Lexium ILTxV

Schneider Electric

Important information

The drive systems described here are products for general use that conform to the state of the art in technology and are designed to prevent any dangers. However, drives and drive controllers that are not specifically designed for safety functions are not approved for applications where the functioning of the drive could endanger persons. The possibility of unexpected or un-braked movements can never be totally excluded without additional safety equipment. For this reason personnel must never be in the danger zone of the drives unless additional suitable safety equipment prevents any personal danger. This applies to operation of the machine during production and also to all service and maintenance work on drives and the machine. The machine design must ensure personal safety. Suitable measures for prevention of property damage are also required.

Qualification of personnel

Only technicians who are familiar with and understand the contents of this manual and the other relevant documentation are authorized to work on and with this drive system. The technicians must be able to detect potential dangers that may be caused by setting parameters, changing parameter values and generally by the operation of mechanical, electrical and electronic equipment.

The technicians must have sufficient technical training, knowledge and experience to recognise and avoid dangers.

The technicians must be familiar with the relevant standards, regulations and safety regulations that must be observed when working on the drive system.

Intended Use

The drive systems described here are products for general use that conform to the state of the art in technology and are designed to prevent any dangers. However, drives and drive controllers that are not specifically designed for safety functions are not approved for applications where the functioning of the drive could endanger persons. The possibility of unexpected or unbraked movements can never be totally excluded without additional safety equipment.

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In all cases the applicable safety regulations and the specified operating conditions, such as environmental conditions and specified technical data, must be observed.

The drive system must not be commissioned and operated until completion of installation in accordance with the EMC regulations and the specifications in this manual. To prevent personal injury and damage to property damaged drive systems must not be installed or operated.

Changes and modifications of the drive systems are not permitted and if made all no warranty and liability will be accepted.

The drive system must be operated only with the specified wiring and approved accessories. In general, use only original accessories and spare parts.

The drive systems must not be operated in an environment subject to explosion hazard (ex area).

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Lexium ILTxV

Part 1: General Usage

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2. Safety
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1 Introduction

The Lexium ILTxV high torque integrated motor and step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the Lexium ILTxV eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise

The Lexium ILTxV uses high torque brushless step motors integrated with a microstepping driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of Lexium CT-ILT, a simple software tool which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

The Lexium ILTxV is a compact, powerful and cost effective pulse and direction solution that will reduce system cost, design and asSchneider Electricbly time for a large range of brushless step motor applications.

1.1 Lexium ILTxV versions

The Lexium ILTxV is available in the following power ranges and flange sizes:

+24 to +48 VDC

- 36 mm (NEMA 14)
- 42 mm (NEMA 17)
- 57 mm (NEMA 23)
- 85 mm (NEMA 34)

230 VAC

- 85 mm (NEMA 34)

Revision R031003

1.2 Product identification

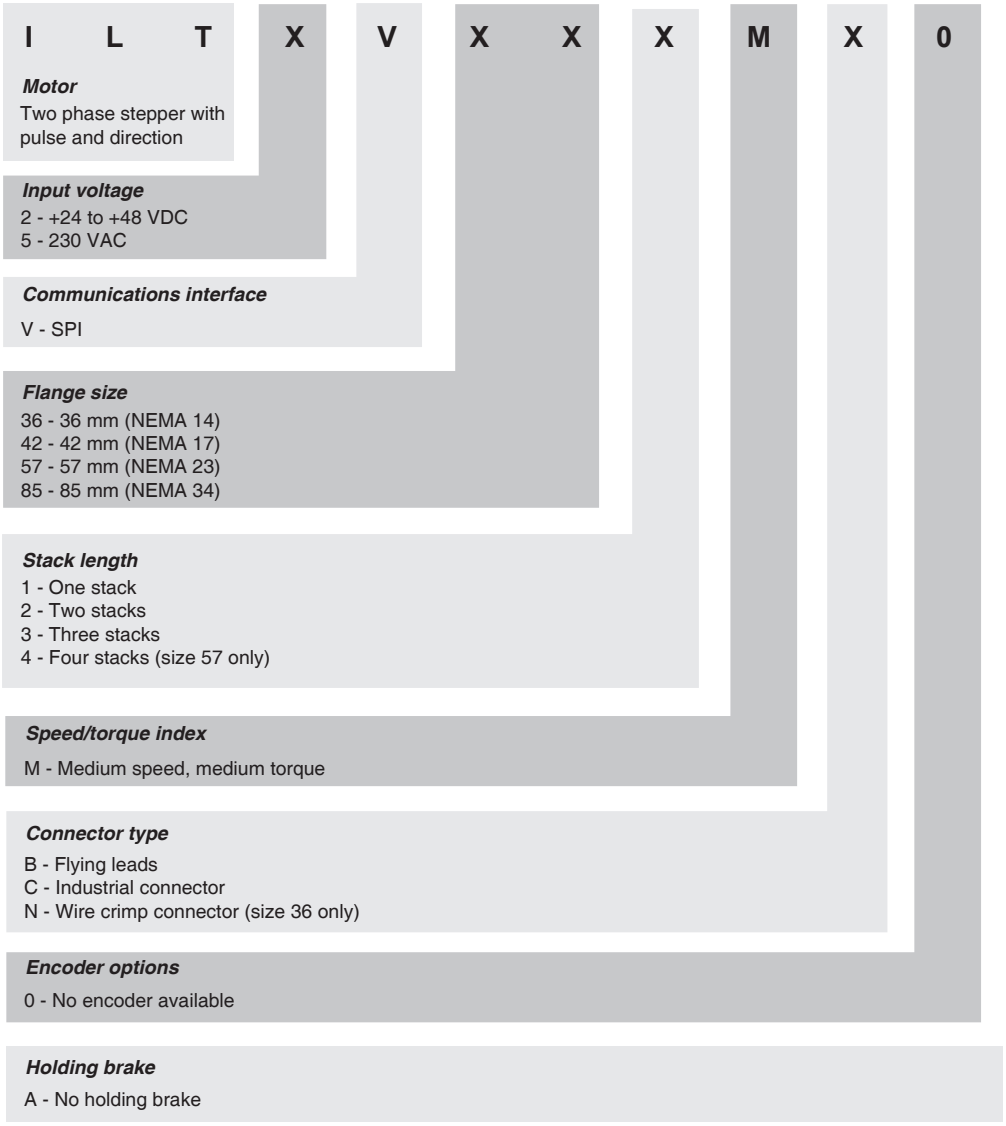

Figure 1.1 Standard product options

1.4 Documentation reference

The following manuals are available for the Lexium ILTxV

- Product manual, describes the technical data, installation, commisioning and programming of the product.

This documentation is also available for download from the Schneider Electric web site at http://www.schneider-electric.com

1.5 Product software

The Lexium ILTxV commissioned using the Lexium CT-ILT Pulse-Direction software. This free software may be downloaded from http://www.schneider-electric.com.

Installation and usages instructions are to be found in Part 1 of this document, Section 5.

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2 Safety

2.1 Qualification of personnel

Only technicians who are familiar with and understand the contents of this manual and the other relevant documentation are authorized to work on and with this drive system. The technicians must be able to detect potential dangers that may be caused by setting parameters, changing parameter values and generally by the operation of mechanical, electrical and electronic equipment.

The technicians must have sufficient technical training, knowledge and experience to recognise and avoid dangers.

The technicians must be familiar with the relevant standards, regulations and safety regulations that must be observed when working on the drive system.

2.2 Intended Use

The drive systems described here are products for general use that conform to the state of the art in technology and are designed to prevent any dangers. However, drives and drive controllers that are not specifically designed for safety functions are not approved for applications where the functioning of the drive could endanger persons. The possibility of unexpected or unbraked movements can never be totally excluded without additional safety equipment.

For this reason personnel must never be in the danger zone of the drives unless additional suitable safety equipment prevents any personal danger. This applies to operation of the machine during production and also to all service and maintenance work on drives and the machine. The machine design must ensure personal safety. Suitable measures for prevention of property damage are also required.

In all cases the applicable safety regulations and the specified operating conditions, such as environmental conditions and specified technical data, must be observed.

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The drive systems must not be operated in an environment subject to explosion hazard (ex area).

2.3 Hazard Categories

Safety notes and general information are indicated by hazard messages in the manual. In addition there are symbols and instructions affixed to the product that warn of possible hazards and help to operate the product safely.

Depending on the seriousness of the hazard, the messages are divided into three hazard categories.

⚠ DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

2.4 General safety instructions

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

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⚠ WARNING

LOSS OF CONTROL

- Observe the accident prevention regulations. (For USA see also NEMA ICS1.1 and NEMA ICS7.1)
- The system manufacturer must take the potential error possibilities of the signals and the critical functions into account to ensure a safe status during and after errors. Some examples are: emergency stop, final position limitation, power failure and restart.
- The assessment of error possibilities must also include unexpected delays and the failure of signals or functions.
- Suitable redundant control paths must be in place for dangerous functions.
- Check that measures taken are effective.

Failure to follow these instructions can result in death or serious injury.

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

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3 Power supply selection and connection

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

MAXIMUM VOLTAGE INPUT

Do not exceed the maximum rated voltage of the device! Motor Back EMF, power supply ripple and high line must be taken into account when selecting a power supply voltage level.

Failure to follow these instructions may result in damage to system components!

⚠ CAUTION

GENERAL POWER SUPPLY PRACTICE

Do not connect or disconnect the power supply while power is applied.

Disconnect the AC side to power down the DC supply.

For battery operated systems connect a “transient suppressor” across the switch to prevent arcs and high-voltage spikes.

Failure to follow these instructions may result in damage to system components!

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions may result in damage to system components!

Detailed specifications, voltage limits, current requirements and connectivity information are located in the product detail section corresponding to the Lexium ILTxV model you purchased.

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3.1 Selecting a power supply (+V)

Proper selection of a power supply to be used in a motion system is as important as selecting the drive itself. When choosing a power supply for a stepping motor driver, there are several performance issues that must be addressed. An undersized power supply can lead to poor performance and possibly even damage to your drive.

3.1.1 Power supply — motor relationship

Motor windings can basically be viewed as inductors. Winding resistance (R) and inductance (L) result in an L/R time constant that resists the change in current. To effectively manipulate the rate of charge, the voltage applied is increased. When traveling at high speeds, there is less time between steps to reach current. The point where the rate of commutation does not allow the driver to reach full current is referred to as voltage mode. Ideally you want to be in current mode, which is when the drive is achieving the desired current between steps. Simply stated, a higher voltage will decrease the time it takes to charge the coil and, therefore, will allow for higher torque at higher speeds.

Another characteristic of all motors is back EMF. Back EMF is a source of current that can push the output of a power supply beyond the maximum operating voltage of the driver. As a result, damage to the stepper driver could occur over a period of time. This is especially prevalent with overhauling loads.

3.1.2 Power supply — driver relationship

The Lexium ILTxV is very current efficient as far as the power supply is concerned. Once the motor has charged one or both windings of the motor, all the power supply has to do is replace losses in the system. The charged winding acts as an energy storage in that the current will recirculate within the bridge and in and out of each phase reservoir. This results in a less than expected current draw on the power supply.

Stepping motor drivers are designed with the intent that a user's power supply output will ramp up to greater than or equal to the minimum operating voltage of the drive. The initial current surge is substantial and could damage the driver if the supply is undersized. The output of an undersized power supply could fall below the operating range of the driver upon a current surge. This could cause the power supply to start oscillating in and out of the voltage range of the driver and result in damage to either the supply, the driver, or both.

There are two types of supplies commonly used, regulated and unregulated, both of which can be switching or linear. Each have advantages and disadvantages.

3.1.3 Regulated vs unregulated

An unregulated linear supply is less expensive and more resilient to current surges, however, the voltage decreases with increasing current draw. This may cause problems if the voltage drops below the working range of the drive.

Fluctuations in line voltage are also a point of concern. These fluctuations may cause the unregulated linear supply to be above or below the

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anticipated or acceptable voltage.

A regulated supply maintains a stable output voltage, which is good for high speed performance. These supplies are also not affected by line fluctuations, however, they are more expensive. Depending on the current regulation, a regulated supply may crowbar or current clamp and lead to an oscillation that, as previously stated, can cause damage to the driver and/or supply. Back EMF can cause problems for regulated supplies as well. The current regeneration may be too large for the regulated supply to absorb. This could lead to an over voltage condition which could damage the output circuitry of the Lexium ILTxV.

Switching power supplies and regulated linear supplies with overcurrent protection are not recommended because of their inability to handle the surge currents inherit in stepping motor systems.

See the product detail section of this document for specific power supply voltage and current requirements and recommended power supplies.

3.3 Power supply cabling best practices and recommendations

⚠ CAUTION

EMI and RFI

These recommendations will provide optimal protection against EMI and RFI. The actual cable type, wire gauge, shield type and filtering devices used are dependent on the customer's application and system.

The length of the DC power supply cable to an Lexium ILTxV should not exceed 15.2 m.

Always use Shielded/Twisted Pairs for the Lexium ILTxV DC Supply Cable and the AC Supply Cable.

Failure to follow these instructions may result in damage to system components!

Cable length, wire gauge and power conditioning devices play a major role in the performance of your Lexium ILTxV.

Figure 3.1 illustrates the recommended cable configuration for DC power supply cabling under 15.2 meters long. If cabling of 15.2 meters or longer is required, the additional length may be gained by adding an AC power supply cable (see Figures 3.2 and 6.3).

Correct AWG wire size is determined by the current requirement plus cable length. Please see Table 3.1.

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3.3.1 DC Cabling Under 15.2 m

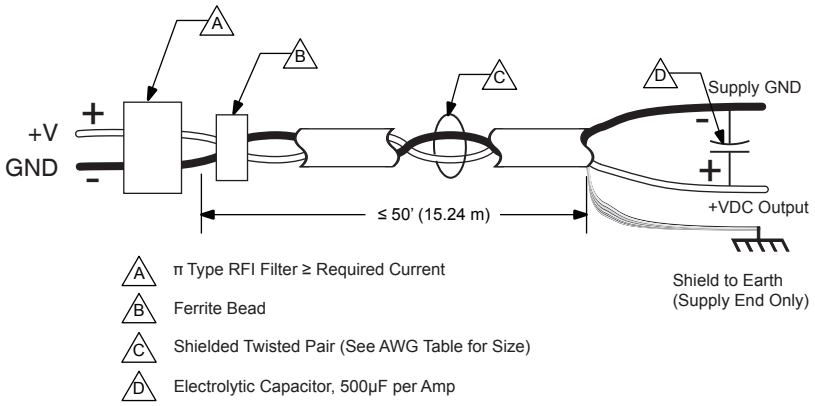

Figure 3.1 DC power supply cabling under 15.2 m

3.3.2 15.2 m or greater, AC power to full wave bridge

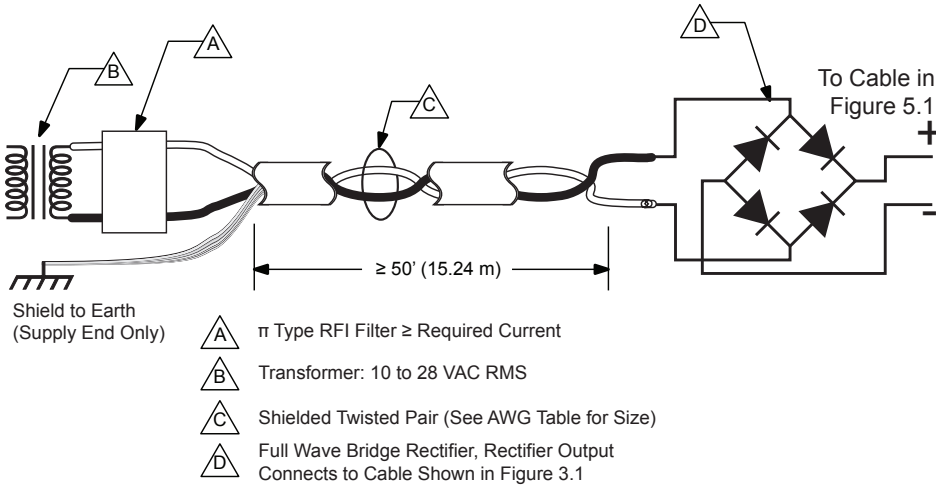

Figure 3.2 15.2 m or greater, AC power to full wave bridge

3.3.3 15.2 m or greater, AC power DC supply

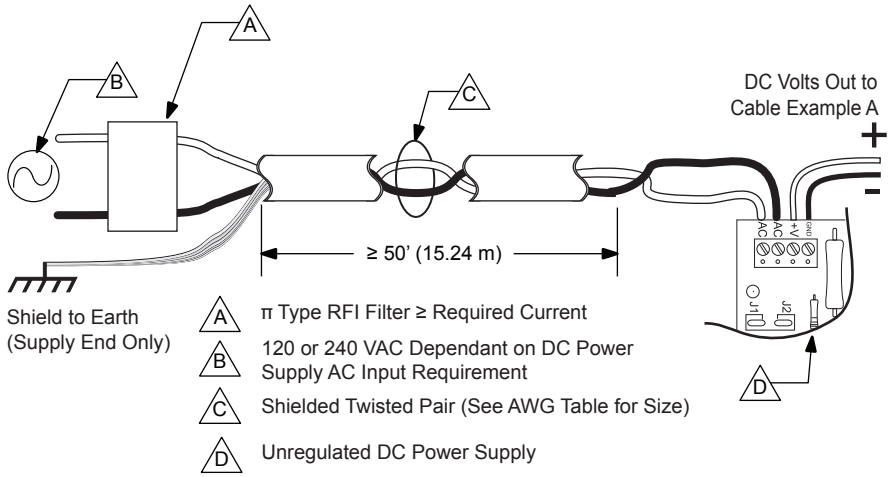

Figure 3.3 15.2 m or greater, AC power to DC supply

3.3.4 Recommended power supply cable wire gauges

For cable lengths exceeding 15.2 meters, use the cable configurations shown in Sections 3.3.2 or 3.3.3.

Cable Length: meters	3.0	7.6	15.2	22.9	30.5
Amps Peak	**Minimum AWG**				
1 Amp Peak	20	20	18	18	18
2 Amps Peak	20	18	16	14	14
3 Amps Peak	18	16	14	12	12
4 Amps Peak	16	14	12	12	12

Table 3.1 Power supply cable AWG recommendations

Detailed specifications, voltage limits and connectivity information are located in the product detail section corresponding to the Lexium ILTxV you purchased.

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4 Interfacing AC power

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if power or signal wiring is exposed.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

MAXIMUM VOLTAGE INPUT

Do not exceed the maximum rated voltage of the device!

Failure to follow these instructions may result in damage to system components!

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Failure to follow these instructions may result in damage to system components!

Detailed specifications, voltage limits, current requirements and connectivity information are located in the product detail section corresponding to the Lexium ILTxV model you purchased.

4.1 Applicability

This section is only applicable to those Lexium ILTxV models with a 230 VAC input voltage.

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4.2 Interfacing AC voltage

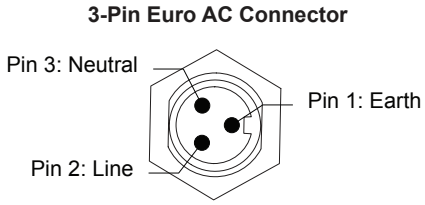

Figure 4.1 Euro AC connector (P3)

Signal	European (IEC) color code
Earth	Yellow/Green
Line	Brown
Neutral	Blue

Table 4.1 AC standard wire colors

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5 Communications and parameter setup

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions may result in damage to system components!

CONNECTOR OPTIONS

The Lexium ILTxV product family has an different connector options. The purpose of this section is to give a general overview of the SPI communications interface methods and practices.

Please see the section specific to the Lexium ILTxV product you purchased in the second part of this document for connectors, pin configurations and connectivity options.

5.1 SPI communications interface

The Lexium ILTxV microstepping integrated motor and driver use the Serial Peripheral Interface (SPI) to configure the setup parameters.

Optionally available are parameter setup and logic interface cables with inline USB to SPI converter for each connector variation. Installation and connection of this covered in the product specific section in Part 2 of this document.

5.1.1 SPI definition

The Serial Peripheral Interface or SPI bus is a synchronous serial data link standard that operates in full duplex mode. Devices communicate in master/slave mode where the master device initiates the data frame. Multiple slave devices are allowed with individual slave select (chip select) lines.

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5.1.3 SPI connection methods

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect communications while the device is in a powered state.

Failure to follow these instructions may result in damage to system components!

⚠ CAUTION

CHANGING PARAMETERS

Do not attempt to change parameter settings while the device is in operation. Parameters must be set while the device is in a disabled state. The motor cannot be in motion.

Failure to follow these instructions may result in damage to system components!

Typically, the parameters are set on a work bench prior to the installation of the Lexium ILTxV into a machine. The ideal accessory for this setup method is the Schneider Electric USB to SPI communications converter cable (see product specific section in Part 2 of this document). If a continuous connection to the SPI port is required, see the following figures. Figure 5.1 illustrates a single Lexium ILTxV on the SPI bus. Figures 5.2 and 5.3 illustrate multi-drop configurations:

- Independent: Lexium ILTxVs communicating independently with different setup parameters.
- Cooperative: Lexium ILTxVs communicating simultaneously with identical setup parameters.

SPI connection: Single master - single Lexium ILTxV slave

The single master - single Lexium ILTxV slave is the most common connection method for the Lexium ILTxV. It is also the only connection method which will allow use of the Lexium CT-ILT Pulse-Direction commissioning utility, which is used to setup and change the motion and current control parameters of the Lexium ILTxV.

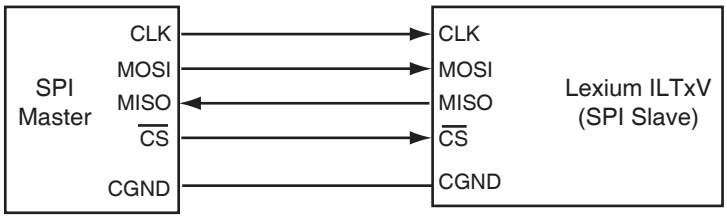

Figure 5.1 Single SPI master - single Lexium ILTxV slave

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SPI connection: Single master - Independent Lexium ILTxV slaves

This connection method allows for multiple Lexium ILTxV units in a system to be continually connected to the SPI bus. This method is useful in systems using multiple size devices with different setup parameters.

Using this method the user will have to create a user interface to communicate with the Lexium ILTxV nodes.

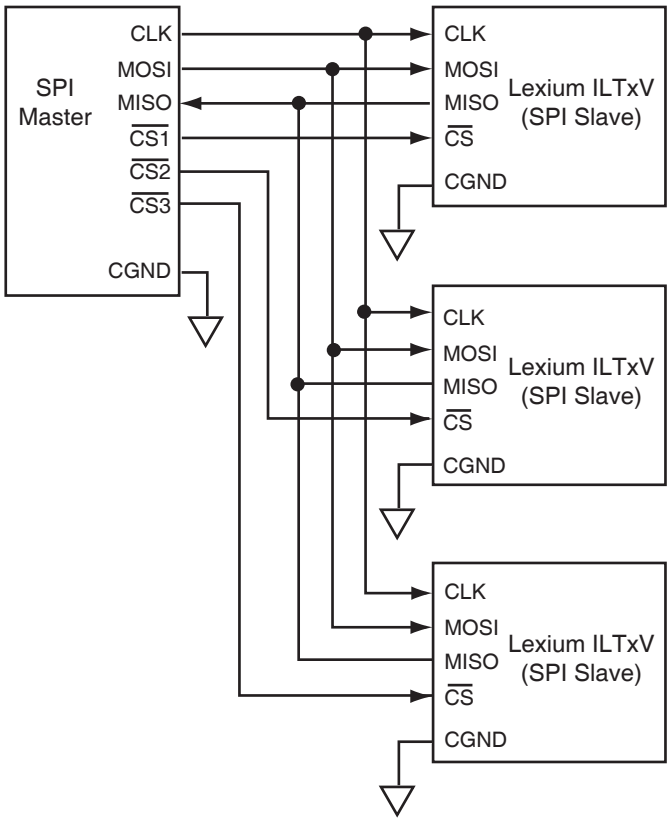

Figure 5.2 Single SPI master - Independent Lexium ILTxV slaves

SPI connection: Single master - cooperative Lexium ILTxV slaves

This connection method allows for multiple Lexium ILTxV units in a system to be continually connected to the SPI bus. This method is useful in systems using multiple devices where the setup parameters need to be identical in each device.

Using this method the user will have to create a user interface to communicate with the Lexium ILTxV nodes.

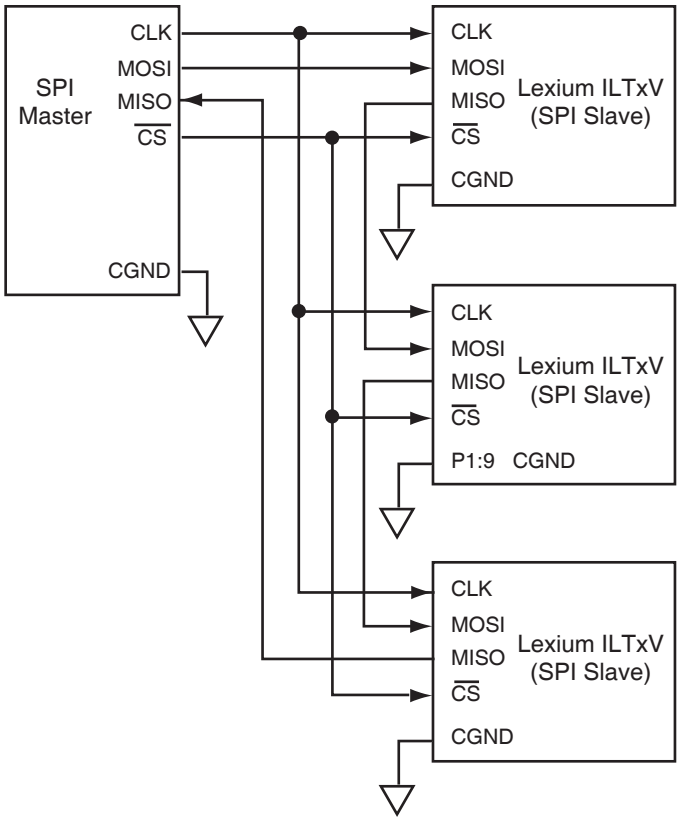

Figure 5.3 Single SPI master - Cooperative Lexium ILTxV slaves

Logic level shifting circuit

A logic level shifting and conditioning circuit may be required if communicating to the Lexium ILTxV using a notebook computer with 3.3 VDC parallel port. The schematic in Figure 5.4 shows this circuit.

