
XLT50-D/XLT50-S 3-Axis Stepper Drive

General Description

Based upon the XL50 single axis drive, the XLT50-D/-S offers a cost-effective 3-axis drive solution in a single open-frame package. The XLT50-D/-S offers the following benefits:

- Reliable design based upon the XL50
- Cost-effective solution for 3-axis application
- Available with differential (-D) or single-ended (-S) inputs

Physical Appearance

The drive is contained within an open-frame aluminium case as shown in Figure A-1. Mounting holes allow it to be attached to a panel using two 4mm screws.

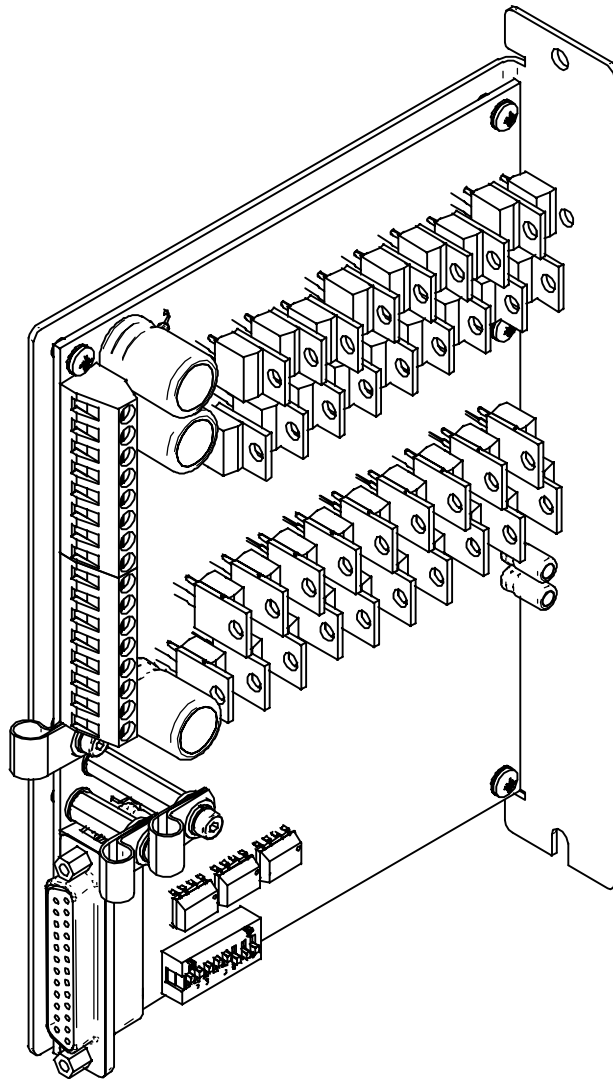


Figure A-1. XTL50 Drive

Dimensions

The overall dimensions of the drive are 141mm deep, 40mm wide (including P-clips) and 172mm high. The distance between centre fixings is 185mm and the overall height of the flange mount is 195mm.

Mounting Information

Mount the drive vertically. Both the top 4.5mm diameter fixing hole and the bottom 4.5mm width fixing slot should be used.

Mount the supply with a minimum free space of 50mm both below and above its case. Allow a side clearance of 10mm free space on both sides.

Note, do not mount the supply above or close to other products which generate a significant amount of heat by radiation or convection.

Drive Layout & Connector Positions

Figure A2 shows the location of connectors X1, X4/5 and the bit switch, together with the solder bridge contacts and LED.

