

# IEX-402-SHDSL Quick Installation Guide

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Moxa Managed SHDSL Ethernet Extender

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## Overview

The Moxa IEX-402-SHDSL series Ethernet Extender consists of one 10/100BaseT(x) port and a DSL interface that provides an economical solution for your Ethernet connections. Utilizing SHDSL technology over copper wires, the IEX-402-SHDSL series supports data rates of up to 15.3 Mbps and long transmission distance of over 8 km. Advanced managed functionality provides highly reliable communication for networks.

The IEX-402-SHDSL series has a wide operating temperature range of -40 to 75°C, and supports 12/24/48 VDC redundant power supplies. The rugged hardware design makes the IEX-402-SHDSL Series perfect for ensuring that your Ethernet equipment can withstand critical industrial applications.

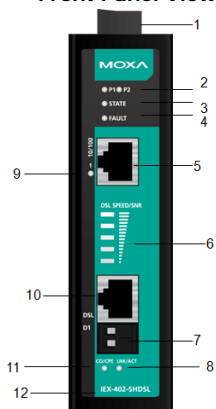
## Package Checklist

The Moxa IEX-402-SHDSL series are shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- IEX-402-SHDSL Ethernet Extender
- Panel mounting kit (optional—must order separately)
- CD-ROM with user's manual and Windows utility
- Quick installation guide (printed)
- Warranty card

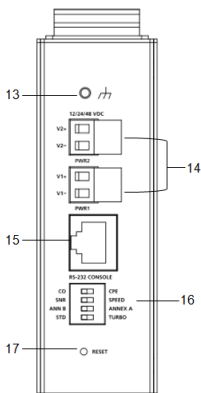
# IEX-402-SHDSL Panel Layout

## Front Panel View

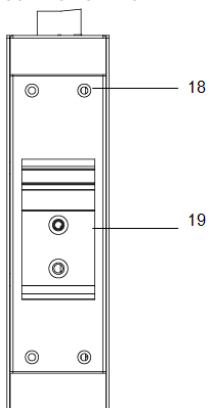


1. Terminal block for power input (PWR1, PWR2)
2. Power input PWR1/PWR2 LED
3. State LED
4. Fault LED
5. 10/100BaseT(X) Port
6. DSL speed/SNR LED
7. Detachable 2-contact DSL Port
8. Link/ACT LED
9. TP port's 10/100 Mbps LED
10. DSL Port(RJ-45/RJ-11 connector)
11. CO/CPE LED
12. Model name
13. Grounding screw
14. Power input PWR1/PWR2
15. RS-232 Console Port
16. DIP Switches
17. Reset button
18. Screw hole for wall mounting kit
19. DIN-Rail Kit

