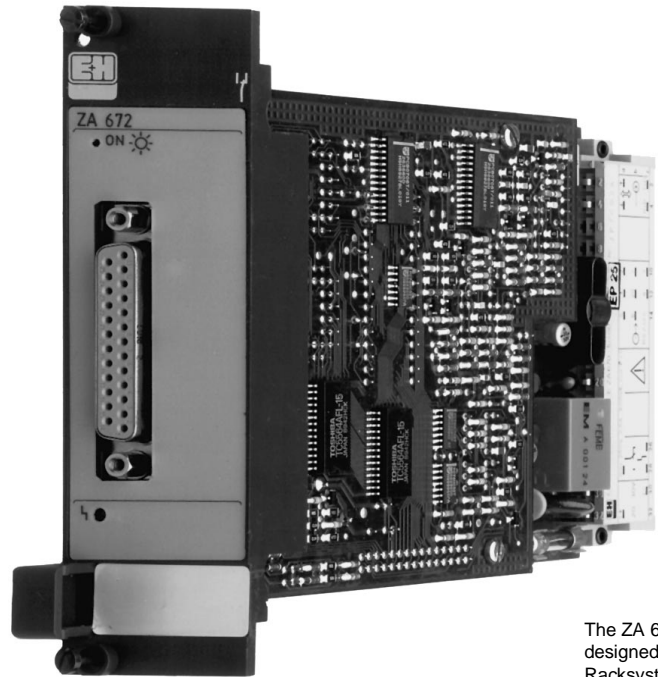


# Field Communication *modbus gateway ZA 672*

**With command and data ports for digital control  
of intrinsically safe field instrumentation**



The ZA 672 gateway is  
designed as a 19"  
Racksys plug-in module

## Application

The ZA 672 modbus gateway interfaces intrinsically safe CommuteC measuring points to programmable logic controllers, process control systems and personal computer. It has three major features:

- an auto-scan buffer listing preselected process parameters,
- an RS-232C command port accessing the buffer and each CommuteC transmitter,
- a data port with the Modbus protocol accessing the buffer and each CommuteC transmitter.

The scan, data port and command port functions operate independent of each other, ensuring efficient processing and optimal data transfer rates.

## Features and Benefits

- Modbus defacto standard  
The ZA 672 gateway conforms to the Gould/Modicon Modbus Protocol, see Reference Guide PI-MBUS-300 REV B.
- Link to field instrumentation  
Level, pressure, temperature and flow data from intrinsically safe measuring points can now be acquired by Modbus systems.
- Auto-scan buffer  
Provides not only accelerated access to process data but also saves memory and time in the supervisory system.
- RS-232C command port  
In addition to data access, this port can be used to up- and download CommuteC operating parameters and to visualize measured values.

# Endress + Hauser

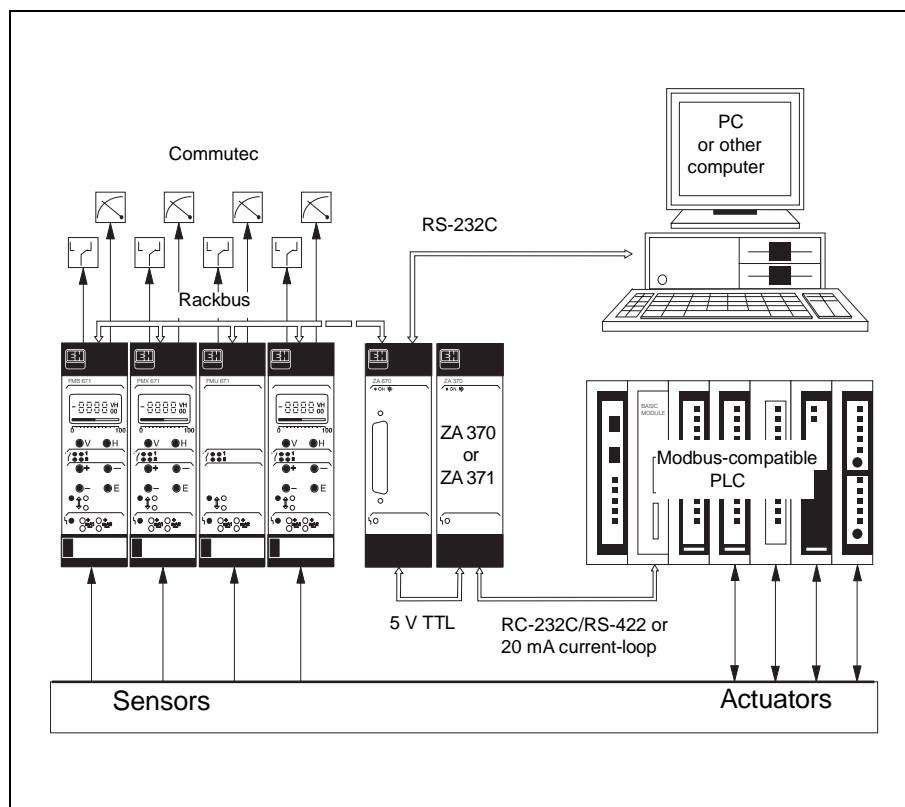
Nothing beats know-how



# Measuring System

The measuring system comprises

- up to 64 Commutec transmitters or 128 measuring points
- ZA 672 modbus gateway
- Personal Computer at the command port
- Modbus-compatible programmable logic controller at the data port.
- ZA 370 interface for 5V TTL/RS-232C/RS-422 or ZA 371 interface for 5V TTL/20 mA current loop conversion.