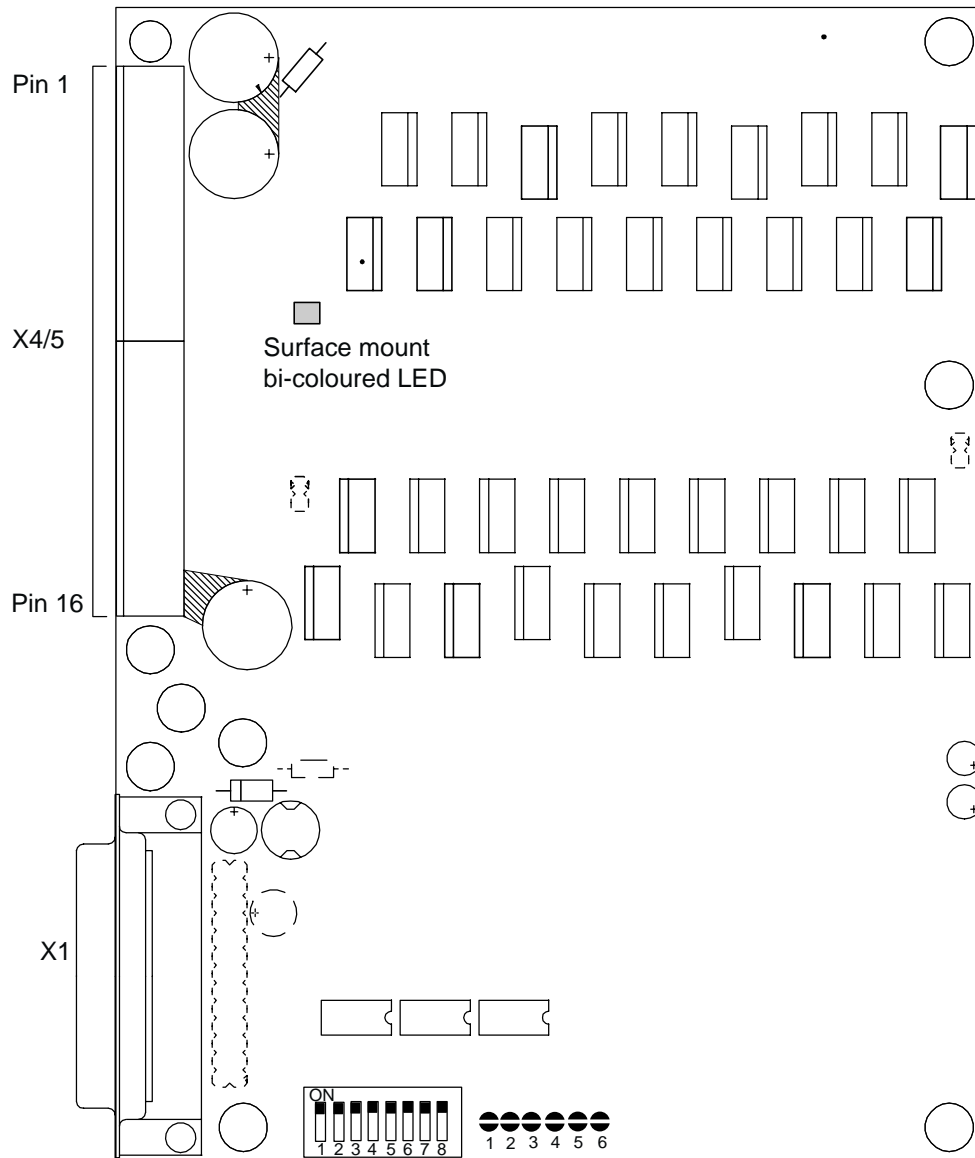


Figure A-2. XLT Drive Board Layout

Note: [1] Connector X4/5 is formed from two 8-way connectors treated as a single 16-way connector.

[2] The solder bridge pads, numbered 1 to 6, next to the bit-switch can be used to alter the step/direction, step-up/step-down and the standby settings of each axis. See the **Control** section.

Power and Motor Connections

Make all DC input connections to the upper part of X4/5, the lower screw connections are used for motor outputs, detailed in Table A-1.

Pin N° of X4/X5	Function
1	HV (24-85V)
2	0V (return for HV)
3	Earth
4	Motor 1A+
5	Motor 1A-
6	Motor 1B+
7	Motor 1B-
8	Motor 2A+
9	Motor 2A-
10	Motor 2B+
11	Motor 2B-
12	Motor 3A+
13	Motor 3A-
14	Motor 3B+
15	Motor 3B-
16	Earth

