FL COMSERVER ... 232/422/485

Serial RS-232/RS-422/RS-485 device server for industrial 10/100 BASE-T(X) networks

Data sheet
103827_en_08

1   Description

The **FL COMSERVER ... 232/422/485** enables the integration of serial RS-232, RS-422, and RS-485 interfaces for machine and system access via Ethernet networks. All controllers and control panels in industrial 10/100 Base-T(X) networks can thus be maintained remotely via the serial device server.

Features

– Can be mounted on EN DIN rails
– 10/100 BASE-T(X) autonegotiation
– 24 V AC/DC ±20% power supply
– Redundant power supply possible with FL COMSERVER UNI 232/422/485 and FL COMSERVER BASIC 232/422/485
– High-quality 3-way isolation (VCC//RS-232, RS-422, RS-485//Ethernet)
– Comprehensive diagnostics indicator
– Configuration with web-based management (WBM)
– Password-protected configuration
– COM port redirector software

Product designation	Temperature range	Data protocols	
		TCP/UDP	**Modbus gateway/PPP**
FL COMSERVER UNI 232/422/485	-25°C ... 60°C	✓	✓
FL COMSERVER BASIC 232/422/485		✓	
FL COMSERVER UNI 232/422/485-T	-40°C ... 70°C, free-standing (40 mm separation on all sides)	✓	✓
FL COMSERVER BASIC 232/422/485-T		✓	

> **NOTE: device damage**
> The device is intended for operation with SELV according to IEC 60950/EN 60950/VDE 0805 only. Only connect the device to devices that satisfy the requirements of EN 60950 (Safety of information technology equipment).

> ℹ This data sheet is only valid in association with the corresponding package slip and user manual. Make sure you always use the latest documentation.
> It can be downloaded at phoenixcontact.net/products.

> ℹ This data sheet is valid for all products listed on the following page:

2   Table of contents

3   Ordering data

FL COMSERVER

Description	Type	Order No.	Pcs. / Pkt.
Second generation FL COMSERVER UNI..., serial device server for converting a serial RS-232/RS-422/RS-485 interface to Ethernet, supports TCP, UDP, Modbus gateway, and PPP applications, incl. COM port redirector software	FL COMSERVER UNI 232/422/485	2313452	1
Second generation FL COMSERVER BASIC..., serial device server for converting a serial RS-232/422/485 interface to Ethernet, supports TCP and UDP applications only, COM port redirector software incl.	FL COMSERVER BAS 232/422/485	2313478	1
FL COMSERVER UNI...-T, version with extended temperature range (-40°C to +70°C). For converting a serial RS-232/RS-422/RS-485 interface to Ethernet, supports TCP, UDP, Modbus gateway, and PPP applications, COM port redirector software incl.	FL COMSERVER UNI 232/422/485-T	2904817	1
FL COMSERVER BASIC...-T, version with extended temperature range (-40°C to +70°C). For converting a serial RS-232/RS-422/RS-485 interface to Ethernet, supports TCP and UDP applications only, COM port redirector software incl.	FL COMSERVER BAS 232/422/485-T	2904681	1

Accessories

Description	Type	Order No.	Pcs. / Pkt.
RS-232 cable, 9-pos. D-SUB socket to 9-pos. D-SUB socket, 9-wire, 1:1	PSM-KA9SUB9/BB/2METER	2799474	1
D-SUB connector, 9-pos. socket, one cable entry <35°, universal type for all systems, pin assignment: 1, 2, 3, 4, 5, 6, 7, 8, 9 to screw connection terminal block	SUBCON 9/F-SH	2761499	1
DIN rail connector for DIN rail mounting. Universal for T-BUS housing. Gold-plated contacts, 5-pos	ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
DIN rail connector for DIN rail mounting. Universal for T-BUS housing. Gold-plated contacts, 5-pos	ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
DIN rail power supply unit, primary switched, slim design, output: 24 V DC/1.5 A	MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1
D-9-SUB data cable to USB, with adapter D-9-SUB to D-25-SUB.	CM-KBL-RS232/USB	2881078	1
Shield connection clamp for PCB terminal block	ME-SAS	2853899	10
Patch cable, CAT5, pre-assembled, 0.5 m	FL CAT5 PATCH 0.5	2832263	10
Ethernet switch for wide temperature range, 5 TP RJ45 connections, automatic detection of data transmission speed of 10/100 Mbps (RJ45), auto-crossing function, reads QoS priority messages, accepts security frames	FL SWITCH SFNT 5TX	2891003	1

