REFUcontrol

Manual

for REFUcontrol RC-10, RC-11, RC-12

Variants	REFUcontrol RC-10	REFUcontrol RC-11	REFUcontrol RC-12
Art. No. (Components)	924002	924003	924004
Art. Nr. (Cabinet with wiring/documentation)	924005	924006	924007

1 Important Note

The use of products described in this manual is oriented exclusively to:

- Qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.
- Qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

2 Copyright

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3 Scope

Almost every solar plant needs some kind of monitoring or remote control solution. The modular REFUcontrol solution is based on the proven, industry graded PLC solution from Phoenix Contact.

Standard tasks like inverter data forwarding of RS485 connected solar parks to the REFUlog monitoring portal or remote active power control can be used out of the box. This means, no configuration is needed in most of the installations.

All kinds of individual requirements for professional park management with active and reactive power control, direct marketing and remote control can be realized with the support of qualified Phoenix Contact Solution Partners. Please contact us for more details.

References

This manual is intended as a setup guide. It does not replace the manuals of the components:

1) Installing and operating the ILC 191 ME/AN and ILC 191 ME/INC Inline controllers, available at www.phoenixcontact.com
2) Installation manual REFUsol 08K … 23K, available at www.refu-sol.com

4 Installation

Please refer to Phoenix Contact Manual for installation instructions of the ILC controller, the power supply and its components
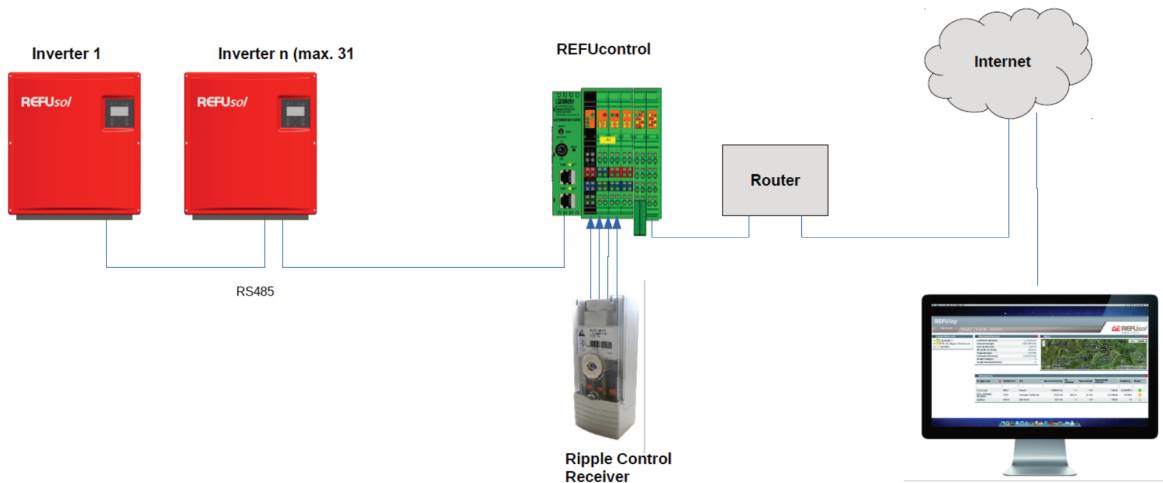

Note:

Terminals 1.3 and 2.3 on connector 1 can be jumpered if the communications power and the segment voltage are not to be electrically isolated.
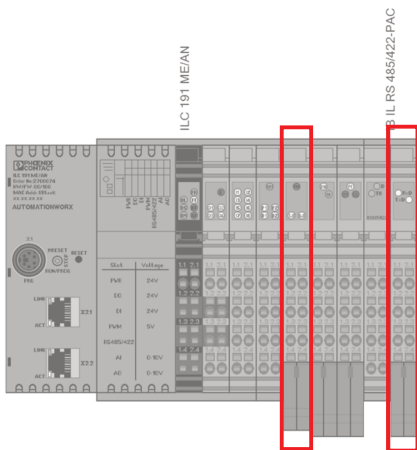
5   Wiring of RS485 connected parks

The following scheme shows the connection of REFUcontrol to RS485 connected parks:

