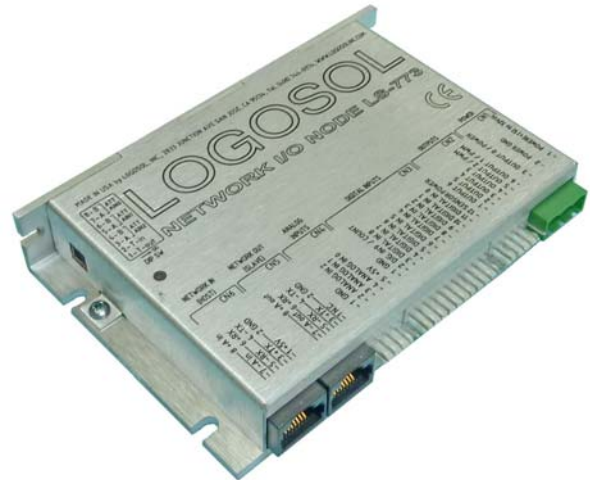


Logosol Network I/O Node LS-773

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Features

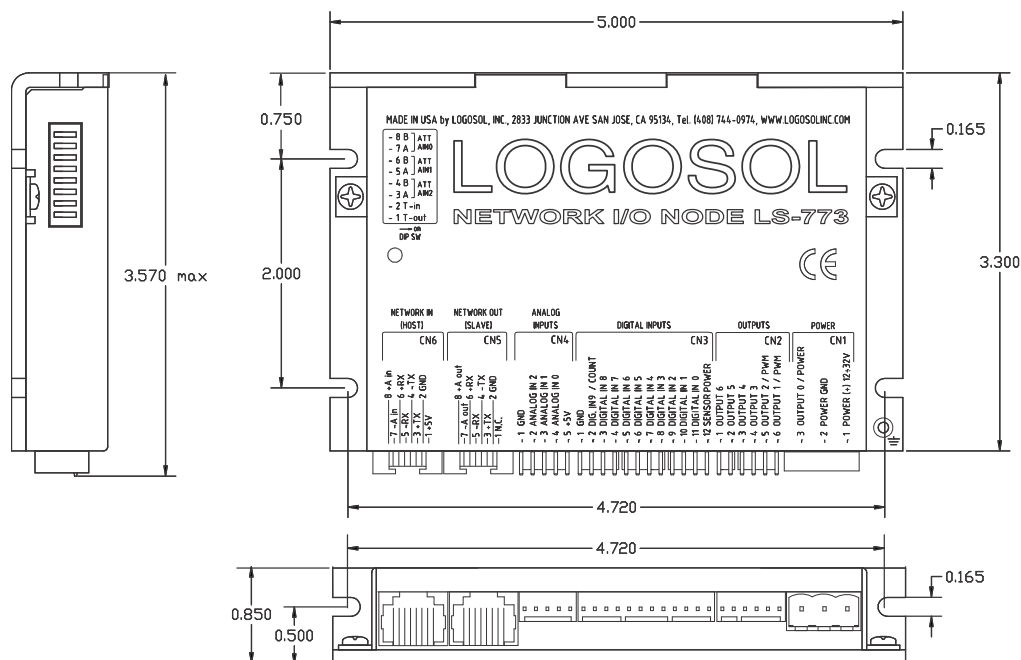
- ❑ 10 general purpose digital inputs
- ❑ 3 analog inputs
- ❑ 6 open collector outputs – 1A max
- ❑ Source output – 0.5A max
- ❑ All outputs are short protected
- ❑ 32-bit counter/timer with prescaler
- ❑ 20 KHz PWM mode for two of the outputs
- ❑ 12 to 32Vdc supply voltage range
- ❑ Communication speed 19.2Kbps ÷ 1.25 Mbps
- ❑ Command rate up to 1000/sec



Description:

LS-773 is a multifunctional, I/O controller designed for a wide range of applications. Up to 31 LS-773 nodes can be controlled over a multi-drop full duplex RS-485 network. Standard RJ-45 connectors and commercially available cables are used for daisy-chaining of the modules.

