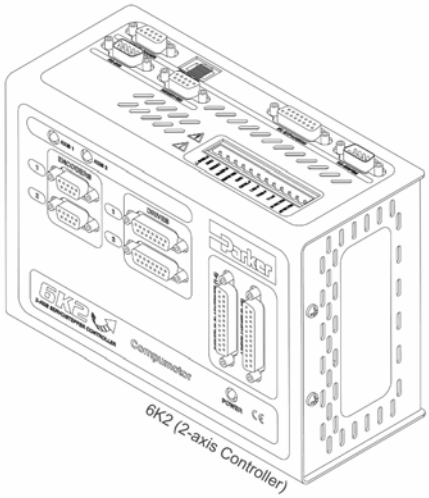
Automation

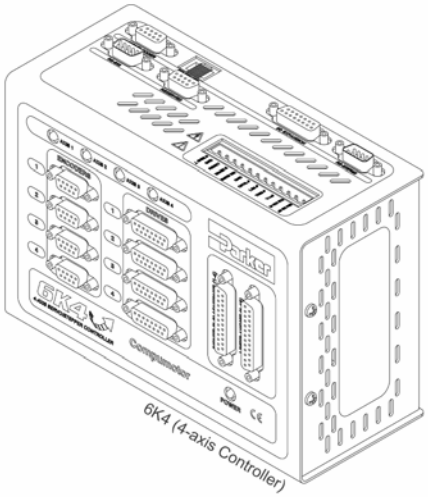
p/n 88-017547-01 B

6K Series Hardware Installation Guide

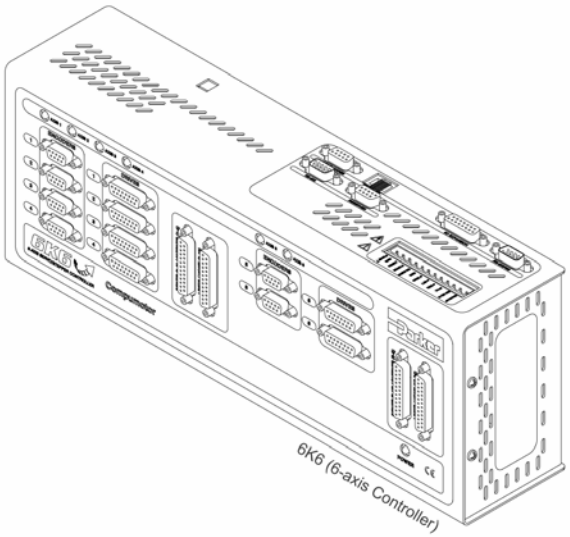
Effective: November 2005



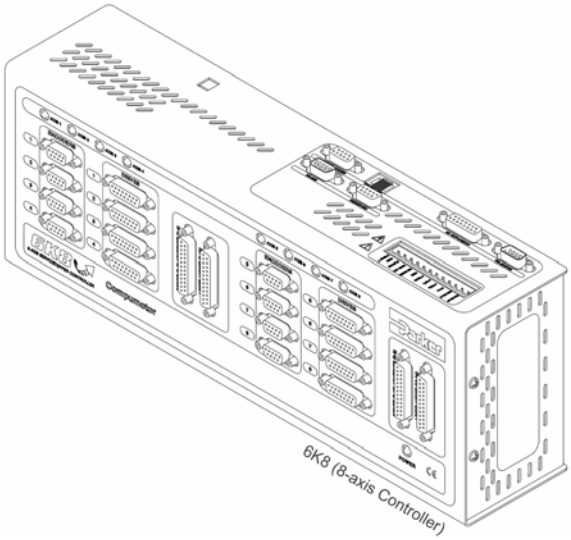
6K2 (2-axis Controller)



6K4 (4-axis Controller)



6K6 (6-axis Controller)



6K8 (8-axis Controller)

