# High Speed Link Bus

Distributed Real-time I/O Control System

High Speed Link (HSL) is an innovative distributed I/O technology based on the RS-485 open standard (supporting full/half-duplex, multi-drop serial transmission and designed for automation applications. **An HSL system is a real-time I/O control system based on master/slave network architecture. Every slave module occupies 1-2 indexes. The HSL master card scans all slave indexes by polling. Scanning every slave index is time deterministic (the fastest response time is 15.1 μs).** The network employs CRC-12 for error correction and standard CAT-5 cables for point-to-point connections between major components.

ADLINK's HSL master board has up to two HSL network ports and can connect up to 126 slave indexes. The slave modules can also be placed near monitored or controlled I/O points, reducing wiring and minimizing potential noise and signal loss.
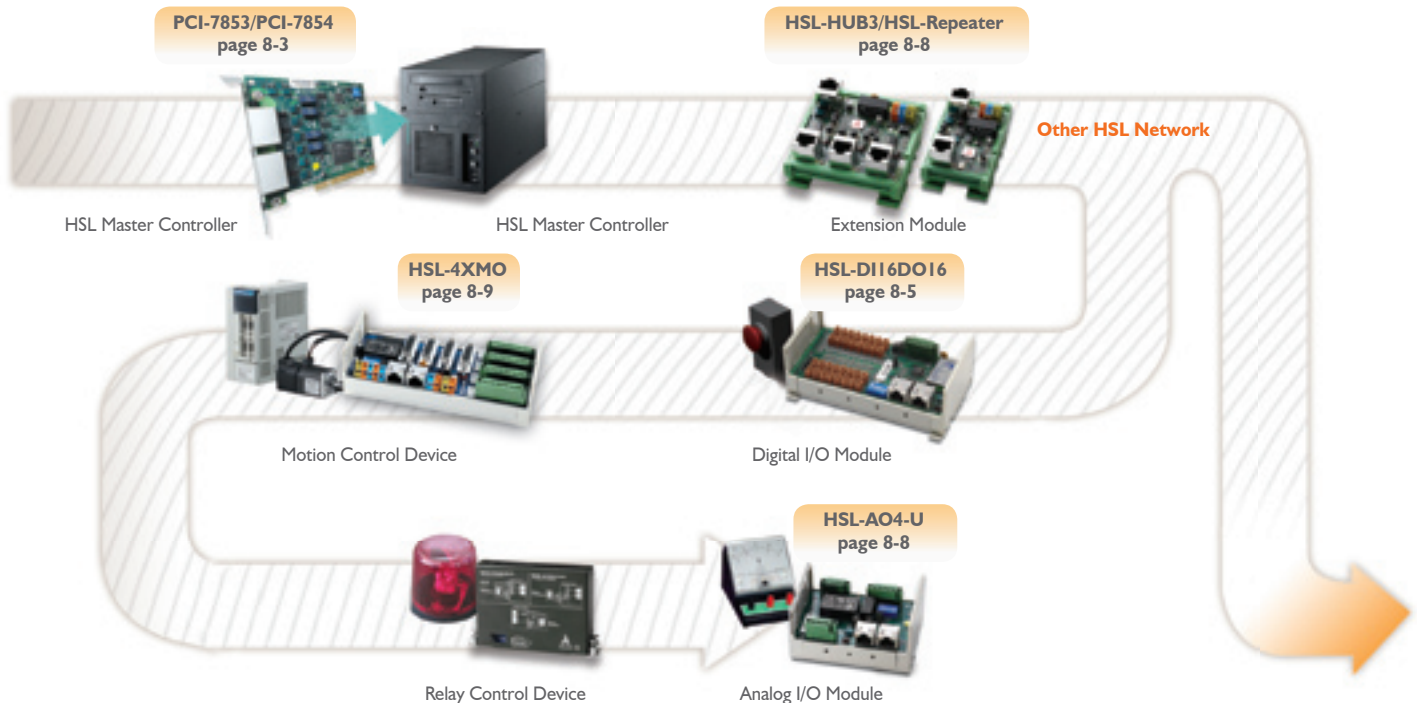
As a result, HSL systems provide excellent solutions where a single board can control over 2,000 I/O points or over 60 axes for motion control despite IPC resource limitations. Deterministic scanning time also provides an easy and stable way to build up the entire system.

Master Site	Remote Site

HSL Master Controller — Slave Module 1
Slave Module 2
Slave Module N
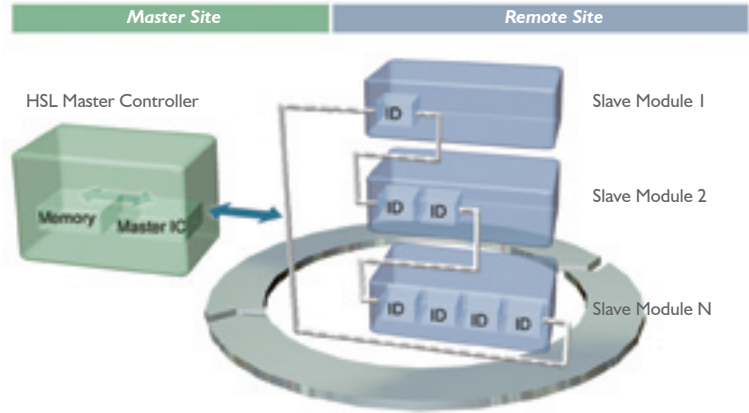
Note: ID is the slave index

An HSL solution is the best choice for optimal high-speed and easily distributed I/O systems, such as precision machine tools, industrial equipment (including instrumentation and control systems), automation equipment, research facilities, building administration systems, and conveyor systems.

