

RI-DRTCP

Modbus RTU / Ethernet TCP Communication Gateway



- RTU to TCP and TCP to RTU converter for the **rayleighconnect™** system
- Compact size - 2 module (35mm width) DIN Rail mounting
- Connect up to 128 x Modbus devices
- 10/100Mbps Ethernet connection
- 230Vac Auxiliary Supply
- DHCP auto discovery via UDP broadcast

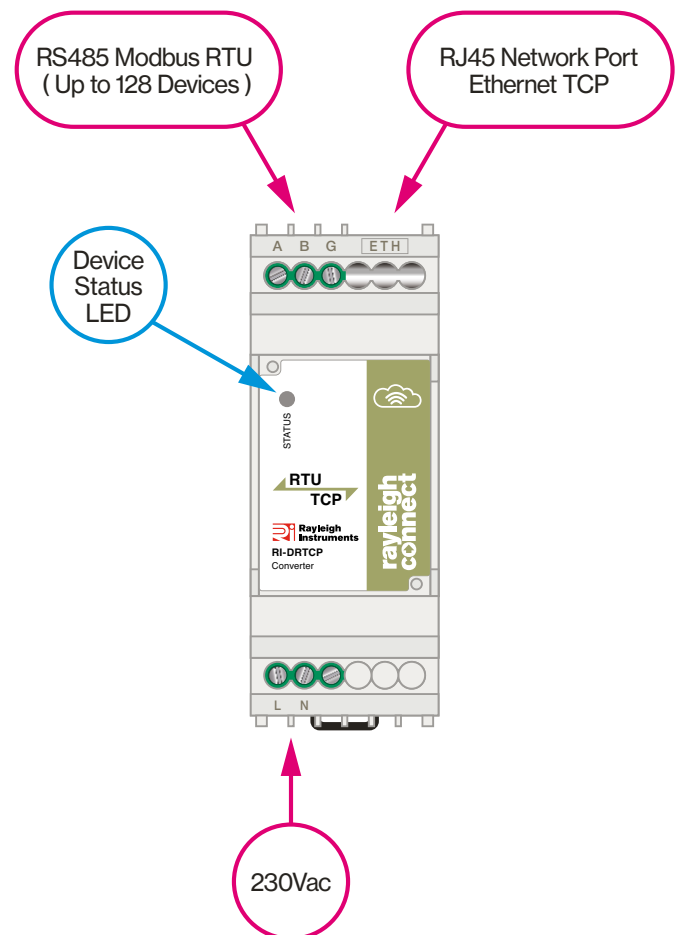
Product Description

The RI-DRTCP is a compact, easy-to-use DIN rail mounted bi-directional Modbus RTU to TCP protocol converter.

The RI-DRTCP forms part of the growing family of hardware devices designed to extend the connectivity of your **rayleighconnect™** cloud-based software platform.

The RI-DRTCP allows for communication between your meters and **rayleighconnect™** gateway via Ethernet, working like a bridge to utilise existing network infrastructure and minimizing expensive and disruptive wiring.

Supports built-in UDP broadcast auto-discovery for automated, zero-configuration IP routing across local networks and VLANs.



Display

Display Type	1 x LED
LED indicators	STATUS LED YELLOW - solid = operating mode not set (manually or automatically) GREEN - solid = operating correctly (mode set manually or automatically) YELLOW - flashing = An RTU $\Rightarrow$ TCP packet is being transmitted RED - flashing = RTU $\Rightarrow$ TCP packet transmission error detected

Connection

Ethernet	10/100Mbps (10 Base T/100 Base TX)
IP address	DHCP (Static IP configuration is also supported)
Modbus (RTU)	RS485

Auxiliary Supply

Voltage range	110V/230V ($\pm 10\%$)
Operating frequency	47...50...63Hz
Power consumption	<18VA