6K Series Controller Ship Kit

Part Name	Part Number
One of the following 6K products:	
6K2 two-axis controller with ship kit (see 6K-KIT list below)	6K2
6K2 without ship kit	6K2-NK
6K4 four-axis controller with ship kit (see 6K-KIT list below)	6K4
6K4 without ship kit	6K4-NK
6K6 six-axis controller with ship kit (see 6K-KIT list below)	6K6
6K6 without ship kit	6K6-NK
6K8 eight-axis controller with ship kit (see 6K-KIT list below)	6K8
6K8 without ship kit	6K8-NK
Ship kit items (6K-KIT): *	
6K Series Hardware Installation Guide	88-017547-01
6K Series Command Reference	88-017136-01
6K Series Programmer's Guide	88-017137-01
Motion Planner CD-ROM	95-017633-01
Ethernet cable (5-foot, RJ-45, cross-over)	71-017635-01
Peel-and-stick labels for onboard I/O cables	87-017636-01

* The panel mounting kit (part number 74-018177-01), which includes two mounting brackets and four screws (6-32 x ¼), is included with all 6K shipments, independent of the 6K-KIT.

NOTE: If an Item is missing, call the factory (see phone numbers on the inside front cover).

Optional Accessories

Part Name	Part Number
Drive cable to Parker step & direction drives, 10-foot	71-016137-10
Drive cable to ±10V drives, 10-foot (no connector at drive end)	71-017003-10
VM25 25-pin screw-terminal adapter for onboard I/O (with 2-foot cable)	VM25
60 Watt power supply (DIN rail mountable)	PS-60W
EVM32 expansion I/O modules. Each module can hold up to four SIM cards for total of up to 128 I/O points. Up to eight EVM32 modules may be connected to your 6K controller.	
EVM32 baseboard, DIN rail mountable (with 2-foot cable)	EVM32-BASE
SIM card with eight digital inputs	SIM8-IN
SIM card with eight digital outputs	SIM8-OUT-EVM32
SIM card with eight 12-bit analog inputs	SIM8-AN-IN
100-foot cable	71-016949-100

6K Series General Specifications

Parameter	Specification
Power (DC input)	24 VDC ±10%, 2A max. (current requirements depend on type/amount of I/O used)
Environmental	
Operating temperature	32 to 122°F (0 to 50°C)
Storage temperature	-22 to 185°F (-30 to 85°C)
Humidity	0 to 95% non-condensing
Performance	
Command output	± 10V or Step & Direction
Servo update	As fast as 62.5 µs per axis
Stepping accuracy	± 0 counts from preset total
Position range	± 2,147,483,648 counts
Velocity range	Stepper axes: 1 to 2,000,000 counts/sec; Servo axes: 1 to 12,000,000 counts/sec;
Acceleration range	1 to 50,000,000 counts/sec/sec
Communication Interface	
Serial	
Connection	RS-232: 3-wire connections (Rx, Tx and GND) on "RS-232" or "RS-232/485" connectors. The "RS-232/485" connector's default configuration is for RS-232 and set for use with an RP240 (see page 32). RS-485: 2- and 4-wire connections to "RS-232/485" connector. Requires DIP switch changes (see page 5).
Maximum units in daisy chain	99 (use ADDR command to set individual addresses for each unit).
Communication parameters	8 data bits; No parity; Baud: 9600 (set with BAUD command; range: 1200-38400).