4 Technical data

Power supply

Nominal supply voltage	24 V AC/DC ±20% (via COMBICON plug-in screw terminal blocks), frequency 50 Hz ... 60 Hz
	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Typical current consumption	100 mA (24 V DC)
Electrical isolation	VCC//Ethernet//Serial (DIN EN 50178)
Test voltage	1.5 kV$_{rms}$ (50 Hz, 1 min)

Serial interfaces

Interfaces	RS-232 interface, according to ITU-T V.28, EIA/TIA-232, DIN 66259-1
	RS-422 interface, according to ITU-T V.11, EIA/TIA-422, DIN 66348-1
	RS-485 interface, according to EIA/TIA-485, DIN 66259-4/RS-485 2-wire
Connection method	
RS-232	D-SUB 9 plug
RS-422/RS-485	Plug-in/screw connection via COMBICON
Termination resistor	390 Ω - 180 Ω - 390 Ω
Pin assignment	DTE/DCE switchover via web-based management
Data format/coding	Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length
Data flow control/protocols	
RS-232	Software handshake, Xon/Xoff, hardware handshake RTS/CTS// 3964R-compatible, Modbus RTU/ASCII
RS-422/RS-485	Automatic
Serial transmission speed	
RS-232	0.3; 0.6; 1.2; 2.4; 4.8; 7.2; 9.6; 19.2; 38.4; 57.6; 115.2; 187.5; 230.4 kbps
RS-422/RS-485	0.3; 0.6; 1.2; 2.4; 4.8; 7.2; 9.6; 19.2; 38.4; 57.6; 115.2; 187.5; 230.4; 500; 1000 kbps

Ethernet interface

Ethernet interface	FL COMSERVER UNI 232/422/485(-T)	FL COMSERVER BASIC 232/422/485(-T)
Interface	Ethernet interface, 10/100 Base-T(X) according to IEEE 802.3u	
Connection method	RJ45 socket, shielded	
Serial transmission speed	10/100 Mbps, autonegotiation	
Transmission length	≤100 m (twisted pair, shielded)	
Supported protocols	Modbus TCP/IP, UDP, (TCP, RTU/ASCII), PPP	TCP/IP, UDP
Secondary protocols	ARP, DHCP, BOOTP, SNMP, RIP, RARP, HTTP, TFTP	

General data	FL COMSERVER UNI 232/422/485 FL COMSERVER BASIC 232/422/485	FL COMSERVER UNI 232/422/485-T FL COMSERVER BASIC 232/422/485-T
Ambient temperature (operation)	-25°C ... 60°C	-40°C ... 70°C, free-standing (40 mm separation on all sides)
Ambient temperature (storage/transport)	-25°C ... 70°C	-40°C ... 70°C
Humidity (operation)	10% ... 95%	
Humidity (storage/transport)	5% ... 95%	
MTTF (Mean Time To Failure) SN 29500 standard, temperature 25°C, operating cycle 21% (5 days per week, 8 hours per day)	2001 years	1973 years
MTTF (Mean Time To Failure) SN 29500 standard, temperature 40°C, operating cycle 34.25% (5 days per week, 12 hours per day)	870 years	854 years
MTTF (Mean Time To Failure) SN 29500 standard, temperature 100°C, operating cycle 100% (7 days per week, 24 hours per day)	355 years	348 years
Dimensions	22.5 mm x 99 mm x 116 mm	45 mm x 99 mm x 116 mm
Weight	130 g	145 g
Housing material	PA 6.6-FR, green	
Vibration resistance	5g according to DIN EN 60068-2-6, 1.5 h each in x, y, and z direction	
Shock testing according to IEC 60068-2-27		
Operation	15g, 11 ms half-sine shock pulse	
Storage	30g, 11 ms half-sine shock pulse	
Free fall according to IEC 60068-2-32	1 m	
Degree of protection	IP20	
Free from substances which would hinder coating with paint or varnish	According to P-VW 3.10.7 57 65 0 VW-AUDI-Seat central standard	

Approvals		
Conformity	CE-compliant	
ATEX (Please follow the special installation instructions in the documentation!)	Ⓔ II 3G Ex nA IIC T4 Gc X	
Standards/regulations	EN 50121-4	
UL (USA/Canada)		
FL COMSERVER UNI 232/422/485,	508 listed	
FL COMSERVER BASIC 232/422/485	508 listed	

Conformance with EMC directive 2004/108/EC

Immunity test according to EN 61000-6-2[1]