DIMENSIONAL DRAWING



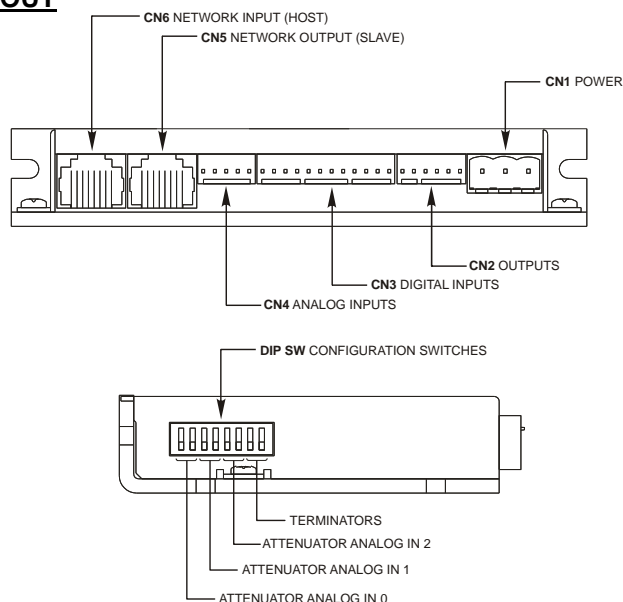
Logosol Network I/O Node LS-773

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TECHNICAL SPECIFICATIONS rated at 25°C ambient, POWER (+)=24Vdc

POWER SUPPLY VOLTAGE	12 to 32Vdc, 35Vdc Absolute Maximum
DIGITAL OUTPUTS OUTPUT 0/ POWER OUTPUT 1 - OUTPUT 6 Max voltage applied to OUTPUT 1 ÷ OUTPUT 6 Max current load OUTPUT 1 ÷ OUTPUT 6 PWM switching frequency (OUTPUT 1, OUTPUT 2)	Solid-state relay – 0.5A Open Collector with protective diode to POWER (+) for inductive loads POWER (+) voltage 1A 20KHz
DIGITAL INPUTS	10K Pull-up / Pull-down resistors to POWER (+) / GND, 50% threshold
ANALOG INPUTS	0-5V, 0-10V, 0-20V or 0-30V DIP switch selectable modes
INDICATORS Green Orange	Power supply ON Node is not initialized
PROTECTION Short	Digital output to POWER (+); OUTPUT 0/ POWER to GND
FIRE-SAFETY Internal fuse on POWER (+)	5A, Quick blow
THERMAL REQUIREMENTS Storage temperature range Operating temperature range	-30 to +85 °C 0 to 45 °C
MECHANICAL Size Weight	L=5.00", H=3.30", D=0.85" 0.55 lb. (0.250 kg)
MATING CONNECTORS Power Supply Inputs Outputs Analog inputs Communication	Magnum EM2565-03-VL or Phoenix contact MSTB 2.5/3-ST-5.08 Molex 22-01-3127 housing with 08-50-0114 pins (12 pcs.) Molex 22-01-3067 housing with 08-50-0114 pins (6 pcs.) Molex 22-01-3057 housing with 08-50-0114 pins (5 pcs.) 8 pin RJ-45

I/O NODE LAYOUT

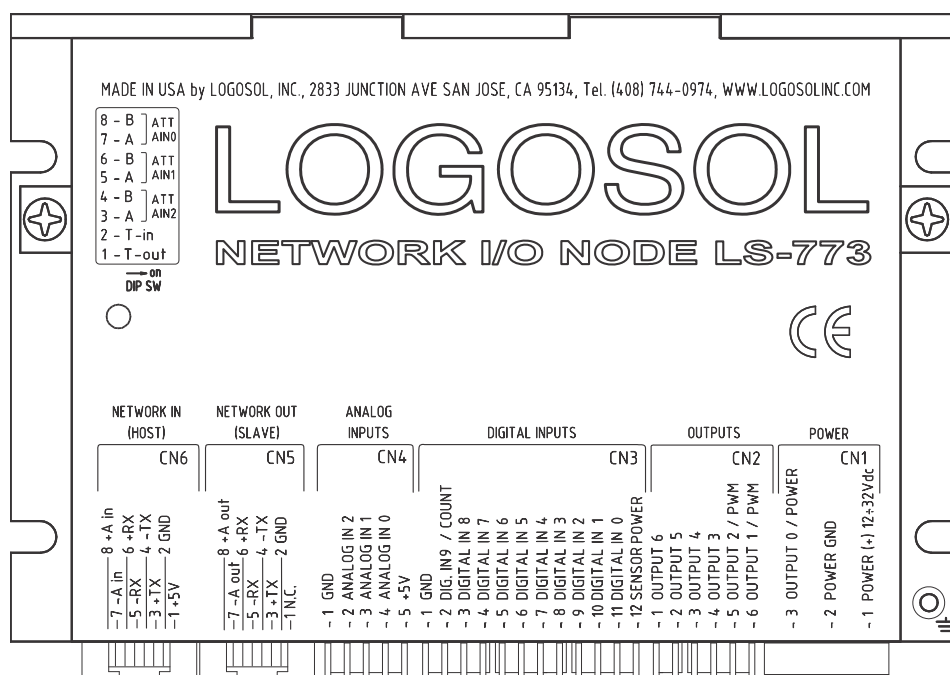


ORDERING GUIDE

PART NUMBER	MODEL	DESCRIPTION
912773001	LS-773	Network I/O Node
230601006	LS-773-CN	Mating connector kit