System Architecture

PCI-7853/PCI-7854
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HSL-HUB3/HSL-Repeater
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Other HSL Network

HSL Master Controller   HSL Master Controller   Extension Module

HSL-4XMO
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HSL-DI16DO16
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Motion Control Device   Digital I/O Module

HSL-AO4-U
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Relay Control Device   Analog I/O Module

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Accessories

Less work
load

Less cost

Less wiring

Shared
technology

Why HSL?

High Speed Deterministic Response Time

The time an HSL network requires to scan every slave index is deterministic (average scan time is 15.1 μs for 32 DI/O channels). The overall scanning cycle time is exactly proportional to the number of slave indices.

Easy Wiring, Reduced Wiring

The connection among the HSL master and all slave I/O modules merely requires commercial CAT-5 cables, which is absolutely the easiest and most cost effective wiring solution.

Vast Number of I/O Points

Up to 12 HSL master boards (PCI-7853/PCI-7854) can be installed in one IPC for a total of 24,192 digital I/O channels.

Easy and Flexible I/O Expansion

All that is needed is to select the I/O type and module number by simple serial wiring and connect an shielding Ethernet cable with RJ-45 connectors between modules. Transmission lengths can reach up to 2400 m from host PC by using a HSL extension module.
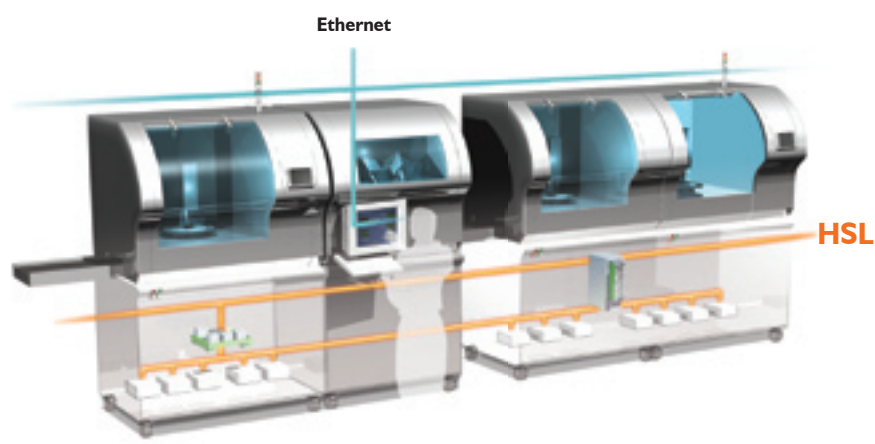
Remote Motion Control is Available

HSL also offers motion control solutions combined with distributed I/O. HSL motion control solutions can be connected with servo motors, stepping motors, and linear motors. PTP (Point-to-Point), ensures that linear interpolated and circular interpolated moves are efficiency executed with our point table management and motion scripts.

System without HSL

System with ADLINK HSL

HSL-HUB   Slave Module

Before   After
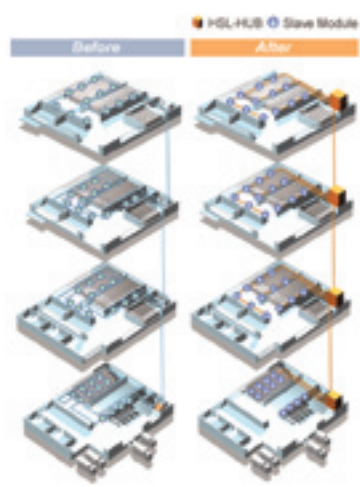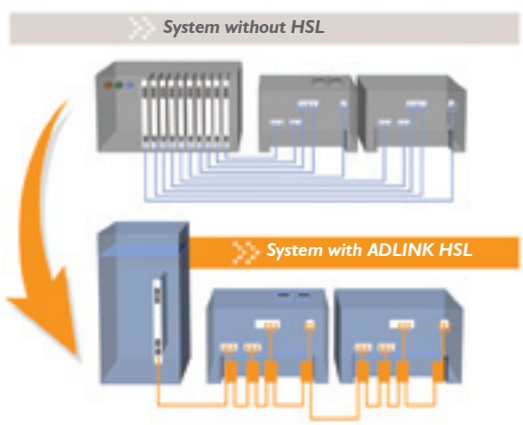
HSL Applications

Semiconductor Manufacturing Equipment

Ethernet

HSL

Applications

- Laser Cutting Machines
- Light-on Testing Machines
- Large FPD Conveyor Machines
- Multi-chamber Sputter Machines
- COG (Chip-on Glass) Machines
- Semiconductor Manufacturing Equipment
- Injection Molding Equipment
- Printing Equipment

