpolated motion
PROGRAM ABSOLUTE
LINEAR X1 Y4                 ;  AB
CW_CIRCLE X2 Y5 C1,0         ;  BC
LINEAR X5 Y5                 ;  CD
CW_CIRCLE X6 Y4 C0,-1        ;  DE
G1 X6 Y2                     ;  EF
G2 X5 Y1 C-1,0               ;  FG
G1 X2 Y1                     ;  GH
G2 X1 Y2 C0, 1               ;  HA
```

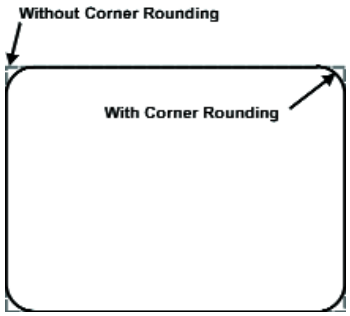
Linear and circular interpolated motion are supported. With interpolated motion, multiple axes start and stop synchronously. Users can program in AeroBASIC™ English-style commands or G-Codes.

Velocity Profiling



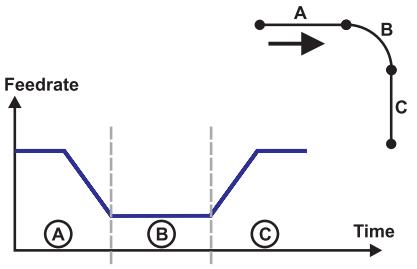
Velocity profiling is a mode of motion where constant vector velocity is maintained along the programmed path.

Corner Rounding



The UNIDEX 511 corner rounding feature allows smooth motion at faster speeds. Cornering time is reduced by blending motion of consecutive blocks together. A blending parameter allows optimization of path accuracy and cycle time.

Lookahead

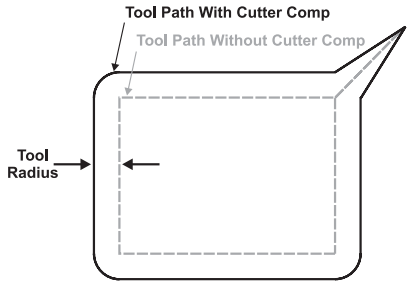


A special feature of velocity profiling is the ability to anticipate sharp corners or small radius arcs. The UNIDEX 511 continuously monitors the next block and will automatically decelerate as needed.

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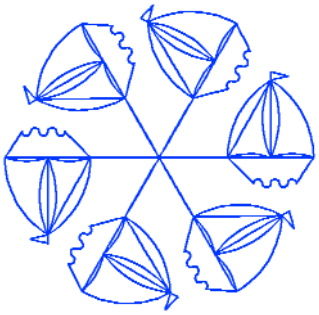
UNIDEX 511 CAPABILITIES

Cutter Compensation



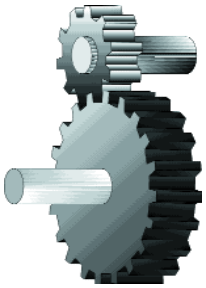
Also known as tool radius compensation, this feature automatically adjusts the path to compensate for the radius of a cutting tool.

Parts Rotation



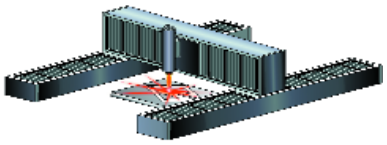
This feature is useful in cases where a two-dimensional part must be repeated in different work areas and in different orientations. The user programs a pivot point and rotation angle. This eliminates the need to translate the part program many times over.

Electronically Geared Motions



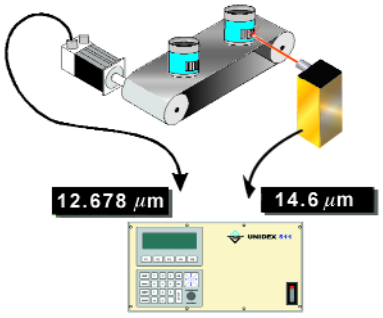
Mechanical line-shaft motion can be replaced with electronic gearing. Gear ratios are programmable and can be electronically engaged and disengaged for flexible, software-based machine control.

Position Synchronized Output



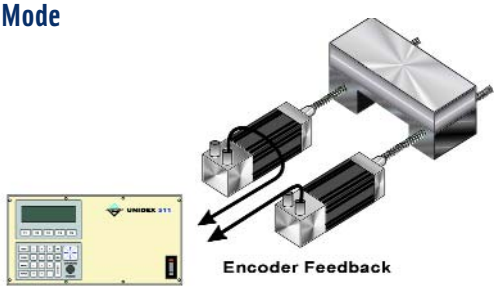
This function is used to precisely set digital outputs relative to motor position in one or two dimensions. Rather than operate as a background task on the DSP, this function is off-loaded to separate hardware for fastest execution and maximum accuracy.