Logosol Network I/O Node LS-773

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DIP SW – DIP SWITCH

SW	SIGNAL		DESCRIPTION
1	T-out		Transmit line terminator
2	T-in		Receive line terminator
3	A	ATT AN2	ANALOG IN2 attenuator
4	B		
5	A	ATT AN1	ANALOG IN1 attenuator
6	B		
7	A	ATT AN0	ANALOG IN0 attenuator
8	B		

CN1 – POWER AND MOTOR CONNECTOR

PIN	SIGNAL	DESCRIPTION
1	POWER(+) 12 to 32Vdc	12 – 32Vdc power supply, positive terminal
2	POWER GND*	Power supply ground
3	OUTPUT 0/ POWER	Solid-state relay – 0.5A, with short circuit protection

CN2 – OUTPUTS

PIN	SIGNAL	DESCRIPTION
1	OUTPUT 6	Open collector output
2	OUTPUT 5	Open collector output
3	OUTPUT 4	Open collector output
4	OUTPUT 3	Open collector output
5	OUTPUT 2/ PWM	Open collector output with PWM mode
6	OUTPUT 1/ PWM	Open collector output with PWM mode

* POWER GND and GND are electrically connected. Drive case is isolated from drive circuitry and can be grounded externally.

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CN3 – DIGITAL INPUTS

PIN	SIGNAL	DESCRIPTION
1	GND*	Signal ground
2	DIG. IN 9/ COUNT	Input #9/ counter input
3	DIGITAL IN 8	Input #8
4	DIGITAL IN 7	Input #7
5	DIGITAL IN 6	Input #6
6	DIGITAL IN 5	Input #5
7	DIGITAL IN 4	Input #4
8	DIGITAL IN 3	Input #3
9	DIGITAL IN 2	Input #2
10	DIGITAL IN 1	Input #1
11	DIGITAL IN 0	Input #0
12	SENSOR POWER	Wired to POWER (+)

CN4 – ANALOG INPUTS

PIN	SIGNAL	DESCRIPTION
1	GND*	Signal ground
2	ANALOG IN 2	Analog input 0-5V, 0-10V, 0-20V or 0-30V
3	ANALOG IN 1	Analog input 0-5V, 0-10V, 0-20V or 0-30V
4	ANALOG IN 0	Analog input 0-5V, 0-10V, 0-20V or 0-30V
5	+5V	Internal power supply output

CN5 – NETWORK OUT (SLAVE)

PIN	SIGNAL	DESCRIPTION
1	N.C.	Not connected
2	GND*	Interface ground
3	+TX	(+) Transmit data
4	-TX	(-) Transmit data
5	-RX	(-) Receive data
6	+RX	(+) Receive data
7	-A out	(-) Address output
8	+A out	(+) Address output

CN6 – NETWORK IN (HOST)

PIN	SIGNAL	DESCRIPTION
1	+5V	RS-232 adapter power supply
2	GND*	Interface ground
3	+TX	(+) Transmit data
4	-TX	(-) Transmit data
5	-RX	(-) Receive data
6	+RX	(+) Receive data
7	-A in	(-) Address input
`	+A in	(+) Address input

* POWER GND and GND are electrically connected. Drive case is isolated from drive circuitry and can be grounded externally.

Logosol Network I/O Node LS-773

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LOGOSOL LS-773 QUICK START GUIDE

Hardware Setup

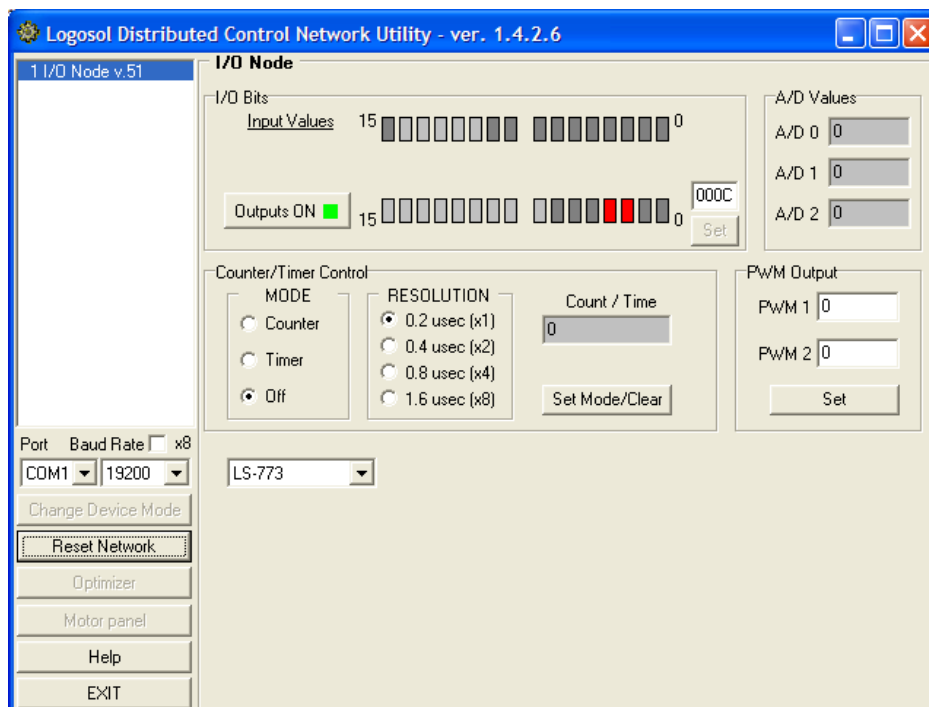
1. Connect power supply (12 to 32Vdc) to LS-773.
2. Connect your I/O devices to LS-773 inputs and outputs.
3. Connect RS-232 adapter and RJ-45 network cable between LS-773 and your host computer.