PCI-7853 / PCI-7854

High Speed Link Master Controllers

ADLINK GREEN RoHS Compliant

Block Diagram
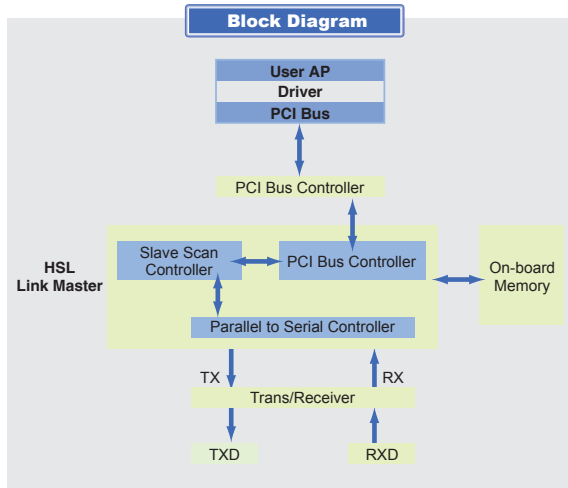
Features

- Single/Dual independent network operation
- Programmable timer interrupt
- RJ-45 phone jack for easy installation
- Software selectable transmission speed and mode
- Supports HSL-HUB3 and HSL-Repeater
- Timer interrupt
- DI data transmission interrupt

Supported Serial Devices

- Windows® Vista (32-bit)/XP/2000 libraries
- Linux Driver for Redhat kernel 2.4.x
- MotionCreatorPro 2™
- HSL LinkMaster Utility
- RTX

DI Interrupt Function

- HSL system DI interrupt
- Any channel of every ID can be set interrupt

DI interrupt
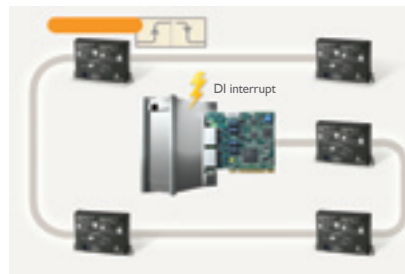
Ordering Information

- **PCI-7853**
  Single HSL master controller with two separate connectors

- **PCI-7854**
  Dual HSL master controller with four separate connectors

Specifications

Model Name	PCI-7853	PCI-7854
Max. Slave Index Support	63	126
Transmission Speed	3/6/12 Mbps (software control)	3/6/12 Mbps (software control)
Transmission Mode	Half/duplex mode (software control)	Half/duplex mode (software control)
Max. Distance	300 M at 12 Mbps	300 M at 12 Mbps
Connection Interface	RJ-45 x 2	RJ-45 x 4
LED Diagnostic	√	√
Storage Consumption	+5 V @ 500 MA	+5 V @ 500 MA
Operating Temperature	0˚C to +70˚C	0˚C to +70˚C
Storage Temperature	-20˚C to +80˚C	-20˚C to +80˚C
Dimensions	122 mm x 107 mm (L x W)	122 mm x 107 mm (L x W)

Selection Guide

High Speed Link Slave Modules

1 Software & Utilities

2 DAQ

3 PXI

4 Modular Instruments

5 GPIB & Bus Expansion

6 PAC

7 Motion

8 Real-time Distributed I/O

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HSL U Series

ADLINK provides three types of connectors for I/O module with the most recent being the HSL U series of compact and horizontally-placed slave modules which is more compact size, is easier-to-wire, and is more cost effective advantages. ADLINK's offering includes digital I/O, analog I/O, and motion control modules to meet a variety of system and application requirements.

	Digital I/O Modules			
	HSL-DI16DO16-UJ	HSL-DI32-US	HSL-DO32-UD	
Model Name	HSL-DI16DO16-UJ/-US/-UD	HSL-DI32-UJ/-US/-UD	HSL-DO32-UJ/-US/-UD	HSL-DI16-UL
Input Channel	16 isolated DI	32 isolated DI	-	16 isolated DI
Output Channel	16 isolated DO	-	32 isolated DO	-
ID Consumption	1	2	2	1
Transmission Speed	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps
Terminal Board	not used	not used	not used	not used
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* There are three types of connectors to choose for different applications. UJ models are suitable for single I/O channel wiring. US models are suitable for bundle wiring with a lock. UD models are suitable for screw type wiring.

	Analog I/O Module	Motion Control Module	Extension Modules		
Model Name	HSL-AO4-U	HSL-4XMO	HSL-HUB3	HSL-Repeater	HSL-Terminator
Controllable Axes	-	4	-	-	-
Input Channel	-	-	1 isolated DO	1 isolated DO	1
Output Channel	4	-	3	1	-
ID Consumption	2	2	-	-	-
Transmission Speed	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps
Transmission Mode	-	Full/half duplex	Full/half duplex	Full/half duplex	Full/half duplex
Terminal Board	not used	not used	-	-	-
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HSL M (Metal Cover) Series / HSL DB (Daughter Board) Series

	HSL-DI16DO16-M / HSL-DI16DO16-DB	HSL-DI32-M / HSL-DI32-DB	HSL-DO32-M / HSL-DO32-DB	HSL-R8DI16-M	HSL-AI16AO2-M
Model Name					
Input Channel	16 isolated DI	32 isolated DI	-	16 isolated DI	16 analog input
Output Channel	16 isolated DO	-	32 isolated DO	8 relay output	2 analog output
ID Consumption	1	2	2	1	2
Transmission Speed	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps	3/6/12 Mbps
Mating Terminal Boards	M Series: HSL-TB-32-MD, HSL-TB-32-M-DIN DB Series: HSL-TB-32-U-DIN, HSL-TB64	M Series: HSL-TB-32-MD, HSL-TB-32-M-DIN DB Series: HSL-TB-32-U-DIN, HSL-TB64	M Series: HSL-TB-32-MD, HSL-TB-32-M-DIN DB Series: HSL-TB-32-U-DIN, HSL-TB64	HSL-TB32-M-DIN	HSL-TB32-M-DIN
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HSL-DI16DO16-UJ/-US/-UD
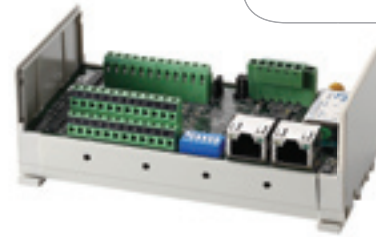
16-CH Discrete Input-16-CH Discrete Output Modules