Fast Position Capture



The UNIDEX 511 has the ability to trap motor positions at the moment a digital input is received. The hardware interface circuitry latches the position within 50 ns on the U511.

Gantry Mode

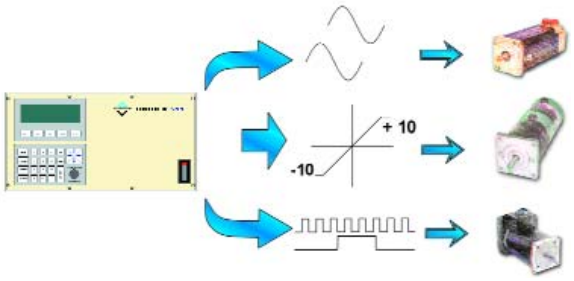


The UNIDEX 511 has built-in algorithms that reduce complex gantry control to a few simple commands. Single feedback-dual motor or dual feedback-dual motor configurations are easily controlled.

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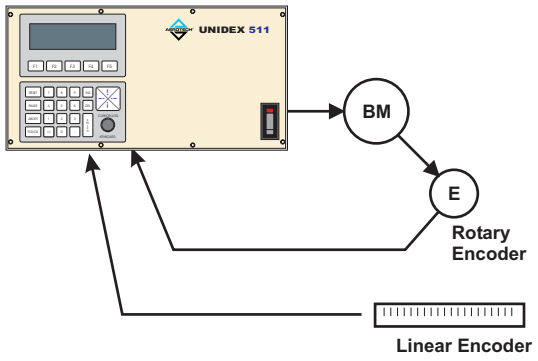
UNIDEX 511 CAPABILITIES

Motor Control



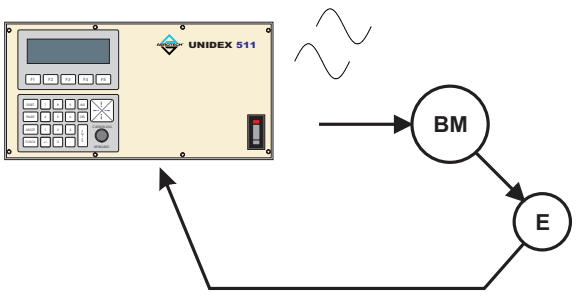
The UNIDEX 511 can be used to control brush, brushless, or stepper motors in any combination.

Dual-Loop Control



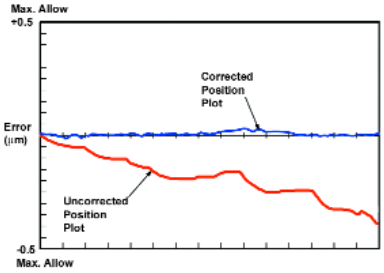
Dual loop control is used to eliminate the effects of backlash and other forms of lost motion.

Sinusoidal Commutation



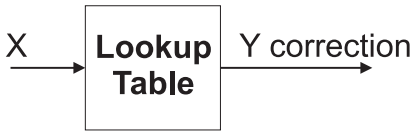
Brushless motors must be sinusoidally commutated to obtain the smoothest motion. By having the motion controller perform the commutation, multiple transducers and cables are not needed. The UNIDEX 511 has dual analog outputs to support direct commutation.

Axis Calibration



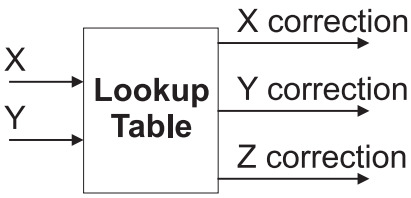
Axis calibration is a way to compensate for repeatable mechanical errors in a mechanism such as a ball screw. A lookup table on-board the UNIDEX 511 is used to make corrections based on measured data. Backlash correction values can also be entered to minimize reversal errors.

Orthogonality Correction



Accuracy in an XY configuration can be dramatically improved using a lookup table. The table contains error data for one axis as a function of the other axis' position, thereby reducing positioning errors caused by misalignment of the axes.

3D Error Mapping



Aerotech's advanced 3D error mapping allows accurate positioning in an XY plane with an XYZ positioning system. A lookup table contains error data for three axes as a function of two of the axes.

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UNIDEX 511 FRONT PANEL INTERFACE

User Interface



The UNIDEX 511 has an easy-to-use menu-driven interface. Programming, system setup, on-board diagnostics, tuning, and manual data input are all readily available via the built-in function keys.

Diagnostics



As an aid to system setup, the UNIDEX 511 has a powerful diagnostic utility. System status is clearly displayed, simplifying system setup and debug.