## Commutec Transmitters

Commutec transmitters are intelligent 19"-rack modules designed for the control of Endress+Hauser sensors. They are available for:

- level measurement (capacitive, conductance, ultrasonic, hydrostatic)
- pressure measurement,
- flow and temperature measurement.

Commutecs provide intrinsically safe power for sensors operating in explosion hazardous areas. The signals sent back from the measuring point are conditioned as:

- a measured value display, at the transmitter or a Commulog handheld terminal
- a 0/4...20 mA analogue signal
- a 0/2...10 V signal
- a limit value controlled relay output.
- a digital signal passed to the Rackbus.

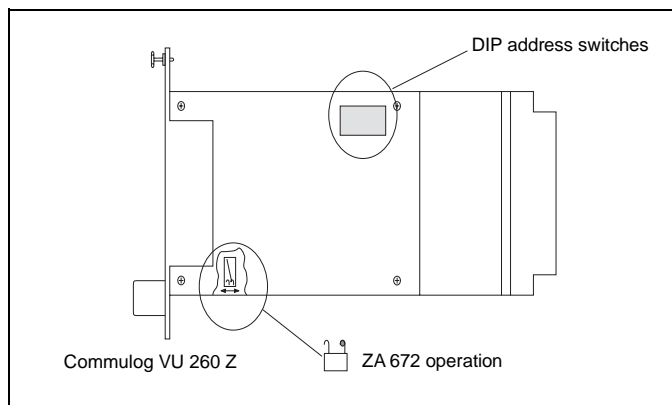
## Rackbus

Up to 64 Commutec transmitters can be connected together on the Rackbus system. Using a simple two wire technique, data is passed along the bus at a rate of 19.2 kbits/s. Each transmitter has a unique device address which allows it to be polled by the ZA 672 interface.

## ZA 672 Modbus Gateway

The ZA 672 modbus gateway is compatible with existing Rackbus equipment. Commutec operating programs and data links used with the ZA 670 computer interface can be run via the RS-232C command port. Exceptions are those requiring protocol mode or TTY link. The data port is interfaced to the Modbus via a ZA 370 or ZA 371 module.

The Commutec transmitter is set for ZA 672 operation at the hook switch, a unique address is configured at the DIP-switches.



# ZA 672 Gateway

## Interface Ports

The ZA 672 gateway offers the user two serial ports for the connection of personal computers, programmable logic controllers and process control systems:

- the command port for connecting RS-232C compatible systems.
- the data port for connection of Modbus systems via an RS-232C, RS-422 or 20 mA current-loop interface.

Both can be used simultaneously to directly access Commutec operating matrices or read values from the auto-scan buffer.

## Device Polling

The Commutec transmitters are polled according to a freely configurable scan list which is accessible from both command and data ports. The poll runs automatically: when the last Commutec has been polled, the scan begins again. The resulting data are written into the auto-scan buffer.

## Auto-Scan Buffer

The primary function of the ZA 672 gateway is the maintenance of the auto-scan data buffer. In this memory block every Commutec measuring point in the scan list is allocated a data field containing the following information:

- measured value
- measuring point status
- event
- communications status

Measured values are e.g. levels, flow rates, pressures. Events are flags indicating limit value status. The measuring point and communications status indicate the operational status of the Commutec-sensor and Commutec-ZA 672 links respectively.

## Measured Value Acquisition

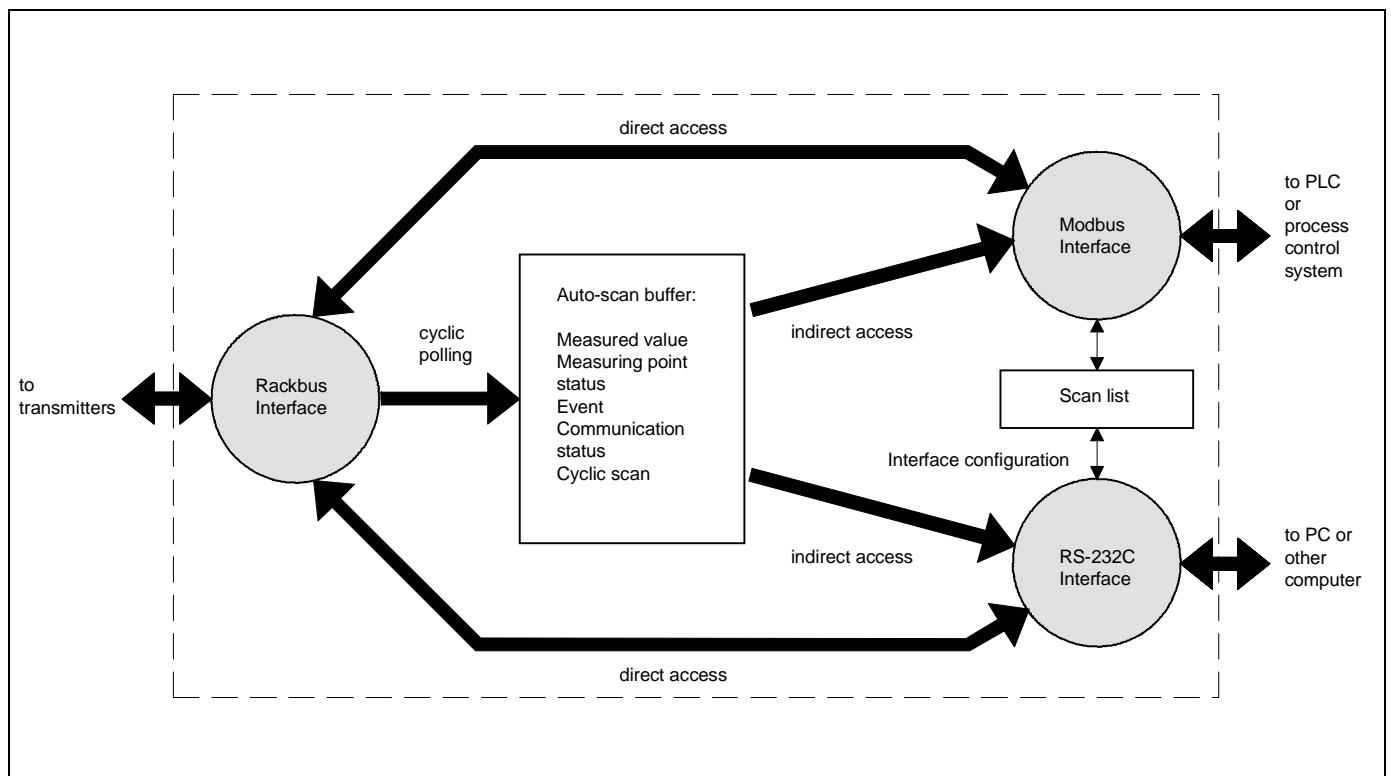
The system acquires measured values from the auto-scan buffer either as individual values or in the form of block telegrams. Only those registers specified in the telegram are read, allowing priorities to be set by the frequency of polling.