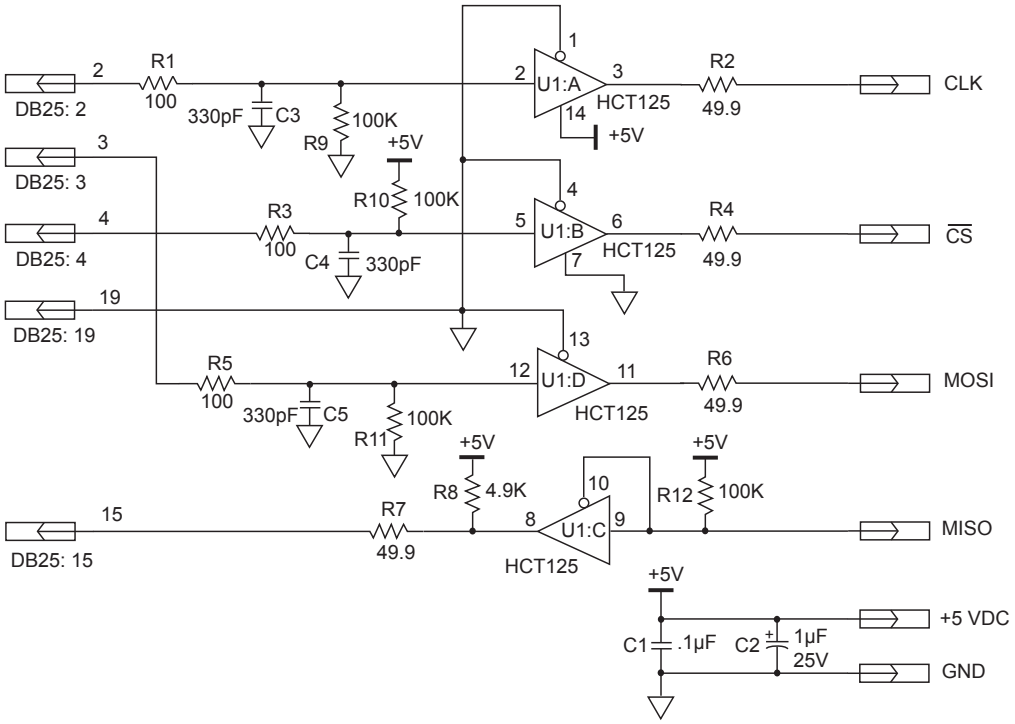

Figure 5.4 Logic level shifting and conditioning circuit

5.1.4 SPI Timing

1) MSb (Most Significant bit) first and MSB (Most Significant Byte) first.
2) 8 bit bytes.
3) 25 kHz SPI Clock (SCK).
4) Data In (MOSI) on rising clock.
5) Data Out (MISO) on falling clock.

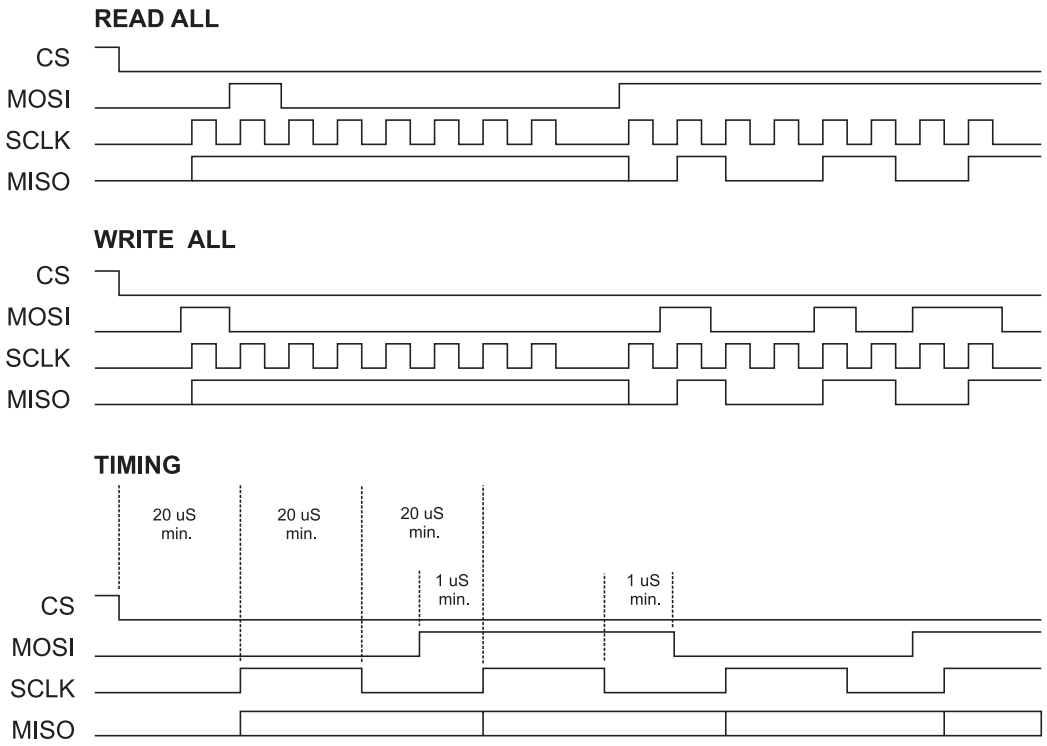

Figure 5.5 SPI Timing

5.1.5 SPI Commands and parameters

CMD/PRM	HEX Default	Dec. Default	Range	Notes
Read All	0x40			Reads the Hex value of all parameters
Write All	0x80			Writes the Hex value to the parameters
DATA READ				
“M”	0x4D			“M” character precedes every data read
Version MSB	0x10		<1-8>.<0-9>	Firmware version MSB
Version LSB	0x01		<0-99>	Firmware version LSB
USR_ID1	0x49	I	Viewable ASCII	Uppercase letter <I>
USR_ID2	0x4D	M	Viewable ASCII	Uppercase letter <M>
USR_ID3	0x53	S	Viewable ASCII	Uppercase letter <S>
MHC	0x05	5%	0 to 100%	Motor Hold Current
MRC	0x19	25%	1 to 100%	Motor Run Current
MSEL	0x00	0	See Table 5.4	Microstep resolution select
DIR_OVRID	0x01	1	0/1	Direction override CCW (0) or CW (1)
HCDT_HI	0x01	500 ms	0 to 65535	Hold Current Delay Time high byte
HCDT_LO	0xF4			Hold Current Delay Time low byte
CLKTYPE	0x00	0 (step/dir)	0-2	0=step/dir, 1=clk up/clk dn, 2=quad
CLKIOF	0x00	0	<0-9>	Input clock filtering
WARNTEMP	0x50	80°C		Warning temperature= overtemp -5°C
ENACT	0x01	1=Active	<0/1>	Enable Active 0=low, 1=high
FAULT	0	0x00	—	See fault error code table
DATA WRITE				
Version MSB	0x10		<1-8>.<0-9>	Firmware version MSB
Version LSB	0x01		<0-99>	Firmware version LSB
USR_ID1	0x49	I	Viewable ASCII	Uppercase letter <I>
USR_ID2	0x4D	M	Viewable ASCII	Uppercase letter <M>
USR_ID3	0x53	S	Viewable ASCII	Uppercase letter <S>
MHC	0x05	5%	0 to 100%	Motor Hold Current
MRC	0x19	25%	1 to 100%	Motor Run Current
MSEL	0x00	0	See Table 5.4	Microstep resolution select
DIR_OVRID	0x01	1	0/1	Direction override CCW (0) or CW (1)
HCDT_HI	0x01	500 ms	0 to 65535	Hold Current Delay Time high byte
HCDT_LO	0xF4			Hold Current Delay Time low byte
CLKTYPE	0x00	0 (step/dir)	0-2	0=step/dir, 1=clk up/clk dn, 2=quad
CLKIOF	0x00	0	<0-9>	Input clock filtering
WARNTEMP	0x50	80°C		Warning temperature= overtemp -5°C
ENACT	0x01	1=Active	<0/1>	Enable Active 0=low, 1=high
CKSUM		33		Checksum

Table 5.1 SPI Commands and Parameters

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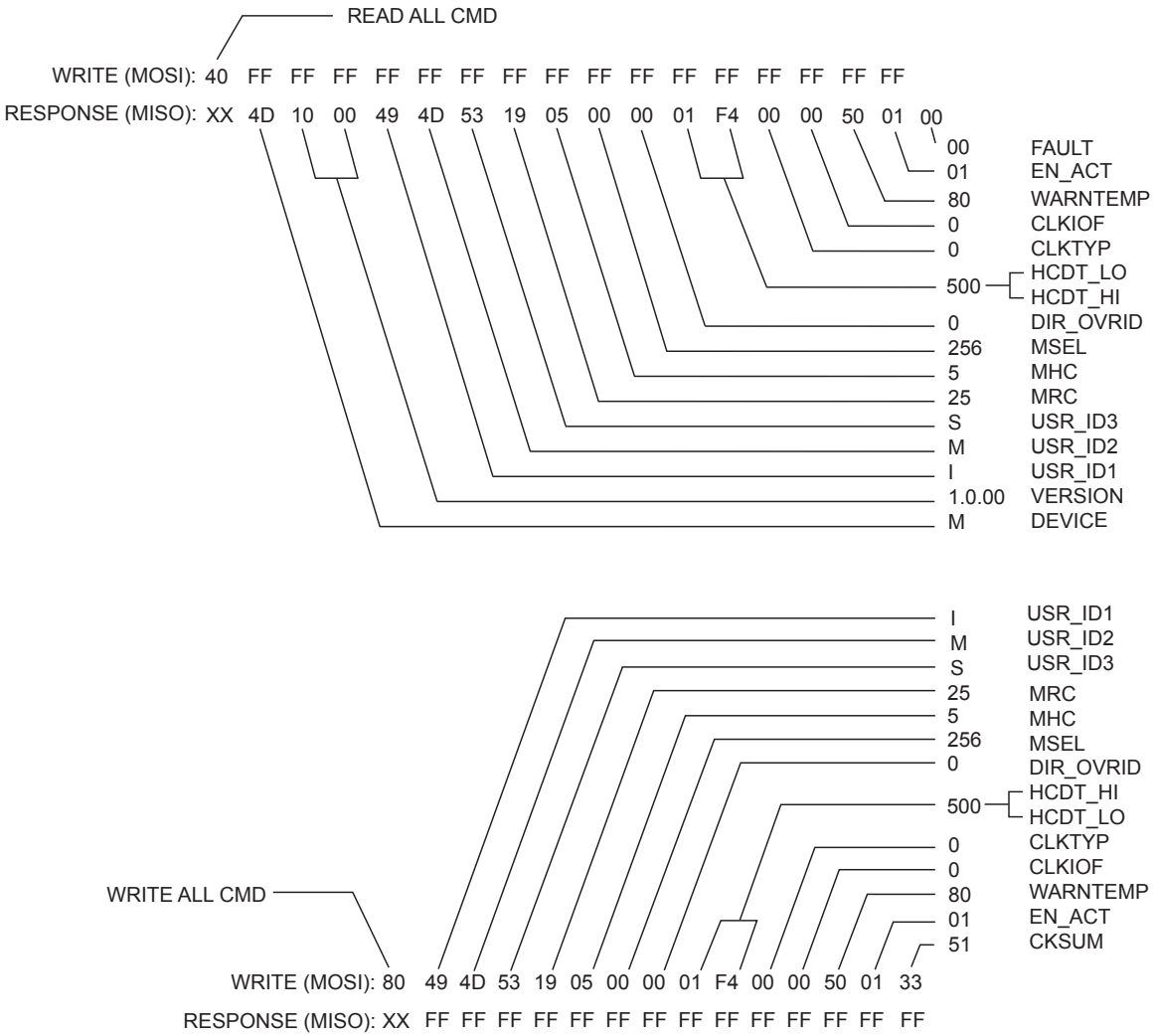

CHECKSUM CALCULATION

80+49+4D+53+19+05+00+00+01+F4+00+00+50+01=CD

BINARY = 1100 1101

1'S COMPLEMENT = 0011 0010

2'S COMPLEMENT = 0011 0011

DEC = 51

HEX = 33

Figure 5.6 SPI commands and parameters

5.1.6 SPI Communications sequence

See Timing Diagram and Byte Order figures.

Read

1) Send READ ALL Command 0x40 down MOSI to Lexium ILTxV followed by
FF (15 Bytes).
2) Receive parameter settings from MISO MSB First (M character) and ending with LSB (Fault).

Write

3) Send WRITE ALL Command (0x80) down MOSI followed by parameter Bytes beginning with MSB (MRC) and ending with the LSB (Checksum of all parameter bytes).
4) Response from MISO will be FF (10) Bytes.

5.2 Lexium CT-ILT Pulse-Direction

Lexium CT-ILT Pulse-Direction commissioning software is the setup and configuration utility developed to provide the customer with a Graphical User Interface (GUI) to easily configure Lexium ILTxV products that communicate over the SPI bus.

5.2.1 System Requirements

- PC or notebook running Windows XP™ service pack 2 or greater.

5.2.2 Installation

1) Download the installation package from http://www.schneider-electric.com
2) Browse to the download location on your PC hard-drive and extract the files from the zip file
3) Double-click setup.exe.
4) Follow the installation prompts to complete the installation.

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5.2.3 Connect to the SPI port

To connect to the SPI port on the Lexium ILTxV14Plus:

1) Apply power to the Lexium ILTxV
2) Open the Lexium CT-ILT Pulse-Direction commissioning program
3) Select the PC COM port that the Lexium ILTxV is connected to (see Figure 5.7)
4) If communications is established, the setup dialog will display (Figure 5.8)

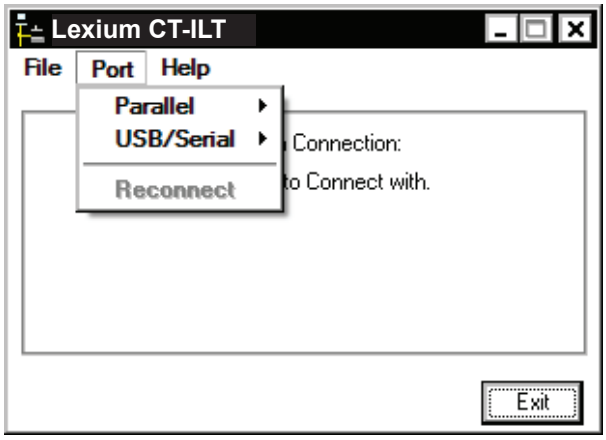

Figure 5.7 Lexium CT-ILT Pulse-Direction startup dialog

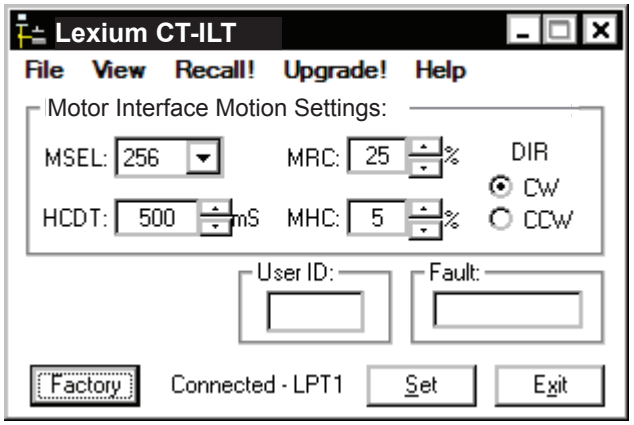

Figure 5.8 Lexium CT-ILT Pulse-Direction parameter setup dialog

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5.2.4 Setup Parameters

Parameter	Default	Range	Notes
MHC	5%	0 to 100%	Motor Hold Current
MRC	25%	1 to 100%	Motor Run Current
MSEL	256	See Table 5.4	Microstep resolution
ENACT	High	High/Low	Enable active state
HCDT	500 ms	0 to 65000	Hold Current Delay Time in milliseconds
DIR	CW	CCW/CW	Direction override CCW or CW
CLK TYPE	Step/Dir	See Specifications	Input clock type
CLK IOF	200ns (250 MHz)	50 ns to 12.9 µs (10 MHz to 38.8 kHz)	Input clock filter
USER ID	Schneider Electric	Viewable ASCII	User identification code

Table 5.2 Lexium ILTxV setup parameters

5.2.5 Color coded parameter values

The Lexium CT-ILT Pulse-Direction displays the parameter values using a predefined system of color codes to identify the status of the parameter.

1) Black: the parameter settings currently stored in the device NVM will display as black.
2) Blue: Blue text indicates a changed parameter setting that has not yet been written to the device.
3) Red: Red text indicates an out-of-range value which cannot be written to the device. When an out-of-range parameter is entered into a field, the "set" button will disable, preventing the value to be written to NVM.

To view the valid parameter range, hover the mouse pointer over the field. The valid range will display in a tool tip.

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5.2.7 Motor settings configuration screen

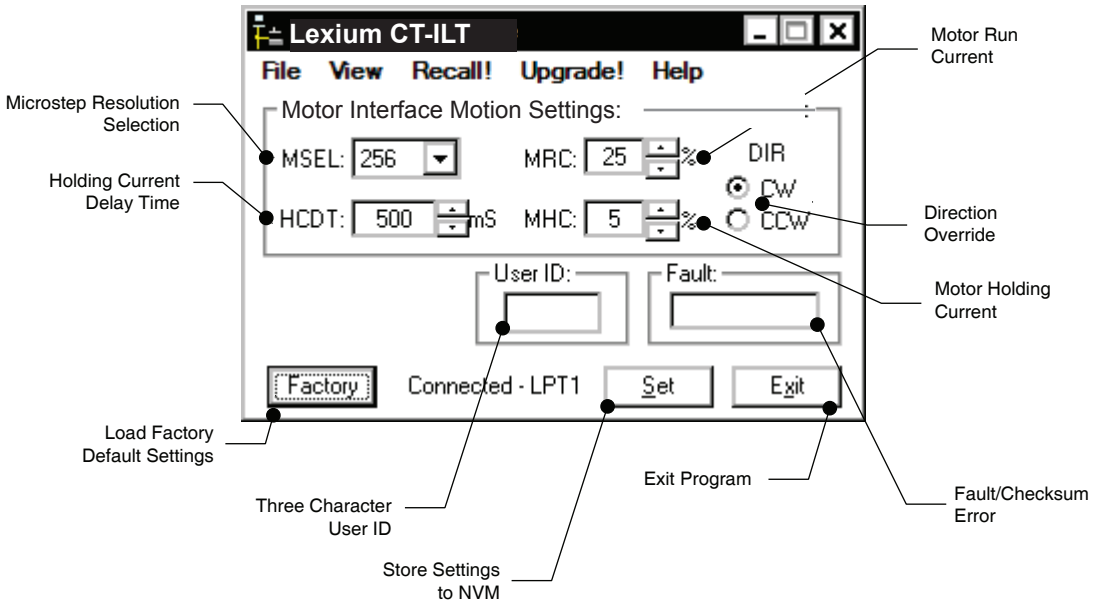

Figure 5.9 Lexium CT-ILT Pulse-Direction commissioning motion settings screen

The Lexium CT-ILT Pulse-Direction commissioning software opens by default to the Motion Settings Screen shown in Figure 5.9.

1) There are six basic parameters that may be set here:
2) MSEL: Microstep Resolution Select.
3) HCDT: Holding Current Delay Time.
4) MRC: Motor Run Current
5) Motor Holding Current
6) User ID: 3-character ID
7) Direction Override: allows the user to set the CW/CCW direction of the motor in relation to the direction Input from the Lexium CT-ILT Pulse-Direction.

MSEL (Microstep Resolution Selection)

The Lexium ILTxV features 20 microstep resolutions. This setting specifies the number of microsteps per step the motor will move.

The Lexium ILTxV uses a 200 step (1.8°) stepping motor which at the highest (default) resolution of 256 will yield 51,200 steps per revolution of the motor shaft.

See Table 5.3 for available microstep resolutions.

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Binary	
microsteps/step	steps/revolution
1	200
2	400
4	800
8	1600
16	3200
32	6400
64	12800
128	25600
256	52100
Additional resolution settings	
180	36000 (0.01°/µstep)
108	21600 (1 arc-min/µstep)
127	25400 (0.001 mm/µstep)

Decimal	
microsteps/step	steps/revolution
5	1000
10	2000
25	5000
50	10000
100	20000
125	25000
200	40000
250	50000

Table 5.3 Microstep resolution settings

HCDT (Hold Current Delay Time)

The HCDT Motor Hold Current Delay sets time in milliseconds for the Run Current to switch to Hold Current when motion is complete. When motion is complete, the Lexium ILTxV will reduce the current in the windings of the motor to the percentage specified by MHC when the specified time elapses.

MRC (Motor Run Current)

The MRC Motor Run Current parameter sets the motor run current to a percentage of the full output current of the Lexium ILTxV driver section.

MHC (Motor Hold Current)

The MHC parameter sets the motor holding current as a percentage of the full output current of the driver. If the hold current is set to 0, the output circuitry of the driver section will disable when the hold current setting becomes active. The hold current setting becomes active the amount of time specified by the HCDT setting following the last clock pulse.

DIR (Motor Direction)

The DIR Motor Direction parameter changes the motor direction relative to the direction input signal, adapting the direction of the Lexium ILTxV to operate as your system expects.

User ID

The User ID is a three character (viewable ASCII) identifier which can be assigned by the user. Default is Schneider Electric.

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Lexium CT-ILT Pulse-Direction Button Functions

The following appear on all of the Lexium CT-ILT Pulse-Direction screens, but will only be documented here.

Factory

Clicking the Factory button will load the factory default settings into the Lexium CT-ILT Pulse-Direction.

connected/disconnected Indicator

Displays the connected/disconnected state of the software , and if connected, the port connected on.

Set

Set writes the new settings to the Lexium ILTxV . Un-set settings will display as blue text in the setting fields. Once set they will be in black text. Setting the Parameters will also clear most fault conditions.

Exit

Disconnects and opens the initialization dialog.

5.2.8 I/O settings configuration screen

The I/O Settings screen may be accessed by clicking View > IO Settings on the menu bar. This screen is used to configure the input clock type, the filtering and the active high/low state of the enable input.

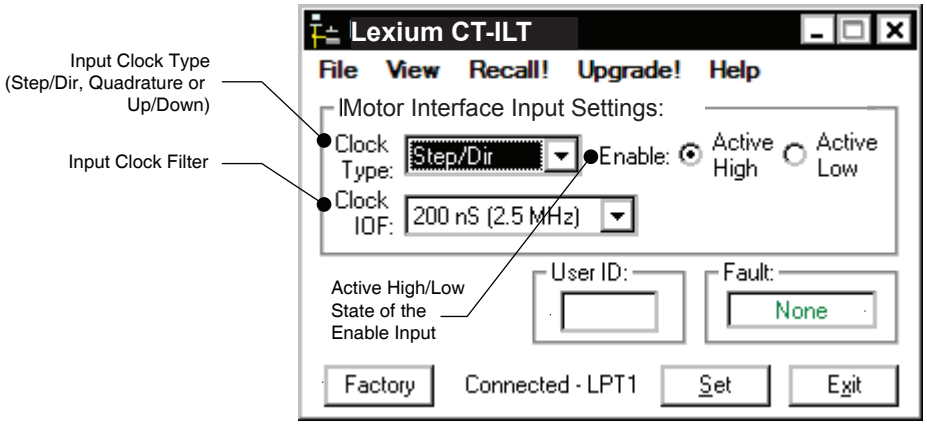

Figure 5.10 Lexium CT-ILT Pulse-Direction I/O settings screen

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Input Clock Type

The input clock type translates the specified pulse source that the motor will use as a reference for establishing stepping resolution based on the frequency.

The three clock types supported are:

1) Step/Direction
2) Quadrature
3) Up/Down
4) CW/CCW - Note that CW/CCW is functionally the same as Up/Down.

Input Clock Filter

The clock inputs may also be filtered using the Clock IOF pull down of the Lexium CT-ILT Pulse-Direction. The filter range is from 50 nS (10 MHz) to 12.9 µSec. (38.8 kHz). Table 5.5 shows the filter settings.

Minimum pulse width	Cut-off frequency
50 ns	10 MHz
150 ns	3.3 MHz
200 ns	2.5 MHz
300 ns	1.67 MHz
500 ns	1.0 MHz
900 ns	555 kHz
1.7 µs	295.1 kHz
3.3 µs	151 kHz
5.5 µs	79.6 kHz
12.9 µs	38.8 kHz

Table 5.4 Input clock filter settings

Enable Active High/Low

The parameter sets the enable input to be active when high (default, disconnected) or active when low.

5.2.9 SPart number/serial number screen

The part number and serial number screen is accessed by clicking “View > Part and Serial Numbers”.

This screen is read-only and will display the part and serial number, as well as the fault code if existing. Schneider Electric may require this information if calling the factory for support.

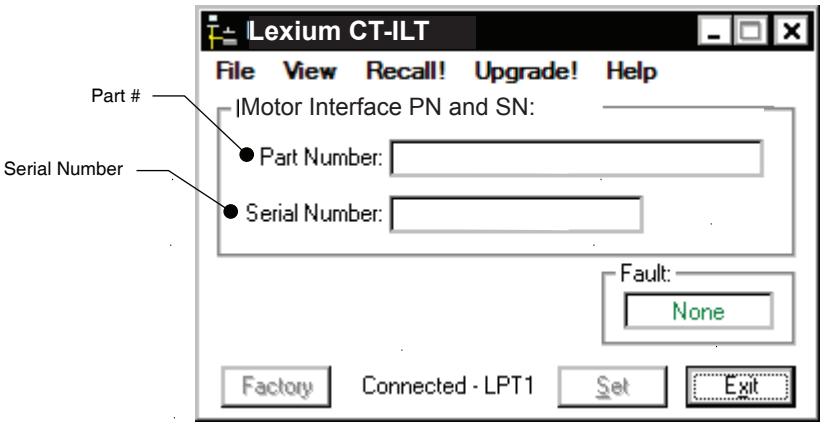

Figure 5.11 Lexium CT-ILT Pulse-Direction part number serial number screen

5.2.10 Fault codes

All of the Lexium CT-ILT Pulse-Direction screens have the Fault field visible. This read-only field will display a 2 character error code to indicate the type of fault. The table below shows the error codes.