Electrostatic discharge (ESD)	EN 61000-4-2	Criterion B[2]	8 kV air discharge 6 kV contact discharge
Electromagnetic HF field	EN 61000-4-3	Criterion A[3]	
Amplitude modulation Pulse modulation			10 V/m 10 V/m
Fast transients (burst)	EN 61000-4-4		
Signal		Criterion B[2] Criterion A[3]	2 kV/5 kHz 1 kV/5 kHz
Supply			2 kV/5 kHz
Surge current loads (surge)	EN 61000-4-5	Criterion B[2]	
Signal Supply			1 kV 2 kV
Conducted interference	EN 61000-4-6	Criterion A[3]	10 V

Noise emission test according to EN 61000-6-4

Noise emission of housing	EN 55022		Limiting curve B

[1] EN 61000 corresponds to IEC 61000

[2] Criterion B: Temporary adverse effects on the operating behavior, which the device corrects automatically.

[3] Criterion A: Normal operating behavior within the specified limits.
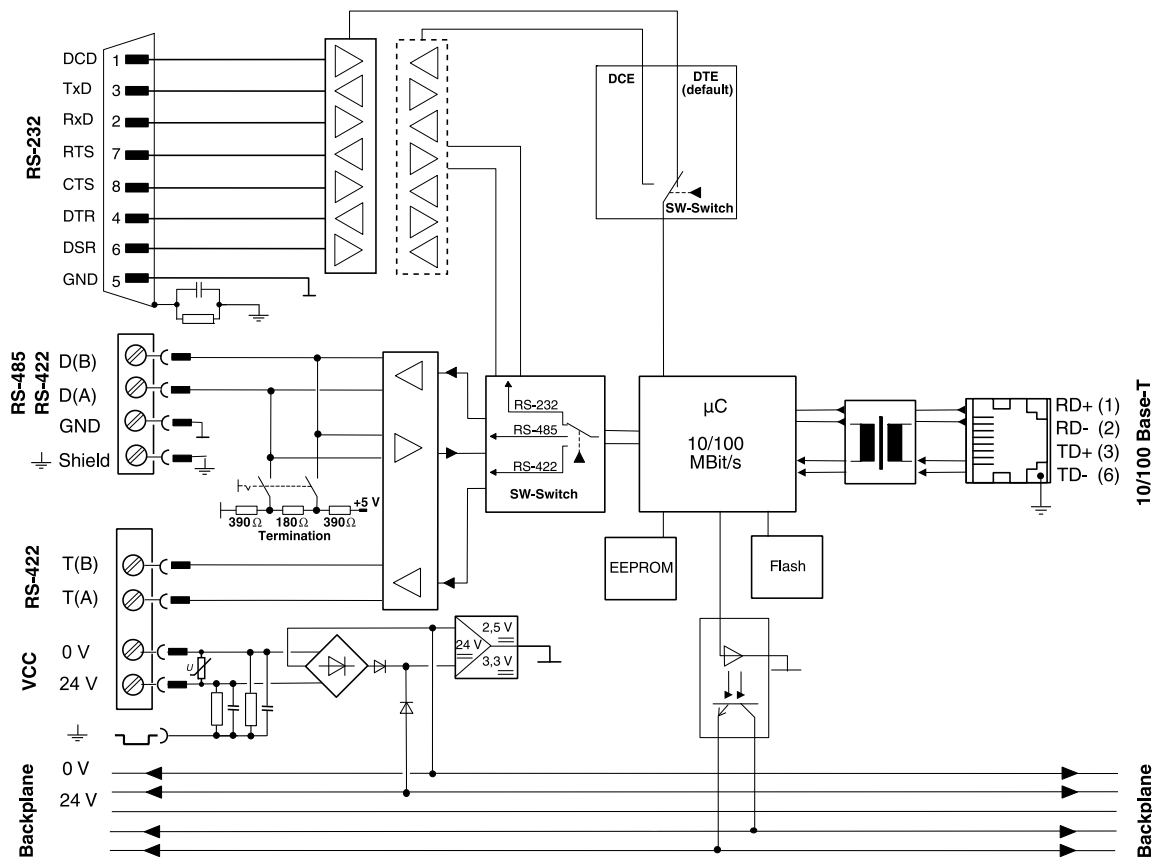
4.1   Block diagram

Figure 1   Block diagram

5 Safety regulations and installation notes

5.1 Installation notes

⚠️ **WARNING:**
Observe the following safety notes when using the device.

- The category 3 device is designed for installation in zone 2 potentially explosive areas. It meets the requirements of EN 60079-0:2009 and EN 60079-15:2010.

- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described. When installing and operating the device, the applicable regulations and safety directives (including national safety directives), as well as the generally recognized rules of technology, must be observed. The safety data is provided in this package slip and on the certificates (conformity assessment, additional approvals where applicable).

- The device must not be opened or modified apart from the configuration of the DIP switches. Do not repair the device yourself; replace it with an equivalent device instead. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from noncompliance.

- The IP20 degree of protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. Do not subject the device to mechanical and/or thermal loads that exceed the specified limits.

- The device is not designed for use in atmospheres with a danger of dust explosions.

- If dust is present, it is necessary to install the devices into a suitable approved housing, taking into consideration the surface temperature of the housing.

- The switches that can be accessed may only be actuated when the power supply to the device is disconnected.

5.2 Installation in zone 2

⚠️ **WARNING: Explosion hazard when used in potentially explosive areas**
Make sure that the following notes and instructions are observed.

- Observe the specified conditions for use in potentially explosive areas.

- Install the device in a suitable, approved housing (with at least IP54 protection) that meets the requirements of EN 60079-15. For this purpose, observe the requirements of IEC 60079-14 / EN 60079-14.

- Only connect devices to the supply and signal circuits in zone 2 that are suitable for operation in the Ex zone 2 and for the conditions at the installation location.

- In potentially explosive areas, snap the device on or off the DIN rail connector, and connect or disconnect the cables only when the power is disconnected.

- The device must be stopped and immediately removed from the Ex area if it is damaged, was subjected to an impermissible load, stored incorrectly or if it malfunctions.

- For reliable operation, the RJ connection must be equipped with a fully functional locking clip. Immediately repair any damaged connectors.

- The connection to the D-SUB interface is permitted only if the screw connection is tightened.
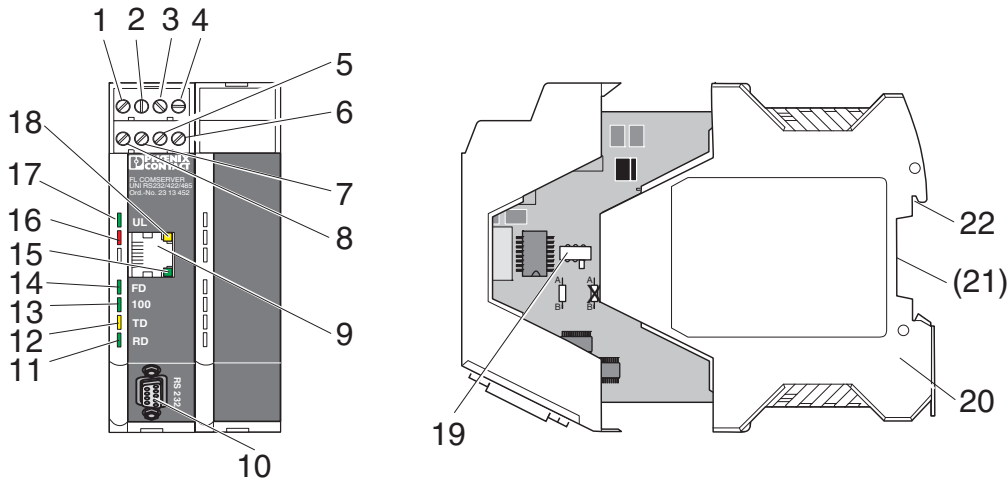
6 Connection and function elements

Figure 2   Connection and function elements

1	24 V supply
2	0 V supply
3	T(A) RS-422 connection, transmit, negative
4	T(B) RS-422 connection, transmit, positive
5	D(A) RS-422/485 connection, receive, negative
6	D(B) RS-422/485 connection, receive, positive
7	GND
8	Shield, same potential as FE
9	RJ45, Ethernet interface (TP port)
10	D-SUB -9: RS-232 interface, pin strip
11	Green LED, RD, reception of serial data
12	Yellow LED, TD, transmission of serial data
13	Green LED, 100, 100 Mbps transmission speed
14	Green LED, FD, full duplex operating mode active
15	Green LED, LINK status TP port
16	Red LED, error display
17	Green LED, UL, power supply
18	Yellow LED, ACT, data transmission TP port, dynamic
19	Slide switch for RS-422/RS-485 termination network
20	Snap-on foot for DIN rail mounting
(21)	FL COMSERVER UNI 232/422/485 and FL COMSERVER BASIC 232/422/485 only: Bus connector for redundant supply voltage (concealed)
22	FE, functional earth ground contact (concealed)

6.1 Termination network

The FL COMSERVER ... 232/422/485 can be operated on a 2-wire or 4-wire bus cable as required. For correct operation of the bus system, termination networks are required for the RS-422/RS-485 bus connection.