Outputs

Communication type	RS485
Communication protocol	Modbus
Number of bits	8bits (default) or 7bits
Stop bits	1bits (default) or 2bits
Parity	None (default), odd, even
Baud rate	4800, 9600 (default), 19200, 38400, 57600, 115200
Number of Modbus devices connected on the bus	Up to 128 (Note: requires a booster every 31 devices)
Max. distance from Slave device	1200M (longer with booster)
Modbus Interface	RTU

Insulation

Installation category	III
Pollution degree	2
Insulation voltage rating	300V L-N

Environmental Conditions

Reference temperature	23°C
Specified temperature operating range	-10°C...+55°C
Storage temperature	-20°C...+70°C
Relative humidity	0...85%, non condensing

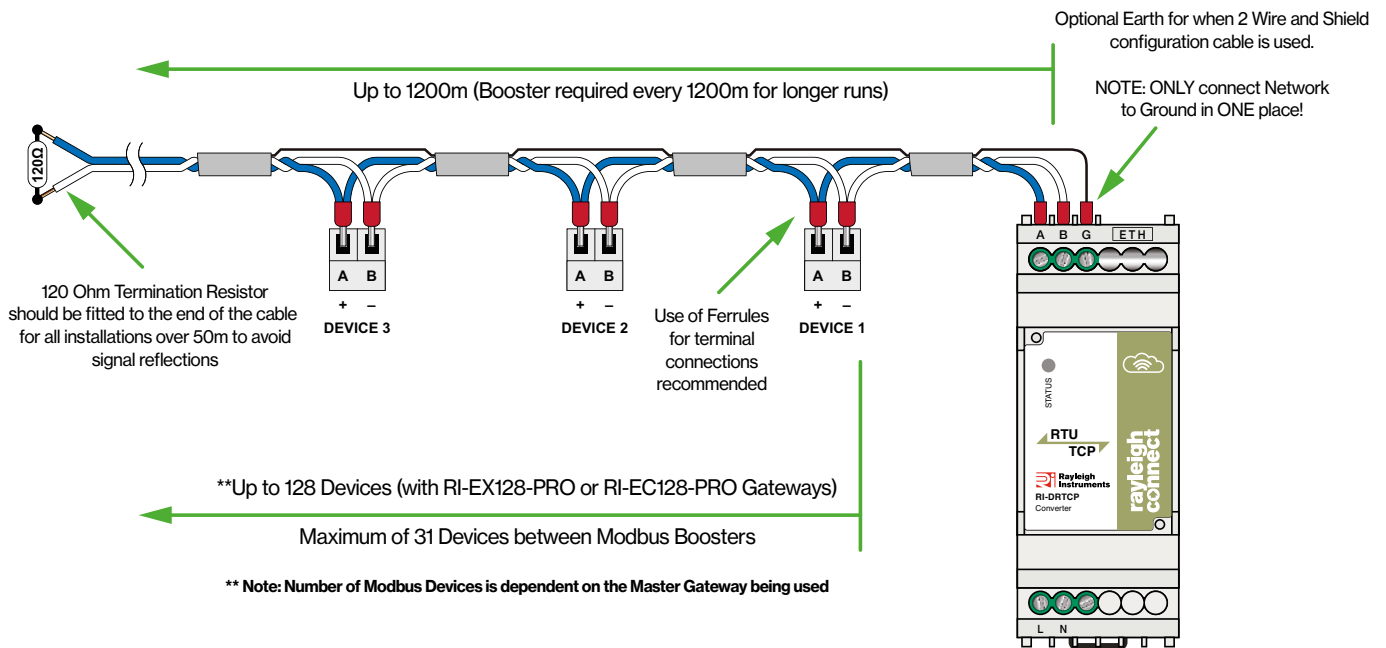
Mechanical

Housing	2 module DIN 43880
Mounting	Snap-on 35mm DIN rail
Housing material	Self-extinguishing polycarbonate (UL94 V-0)
Weight	<116g