## Commutec Configuration

The command port (and data port) can also be used to transmit instructions, directly to the operating matrix. If polling occurs simultaneously the ZA 672 regulates access between the scan and configuration functions.

Block diagram of the ZA 672 gateway structure

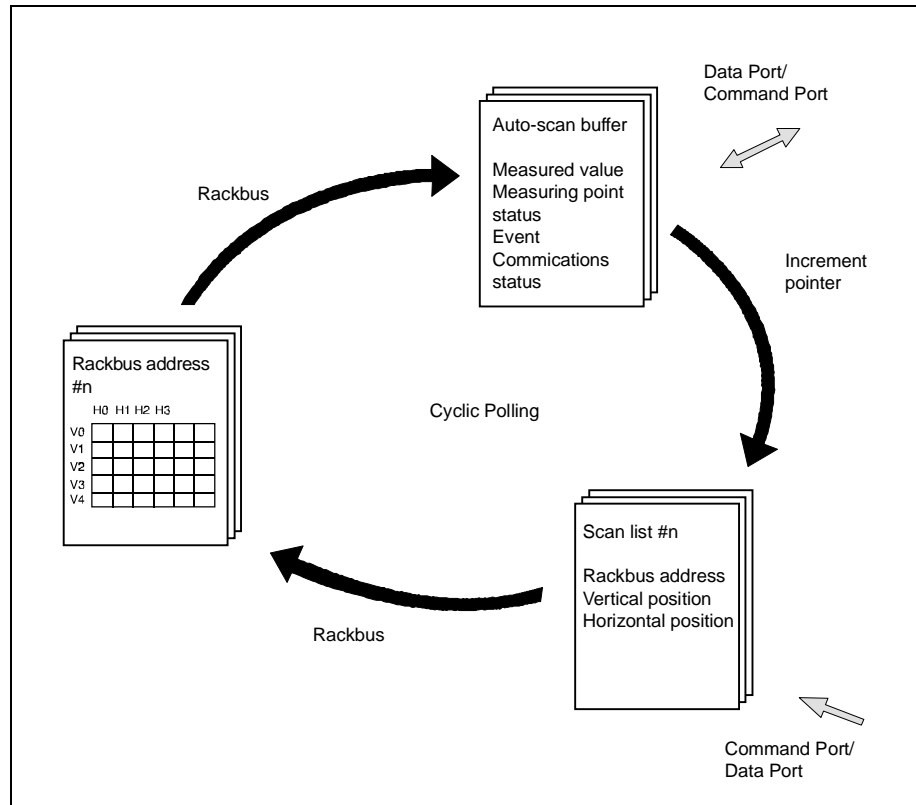
- Direct access to Commutec transmitters is provided via the Rackbus
- Indirect access to process data via the scan buffer is quicker.



# Command Port

Logical polling sequence for auto-scan buffer:

- The entries in the configuration file are cyclically scanned.
- The Commutec matrix is polled via the Rackbus
- The measured value, communication and event status are filed in the auto-scan buffer



## RS-232C Command Port

The command port interfaces RS-232C devices to the ZA 672 gateway. It is freely configurable at the DIP-switches on the plug-in board. The port is used:

- to configure the Commutec operating matrices on commissioning,
- to secure Commutec configurations by up- or downloading data,
- to create and amend the scan list for the auto-scan buffer.
- to configure the Modbus data port

The port also has access to the auto-scan buffer.

## Scan list

The scan list contains up to 320 indexed entries defining:

- Commutec rackbus address,
- vertical position of the measured value in the Commutec operating matrix,
- horizontal position in the matrix.

The file can be read and appended, fields inserted, overwritten and deleted by the commands LST, APP, INS, OVW and DEL, e.g.

```
INS 40, 36, 0, 0
```

inserts the Commutec with address 36 at position 40 in the list: the principle measured value at V0H0 is read.