HSL-DI16DO16-UJ-NN   HSL-DI16DO16-US-NN   HSL-DI16DO16-UD-NN

Features

- **Support 16 DI channels and 16 DO channels**
- **Transmission speeds: 3/6/12 Mbps**
- **RJ-45 phone jack for easy installation**
- **Compact and single board design to meet space limitation and cost-effective requirement**
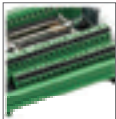- **Offer three connection options:**

UJ Type
- Suitable for single I/O channel wiring.
- Each connector offers three pins: power, signal, and ground.

US Type
- Suitable for bundle wiring with lock.
- Flat cables can be used to connect to each sensor or actuator.

UD Type
- Suitable for screw type wiring.
- Each wire to sensors or actuators can be fixed by the screw terminal.

Software Support

- **Windows® Platform**

  Windows® Vista (32-bit)/XP/2000 libraries

- **HSL LinkMaster Utility**

  The HSL LinkMaster utility is used to scan and test slave devices.

Applications

- **Industrial control and Process systems**
- **CIM (Computer Integrated Manufacturing) systems**
- **Security control systems**
- **Remote control systems**

Specifications

Slave ID Consumption	1
Transmission Mode	Full/Half duplex
Transmission Speed	3/6/12 Mbps selectable, 6 Mbps is the default setting
Input Impedance	4.7 KΩ
Input Current	±10 mA (max), ±12 mA (peak), NPN sinking type
Input Voltage	+24 V
Operation Temperature	0˚C to +60˚C
Photo Couple Isolation Voltage	2500 V_{RMS}
LED Indicator	Power, Input/Output status and Link
Dimension	138 x 52.7 x 71.8 mm (W x H x D)
Power Requirement	+24 V_{DC} (±10%)

Ordering Information

- **HSL-DI16DO16-UJ-NN**
  16-CH discrete input and 16-CH discrete output module with UJ type connector, NPN type

- **HSL-DI16DO16-US-NN**
  16-CH discrete input and 16-CH discrete output module with US type connector, NPN type

- **HSL-DI16DO16-UD-NN**
  16-CH discrete input and 16-CH discrete output module with UD type connector, NPN type

- **PCI-7853**
  Single HSL master controller with two separate connectors

- **PCI-7854**
  Dual HSL master controller with four separate connectors

HSL-DI32-UJ/-US/-UD

32-CH Discrete Input Modules with U Profile

HSL-DI32-UJ-N   HSL-DI32-US-N   HSL-DI32-UD-N

Features

- **Support 32 DI channels**
- **Transmission speeds: 3/6/12 Mbps**
- **RJ-45 phone jack for easy installation**
- **Compact and single board design to meet space limitation and cost-effective requirement**

Ordering Information

- **HSL-DI32-UJ-N**
  32-CH discrete input with UJ type connector, NPN type
- **HSL-DI32-US-N**
  32-CH discrete input with US type connector, NPN type
- **HSL-DI32-UD-N**
  32-CH discrete input with UD type connector, NPN type

Specifications

Slave ID Consumption	2
Transmission Mode	Full/Half duplex
Transmission Speed	3/6/12 Mbps selectable, 6 Mbps is default setting
Input Impedance	4.7 KΩ
Input Current	±10 mA (max), ±12 mA (peak), NPN sinking type
Input Voltage	+24 V
Operation Temperature	0°C to +60°C
Photo Couple Isolation Voltage	2500 V_{RMS}
LED Indicator	Power, Input/Output status and Link
Dimension	138 x 52.7 x 71.8 mm (W x H x D)
Power Requirement	+24 V_{DC} (±10%)

Software Support

- **Windows® Platform**
  Windows® Vista (32-bit)/XP/2000 libraries

- **HSL LinkMaster Utility**
  The HSL LinkMaster utility is used to scan and test slave devices

HSL-DO32-UJ/-US/-UD

32-CH Discrete Output Modules with U Profile

HSL-DO32-UJ-N   HSL-DO32-US-N   HSL-DO32-UD-N

Features

- **Support 32 DO channels**
- **Transmission speeds: 3/6/12 Mbps**
- **RJ-45 phone jack for easy installation**
- **Compact and single board design to meet space limitation and cost-effective requirement**

Ordering Information

- **HSL-DO32-UJ-N**
  32-CH discrete input with UJ type connector, NPN type
- **HSL-DO32-US-N**
  32-CH discrete input with US type connector, NPN type
- **HSL-DO32-UD-N**
  32-CH discrete input with UD type connector, NPN type