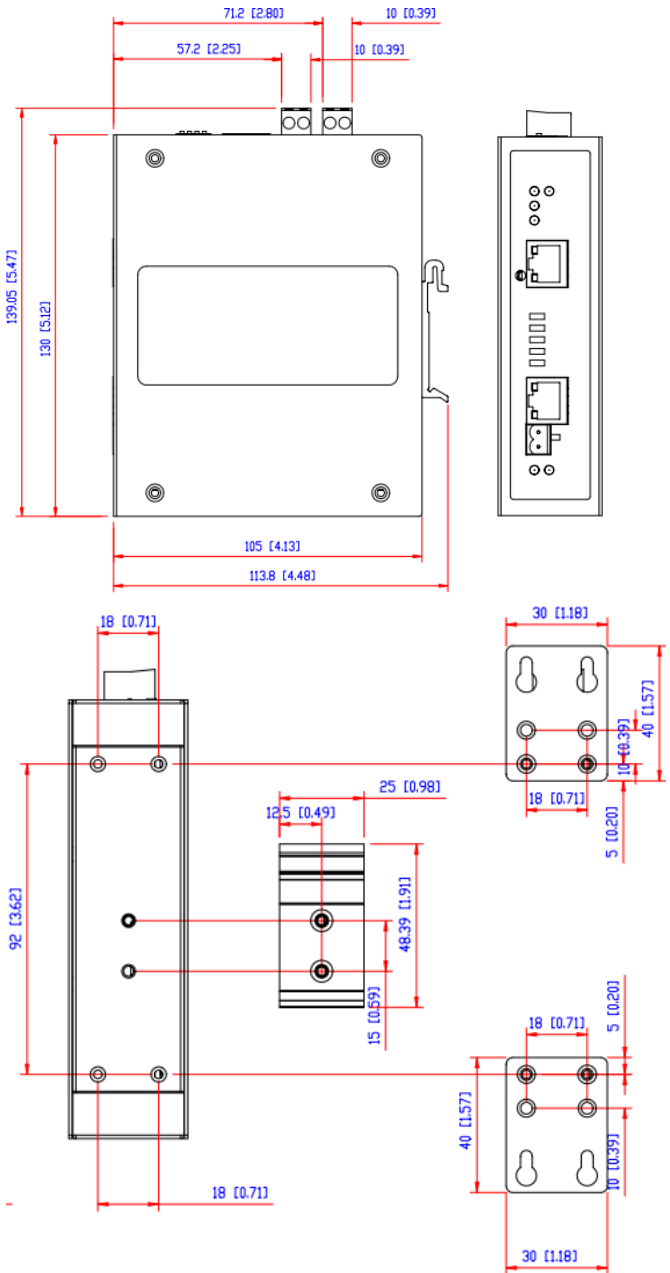
## Top Panel View



## Rear Panel View



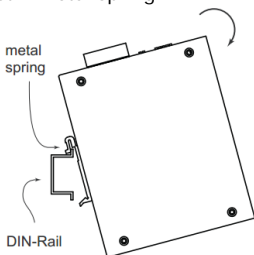
# Mounting Dimensions (unit = mm [inches])



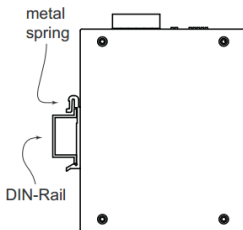
## DIN-Rail Mounting

The aluminum DIN-Rail attachment plate should already be fixed to the back panel of the IEX-402-SHDSL when you take it out of the box. If you need to reattach the DIN-Rail attachment plate, make sure the stiff metal spring is situated towards the top, as shown in the following figures.

**STEP 1:** Insert the top of the DIN-Rail into the slot just below the stiff metal spring.



**STEP 2:** The DIN-Rail attachment unit will snap into place as shown below.



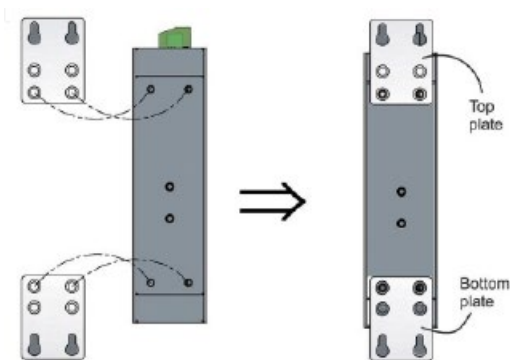
To remove the Moxa Ethernet Extender from the DIN-Rail, simply reverse Steps 1 and 2.

## Wall Mounting (optional)

For some applications, you will find it convenient to mount the IEX-402-SHDSL on the wall, as shown in the following figures.

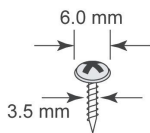
**STEP 1:**

Remove the aluminum DIN-Rail attachment plate from the IEX-402-SHDSL rear panel, and then attach the wall mount plates as shown in the diagram at the right.



**STEP 2:**

Mounting the IEX-402-SHDSL on the wall requires 4 screws. Use the switch, with wall mount plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5mm in diameter, as shown in the figure at the right.



**NOTE** Before tightening the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw into one of the keyhole-shaped apertures of the wall mounting plates.

Do not screw the screws in completely—leave about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

**STEP 3:**

Once the screws are fixed in the wall, insert the four screw heads through the large parts of the keyhole-shaped apertures, and then slide the IEX-402-SHDSL downwards, as indicated. Tighten the four screws for added stability.

## Wiring Requirement



### ATTENTION

#### Safety First!

Be sure to disconnect the power cord before installing and/or wiring your Moxa Ethernet Extender.

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment

Be sure to read and follow these important guidelines:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.  
**NOTE:** Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- Use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- When necessary, you should label the wiring to all devices in the system.