On-Line Help



Generating motion programs is simple with the built-in help utility. Example code is given, assisting in the "construction" of a motion command.

Auto-Tuning



With an advanced autotuning utility built-in to the UNIDEX 511, servo tuning could not be easier. Simply enter distance and desired speed and the UNIDEX 511 will do the rest.

Parameter Setup



A parameter file on-board the unit stores power-up information such as default feedrates, servo gains, and homing configuration. System parameters utilize text descriptions that are easy to understand.

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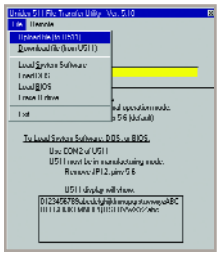
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UNIDEX 511 REMOTE DIAGNOSTIC, SETUP, AND TUNING TOOLS

While the UNIDEX 511 operates as an independent, stand-alone controller, many applications require communication with a host PC. To meet this need, a complete set of Windows™-based remote tools is provided with each UNIDEX 511, free of charge.

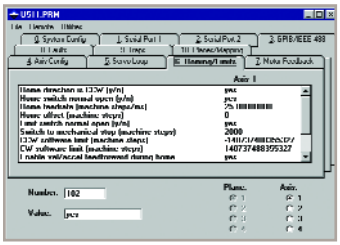


Remote File Transfer



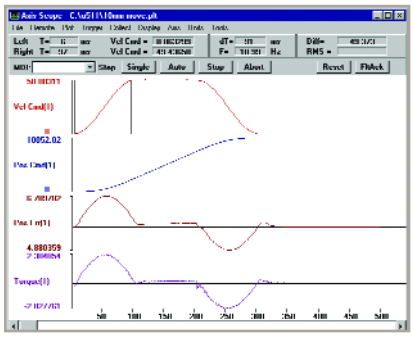
A file transfer utility is provided with all UNIDEX 511s to facilitate off-line storage/editing of motion program files. This utility can also be used to upload the system firmware, greatly simplifying system upgrades.

Parameter Editor



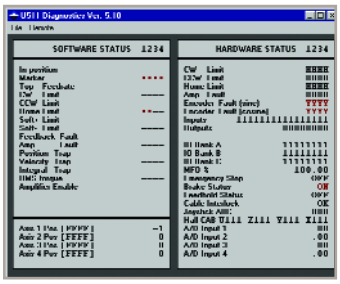
No controller on the market is easier to configure than the UNIDEX 511. System parameters utilize text descriptions that are easy to understand.

Axis Tuning



One look at Aerotech's Axis Tuning utility and it is easy to see why it is regarded as the industry's best. Complete analysis of system performance and move profiles are simply a mouse click away. Left/right cursor utilities enable detailed data analysis.

Diagnostics



A powerful diagnostic screen is available that summarizes system status on a single page.

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UNIDEX 511 PROGRAMMING

Motion Commands

ABORT	Abort motion and clear buffer
ACCELERATION	Set accel / decel rate
AUTOTUNING	Initiate Autotune routine
BRAKE	Engage / Disengage brake
CALIBRATION	Download calibration file
CM (Contour Mode)	Set enhanced contour mode
CUTTER COMPENSATION	Set up cutter compensation
CW_CIRCLE	Clockwise circular contour
CCW_CIRCLE	Counterclockwise circular contour
DISABLE	Disable single or multiple axes
DWELL	Dwell between moves
ENABLE	Enable single or multiple axes
FREERUN	Run at constant feedrate
GEAR	Link master to slave at defined ratio
HOME	Initiate home routine
INDEX	Non-interpolated linear move
LINEAR	Linear interpolated move
PROGRAMMING_MODE	Set programming mode (English/metric, absolute/incremental)
RAMP	Set accel / decel ramp time
REFERENCE	Send stage to marker
ROTATION	Set up parts rotation
ROUNDING	Enable corner rounding mode
SEGMENT	Define trajectory segment time
SLEW	Enable joystick control
SOFTWARE, HOME, POSITION	Set/clear software registers
SPLINE	Enable / disable cubic spline curve fitting
TT (Target Tracking)	Track non-determinant motion path
TRAJECTORY	Toggle between linear and sinusoidal accel/decel profiles
VELOCITY PROFILING	Enable velocity profiling (move blending)

G Codes

G0	Non-interpolated linear move
G1	Linear interpolated move
G2	Clockwise circular contour
G3	Counterclockwise contour
G4	Dwell between moves
G8	Enable velocity profiling
G9	Disable velocity profiling
G23	Enable corner rounding mode
G24	Disable corner rounding mode
G40	Cutter compensation off
G41	Cutter compensation on - left
G42	Cutter compensation on - right
G43	Define cutter radius
G44	Define compensated axes
G70	Specifies English mode
G71	Specifies metric mode
G90	Specifies absolute mode