The FL COMSERVER ... 232/422/485 is equipped with a switchable termination network upon delivery.

RS-422

In the case of a point-to-point connection, the termination network on both devices must be activated.

RS-485

In the case of multipoint connections, the termination network must be activated on the first and last bus device of the line.

7 Serial pin assignments

ℹ️ Observe the different interface configuration when changing a device from
FL COM SERVER RS... to
FL COMSERVER ... 232/422/485.

When connecting the device, make sure the signal assignment of the interfaces is correct.

RS-232 pin assignment

ℹ️ The RS-232 interface of the
FL COMSERVER ... 232/422/485 can be switched via WBM between DTE (data terminal equipment) and DCE (data communication equipment) assignment. By default upon delivery (DTE), the interface behaves like a PC.
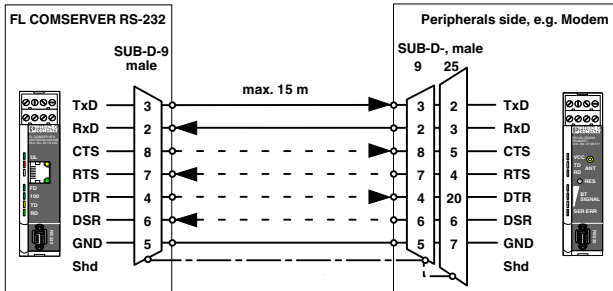

Figure 3   RS-232 pin assignment

RS-422 pin assignment

In RS-422 operating mode, a point-to-point connection can be established. When connecting the I/O device, use a common shielded twisted-pair bus line. Fit this bus cable with a termination network on both I/O devices.

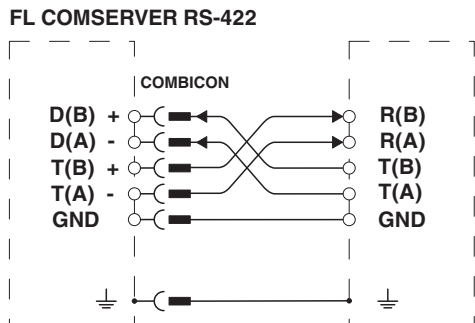This operational mode supports full duplex transmission mode.

Figure 4   RS-422 pin assignment

RS-485 pin assignment

ℹ️ The 9-pos. D-SUB connector must be disconnected from the data cable when changing a device from the FL COM SERVER RS... to the FL COMSERVER ... 232/422/485. Connect the single wires of the data cable to the COMBICON plug-in screw terminal block.

Make sure the signal assignment is correct.

In RS-485 operating mode, a network with several I/O devices can be created. When connecting the I/O devices, use a common shielded twisted-pair bus cable. Fit this bus cable with a termination network at the two furthest points.
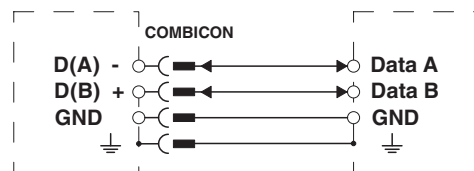

Figure 5   RS-485 pin assignment

8 Application examples

Thanks to a wide range of integrated functions, the device can be used in various ways for different applications. Web-based management provides user-friendly support during configuration.

8.1 Point-to-point/permanent line replacement

A common application is the simple point-to-point connection of two serial devices via an existing network. For this cable replacement, the data is tunneled through the network using two FL COMSERVER ... 232/422/485. Any limits on range (e.g., the maximum of 15 m imposed by RS-232) are thus overridden.

Permanent lines phased out by telecommunications companies can be easily replaced using DSL technology.

Figure 6   Point-to-point connection

8.2 Point-to-point/PSI MODEM SPLITTER

The PSI MODEM SPLITTER auxiliary device (Order No. 2708766) enables interface switching between two RS-232 channels or RS-232 ports in the case of another application.