Binary case	Error code	Description	Action	To clear
—	None	No fault	—	—
4	CS	SPI checksum error	Error displayed	Write to device
8	SC/CS	SPI checksum error/sector changing	Error displayed	Write to device
16	DFLT	Defaults checksum error	Error displayed	Write to device
32	DATA	Settings checksum error	Error displayed	Write to device

Table 5.5 Fault error codes

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5.2.10 Upgrading the firmware

The SPI Upgrader

New firmware releases are posted to the Schneider Electric web site at http://www.schneider-electric.com.

The Lexium CT-ILT Pulse-Direction commissioning is required to upgrade your Lexium ILTxV product. To launch the Upgrader, click “Upgrade!” on the Lexium CT-ILT Pulse-Direction menu.

The Upgrader screen has 4 read-only text fields that will display the necessary info about your Lexium ILTxV.

Previous Version: this is the version of the firmware currently on your Lexium ILTxV.

Serial Number: the serial number of your unit.

Upgrade Version: will display the version number of the firmware being installed.

Messages: the messages text area will display step by step instructions through the upgrade process.

Upgrade Instructions

Below are listed the upgrade instructions as they will appear in the message box of the SPI Upgrader. Note that some steps are not shown as they are accomplished internally, or are not relevant to the model Lexium ILTxV product you are updating. The only steps shown are those requiring user action.

Welcome Message: Welcome to the Motor Interface UPGRADER! Click NEXT to continue.

Step 2: Select Upgrade File

When this loads, an explorer dialog will open asking you to browse for the firmware upgrade file. This file will have the extension *.sem.

Step 3: Connect SPI Cable

Step 4: Power up or Cycle Power to the Lexium ILTxV

Step 6: Press Upgrade Button

Progress bar will show upgrade progress in blue, Message box will read “Resetting Motor Interface”

Step 8: Press DONE, then select Port/Reconnect.

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6 Interfacing logic inputs

⚠ CAUTION

ELECTRICAL OVERSTRESS

The universal logic inputs are tolerant to +24 VDC. Do not exceed +24 VDC on the inputs.

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions may result in damage to system components!

⚠ CAUTION

EMI and RFI

These recommendations will provide optimal protection against EMI and RFI. The actual cable type, wire gauge, shield type and filtering devices used are dependent on the customer's application and system.

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make your system unreliable.

Logic level cables must be shielded to reduce the chance of EMI induced noise. The shield needs to be grounded at the signal source to earth. The other end of the shield must not be tied to anything, but allowed to float. This allows the shield to act as a drain.

Failure to follow these instructions may result in damage to system components!

CONNECTOR OPTIONS

The Lexium ILTxV microstepping product family has different connector options. The purpose of this section is to give a general overview of the I/O interface methods and practices.

Please see the section specific to the Lexium ILTxV product you purchased in the second part of this document for connectors, pin configurations and connectivity options.

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6.1 Logic inputs

The Lexium ILTxV has three optically isolated inputs which are located on connector P1. These inputs are isolated to minimize or eliminate electrical noise coupled onto the drive control signals. Each input is internally pulled-up to the level of the optocoupler supply and may be connected to sinking or +5 to +24 VDC sourcing outputs on a controller or PLC. These inputs are:

1) Step Clock (SCLK)
2) Direction (DIR)
3) Enable (EN)

Of these inputs only step clock and direction are required to operate the Lexium ILTxV.

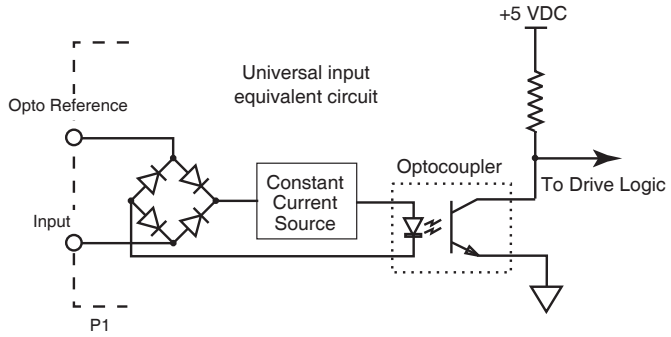

Figure 6.1 Universal optically isolated input equivalent circuit

6.1.1 Logic inputs

Function	Description
OPTO	Optocoupler reference input.
SCLK	Step clock input.
EN	The enable input can be used to enable or disable the driver output circuitry.
DIR	The direction input controls the clockwise/ counterclockwise direction of the motor. It may be configured as sinking or sourcing depending on the state of the optocoupler reference.

Table 6.1 Universal logic inputs

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6.1.2 Optically isolated input description

P1:4 — Step Clock

The step clock input is where the motion clock from your control circuitry will be connected. The motor will advance one microstep in the plus or minus direction (based upon the state of the direction input) on the rising edge of each clock pulse. The size of this increment or decrement will depend on the microstep setting

.

P1:6 — Direction

The direction input controls the CW/CCW direction of the motor. The input may be configured as sinking or sourcing based upon the state of the Optocoupler Reference. The CW/CCW rotation, based upon the state of the input may be set using the Lexium CT-ILT Pulse-Direction software included with the Lexium ILTxV.

P1:5 — Enable Input

This input can be used to enable or disable the driver output circuitry. Leaving the enable switch open, Disconnected) for sinking or sourcing configuration, the driver outputs will be enabled and the step clock pulses will cause the motor to advance. When this input switch is closed (active signal) in both sinking and sourcing configurations, the driver output circuitry will be disabled. Please note that the internal sine/cosine position generator will continue to increment or decrement as long as step clock pluses are being received by the device.

6.1.3 Optocoupler reference input

The optocoupler reference sets the reference state, sinking or sourcing, for the universal isolated logic inputs.

If a +5 to +24 VDC power source is connected to the reference, the inputs will be sinking-type inputs.

If the reference is connected to ground, the inputs will be sourced by a +5 to +24 VDC signal. Section 6.3 details both connection methods.

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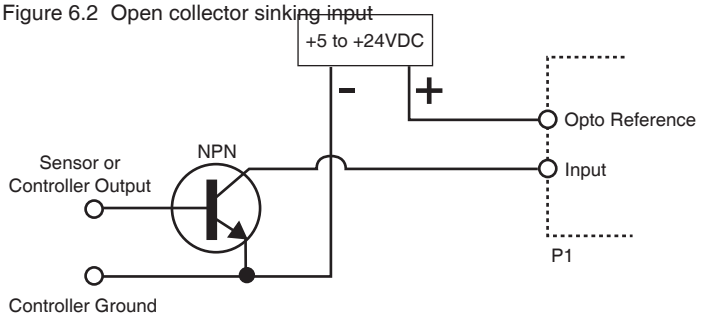
6.1.4 Interfacing the isolated logic inputs

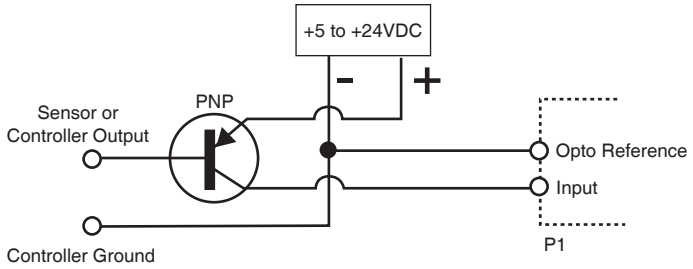
NPN Sinking inputs

Figure 6.2 Open collector sinking input



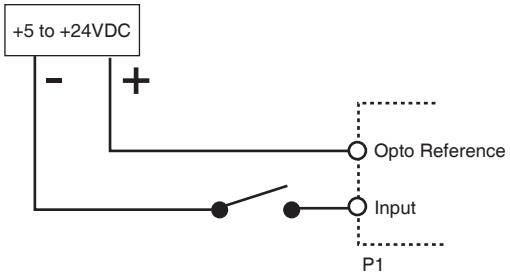
PNP sourcing inputs

Figure 6.3 Open collector sourcing input



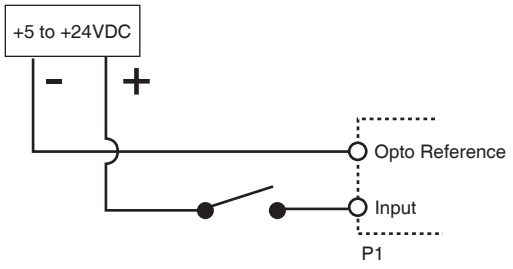
Sinking inputs

Figure 6.4 Switch interface sinking input



Sourcing inputs

Figure 6.5 Switch interface sourcing input



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7 Minimum connection requirements

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the optocouplers and motor power.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

HOT PLUGGING!

Do not connect or disconnect DC power, logic or communications while the device is in a powered state.

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

EMI and RFI

These recommendations will provide optimal protection against EMI and RFI. The actual cable type, wire gauge, shield type and filtering devices used are dependent on the customer's application and system.

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make your system unreliable.

Logic level cables must be shielded to reduce the chance of EMI induced noise. The shield needs to be grounded at the signal source to earth. The other end of the shield must not be tied to anything, but allowed to float. This allows the shield to act as a drain.

Failure to follow these instructions may result in damage to system components!

CONNECTOR OPTIONS

The Lexium ILTxV motion control products family hasdifferent connector options. The purpose of this section is to give a general overview of the I/O interface methods and practices.

Please see the section specific to the Lexium ILTxV product you purchased in the second part of this document for connectors, pin configurations and connectivity options.

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7.1 Minimum connection requirements

The diagrams below illustrates the minimum connections required to operate the Lexium ILTxV.

These connections are:

- +V Motor power
- Power ground
- Optocoupler reference
- Step clock
- CW/CCW direction

Connecting SPI communications is not required as the device will operate using the factory default settings in full step mode at 25% run current.

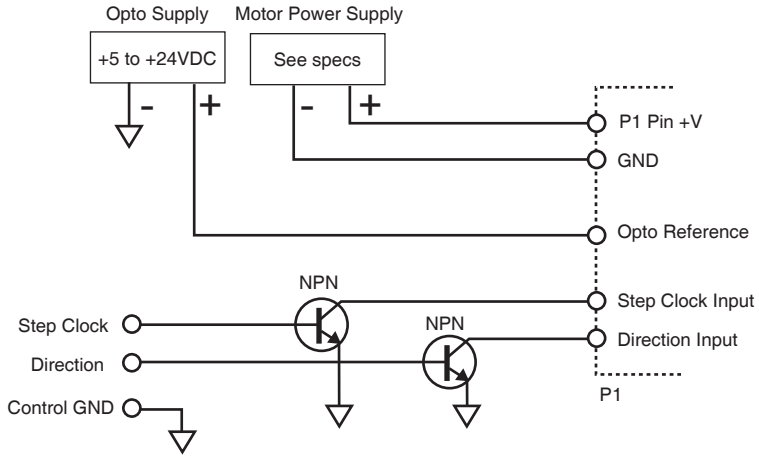

Figure 6.1 Minimum connections, open-collector sinking configuration

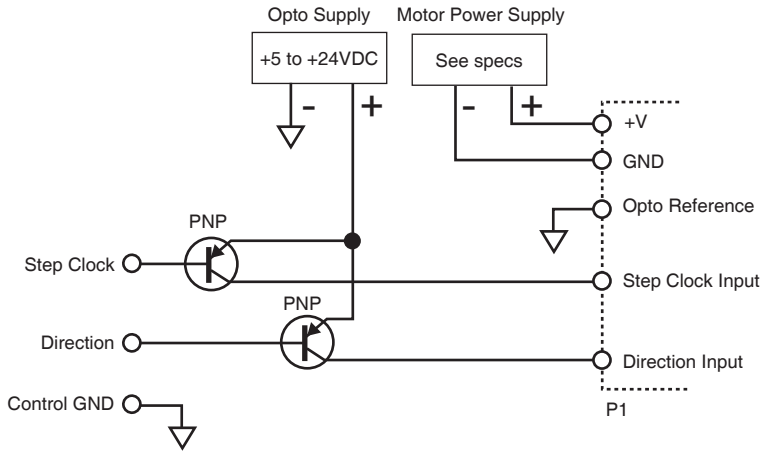

Figure 6.2 Minimum connections, open-collector sourcing configuration

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Lexium ILTxV

Part 2: Detailed Specifications and Connectivity Information

1. Lexium ILT2V36
2. Lexium ILT2V42
3. Lexium ILT2V57
4. Lexium ILT2V85
5. Lexium ILT5V85

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Lexium ILT2V36

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1 Introduction

The Lexium high torque integrated motor and step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the Lexium ILT2V36 eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise.

1.1 Lexium ILT2V36 unit overview

The unsurpassed smoothness and performance delivered by the Lexium ILT2V36 are achieved through the advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

The Lexium ILT2V36 accepts a broad input voltage range from +24 to +48 VDC, delivering enhanced performance and speed. Oversized input capacitors are used to minimize power line surges, reducing problems that can occur with long runs and multiple drive systems. An extended operating range of –40° to +85°C provides long life, trouble free service in demanding environments.

The Lexium ILT2V36 uses a size 36 high torque brushless step motor integrated with a driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of the Lexium CT-ILT Pulse-Direction commissioning tool, which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

The Lexium ILT2V36 is a compact, powerful and cost effective motion control solution that will reduce system cost, design and assembly time for a large range of brushless step motor applications.

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1.2 Product identification

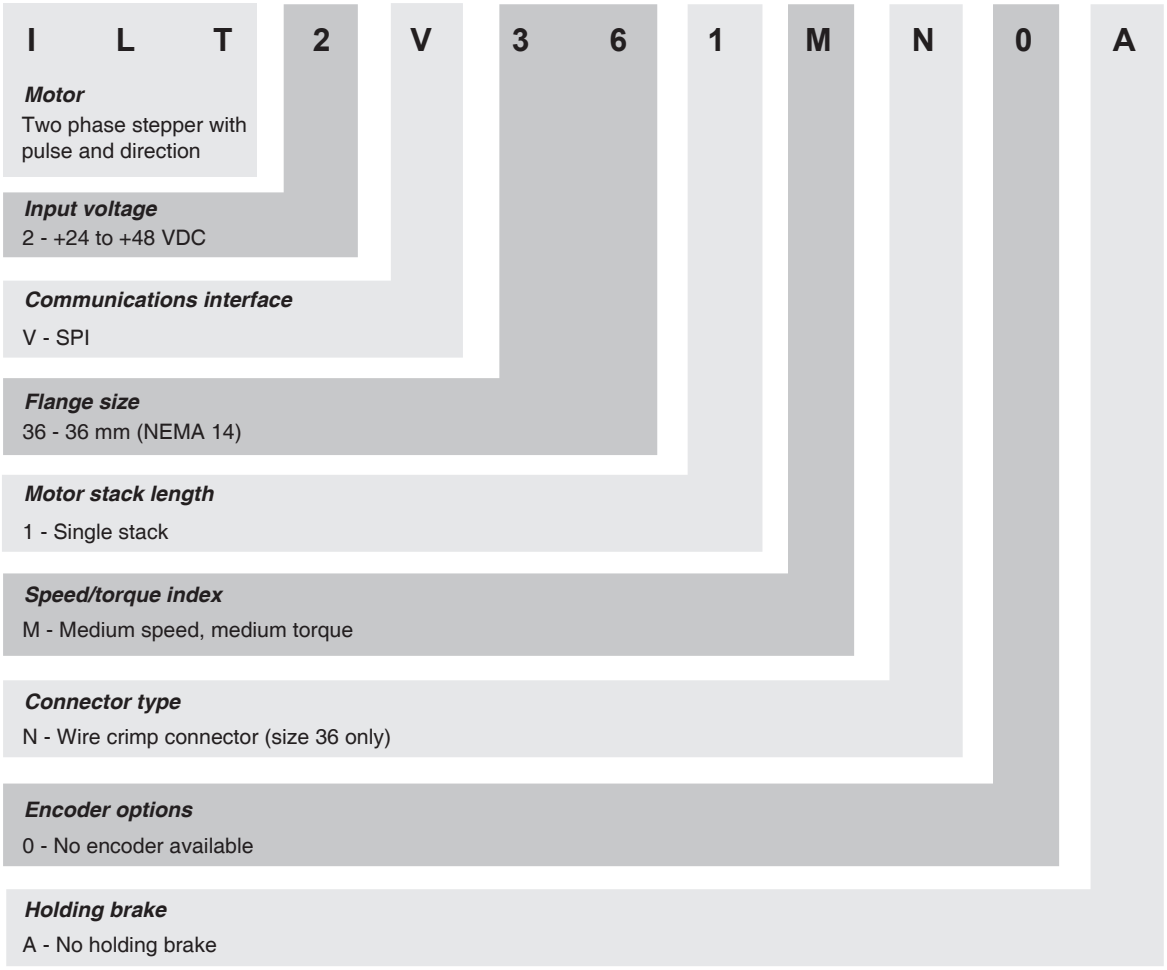

Figure 1.1 Standard product options

1.3 Documentation reference

The following User's manuals are available for the Lexium ILT2V36:

- Product manual, describes the technical data, installation, configuration and programming of the product.

This documentation is also available for download from the Schneider Electric web site at http://www.schneider-electric.com

1.4 Product software

The Lexium ILT2V36 integrated motor and driver is commissioned using the Lexium CT-ILT Pulse-Direction tool. This free software may be downloaded from http://www.schneider-electric.com.

Installation and usages instructions are to be found in Part 1 of this document, Section 5.

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2 Specifications

2.1 Mechanical specifications

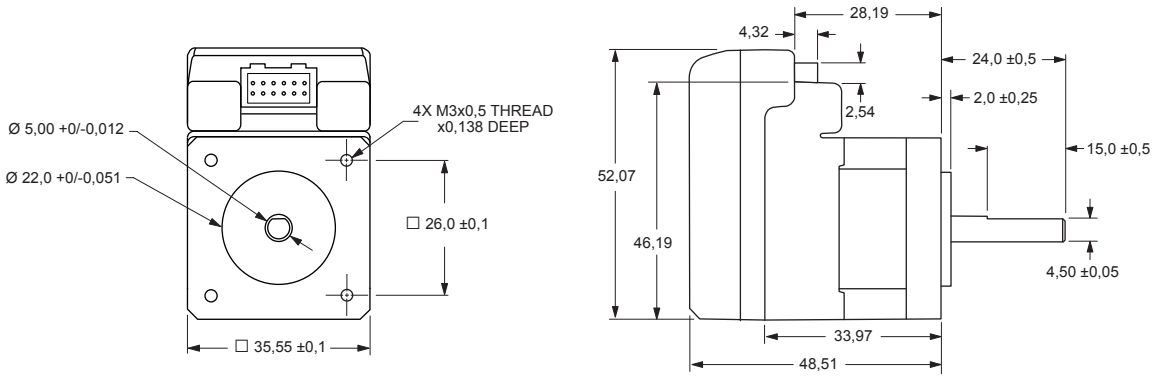

Figure 2.1 Mechanical specifications - dimensions in inches (mm)

2.2 General specifications

2.2.1 Electrical specifications

	Condition	Min	Typ	Max	Unit
Input voltage range	—	+24	—	+48	VDC
Max power supply current	—	—	—	1.0*	A

**per Lexium ILT2V36, Actual current depends on voltage and load.*

Table 2.1 Electrical specifications

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2.2.2 Logic specifications

	Condition	Min	Typ	Max	Unit
Logic Inputs					
Isolated input voltage range (sourcing or sinking)	Isolated inputs	+5	—	+24	VDC
Current	+5 VDC max	—	—	8.7	mA
Current	+24 VDC max	—	—	14.6	mA

Table 2.2 I/O specifications

2.2.3 Communications specifications

Protocol	SPI

Table 2.3 Communications specifications

2.2.4 Thermal specifications

		Min	Typ	Max	Unit
Heat sink temperature	non-condensing humidity	-40	—	+85	ºC
Motor temperature	non-condensing humidity	-40	—	+100	ºC

Table 2.4 Thermal specifications

2.2.5 Motion specifications

Number of microstep resolutions	20

Available microsteps per revolution

200	400	800	1000	1600	2000	3200	5000	6400	10000
12800	20000	25000	25600	40000	50000	51200	36000[1]	21600[2]	25400[3]

1=0.01 deg/µstep 2=1 arc minute/µstep *3=0.001 mm/µstep
** 1" per revolution lead screw*

Digital filter range	50 ns to 12.9 µs (10 MHz to 38.8 kHz)
Clock types	step/direction, up/down, quadrature
Step frequency (max)	5 MHz
Step frequency minimum pulse width	100 ns

Table 2.5 Motion specifications

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2.2.6 Motor specifications

Specification	
Holding torque	0.11 Nm
Detent torque	0.014 Nm
Rotor inertia	0.017 kg-cm^2
Weight motor and driver	150.0 g

Table 2.6 Motor specifications

2.2.7 Performance curves

Single length motor

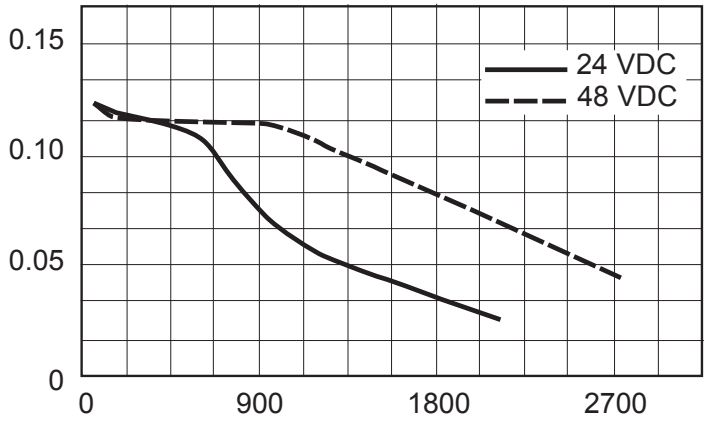

Figure 2.2 Performance curves - single length motor

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2.3 Connectivity specifications/pin assignments

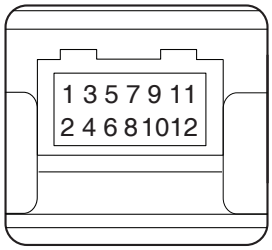
2.3.1 P1 — Power, communications and logic

⚠ CAUTION

+5VDC OUTPUT

The +5 VDC output on connector P1 is for the express purpose of powering the VW3L1V305 isolated communications converter cables. Do not use to power external devices.

Failure to follow these instructions may result in damage to system components!



Connectivity Options
USB to SPI Converter:
VW3LI1V305
Mating connector kit:
VW3L5C08N05

Mfg P/N:
Shell
JST PADP-12V-1-S

Pins
JST SPH-001T0.5L

Pin #	Function	Description
1	GND	Motor power supply return (ground)
2	+V	+24 to +48 VDC motor power supply input
3	OPTO	Optocoupler power supply input
4	SCLK	Step clock input
5	EN	The enable input can be used to enable or disable the driver output circuitry.
6	DIR	The direction input controls the clockwise/ counterclockwise direction of the motor. It may be configured as sinking or sourcing depending on the state of the optocoupler reference.
7	+5 VDC	+5 VDC output. This output is only to be used to power the optional communications converter cable VW3L1V305. Do not use to power external devices.
8	CLK	SPI clock
9	CGND	Communications ground
10	MOSI	SPI master out - slave in
11	CS	SPI chip select input
12	MISO	SPI master in - slave out

Table 2.7 P1 — Power, communications and logic, 12-oin locking wire crimp

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2.4 Connectivity

Parameter Setup Cable

The optional 3,6 m commisioning cable assembly with inline USB to SPI converter, part number VW3L1V305 facilitates communications, power and logic wiring and is recommended with first order.

Prototype development cable

The optional 3,0 m prototype development cable without inline communications converter, part number VW3L3D04R30 facilitates communications, power and logic wiring.

Mating Connector Kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

12-Pin Wire Crimp VW3L5C08N05

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3 Mounting and connection recommendations

⚠ CAUTION

LEAD RESTRAINT

Some mounting configurations require that the Lexium move along the screw. Ensure that all cabling is properly restrained to provide strain relief on connection points..

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

MOUNTING SCREW TORQUE

When mounting the Lexium, do not exceed the maximum recommended tightening torque of 9 kg-cm.

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

HOT PLUGGING

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

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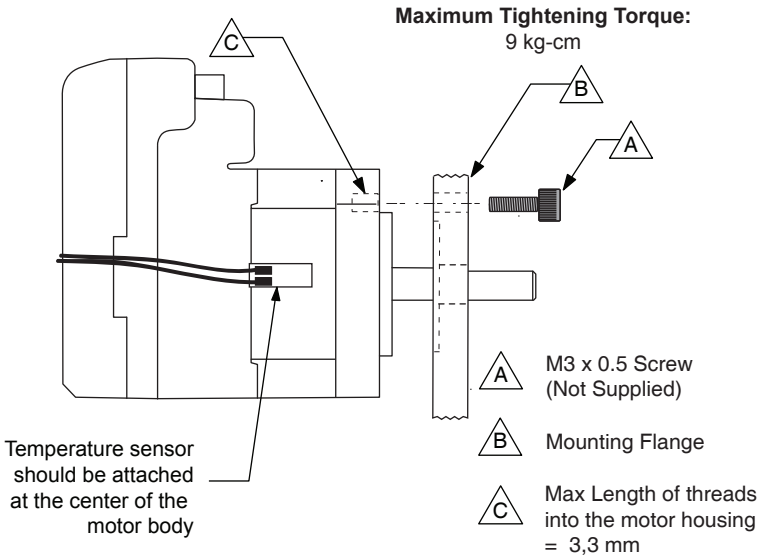
3.1 Mounting

The maximum temperature for the Lexium ILT2V36 is 85°C measured at the heat sink, 100°C measured at the motor. Ensure that the unit is mounted to adequate heat sink plating to ensure that the temperature does not exceed 85°C.