G91	Specifies incremental mode
G92	Sets/clears axes' position registers
M0	Pause
M2	Exit
M47	Return flow to beginning of program
Mxx	User defined M-code

Flow Control

AGAIN	Repeat queue buffer
CLRS (Clear Screen)	Clear program screen
CI (Command Interrupt)	Generate interrupt upon command completion
CYCLE	Map input bit to cycle start command
ENDWHILE	End 'While' loop
EXIT	Terminate program flow
GOTO	Jump to label
HALT	Halt queue buffer
IF	Conditional statement
IMMEDIATE	Send commands without pre-processing
INT_PROGRAM	Jump to label based in input interrupt
JOG	Display jog screen
LABEL MARKER :	String to define program entry point
LOOP	Repeat block given number of iterations
MESSAGE	Output message
NEXT	End of loop statement
PAUSE	Suspend program execution
PLANE	Switch to one of four buffer planes
PLC	Perform continuous I/O scan
QUEUE	Control execution flow of queue buffer
RETURN	Exit subroutine and return to program
SKEYS (Software Keys)	Relabel function keys
START	Activate planes under HALT command
SUBROUTINE	Direct flow to subroutine
TRIGGER	Begin execution of buffer plane
WAIT	Commands not sent until previous move is complete
WHILE LOOP	Loop while condition is true

Utility Commands

CVI	Convert value to integer
DAC	Output value to DAC channel
DISPLAY SERVO LOOP DATA	Output servo value to DAC channel
ERROR MASK (0,1,2,3)	Set axis error mask
EXTENDED OUTPUT (OEn)	Set extended I/O output bit or word
FAULT_ ACKNOWLEDGE	Initiate fault recovery
FL (Filter Time Constant)	Set filter time constant
GAIN	Set servo gains
GAIN READ	Read servo gains
LVDT	Move axis to find LVDT null position
MREAD (Memory Read)	Read value from DSP memory location
MWRITE (Memory Write)	Write value to DSP memory location
MCOMM (Motor Commutation)	Open loop commutation
MSET (Motor Setup)	Set fixed vector for commutation
OUTPUT	Set output bit or word
PSO x	PSO laser firing card control
SCFACTOR (Scale Factor)	Scales / inverts move profiles
UMFO	Override MFO potentiometer setting
VAR	Read/write user variables to file

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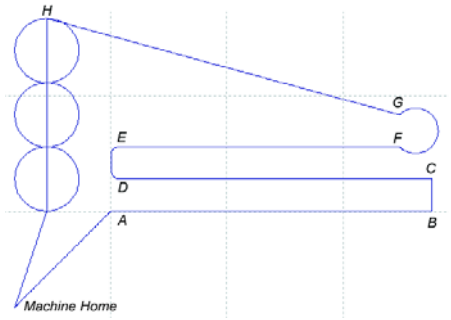
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UNIDEX 511 PROGRAMMING

Remote Commands

AR	Auto run a program
BR	Block run a program
DF	Delete file
FM	Set format of returned data
GV	Get software version
HD/TR	Hold/Trigger/Cancel
HE	Help – returns command syntax
I	Execute immediate command
PA	Program abort
PD	Print directory of flash disk
PE	Print error message
PP	Print program to port
PS	Return system status word
PX, PY, PZ, PU	Return axis positions
Q	Return serial poll status byte
RE	Hardware reset
RP/WP/SP	Read/Write/Save parameter
RR/WR	Read/Write register
RV	Read variable
SRQ	Service Request Mode (ON/OFF)
UL/DL	Upload/Download file

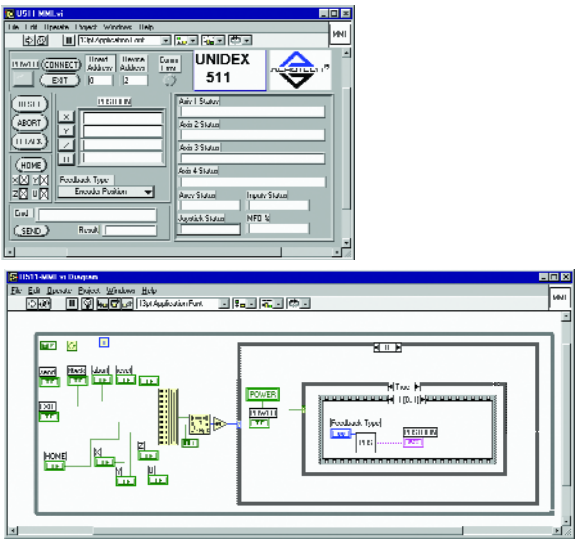
Program Example



Command	Description
EN X Y	; enable axes
PROGRAM INCREMENTAL METRIC UNITS UNITS/SEC	
HO X Y	; Home axes
LINEAR X3 Y3	; Go to start point-Interpolated move
PR IN	; Incremental positioning mode
X10	; Segment AB
Y1	; Segment BC
ROUND ON	; Enable corner rounding
X-10	; Segment CD
Y1	; Segment DE
ROUND OFF	; Disable corner rounding
X9	; Segment EF
G3 X0 Y1 C.5,.5	; Segment FG
G1 x-11 y3	; Segment GH
LOOP 3	
G2 X0 Y0 C0,-1	; Segment CIRCLES
INDEX y-2	; Non-interpolated move
NEXT	
PR AB	; Absolute positioning mode
LINEAR x0 y0	; Return to machine home
EXIT	

UNIDEX 511 LabVIEW™ Drivers

Aerotech has developed a complete set of LabVIEW™ drivers for the UNIDEX 511 controller. These drivers are included free of charge with the standard Windows™-based utility software. All of the UNIDEX 511's advanced motion control features are available through the LabVIEW™ interface, resulting in an easy-to-use, yet powerful, remote interface.



