

Power Line Communication

ILV2010, ILV2110, ILV2120 *Head End/Repeater*

Installation Guide



Power to communicate



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Technical Specifications

A. Specifications ILV2010, ILV2110, ILV2120

Physical Features	
Weight	Approx 2.5kg
Dimensions	Approx 190x150x80 mm
Material	Aluminum
Ports & Connectors	1 coupler interface (ILV2010 and ILV2110) 2 coupler interfaces (ILV2120) RJ45 10/100BASE-T RS485 serial port
Status indicators (LEDs)	Power, Status, PLC, Eth (ILV2010)
Electrical Characteristics	
Power Consumption	ILV2110/ILV2010 - Max 10W (+8W with optional active accessories) ILV2120 - Max 17W (+15W with optional active accessories)
Voltage	100-240VAC
Frequency	50/60Hz
PSD (Power Spectral Density)	- 46dBm/Hz @ 10MHz bandwidth - 49dBm/Hz @ 20MHz bandwidth - 50dBm/Hz @ 30MHz bandwidth
Class of equipment	Class II
Internal fuse (F1)	250 V (Min.), 2 A T
Environmental	
Ingress Protection (IP)	IP54
Operating	
Operating environment	Schneider Standard FT15005 Category C2. The climatic conditions of category C2 are in accordance to the conditions defined in IEC 60721-3-3 standard: - 3K3
Relative humidity	10% to 100% non-condensing
Ambient operating temperature	-25C° to 45C° (ILV2110) -25C° to 40C° (ILV2120) -25C° to 55C° in restricted areas according to EN 60950
Storage	
Storage environment	According to ETS 300 019-1-1 Class 1.1
Relative humidity	5% to 95% non-condensing
Temperature	-5°C to +45°C

Transport	
Transport environment	According to ETS 300 019-1-2 Class 2.3
Relative humidity	95% non-condensing
Temperature	-40°C to +70°C, < 30days
CE Approval and labels	
EMC	EN55022 class B EN55024 prEN50412-1 type 1, class 2
Electrical safety	EN 60950-1:2001 IEC 60950-1:2001

Any changes or modifications not expressly approved by Ilevo could void the user's authority to operate this equipment.

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Introduction

A. About This Guide

This guide is intended for service personnel that have completed the Ilevio PLC course.

This documentation is valid for

- ILV2010 - PU1071/1 - HE Top
- ILV2110 - PU1067/1 - Time Division (TD) part
- ILV2120 - PU1060/1 - Frequency Division (FD) part
- ILV21xx - PU1069/1 - Bottom part

Warnings, Cautions, and Notes

Throughout this guide, there may be blocks of text indicated by symbols. These blocks are warning, caution and notes, and they are used as follows:



WARNING: A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.



CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.



NOTE: A NOTE indicates important information that helps you make better use of your modems.

Installation Notes

The graphics and screen illustrations shown in this manual may differ from what you see from your system, but the steps still apply.

Disclaimer

Products and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are used only for identification or explanation and to the owners' benefit, without intent to infringe.

Glossary

FD	Frequency Division
HE	Head End
HW	Hardware
PLC	Powerline Communication
TD	Time Division

Document History

Revision	Date	Remark
A	December, 2005	
B	July, 2006	Added appendix
PC1	June, 2007	Minor changes

Safety Instructions

A. Safety Precautions

Use the following safety precautions to help protect the PLC communication system from potential damage and to ensure your own personal safety.

If the ambient temperature of ILV2110 will reach above +45C°, and for the ILV2120 above +40C°, the equipment shall be installed in a RESTRICTED ACCESS LOCATION where the two following paragraphs apply:



- Access can only be gained by SERVICE PERSONNEL or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken and;

- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.



- Working with electricity can be dangerous. Only a trained power line technician should connect the network components onto power line bus bars and cables. This is a situation that could cause bodily injury.

- Before working on any equipment, be aware of the hazards involved with the electrical circuitry and be familiar with the standard practices for preventing accidents.

- Before connecting the llevo PLC equipment to the power mains, check the voltage rating of the llevo PLC equipment to ensure the required voltage and frequency match the available power source.

- Only qualified and trained personnel may install and service llevo PLC equipment.

- Follow all warnings and instructions marked on the products.



- Installation of the equipment can be carried out in various part of the network. The utility network owner may apply local requirements, which can cause variations according to normal procedures. The network owner must always be notified before any installation is carried out to confirm local network aspects such as fuse breaking capacity according to transformer specifications. Make sure that the injection points are unreachable for unauthorized persons.

- To ensure that designated ventilation slots and opening in the cabinet operate in a reliable manner and do not over-heat, make sure that the slots and openings are not blocked or covered. See “Installation Guide” for more information.

Safety Symbols and Labels

Read and understand all warning labels before working with the equipment.

The warning labels are located on the housing, and consists of warning markings with a yellow background, as shown below.



Figure 1. Electric Hazard



Figure 2. Hot Surface

Hardware Installation

A. Mounting Recommendations

To ensure ventilation it is recommended that the unit is mounted with certain space to surrounding surfaces. The unit shall be mounted vertically with the cable downwards.

The holes used to fasten the mounting bracket to a wall etc. are 6 mm in diameter. Use corresponding screws and plugs.