Software Installation

1. Installation and using Logosol Distributed Control Network Utility

A. Installation

1. Insert the Logosol Distributed Control Network Utility installation disk into the floppy drive.
2. Select Run from the Windows 95/98/NT/XP Start menu.
3. Type a:\dcnsetup and then click OK (a: represents the drive letter).
4. The installation wizard will guide you through the setup process.



B. Initial Connection to the Host

1. Turn on the power supply.
2. Run the Logosol Distributed Control Network Utility.
3. Choose the proper COM port
4. You will see the IO node specific screen. More information about using LDCN utility is available in LDCN Help.

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LS-773 ARCHITECTURE

Overview

LS-773 - Network I/O Node provides the following I/O capabilities:

Ten digital input lines.

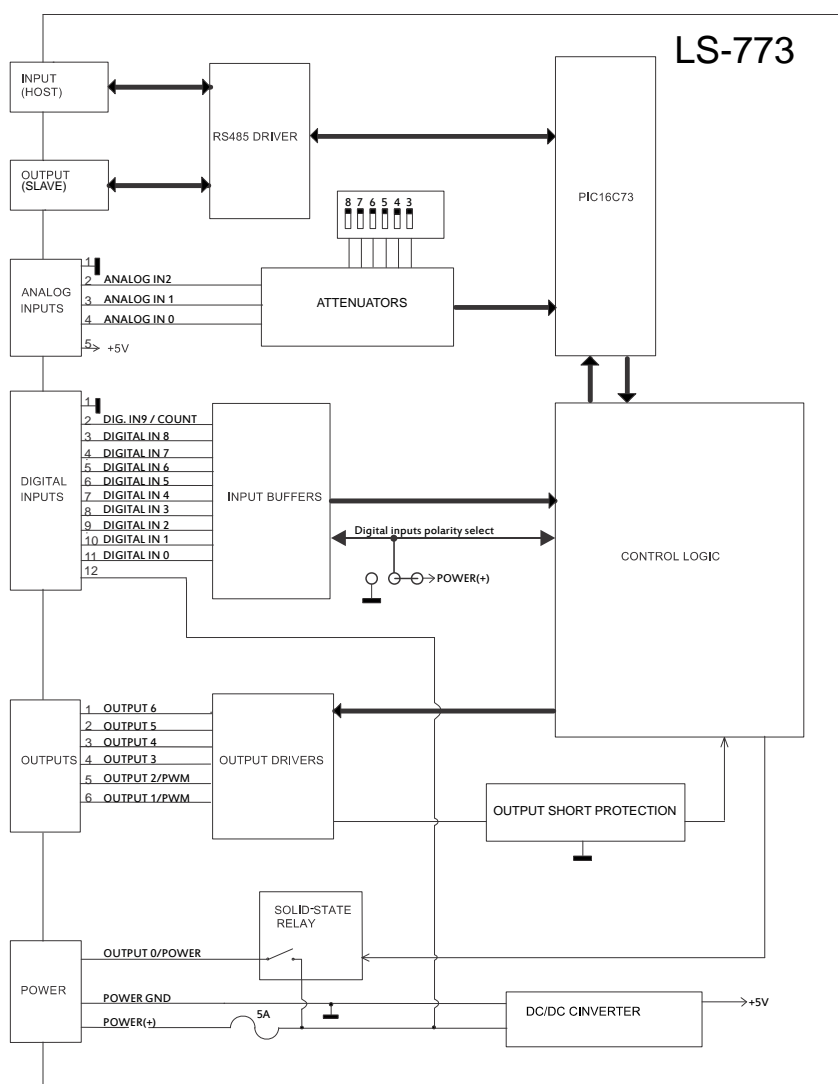
Power source output.