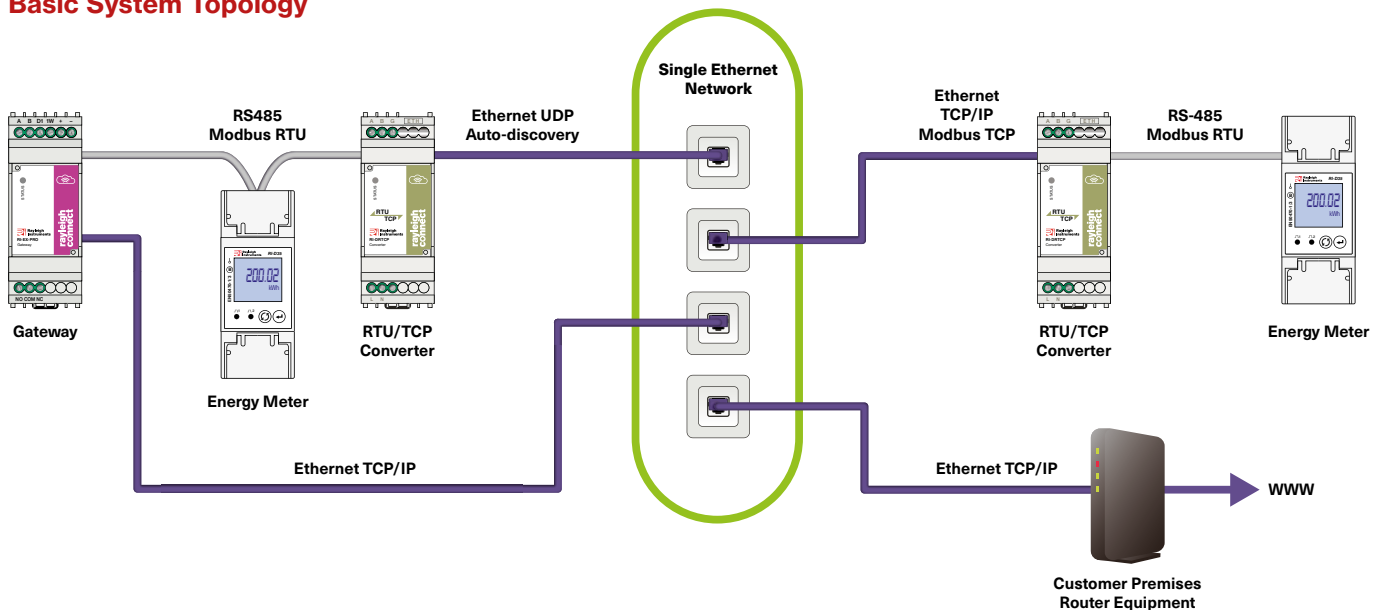
Conformity

Electromagnetic compatibility	IEC/EN55032, IEC/EN55016-2-3 Class B, IEC/EN61000-4-2, IEC/EN61000-4-3, IEC/EN61000-4-4, IEC/EN61000-4-5, IEC/EN61000-4-6, IEC/EN61000-4-11
Safety	IEC/EN61010