Up to 25 inverters can be connected to one RS485 interface of the ILC controller. REFUcontrol RC-12 provides 2 RS485 ports for connection up to 50 solar inverter (25 inverters connected to each RS485 port).
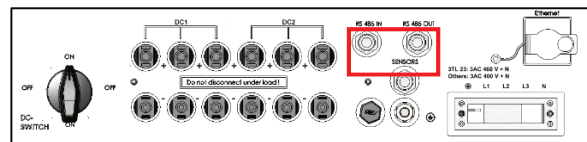

Where to find the RS485 Interface

ILC 191 Terminals   **REFUsol 08K … 46K Terminals**

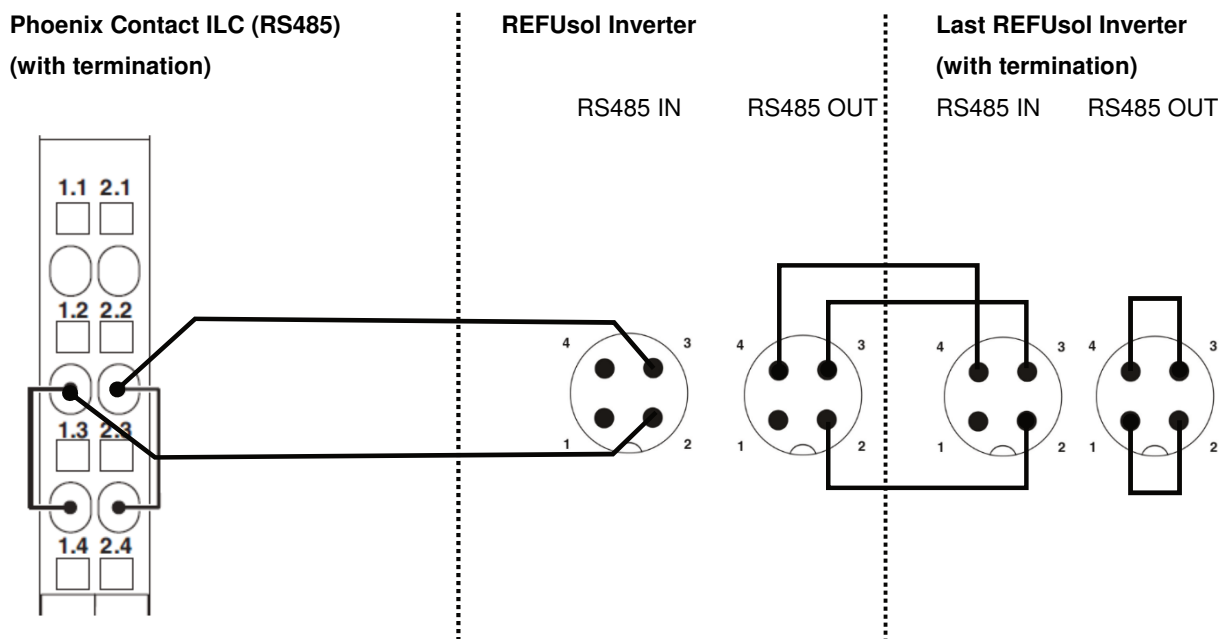Please note: the additional IB IL RS 485/422PAC module is only present on RC-12

Connection between ILC 191 and REFUsol 08K … 46K

For the connection to the REFUsol inverter, a Phoenix Contact type M12MS SACC-4SC SH plug and a shielded twisted pair cable must be used. The outer diameter of the connecting cable can be max. 8 mm. Failure to observe this can lead to damage to the inverter and therefore void the warranty.

Phoenix ILC RS485	
Pin	Signal
1.2	RX+ (RS485+)
2.2	RX- (RS485-)
1.3	R+ (Termination resistor +)
2.3	R- (Termination resistor -)
1.4, 2.4	Functional earth ground

REFUsol Inverter RS485	
Pin	Signal
Pin 1	(only used for termination)
Pin 2	RS485+
Pin 3	RS485-
Pin 4	Reference

Use the following connection scheme between Phoenix Contact ILC and the REFUsol solar inverters.