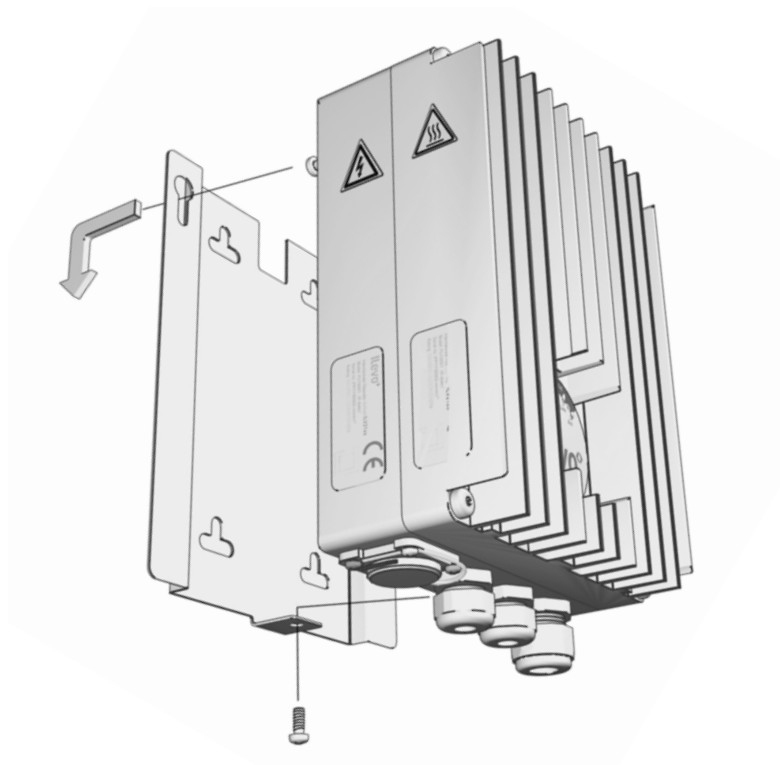


Figure 3. Assembly with mounting bracket

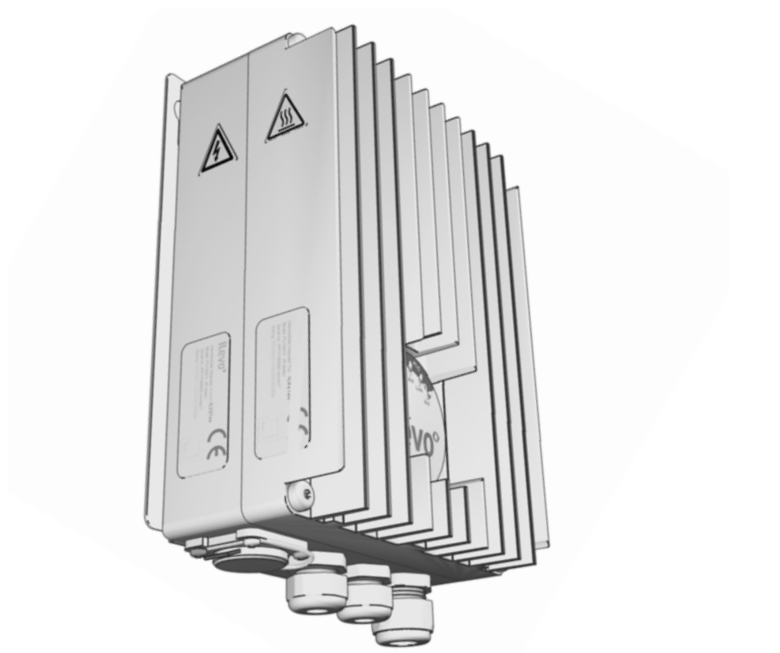


Figure 4. Single box mounted in the bracket

B. Coupler Cable Installation

The two halves are screwed together with 4 security screws. Use a Resitorx / Tamper-proof Torx driver, size T25.

All cables are connected in the bottom part of the housing.

The coupler cables go through two M16 cable glands. We recommend Ilevo Professional shielded twisted pair PLC signal cable LLC3.

There are connections for two external couplers. The three terminals (Signal+, Ground and Signal-) on each connector, have a screw terminal for up to 1 mm² conductors. The coupler signal is balanced and the impedance is 100 Ohms.

For more information regarding coupling, please refer to the coupling documentation.



WARNING: Hazardous Voltage! Disconnect power before removing modem part.

Open the single box by removing the screws and lift the top part gently straight up.

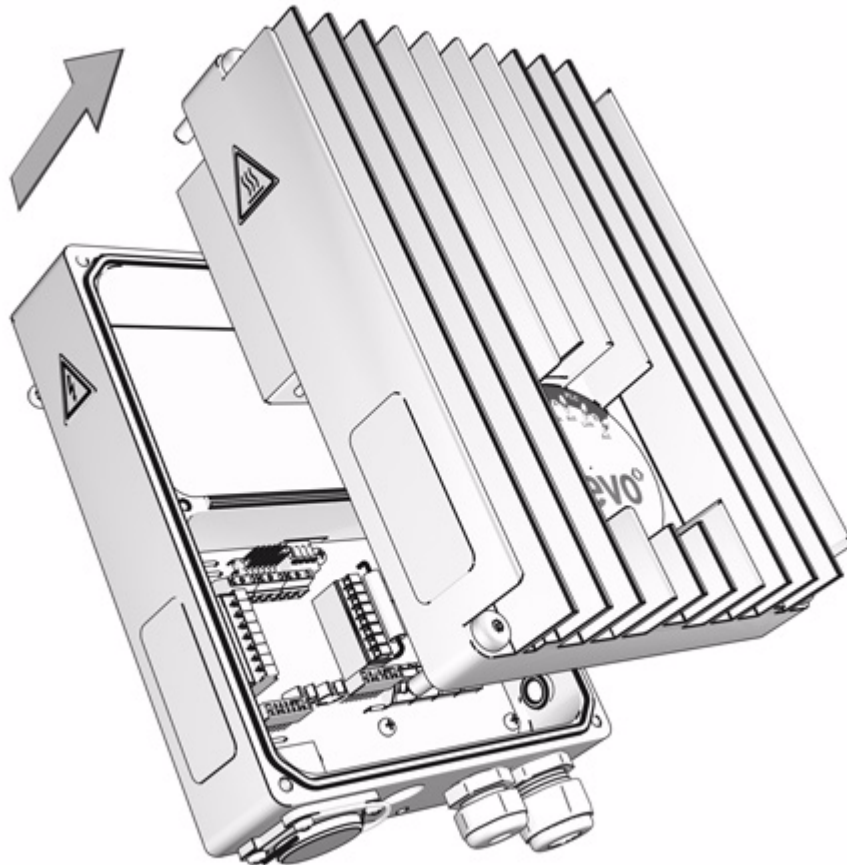


Figure 5. Dismounting/mounting

When having one coupler cable - use cover plug.