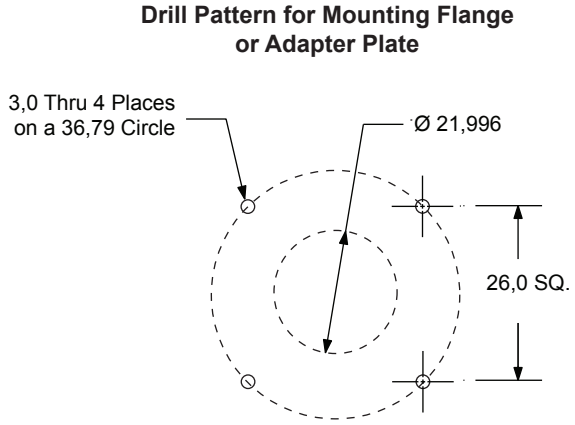


Figure 3.1 Lexium ILT2V36 mounting and drill pattern

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3.2 Layout and interface guidelines

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

HOT PLUGGING

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make your system unreliable.

Logic level cables must be shielded to reduce the chance of EMI induced noise. The shield needs to be grounded at the signal source to earth. The other end of the shield must not be tied to anything, but allowed to float. This allows the shield to act as a drain.

Power supply leads to the Lexium ILT2V36 need to be twisted. If more than one Lexium is to be connected to the same power supply, run separate power and ground leads from the supply to each driver.

3.2.1 Recommended Wiring

The following wiring/cabling is recommended for use with the Lexium ILT2V36:

Logic Wiring..... 22 AWG

Wire Strip Length..... 6,0 mm

Power, Ground ..... 20 AWG

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4.2.2 Securing cabling

Some applications may require that the Lexium move with the axis motion. If this is a requirement of your application, the motor leads must be properly anchored. This will prevent flexing and tugging which can cause damage at critical connection points.

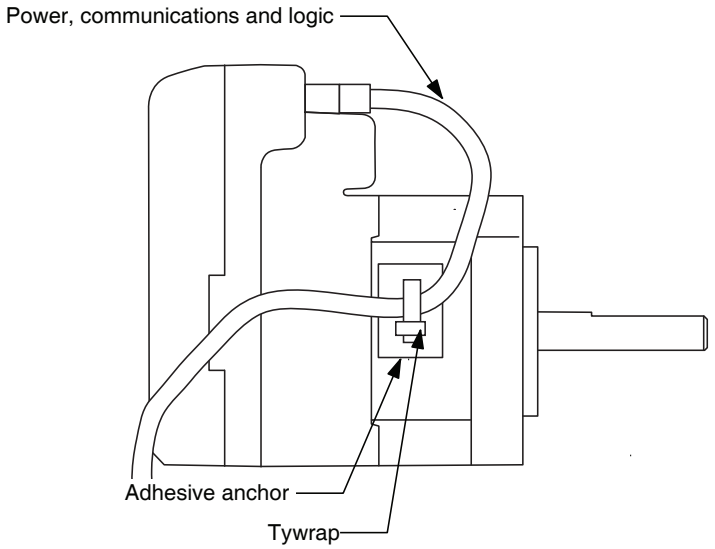

Figure 3.2 Secure leads

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4 Connection and interface

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

SWITCHING DC POWER/HOT PLUGGING

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

Communications, DC power and logic are all interfaced using the 12-pin wire crimp connector at P1.

4.1 Interfacing communications

SPI communications may be interfaced using a 12-pin locking wire crimp connector at P1

For general SPI communications methods and practices please see Part 1, Section 5 of this document.

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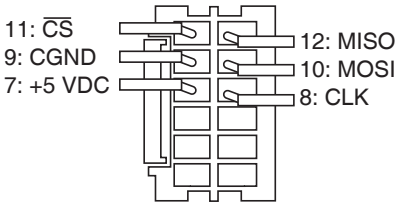
4.1.1 P1 — 12--pin wire crimp connector



Pin #	Function	Description
7	+5V	+ 5 VDC output. Used to power the VW3L1V305 communications converter ONLY! Not for general purpose use.
8	CLK	SPI clock
9	GND	Communications ground
10	MOSI	SPI master out - slave in
11	CS	SPI chip select, selected when low.
12	MISO	SPI master in - slave out

Table 4.1 Communications connections, P1 - 12-pin wire crimp

4.2 Interfacing DC power

See part 1 of this document, section 3, for recommended power cable configurations.

⚠ CAUTION

OVER VOLTAGE

The DC voltage range for the Lexium ILT2V36 is +24 to +48 VDC. Ensure that motor back EMF is factored into your power supply size calculations.

Allow 1.0 A maximum power supply output current per Lexium ILT2V36 in the system. Actual power supply current will depend on voltage and load.

Failure to follow these instructions can result in equipment damage.

4.2.1 Recommended wire gauge

Cable Length: meters	3,0	7,6	15,2	22,9	30,5
Amps Peak	**Minimum AWG**				
1 Amp Peak	20	20	18	18	18

Table 4.2 Recommended power supply wire gauge

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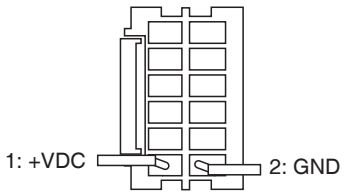
4.2.2 P1 — 12-pin locking wire crimp interface



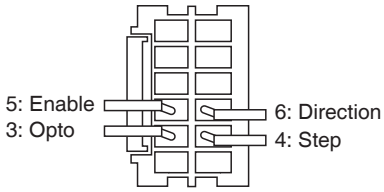
Pin #	*Signal*	*Cable wire colors*	
		VW3L1V305	VW3L3D04R30
2	+12 to + 48 VDC	Red	See section 4.7.2 for wire colors.
1	Power ground	Black	

Table 4.3 Power and ground connections, 12-pin locking wire crimp

4.3 Interfacing Logic

See part 1 of this document, section 4, for logic interface configurations and methods.

4.3.1 P1 — 12-pin locking wire crimp



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V305	VW3L3D04R30
3	Opto reference	White	See section 4.7.2 for wire colors.
4	Step clock input	Green	
5	Enable input	Orange	
6	Direction input	Blue	

Table 4.4 Universal input connections, 12-pin locking wire crimp

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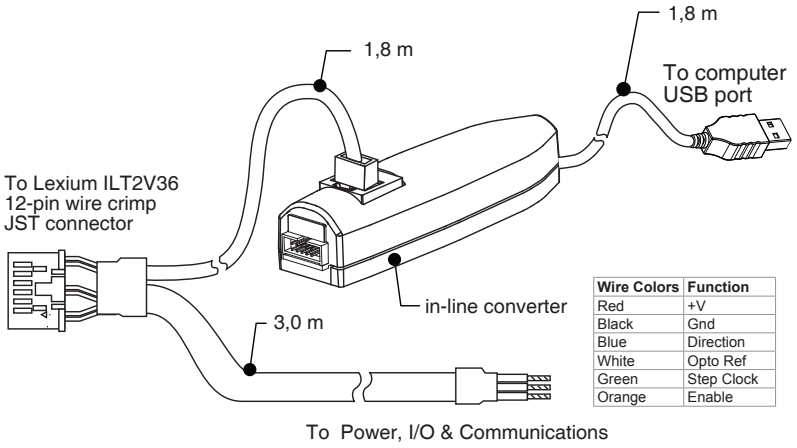
4.4 Connectivity accessory details

4.4.1 VW3L1V305 communications converter cable

The VW3L1V305 is an interface cable which combines Power, Logic and communications with an inline USB to SPI converter.

It is recommended with the first purchase.



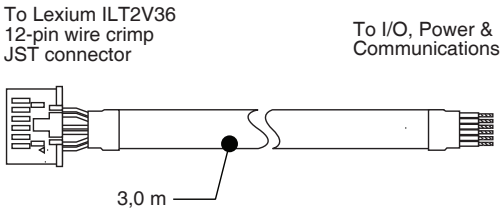
Wire Colors	Function
Red	+V
Black	Gnd
Blue	Direction
White	Opto Ref
Green	Step Clock
Orange	Enable

Figure 4.1 VW3L1V305 USB to SPI converter cable

4.4.2 VW3L3D04R30 prototype development cable

Description: Pre-wired mating connector interfaces to an Lexium's 12-pin wire crimp connector, with flying leads other end, for quick test/ development.

Function: I/O, Power & Communications Interface.



Pair	Wire Colors	Function
1	Black	GND
	Red	+V
2	Black	Comm GND
	White	MOSI
3	Black	CS
	Green	MISO
4	Black	Opto Ref
	Blue	+5 VDC Out
5	Black	Step Clock
	Yellow	Enable
6	Black	Direction
	Brown	SPI Clock

Figure 4.2 Prototype development cable VW3L3D04R30

4.7.3 Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P1 12-pin wire crimp..... VW3L5C08N05

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Lexium ILT2V42

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List of Tables

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1 Introduction

The LexiumILT2V42 high torque integrated motor and step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the Lexium ILT2V42 eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise.

1.1 Lexium ILT2V42 unit overview

The unsurpassed smoothness and performance delivered by the Lexium ILT2V42 are achieved through advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

The Lexium ILT2V42 accepts a broad input voltage range from +24 to +48 VDC, delivering enhanced performance and speed. Oversized input capacitors are used to minimize power line surges, reducing problems that can occur with long runs and multiple drive systems. An extended operating range of –40° to +85°C provides long life, trouble free service in demanding environments.

The Lexium ILT2V42 uses a NEMA 17 frame size high torque brushless step motor integrated with a microstepping driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of a simple GUI which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

The Lexium ILT2V42 is a compact, powerful and cost effective motion control solution that will reduce system cost, design and assembly time for a large range of brushless step motor applications.

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1.3 Product identification

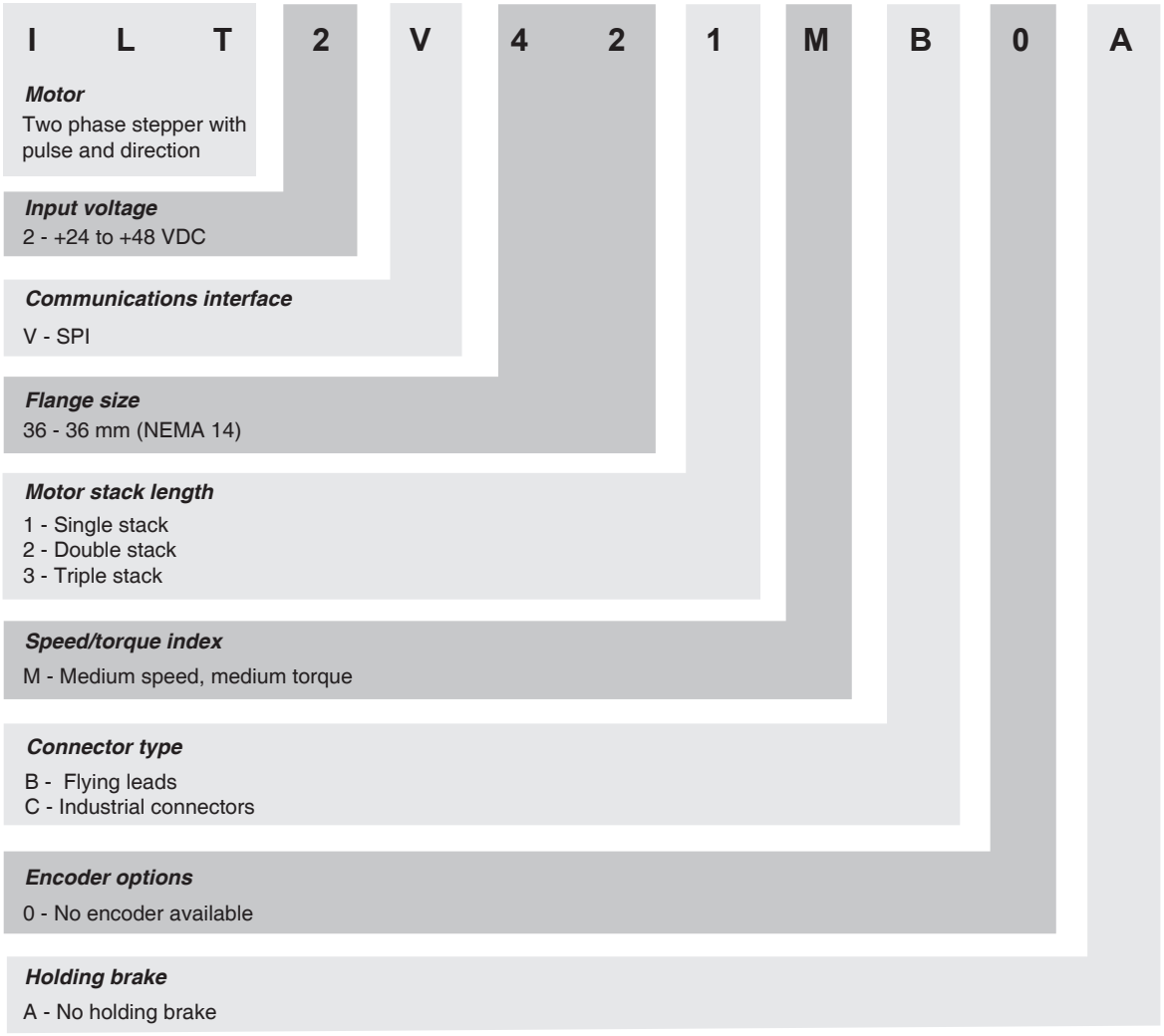

Figure 1.1 Standard product options

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1.4 Documentation reference

The following user's manuals are available for the Lexium ILT2V42:

- Product manual, describes the technical data, installation, configuration and programming of the product.

This documentation is also available for download from the Schneider Electric web site at http://www.schneider-electric.com

1.5 Product software

The Lexium ILT2V42 integrated motor and driver is configured using the Lexium CT-ILT Pulse-Direction commissioning tool. This free software may be downloaded from http://www.schneider-electric.com.

Installation and usages instructions are to be found in Part 1 of this document, Section 5.

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2 Specifications

2.1 Mechanical specifications

2.1.1 Lexium ILT2V42 mechanical specifications

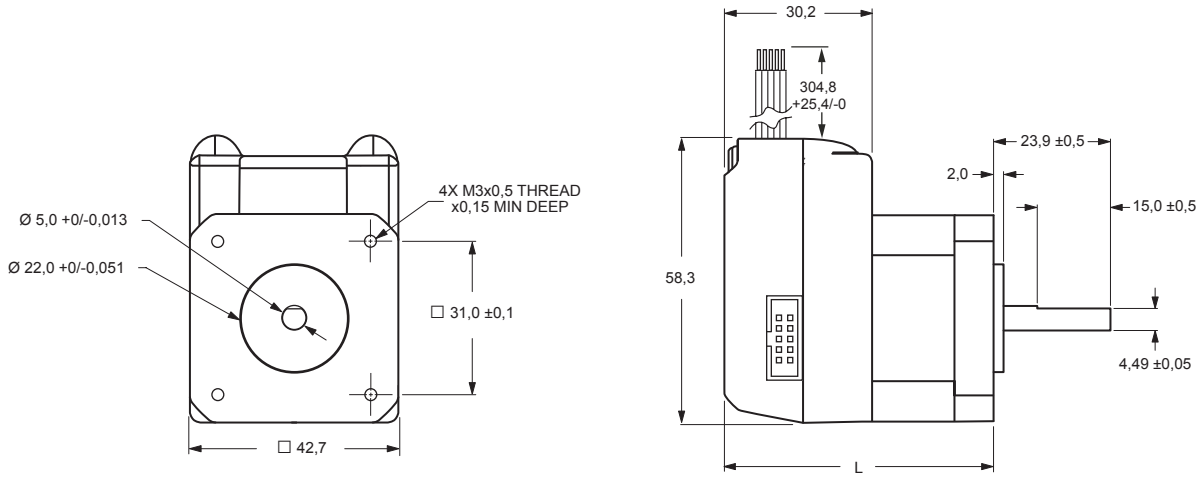

Figure 2.1 Lexium ILT2V42 Mechanical Specifications

2.1.2 Lexium ILT2V42 mechanical specifications

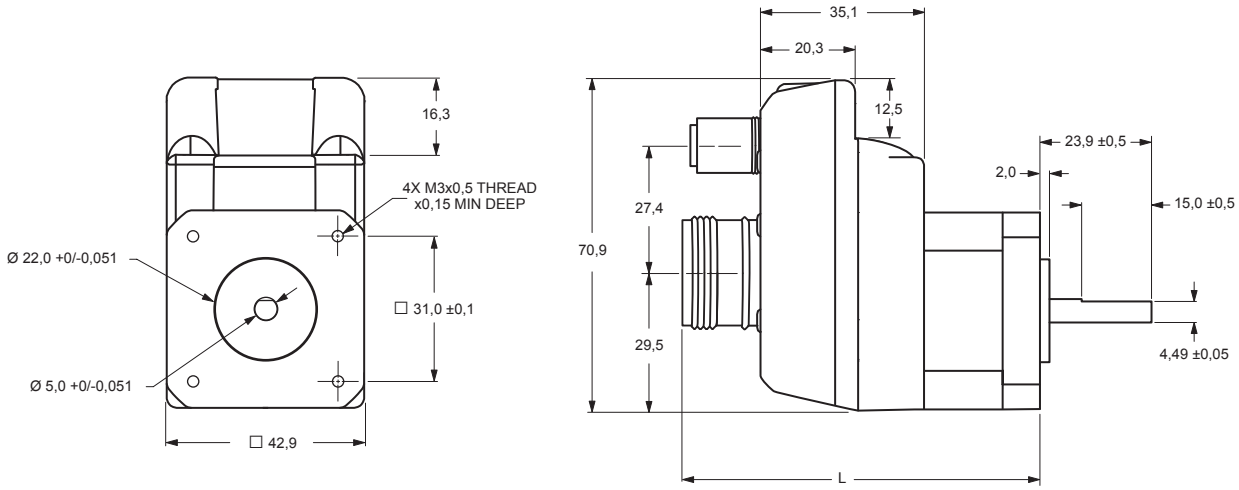

Figure 2.2 Lexium ILT2V42-65 Mechanical Specifications

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2.2 General specifications

2.2.1 Electrical specifications

	Condition	Min	Typ	Max	Unit
Input voltage range	—	+24	—	+48	VDC
Max power supply current	—	—	—	2.0*	A

**per Lexium ILT2V42, Actual current depends on voltage and load.*

Table 2.1 Electrical specifications

2.2.2 Logic specifications

	Condition	Min	Typ	Max	Unit
Inputs					
Isolated input voltage range (sourcing or sinking)	Isolated inputs	+5	—	+24	VDC
Current	+5 VDC max	—	—	8.7	mA
Current	+24 VDC max	—	—	14.6	mA

Table 2.2 Logic input specifications

2.2.3 Communications specifications

Protocol	SPI

Table 2.3 Communications specifications

2.2.4 Thermal specifications

		Min	Typ	Max	Unit
Heat sink temperature	non-condensing humidity	-40	—	+85	ºC
Motor temperature	non-condensing humidity	-40	—	+100	ºC

Table 2.4 Thermal specifications

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2.2.5 Motion specifications

Number of microstep resolutions	20

Available microsteps per revolution

200	400	800	1000	1600	2000	3200	5000	6400	10000
12800	20000	25000	25600	40000	50000	51200	36000[1]	21600[2]	25400[3]

1=0.01 deg/µstep 2=1 arc minute/µstep *3=0.001 mm/µstep
** 1" per revolution lead screw*

Digital filter range	50 ns to 12.9 µs (10 MHz to 38.8 kHz)
Clock types	step/direction, up/down, quadrature
Step frequency (max)	5 MHz
Step frequency minimum pulse width	100 ns

Table 2.5 Motion specifications

2.2.8 Motor specifications

Specification	Single length	Double length	Triple length
Holding torque (Nm)	0.19	0.33	0.39
Detent torque (Nm)	0.0117	0.0147	0.0245
Rotor inertia (kg-cm^2)	0.038	0.057	0.082
Weight motor and driver oz (g)	294.8	340.2	430.9

Table 2.6 Motor specifications

2.2.9 Torque-speed performance curves

One stack motor

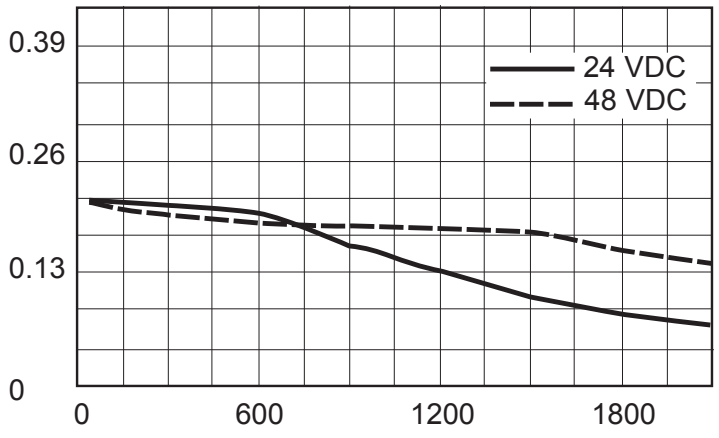

Figure 2.3 One stack motor

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Two stack motor

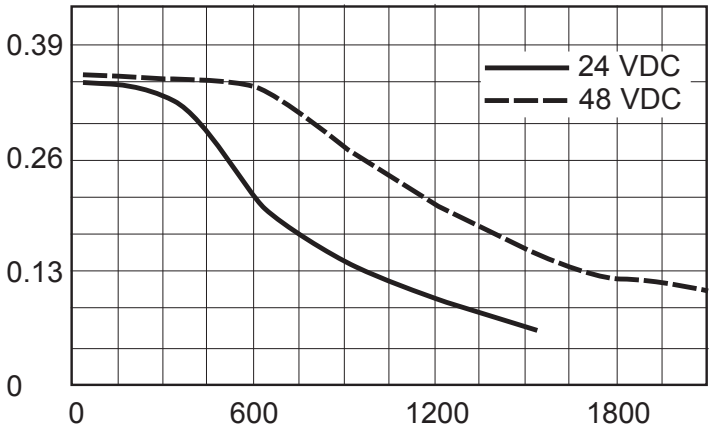

Figure 2.4 Two stack motor

Three stack motor

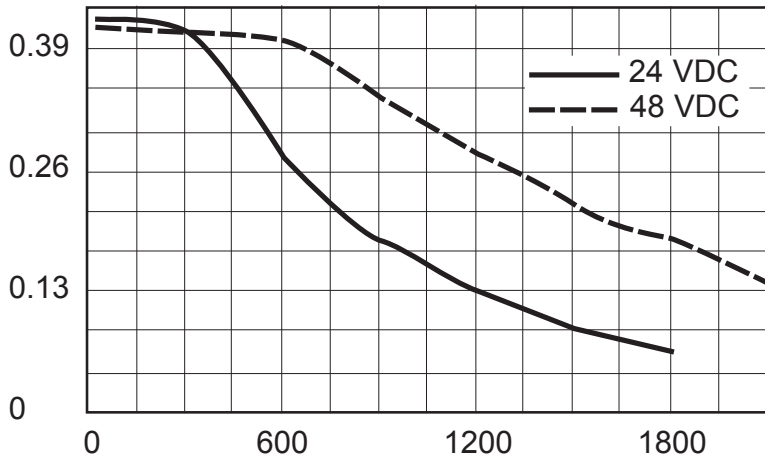

Figure 2.5 Three stack motor

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2.3 Connectivity specifications/pin assignments - Communications

2.3.1 SPI communications - connector P2

⚠ CAUTION

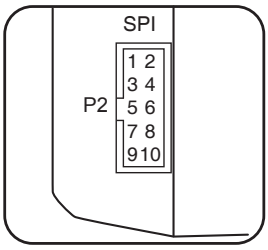
+5VDC OUTPUT

The +5 VDC output on connector P2 is for the express purpose of powering the isolated communications converter cables. Do not use to power external devices.

Failure to follow these instructions may result in damage to system components!

If using the model Lexium with the industrial connector at position P1, the P2 connector is eliminated and SPI communications are bundled with power and logic.

10-pin IDC style connector



Connectivity Options
USB to SPI Converter:
VW3L1V300

Mating connector kit:
VW3L5C01N05 (ribbon cable not included)

Mfg P/N:
Shell
SAMTEC TSD-05-01-N

Ribbon cable
Tyco: 1-57051-9

Pin #	Function	Description
1	N/C	Not connected
2	N/C	Not connected
3	N/C	Not connected
4	CS	SPI chip select, selected when low.
5	GND	Communications ground
6	+5V	+ 5 VDC output. Used to power the SEM communications converter ONLY! Not for general purpose use.
7	MOSI	SPI master out - slave in
8	CLK	SPI clock
9	N/C	Not connected
10	MISO	SPI master in - slave out

Table 2.7 P2 communications, 10-pin locking wire crimp

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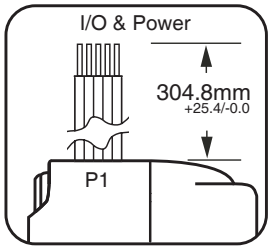
2.4 Connectivity specifications/pin assignments - power and logic

2.4.1 Power and logic

12” (304.8 mm) flying leads

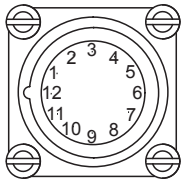


Wire Color	Function	Description
White	Opto	Optocoupler reference
Orange	Step clock	Step clock input
Blue	Direction	CW/CCW direction input
Brown	Enable	Output bridge enable input
Black	GND	Power ground
Red	+V	Motor Power (+24 to +48 VDC)

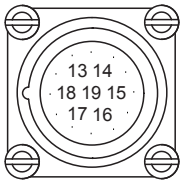
Table 2.8 Power and logic interface - 12” (308.8.mm) flying leads

2.4.2 Power, logic, communications — 19-pin M23 (industrial connector)

Outside: Pins 1 -12



Inside: Pins 13 -19



Connectivity Options
USB to SPI Converter:
VW3L1V301

Prototype development cable:
VW3L3D01R40

Pin #	Function	Description
1	Opto Reference	The signal applied to the optocoupler reference will determine the sinking/ or sourcing configuration of the inputs. Sinking: +5 to +24 VDC, Sourcing=ground.
2	Enable	Enable/disable input will enable or disable the driver output to the motor. In the disconnected state the driver outputs are enabled in either sinking or sourcing configuration. Can be configured as active high or active low.
3-5	N/C	Not connected
6	+V	+24 to +48 VDC motor power supply input.
7	N/C	Not connected
8	MOSI	Master-out/slave-in. Carries output data from the SPI Master to the Lexium ILT..
9	CS	SPI chip select. This signal is used to turn communications on multiple Lexium units on or off.
10	+5 VDC Output	Supply voltage for the VW3L1V301 converter cable ONLY!
11	GND	Communications ground.
12	Connector Shell	Connector shell,
13	Direction/ Channel B/ Clock Down	Direction input. The axis direction will be with respect to the state of the direction override parameter. It may also receive quadrature and clock up type inputs if so configured.
14 -15	N/C	Not connected
16	SPI Clock	The clock is driven by the SPI Master. The clock cycles once for each data bit.
17	MISO	Master-in/slave-out. Carries output data from the Lexium back to the SPI Master.
18	Step Clock/ Channel A/ Clock Up	Step clock input. The step clock input will receive the clock pulses which will step the motor 1 step for each pulse. It may also receive quadrature and clock up type inputs if so configured.
19	GND	Power ground

Table 2.9 P1 Power, logic, communications.