Phoenix Contact ILC (RS485)
(with termination)

REFUsol Inverter

RS485 IN   RS485 OUT

Last REFUsol Inverter
**(with termination)**

RS485 IN   RS485 OUT

Termination

Termination of the RS485 bus is necessary on the Phonenix Contact ILC between Pin 1.3 – 1.4 and Pin 2.3 – 2.4 with two wire bridges.

Termination of the RS485 bus is necessary at the last REFUsol inverter between Pin 1 – Pin 2 and Pin 3 – Pin 4 with two wire bridges.

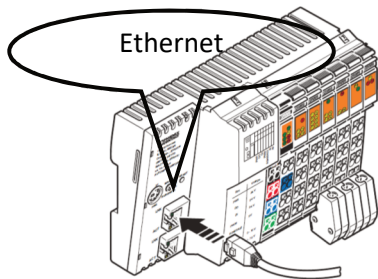# 6 Wiring of Ethernet connected parks

The following scheme shows the connection of REFUcontrol to Ethernet connected parks.

Typically, a group of inverters are connected to a Ethernet switch, switches are interconnected to each other, and the last switch is connected to REFUcontrol:
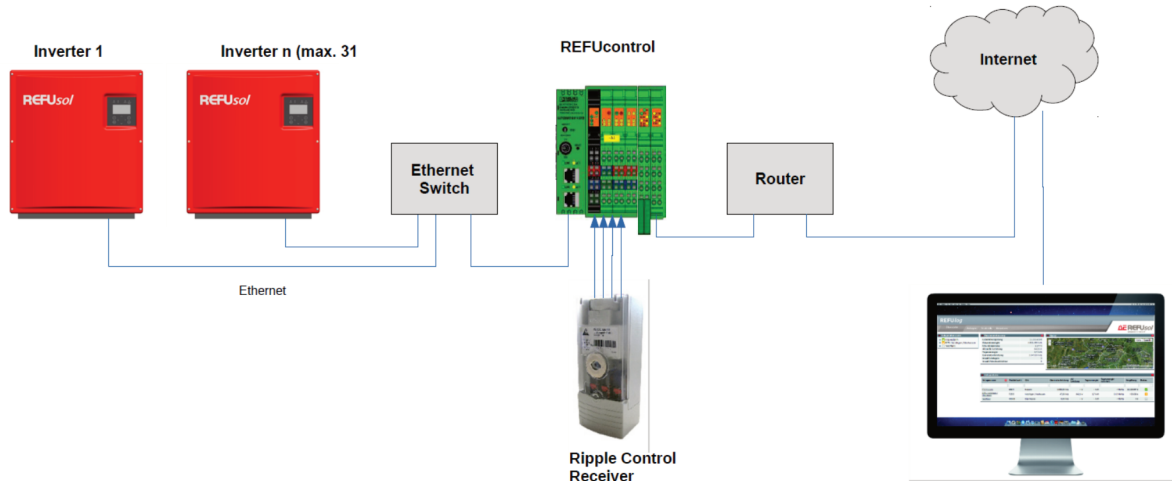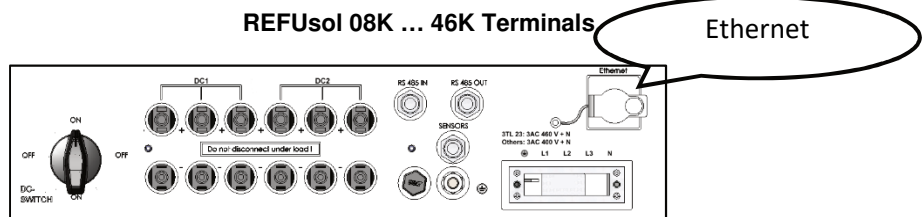

Inverter connection

ILC 191 Terminals   **REFUsol 08K … 46K Terminals**
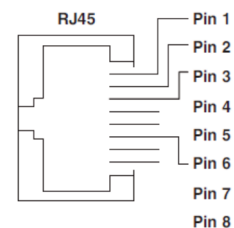

Use an Ethernet cable according to at least CAT5 of IEEE 802.3 with S/FTP design (shielded foiled twisted pair).

For the Inverter connection, use Phoenix Contact plug type Quickon VS-08-RJ45-5-Q/IP67.

Ethernet Connection

Pin	Signal
Pin 1	T +
Pin 2	T -
Pin 3	R +
Pin 6	R -

Observe the bending radii of the Ethernet cables used.