## Grounding the Ethernet Extender

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.



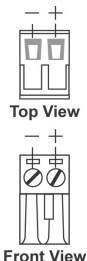
### ATTENTION

This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

## Wiring the Redundant Power Inputs

Both power inputs can be connected simultaneously to live DC power sources. If one power source fails, the other live source acts as a backup, and automatically supplies the IEX-402-SHDSL with power.

The two 2-contact terminal block connectors on the IEX's top panel are used for IEX's two DC power inputs. Top and front view of the terminal block connectors are shown here.



**Step 1:** Insert the negative/positive DC wires into the V-/V+ terminals

**Step 2:** To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

**Step 3:** Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on IEX's top panel.



### ATTENTION

Before connecting the IEX-402-SHDSL to the DC power inputs, make sure the DC power source voltage is stable.

## Auto MDI /MDI-X Connection

The Auto MDI/MDI-X function allows users to connect the IEX-402-SHDSL's 10/100BaseTX ports to any kind of Ethernet device, without needing to pay attention to the type of Ethernet cable being used for the connection. This means that you can use either a straight-through cable or cross-over cable to connect the IEX-402-SHDSL to Ethernet devices.

## Communication Connections

IEX-402-SHDSL models have one 10/100BaseT(x) Ethernet port, and one DSL port.

### 10/100BaseT(X) Ethernet Port Connection

The 10/100BaseT(X) ports located on the IEX's front panel are used to connect to Ethernet-enabled devices.

Next, we show pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports, and also show wiring diagrams for straight-through and cross-over Ethernet cables.

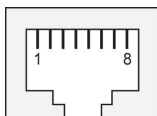
#### MDI Port Pinouts

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

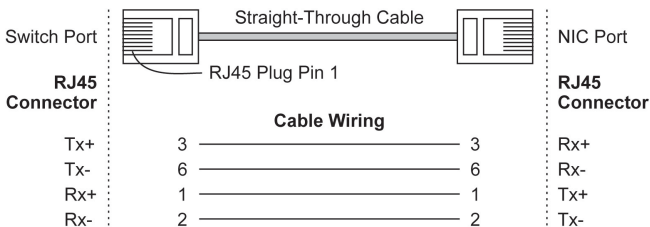
#### MDI-X Port Pinouts

Pin	Signal
1	Rx+
2	Rx-
3	Tx+
6	Tx-

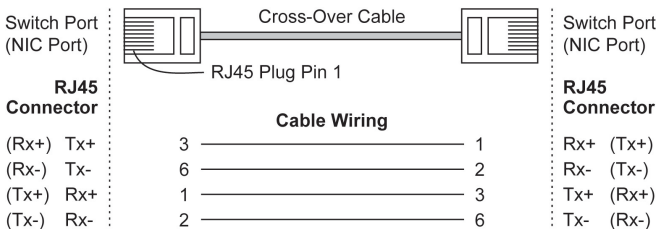
#### 8-pin RJ45



## RJ45 (8-pin) to RJ45 (8-pin) Straight-Through Cable Wiring



## RJ45 (8-pin) to RJ45 (8-pin) Cross-Over Cable Wiring

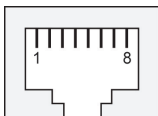


## DSL Port Connection

The DSL port located on the IEX-402-SHDSL has two connection options. One is the RJ45 connector interface (2-wire on pin 4 and pin 5), the other is the screw detachable interface. Pinouts are illustrated below.

### RJ11 (RJ45 connector) DSL Port Pinouts

Pin	Signal
1	—
2	—
3	—
4	Ring
5	Tip
6	—
7	—
8	—



### Wiring the 2-Contact DSL Port

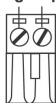
The 2-contact terminal block connectors on the IEX's top panel are used for the IEX's DSL port wiring. Top and front views of the terminal block connectors are shown here.

Ring Tip



Top View

Ring Tip



Front View

**Step 1:** Insert the wires into the Ring/Tip terminals

**Step 2:** To keep the wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

**Step 3:** Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the IEX's top panel.



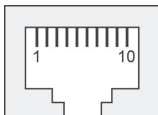
## RS-232 Console Port Connection

The IEX-402-SHDSL has one RS-232 (10-pin RJ45) console port, located on the top panel. Use either an RJ45-to-DB9 (see the cable following wiring diagrams) to connect the IEX-402-SHDSL's console port to your PC's COM port.