Specifications

Slave ID Consumption	2
Transmission Mode	Full/Half duplex
Transmission Speed	3/6/12 Mbps selectable, 6 Mbps is default setting
Input Voltage	+24 V
Output Switching Capacity	Per single channel 90mA (max.), NPN sinking type
Operation Temperature	0°C to +60°C
Photo Couple Isolation Voltage	2500 V_{RMS}
LED Indicator	Power, Input/Output status and Link
Dimension	138 x 52.7 x 71.8 mm (W x H x D)
Power Requirement	+24 V_{DC} (±10%)

Software Support

- **Windows® Platform**
  Windows® Vista (32-bit)/XP/2000 libraries

- **HSL LinkMaster Utility**
  The HSL LinkMaster utility is used to scan and test slave devices

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HSL-DI16-UL

16-CH Discrete Input Module with Stretcher Function

ADLINK **GREEN** RoHS Compliant

Specifications

Slave ID Consumption	1
Transmission Mode	Full/Half duplex
Transmission Speed	3/6/12 Mbps selectable, 6 Mbps is default setting
Input Current	10 mA (max.), NPN sinking
Input Voltage	5 V, 12 V, and 24 V
Operation Temperature	0˚C to +60˚C
Photo Couple Isolation Voltage	2500 V$_{RMS}$
LED Indicator	Power, Input status and Link
Dimension	138 x 52.7 x 71.8 mm (W x H x D)
Power Requirement	+24 V$_{DC}$ (±10%)

Features

- **Support 16 DI channels**
- **Build in pulse stretcher function**
- **Suitable for single I/O channel wiring (3-pin)**
- **User stretch duration definable from 0 ms to 100 ms**
- **User can define active high or active low**
- **Input voltage can be selectable to cater for 5 V, 12 V, and 24 V**
- **Transmission speeds: 3/6/12 Mbps**
- **RJ-45 phone jack for easy installation**
- **Compact and single board design to meet space limitation and cost-effective requirement**

Software Support

- **Windows® Platform**

  Windows® Vista (32-bit)/XP/2000 libraries

- **HSL LinkMaster Utility**

  The HSL LinkMaster utility is used to scan and test slave devices.

Ordering Information

- **HSL-DI16-UL**
  16-CH discrete input with stretcher function

Pulse Stretch Options

Case 1. Input pulse duration < setting duration: stretch duration = setting time.
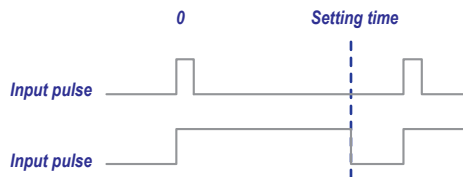
Case 2. Input pulse duration > setting duration: stretch duration = input pulse duration
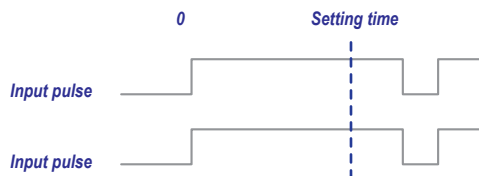
Case 3. Input pulse duration < setting duration, but extra pulses occurs in this period: Stretch active based on first pulse.
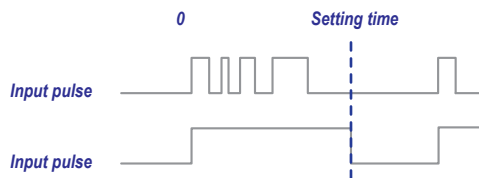
Case 4. Input pulse duration < setting duration, but extra pulse occurs at the end of setting time: Stretch will extend the duration until extra pulse ends.
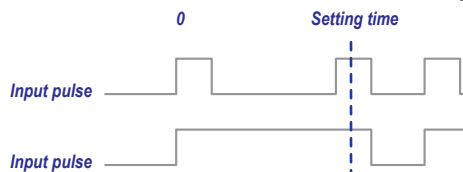
HSL-AO4-U

4-CH Analog Output Module

Features

- **4-CH analog output**
- **Output voltage range selection ±12 V**
- **16-bit resolution**
- **Isolation voltage: 2500 Vrms**
- **Easy programming by software**
- **Easy installation and wiring**

Specifications

|	
Slave ID Consumption	2
Transmission Mode	Full/Half duplex
Transmission Speed	3/6/12 Mbps selectable, 6 Mbps is default setting
Analog Output Channel	4
Circuit Type	Single-ended
D/A Resolution	16-bit
Output Range	± 12 V
D/A Settling Time	10 μs (max.)
D/A Offset Error	0.5 mV (max.)
LED Indicator	Power and Link
Power Requirement	+24 Vdc (±10%)

Software Support

- **Windows® Platform**

  Windows® Vista (32-bit)/XP/2000 libraries

- **HSL LinkMaster Utility**

  The HSL LinkMaster utility is used to scan and test slave devices.

# HSL-HUB3 / HSL-Repeater / HSL-Terminator

High Speed Link Extension Modules

HSL-HUB3   HSL-Repeater   HSL-Terminator

Features

- **Linking style: Master to HUB, HUB to HUB, HUB to Slave**
- **Support T bracing connection and star connection (subsystem concept)**
- **One input port with 3 output segment ports**
- **Jumper selectable transmission speeds: 3/6/12 Mbps**
- **Full and half duplex transmission mode are jumper selectable**
- **RJ-45 phone jack for easy installation**
- **24 Vdc input**

General Introduction

The HSL-HUB3 is an HSL subsystem which can offer one to three port transformation in automation applications. Unlike the traditional daisy chain configurations, the HSL-HUB3 provides more flexible connections (tree configurations) while building up the application.