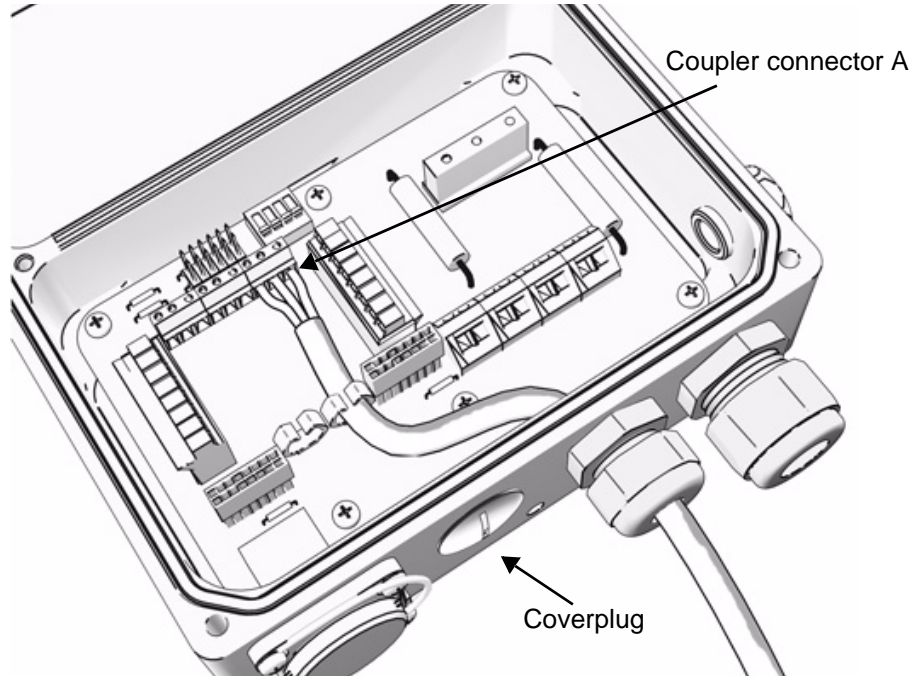


Figure 6. Unit with normal TD coupling installation (ILV2010 and ILV2110)

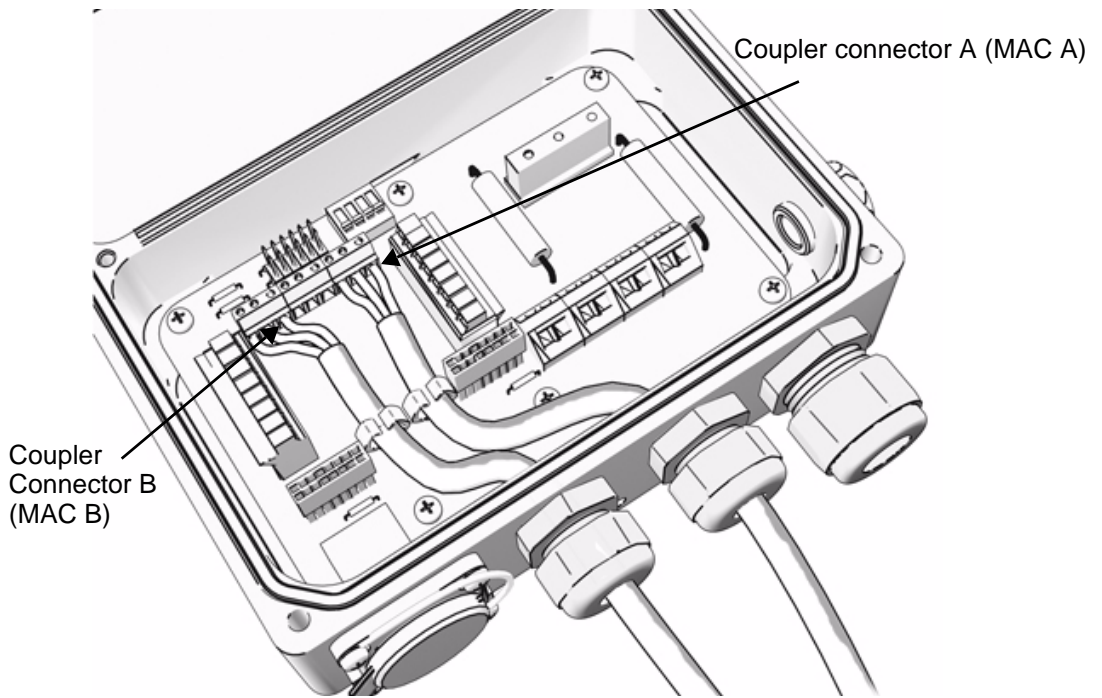


Figure 7. ILV2120 unit with normal FD coupling installation



NOTE: In ILV2120, connector A = MAC address A, Connector B = MAC address B



NOTE: For information about combining for single injection point, see Appendix.

C. Switch

The switch on the board is not yet supported. The positions shall be all **Off**.