Six open collector outputs (two of them may be used as PWM outputs)

Three 8-bit analog input channels.

One 32-bit counter/timer.

RS-485 serial interface allows up to 31 modules LS-773 to be controlled from a single serial port.



Functional Diagram

Logosol Network I/O Node LS-773

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Serial Command Interface

The serial communication with the LS-773 drives adheres to a full-duplex (4 wire) 8 bit asynchronous protocol with one start bit, followed by 8 data bits (lsb first), followed by a single stop bit.

The communication protocol also supports a full-duplex multi-drop RS-485 interface which allows multiple LS-773 Network I/O Nodes to be controlled over a single RS-485 port. In this case, the host sends commands over its RS-485 transmit line and receives all status data back over the shared RS-485 receive line. The command protocol is a strict master/slave protocol in which the host master sends a command packet over the command line to a specific LS-773 slave. The Node sends back a status packet. Typically, the host does not send another command until a status packet has been received to insure that it does not overwrite any previous command data still in use.

Each command packet consists of the following:

Header byte (0xAA)

Address byte - individual or group (0x00 - 0xFF)

Command byte

0 - 15 data bytes

Checksum byte

The command byte is divided into upper and lower nibbles: the lower nibble is the command value; the upper nibble is the number of additional data bytes, which will follow the command byte. The checksum byte is 8-bit sum of the address byte, the command byte and the data bytes. The number of data bytes depends on the particular command chosen. After a command is issued, the corresponding node will send back a status packet consisting of:

Status byte

Optional bytes of status data

Checksum byte

The Status Byte contains basic status data about the LS-773, including a checksum error flag for the command just received. The number and the meaning of Optional Status Data Bytes are programmable by the user and may include any, none or all of data available from the module. The checksum byte is the 8-bit sum of the status byte and the additional optional status data bytes. All 16-bit and 32-bit data is sending with the least significant byte first.

Addressing

Rather than using hard-wired or switch-selected address of each LS-773 node, the host dynamically sets the address of each LS-773 with the aid of the daisy-chained "A in" and "A out" lines. This allows additional LS-773 controllers to be added to an RS-485 network with no hardware changes. On Power-up, "A in" of the first LS-773 is pulled low, its communication is enabled and the default address is 0x00. When the *Set Address* command is issued to give this LS-773 new unique address, it will lower its "A out" line. Connecting "A out" to the "A in" of the next node on the network will enable its communication at default address of 0x00. Repeating this procedure allows a variable number of controllers present to be given an unique addresses.

Group Addresses

In addition to the individual address, each node has a secondary group address. Several LS-773 controllers may share a common group address. This address is useful for sending commands, which must be performed simultaneously by a number of nodes (e.g. *Set Baud Rate*, etc.). When a LS-773 receives a command sent to its group address, it will execute the command but not send back a status packet. This prevents data collisions on the shared response line. When programming group addresses, however, the host can specify that one

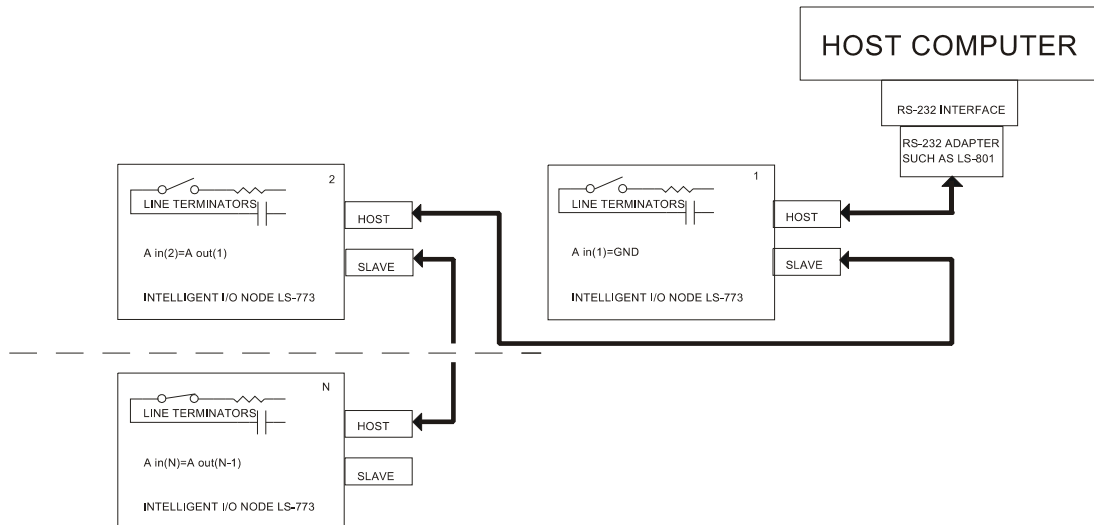
Logosol Network I/O Node LS-773

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member of the group is the “group leader”. The group leader will send back a status packet just like it would for a command sent to its individual address. The group address is programmed at the same time as the unique individual address using the *Set Address* command.