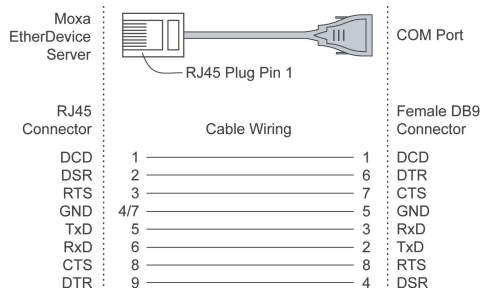
You may then use console terminal software, such as Moxa PComm Terminal Emulator, to access the IEX-402-SHDSL'S serial console.

### RJ45 (10-pin) Console Port Pinouts

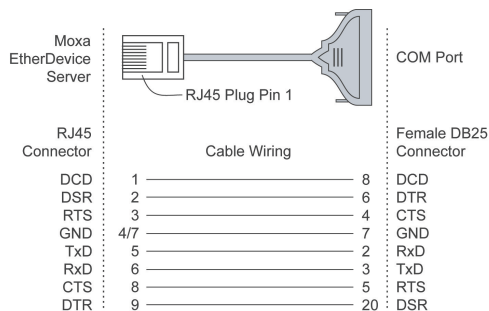
Pin	Description
1	DCD
2	DSR
3	RTS
4	GND
5	TxD
6	RxD
7	GND
8	CTS
9	DTR
10	-



### RJ45 (10-pin) to DB9 (F) Cable Wiring



### RJ45 (10-pin) to DB25 (F) Cable Wiring



## Restore Factory Defaults Button

Press and hold the Reset button for 5 seconds to load the factory default settings. Use a pointed object, such as a straightened paper clip or toothpick, to depress the Reset button. This will cause the STATE LED to blink once a second. After depressing the button for 5 continuous seconds, the STATE LED will start to blink rapidly. This indicates that factory default settings have been loaded and you can release the reset button.

**NOTE** Do NOT power off the Ethernet extender when loading default setting

## DIP Switches Settings

The IEX-402-SHDSL series provides 4 hardware DIP switches for quick configurations, based on terminal type (CO/CPE), DSL signal measurement type (Speed/SNR), communication media type (ANNEX A/ANNEX B) and data rate mode (STD/Turbo).

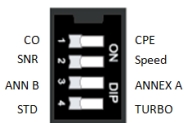
**NOTE** Reboot the system after changing any of the DIP switch configurations.

## Auto Negotiation Mode

The SHDSL Ethernet extenders operate in pairs. One of the units needs to be configured as a CO and the other as a CPE. By factory default, IEX-402-SHDSL are configured as COs.

To make configuration easier, the IEX-402-SHDSL supports CO/CPE auto negotiation. Enable the factory setting CO mode on the CO/CPE DIP switch for both connected extenders, and the system will auto negotiate and assign CPE to one of the devices in each pair.

## IEX-402-SHDSL Series DIP Switches



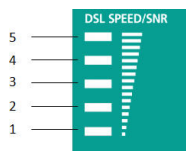
The following table explains the default setting and meaning of each DIP switch.

DIP switch (CO/CPE)	CO(Central Office) The default value. Designates the IEX-402-SHDSL as CO.	CPE (Customer Premises Equipment) Designates the IEX-402-SHDSL as CPE role
DIP switch (SNR/SPEED)	SNR(signal-to-noise ratio): The default value. The DSL SPEED/SNR LED indicator will show SNR information when this is enabled.	SPEED: The DSL SPEED/SNR LED indicator will show speed when this is enabled.
DIP switch (ANN B/ANN A)	ANN B (ANNEX B) The default value. The device connects with European-type cables (0.4 mm).	ANN A (ANNEX A) The device connects with U.S.-type cables (0.5mm)
DIP switch (STD/TURBO)	STD: The default value. The data rate follows defined standard mode value	TURBO: The data rate follows the defined Turbo mode value