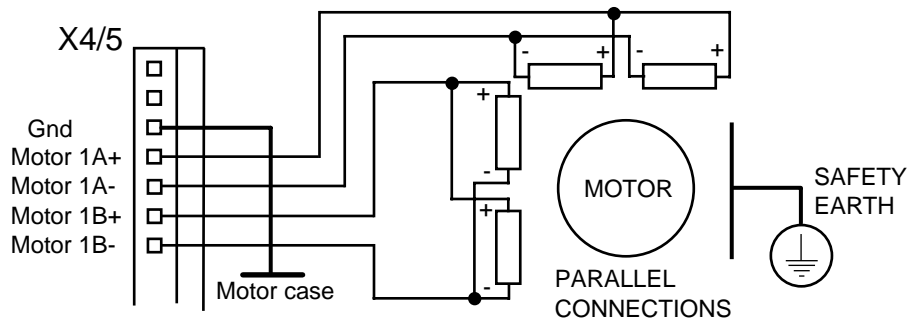
Table A-1. X4/X5 Connector Pin Out

Motor Connections (at the motor)

Make motor connections directly between the drive and motor, do not use any switching devices, such as a contactor, in the motor supply cables.

The majority of applications use an eight-lead motor with the windings connected in parallel or series, as shown in Figure A-3. Motor connections will need to be determined from the data sheet of the motor. Wire colour or terminal markings identify the connections, depending upon the make of the motor.

MOTOR CONNECTOR



MOTOR CONNECTOR

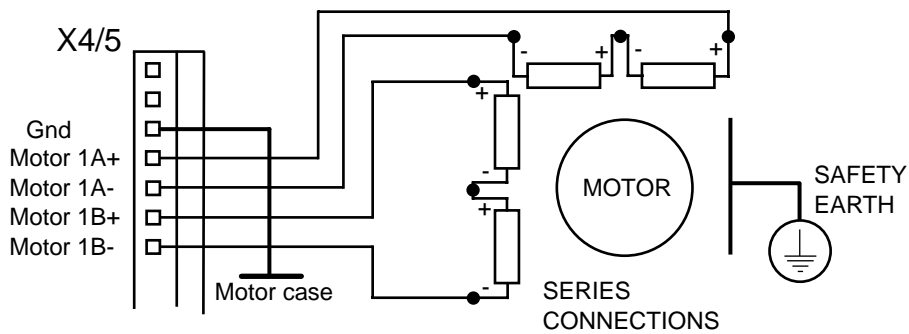


Figure A-3. 8 Lead Motor Connection Options

Control XLT50 Drive

Input Configuration

The XLT50 drive is available in two versions:

- XLT50-D Differential step/direction inputs
- XLT50-S Single-ended step/direction inputs

The use of differential inputs gives the option of good electrical noise immunity and finds greatest use where control signals have to be routed long distances in electrically noisy environments. The single-ended version does not have the same noise immunity, but offers the choice of a simple control interface.

Table A-2 lists the signal functionality for a differential input drive.

Pin	Function (differential input)	Pin	Function (differential input)
1	Step 1+	14	Step 1-
2	Direction 1-	15	Direction 1+
3	Step 2+	16	Step 2-
4	Direction 2-	17	Direction 2+
5	Step 3+	18	Step 3-
6	Direction 3-	19	Direction 3+
7	Shutdown (bar) 1	20	Shutdown (bar) 2
8	Shutdown (bar) 3	21	0V
9	Fault 1	22	Zero phase (bar) 1
10	Fault 2	23	Zero phase (bar) 2
11	Fault 3	24	Zero phase (bar) 3
12	Composite fault	25	0V
13	Reserved		

Table A-2. X1 Connector Differential Inputs Function

Differential Input Circuit Configuration

Figure A-4 shows the differential input circuit for the Step and Direction signals.

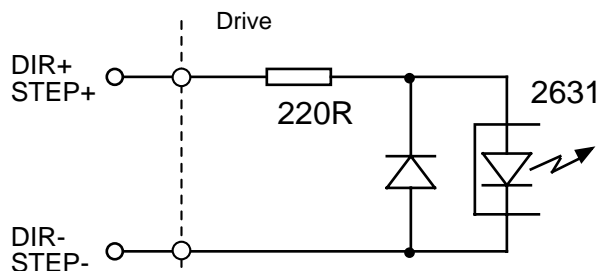


Figure A-4. Differential Input Circuit Configuration

Table A-3 lists the signal functionality for a single-ended input drive.