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2.5 Connectivity

Communication converters

Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single Lexium product via a PC's USB port. Length 3,6 m.

Mates to connector:

P2 10-pin IDC VW3L1V300

P1 19-pin M23 circular VW3L1V301

Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Length 4,0 m.

Mates to connector:

P1 19-pin M23 (straight) VW3L3D01R40

Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P2 10-pin IDC VW3L5C01N05

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3 Mounting and connection recommendations

⚠ CAUTION

LEAD RESTRAINT

Some Microstepping mounting configurations require that the Lexium move along the screw. Ensure that all cabling is properly restrained to provide strain relief on connection points..

Failure to follow these instructions can result in equipment damage.

⚠ CAUTION

MOUNTING SCREW TORQUE

When mounting the Lexium, do not exceed the maximum recommended tightening torque of 9 kg-cm.

Failure to follow these instructions can result in equipment damage.

3.1 Mounting

Care must be observed when installing the mounting screws on ALL Lexium ILT2V42 versions. The mounting holes on the flange are not drilled through and have a maximum depth of 3,81 mm.

The warning note and Figure below illustrate the maximum safe thread length and maximum torque for mounting all versions of the Lexium ILT2V42.

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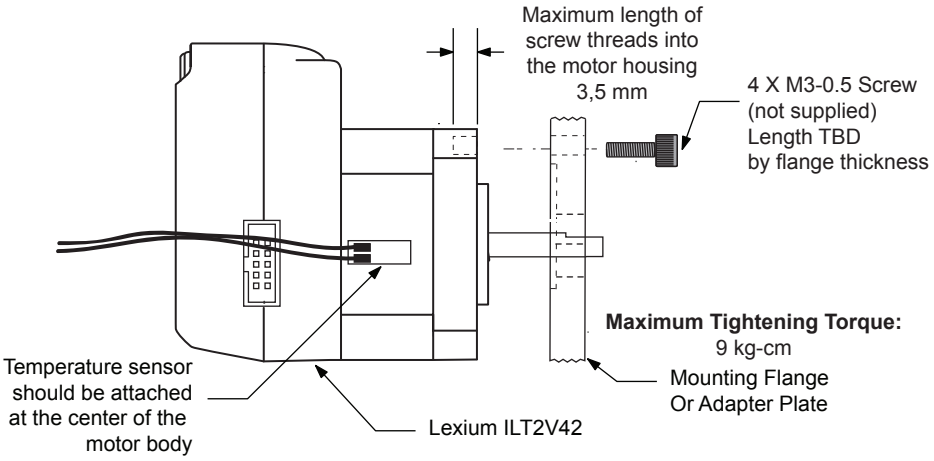

Drill Pattern for Mounting Flange or Adapter Plate

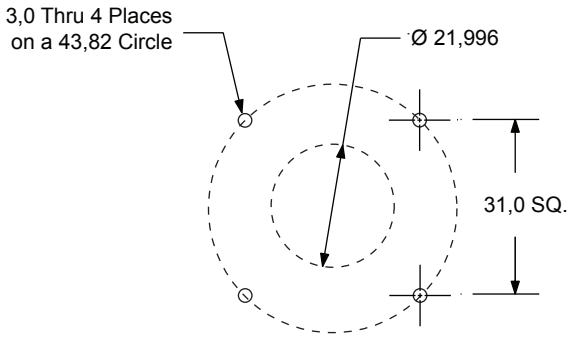

Figure 3.1 Lexium mounting and drill pattern

3.2 Layout and interface guidelines

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make your system unreliable.

Logic level cables must be shielded to reduce the chance of EMI induced noise. The shield needs to be grounded at the signal source to earth. The other end of the shield must not be tied to anything, but allowed to float. This allows the shield to act as a drain.

Power supply leads to the Lexium ILT2V42 need to be twisted. If more than one driver is to be connected to the same power supply, run separate power and ground leads from the supply to each driver.

3.2.1 Rules of wiring

- Power Supply and Motor wiring should be shielded twisted pairs, and run separately from signal-carrying wires.
- A minimum of one twist per inch is recommended.
- Motor wiring should be shielded twisted pairs using 20 gauge, or for distances of more than 2 m, 18 gauge or better.
- Power ground return should be as short as possible to established ground.
- Power supply wiring should be shielded twisted pairs of 18 gauge for less than 4 amps DC and 16 gauge for more than 4 amps DC.

3.2.2 Rules of shielding

- The shield must be tied to zero-signal reference potential. It is necessary that the signal be earthed or grounded, for the shield to become earthed or grounded. Earthing or grounding the shield is not effective if the signal is not earthed or grounded.
- Do not assume that Earth ground is a true Earth ground. Depending on the distance from the main power cabinet, it may be necessary to sink a ground rod at the critical location.
- The shield must be connected so that shield currents drain to signal-earth connections.
- The number of separate shields required in a system is equal to the number of independent signals being processed plus one for each power entrance.
- The shield should be tied to a single point to prevent ground loops.
- A second shield can be used over the primary shield; however, the second shield is tied to ground at both ends.

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3.3 Recommended wiring

The following wiring/cabling is recommended for use with the Lexium ILT2V42:

Logic Wiring.....22 AWG

Wire Strip Length.....6.0 mm

Power and Ground .....20 AWG

3.4 Securing power leads and logic leads

Some applications may require that the Lexium move with the axis motion. If this is a requirement of your application, the motor leads (flying, pluggable or threaded) must be properly anchored. This will prevent flexing and tugging which can cause damage at critical connection points within the Lexium.

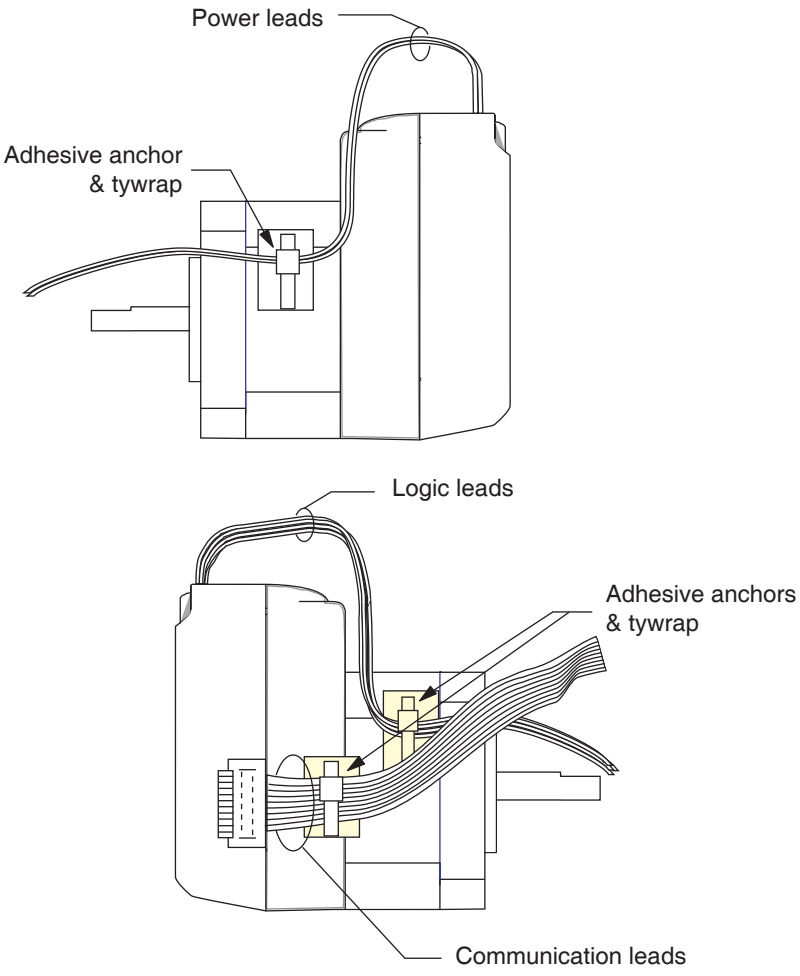

Figure 3.2 Securing leads

4 Connection and interface

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

SWITCHING DC POWER/HOT PLUGGING

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

4.1 Interfacing communications

SPI communications may be interfaced using one of two possible connector options:

1. 10-pin IDC connector at P2
2. 19-pin M23 industrial connector at P1

If using the industrial connector at P1, there will be no P2 connector. The P1 option will bundle power, logic and communications on a single connector.

For general SPI communications methods and practices please see Part 1, Section 5 of this document.

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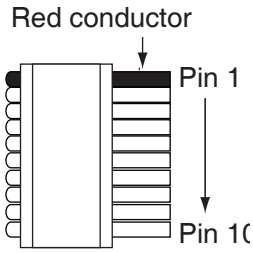
4.1.1 P2 - 10-pin IDC style connector



Pin #	Function	Description
1	N/C	Not connected
2	N/C	Not connected
3	N/C	Not connected
4	CS	SPI chip select, selected when low.
5	GND	Communications ground
6	+5V	+ 5 VDC output. Used to power the communications converter ONLY! Not for general purpose use.
7	MOSI	SPI master out - slave in
8	CLK	SPI clock
9	N/C	Not connected
10	MISO	SPI master in - slave out

Table 4.1 Communications connections, P2 - 10-pin IDC

Connectivity accessories

Mating connector kit VW3L5C01N05
(contains 5 connector shells, ribbon cable not included)

Communications converter cable 3.0 m VW3L1V300

Manufacturer (SAMTEC) part numbers

Connector shell..... TCSD-05-01-N

Ribbon cable..... Tyco 1-57051-9

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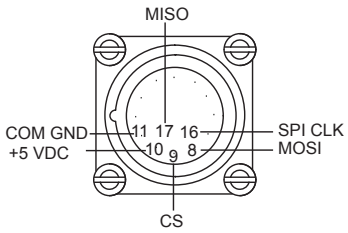
4.1.3 P1 - 19-pin M23 circular connector



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
7	+ 5 VDC output	—	White/gray
8	SPI clock	—	Yellow
9	Comm ground	—	Black
10	SPI MOSI	—	White/green
11	SPI chip select	—	White/yellow
12	SPI MISO	—	Pink

Table 4.3 SPI communications, 19-pin M23 circular

4.3 Interfacing DC power

See part 1 of this document, section 3, for recommended power cable configurations.

⚠ CAUTION

OVER VOLTAGE

The DC voltage range for the Lexium ILT2V42 is +24 to +48 VDC. Ensure that motor back EMF is factored into your power supply size calculations.

Allow 2.0 A maximum power supply output current per Lexium ILT2V42 in the system. Actual power supply current will depend on voltage and load.

Failure to follow these instructions can result in equipment damage.

4.2.2 Recommended wire gauge

Cable Length: meters	3,0	7,6	15,2	22,9	30,5
Amps Peak	**Minimum AWG**				
1 Amp Peak	20	20	18	18	18
2 Amps Peak	20	18	16	14	14

Table 4.4 Recommended power supply wire gauge

4.3.3 P1 — 30.5 cm flying leads interface

Wire Color	
Red	+24 to +48 VDC supply
Black	Power ground

Table 4.5 Power and ground connections, flying leads

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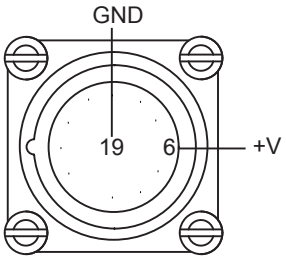
4.3.6 P1 — 19-pin M23 circular interface



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
6	+24 to +48 VDC supply	Blue	Blue
19	Power ground	Brown	Brown

Table 4.6 Power and ground connections, industrial connectors

4.4 Interfacing Logic)

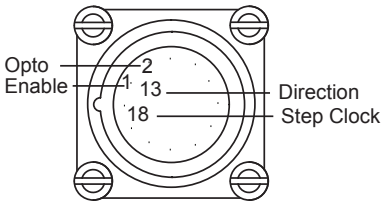
See part 1 of this document, section 6, for logic interface configurations and methods.

4.4.1 P1 — 30.5 cm flying leads interface

Wire Color	*Signal*
White	Opto reference
Orange	CW/CCW direction input
Blue	Step clock input
Brown	Enable input

Table 4.7 Universal input connections, flying leads

4.4.3 P1 — 19-pin M23 circular connector



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
1	Opto reference	Violet	Violet
18	Step clock input	Gray/brown	Gray/brown
2	Enable input	Red	Red
13	Direction input	Yellow/brown	Yellow/brown

Table 4.8 Logic connections - industrial connector

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4.5 USB to SPI communications converters

4.5.1 USB to 10-pin IDC — VW3L1V300

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters.

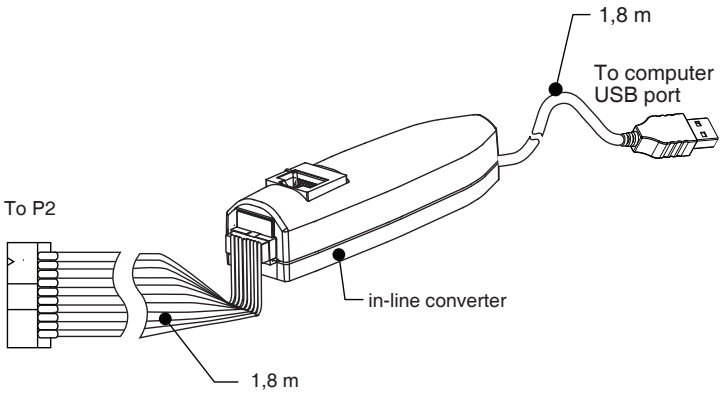
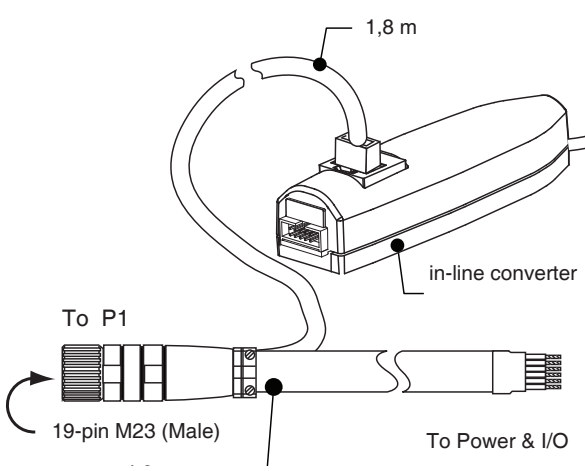


Figure 4.1 VW3L1V300 communications converter cable

4.5.3 USB to 19-pin M23 circular — VW3L1V301

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters. Power and logic signals are bundled into this connector via a second cable with signal accessibility via flying leads.



Wire Colors	Function
Violet	Opto Ref.
Red	Enable
Blue	+V*
Black	Comm GND
Green/Yellow	Shell
Yellow/Brown	Direction
Gray/Brown	Step Clock
Brown	Power GND*
Optional internal encoder	
Gray	Index +
Red/blue	Channel B +
Green	Channel B -
Gray/pink	Channel A -
Brown/green	Index -
White	Channel A +

Figure 4.2 VW3L1V301 communications converter

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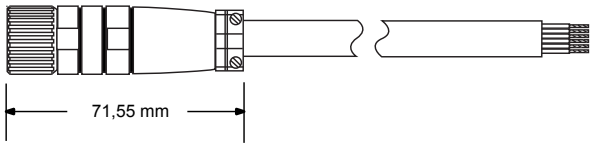
4.6 Prototype development cables

4.6.2 VW3L3D01R40 Power, logic and communications cable

The VW3L3D01R40 prototype development cordset is used to rapidly interface the Lexium to the users communications and logic interface. This 4,0 m cable consists of a 19-pin M23 circular connector to plug directly into the P1 connector with flying leads on the opposite end.



Wire Colors	Function
Violet	Opto Ref.
Red	Enable
Blue	+V
White/Green	MOSI
White/Yellow	CS
White/Gray	+5 VDC
Black	Comm GND
Green/Yellow	Shell
Yellow/Brown	Direction
Yellow	SPI Clock
Pink	MISO
Gray/Brown	Step Clock
Brown	Power ground

Figure 4.3 VW3L3D01R40 prototype development cordset

4.7 Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P2 10-pin IDC VW3L5C01N05

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Lexium ILT2V57

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1 Introduction

The LexiumILT2V57 high torque integrated motor and step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the Lexium ILT2V57 eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise.

1.1 Lexium ILT2V57 unit overview

The unsurpassed smoothness and performance delivered by the Lexium ILT2V57 are achieved through advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

The Lexium ILT2V57 accepts a broad input voltage range from +24 to +48 VDC, delivering enhanced performance and speed. Oversized input capacitors are used to minimize power line surges, reducing problems that can occur with long runs and multiple drive systems. An extended operating range of –40° to +85°C provides long life, trouble free service in demanding environments.

The Lexium ILT2V57 uses a NEMA 23 frame size high torque brushless step motor integrated with a microstepping driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of a simple GUI which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

The Lexium ILT2V57 is a compact, powerful and cost effective motion control solution that will reduce system cost, design and assembly time for a large range of brushless step motor applications.

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1.3 Product identification

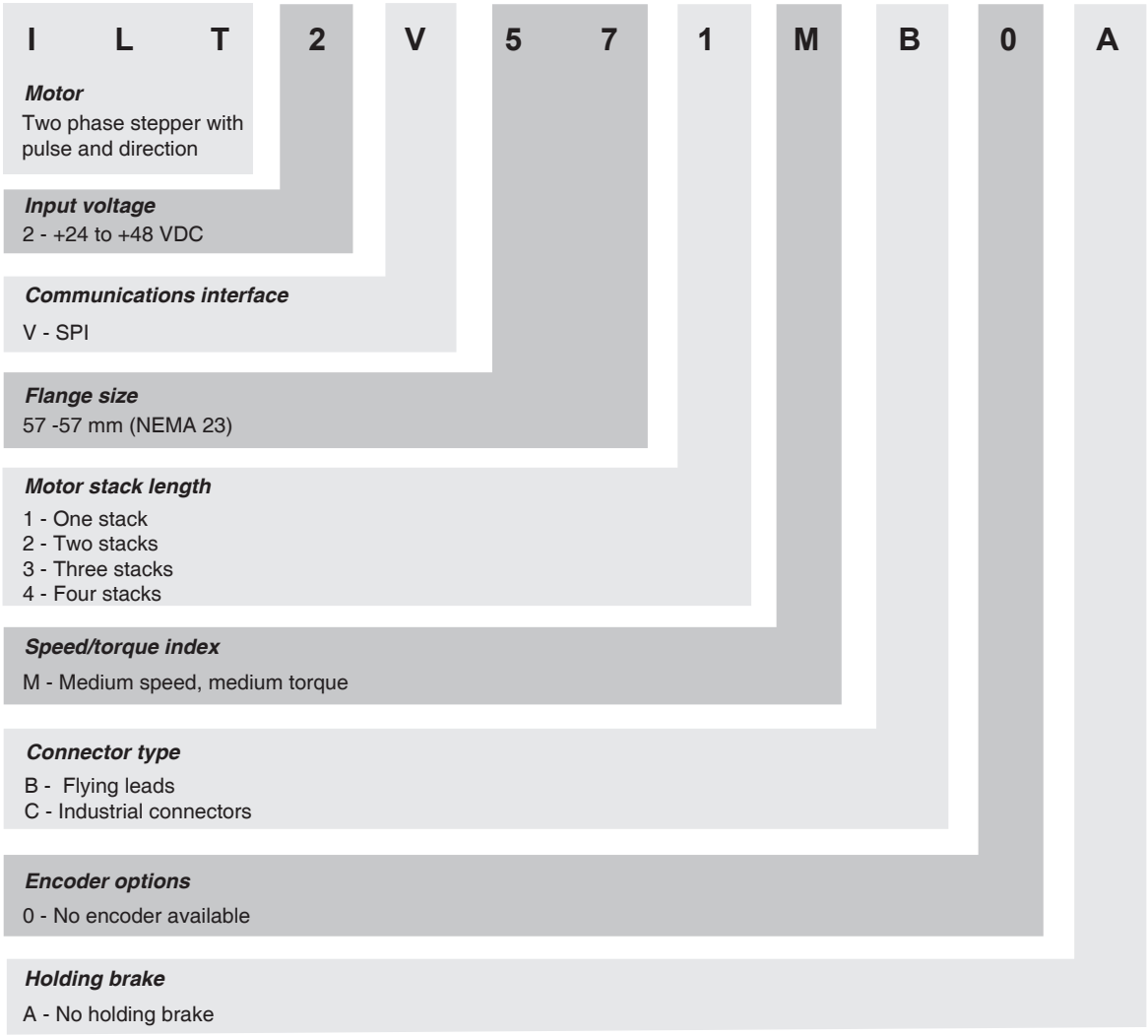

Figure 1.1 Standard product options

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1.4 Documentation reference

The following user's manuals are available for the Lexium ILT2V57:

- Product manual, describes the technical data, installation, configuration and programming of the product.

This documentation is also available for download from the Schneider Electric web site at http://www.schneider-electric.com

1.5 Product software

The Lexium ILT2V57 integrated motor and driver is configured using the Lexium CT-ILT Pulse-Direction commissioning tool. This free software may be downloaded from http://www.schneider-electric.com.

Installation and usages instructions are to be found in Part 1 of this document, Section 5.