The interface is able to switch over the transmitter and receiver automatically (auto crossover).

7 Wiring of Remote Step control of active power

This function can be used to connect Ripple control receiver (Rundsteuerempfänger) to control the power in steps of 100%, 60%, 30% and 0%. The signal is transmitted via RS485 and Ethernet to any connected inverter using broadcast messages.

REFUcontrol RC-10

The digital inputs of the Phoenix ILC 151 can be found at the 3rd connectors segment:
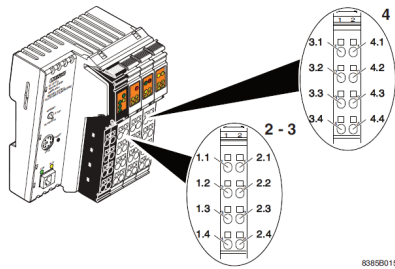
Terminal Assignment

Connect the ripple control receiver to Digital inputs 1 to 4 on the Phoenix Contact ILC 151 as follows:

ILC Terminals	Assignment	Name	Pre-configured setpoint in % from rated AC power
1.1	I1	Digital Input 1	0%
2.1	I2	Digital Input 2	30%
1.2, 2.2	24 V	Power Supply UM for 2 and 3 wire connection	
1.3, 2.3	GND	Earth connection for 3 wire connection	
1.4	I3	Digital Input 3	60%
2.4	I4	Digital Input 4	100%

REFUcontrol RC-11 and RC-12

The digital inputs of the Phoenix ILC 191 ME/AN can be found at the 3rd connectors segment:
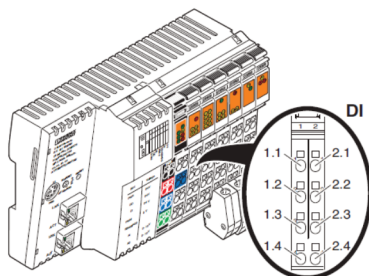

ILC Terminals	Assignment	Name	Pre-configured setpoint in % from rated AC power
1.1	I1	Digital Input 1	0%
2.1	I2	Digital Input 2	30%
1.2	I3	Digital Input 3	60%
2.2	I4	Digital Input 4	100%

Note: If you need a different power limitation function, see chapter Configuration.

8   Commissioning

Please follow these steps to start-up the system:

1) Switch on power supply
   a. The UL, UM, and US LEDs light up
   b. after around 10 seconds, the FR and RDY LEDs are flashing

2) Check operation mode
   a. The dip switch has to be in position „RUN/PROG"
   b. LED „FR" on

3) Testing RS485 connection (if used)
   a. LED „TxD" yellow flashing: sending data
   b. LED „RxD" yellow flashing: receiving data

4) Testing Digital Inputs (if used)
   a. LED „I1" … „I4" yellow on: the corresponding input is set
   b. Solar Inverters will display a message in the display if power reduction is active

5) Testing Ethernet Connection
   a. LED „LNK" green on: Connection established successfully
   b. LED „ACT" yellow on: data transmission active (sending or receiving data)
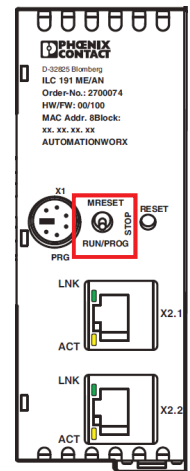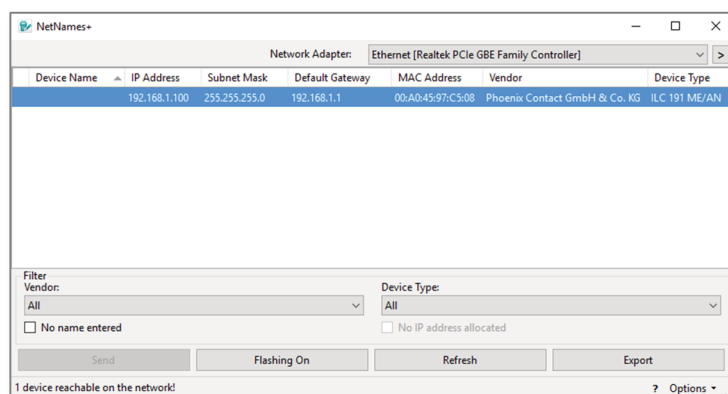
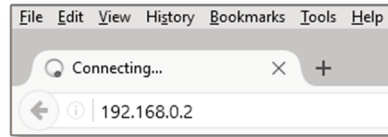# 9   Configuration

Reaching the device

REFUcontrol will receive an IP configuration from Switch or Router with the activated DHCP function. In this case, the assigned IP address needs to be verified using the web interface of the Switch or Router.