Ethernet	10Base-T (10Mbps twisted pair); TCP/IP protocol. RJ-45 connector. Default IP address is 192.168.10.30 (use NTADDR on RS-232 port to change address).
Onboard Inputs	
Encoder inputs	Differential comparator accepts two-phase quadrature incremental encoders with differential or single-ended outputs. To use single-ended encoders, jumper pin 8 to pin 9 (not available on Master Encoder connector). The "Master Encoder" connector may not be used for servo feedback or stepper stall detect. Maximum voltage = 5VDC. Switching levels (TTL): Low ≤ 0.4V, High ≥ 2.4V. Maximum frequency = 12.0 MHz post quadrature.
Limit inputs ("LIMITS/HOME" connectors)	Voltage range = 0-24 VDC. Factory default is sourcing current, voltage reference is 24 VDC*. To make all limit inputs sink current, connect the "LIM-P" terminal to the "GND" terminal (see connector on top of 6K chassis).
Trigger inputs ("TRIGGERS/OUTPUTS" connectors)	Voltage range = 0-24 VDC. Factory default is sourcing current, voltage reference is 24 VDC*. To make all trigger inputs sink current, connect the "TRIG-P" terminal to the "GND" terminal (see connector on top of 6K chassis).
Master trigger input ("MASTER TRIG")	(same specification as the rest of the trigger inputs)
Drive Fault input (pin 5 on "DRIVE" connectors)	Voltage range = 0-24 VDC. Factory default is sourcing current, voltage reference is 24 VDC*. To make all drive fault inputs sink current, connect the "CNTRL-P" terminal to the "GND" terminal (see connector on top of 6K chassis).
"ENABLE" input	Voltage range = 0-24 VDC. Voltage reference is 24 VDC*. Internal 6.8 KΩ pull-up to 24 VDC. If this input is opened, motion is killed and the program in progress is terminated. If ENABLE is not grounded when motion is commanded, motion will not occur, and the error message "WARNING: ENABLE INPUT ACTIVE" will be displayed to the terminal emulator. (see connector on top of 6K chassis).
Onboard Outputs	
Digital outputs ("TRIGGERS/OUTPUTS" connectors)	Open-collector outputs; will sink up to 300 mA.
+5VDC output (pin 1 on "ENCODER")	Internally supplied +5VDC. Provides up to 250 mA per encoder.
Servo drive command out (pin 3 on "DRIVE")	Command signal output to the drive. ±10VDC analog output. 12-bit DAC. Load should be > 2 KΩ impedance.
Servo drive shutdown (pins 7 & OUT DIODE")8 on "DRIVE")	Shutdown relay output. Max rating: 175VDC, 0.25A, 3W.
Step, Direction, Shutdown (pins 1,2,11 on "DRIVE")	Differential line drive output. Signal high > 3.5VDC @ +30 mA, signal low < 1.0VDC @ -30 mA. +output for each driver is active high, -output is active low. Step pulse width is 0.3-20 µs (depending on PULSE command — default is 0.5 µs).
Flyback diode output ("OUT DIODE")	Connected to 24 VDC power with external jumper — allows you to use internal flyback diode for onboard outputs that are driving inductive loads. DISCONNECT the jumper if the onboard outputs are not driving inductive loads.