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2 Specifications

2.1 Mechanical specifications

2.1.1 Lexium ILT2V57 mechanical specifications

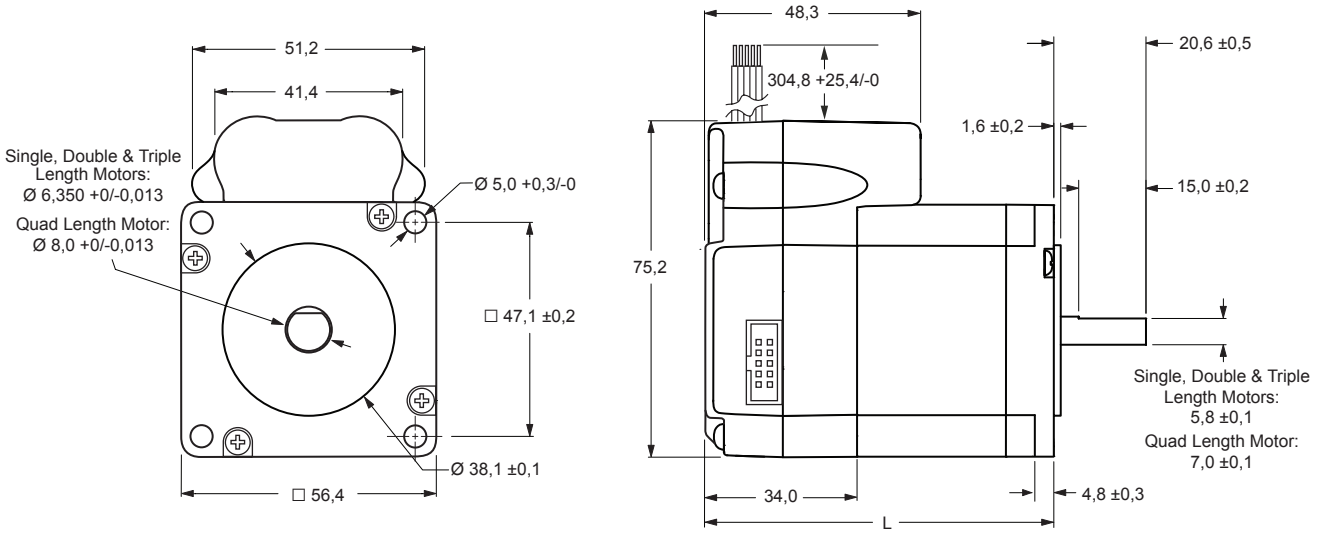

Figure 2.1 Lexium ILT2V57 Mechanical Specifications

2.1.2 Lexium ILT2V57-65 mechanical specifications

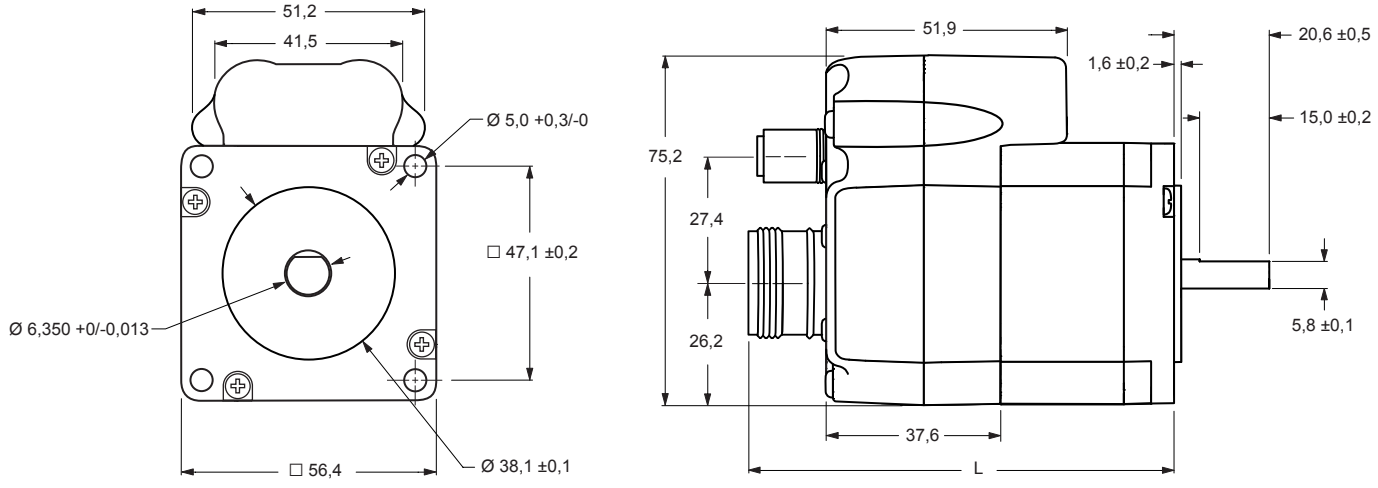

Figure 2.2 Lexium ILT2V57-65 Mechanical Specifications

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2.2 General specifications

2.2.1 Electrical specifications

	Condition	Min	Typ	Max	Unit
Input voltage range		+24	—	+48	VDC
Power supply current (max)	One, two and three stack motor			2.0	A
	Four stack motor			2.8	A

**per Lexium ILT2V57, Actual current depends on voltage and load.*

Table 2.1 Electrical specifications

2.2.2 Logic specifications

	Condition	Min	Typ	Max	Unit
Inputs					
Isolated input voltage range (sourcing or sinking)	Isolated inputs	+5	—	+24	VDC
Current	+5 VDC max	—	—	8.7	mA
Current	+24 VDC max	—	—	14.6	mA

Table 2.2 Logic input specifications

2.2.3 Communications specifications

Protocol	SPI

Table 2.3 Communications specifications

2.2.4 Thermal specifications

		Min	Typ	Max	Unit
Heat sink temperature	non-condensing humidity	-40	—	+85	ºC
Motor temperature	non-condensing humidity	-40	—	+100	ºC

Table 2.4 Thermal specifications

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2.2.5 Motion specifications

Number of microstep resolutions									20
Available microsteps per revolution									
200	400	800	1000	1600	2000	3200	5000	6400	10000
12800	20000	25000	25600	40000	50000	51200	36000[1]	21600[2]	25400[3]

1=0.01 deg/µstep 2=1 arc minute/µstep *3=0.001 mm/µstep
** 1" per revolution lead screw*

Digital filter range	50 ns to 12.9 µs (10 MHz to 38.8 kHz)
Clock types	step/direction, up/down, quadrature
Step frequency (max)	5 MHz
Step frequency minimum pulse width	100 ns

Table 2.5 Motion specifications

2.2.8 Motor specifications

Specification	Single length	Double length	Triple length	Quad length
Holding torque (Nm)	0.63	0.86	1.44	1.77
Detent torque (Nm)	0.027	0.039	0.069	0.010
Rotor inertia (kg-cm^2)	0.18	0.26	0.46	0.76
Weight motor and driver (g)	612.3	784.4	1111.3	1746.3

Table 2.6 Motor specifications

2.2.9 Torque-speed performance curves

One stack motor

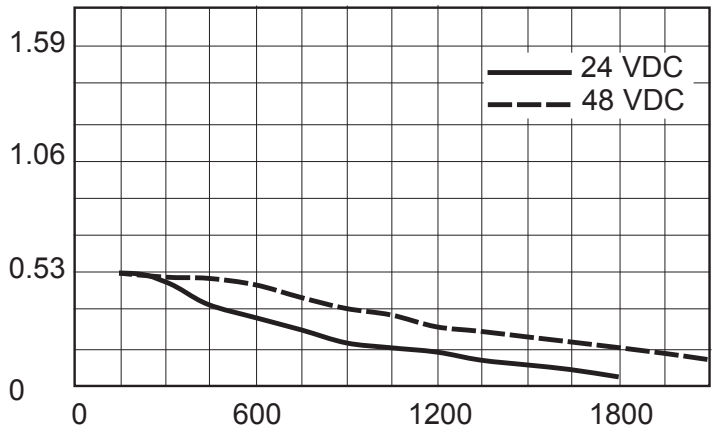

Figure 2.3 Single stack motor

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Two stack motor

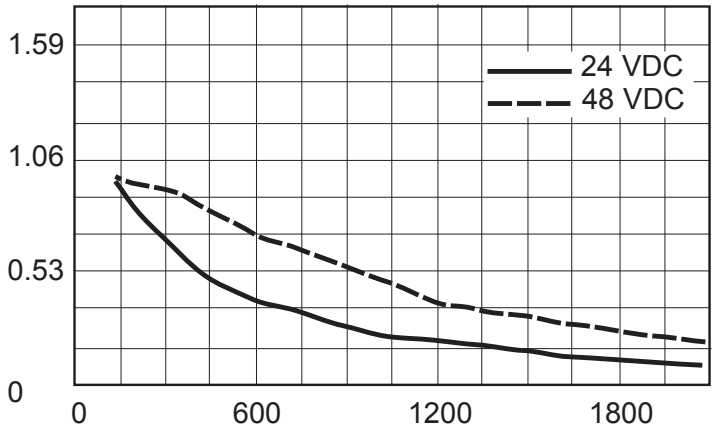

Figure 2.4 Double stack motor

Three stack motor

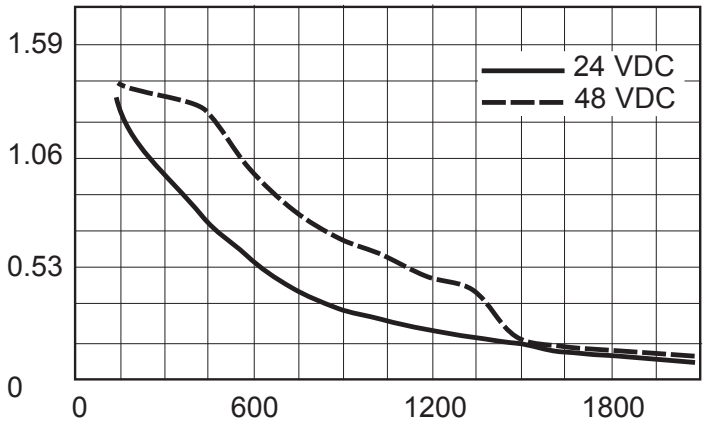

Figure 2.5 Triple stack motor

Four stack motor

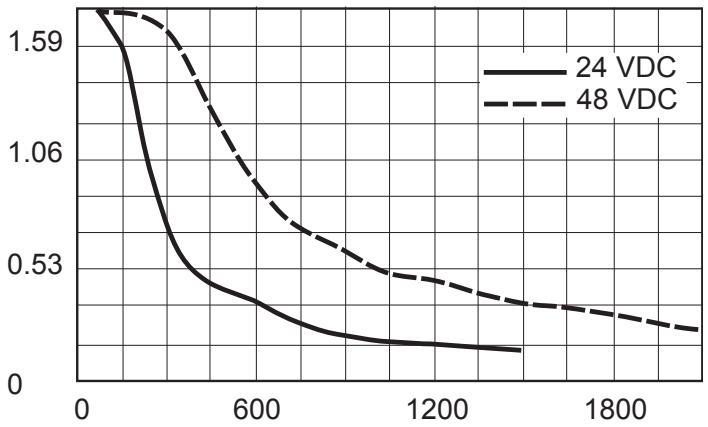

Figure 2.6 Four stack motor

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2.3 Connectivity specifications/pin assignments - Communications

2.3.1 SPI communications - connector P2

⚠ CAUTION

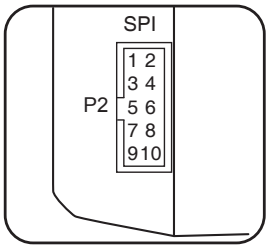
+5VDC OUTPUT

The +5 VDC output on connector P2 is for the express purpose of powering the isolated communications converter cables. Do not use to power external devices.

Failure to follow these instructions may result in damage to system components!

If using the model Lexium with the 12-pin locking wire crimp connector at connector position P1, the P2 connector is eliminated and SPI communications are bundled with power and logic.

10-pin IDC style connector



Connectivity Options
USB to SPI Converter:
VW3L1V300

Mating connector kit:
VW3L5C01N05 (ribbon cable not included)

Mfg P/N:
Shell
SAMTEC TSD-05-01-N

Ribbon cable
Tyco: 1-57051-9

Pin #	Function	Description
1	N/C	Not connected
2	N/C	Not connected
3	N/C	Not connected
4	CS	SPI chip select, selected when low.
5	GND	Communications ground
6	+5V	+ 5 VDC output. Used to power the communications converter ONLY! Not for general purpose use.
7	MOSI	SPI master out - slave in
8	CLK	SPI clock
9	N/C	Not connected
10	MISO	SPI master in - slave out

Table 2.7 P2 communications, 10-pin locking wire crimp

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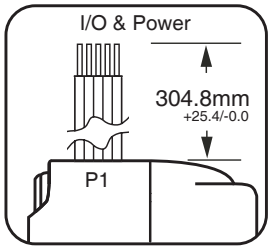
2.4 Connectivity specifications/pin assignments - power and logic

2.4.1 Power and logic

30.5 cm flying leads

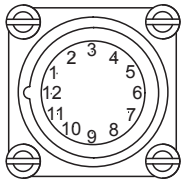


Wire Color	Function	Description
White	Opto	Optocoupler reference
Orange	Step clock	Step clock input
Blue	Direction	CW/CCW direction input
Brown	Enable	Output bridge enable input
Black	GND	Power ground
Red	+V	Motor Power (+12 to +48 VDC)

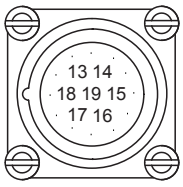
Table 2.8 Power and logic interface - 12” (308.8.mm) flying leads

2.4.2 Power, logic, communications — 19-pin M23 (industrial connector)

Outside: Pins 1 -12



Inside: Pins 13 -19



Connectivity Options
USB to SPI Converter:
VW3L1V301

Prototype development cable:
VW3L3D01R40

Pin #	Function	Description
1	Opto Reference	The signal applied to the optocoupler reference will determine the sinking/ or sourcing configuration of the inputs. Sinking: +5 to +24 VDC, Sourcing=ground.
2	Enable	Enable/disable input will enable or disable the driver output to the motor. In the disconnected state the driver outputs are enabled in either sinking or sourcing configuration. Can be configured as active high or active low.
3-5	N/C	Not connected
6	+V	+12 to +48 VDC motor power supply input.
7	N/C	Not connected
8	MOSI	Master-out/slave-in. Carries output data from the SPI Master to the Lexium ILT..
9	CS	SPI chip select. This signal is used to turn communications on multiple Lexium units on or off.
10	+5 VDC Output	Supply voltage for the VW3L1V301 converter cable ONLY!
11	GND	Communications ground.
12	Connector Shell	Connector shell,
13	Direction/ Channel B/ Clock Down	Direction input. The axis direction will be with respect to the state of the direction override parameter. It may also receive quadrature and clock up type inputs if so configured.
14 -15	N/C	Not connected
16	SPI Clock	The clock is driven by the SPI Master. The clock cycles once for each data bit.
17	MISO	Master-in/slave-out. Carries output data from the Lexium back to the SPI Master.
18	Step Clock/ Channel A/ Clock Up	Step clock input. The step clock input will receive the clock pulses which will step the motor 1 step for each pulse. It may also receive quadrature and clock up type inputs if so configured.
19	GND	Power ground

Table 2.9 P1 Power, logic, communications.

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2.5 Connectivity

Communication converters

Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single Lexium product via a PC's USB port. Length 3,6 m.

Mates to connector:

P2 10-pin IDC VW3L1V300

P1 19-pin M23 circular VW3L1V301

Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Length 4,0 m.

Mates to connector:

P1 19-pin M23 (straight) VW3L3D01R40

Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P2 10-pin IDC VW3L5C01N05

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3 Mounting and connection recommendations

⚠ CAUTION

LEAD RESTRAINT

Some Microstepping mounting configurations require that the Lexium move along the screw. Ensure that all cabling is properly restrained to provide strain relief on connection points..

Failure to follow these instructions can result in equipment damage.

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3.1 Mounting

Care must be observed when installing the mounting screws on ALL Lexium ILT2V57 versions.

The warning note and Figure below illustrate the maximum safe thread length and maximum torque for mounting all versions of the Lexium ILT2V57.

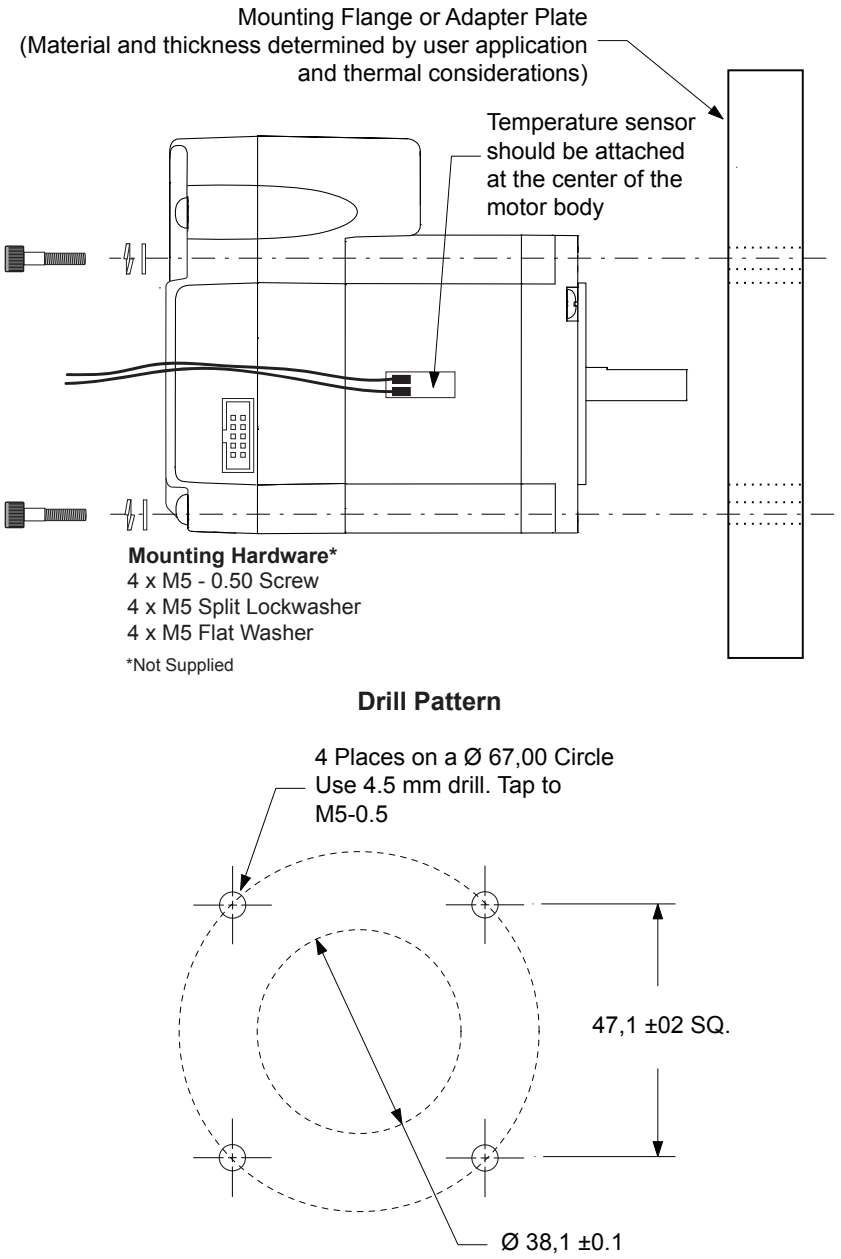

Figure 3.1 Lexium mounting and drill pattern

3.2 Layout and interface guidelines

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make your system unreliable.

Logic level cables must be shielded to reduce the chance of EMI induced noise. The shield needs to be grounded at the signal source to earth. The other end of the shield must not be tied to anything, but allowed to float. This allows the shield to act as a drain.

Power supply leads to the Lexium ILT2V57 need to be twisted. If more than one driver is to be connected to the same power supply, run separate power and ground leads from the supply to each driver.

3.2.1 Rules of wiring

- Power Supply and Motor wiring should be shielded twisted pairs, and run separately from signal-carrying wires.
- A minimum of one twist per inch is recommended.
- Motor wiring should be shielded twisted pairs using 20 gauge, or for distances of more than 2 m, 18 gauge or better.
- Power ground return should be as short as possible to established ground.
- Power supply wiring should be shielded twisted pairs of 18 gauge for less than 4 amps DC and 16 gauge for more than 4 amps DC.

3.2.2 Rules of shielding

- The shield must be tied to zero-signal reference potential. It is necessary that the signal be earthed or grounded, for the shield to become earthed or grounded. Earthing or grounding the shield is not effective if the signal is not earthed or grounded.
- Do not assume that Earth ground is a true Earth ground. Depending on the distance from the main power cabinet, it may be necessary to sink a ground rod at the critical location.
- The shield must be connected so that shield currents drain to signal-earth connections.
- The number of separate shields required in a system is equal to the number of independent signals being processed plus one for each power entrance.
- The shield should be tied to a single point to prevent ground loops.
- A second shield can be used over the primary shield; however, the second shield is tied to ground at both ends.

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3.3 Recommended wiring

The following wiring/cabling is recommended for use with the Lexium ILT2V57:

Logic Wiring..... 22 AWG

Wire Strip Length.....6.0 mm

Power and Ground .....See table 4.4 in Section 4 of this document

3.4 Securing power leads and logic leads

Some applications may require that the Lexium move with the axis motion. If this is a requirement of your application, the motor leads (flying, pluggable or threaded) must be properly anchored. This will prevent flexing and tugging which can cause damage at critical connection points within the Lexium.

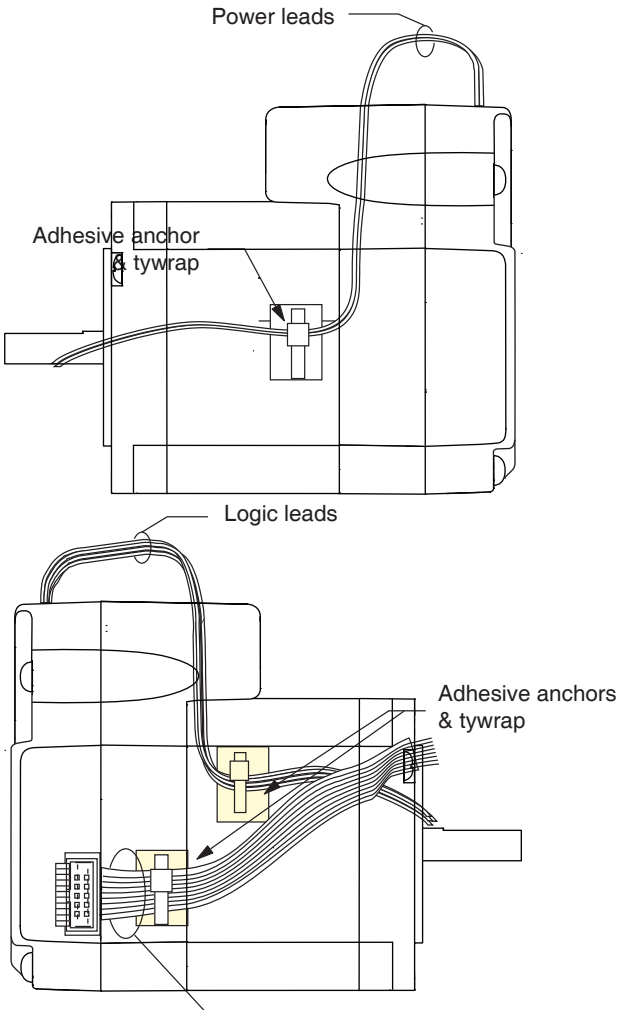

Figure 3.2 Securing leads

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4 Connection and interface

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

SWITCHING DC POWER/HOT PLUGGING

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

4.1 Interfacing communications

SPI communications may be interfaced using one of two possible connector options:

1. 10-pin IDC connector at P2
2. 19-pin M23 industrial connector at P1

If using the M23 industrial connector at P1, there will be no P2 connector. The P1 option will bundle power, logic and communications on a single connector.

For general SPI communications methods and practices please see Part 1, Section 5 of this document.

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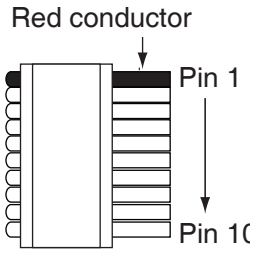
4.1.1 P2 - 10-pin IDC style connector



Pin #	Function	Description
1	N/C	Not connected
2	N/C	Not connected
3	N/C	Not connected
4	CS	SPI chip select, selected when low.
5	GND	Communications ground
6	+5V	+ 5 VDC output. Used to power the communications converter ONLY! Not for general purpose use.
7	MOSI	SPI master out - slave in
8	CLK	SPI clock
9	N/C	Not connected
10	MISO	SPI master in - slave out

Table 4.1 Communications connections, P2 - 10-pin IDC

Connectivity accessories

Mating connector kit VW3L5C01N05
(contains 5 connector shells, ribbon cable not included)

Communications converter cable (3,0 m)..... VW3L1V300

Manufacturer (SAMTEC) part numbers

Connector shell..... TCSD-05-01-N

Ribbon cable..... Tyco 1-57051-9

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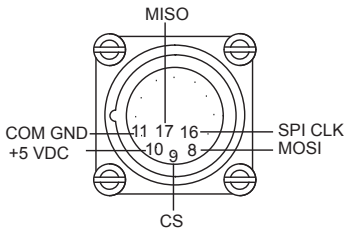
4.1.3 P1 - 19-pin M23 circular connector



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
7	+ 5 VDC output	—	White/gray
8	SPI clock	—	Yellow
9	Comm ground	—	Black
10	SPI MOSI	—	White/green
11	SPI chip select	—	White/yellow
12	SPI MISO	—	Pink

Table 4.3 SPI communications, 19-pin M23 circular

4.3 Interfacing DC power

See part 1 of this document, section 3, for recommended power cable configurations.

⚠ CAUTION

OVER VOLTAGE

The DC voltage range for the Lexium ILT2V57 is +24 to +48 VDC. Ensure that motor back EMF is factored into your power supply size calculations.

Allow 2.0 A (2.8 A - four stack motor) maximum power supply output current per Lexium ILT2V57 in the system. Actual power supply current will depend on voltage and load.

Failure to follow these instructions can result in equipment damage.

4.2.2 Recommended wire gauge

Cable Length: meters	3,0	7,6	15,2	22,9	30,5
Amps Peak	**Minimum AWG**				
1 Amp Peak	20	20	18	18	18
2 Amps Peak	20	18	16	14	14
3 Amps Peak	18	16	14	12	12

Table 4.4 Recommended power supply wire gauge

4.3.3 P1 — 30.5 cm flying leads interface

Wire Color	
Red	+24 to +48 VDC supply
Black	Power ground

Table 4.5 Power and ground connections, flying leads

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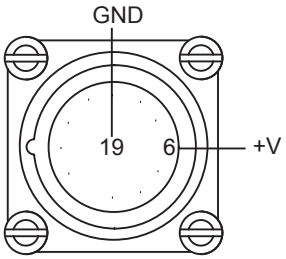
4.3.6 P1 — 19-pin M23 circular interface



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
6	+24 to +48 VDC supply	Blue	Blue
19	Power ground	Brown	Brown

Table 4.6 Power and ground connections, industrial connectors

4.4 Interfacing Logic)

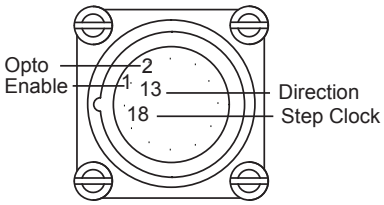
See part 1 of this document, section 6, for logic interface configurations and methods.

4.4.1 P1 — 30.5 cm flying leads interface

Wire Color	*Signal*
White	Opto reference
Orange	CW/CCW direction input
Blue	Step clock input
Brown	Enable input

Table 4.7 Universal input connections, flying leads

4.4.3 P1 — 19-pin M23 circular connector



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
1	Opto reference	Violet	Violet
18	Step clock input	Gray/brown	Gray/brown
2	Enable input	Red	Red
13	Direction input	Yellow/brown	Yellow/brown

Table 4.8 Logic connections - industrial connector

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4.5 USB to SPI communications converters

4.5.1 USB to 10-pin wire crimp — VW3L1V300

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters.