A sample of UNIDEX 511 Virtual Instrument Set.

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UNIDEX 511 MOTOR/DRIVER SELECTION TABLES

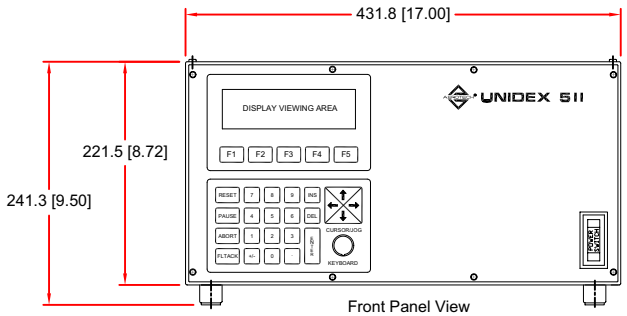
Amplifier	AM16007	DS16020	DS16030	AS32020	AS32030	AS3005
Control Type	Microstepping	Brush	Brush	Brushless	Brushless	Brushless
Output Type	PWM	PWM	PWM	PWM	PWM	Linear
Output Voltage (VDC)	40-160	40-160	40-160	40-160	40-160	30
Continuous Current	7	10	15	10	15	2.5
Peak Current	7.5	20	30	20	30	5
Minimum Load	2 mH	2 mH	2 mH	2 mH	2 mH	2 mH
Operating Temperature	50° C	50° C	50° C	50° C	50° C	50° C
Protection	Short Circuit Protection, Overload Protection, Low Level Power Supply Detection and Fuse					Fused
Switching Frequency	20 KHz	20 KHz	20 KHz	20 KHz	20 KHz	N/A

Type	Driver Model	Motor Model	Cont. Torque N-m (oz-in)	Peak Torque N-m (oz-in)	Speed rpm	Bus Voltage (VDC)	Fn	Cables
Stepping	AM16007	50SM	0.3 (38)	0.3 (38)	900	40	1.0	SMS-O
		55SM	0.4 (55)	0.4 (55)	1500	160	0.8	SMS-O
		101SM	0.6 (90)	0.6 (90)	2200	40	5.0	SMS-O
		140SM	1.0 (140)	1.0 (140)	2200	160	1.4	SMS-O
		310SM	2.6 (370)	2.6 (370)	2200	80	6.0	SMS-O
		450SM	3.2 (450)	3.2 (450)	2200	160	3.5	SMS-O
DC Servo	DS16020	1035	0.25 (35)	1.84 (260)	6000	40	4.0	DC-MSO
		1050	0.35 (50)	2.52 (355)	6000	40	5.0	DC-MSO
		1075	0.53 (75)	2.87 (406)	5000	80	5.0	DC-MSO
		1135	0.95 (135)	5.22 (736)	5000	80	5.0	DC-MSO
		1410	2.89 (410)	14.1 (2000)	2750	80	8.0	MS-O
Brushless Rotary Servo	AS32020	BMS60	0.42 (59)	1.68 (238)	4000	160	1.8	BFCD/BMCHPD
		BMS100	0.69 (98)	2.76 (391)	3000	160	1.5	BFCD/BMCHPD
		BM75E	0.53 (75)	1.41 (200)	4000	160	6.0	BFC/BMC2
		BM130E	1.0 (140)	2.5 (350)	4000	160	4.5	BFC/BMC2
		BM200E	1.4 (200)	3.5 (500)	4000	160	7.0	BFC/BMC2
		BM250E	1.94 (275)	5.0 (700)	4000	160	7.0	BFC/BMC2
	AS32030	BM500E	3.6 (510)	9.0 (1275)	4000	160	12.7	BFC/BMC2
	AS32020	BM800E	5.5 (780)	14.0 (2000)	3000	320	7.0	BFC/BMC2
	AS32030	BM1400E	9.6 (1365)	24.0 (3400)	3000	320	12.7	BFC/BMC2

Type	Driver Model	Motor Model	Cont. Force N (lb)	Peak Force N (lb)	Speed m/s (in/s)	Forcer Weight kg (lb)	Max Bus Voltage VDC	Fn