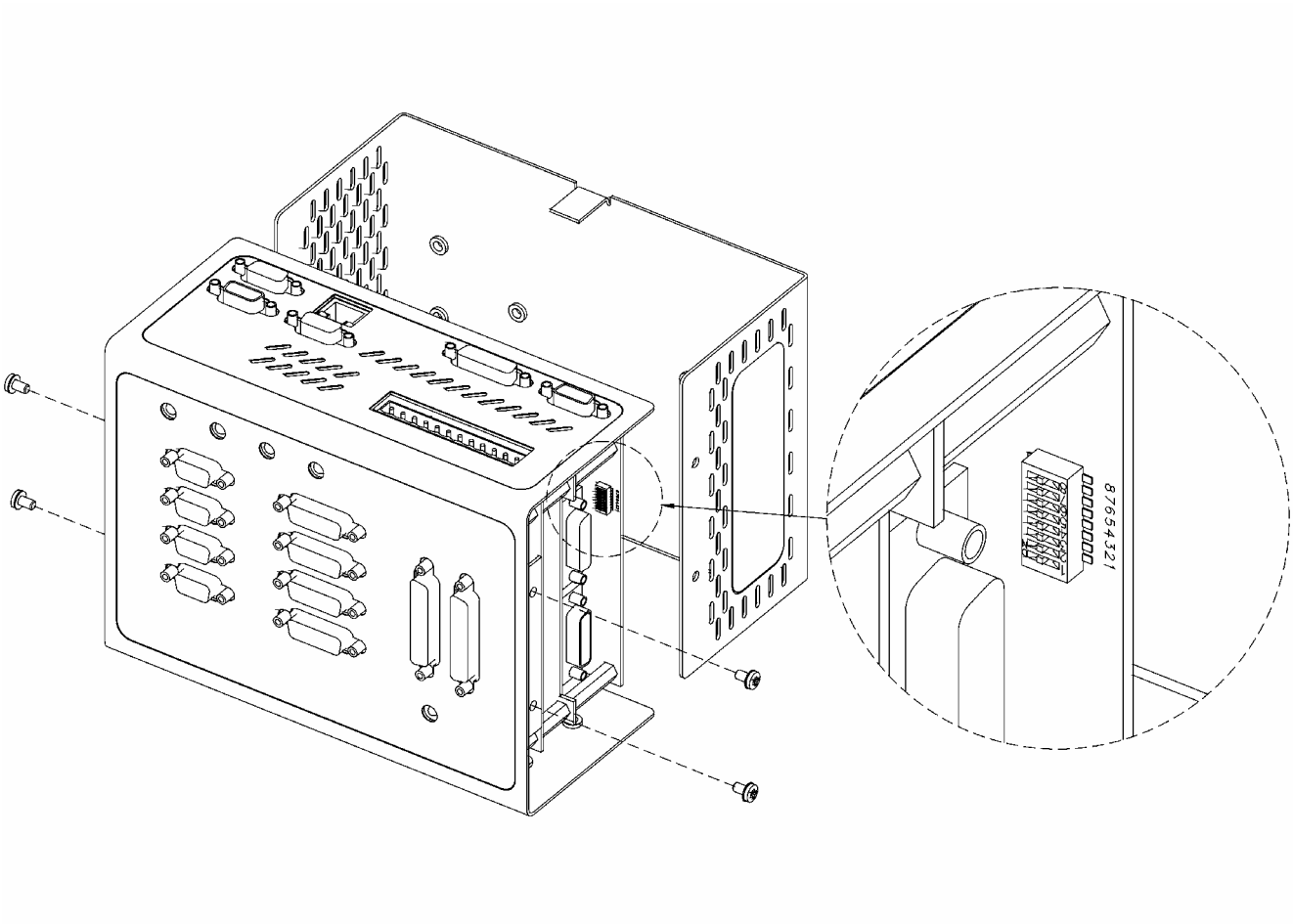
* The voltage reference (VINref) is +24 VDC, unless you connect an external 5-24 VDC supply to the "VINref" terminal (see connector on top of 6K chassis). Switching levels: Low ≤ 1/3 VINref, High ≥ 2/3 VINref.