Alternatively, the free PC tool NetNames+ from Phoenix Contact can be used, which is part of the development environment PC Worx:

If it is connected to a PC (without DHCP server), it will use the pre-assigned address **192.168.0.2**

The internal configuration pages of REFUcontrol can be accessed with a web browser, by typing the IP address of the REFUcontrol into the address bar of the browser:

Screens

Login Screen

Input of the password level1, to reach the basic configuration screens. Input of password level2, to reach the configuration screens for power control.

Confirm the password with Enter Key and click on the Lock symbol:

DNS IP

As default setting the Google DNS IP address 8.8.8.8 is used. If you need another DNS Server address, you can change this in the field „new DNS IP".

Home Screen

Select from the following option:

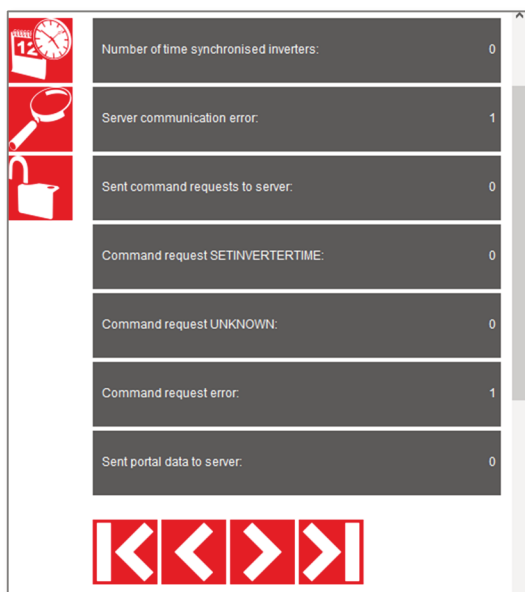|	
	Date and Time settings
	Communication statistics
	Logout

Date and Time settings

Input the date in format day / month / year and time in format hour / minute / second.

Saving Date and Time on the control with upper Save Button, sending the Date / Time to all connected inverters with the lower Save button.
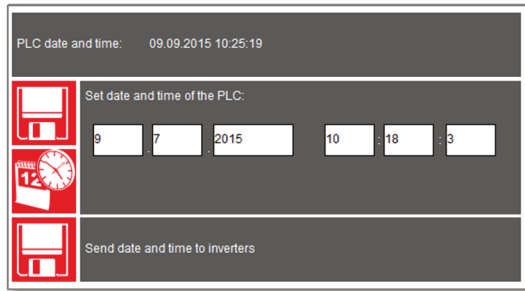
Communication Statistic

Using the arrow keys to change between the screens.

Power Reduction Settings

|	
Current active power Setpoint	Shows actual power setpoint
Enable Active Power Management	Enable / disable Active Power Management
Fix active power setpoint	Fix active power setpoint as a percentage of the rated AC power of the inverter
Enable setpoint from digital input	Enable /disable setpoint from digital input
Active power setpoint for invalid digital input combination	Active power setpoint for invalid digital input combination as a percentage of the rated AC power of the inverter

Switch between the available screens with the Arrow Keys

Saving the Settings with Save button.