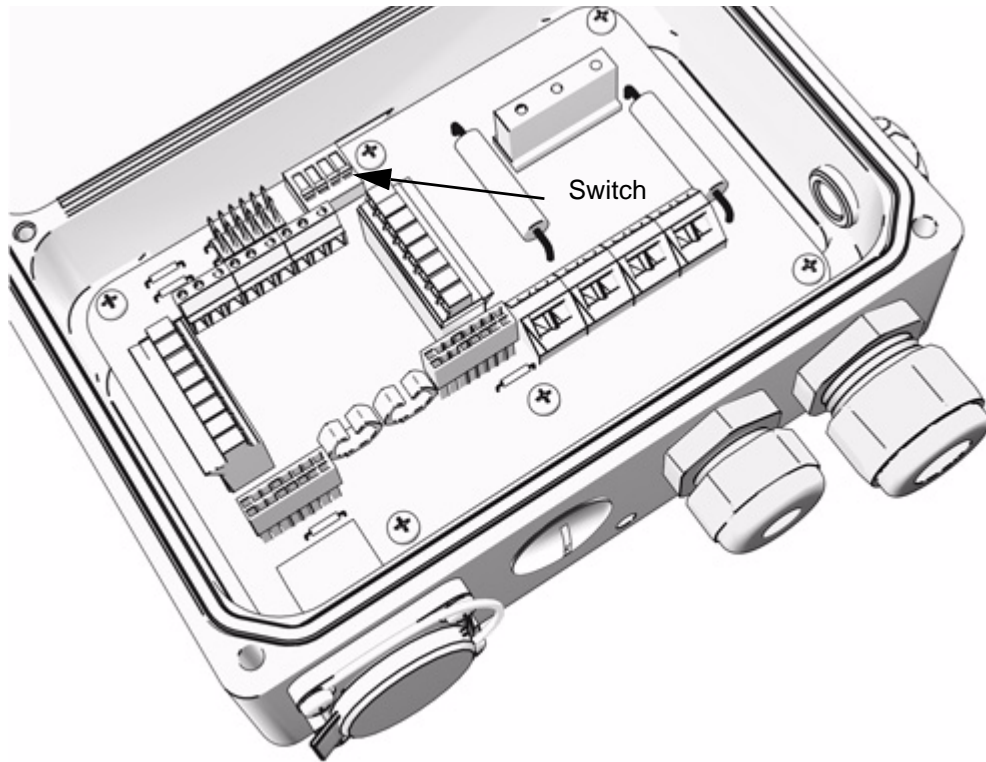


Figure 8. Switch

D. Installation of Mains Supply



WARNING: When performing an overvoltage category III or overvoltage category IV installation, the mains supply cable shall be connected together with an external transient protection.



CAUTION: An appropriate disconnect device shall be provided as part of the building installation

The voltage rating for the main voltage must not exceed 240 V.



NOTE: As the equipment does not incorporate any disconnect device, the fuses or a disconnect device incorporated in the building installation wiring must be readily accessible.

Use the following components when installing the single box.

Fuses

The phase must be fuse protected.

Current rating ≥ 3 A, ≤ 16 A

Voltage rating ≥ 250 V

Breaking Capacity ≥ 50 kA

Breaking Characteristic gG

Disconnecting Device

Voltage rating ≥ 500 V

Breaking current capacity ≥ 6 A

Transient voltage rating ≥ 6 kV

Contact separation of minimum 3 mm

Connection Steps



WARNING: Hazardous Voltage!

Make sure to complete all physical installation before connecting to mains!

The power cable goes through a M20 cable gland. The default cable gland can be used with cables with diameter 10-14mm. The three terminals (Phase, Neutral and Functional Ground) have a screw terminal each for 2.5mm² cables.



NOTE: It is not required to connect protected earth. The single boxes are class II equipment

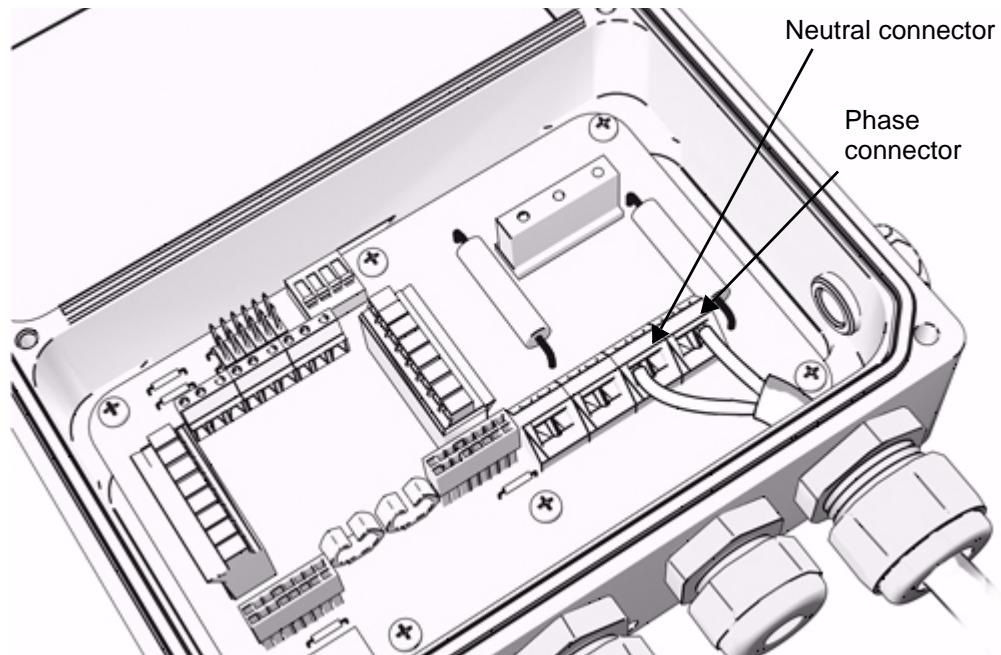


Figure 9. Connection of power cable

E. Top Part Change

All cables are connected in the bottom part of the housing and all electronic parts (power supply, modem board) in the top of the housing, so it's possible to swap the electronic part without dismantling the cables.