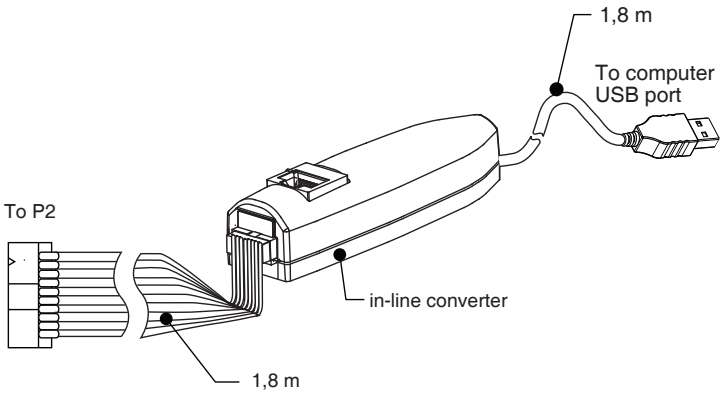
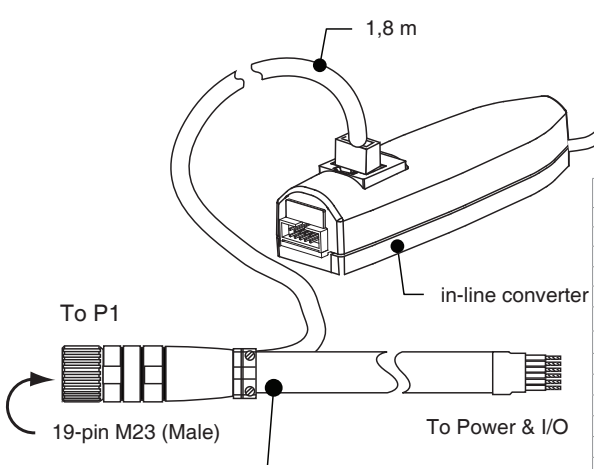


Figure 4.1 VW3L1V300 communications converter cable

4.5.3 USB to 19-pin M23 circular — VW3L1V301

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters. Power and logic signals are bundled into this connector via a second cable with signal accessibility via flying leads.



Wire Colors	Function
Violet	Opto Ref.
Red	Enable
Blue	+V*
Black	Comm GND
Green/Yellow	Shell
Yellow/Brown	Direction
Gray/Brown	Step Clock
Brown	Power GND*
Optional internal encoder	
Gray	Index +
Red/blue	Channel B +
Green	Channel B -
Gray/pink	Channel A -
Brown/green	Index -
White	Channel A +

Figure 4.2 VW3L1V301 communications converter

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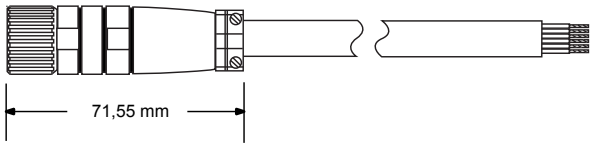
4.6 Prototype development cables

4.6.2 VW3L3D01R40 Power, logic and communications cable

The VW3L3D01R40 prototype development cordset is used to rapidly interface the Lexium to the users communications and logic interface. This 3.0 m cable consists of a 19-pin M23 circular connector to plug directly into the P1 connector with flying leads on the opposite end.



Wire Colors	Function
Violet	Opto Ref.
Red	Enable
Blue	+V
White/Green	MOSI
White/Yellow	CS
White/Gray	+5 VDC
Black	Comm GND
Green/Yellow	Shell
Yellow/Brown	Direction
Yellow	SPI Clock
Pink	MISO
Gray/Brown	Step Clock
Brown	Power ground

Figure 4.3 VW3L3D01R40 prototype development cordset

4.7 Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P2 10-pin IDC VW3L5C01N05

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Lexium ILT2V85

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1 Introduction

The LexiumILT2V85 high torque integrated motor and step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the Lexium ILT2V85 eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise.

1.1 Lexium ILT2V85 unit overview

The unsurpassed smoothness and performance delivered by the Lexium ILT2V85 are achieved through advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

The Lexium ILT2V85 accepts a broad input voltage range from +24 to +48 VDC, delivering enhanced performance and speed. Oversized input capacitors are used to minimize power line surges, reducing problems that can occur with long runs and multiple drive systems. An extended operating range of –40° to +75°C provides long life, trouble free service in demanding environments.

The Lexium ILT2V85 uses a NEMA 34 frame size high torque brushless step motor integrated with a microstepping driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of a simple software tool which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

The Lexium ILT2V85 is a compact, powerful and cost effective motion control solution that will reduce system cost, design and assembly time for a large range of brushless step motor applications.

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1.3 Product identification

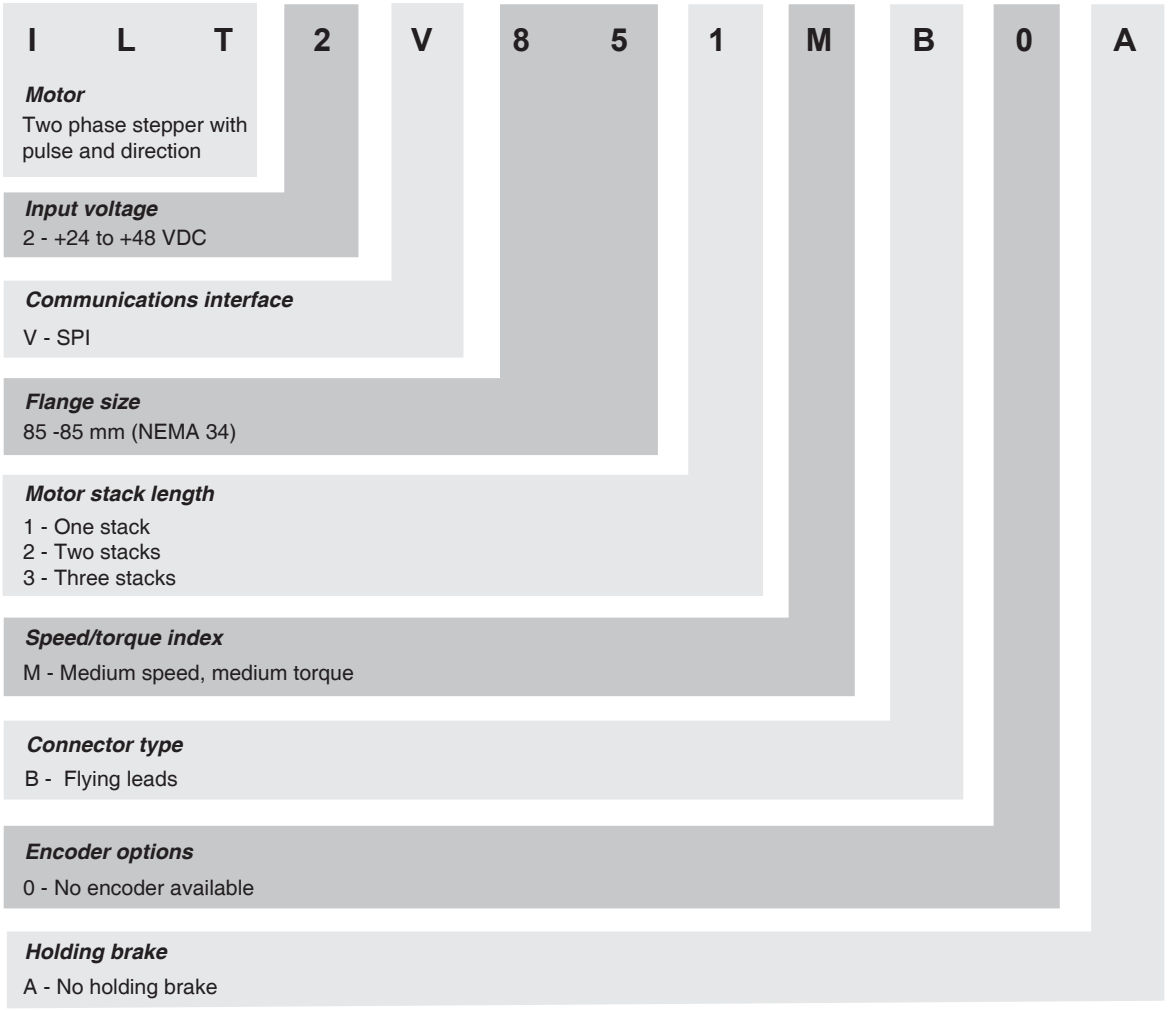

Figure 1.1 Standard product options

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1.4 Documentation reference

The following user's manuals are available for the Lexium ILT2V85:

- Product manual, describes the technical data, installation, configuration and programming of the product.

This documentation is also available for download from the Schneider Electric web site at http://www.schneider-electric.com

1.5 Product software

The Lexium ILT2V85 integrated motor and driver is configured using the Lexium CT-ILT Pulse-Direction commissioning tool. This free software may be downloaded from http://www.schneider-electric.com.

Installation and usages instructions are to be found in Part 1 of this document, Section 5.

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2 Specifications

2.1 Mechanical specifications

2.1.1 Lexium ILT2V85 mechanical specifications

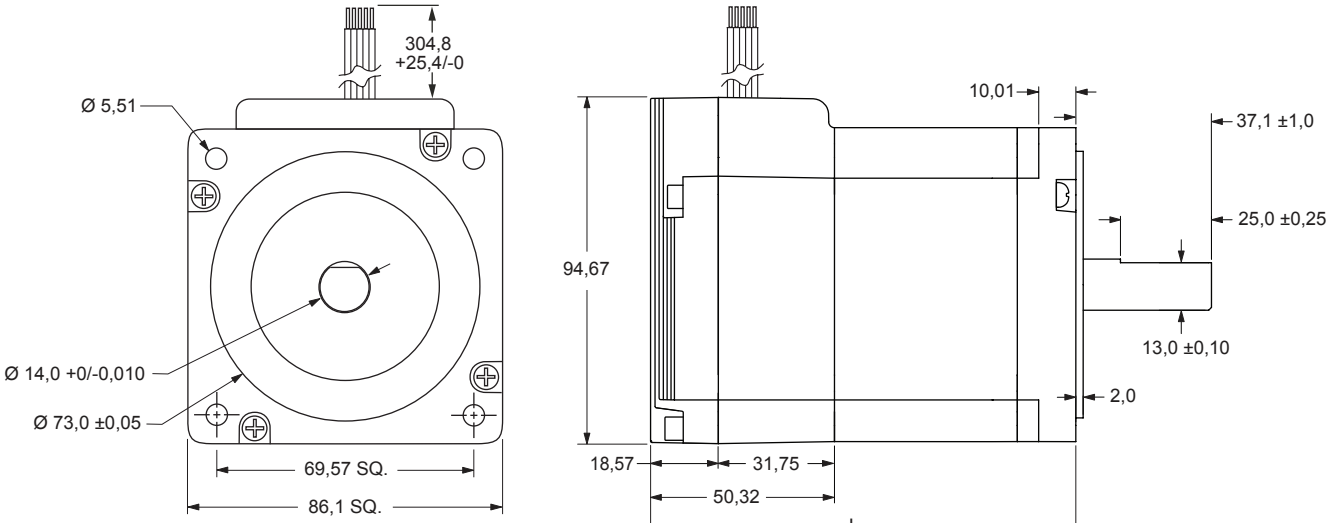

Figure 2.1 Lexium ILT2V85 Mechanical Specifications

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2.2 General specifications

2.2.1 Electrical specifications

	Condition	Min	Typ	Max	Unit
Input voltage range		+24	—	+48	VDC
Power supply current (max)				4.0	A

**per Lexium ILT2V85, Actual current depends on voltage and load.*

Table 2.1 Electrical specifications

2.2.2 Logic specifications

	Condition	Min	Typ	Max	Unit
Inputs					
Isolated input voltage range (sourcing or sinking)	Isolated inputs	+5	—	+24	VDC
Current	+5 VDC max	—	—	8.7	mA
Current	+24 VDC max	—	—	14.6	mA

Table 2.2 Logic input specifications

2.2.3 Communications specifications

Protocol	SPI

Table 2.3 Communications specifications

2.2.4 Thermal specifications

		Min	Typ	Max	Unit
Heat sink temperature	non-condensing humidity	-40	—	+85	ºC
Motor temperature	non-condensing humidity	-40	—	+100	ºC

Table 2.4 Thermal specifications

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2.2.5 Motion specifications

Number of microstep resolutions	20

Available microsteps per revolution

200	400	800	1000	1600	2000	3200	5000	6400	10000
12800	20000	25000	25600	40000	50000	51200	36000[1]	21600[2]	25400[3]

1=0.01 deg/µstep 2=1 arc minute/µstep *3=0.001 mm/µstep
** 1" per revolution lead screw*

Digital filter range	50 ns to 12.9 µs (10 MHz to 38.8 kHz)
Clock types	step/direction, up/down, quadrature
Step frequency (max)	5 MHz
Step frequency minimum pulse width	100 ns

Table 2.5 Motion specifications

2.2.8 Motor specifications

Specification	Single length	Double length	Triple length
Holding torque (Nm)	2.13	3.12	5.87
Detent torque (Nm)	0.077	0.010	0.140
Rotor inertia (kg-cm^2)	1.0	1.6	3.4
Weight motor and driver (kg)	1.90	2.5	4.0

Table 2.6 Motor specifications

2.2.9 Torque-speed performance curves

One stack motor

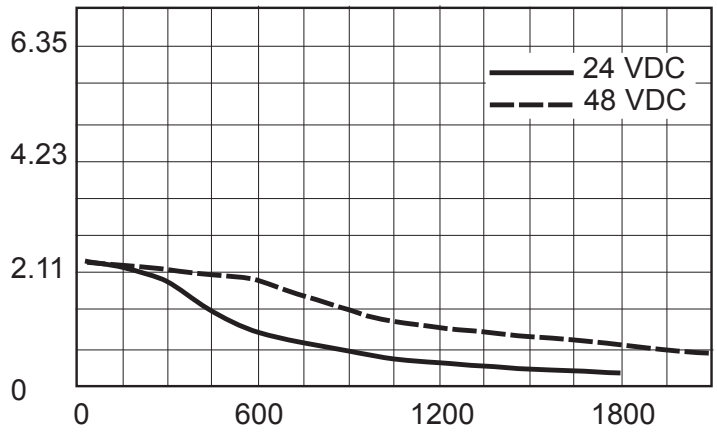

Figure 2.2 Single stack motor

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Two stack motor

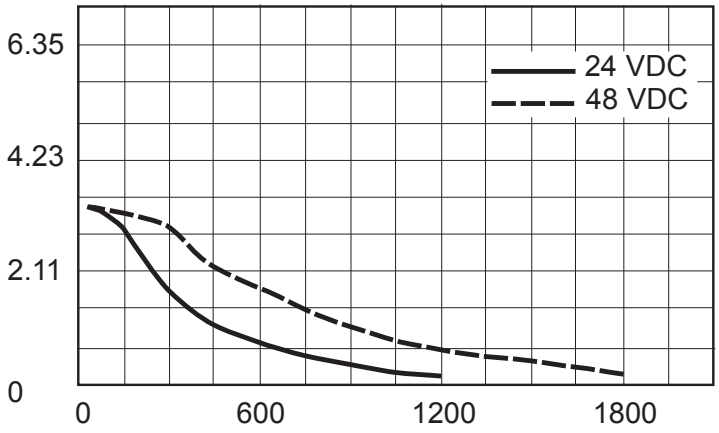

Figure 2.3 Double stack motor

Three stack motor

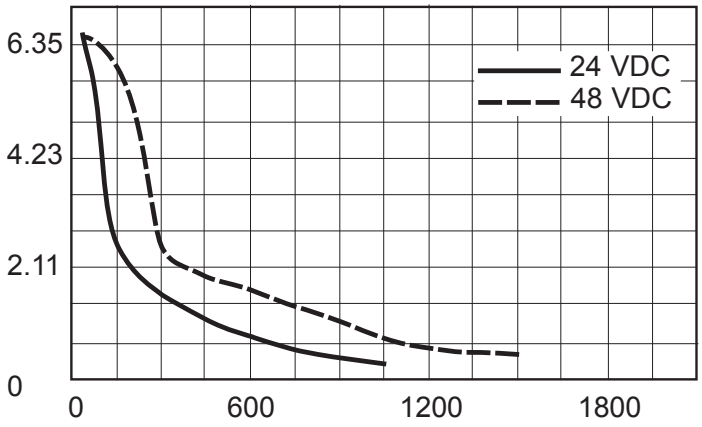

Figure 2.4 Triple stack motor

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2.3 Connectivity specifications/pin assignments - Communications

2.3.1 SPI communications - connector P2

⚠ CAUTION

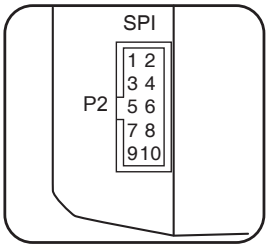
+5VDC OUTPUT

The +5 VDC output on connector P2 is for the express purpose of powering the isolated communications converter cables. Do not use to power external devices.

Failure to follow these instructions may result in damage to system components!

If using the model Lexium with the 12-pin locking wire crimp connector at connector position P1, the P2 connector is eliminated and SPI communications are bundled with power and logic.

10-pin IDC style connector



Connectivity Options
USB to SPI Converter:
VW3L1V300

Mating connector kit:
VW3L5C01N05 (ribbon cable not included)

Mfg P/N:
Shell
SAMTEC TSD-05-01-N

Ribbon cable
Tyco: 1-57051-9

Pin #	Function	Description
1	N/C	Not connected
2	N/C	Not connected
3	N/C	Not connected
4	CS	SPI chip select, selected when low.
5	GND	Communications ground
6	+5V	+ 5 VDC output. Used to power the communications converter ONLY! Not for general purpose use.
7	MOSI	SPI master out - slave in
8	CLK	SPI clock
9	N/C	Not connected
10	MISO	SPI master in - slave out

Table 2.7 P2 communications, 10-pin locking wire crimp

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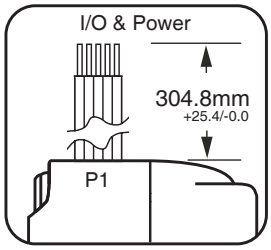
2.4 Connectivity specifications/pin assignments - power and logic

2.4.1 Power and logic

12” (304.8 mm) flying leads



Wire Color	Function	Description
White	Opto	Optocoupler reference
Orange	Step clock	Step clock input
Blue	Direction	CW/CCW direction input
Brown	Enable	Output bridge enable input
Black	GND	Power ground
Red	+V	Motor Power (+24 to +48 VDC)

Table 2.8 Power and logic interface -308.8.mm flying leads

2.5 Connectivity

Communication converters

Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single Lexium product via a PC’s USB port. Length 3.6m.

Mates to connector:

P2 10-pin IDC VW3L1V300

Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer’s crimp tool recommended.

Mates to connector:

P2 10-pin IDC VW3L5C01N05

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3 Mounting and connection recommendations

⚠ CAUTION

LEAD RESTRAINT

Some Microstepping mounting configurations require that the Lexium move along the screw. Ensure that all cabling is properly restrained to provide strain relief on connection points..

Failure to follow these instructions can result in equipment damage.

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3.1 Mounting

Care must be observed when installing the mounting screws on ALL Lexium ILT2V85 versions.

The warning note and Figure below illustrate the maximum safe thread length and maximum torque for mounting all versions of the Lexium ILT2V85.

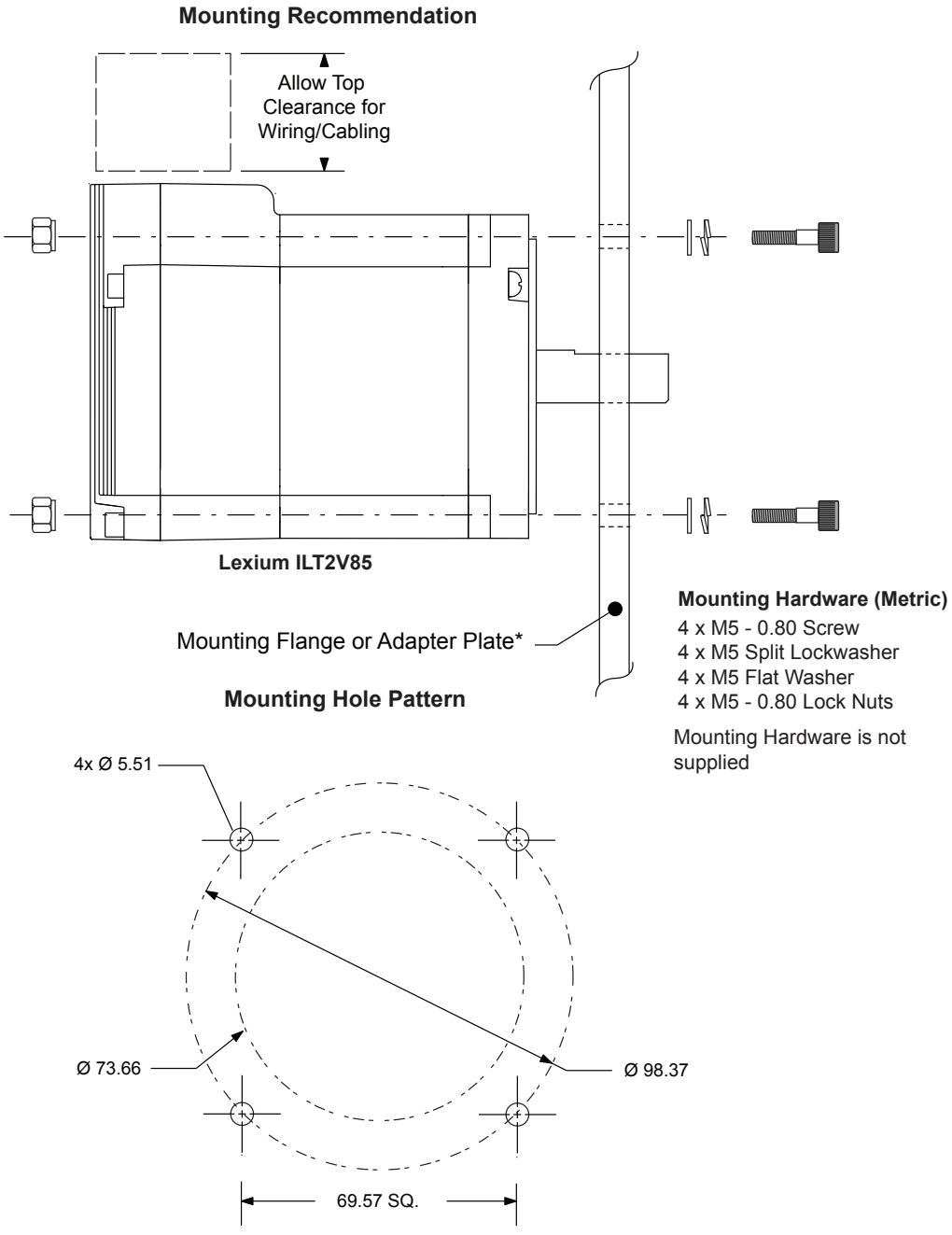

Figure 3.1 Lexium mounting and drill pattern

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3.2 Layout and interface guidelines

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make your system unreliable.

Logic level cables must be shielded to reduce the chance of EMI induced noise. The shield needs to be grounded at the signal source to earth. The other end of the shield must not be tied to anything, but allowed to float. This allows the shield to act as a drain.

Power supply leads to the Lexium ILT2V85 need to be twisted. If more than one driver is to be connected to the same power supply, run separate power and ground leads from the supply to each driver.

3.2.1 Rules of wiring

- Power Supply and Motor wiring should be shielded twisted pairs, and run separately from signal-carrying wires.
- A minimum of one twist per inch is recommended.
- Motor wiring should be shielded twisted pairs using 20 gauge, or for distances of more than 2 m, 18 gauge or better.
- Power ground return should be as short as possible to established ground.
- Power supply wiring should be shielded twisted pairs of 18 gauge for less than 4 amps DC and 16 gauge for more than 4 amps DC.

3.2.2 Rules of shielding

- The shield must be tied to zero-signal reference potential. It is necessary that the signal be earthed or grounded, for the shield to become earthed or grounded. Earthing or grounding the shield is not effective if the signal is not earthed or grounded.
- Do not assume that Earth ground is a true Earth ground. Depending on the distance from the main power cabinet, it may be necessary to sink a ground rod at the critical location.
- The shield must be connected so that shield currents drain to signal-earth connections.
- The number of separate shields required in a system is equal to the number of independent signals being processed plus one for each power entrance.
- The shield should be tied to a single point to prevent ground loops.
- A second shield can be used over the primary shield; however, the second shield is tied to ground at both ends.

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3.3 Recommended wiring

The following wiring/cabling is recommended for use with the Lexium ILT2V85:

Logic Wiring.....22 AWG

Wire Strip Length.....0.25” (6.0 mm)

Power and Ground .....See table 4.4 in Section 4 of this document

3.4 Securing power leads and logic leads

Some applications may require that the Lexium move with the axis motion. If this is a requirement of your application, the motor leads (flying, pluggable or threaded) must be properly anchored. This will prevent flexing and tugging which can cause damage at critical connection points within the Lexium.

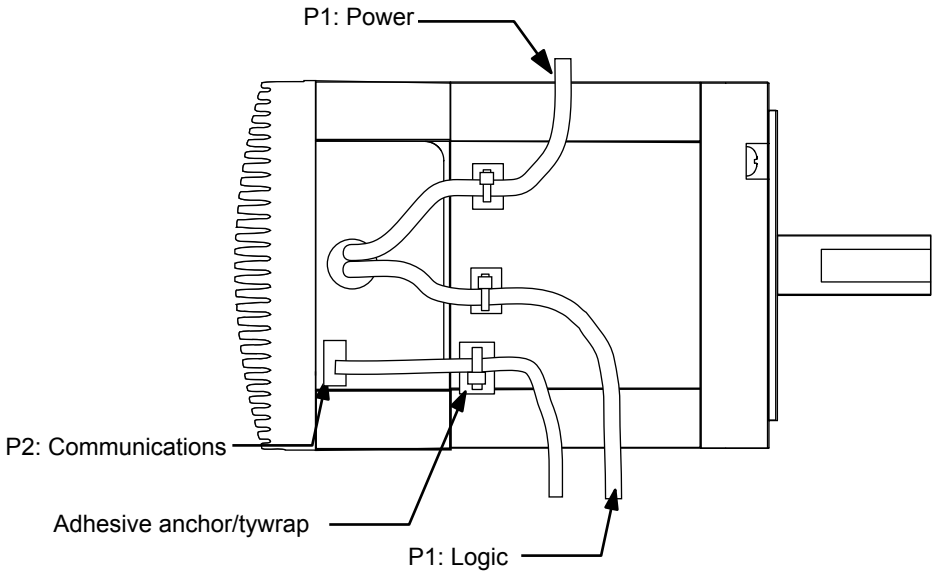

Figure 3.2 Securing leads

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4 Connection and interface

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

SWITCHING DC POWER/HOT PLUGGING

Do not connect or disconnect power, logic, or communications while the device is in a powered state.

Remove DC power by powering down at the AC side of the DC power supply.