With Back Button the screen is closed without saving the settings.
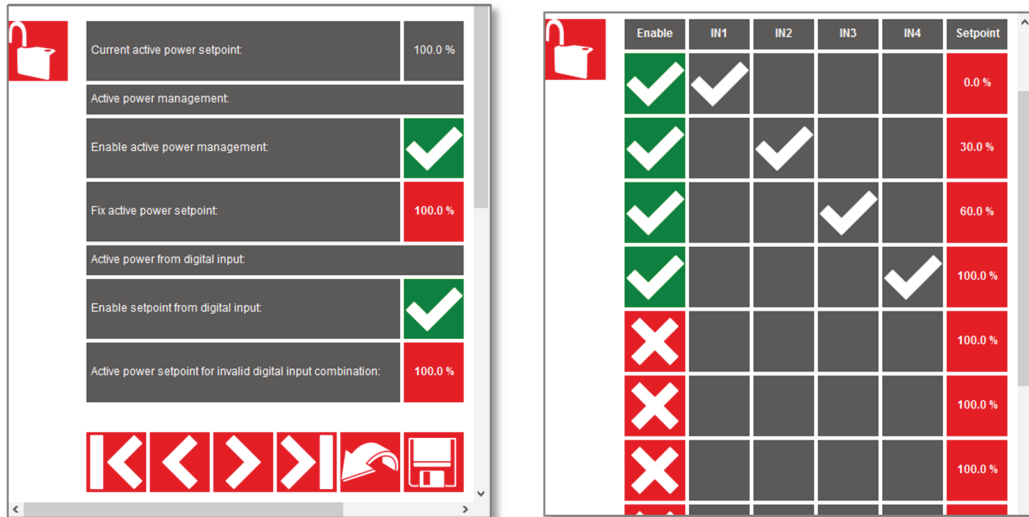
10 Technical Data

Variants	REFUcontrol RC-10	REFUcontrol RC-11	REFUcontrol RC-12
Art. No. (Components)	924002	924003	924004
Art. No. (Cabinet with wiring/documentation)	924005	924006	924007
Application	for Ethernet connected parks	for RS485 connected parks with up to 25 REFUsol inverters	for RS485 connected parks with up to 50 REFUsol inverters
FUNCTIONALITY			
Data forwarding to REFUlog	✓	✓	✓
Data collection from REFUsol inverters (RS485)	-	✓	✓
Power reduction via 4 Digital Inputs (RS485)	-	✓	✓
Power reduction via 4 Digital Inputs (Ethernet)	✓	✓	✓
Time synchronization of inverters with REFUlog	✓	✓	✓
Reactive Power control at Point of Inter-connection	-	-	-
Active Power control at Point of Inter-connection	-	-	-
Connection to remote control IEC 60870-5-104 or Modbus TCP	-	-	-
Connection to direct marketing platforms	-	-	-
Connection of Irradiation/Temperature sensor	-	-	-
Customized functions	-	-	-
Master Park Control	-	-	-

COMPONENTS			
Control	ILC 151 ETH	ILC 191 ETH ME/AN	ILC 191 ETH ME/AN
Power Supply	UNO-PS/1AC/24DC/ 30W		
Inline communication terminal	-	-	IB IL RS UNI-PAC
INTERFACES			
Digital Inputs	4	4	4
RS485 interface	-	1	2
Ethernet interfaces	1	2	2
ELECTRICAL DATA			
AC nominal input voltage range (V)	100 … 240		
Frequency range AC (Hz)	45 … 65		
Max. used power (W)	5.0	7.5	8.0
Typical max. current (mA)	210	310	325

MECANICAL / ENVIRONMENTAL DATA		
	Components	**Cabinet**
for Art. No.	924002 / 924003 / 924004	924005 / 924006 / 924007
Dimensions (Width x Height x Depth, mm)	max. 127 x 135 x 90	400 x 400 x 200
Weight (kg)	max. 0.6	~ 3
Housing	plastic	Metal, coated
Colour	green / grey	grey (RAL 7035)
Protection Degree	IP 20	IP 54
Protection Class	III, IEC/EN 61140, VDE 0140-1	I
Ambient Temperature range (operation)	-25 °C … 55 °C	
Ambient Temperature range (storage/transport)	-25 °C … 85 °C	
Air Humidity range (operation/storage/transport)	10 % … 95 % (nach DIN EN 61131-2)	
Air pressure (operation/storage/transport)	70 kPa … 106 kPa (bis 3000 m üNN)	

Please address any questions on malfunctions or technical problems to:

Europe

Service-Hotline: +49 (0)7121 4332 – 333

                          (Monday - Thursday, 8am to 5pm, Friday 8am to 4pm)

Online

Email: service@refu-sol.com

Website: www.refu-sol.com

Direct link: www.refu-sol.com/en/accessories/technischer-support/