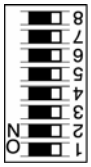
RS-485 Setup (Optional)

READ THIS FIRST— The "RS-232/485" connector (also referred to as "COM2") is factory-configured for RS-232 communication; this makes it compatible with an RP240 remote operator panel. If you are not using RS-485 communication, skip this section and proceed to Mounting.

Caution — Remove power before removing the 6K controller's enclosure.

While handling the 6k controller's printed circuit assemblies, be sure to observe proper grounding techniques to prevent electrostatic discharge (ESD).





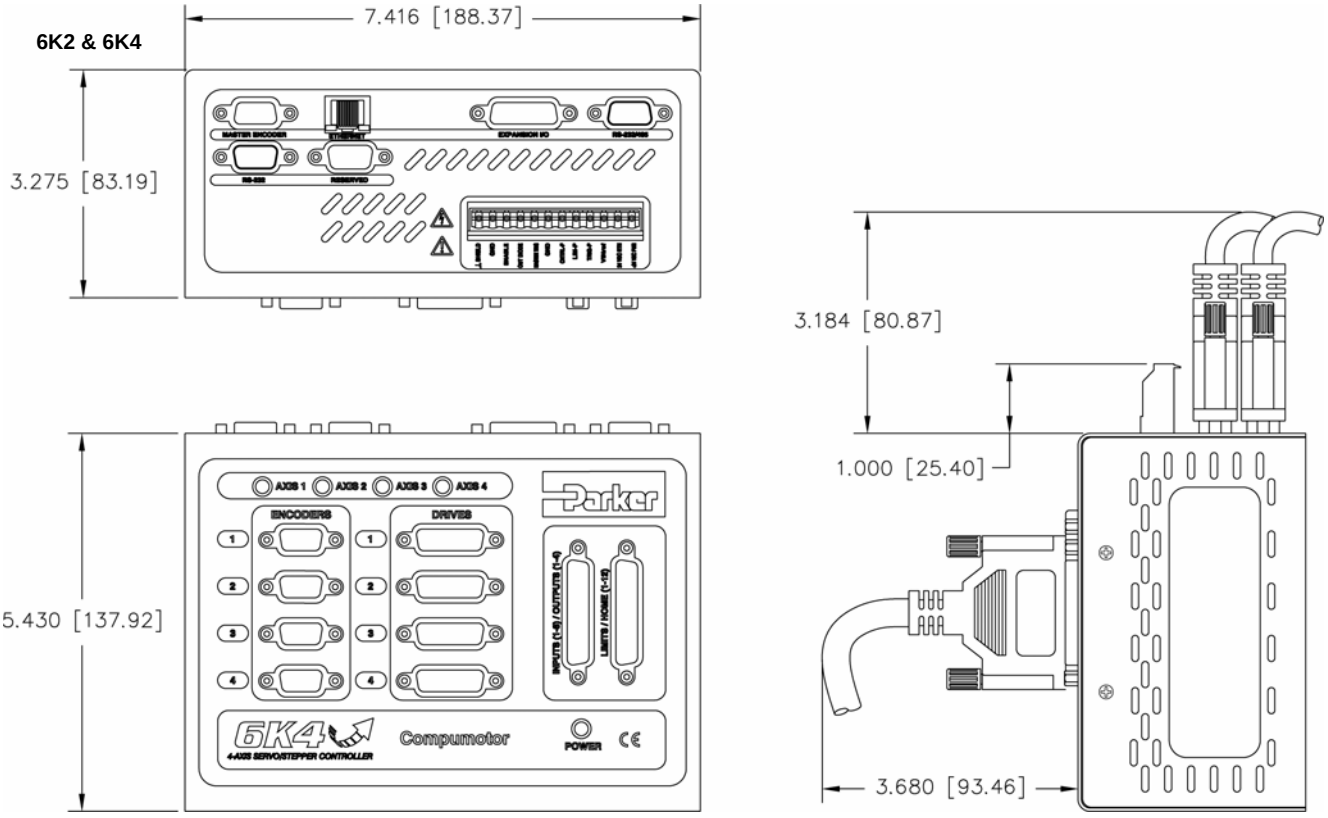
DIP Switch		RS-485 2-Wire	RS-485 4-Wire	RS-232
8	2-wire RS-485	ON	OFF	OFF
7	4-wire RS-485	OFF	ON	OFF
6	*Reserved*	OFF	OFF	OFF
5	Enable RS-485	ON	ON	OFF
4	120Ω Rx termination resistor	ON *	ON	OFF
3	120Ω Tx termination resistor	ON *	ON	OFF
2	681Ω Tx+ bias resistor	ON	ON	OFF
1	681Ω Tx- bias resistor	ON	ON	OFF

* For 2-wire RS-485, use switch #3 or switch #4 for 120Ω termination (not both).