The HSL-Repeater is the HSL subsystem which can extend the connection distance in automation application, especially in factory automations. One HSL bus can connect up to seven repeater modules and wire lengths up to 2.4 KM at a 3 Mbps transmission rate. In other words, all 2016 points can be monitored within 4 ms via the HSL bus up to 2.4 KM in length to provide fast, time-deterministic, and robust configurations over traditional RS-485 devices.

The HSL-Terminator can be used for stable communication. The HSL-Terminator provides an adjustable resistor to allow the impedance of the wiring of the HSL system or Motionnet system to be adjusted to ensure the quality of the transmission.

The extension possibility of HSL system by using HSL-HUB3/HSL-Repeater

| Without HSL-Repeater | 300 m |
| With HSL-Repeater | X8 | 2400 m |
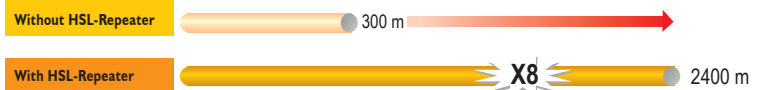
	Without Repeater	Repeater X 1	Repeater X 2	Repeater X 5	Repeater X 7
12 Mbps	100 m	200 m	300 m	600 m	800 m
6 Mbps	200 m	400 m	600 m	1200 m	1600 m
3 Mbps	300 m	600 m	900 m	1800 m	2400 m

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HSL-4XMO-CG-N/-P, HSL-4XMO-CD-N/-P

4-axis Pulse Train Motion Control Modules

HSL-4XMO-CD

HSL-4XMO-CG

General Features

- HSL communication protocol
- Transmission speed selectable: 3/6/12 Mbps
- Support for half/full duplex mode
- On-board DSP
- 4-axis pulse train Output channels
- Up to 60 axes on a single HSL Network
- Motion point table management
- Motion script download (G-Code-Like Language)

Notes:
1. HSL-4XMO-CG-N/-P provides general-purpose interface for connection. Steppers, linear motors, and other pulse train amplifiers can be easily connected.
2. HSL-4XMO-CD-N/-P provides D-sub interface for connection. Servo motors with a transfer cable can be easily connected.

Motion Control Features

- Pulse train frequency up to 6.55 MHz
- Point-to-point motion
- 13 home return modes
- 4 axes high-speed position counter latches
- Dedicated motion I/O: EL, ORG, INP, RDY, SVON, ERC, and ALM
- Pulse output options: OUT/DIR, CW/CCW, AB phase
- 2 to 4 axes linear interpolation
- 2 axes circular interpolation
- Multi-axis continuous interpolation
- Position/Speed change on-the-fly
- 13 home return modes and auto home search
- Hardware position compare and trigger
- High speed position latch function
- Programmable acceleration and deceleration time
- Trapezoidal and S-curve velocity profiles
- 28-bit up/down counter for incremental encoder
- Hardware backlash compensator
- Software limit function
- Easy interface to any stepping motors, AC or DC servo, linear or rotary motors
- All digital inputs and outputs are 2500 V$_{RMS}$ isolated
- Point table management up to 2000 sets

General Introduction

4-axis Pulse Train Control Modules

ADLINK HSL-4XMO-CG-N and HSL-4XMO-CD-N are 4-axis pulse train motion control modules based on the HSL bus. The HSL bus provides a cost-effective distribution solution which reduces wiring and saves space compared to traditional PCI boards. One HSL bus can support up to 60 axes pulse train motion controllers. The HSL-4XMO series also offers point table management which can reduce move points in the module and provide movement without consuming CPU resources.

Velocity and Position Override

The HSL-4XMO provides powerful position and speed changing function while axis is moving. After motion begins, target of speed or position can be changed on-the-fly at the user's discretion.

Linear & Circular Interpolation

In multi-axis operation, the HSL-4XMO provides linear interpolation by any 2, any 3, or even all 4 axes. Any 2 axes can also perform circular interpolation.

Continuous Contouring

The pre-register architecture of HSL-4XMO offers the feature to build the continuous interpolation function, where the second motion may follow previous motion instantly without latency. Thus perfect velocity continuity can be established.

Hardware Position Compare and Trigger Output

The HSL-4XMO provides position compare and trigger functions. The CMP channel will output a trigger pulse when encoder counter reaches the compared value preset by the user. Comparison is done by hardware and virtually no CPU the resource is needed.

Automatic Backlash Compensation

Whenever direction change occurs, the HSL-4XMO outputs backlash corrective pulses before sending commands. During interpolation mode, this function will be ineffective.

13 Home Return Modes

To fit into various mechanical design and operating restrictions, the HSL-4XMO provides 13 home moving modes for users to choose from.