WARNING: Hazardous Voltage! Disconnect power before removing modem part.

Open the unit by removing the screws and lift the upper part gently straight up.

Replace the top part.

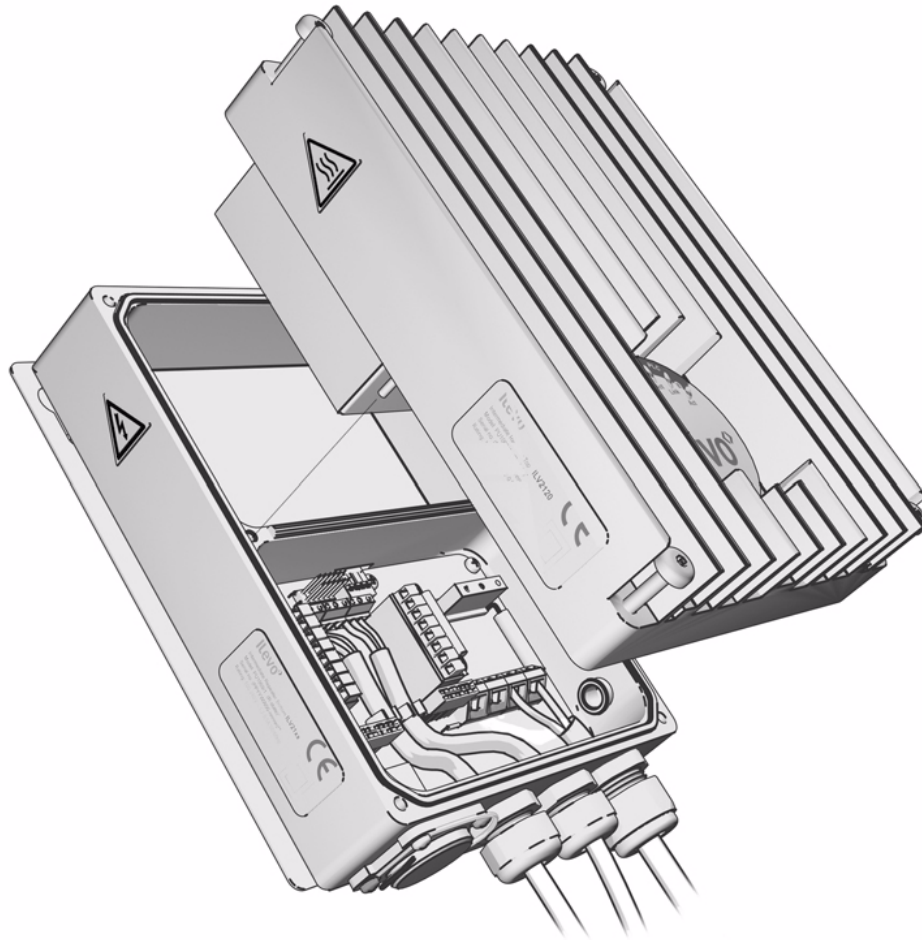


Figure 10. Upgrading of unit

F. Filters

The FIF100 products has two filters; one high pass filter and one low pass filter. The filter can easily be replaced when the box is opened.

For more information about frequencies, see *ILV Access System Configuration Manual*.

If the filter is not needed, it can be by-passed by jumpers (see See “Shorting Jumpers” on page 9.).

FIF100

	PP1102/1	PP1102/2	PP1102/7	PP1102/8	PP1102/9	PP1102/10	PP1102/11	PP1102/12
Modes channel A:	5, 14, 15	11, 12	3	1, 10, (7)	7	4	2	8
Modes channel B:	1, 10, (7)	7	1, 10, (7)	2	8	3	3	5, 14, 15, (2, 3)

Filter Installation

The modules comes with 2.54mm shorting jumpers pre-assembled. Remove the jumpers and install the filter as in figures 11 and 12.



NOTE: Make sure that all pins are connected.