Brushless U -Channel Linear	AS32020	BLMUC-95	43 (10)	173 (39)	20 (800)	0.12 (0.3)	160	3.1
		BLMUC-143	73 (17)	292 (66)	9 (350)	0.20 (0.4)	160	3.2
		BLMC-142	114 (26)	458 (103)	18 (710)	0.26 (0.6)	320	5.2
		BLMC-267	193 (43)	770 (173)	9 (350)	0.52 (1.2)	320	4.2
		BLM-203	232 (52)	902 (208)	12 (470)	0.9 (1.9)	320	7.0
		BLM-386	352 (80)	1408 (316)	6 (240)	1.7 (3.7)	320	5.3
	AS32030	BLMH-382	822 (185)	3288 (740)	6 (240)	3.1 (6.8)	320	14.0
	AS32020	BLMX-502	1186 (266)	4744 (1064)	3 (120)	4.45 (9.8)	320	8.9
Brushless Flat Linear	AS32020	BLMFI-142	48 (11)	190 (43)	20 (800)	0.84 (1.9)	320	2.4
		BLMFI-386	116 (26)	464 (105)	13 (540)	2.3 (5.0)	320	4.2
		BLMFS-142	77 (17)	309.0 (69.5)	13 (540)	1.02 (2.3)	320	2.4
		BLMFS-386	190 (43)	760 (171)	8 (320)	2.76 (6.1)	320	4.2

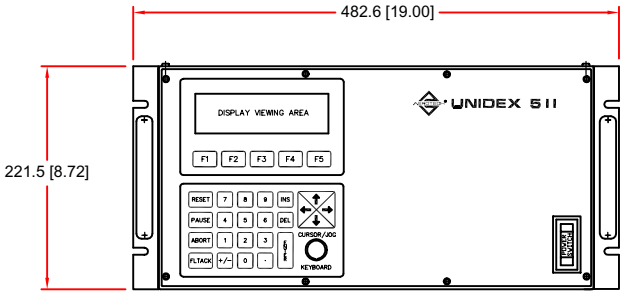
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UNIDEX 511 DIMENSIONS



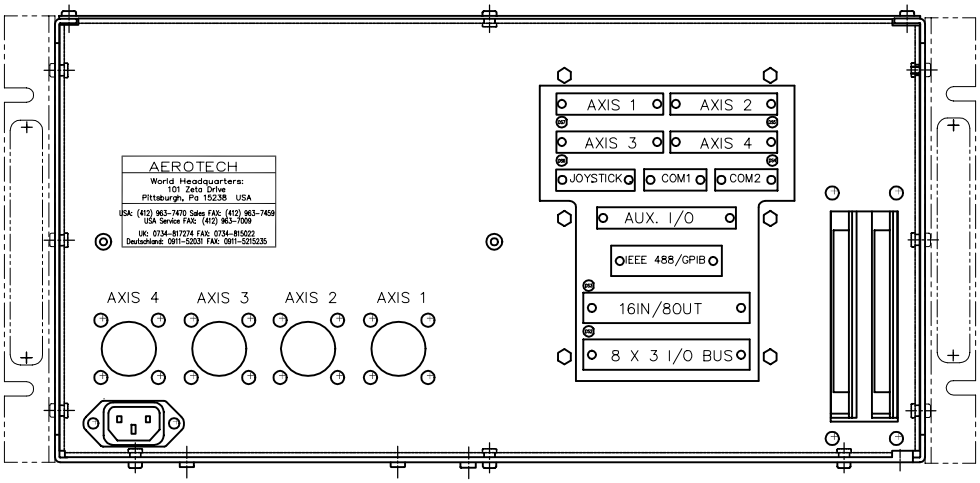
Front Panel View

Basic Model: U511 Series Desk Top Controller
Dimensions - Millimeters [Inches]
Note: U511 Depth, Not Including
Connectors is 381.0 [15.00]



Front Panel View

Basic Model: U511 Series Rack Mount Controller
Dimensions - Millimeters [Inches]
Note: U511 Rack Depth, Not Including
Handles or Connectors is 381.0 [15.00]



Rear Panel View

Basic Model: U511 Series Controller

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UNIDEX 511 ORDERING INFORMATION

Ordering Example

U511	R	-A	-40	-80	/DS16020C	/DS16020C	/AS32020C		/IEEE
Base	Package	Input	Vbus1	Vbus2	Amp1	Amp2	Amp3	Amp4	Options
	R	A	0	0	AM16007C-Fn	AM16007C-Fn	AM16007C-Fn	AM16007C-Fn	IEEE
	S	B	30	30	DS16020C-Fn	DS16020C-Fn	DS16020C-Fn	DS16020C-Fn	ESTOP1
	BR	C	40	40	DS16030C-Fn	DS16030C-Fn	DS16030C-Fn	DS16030C-Fn	ESTOP2
	BS	D	80	80	AS32020C-Fn	AS32020C-Fn	AS32020C-Fn	AS32020C-Fn	ESTOP5
			160	160	AS32030C-Fn	AS32030C-Fn	AS32030C-Fn	AS32030C-Fn	LF
			160LT	160LT	AS3005LC-Fn	AS3005LC-Fn	AS3005LC-Fn	AS3005LC-Fn	

UNIDEX 511 Stand-Alone Motion Controllers

U511R	Rack mount UNIDEX 511 with integral power supply and interconnection panel for all controller signals.