Specifications

Slave ID Consumption	4	
Number of Controllable Axes	4	
Maximum Number of HSL-4XMO in Single HSL Network	15 (60 axes)	
Position Range	Pulse output is programmable to be OUT/DIR or CW/CCW	
	28-bit up/down counter for encoder feedback signal	
	-134,217,728 to +134,217,727 pulses (28-bit)	
General-purpose Input Type	NPN/ PNP jumper selectable	
General-purpose Input Voltage	ON: 6.5 V to 24 V	
	OFF: 0 to 3 V	
General-purpose Output	N for NPN sinking type output	
	P for PNP sourcing type output	
General-purpose Output Current	±90 mA (max.)	
Power Supply	22 V$_{DC}$ to 26 V$_{DC}$	
Power Consumption	8 W	
CE Certification	√	

HSL-DI16DO16-DB-NN/-NP/-PN/-PP

16-CH Discrete Input 16-CH Discrete Output Daughter Board Modules

Specifications

Slave ID Consumption	1
Interface	NN: for NPN sinking type sensor input or dry contact and NPN sinking type output
	NP: for NPN sinking type sensor input or dry contact and PNP sourcing type output
	PN: for PNP sourcing type sensor input or wet contact and NPN sinking type output
	PP: for PNP sourcing type sensor input or wet contact and PNP sourcing type output
Photo Couple Isolation Voltage	2500 V$_{RMS}$
Input Impedance	4.7 KΩ
Input Current	±10 mA (max.) , ±12.5 mA (peak)
Input Voltage	±40 V (max.)
Output Switching Capacity	Single channel 400 mA; Full channels 50 mA at 100% duty cycle
LED Indicator	Power, Link and I/O status
Power Supply	22 V to 26 V$_{DC}$
Operating Temperature	0˚C to +60˚C
Storage Temperature	-20˚ to +80˚C
Power Consumption	1.8 W

HSL-DI32-DB-N/-P

32-CH Discrete Input Daughter Board Modules

Specifications

Slave ID Consumption	2 consecutive from odd
Interface	N: for NPN sinking type sensor input or dry contact
	P: for PNP sourcing type sensor input or wet contact
Photo Couple Isolation Voltage	2500 V$_{RMS}$
LED Indicator	Power, Link and Input status
Power Supply	22 V to 26 V$_{DC}$
Operating Temperature	0˚C to +60˚C
Storage Temperature	-20˚C to +80˚C
Power Consumption	1.8 W
CE Certificate	Ready
Input Impedance	4.7 KΩ
Input Current	±10 mA (max.), ±12.5 mA (peak)
Input Voltage	±40 V (max.)

HSL-DO32-DB-N/-P

32-CH Discrete Output Daughter Board Modules

Specifications

Slave ID Consumption	2 consecutive from odd
Interface	N: for NPN sinking type sensor input or dry contact
	P: for PNP sourcing type sensor input or wet contact
Photo Couple Isolation Voltage	2500 V$_{RMS}$
LED Indicator	Power, Link and Input status
Power Supply	22 V to 26 V$_{DC}$
Operating Temperature	0˚C to +60˚C
Storage Temperature	-20˚C to +80˚C
Power Consumption	1.8 W
CE Certificate	Ready
Response Time	ON → OFF: 180 μs, OFF → ON : 1.2 μs
Switch Capacity	Single channel 500 mA; Full channels 50 mA at 100% duty cycle

HSL-DI16DO16-M-NN/-NP/-PN/-PP

16-CH Discrete Input 16-CH Discrete Output Modules

Specifications

■ Slave ID Consumption	1
■ Interface	NN: for NPN sinking type sensor input or dry contact and NPN sinking type output
	NP: for NPN sinking type sensor input or dry contact and PNP sourcing type output
	PN: for PNP sourcing type sensor input or wet contact and NPN sinking type output
	PP: for PNP sourcing type sensor input or wet contact and PNP sourcing type output
■ Photo Couple Isolation Voltage	2500 Vrms
■ Input Impedance	4.7 KΩ

■ Input Current	±10 mA (max.) , ±12.5 mA (peak)
■ Input Voltage	±40 V (max.)
■ Output Switching Capacity	Single channel 400 mA; Full channels 50 mA at 100% duty cycle
■ Output Response	ON → OFF: 180 μs, OFF → ON: 1.2 μs
■ LED Indicator	Power, Link and I/O status
■ Power Supply	22 V to 26
■ Operating Temperature	0°C to +60°C
■ Storage Temperature	-20° to +80°C
■ Power Consumption	1.8 W
■ CE Certification	Change to checkmark

HSL-DI32-M-N/-P, HSL-DO32-M-N/-P

32-CH Discrete Input Modules; 32-CH Discrete Output Modules

Specifications

■ Slave ID Consumption	2 consecutive from odd
■ Interface	N: for NPN sinking type sensor input or dry contact
	P: for PNP sourcing type sensor input or wet contact
■ Photo Couple Isolation Voltage	2500 Vrms
■ LED Indicator	Power, Link and Input status
■ Power Supply	22 V to 26 Vdc
■ Operating Temperature	0°C to +60°C
■ Storage Temperature	-20°C to +80°C
■ Power Consumption	1.8 W
■ CE Certification	√

HSL-DI32-M-N/-P:

■ Input Impedance	4.7 KΩ
■ Input Current	±10 mA (max.), ±12.5 mA (peak)
■ Input Voltage	±40 V (max.)