Pin	Function (differential input)	Pin	Function (differential input)
1	NC	14	Step 1-
2	Direction 1-	15	NC
3	NC	16	Step 2-
4	Direction 2-	17	NC
5	NC	18	Step 3-
6	Direction 3-	19	NC
7	Shutdown (bar) 1	20	Shutdown (bar) 2
8	Shutdown (bar) 3	21	0V
9	Fault 1	22	Zero phase (bar) 1
10	Fault 2	23	Zero phase (bar) 2
11	Fault 3	24	Zero phase (bar) 3
12	Composite fault	25	0V
13	Reserved		

Note: NC means No Connection

Table A-3. X1 Connector Single-ended Inputs Function

Single-ended Input Circuit Configuration

Figure A-5 shows the single-ended input circuit for the Step and Direction signals.

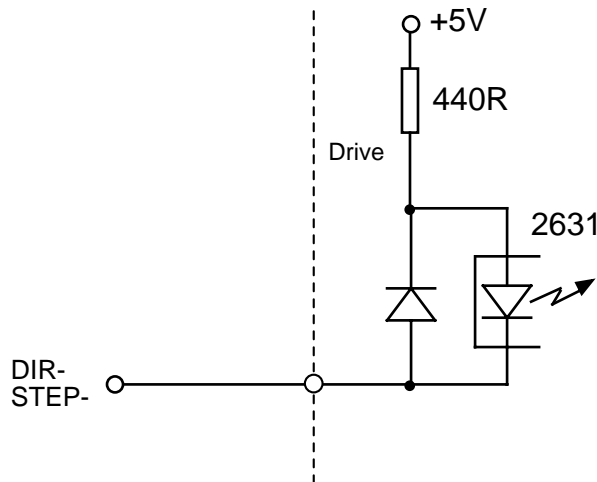


Figure A-5. Single-ended Input Circuit Configuration

Figure A-6 shows the input circuit of a Shutdown(bar) signal. This signal, when active (logic pull-down low) will shutdown the selected axis number.

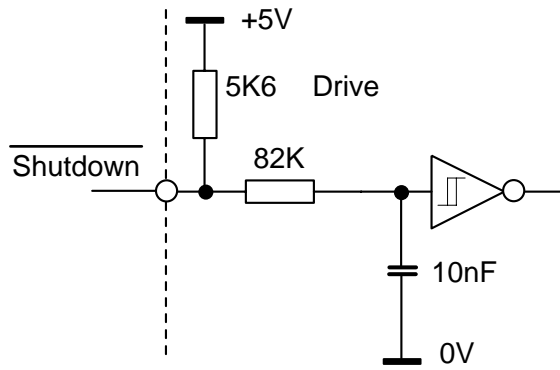


Figure A-6. Shutdown Input Circuit Configuration

The Shutdown input circuit forms a filter that introduces an approximate 1mS delay, which reduces the chances of false triggering of the Shutdown input.

Fault Outputs

The individual Fault 1, 2 & 3 outputs indicate an over-current fault has occurred on a particular axis (1, 2 or 3). The Fault output can be reset by toggling (turning OFF and ON) the axis Shutdown input. If a supply rail fault occurs, all three axes Fault outputs will signal a fault. In this situation you may either reset each individual axis or cycle the power to the drive to clear the fault indication.

Composite Fault Output

This output is used to alert a controller that a fault has occurred on one or more axes of the drive.

Zero Phase Outputs

The individual Zero Phase outputs 1, 2 & 3 indicate the zero phase condition for each individual axis, that occurs once every electrical cycle or 50 times per mechanical revolution of the motor.

LED Indicators Function

The bi-coloured LED indicates the state of the drive, as shown in Table A-4.

Colour	Function
Green	Supplies OK (HV and internal supplies). The LED is non-latched
Green & Red (Orange)	Supplies OK & Fault (over-current or possibly latched supply fault after HV over-voltage)
Red	Fault (supply fault)

Table A-4. LED Indicator Function

Bit Switch Settings

The bit switch mounted behind connector X1 controls the resolution of the drive in steps/rev. The switch also controls the current level settings of the individual axes as a percentage of the full output current obtainable. Resolution is set using bit switches 1 and 2, as indicated in Table A-5.