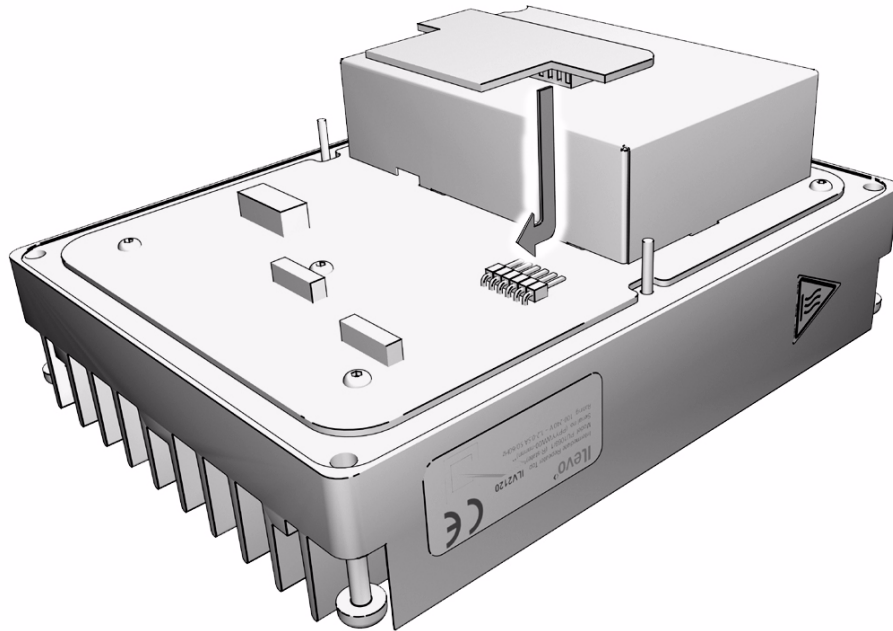


Figure 11. Mounting of filter

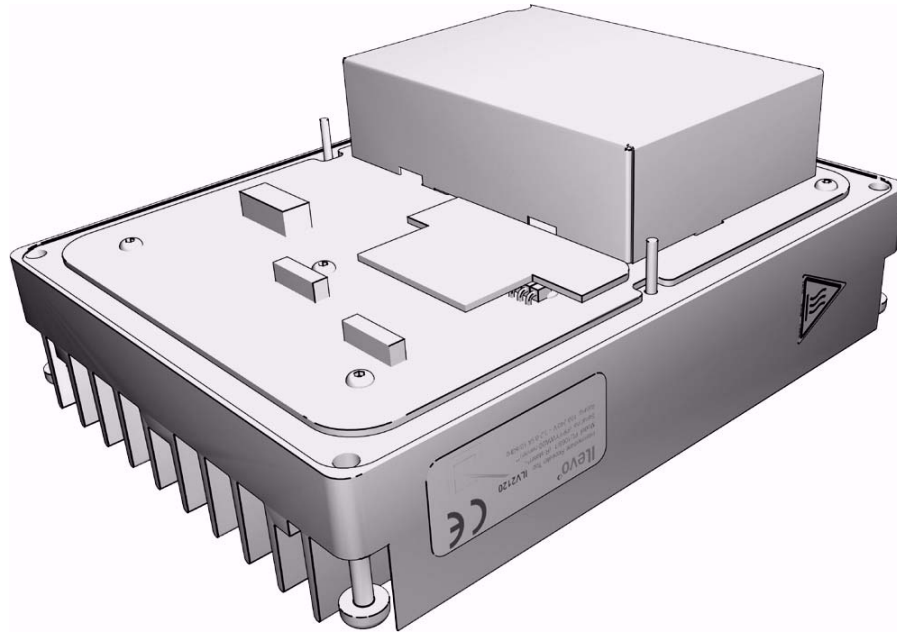


Figure 12. Filter mounted

Shorting Jumpers

The module comes with 2.54mm shorting jumpers pre-assembled. These shall be positioned as in the picture below. These jumpers shall be mounted when no filter is used.

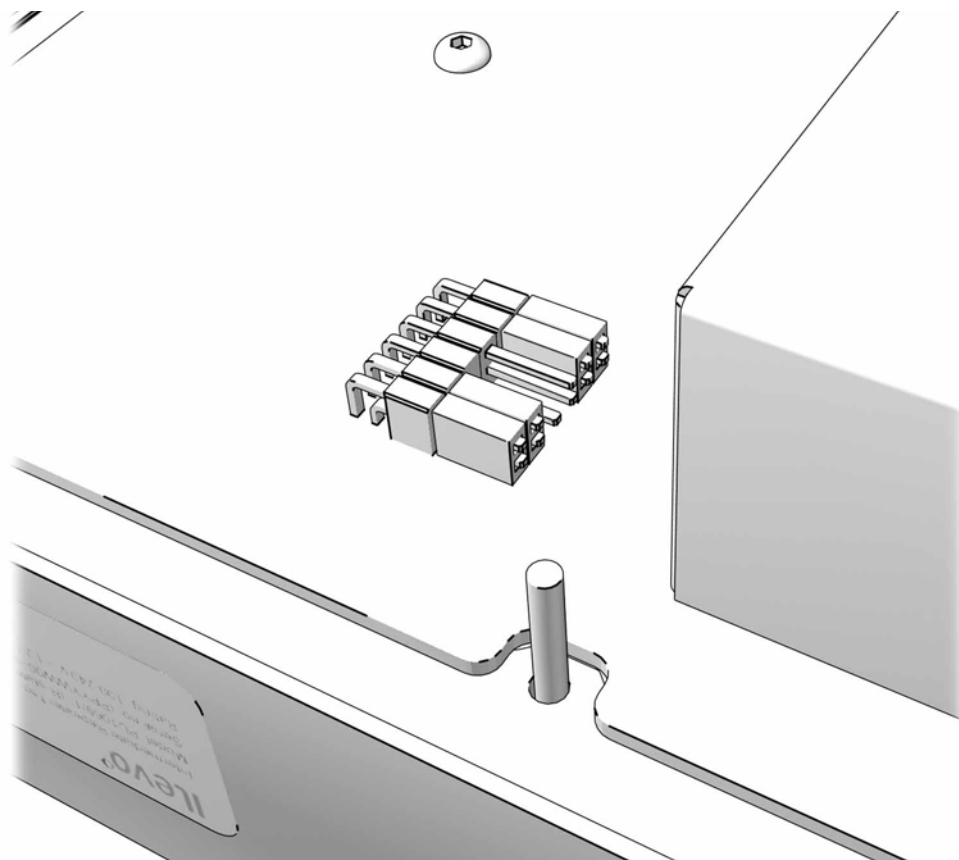


Figure 13. Shorting jumpers

G. Ethernet Interface

A 10/100BASE-T connection is used for backbone and local management. The connector is an RJ45 and it is accessible without opening the unit. The Ethernet connector is protected with a tightly closing cover.

R-state R1 of PU1071/1 (ILV2010), PU1067/1 (ILV2110) or PU1060/1 (ILV2120) use MDI. To connect equipment using:

- MDI-X (such as hub or switch), use a Category 5 straight-through STP cable.
- MDI (such as PC), use a Category 5 crossover STP cable.

R-state R2 of PU1071/1 (ILV2010), PU1067/1 (ILV2110) or PU1060/1 (ILV2120) use MDI-X. To connect equipment using:

- MDI-X (such as hub or switch), use a Category 5 crossover STP cable.
- MDI (such as PC), use a Category 5 straight-through STP cable.

Ilveo offers IP67 classed Category 5 STP cables as accessories, PC1265.