Modbus Connection



Basic System Topology

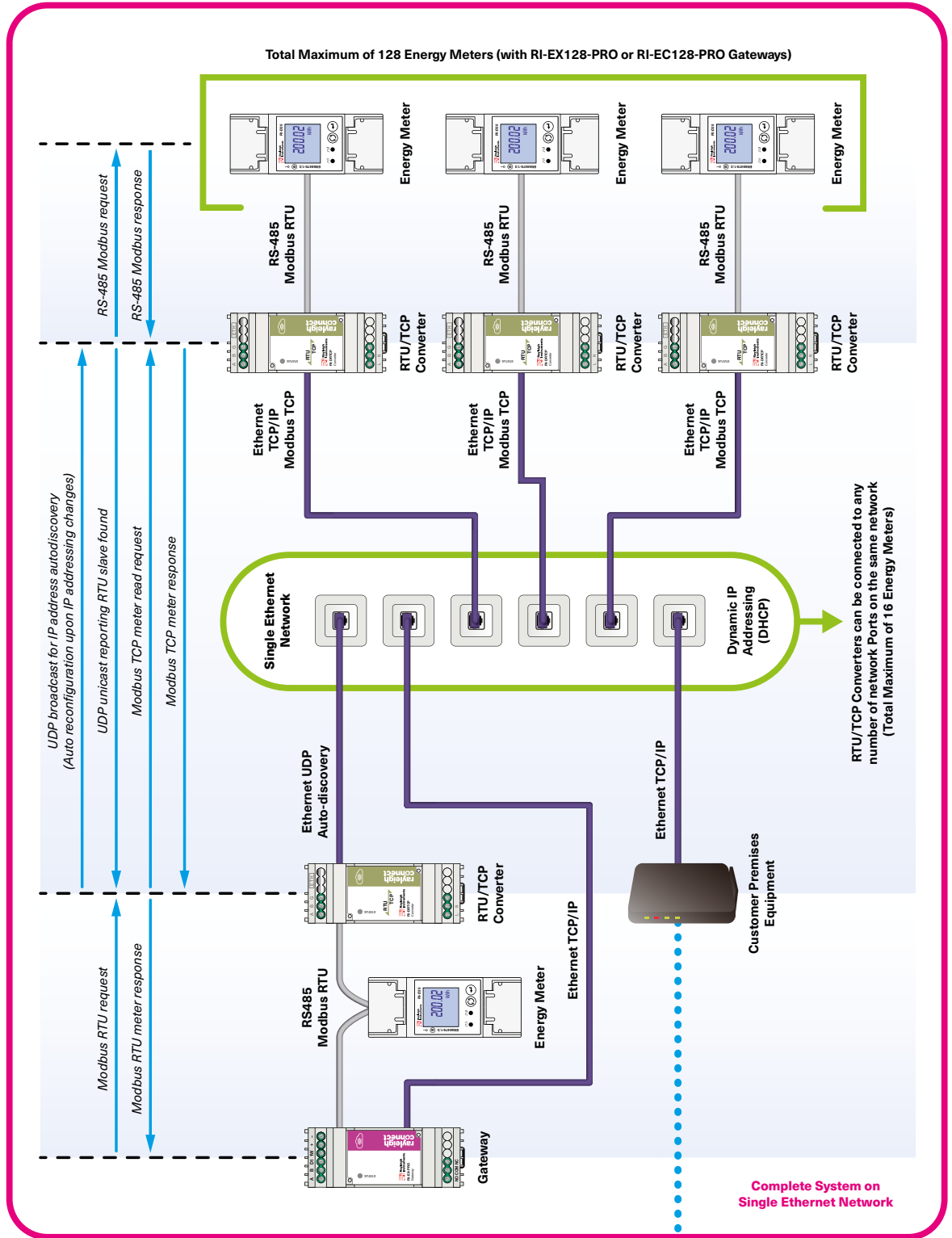


Principle of Operation Schematic

The number of Modbus Devices that can be connected to the system is dependant on the Master Gateway used.

When using the RI-EX128-PRO or RI-EC128-PRO Gateways up to 128 Modbus Devices can be connected and monitored.

These can be connected in any number of combinations. From one RI-DRTCP with 128 devices attached to 128 RI-DRTCP units each with 1 Modbus Device attached, or any combination in between.



Modbus RS485 Topology

Always ensure devices are disconnected from power when wiring this device.

Modbus RS485 cabling is different in some ways to standard power cabling. This may cause some electricians to experience difficulties in commissioning a system as an understanding of the network topology is essential.

A Modbus RS485 network connects a Master device, your RI-EX128-PRO or RI-EC128-PRO, to one or more Slave devices, your energy meter(s) or other Modbus devices.

A two-wire Modbus RS485 network operates in half-duplex mode on one twisted pair cable. All devices on the network can be transmitters or receivers but only one may transmit at any given time. The network must have one master device (RI-EX128-PRO/RI-EC128-PRO) which polls the network of slave devices and the slave then responds. All devices on the network receive any transmitted data but only the device for which the data is intended will respond if necessary.