## Variable Read Command

The variable read command allows direct access via the Rackbus to the Commutec operating matrix. The Rackbus address, vertical and horizontal matrix position must be defined:

```
VR 36, 0, 0
36, 245.7
```

The ZA 672 responds with the Rackbus address and a data string. If an error is detected, an error code is sent back.

## Variable Write Command

The variable write command allows a value to be written into the specified position in Commutec matrix. Rackbus address, matrix positions and number or value must be defined.

```
VW 36, 1, 0, 10.0
36, 10.00
```

The ZA 672 replies with the Rackbus address and ASCII string actually stored.

## Auto-Scan Buffer Command

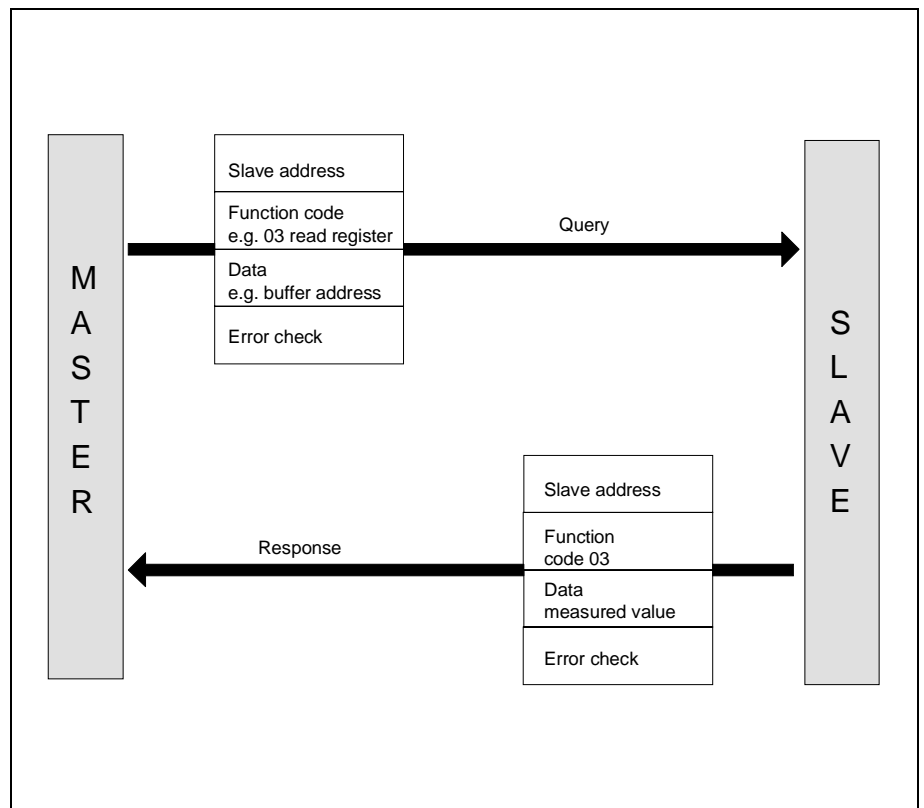
For fast access to Commutec data the Auto-scan buffer can be polled.

```
VRB 10
010, +00314E-01, 002, 606
```

The ZA 672 replies with list position, Rackbus address, measured value and event and status data in a fixed format.

## Data Port

Block diagram of a Modbus query/response transaction



### Modbus Data Port

The ZA 672 data port interfaces to Modbus devices. The Modbus protocol controls the language structure and message format. It provides for one master and up to 247 slaves, whereby the permissible number of slaves may be less.

### Master/Slave operation

Since not all PLC systems can be configured as masters, the ZA 672 can assume the additional role of master. This function and other variables such as baudrate, parity, stopbits and transmission mode can be set from the command port.

- When the ZA 672 is operating as a master the contents of the auto-scan buffer are continually transmitted to the slave at preset intervals. No other data can be accessed.
- Priorities can be allotted by multiple entries in the scan list.

### Modbus Transactions

The Modbus protocol controls the query and response cycle between master and slave. The ZA 672 supports the following functions:

- Query/response transaction comprising a single query and single response frame,
- Function codes 03, 06, 08 and 16

### Frames

The Modbus protocol provides frames for the transfer of data on the data line. These contain the data:

- slave address
- function code
- data (e.g. buffer address, length, measured value)
- error check.

When the slave receives the message, it checks for errors, reads the contents and builds the response for transmission back to the master. The master sends the next message as soon as it receives a valid response, or if no reply is received, when the timeout is exceeded.

### Transmission Modes

Data can be exchanged in two transmission modes:

- ASCII, readable, used e.g. for testing
- RTU, compact and faster, used for normal operation.