Failure to follow these instructions can result in equipment damage.

4.1 Interfacing communications

SPI communications may be interfaced using one of two possible connector options:

1. 10-pin IDC connector at P2

For general SPI communications methods and practices please see Part 1, Section 5 of this document.

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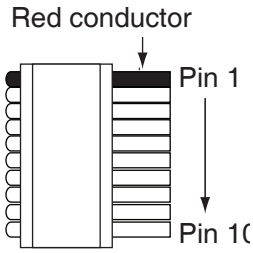
4.1.1 P2 - 10-pin IDC style connector



Pin #	Function	Description
1	N/C	Not connected
2	N/C	Not connected
3	N/C	Not connected
4	CS	SPI chip select, selected when low.
5	GND	Communications ground
6	+5V	+ 5 VDC output. Used to power the communications converter ONLY! Not for general purpose use.
7	MOSI	SPI master out - slave in
8	CLK	SPI clock
9	N/C	Not connected
10	MISO	SPI master in - slave out

Table 4.1 Communications connections, P2 - 10-pin IDC

Connectivity accessories

Mating connector kit VW3L5C01N05
(contains 5 connector shells, ribbon cable not included)

Communications converter cable 3.0 m VW3L1V300

Manufacturer (SAMTEC) part numbers

Connector shell..... TCSD-05-01-N

Ribbon cable..... Tyco 1-57051-9

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4.2 Interfacing DC power

See part 1 of this document, section 3, for recommended power cable configurations.

> **⚠ CAUTION**
>
> OVER VOLTAGE
>
> The DC voltage range for the Lexium ILT2V85 is +24 to +48 VDC. Ensure that motor back EMF is factored into your power supply size calculations.
>
> Allow 4.0 maximum power supply output current per Lexium ILT2V85 in the system. Actual power supply current will depend on voltage and load.
>
> **Failure to follow these instructions can result in equipment damage.**

4.2.2 Recommended wire gauge

Cable Length: meters	3,0	7,6	15,2	22,9	30,5
Amps Peak	**Minimum AWG**				
1 Amp Peak	20	20	18	18	18
2 Amps Peak	20	18	16	14	14
3 Amps Peak	18	16	14	12	12
4 Amps Peak	16	14	12	12	12

Table 4.2 Recommended power supply wire gauge

4.2.3 P1 — 30.5 cm flying leads interface

Wire Color	
Red	+24 to +48 VDC supply
Black	Power ground

Table 4.3 Power and ground connections, flying leads

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4.2 Interfacing Logic

See part 1 of this document, section 6, for logic interface configurations and methods.

4.2.1 P1 — 30.5 cm flying leads interface

Wire Color	*Signal*
White	Opto reference
Orange	CW/CCW direction input
Blue	Step clock input
Brown	Enable input

Table 4.4 Input connections, flying leads

4.4 USB to SPI communications converters

4.4.1 USB to 10-pin wire crimp — VW3L1V300

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters.

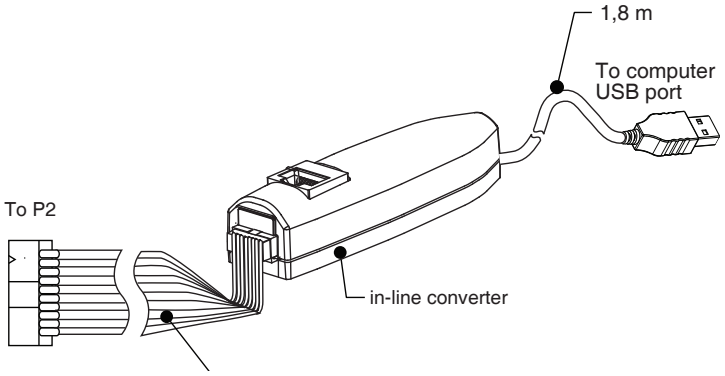

Figure 4.1 VW3L1V300 communications converter cable

4.5 Mating connector kits

Use to build your own cables. Kit contains 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

P2 10-pin IDC VW3L5C01N05

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Lexium ILT5V85

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1 Introduction

The Lexium ILT5V85 integrates high torque integrated motor, power suplly and a step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the Lexium ILT5V85 eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise.

1.1 Lexium ILT5V85 unit overview

The unsurpassed smoothness and performance delivered by the Lexium ILT5V85 are achieved through advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

The Lexium ILT5V85 accepts a 230 VAC input, delivering enhanced performance and speed. An extended operating range of –40° to +85°C provides long life, trouble free service in demanding environments.

The Lexium ILT5V85 uses a NEMA 34 frame size high torque brushless step motor integrated with a microstepping driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of a simple GUI which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

The Lexium ILT5V85 is a compact, powerful and cost effective motion control solution that will reduce system cost, design and assembly time for a large range of brushless step motor applications.

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1.3 Product identification

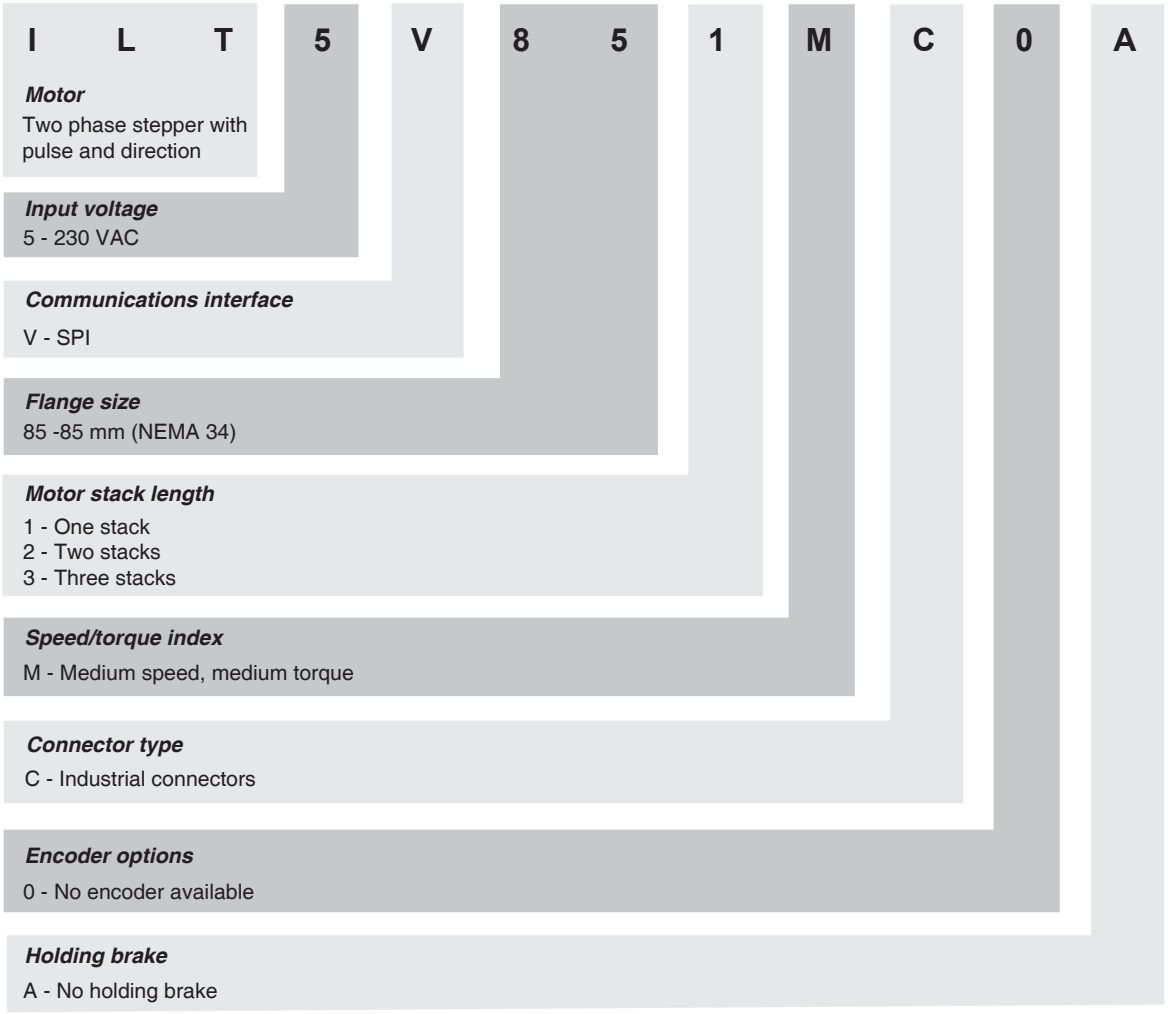

Figure 1.1 Standard product options

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1.4 Documentation reference

The following user's manuals are available for the Lexium ILT5V85:

- Product manual, describes the technical data, installation, configuration and programming of the product.

This documentation is also available for download from the Schneider Electric web site at http://www.schneider-electric.com

1.5 Product software

The Lexium ILT5V85 integrated motor and driver is configured using the Lexium CT-ILT Pulse-Direction commissioning tool. This free software may be downloaded from http://www.schneider-electric.com.

Installation and usages instructions are to be found in Part 1 of this document, Section 5.

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2 Specifications

2.1 Mechanical specifications

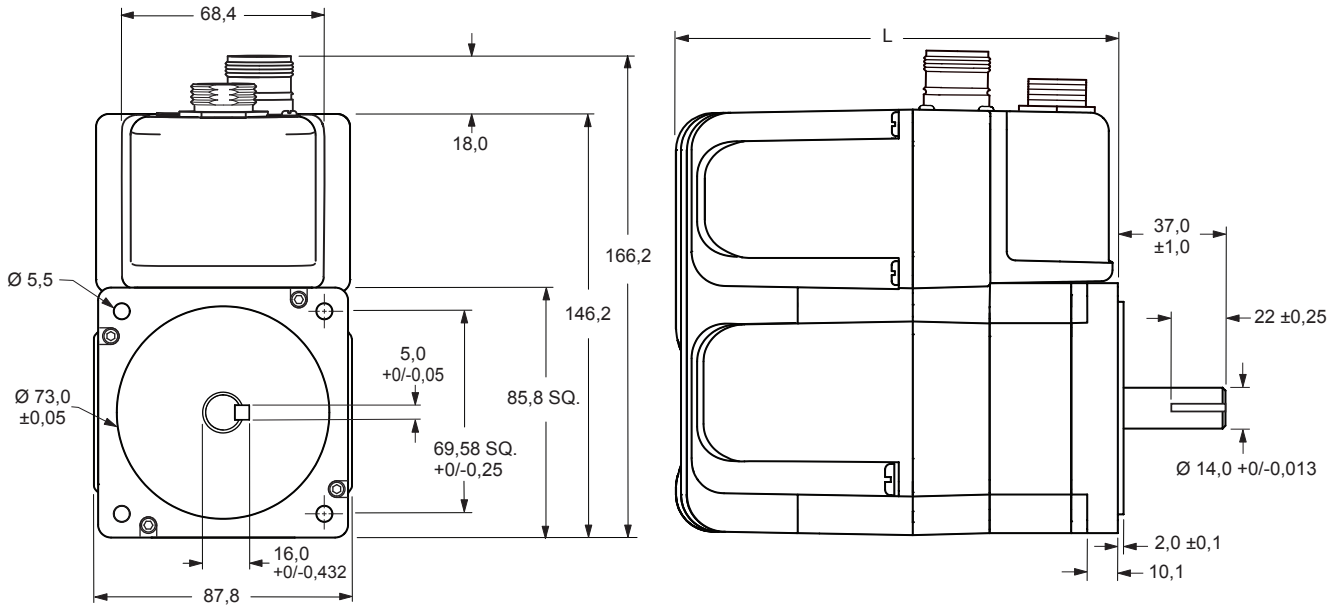

Figure 2.1 Lexium ILT5V85 Mechanical Specifications

2.2 General specifications

2.2.1 Electrical specifications

	Condition	Min	Typ	Max	Unit
Input voltage range		95		264	VAC

Table 2.1 Electrical specifications

2.2.2 Logic specifications

	Condition	Min	Typ	Max	Unit
Inputs					
Isolated input voltage range (sourcing or sinking)	Isolated inputs	+5	—	+24	VDC
Current	+5 VDC max	—	—	8.7	mA
Current	+24 VDC max	—	—	14.6	mA

Table 2.2 Logic input specifications

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2.2.3 Communications specifications

Protocol	SPI

Table 2.3 Communications specifications

2.2.4 Thermal specifications

		Min	Typ	Max	Unit
Heat sink temperature	non-condensing humidity	-40	—	+75	ºC
Motor temperature	non-condensing humidity	-40	—	+90	ºC

Table 2.4 Thermal specifications

2.2.5 Motion specifications

Number of microstep resolutions	20

Available microsteps per revolution

200	400	800	1000	1600	2000	3200	5000	6400	10000
12800	20000	25000	25600	40000	50000	51200	36000[1]	21600[2]	25400[3]

1=0.01 deg/µstep 2=1 arc minute/µstep *3=0.001 mm/µstep
** 1" per revolution lead screw*

Digital filter range	50 ns to 12.9 µs (10 MHz to 38.8 kHz)
Clock types	step/direction, up/down, quadrature
Step frequency (max)	5 MHz
Step frequency minimum pulse width	100 ns

Table 2.5 Motion specifications

2.2.6 Motor specifications

Specification	**Single length**	**Double length**	**Triple length**
Holding torque (Nm)	2.16	3.16	4.79
Detent torque (Nm)	0.077	0.100	0.140
Rotor inertia (kg-cm^2)	1.0	1.6	3.4
Weight motor and driver (kg)	2.9	3.5	5.0

Table 2.6 Motor specifications

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2.2.7 Torque-speed performance curves

One stack motor

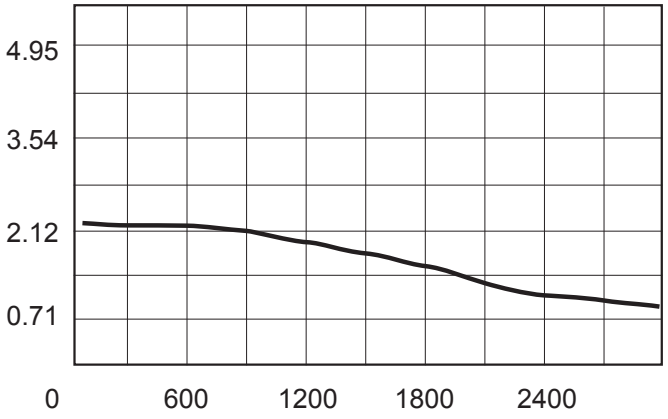

Figure 2.2 Single stack motor

Two stack motor

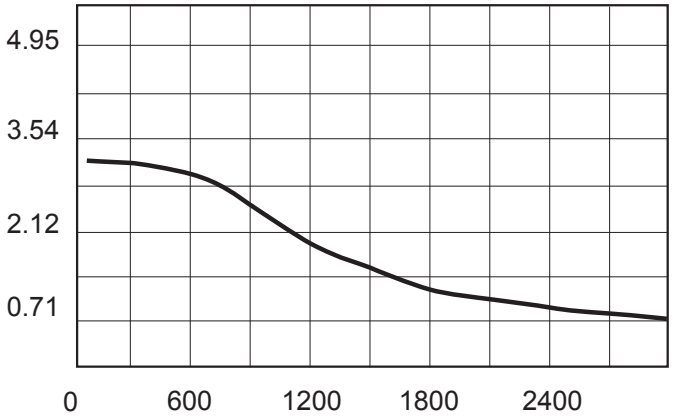

Figure 2.3 Double stack motor

Three stack motor

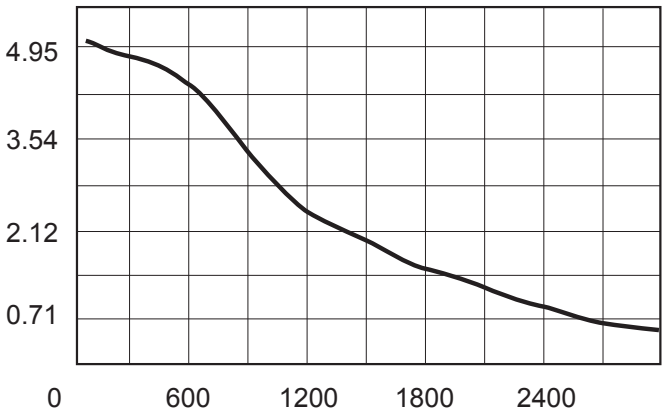

Figure 2.4 Triple stack motor

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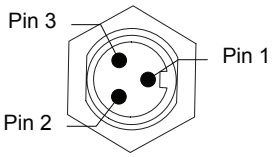
2.3 Connectivity specifications/pin assignments

2.3.1 P3 — AC power (3-pin Euro AC)



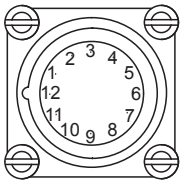
Pin #	Function	Description
1	Earth	Chassis (earth) ground
2	Line	AC line
3	Neutral	AC neutral

Connectivity Options
Prototype development cable:
VW3L3P01R40

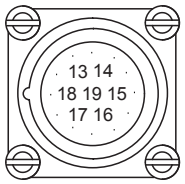
Table 2.8 P3 AC power - 3-pin Euro AC

2.3.2 logic, communications — 19-pin M23 (industrial connector)

Outside: Pins 1 -12



Inside: Pins 13 -19



Connectivity Options
USB to SPI Converter:
VW3L1V301

Prototype development cable:
VW3L3D01R40

Pin #	Function	Description
1	Opto Reference	The signal applied to the optocoupler reference will determine the sinking/ or sourcing configuration of the inputs. Sinking: +5 to +24 VDC, Sourcing=ground.
2	Enable	Enable/disable input will enable or disable the driver output to the motor. In the disconnected state the driver outputs are enabled in either sinking or sourcing configuration. Can be configured as active high or active low.
3-6	N/C	Not connected
7	N/C	Not connected
8	MOSI	Master-out/slave-in. Carries output data from the SPI Master to the Lexium ILT..
9	CS	SPI chip select. This signal is used to turn communications on multiple Lexium units on or off.
10	+5 VDC Output	Supply voltage for the VW3L1V301 converter cable ONLY!
11	GND	Communications ground.
12	Connector Shell	Connector shell,
13	Direction/ Channel B/ Clock Down	Direction input. The axis direction will be with respect to the state of the direction override parameter. It may also receive quadrature and clock up type inputs if so configured.
14 -15	N/C	Not connected
16	SPI Clock	The clock is driven by the SPI Master. The clock cycles once for each data bit.
17	MISO	Master-in/slave-out. Carries output data from the Lexium back to the SPI Master.
18	Step Clock/ Channel A/ Clock Up	Step clock input. The step clock input will receive the clock pulses which will step the motor 1 step for each pulse. It may also receive quadrature and clock up type inputs if so configured.
19	N/C	Not connected

Table 2.9 P1 Power, logic, communications.

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2.5 Connectivity

Communication converters

Electrically isolated, in-line converters pre-wired with mating connectors to conveniently set/program communication parameters for a single Lexium product via a PC's USB port. Length 3.6 m.

Mates to connector:

P1 19-pin M23 circular..... VW3L1V301

Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Length 3.6 m.

Mates to connector:

P1 19-pin M23 (straight)..... VW3L3D01R40

P3 Euro AC (straight) VW3L3P01R40

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3 Connection and interface

⚠ DANGER

EXPOSED SIGNALS

Hazardous voltage levels may be present if using an open frame power supply to power the product.

Failure to follow these instructions will result in death or serious injury.

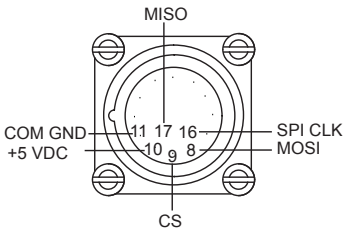
3.1 Interfacing communications

SPI communications may be interfaced using one of two possible connector options:

1. 10-pin IDC connector at P2

For general SPI communications methods and practices please see Part 1, Section 5 of this document.

3.1.1 P1 - 19-pin M23 circular connector



Pin #	*Signal*		*Cable wire colors*
			VW3L3D01R40
7	+ 5 VDC output	—	White/gray
8	SPI clock	—	Yellow
9	Comm ground	—	Black
10	SPI MOSI	—	White/green
11	SPI chip select	—	White/yellow
12	SPI MISO	—	Pink

Table 3.1 SPI communications, 19-pin M23 circular

A mating connector kit is not available for this connector. Shop for compatible connectors at:

- Lumberg
- Phoenix
- Turck
- Coninvers

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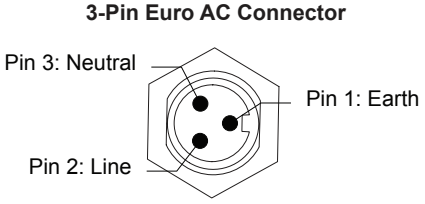
3.2 Interfacing AC power

3.2.1 P3 — 3-pin Euro AC



Pin number	Signal	European (IEC) color code
1	Earth	Yellow/Green
2	Line	Brown
3	Neutral	Blue

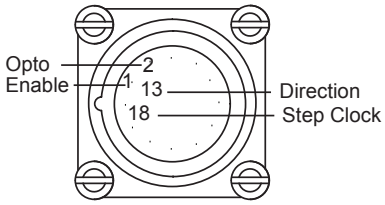
Table 3.2 AC standard wire colors

The single-end three conductor cordsets are used with the Lexium ILT58s. Measuring 4.0 m long, they are available in either straight or right angle termination. IEC color code, oil-resistant yellow PVC jacket, IP68 and NEMA 6P rated.

Straight Termination VW3L3P01R40

3.3 Interfacing logic

3.3.1 P1 — 19-pin M23 industrial connector



Pin #	*Signal*	*Cable wire colors*	
		VW3L1V301	VW3L3D01R40
1	Opto reference	Violet	Violet
18	Step clock input	Gray/brown	Gray/brown
2	Enable input	Red	Red
13	Direction input	Yellow/brown	Yellow/brown

Table 3.3 Logic connections

A mating connector kit is not available for this connector. Shop for compatible connectors at:

- Lumberg
- Phoenix
- Turck
- Coninvers

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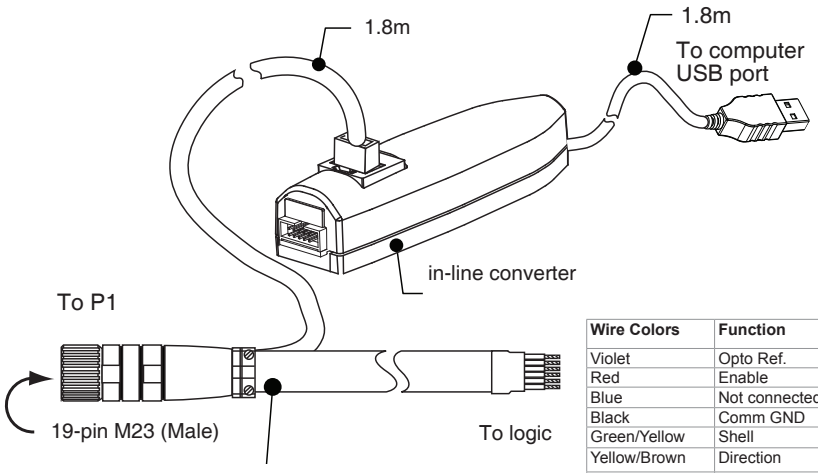
3.4 USB to SPI communications converters

3.4.1 VW3L1V301

Electrically isolated in-line USB to SPI converter pre-wired with mating connector to conveniently program and set configuration parameters. Logic signals are bundled into this connector via a second cable with signal accessibility via flying leads. Colorsa not specified are not connected.



Wire Colors	Function
Violet	Opto Ref.
Red	Enable
Blue	Not connected
Black	Comm GND
Green/Yellow	Shell
Yellow/Brown	Direction
Gray/Brown	Step Clock
Brown	Not connected

Figure 3.1 VW3L1V3011 communications converter

3.5 Prototype development cables

3.5.1 VW3L3P01R40 AC power cable

The single-end three conductor cordsets are used with the Lexium ILT5V85. Measuring 4.0 m long, they are available in either straight or right angle termination. IEC color code, oil-resistant yellow PVC jacket, IP68 and NEMA 6P rated.

Straight Termination VW3L3P01R40

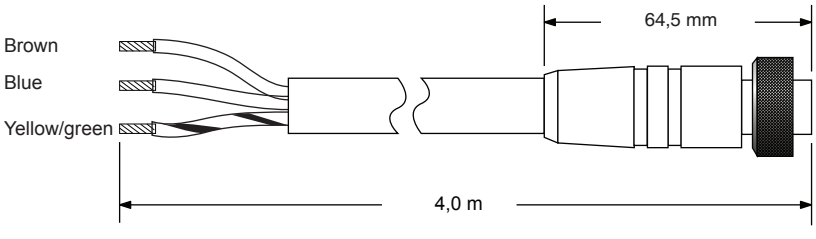


Figure 3.2 VW3L3P01R40

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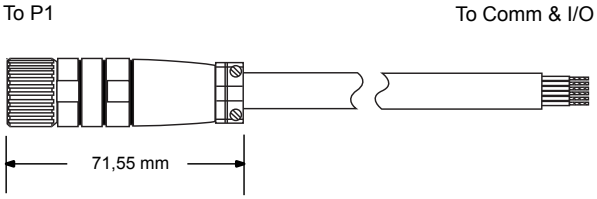
3.5.2 VW3L3D01R40 Logic and communications cable

The VW3L3D01R40 prototype development cordset is used to rapidly interface the Lexium to the users communications and logic interface. This 4.0 m cable consists of a 19-pin M23 circular connector to plug directly into the P1 connector with flying leads on the opposite end.



Wire Colors	Function
Violet	Opto Ref.
Red	Enable
Blue	Not connected
White/Green	MOSI
White/Yellow	CS
White/Gray	+5 VDC
Black	Comm GND
Green/Yellow	Shell
Yellow/Brown	Direction
Yellow	SPI Clock
Pink	MISO
Gray/Brown	Step Clock
Brown	Not connected

Figure 3.3 VW3L3D01R40 prototype development cordset

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