Changing Communications Rates

The default baud rate after Power-up is 19.2 Kbps. Baud rates up to 1.25 Mbps may be used. After communication has been established with all nodes on a single network, the baud rate may be changed to a higher value with the *Set Baud Rate* command.



Multiple Controller Configuration

Digital Outputs

LS-773 features 7 outputs - OUTPUT 0 to OUTPUT 6.

OUTPUT 0/ POWER is designed with solid-state relay and may be used for powering of user devices or as a general purpose output capable to source 0.5A. OUTPUT 0/ POWER is protected against short to GND.

OUTPUT 1 to OUTPUT 6 are open collector outputs capable to sink 1A and are equipped with protective diodes for inductive loads. Outputs are protected against short to POWER (+).

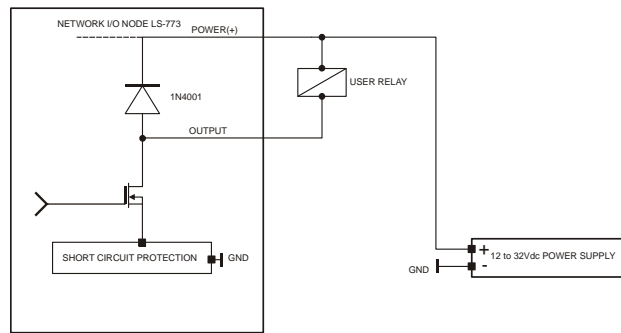
OUTPUT 1 and OUTPUT 2 may be used as general-purpose outputs or as PWM outputs. To use OUTPUT 1 or OUTPUT 2 as simple outputs set PWM1 or PWM2 to 0. If OUTPUT 1, or OUTPUT 2 are set to 1 then:

- PWM=255 - 0% PWM (output off);
- PWM=128 - 50% PWM;
- PWM=0 - 100% PWM (output on).

If one or more active open collector output are shorted to POWER (+), all outputs will be turned off and cannot be controlled while shorted. The normal operation, after short, is restored by the next setting of outputs.

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Digital Outputs

Digital Outputs

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	X	OUTPUT 6	OUTPUT 5	OUTPUT 4	OUTPUT 3	OUTPUT 2 PWM	OUTPUT 1 PWM	OUTPUT 0 POWER
Byte 1	X	X	X	X	X	X	X	X

Digital Inputs

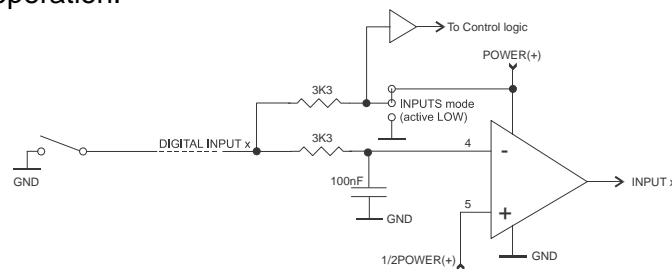
LS-773 has 10 general-purpose digital inputs - DIGITAL IN 0 to 9. Depending on the "INPUTS mode" jumper position inputs are equipped with Pull-up / Pull-Down resistors 10K.

Digital Inputs

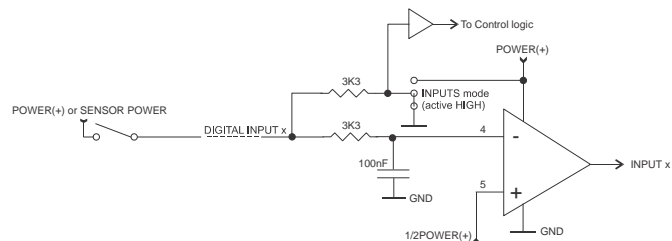
Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	INPUT 7	INPUT 6	INPUT 5	INPUT 4	INPUT 3	INPUT 2	INPUT 1	INPUT 0
Byte 1	OUT_SH	X	X	X	X	X	INPUT 9	INPUT 8

DIG. IN 9/ COUNT is has two functions: digital input and counter input. To use DIG. IN9 in a counter input mode refer to *Set Timer Mode* command in "Command Description" section of this manual.

OUT_SH = 1 when one or more outputs are shorted to POWER(+). OUT_SH is 0 during the normal operation.



Active low digital Inputs. INPUT x = 1 when DIGITAL IN x is connected to GND.