HSL-DO32-M-N/-P:

■ Response Time	ON → OFF: 180 μs, OFF → ON : 1.2 μs
■ Switch Capacity	Single channel 500 mA; Full channels 50 mA at 100% duty cycle

HSL-R8DI16-M-N/-P

8-CH Relay Output 16-CH Discrete Input Modules

Specifications

■ Slave ID Consumption	1
■ Interface	N: for NPN sinking type sensor or dry contact
	P: for PNP sourcing type sensor input or wet contact
■ Photo Couple Isolation Voltage	2500 Vrms
■ Input Impedance	4.7 KΩ
■ Input Current	±10 mA (max.), ±12.5 mA (peak)
■ Input Voltage	±40 V (max.)
■ Relay Rating	30 Vdc / 2 A; 250 Vac / 2 A
■ Relay Switching Frequency	20 times/minute at rating load (max.)
■ Relay Response Time	ON → OFF: 3 ms (max.), OFF → ON: 6 ms (max.)

■ Nominal Voltage for Relay	24 Vdc
■ Input Impedance	4.7 KΩ
■ Power Supply	22 V to 26 Vdc
■ Operating Temperature	0°C to +60°C
■ Storage Temperature	-20°C to +80°C
■ Power Consumption	1.8 W
■ CE Certification	√

HSL-AI16AO2-M-VV/-AV

16-CH Analog Input 2 Analog Output Modules

Specifications

■ Slave ID Consumption	2
■ Interface	16-CH single-ended or 8-CH differential analog input
	2-CH single-ended analog output
■ AD Resolution	16-bit (14-bit guarantee)
■ DA Resolution	16-bit
■ AD Voltage Input Range	±10 V, ±5 V, ±2.5 V, ±1.25 V
■ AD Current Input Range	±20 mA
■ DA Voltage Output Range	±10 V
■ AD Conversion Time	10 μs
■ DA Settling Time	10 μs

■ Over-voltage Protection	±30 V
■ LED Indicator	Power and Link
■ Power Supply	22 V to 26 Vdc
■ Operating Temperature	0°C to +60°C
■ Storage Temperature	-20°C to +80°C
■ Power Consumption	2.9 W

HSL-TB32-MD

32-CH Separate I/O Terminal Base

Specifications

◾ General Description	Separate I/O wiring connection for HSL I/O modules	◾ I/O Wire Gauge	20 AWG. (max.); 28 AWG. (min.)
	Every I/O points uses 3-pin connector	◾ Power Supply	22 V to 26 V_{DC}
	Pin definition is signal/ground/power (from left to right)	◾ Dimensions	129 x 107 x 47.5 mm (W x L x H)
	Separate fuse protection for each I/O points (jumper selection)		
	Supports common/separate DC power supply (jumper selection)		
	Terminator resistor on board (jumper selection)		
	Interlocking design for rugged installation		
	Power LED indicator		
	DIN rail mounting		
	Power and ground included for each signal channel		

Support Modules

- HSL-DI16DO16-M-NN/-PN/-PP/-NP
- HSL-DI32-M-N/P
- HSL-DO32-M-N/P

HSL-TB32-M-DIN

32-CH I/O Terminal Base

Specifications

◾ General Description	Field I/O wiring connection for HSL I/O modules	
	Spring terminal for easy field wiring	
	Power and ground included for each signal channel	
	Interlocking design for rugged installation	
	Power LED indicator	
	DIN rail mounting	
	Terminator resistor on board	
◾ I/O Wire Gauge	20 AWG. (max.); 28 AWG. (min.)	
◾ Power supply	22 V to 26 V_{DC}	
◾ Dimensions	128.5 x 85.5 x 108 mm (W x L x H)	

Support Modules

- HSL-DI16DO16-M-NN/-PN/-PP/-NP
- HSL-DI32-M-N/P
- HSL-DO32-M-N/P
- HSL-R8DI16-M-N/-P
- HSL-AI16AO2-M-VV/-AV

HSL-TB32-U-DIN

32 Points Universal Terminal Base

Specifications

◾ General Description	Field I/O wiring connection for HSL I/O modules
	Spring terminal for easy field wiring
	Power and ground included for each signal channel
	Interlocking design for rugged installation
	Power LED indicator
	DIN rail mounting
	Terminator resistor on board
◾ I/O Wire Gauge	20 AWG. (max.); 28 AWG. (min.)
◾ Power Supply	22 V to 26 V_{DC}
◾ Dimensions	126 x 120.1 x 107.3 mm (W x L x H)

Support Modules

- HSL-DI16DO16-DB-NN/-PN/-PP/-NP
- HSL-DI32-DB-N/P
- HSL-DO32-DB-N/P

HSL-TB64

64 Points High Density Terminal Base

Specifications

◾ General Description	Field I/O wiring connection for HSL I/O modules
	Spring terminal for easy field wiring
	Power and ground included for each signal channel
	Interlocking design for rugged installation
	Power LED indicator
	DIN rail mounting
	Terminator resistor on board
◾ I/O Wire Gauge	20 AWG. (max.); 28 AWG. (min.)
◾ Power Supply	22 V to 26 V_{DC}
◾ Dimensions	168.7 x 120.1 x 107.1 mm (W x L x H)

Support Modules

- HSL-DI16DO16-DB-NN/-PN/-PP/-NP
- HSL-DI32-DB-N/P
- HSL-DO32-DB-N/P

1 Software & Utilities

2 DAQ

3 PXI

4 Modular Instruments

5 GPIB & Bus Expansion

6 PAC

7 Motion

8 Real-time Distributed I/O

9 Remote I/O

10 Communications

11 Vision

12 Fanless I/O Platforms

13 cPCI & Industrial Computers

14 Accessories