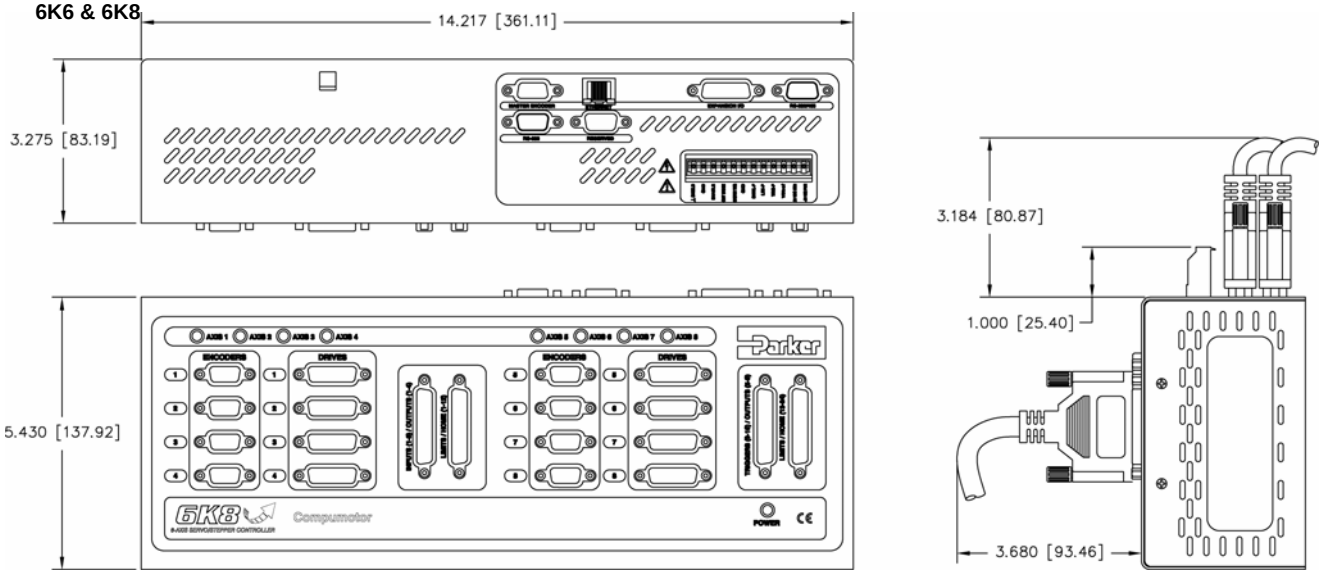
6K Series Dimensions & Mounting

Dimensions

6K2 & 6K4



6K6 & 6K8



Mounting

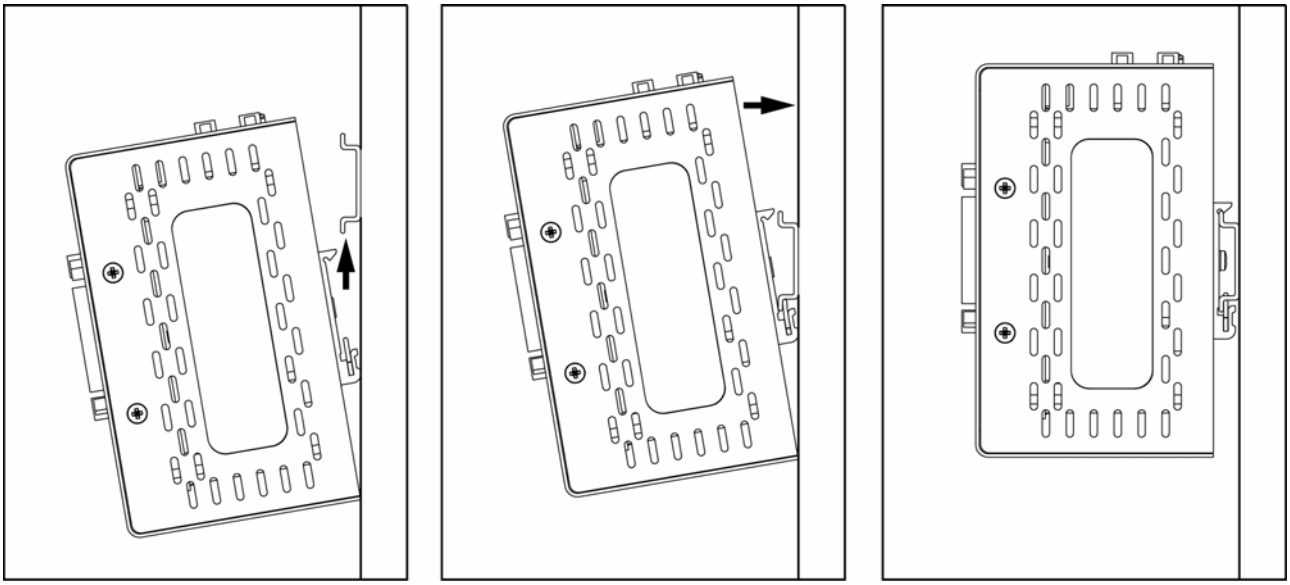
Environmental Considerations

Temperature—Operate the 6K in ambient temperatures between 32°F (0°C) and 122°F (50°C). Provide a minimum of 4 inches (100.6 mm) of unrestricted air-flow space around the 6K chassis. Fan cooling may be necessary if adequate air flow is not provided.