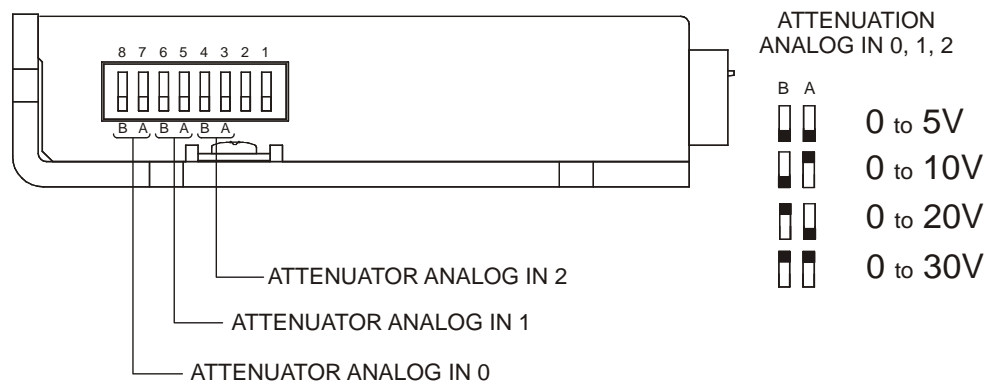
Active HIGH digital Inputs. INPUT x = 1 when DIGITAL IN x is connected to POWER(+) or SENSOR POWER.

Analog Inputs

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LS-773 has three 8 bit analog inputs. The input range may be set using DIP Switch 3-8 as shown below:



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10K Pull-up resistors are connected to each input.



10K Pull-down resistors are connected to each input.



Logosol Network I/O Node LS-773

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COMMAND SPECIFICATION

The following section describes in detail the commands available for the LS-773.

Command	CMD Code	# Data bytes	Description
---	0X0	0	Not used
Set Address	0x1	2	Sets the individual and group addresses
Define Status	0x2	1	Defines which data should be sent in every status packet
Read Status	0x3	1	Causes particular status data to be returned just once
Set PWM	0x4	2	Immediately sets the PWM output values
Synch Output	0x5	0	Outputs previously stored output bits and PWM output values
Set Outputs	0x6	2	Immediately sets the states of the output bits
Set Synch Output	0x7	4	Stores output bit values and PWM values to be synchronously set with the <i>Synch Output</i> command
Set Timer Mode	0x8	1	Sets mode of the counter/timer and its prescaler
---	0x9	0	Not used
Set Baud Rate	0xA	1	Sets the baud rate (group command only)
---	0xB	0	Not used
Synch Input	0xC	0	Synchronously stores the input bit values and the counter/timer value
---	0xD	0	Not used
Nop	0xE	0	Simply causes the defined status data to be returned
Hard reset	0xF	0	Resets the controller to its power-up state.

LS-773 Command Description

Set Address

Command value: 0x1

Number of data bytes: 2

Command byte: **0x21**

Data bytes:

1. Individual address: 0x00-0x7F (initial value 0x00)
2. Group Address: 0x80-0xFF (initial value 0xFF)

Description:

Sets the individual address and group address. Group addresses are always interpreted as being between 0x80 and 0xFF. If a LS-773 is to be a group leader, clear bit 7 of the desired group address in the second data byte. LS-773 will automatically set bit 7 internally after flagging itself as a group leader. (If bit 7 of the second data byte is set, the module will be by default a group member.) The first time this command is issued after power-up or reset, it will also enable communications for the next module on the network chain by lowering the it's "A out" signal.

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Define Status

Command value: 0x2

Number of data bytes: 1

Command byte: 0x12

Data bytes:

1. Status items: (default: 0x00)

- | | | |
|-----|----|---|
| Bit | 0: | send Input Byte 0 and Byte 1 (2 bytes) |
| | 1: | send ANALOG IN 0 value (1 byte) |
| | 2: | send ANALOG IN 1 value (1 byte) |
| | 3: | send ANALOG IN 2 value (1 byte) |
| | 4: | send counter/timer value (4 bytes, least significant first) |
| | 5: | send device ID, version number (2 bytes)
(LS-773 device ID = 2, version number = 50) |
| | 6: | send input bit values captured with the Synch Input command (2 bytes) |
| | 7: | send counter/timer value captured with the Synch Input command (4 bytes) |

Description:

Defines what additional data will be sent in the status packet along with the status byte. Setting bits in the data byte will cause the corresponding additional data to be included in the status packet. The status data will always be sent in the order listed. For example if bits 0 and 3 are set, all subsequent status packets will consist of the status byte followed by two bytes of input bit data, followed by the ANALOG IN 2 input byte, followed by the checksum. The status packet returned in response to this command will include the additional data bytes specified. On power-up or reset, the default status packet will include only the status byte and the checksum byte.