Optional switching of the point-to-point connection is performed via the web-based management of the FL COMSERVER ... 232/422/485 or via the switch on the front side of the splitter.
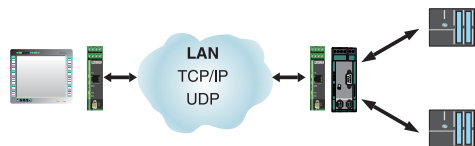

Figure 7   Point-to-point connection (two controllers)

8.3 Client/server mode

If, however, the serial data of an application software program is to be available in the network, only one FL COMSERVER ... 232/422/485 is installed at the serial device. In its function as a client or server, the FL COMSERVER ... 232/422/485 can then make the data available and transmit it in TCP/IP or UDP. The sockets of the application software can therefore directly access the serial data in the field.
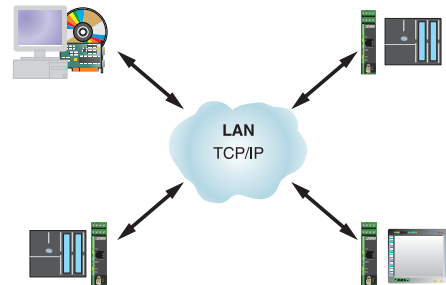

Figure 8   Client/server mode

8.4   Redirector/virtual COM ports

In many cases, the existing application software does not support Ethernet communication. However, in the face of increasing networking, local connections, e.g., to programming interfaces, often have to be established via the PC's existing network card and the connected network. The COM port redirector software acts as a remedy for this and is supplied as standard. It creates virtual COM ports on the PC that can be used by the existing application software. No changes have to be made to the application software so it is easy to establish a connection to the programming interfaces with all the advantages of networking.
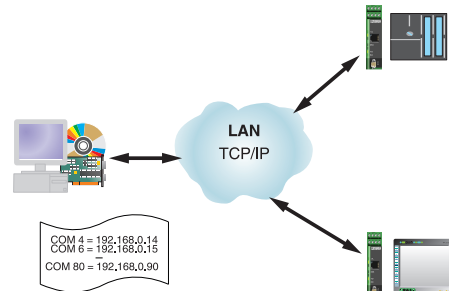
Figure 9   Redirector

Redirector software	Number of virtual ports	Operating system
FL COM port redirector	≤8	Windows XP, 2003 server, Vista, 7, 2008 server (32/64 bit)
CPR Manager (firmware E2.20 or later)	≤254	Windows XP, 2003 server, Vista, 7, 2008 server (32/64 bit)
COM port redirector	≤80	Windows 98, ME, 2000, NT, 2003 server, XP

8.5 Modbus gateway/multi-drop networks

Even conventional RS-485 multi-drop networks can be extended or replaced by modern network technology with the FL COMSERVER ... 232/422/485.

Modbus is the best-known version of this technology. The FL COMSERVER ... 232/422/485 supports both the serial Modbus ASCII and RTU protocols, as well as the Ethernet-based Modbus/TCP protocol. The complete gateway function enables use with Modbus masters and slaves, and therefore the integration of any number of serial Modbus devices into Modbus/TCP networks.

Other multi-drop networks can be addressed directly using simple broadcast addressing sent out to all network devices or using intelligent mechanisms. The required destination address is read directly from the serial data stream and used for addressing.
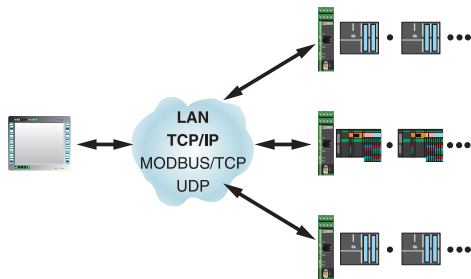

Figure 10   Modbus gateway

8.6 Access to remote networks

Dialing into remote networks that are otherwise difficult to access (e.g., wind parks) can now be easily ensured via a modem connection (dial-up) in combination with the FL COMSERVER ... 232/422/485. The FL COMSERVER ... 232/422/485 supports the PPP protocol with CHAP authentication (Challenge Handshake Authentication Protocol). Unauthorized access to the network is prevented by 128-bit password encryption.

In addition, a Bluetooth access point can be implemented by combining the new PSI WL BLUETOOTH converter with the FL COMSERVER ... 232/422/485. This enables the wireless integration of serial devices in an Ethernet network with a range of up to 150 m.
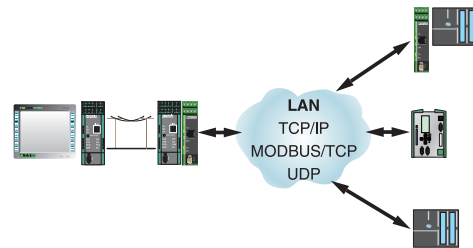

Figure 11   Access to remote networks