NOTE: For configuration, the Ethernet interface is named EXTB in circuit A (MAC).

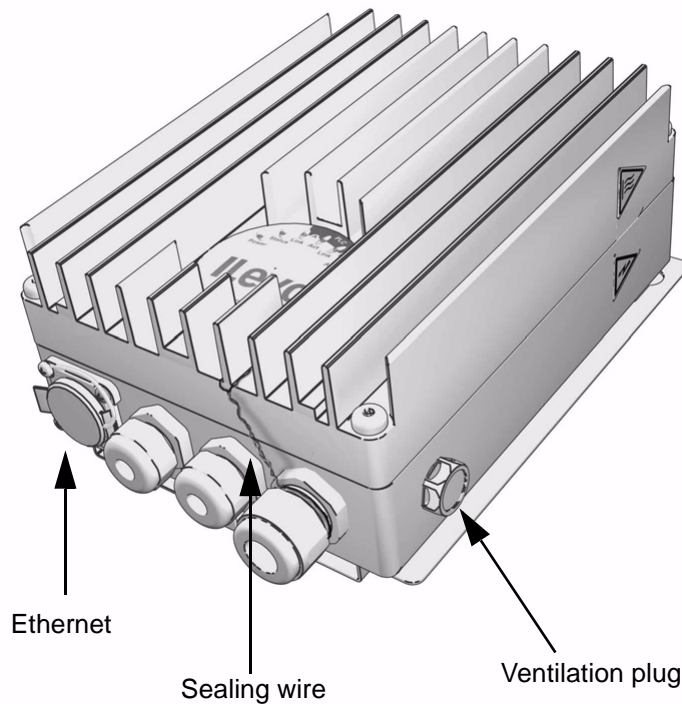


Figure 14. Ethernet and ventilation plug

H. Ventilation Plug

The ventilation plug allow enclosures to equalize pressure, preventing the ingress of air and moisture around seals and preserving seal integrity.

I. Sealing Wire

The construction makes it possible to “seal” the unit. See figure above.

Status LEDs

A. Status LEDs Functionality

ILV2010 Status LEDs



Figure 15. ILV2010

LED	STATUS	DESCRIPTION
1. Power	On Off	Power is being supplied to ILV2010 No power to the modem. Check installation.
2. Status	On Off Short-Short-Short-Short-Short Long- Long-Long-Long-Long Short-Long-Long-Long-Long Short- Short-Long-Long-Long	Operating OK Modem failed to start correctly. Try to restart the modem. If the same error returns, service is needed. Firmware upgrade of the supervision system. During the upgrade, the supervision system (temperature and voltage monitoring) is temporary disabled. The upgrade takes approx. 2-3 min. and will be done automatically if a new repeater firmware includes a new supervision firmware. If the LED keeps flashing for more than 5 min., the unit needs service. Indicates low/high temperature alarm. The modem is still functioning. Shutdown because of high temperature. The power up sequence will start if the temperature drop to the start limit. Shutdown because of internal power supply failure. Service needed.

LED	STATUS	DESCRIPTION
2. Status	Short-Short-Short-Long-Long	Boot sequence aborted because of internal power supply failure. Power up sequence tries up to three times. If all tries fail the controller will keep the modem in power off. The retry-counter will be reset after 100 seconds with normal operation. Service needed.
3. PLC link	On	PLC Link. Slave mode: On if the modem is linked with its master. Master mode: On when data is sent to connected CPE/slave part of other repeater.
4. PLC act	Flashing Off	Master mode: Flashing continuously. No PLC activity
5. Eth link	On Off	Ethernet link established. No link.
6. Eth act	Flashing Off	Ethernet activity No Ethernet activity

ILV2110 Status LEDs



Figure 16. ILV2110

LED	STATUS	DESCRIPTION
1. Power	On Off	Power is being supplied to ILV2110 No power to the modem. Check installation.
2. Status	On	Operating OK

LED	STATUS	DESCRIPTION
2. Status	Off	Modem failed to start correctly. Try to restart the modem. If the same error returns, service is needed.
	Short-Short-Short-Short-Short	Firmware upgrade of the supervision system. During the upgrade, the supervision system (temperature and voltage monitoring) is temporary disabled. The upgrade takes approx. 2-3 min. and will be done automatically if a new repeater firmware includes a new supervision firmware. If the LED keeps flashing for more than 5 min., the unit needs service.
	Long- Long-Long-Long-Long	Indicates low/high temperature alarm. The modem is still functioning.
	Short-Long-Long-Long-Long	Shutdown because of high temperature. The power up sequence will start if the temperature drop to the start limit.
	Short- Short-Long-Long-Long	Shutdown because of internal power supply failure. Service needed.
3. PLC link	On	PLC Link. On if the modem is linked with its master.
	Off	No PLC link. Check installation.
4. PLC act	Flashing	Flashing when the modem is under normal working conditions.
	Off	No PLC activity