Read Status

Command value: 0x3

Number of data bytes: 1

Command byte: 0x13

Data bytes:

1. Status items: (default: 0x00)

- | | | |
|-----|----|---|
| Bit | 0: | send Input Byte 0 and Byte 1 (2 bytes) |
| | 1: | send ANALOG IN 0 value (1 byte) |
| | 2: | send ANALOG IN 1 value (1 byte) |
| | 3: | send ANALOG IN 2 value (1 byte) |
| | 4: | send counter/timer value (4 bytes, least significant first) |
| | 5: | send device ID, version number (2 bytes)
(LS-773 device ID = 2, version number = 50) |
| | 6: | send input bit values captured with the Synch Input command (2 bytes) |
| | 7: | send counter/timer value captured with the Synch Input command (4 bytes) |

Description:

This is a non-permanent version of the *Define Status* command. The status packet returned in response to this command will incorporate the data bytes specified, but subsequent status packets will include only the data bytes previously specified with the *Define Status* command.

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Set PWM

Command value: 0x4
Number of data bytes: 2
Command byte: **0x24**
Data bytes:
1. PWM 1 output value (255 - 0)
2. PWM 2 output value (255 - 0)

Description:

Immediately set the two PWM output values. To use OUTPUT 1, 2 in PWM mode set output byte bits 1 and 2 (*Set Output* command) to 1. A value of 255 will turn off the PWM output; a value of 0 will turn it on with a 100% duty cycle.

Synch Output

Command value: 0x5
Number of data bytes: 0
Command byte: **0x05**
Data bytes:
None

Description:

Synchronously set the output bit values and PWM values previously stored with the *Set Synch Output* command.

Set Output

Command value: 0x6
Number of data bytes: 2
Command byte: **0x26**
Data bytes:
1. Output Byte 0
2. Output Byte 1

Description:

Immediately sets the values for the output bits.

Set Synch Output

Command value: 0x7
Number of data bytes: 4
Command byte: **0x47**
Data bytes:
1. Bit values for Output bits 0-6 (bit 7 is ignored)
2. Set this byte to 0x00
3. PWM 1 output value (255-0)
4. PWM 2 output value (255-0)

Description:

Stores output bit values and PWM values in internal registers to be set synchronously with the *Synch Output* command.

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Set Timer Mode

Command value: 0x8

Number of data bytes: 1

Command byte: 0x18

Data bytes:

1. Timer mode configuration byte

Bit 0: 0 = Counter/timer disabled, 1 = Counter/timer enabled

Bit 1: 0 = Select timer mode, 1 = Select counter mode

Bits 5,4: 00 = No prescaler (count every event)

01 = 2:1 prescaler (every other event counted)

10 = 4:1 prescaler (every 4th event counted)

11 = 8:1 prescaler (every 8th event counted)

Bits 2,3,6,7: are not used

Description:

Sets the operating mode of the counter/timer. In counter mode, each active (high to low) transition of DIGITAL IN 9/ COUNT will be counted. In timer mode, the counter counts the LS-773's 5.0 MHz internal clock. The prescaler applies to both the counter and the timer modes.

Set Baud Rate

Command value: 0xA

Number of data bytes: 1

Command byte: 0x1A

Data bytes:

1. Baud rate divisor, BRD

sample values:

9600 BRD = 0x81

19200 BRD = 0x3F

57600 BRD = 0x14

115200 BRD = 0x0A

125000 BRD = 0x27

312500 BRD = 0x0F

625000 BRD = 0x07

1250000 BRD = 0x03

Description:

Sets the communications baud rate. All control modules on the network must have their baud rates changed at the same time, therefore this command should only be issued to a group including all of the modules on the network. A status packet returned from this command would be at the new baud rate, so typically, there should be no group leader when this command is issued. (Note that the host's baud rate must also be changed for subsequent communication.)

Synch Input

Command value: 0xC

Number of data bytes: 0

Command byte: 0x0C

Data bytes:

None

Description:

Causes the current Input bit values and the counter/timer value to be synchronously stored in the LS-773's internal registers. These values can be read using the *Read Status* or the *Define Status* commands.

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No Operation

Command value: 0xE
Number of data bytes: 0
Command byte: 0x0E

Description:

Does nothing except that causes a status packet with the currently defined status data to be returned.

Hard Reset

Command value: 0xF
Number of data bytes: 0
Command byte: 0x0F

Description:

Resets modules to their power-up state. No status will be returned. Typically, this command is issued to all modules on the network, although if the baud rate is set to the default value, it is possible to reset and re-initialize the addresses of a contiguous sub-chain of modules.

Status Byte

The first byte of each status packet is the status byte. The LS-773 has only one bit defined: *if bit 1 of the Status Byte is set*, the LS-773 detected a *checksum error* in most recently command packet. Bits 0, 2, 3, 4, 5, 6 and 7 are undefined and can be ignored.