### Transmission Medium

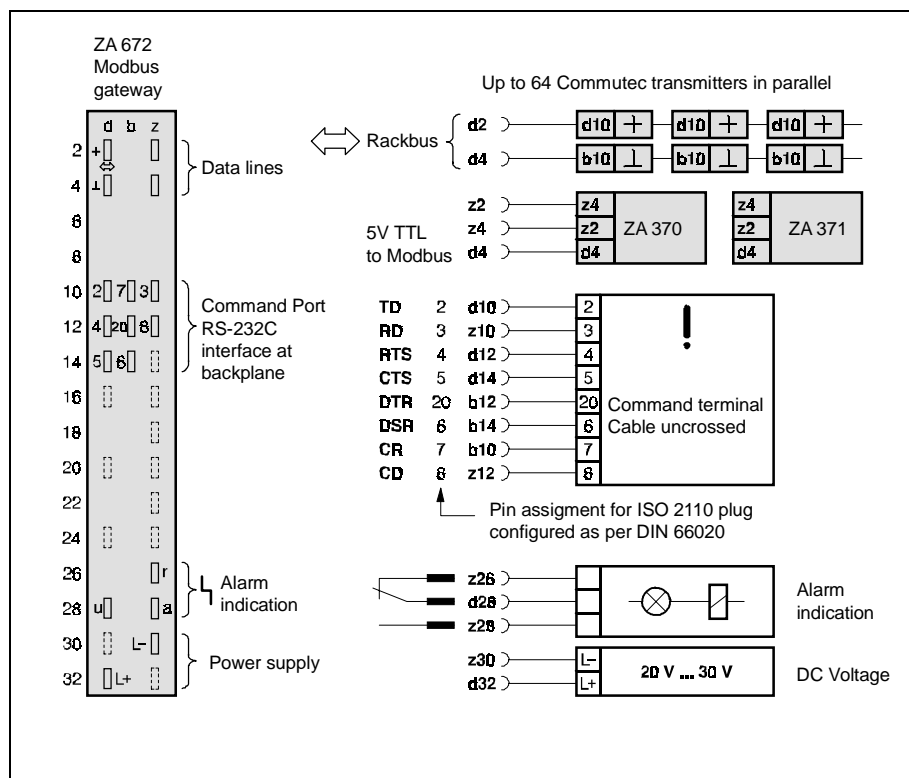
The Modbus protocol does not specify the transmission medium (Layer 1, ISO-OSI model). The following options are available:

- RS-232C via the ZA 370 interface,
- RS-442 via the ZA 370 interface,
- TTY 20 mA current loop via the ZA 371 interface

## Installation

Wiring diagram for backplane connector.

- The command terminal is plugged into the front panel or can be connected at the rear.
- The ZA 370 or ZA 371 module is connected to pins z2, z4, d4 on the backplane connector.



## ZA 672 Connection

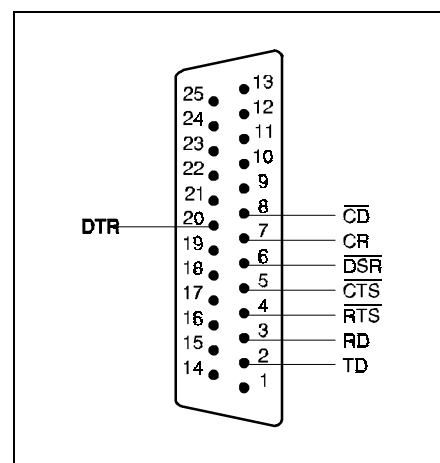
The diagram above shows the wiring of the ZA 672 Modbus Gateway

- The command port is on the front panel and is configured at the DIP-switches.
- The Modbus data port is configured via the command port.

## ZA 370/371-Modbus Connection

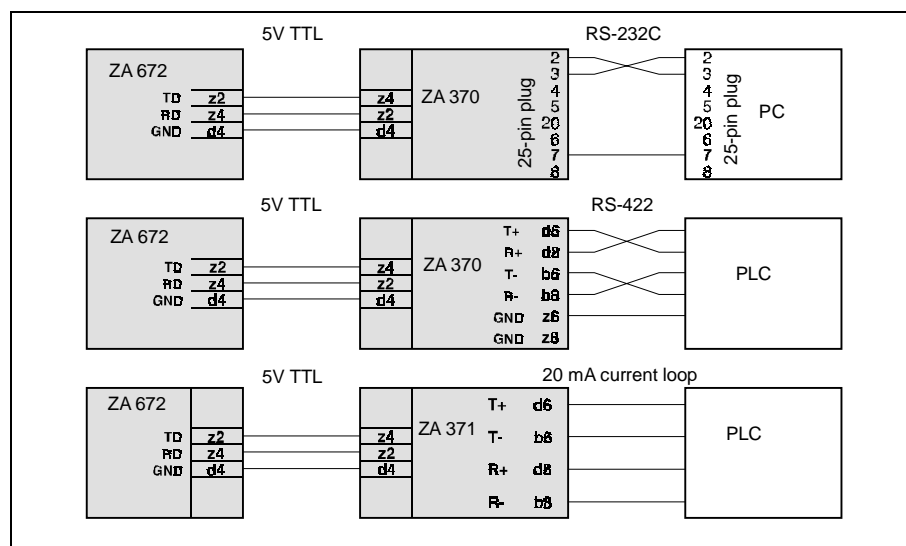
The diagram below indicates the connection of the ZA 672 and Modbus via the ZA 370 and ZA 371 modules.

- RS-232C max. 15 m/50 ft
- RS-422 max. 1200 m/4000 ft
- TTY 20 mA current loop max. 1000 m/3300 ft.