ILV2120 Status LEDs

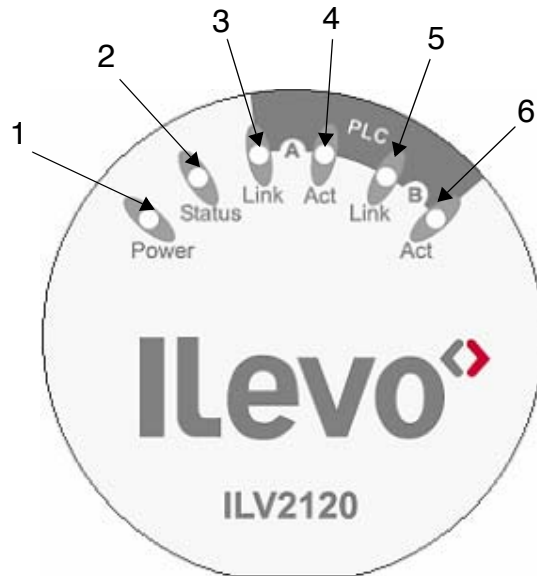


Figure 17. ILV2120

LED	STATUS	DESCRIPTION
1. Power	On	Power is being supplied to ILV2120
	Off	No power to the modem. Check installation.
2. Status	On	Operating OK
	Off	Modem failed to start correctly. Try to restart the modem. If the same error returns, service is needed.
	Short-Short-Short-Short-Short	Firmware upgrade of the supervision system. During the upgrade, the supervision system (temperature and voltage monitoring) is temporary disabled. The upgrade takes approx. 2-3 min. and will be done automatically if a new repeater firmware includes a new supervision firmware. If the LED keeps flashing for more than 5 min., the unit needs service.
	Long- Long-Long-Long-Long	Indicates low/high temperature alarm. The modem is still functioning.
	Short-Long-Long-Long-Long	Shutdown because of high temperature. The power up sequence will start if the temperature drop to the start limit.
	Short- Short-Long-Long-Long	Shutdown because of internal power supply failure. Service needed.
Short-Short-Short-Long-Long	Boot sequence aborted because of internal power supply failure. Power up sequence tries up to three times. If all tries fail the controller will keep the modem in power off. The retry-counter will be reset after 100 seconds with normal operation. Service needed.	

LED	STATUS	DESCRIPTION
3. PLC link A	On	<p>PLC link on interface A.</p> <p>Slave mode: On if the modem is linked with its master.</p> <p>Master mode: On when data is sent to connected CPE/slave part of other repeater.</p>
4. PLC act A	<p>Flashing</p> <p>Off</p>	<p>Slave mode: Flashing continuously when idle. Flashing faster when transmitting/receiving data from its master.</p> <p>Master mode: Flashing continuously</p> <p>No PLC activity</p>
5. PLC link B	On	<p>Slave mode: On if the modem is linked with its master.</p> <p>Master mode: On when data is sent to connected CPE or slave part of other repeater.</p>
6. PLC act B	<p>Flashing</p> <p>Off</p>	<p>Slave mode: Flashing continuously when idle. Flashing faster when transmitting/receiving data from its master.</p> <p>Master mode: Flashing continuously</p> <p>No PLC activity</p>

Combining Filters

A. Single Injection Point When Using FDD

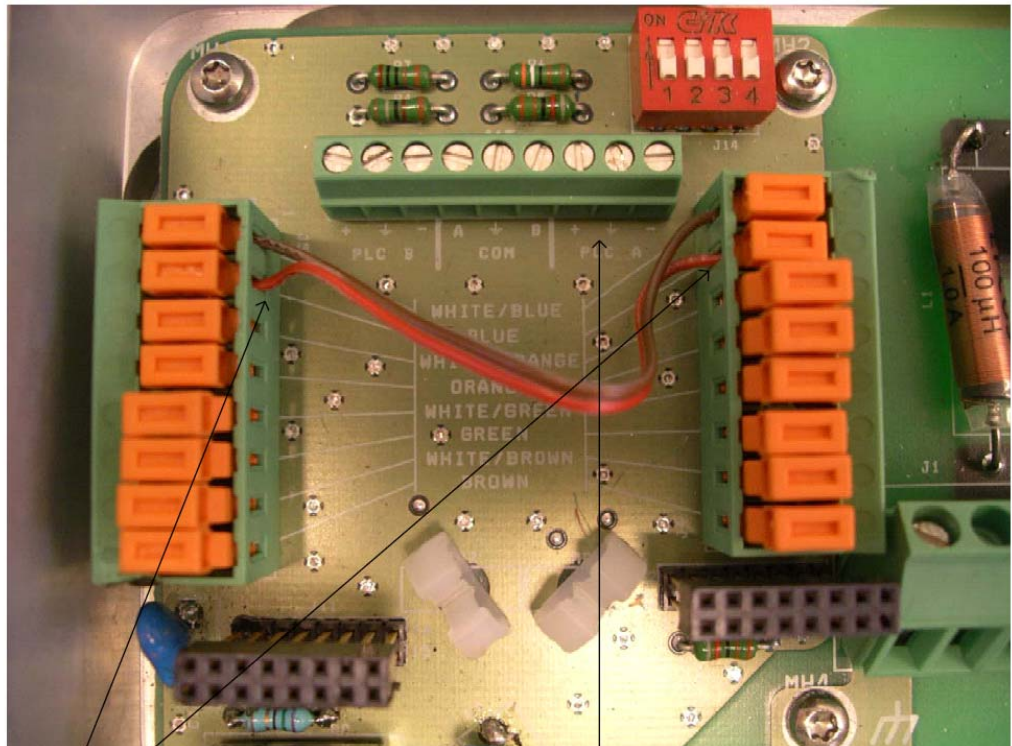


NOTE: This chapter is valid when using products FIF100 - PA1038/1, PA1038/2, PA1038/3, all version R1X.

How to Connect Single Injection Point

We recommend to always use two injection points for FD coupling. (See coupling documentation). Sometimes, due to limited space or network limitations a single injection point is preferred. This is done by connecting two signal interfaces on the connection board. A single point injection may result in reduced performance of the FD repeater and a more complex configuration by use of powermasks.

Connect it as in figure below and follow the cable data in the table below to know what kind of cables to be used. The cables shall be twisted or paired.



Connect WHITE/BLUE to
WHITE/BLUE and BLUE to BLUE

Connect coupler to interface A

Figure 18. Straps

	Min	Max
Solid Wires	0.13 mm ²	0.31 mm ²
Stranded Wires	0.22 mm ²	0.34 mm ²



ILV2010, ILV2110, ILV2120 Installation Guide ENG PM1065/1 PC1

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