U511S	Desktop UNIDEX 511 with integral power supply and interconnection panel for all controller signals.
U511BR	Blank front, rack mount UNIDEX 511 with integral power supply and interconnection panel for all controller signals.
U511BS	Blank front, desktop mount UNIDEX 511 with integral power supply and interconnection panel for all controller signals.
U511CE	CE certified, UNIDEX 511 with integral power supply and interconnection panel for all controller signals.

Note: All UNIDEX 511 controllers include Windows™-based utility software.

Power Input (y)

-A	115 VAC
-B	230 VAC
-C	100 VAC
-D	208 VAC

Bus Voltage (Vbus1) Configures the bus voltage for axis 1 and 2

-0	Do not wire additional axes
-30	30 VDC (100 W power supply)
-40	40 VDC (175 W power supply)
-80	80 VDC (325 W power supply)
-160	160 VDC (325 W power supply)
-160LT	160 VDC (750 W power supply, does not include transformer)

Bus Voltage (Vbus2) Configures the bus voltage for axis 3 and 4

-0	Do not wire additional axes
-30	30 VDC (100 W power supply)
-40	40 VDC (175 W power supply)
-80	80 VDC (325 W power supply)
-160	160 VDC (325 W power supply)
-160LT	160 VDC (750 W power supply, does not include transformer)

U511 Amplifiers

AM16007C-Fn	Microstepping motor driver, 160 V, 7 A cont., 7 A peak, 20 kHz PWM, 3U height
DS16020C-Fn	DC servomotor driver, 160 V, 10 A cont., 20 A peak, 20 kHz PWM, 3U height
DS16030C-Fn	DC servomotor driver, 160 V, 15 A cont., 30 A peak, 20 kHz PWM, 3U height
AS32020C-Fn	Brushless motor driver, 320 V, 10 A cont., 20 A peak, 20 kHz PWM, 3U height
AS32030C-Fn	Brushless motor driver, 320 V, 15 A cont., 30 A peak, 20 kHz PWM, 3U height
AS3005LC-Fn	Brushless motor driver, 30 V, 3 A cont., 5 A peak, linear DC, 3U height

Note: Specify fuse value “Fn” for each amplifier. Current command input, designated by the “C” is default configuration. For tachometer feedback, omit the “C” on the part number (DS series only).

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UNIDEX 511 ORDERING INFORMATION

Options

IEEE	IEEE-488 communications interface.
ESTOP1	E-stop mushroom switch faceplate mounted. No latching circuitry included.
ESTOP2	Internal E-stop circuitry that breaks bus power with remote interface.
ESTOP5	Breaks bus power with latching circuitry with E-stop mushroom switch, faceplate mounted.

Accessories

PSO-1	Programming laser firing option, requires ULTRA (≤+5 V, high speed, high current, HCPL2601)
PSO-2	Programming laser firing option, requires ULTRA (≤+15 V, high speed, low current, 6N136)
PSO-3	Programming laser firing option, requires ULTRA (≤+30 V, low speed, high current, 4N33)
RDP-PC-2	Resolver-to-digital converter card, 4 channel capable, 2 channels installed
RDP-PC-4	Resolver-to-digital converter card, 4 channel capable, 4 channels installed
4EN-PC	Four axis encoder and I/O interface expansion card for UNIDEX 511 controllers. Includes: 40 in/40 out digital I/O, four 12-bit A/D inputs and 4 encoder channels for dual-loop feedback.