Bit-switch settings only take effect following a power cycle or by de-energising and re-energising the drive.

Bit Switch 1	Bit Switch 2	Overall Resolution in steps/rev
OFF	OFF	4000
OFF	ON	2000
ON	OFF	800
ON	ON	400

Table A-5. Resolution Settings Using Switches 1 and 2

The current level of individual axes is set using switches 3 to 8 as shown in Table A-6.

Bit Switch 3	Bit Switch 4	Axis 1 Current Level in % of full rating
ON	ON	100%
ON	OFF	80%
OFF	ON	64%
OFF	OFF	50%
Bit Switch 5	Bit Switch 6	Axis 2 Current Level in % of full rating
ON	ON	100%
ON	OFF	80%
OFF	ON	64%
OFF	OFF	50%
Bit Switch 7	Bit Switch 8	Axis 3 Current Level in % of full rating
ON	ON	100%
ON	OFF	80%
OFF	ON	64%
OFF	OFF	50%

Table A-6. Current Settings Using Switches 3 to 8

Solder Bridge Pads

Next to the bit-switch are six solder bridge pads numbered 1 to 6. By bridging the pad with solder the functionality of each axis can be adjusted, as follows:

CAUTION – Risk of equipment damage

You must observe electrostatic precautions before attempting to make any changes to the drive.

Solder Pad Number	Function	Description
1	Standby 50% (un-bridged pad default) 70% (bridged pad)	Standby select for axis 1 Note 1
2	Standby 50% (un-bridged pad default) 70% (bridged pad)	Standby select for axis 2 Note 1
3	Standby 50% (un-bridged pad default) 70% (bridged pad)	Standby select for axis 3 Note 1
4	Step/dir. (un-bridged pad default) Step+/Step- (bridged pad)	Allows conventional step, direction control or step-up/step-down control for axis 1 – Note 2
5	Step/dir. (un-bridged pad default) Step+/Step- (bridged pad)	Allows conventional step, direction control or step-up/step-down control for axis 2 – Note 2
6	Step/dir. (un-bridged pad default) Step+/Step- (bridged pad)	Allows conventional step, direction control or step-up/step-down control for axis 3 – Note 2

Table A-7. Use of Solder Bridge Pads

Note: [1] The standby current selected via pads 1, 2 & 3 is 50% or 70% of the bit-switch (switches 3 to 8) selected current, not the maximum output current of the drive.

[2] Step-up/step-down control uses two independent step pulse trains, one for each direction of rotation. Connect the step-down signal to the normal step input and the step-up signal to the direction input.

Functional Specification

Parameter	Value
Amplifier type	MOSFET chopper
Motor resolution	400, 800, 2000, 4000 steps/rev
Maximum stepping rate	200kHz at 4000 steps/rev
Nominal chopping frequency	20kHz (XLT50)
Protection circuits	Short circuit (phase-to-phase, across phases and phase to ground), motor overcurrent, over/under voltage, logic supply fault
Maximum output current	XLT50: 5A peak +/-10%
Output current adjustment	50%, 64%, 80% & 100% of maximum current, switch selectable
Standby current reduction	50% or 70% selected by solder bridge
Standby reduction time	30mS from last step pulse
Nominal motor bus voltage	80V DC
Supply voltage, DC operation	XLT50: 40 to 84V absolute limits
Motor inductance range (recommended)	0.8 - 10mH
Step and Direction input levels	Differential TTL Minimum ON state current 6.3mA Maximum current 15mA Differential ON state voltage 3.5V min. Differential maximum voltage 5V Maximum -ve input voltage 0.5V (for XLT50-S)
Fault & Zero phase outputs	Open collector outputs Maximum current 15mA max. On state voltage 0.8V max. Maximum open collector voltage 30V max.

Table A-7. Functional Specification

Drive Environment Specification

Parameters	All drive types
Environment	Pollution degree 2, Installation category II
Operating temperature range	0 to 50°C ambient
Storage temperature range	-20 to 70°C
Humidity	5 to 95% non-condensing
Cooling	Natural convection
Housing	Aluminium
Protection class	IP00
Weight of drive	XLT50 0.35kg

Table A-8. Environment Specification