## LED Indicators

LED	Color	State	Description
PWR1	AMBER	On	Power is being supplied to the power input PWR1
		Off	Power is not being supplied to the power input PWR1
PWR2	AMBER	On	Power is being supplied to the power input PWR2
		Off	Power is not being supplied to the power input PWR2
STATE	GREEN	On	System has passed self-diagnosis test on boot-up and is ready to run
		Blinking	1. System is undergoing the self-diagnosis test when booting up. 2. Blinks continuously when pressing the reset button 5 seconds to reset to factory default.
	RED	On	1. System failed self-diagnosis on boot-up. 2. Link Fault Pass Through active, link fault on the opposite unit
		Blinking	Link Fault Pass Through active, link fault on this unit
FAULT	RED	On	System is in the event of failure, or is under quick inspection
		Off	System is in normal operation
10/100M (TP port)	GREEN	On	The corresponding port's link is active
		Blinking	The corresponding port's data is being transmitted
		Off	The corresponding port's link is inactive
LINK/ACT	GREEN	On	The corresponding port's link is active at Turbo speed
		Blinking	The corresponding port is auto negotiating for the optimized speed (Blink every 1 sec)
			The corresponding port's data is being transmitted
	Off	The corresponding port's link is inactive	
	AMBER	On	The corresponding port's link is active at Standard speed
		Blinking	The corresponding port is auto negotiating for the optimized speed (Blink every 1 sec)
The corresponding port's data is being transmitted			
Off	The corresponding port's link is inactive		
CO/CPE	GREEN	On	The IEX-402 is set as CPE
		Off	The corresponding port's link is inactive
	AMBER	On	The IEX-402 is set as CO
		Off	The corresponding port's link is inactive

## DSL Speed/SNR LED Indicator



### Five Levels of SNR/SPEED Setting

	Turbo Speed (K bits)	STD Speed (K bits)
5	10297 – 15304	4609 – 5760
4	5697 – 10296	3073 – 4608
3	3457 – 5696	2049 – 3072
2	1025 – 3456	769 – 2048
1	192 – 1024	192 – 768

	SNR (dB)
5	18 – 30
4	14 – 17
3	10 – 13
2	6 – 9
1	3 – 5

## Specifications

Technology	
Standards	IEEE802.3, 802.3u, 802.3x, 802.1p, ITU-T G.991.2, G.SHDSL and G.SHDSL.bis
SHDSL Data Rate	192kbit/s to 15304kbit/s
Protocols	SNMPv1/v2c/v3, DHCP Client, SNTP, HTTP, Telnet, Syslog, LLDP, Modbus/TCP, IPv6
MIB	MIB-II
Flow Control	IEEE802.3x flow control, back pressure flow control
Interface	
RJ45 Port	10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
DSL Port	RJ-11 (RJ-45 connector) or detachable 2-contact terminal block
Console	RS-232 (RJ45)
LED Indicators	PWR1, PWR2, FAULT, 10/100M (TP port), STATE, CO/CPE, LINK/ACT, DSL SPEED/SNR
DIP Switches	Reset button, CO/CPE, SNR/SPEED, ANN B/ANNEX A, STD/TURBO
Power	
Input Voltage	12/24/48 VDC (9.6 to 60 VDC)
Input Current	0.36 A @ 24 V
Connection	Two removable 2-pin terminal block
Overload Current Protection	Present
Reverse Polarity Protection	Present
Physical Characteristics	
Housing	Metal, IP30 protected
Dimension	35 x 130 x 105 mm
Weight	0.29 kg
Installation	DIN-Rail, Wall Mounting (optional kit)

<b>Environmental Limits</b>	
Operating Temperature	-10 to 60°C (32 to 140°F); -40 to 75°C (-40 to 167°F ) for -T models
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5% to 95% (non-condensing)
Altitude	Up to 2000 m, contact Moxa for products guaranteed to function at higher altitudes
<b>Regulatory Approvals</b>	
Safety	UL 508
EMI	FCC Part 15 Subpart B Class A, CISPR (EN 55032) class A
EMS	EN 61000-4-2 (ESD), Level 3 EN 61000-4-3 (RS), Level 3 EN 61000-4-4 (EFT), Level 3 EN 61000-4-5 (Surge), Level 3 EN 61000-4-6 (CS), Level 3 EN 61000-4-8
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6
<b>Warranty</b>	5 years



## **ATTENTION**

This device complies with Part 15 of the FCC rules.

Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received including interference that may cause undesired operation.