BRAKE-z	Brake control logic and power supply; specify which axis "z" as 1, 2, 3, or 4

Software

U511	UNIDEX 511 software for running and editing programs and setting parameters
U11	UNIDEX 11 emulation software
MMI511	Windows-based remote software package; includes graphical tuning, program editing, program/parameter down-load/upload, diagnostics (this software is included standard with each U511)
LV511	32-bit LabVIEW™ for Windows™ drivers (for Windows™ 95, 98 and Windows NT)

System Check-Out

INTEGRATION	Setup and tune U511 system with loaded motor and set parameters for customer specific motor; provide parameter specification sheet

E-Stop Accessories

EPANEL-ESTOP3	External emergency stop control panel for disconnecting power to motors. Includes interface to Aerotech drive racks including 3 ft motor power cables for each contactor installed.
-5C	Contactor and wiring for one motor, up to 5 A DC
-10C	Contactor and wiring for one motor, up to 10 A DC
EPANEL-ESTOP4	External emergency stop control panel for disconnecting power to motors with a safety relay interface. Includes interface to Aerotech drive racks including 915 mm (3 ft) motor power cables for each contactor installed.
-SRC	Safety relay E-Stop contactor for disconnecting power to motors; up to 10 A.

Accessories

HW500	Handwheel assembly (3.6 inch diameter) and cable with 25-pin D-shell
JBV	Standard joystick with cable, 1.5 m (5 ft)
JI	Industrial joystick with cable, 1.5 m (5 ft)
JP4X-10	Joystick extension cable, 3.0 m (10 ft)
KYBD	Standard QWERTY keyboard
TB-DB25-P	25 conductor, DIN mount, screw terminal interface for 25-pin D-shell male
TB-DB37-P	37 conductor, DIN mount, screw terminal interface for 37-pin D-shell male
TB-DRH50-P	50 conductor, DIN mount, screw terminal interface for 50-pin dual row header (IDE) male
AF5	EMI filter module for use with brush motors; 5 amp rated with drive rack interface cabling
AF10	EMI filter module for use with brush motors; 10 amp rated with drive rack interface cabling

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UNIDEX 511 ORDERING INFORMATION

I/O Options – Generation 4 (Equivalent Generation 1 in parentheses)

G4PB8 (PB8)	Opto22 I/O rack, supports 8 modules
G4PB16 (PB16)	Opto22 I/O rack, supports 16 modules
G4PB24 (PB24)	Opto22 I/O rack, supports 24 modules
G4OAC5A (OAC5A)	AC output module, opto-isolated, 24-280 VAC, 2 A
G4IAC5 (IAC5)	AC input module, opto-isolated, 90-140 VAC
G4ODC5 (ODC5)	DC output module, opto-isolated, 5-60 VDC, 2 A
G4IDC5 (IDC5)	DC input module, opto-isolated, 10-32 VDC
G4IDC5B (IDC5B)	DC input module, opto-isolated, 4-16 VDC

Cables (Control)

OPC-5	I/O cable, system interconnect to Opto 22 (G1) board, 1.5 m (5 ft)
OPC-12	I/O cable, system interconnect to Opto 22 (G1) board, 3.6 m (12 ft)

Cables (Communications)

CBL232-10	Communications cable, RS-232C protocol, 3.0 m (10 ft) , DB9, DB9
I488-1M	Communications cable, IEEE-488 protocol, 1.55 m (3.3 ft)
I488-3M	Communications cable, IEEE-488 protocol, 3.0 m (10 ft)

Motor Feedback (Brushless)

BFC-15	Feedback cable, BM series brushless motor to controller, 4.5 m (15 ft), MS, DB25
BFCD-15	Feedback cable, BMS series slotless motor to controller, 4.5 m (15 ft), DB25, DB25
BFCL-15	Feedback cable, linear motor stage to controller, 4.5 m (15 ft)
BFCMX-15	Feedback cable, linear motor stage with MX multiplier to controller, 4.5 m (15 ft)
BRC-15	Feedback cable, resolver motor to controller, 4.5 m (15 ft)
-X	Custom length, adder for custom length feedback cable

Motor Power (Brushless)

BMC2-15	Cable, brushless motor power cable for DR300 and DR500 drive racks, 4.5 m (15 ft)
BMCHPD-15	Motor power cable, DR series to BMS series motors, 4.5 m (15 ft)
-X	Custom length, adder for custom length power cable

Motor Feedback & Power (DC Brush and Stepper)

SMS-O-15	Integral cable, SM series motor to contoller, 4.5 m (15 ft)
DC-MSO-15	Integral cable, 1017, 1035, 1050, 1075, 1135 DC motor to contoller, 4.5 m (15 ft)
MS-O-15	Integral cable, 1210, 1410, 1580, 1960 DC motor to contoller, 4.5 m (15 ft)

Manuals

EDU00162	U511 Operation & Technical Manual
EDO00105	PSO-PC Operation & Technical Manual
EDU00111	4EN-PC Board Option Manual
EDU00112	RDP-PC Board Option Manual

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