### Pin assignment of command port

Wiring diagram for  
ZA 672, ZA 370 and  
ZA 371 modules

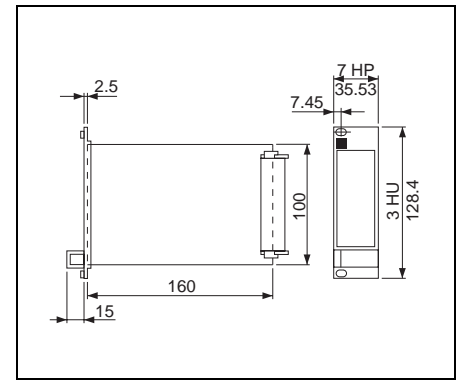


# Technical Data

## Mounting

The Modbus Gateway ZA 672 is a Racksyst plug-in card which must be installed outside explosion hazardous areas in a rack or protective housing, for example:

- 19" rack for mounting up to 12 x 7 HP modules in the control room,
- Half 19" wide field housing with Protection IP 65,
- Monorack housing (7 HP) for single or multiple mounting at the measuring point.



Card dimensions (mm)

## Construction

Plug-in card to DIN 41 494 (Eurocard).

- Frontpanel: black synthetic with blue field inlay, grip and tag space
- Degree of Protection to DIN 40 050: panel IP 20; board IP 00
- Dimensions: see diagram
- Weight: approx. 0.3 kg
- Permissible ambient temperature:  
Operation: 0 °C...+70 °C  
Storage: -20 °C...+80 °C

## Electrical Connection

- Backplane connector: multipoint plug to DIN 41 612, Part 3, Type F (28-pole)
- Front panel connector: 25-pin female connector conforming to ISO 2110 socket, configurable as per DIN 66 020 as DTE or DCE

## Power Supply

Electrically isolated power supply:

- Voltage: 24 VDC (+6 V...-4 VDC)
- Residual ripple: max 1 V within tolerance
- Current: approx. 90 mA, max. 120 mA, integrated fine-wire fuses (315 mA)
- Status: green LED lights when on.

## Fault Indication

Relay with potential-free changeover contact:

- Max. switching capacity:
  - 2.5 A, 250 V AC, 300 VA at  $\cos \varphi > 0.7$
  - 100 VDC, 90 W
- Status: red LED lights on alarm

## Transmission Medium

- Data port for connection to Modbus devices via:
  - RS-232C interface (ZA 370)
  - RS-422 interface (ZA 371)
  - TTY 20 mA current loop (ZA 371)
- Command port for connection of RS-232C devices.

## System requirements

- Modbus functions 03, 06, 08 and 16 must be supported
- Floating point numbers as sign, integer and exponent (please check with us)

## Rackbus interface

- Devices: max. 64 Commutec transmitters
- Baudrate: 19.2 kbits/s

## Command Port

Configurable by DIP-switches on the ZA 672 board:

- Baudrate: 300...19,200; recommended: 9600 Baud.
- Data bits: 7 or 8
- Stop bits: 1 or 2
- Parity: None, even or odd.

Memory response time:

- Direct Rackbus access: 250 ms/value
- Via auto-scan buffer: ca. 50 ms/value set

## Data Port

Modbus protocol, software-configurable via the command port:

- Transmission mode: RTU or ASCII
- Modbus function: slave or master

Data transmission format configurable:

- Data bits: 7 or 8
- Parity: None, (N) even (E) or odd. (O)
- Stop bits: 1 or 2
- Baudrate: 600...19,200;

Supported combinations:

- ASCII: 7N2, 7E1, 7O1, 9600
- RTU: 8N1, 8E1, 8O1, 9600

Memory response time:

- Direct Rackbus access: 250 ms/value
- Via auto-scan buffer: ca. 50 ms/value set

## How to Order

### ZA 672 Modbus Gateway

#### Language

- E English
- D German
- F French
- I Italian



ZA 672-R0E1 1 Complete order code

### Accessories

ZA 370 Interface Module	Order No. 200 005-0000
ZA 371 Interface Module	Order No. 014 887-0000

## Modbus Compatible Systems

- ABB MP 200/1 with DSCA 180B  
AEG A 500, A 350,  
AEG-Modicon 984-120, 130, 145,  
984-380, 480, 680,  
984A, B, X
- Allen-Bradley  
Bernecker+Reiner  
CEGELEC P 1200  
Fisher Controls Provox  
Foxboro
- H+B Contronic P  
Hima H30, H50, H51  
Honeywell TDC 3000  
Merlin Gerin PB 400  
Siemens S5 (driver software available)  
Syclop de Mec  
Télémécanique TSX 67/20  
Valmet Damatic XD  
VDO MDC 200  
and others

## Supplementary Documentation

### Modbus Protocol

- ☐ Gould Modbus Protocol:  
Reference Guide PI-MBUS-300  
(Gould Electronics)

### Racksyst

- ☐ Racksyst  
System Information SI 008F/00/e
- ☐ Assembly Racks FXG 1  
Technical Information TI 224F/00/e
- ☐ Monorack  
Technical Information TI 187F/00/e

### Rackbus

- ☐ Rackbus  
System Information SI 014/00/e

- ☐ Integration of intrinsically safe field instrumentation into industrial networks  
Special Documentation SD 014/00/e

### CommuteC Transmitters

- ☐ CommuteC Transmitters  
System Information SI 012/00/e
- ☐ Omnigrad TMT 2371...2377  
Technical Information TI 022/02/ei
- ☐ Procom II  
In Preparation

### CommuteC Software

- ☐ CommuteC Operating Program for Personal Computers  
Technical Information TI 113/00/e
- ☐ Commugraph  
Technical Information TI 158/00/e

Endress+Hauser  
GmbH+Co.  
Instruments International  
P.O. Box 2222  
D-79574 Weil am Rhein  
Germany