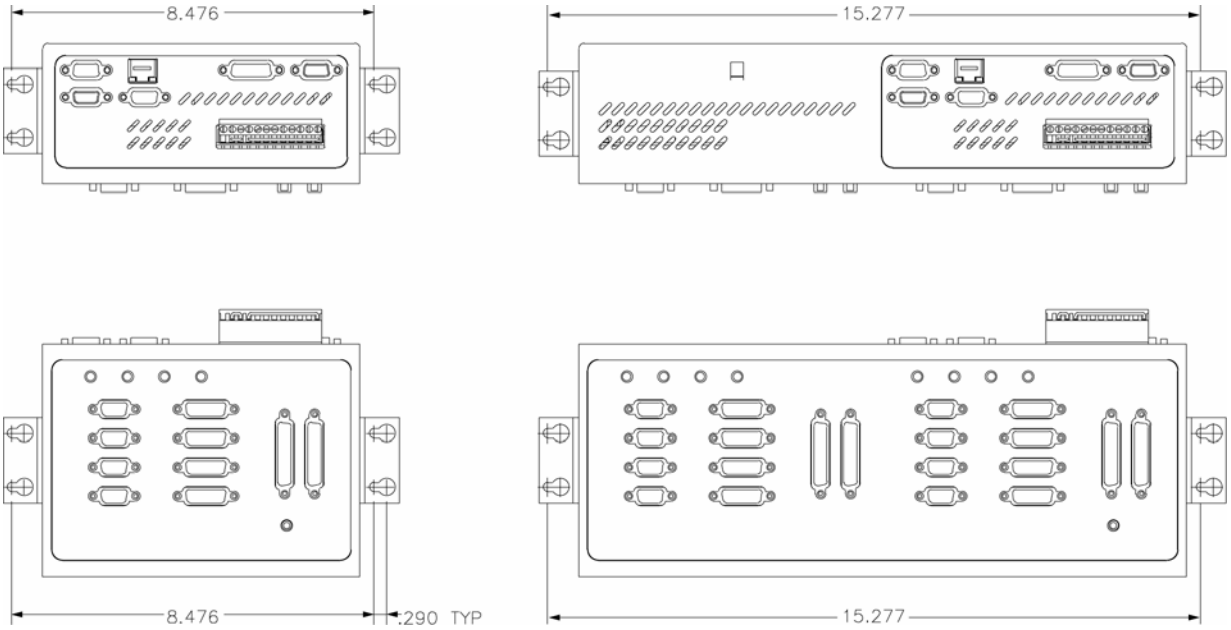
Humidity—Keep below 95%, non-condensing.

Airborne Contaminants, Liquids—Particulate contaminants, especially electrically conductive material, such as metal shavings and grinding dust, can damage the 6K. No not allow liquids or fluids to come in contact with the 6K or its cables.