Each device has two communication terminals labelled A and B .

On some devices the A terminal is labelled + and the B terminal labelled -
NB: Both cables in a Modbus RS485 network carry data.

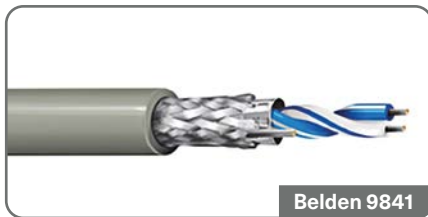
These terminals must be connected in parallel with all A terminals connected together and all B terminals connected together in a daisy-chain topology.

Modbus RS485 Cabling

All applicable local regulations should be followed when installing communication wiring.

The Modbus RS485 recommended cable characteristics are : twisted pair with tinned copper braid shielding. Minimum overlap: 65%. Gauge: AWG 24. Characteristic impedance: 120Ω. Maximum linear resistance: 100Ω/km. Maximum capacitance between conductors: 60pF/m. Maximum capacitance between conductors and shielding: 100pF/m. Maximum length of network cable: 1300m.

For cabling your RI-DRTCP network we recommend using Belden 9841 twisted-pair cable or equivalent. We also recommend that you use ferrules to ensure good clean connection with the terminals.



Shielded twisted-pair cable reduces network susceptibility to electromagnetic interference. The arrangement of successive coils, each facing in the opposite direction to the next one, effectively cancels out any magnetic field traversing the cable.

It can be difficult to assess if shielding is required in a particular network, however the use of shielded cable will reduce the likelihood of problems arising and is only slightly more expensive than unshielded. The shielding works like a Faraday cage to exclude external electromagnetic interference from disturbing the signals in the communication wires.

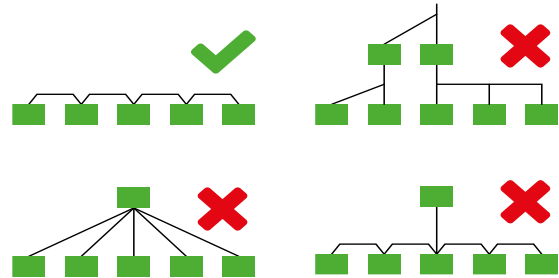
For installations where the cable run is 50 metres or more a 120Ω* resistor should be fitted to minimise signal reflections in the data cables; thus reducing communication error rates and electromagnetic emissions.

(*Resistor value = Impedance of wiring - typically 120Ω for twisted-pair cable)

Tree and Star networks are not permitted and will not function!

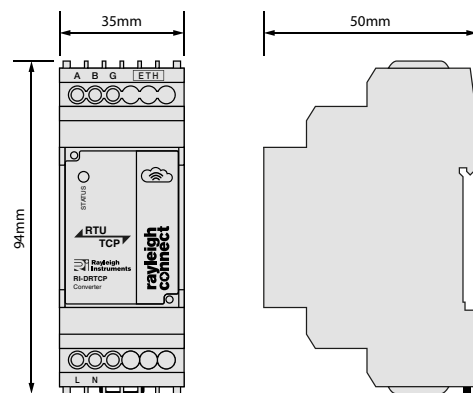
Inverting the A and B connections on one device will not only stop that device from communicating but may also stop all devices on the network from working.

For this reason we highly recommend that you plan ahead. Check the building plans and design the network on paper before you install. Choose a colour-code for your network and stick to it. This will help you to avoid errors in your installation. Also insure that your devices have a unique ID and are set up identically.



Termination resistors should only be at the extreme ends of a RS485 network in order to prevent signal reflection in an open circuit. Some RS485 devices have a resistor built in. If you use such a device and the resistor is not disengaged than you should only use this device at the extreme end of your network.

Dimensions (mm)



Model Selection Table

Communications	Model
Modbus RTU to Ethernet TCP Gateway	RI-DRTCP