Tel. (07621) 975-02  
Tx 773926  
Fax (07621) 975345

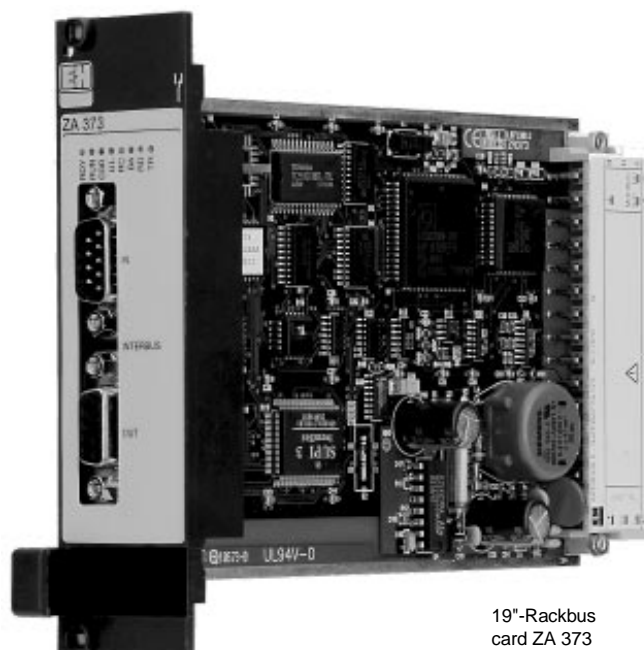
Endress + Hauser  
Nothing beats know-how





# Field Communication Gateway for *INTERBUS* (ZA 373 + ZA 672)

**Connects intelligent Rackbus devices to  
INTERBUS networks**



19"-Rackbus  
card ZA 373

## Application

The INTERBUS gateway (ZA 373 and ZA 672), connects intelligent measuring points to programmable logic controllers, personal computers and process control systems which are operating within INTERBUS networks. The ZA 373 behaves as a PCP device within the INTERBUS environment.

## Features and Benefits

- INTERBUS standard gateway corresponds to INTERBUS standard DIN 19 258
- Transmission of 320 measured values e.g. level, pressure, temperature, flow and analysis measurements
- Auto-scan buffer provides fast cyclic access to process data
- Process data channel allows acyclic access to transmitter operating parameters, e.g. for configuration
- Data format  
Values can be transmitted in various formats, e.g. Endress+Hauser, IEEE and Siemens MC5.

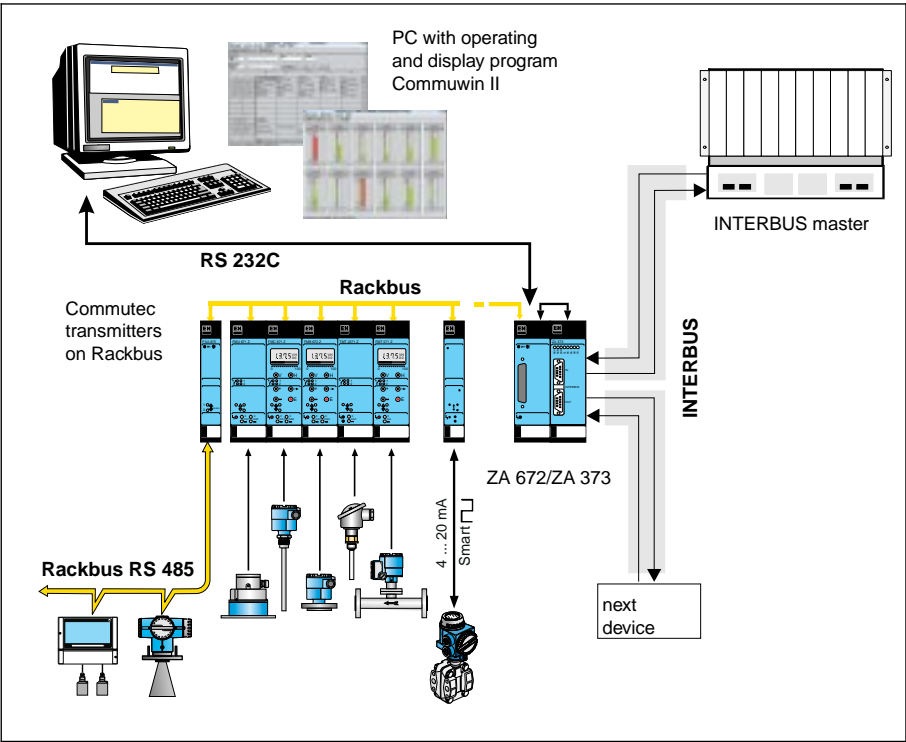
# Endress + Hauser

Nothing beats know-how



# Measuring System

Measuring system with the Commutec transmitters, INTERBUS gateway (ZA 373 + ZA 672), PC with operating program and INTERBUS master



## Commutec Transmitters

Commutec transmitters are intelligent 19"-rack modules which can be connected together on the Rackbus. They provide intrinsically safe power to the sensors and condition the signals returned. Transmitters are available for level, pressure, flow and temperature measurement as well as water analysis.

## Rackbus

Up to 320 measured values from max. 64 commutec transmitters can be transmitted over the Rackbus to the ZA 373 and INTERBUS master.

Each transmitter has a unique address, which allows it to be interrogated by the master or a personal computer.