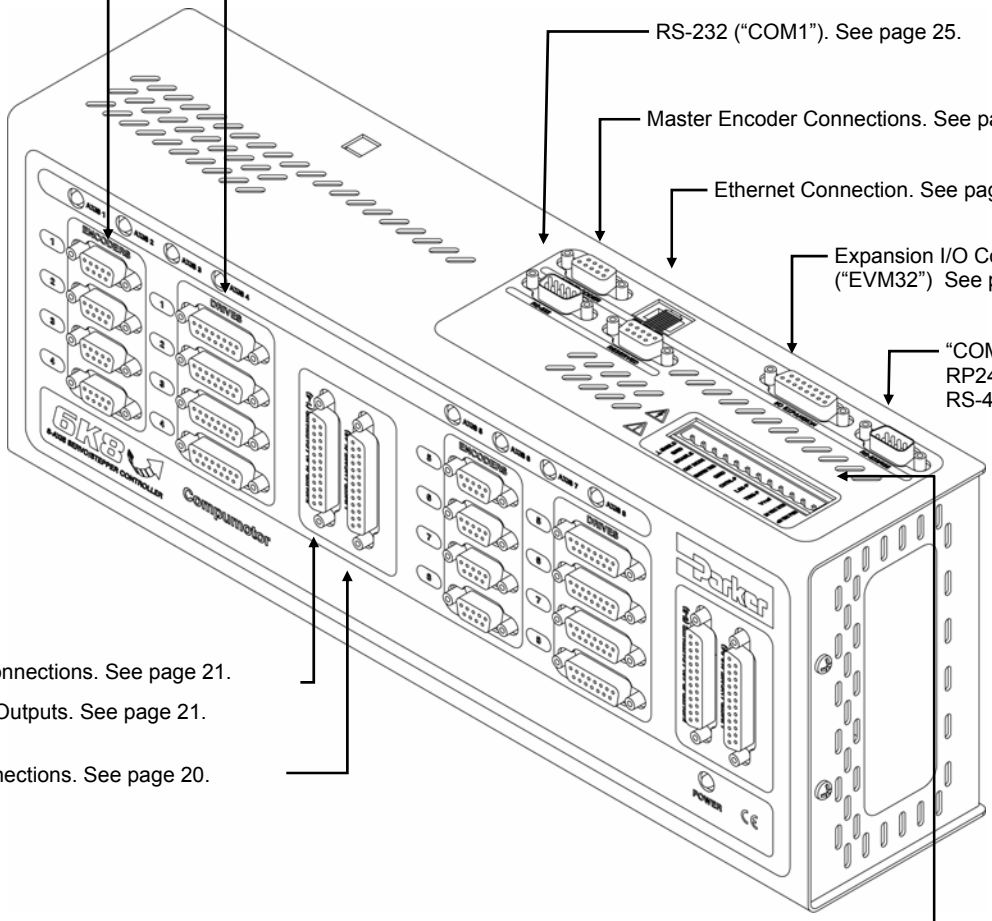
Mounting Option — DIN Rail



Mounting Option — Brackets (*brackets provided in ship kit*)



6K Series Electrical Connections



Auxiliary Connections

- +24 VDC PWR ..... +24 VDC power input. See page 29.
- 24 VDC RTN..... 24 VDC power return. See page 29.
- VINref ..... Voltage reference for trigger, limit, drive fault, and enable inputs (default is 24 VDC; if 24 VDC is desired, it is not necessary to connect an external power source to the VINref terminal). Switching: ≤ 1/3 VINref = Low; ≥ 2/3 VINref = High.
- TRIG-P * ..... Pull-up for trigger inputs. No connection necessary for pull-up to 24 VDC. See page 21.
- LIM-P *..... Pull-up for limit inputs. No connection necessary for pull-up to 24 VDC. See page 20.
- CNTRL-P *..... Pull-up for drive fault inputs. No connection necessary for pull-up to 24 VDC. See page 10 and 15.
- GND..... Isolated logic ground.
- MASTER TRIG..... Master Trigger Input. See page 10.
- OUT DIODE..... The 6K is shipped from the factory with this pin connected to 24 VDC power with an external jumper; this uses the internal flyback diode for onboard outputs that are driving inductive loads. DISCONNECT the jumper if the onboard outputs are <u>not</u> driving inductive loads.
- ENABLE ..... Enable Input (**must be connected to GND to allow motion**). See page 9.
- GND..... Isolated logic ground.
- SHIELD..... Internally connected to chassis earth ground.

* The only reason to use the pull-up terminals is to change the respective inputs from sourcing VINref (factory default) to sinking. If sourcing inputs is appropriate for your application, then leave the pull-ups not connected. Note that the factory default is for the inputs to source 24 VDC; if sourcing other than 24 VDC is desired, connect the other voltage to the VINref terminal (e.g., to source 12VDC, connect a user-supplied 12VDC supply to the VINref terminal.

Enable Input

The 6K controller is shipped from the factory with the ENABLE input jumpered to ground, thus allowing motion “out of the box” for bench-testing purposes. Use the diagram below as a guide for connecting the ENABLE input according to your application’s needs.