## Module ZA 672

The ZA 672 is the interface between the Rackbus and the ZA 373. It scans the transmitter measured values cyclically according to a freely configurable scan list and stores them in an auto-scan buffer.

It is also equipped with an RS-232C interface, which allows the configuration of the transmitters via a PC with the operating program or Commuwin II.

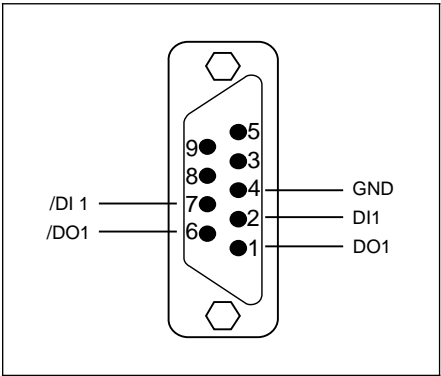
## Module ZA 373

The ZA 373 is the interface between the ZA 672 and the INTERBUS master. It automatically scans the measured values in the ZA 672 auto-scan buffer and stores them in an I/O buffer which can be accessed as an object by the INTERBUS master. Individual parameters can also be read or written.

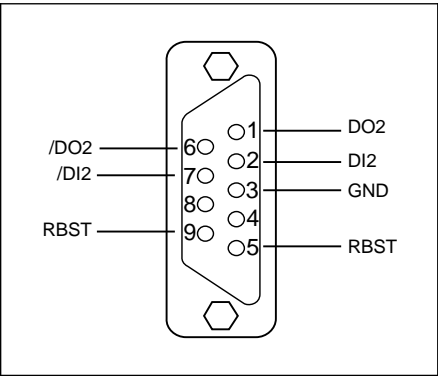
# Electrical Connection

## INTERBUS network

The two front panel connectors are used.



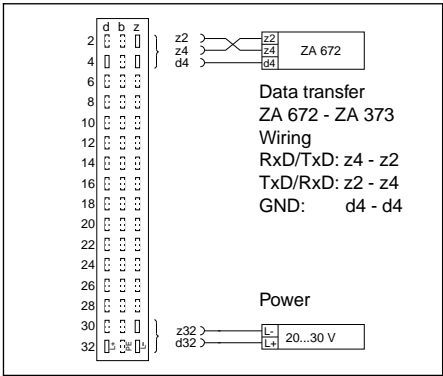
INTERBUS IN  
9-pin Sub-D connector



INTERBUS OUT  
9-pin Sub-D connector

## ZA 672

The multipoint connector at the rear of the gateway is used.



ZA 373 male connector

# Technical data

## Application

General information	Gateway for connecting Rackbus devices (including intrinsically safe ones) to INTERBUS networks, corresponds to DIN 19 258
Instrument designation	INTERBUS gateway (comprising ZA 373 and ZA 672 modules)

## Function and system design

Measuring system	Depending upon the number of measured values transmitted per measuring point, the measuring system comprises up to 64 Commutec transmitters on the Rackbus, an INTERBUS gateway (ZA 672 and ZA 373) as well as a personal computer or PLC
Bus cable INTERBUS	Phoenix Contact

## Input/Output

Process data channel	5 data words for read/write jobs
Parameter data channel	Up to 320 measured values with status data from the ZA 672 auto-scan buffer and setting of the data format
Signal on alarm	Depending on error, setting of an error bit in the input status word of the ZA 373 telegram ERR LED lights

## Operating conditions

### Environment

Ambient temperature	0 °C...+60 °C
Limiting temperature range	0 °C...+70 °C
Storage temperature	-20 °C...+80 °C
Ingress protection	to DIN 40 050 front panel IP 20, plug-in card IP 00
Electromagnetic compatibility	Interference emission to EN 50 081-2 Interference immunity to EN 50 082-2 and industrial standard NAMUR with 10 V/m for assembly rack guide rail with ground clip

## Mechanical construction

Design	19" Racksyst plug-in card, Type II, Europa card
Front panel	Black plastic with blue field inlay, with grip and tagging field
Connector at rear	Male multipoint connector to DIN 41 612 Part 3, Type F (25 pin) Plug-in point installation kit 25/2
Connector at front panel	2x 9-pin Sub-D connectors with INTERBUS protocol
Dimensions	7 HP, 3 HU
Weight	approx. 0.3 kg

User interface

Display	LED display: operation and communication readiness of gateway as well as status display
Communication interface	Input side: TTL fixed potential with Modbus protocol Data transmission rate: 9,600 Bit/s Output side: incoming INTERBUS interface potential-free outgoing INTERBUS interface potential-carrying. Data transmission rate: 500 kBit/s

Power

Supply voltage	18...30 V
Current consumption	2.7 W

Certificates and approvals

CE mark	By attaching the CE Mark, the manufacturer confirms that the instrument fulfils all legal requirements of the relevant EU directives
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Supplementary documentation

Device	Operating manual BA 054F, Gateway ZA 672 Technical Information TI 113/00/en, Commute operating program
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External standards and guidelines

INTERBUS	DIN 19 258
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Product Structure

INTERBUS gateway (ZA 373 + ZA 672)	Part No. 017428-0000
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Supplementary Documentation

- ☐ INTERBUS gateway  
Operating Instructions BA 178F/00/en
- ☐ Gateway ZA 672  
Operating Instructions BA 054F/00/en
- ☐ Gateway ZA 672  
Technical Information TI 148F/00/en

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