Field Communication ZA 673 PROFIBUS gateway

Integrates intrinsically safe Rackbus instrumentation into PROFIBUS networks.





















The ZA 673 gateway is designed as a 19" Racksyst plug-in module

Application

The ZA 673 Gateway interfaces Commutec measuring points to process control systems, programmable logic controllers and personal computers operating within PROFIBUS networks:

- On power-up the Gateway is automatically configured.
- Measured values, status and events can be read immediately from an auto-scan buffer.
- Commutec transmitters can be directly accessed for configuration, parameter interrogation and back-up.

The Rackbus polling and PROFIBUS access mechanisms operate independently, ensuring efficient processing and optimal data transfer rates.

Features and Benefits

• PROFIBUS standard The ZA 673 gateway conforms to the PROFIBUS standard laid down in DIN 19 245, Parts 1 and 2.

• Link to field instrumentation Level, pressure, temperature and flow data etc. from intrinsically safe measuring points can now be acquired by PROFIBUS systems.

• Auto-scan buffer

Provides not only accelerated access to process data but also saves memory and time in the supervisory system.

• User command services Realises the up- and downloading of Commutec operating parameters, envelope curve display and Rackbus service commands on the PROFIBUS.



Measuring System

The measuring system

up to 64 Commutec transmitters or 128 measuring points
ZA 673 Profibus Gateway

PROFIBUS-compatible

personal computer or programmable logic controller

comprises



Commutec Transmitters

Commutec transmitters are intelligent 19"-rack modules designed for the powering and control of Endress+ Hauser sensors operating in explosion hazardous areas. They are available for:

- level measurement (capacitive, conductance, ultrasonic, hydrostatic)
- pressure measurement,
- flow, bulk flow and temperature measurement.
- Humidity measurement, water and gas analysis in preparation.

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 for 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 673 interface.

ZA 673 Profibus Gateway

The ZA 673 Gateway interfaces Rackbus equipment to the PROFIBUS network. Conforming to DIN 19 245, data is transmitted via a built-in RS-485 port. Special programs allow gateway configuration and Commutec data presentation at personal computers operating with the PROFIBUS protocol.

The Commutec transmitter is set for ZA 673 operation at the hook switch, a unique address is configured at the DIP-switches. The latest Rackbus cards switch automatically when the Commulog is plugged into the front panel



PROFIBUS Description



Schematic diagram of PROFIBUS topology

Design

The Process Field Bus, PROFIBUS, is a high performance communications system for simple, inexpensive equipment conforming to German Standard DIN 19 245, Parts 1 and 2.

Up to 127 users can be accommodated whereby up to 32 devices can be designated »active« or token passers. A token passer receives the right to control the bus at regular intervals and holds the token for a predefined time.

The system is designed to allow fair bus access between intelligent automation devices. Each master is allowed to transmit once within a fixed period, the token rotation time. In addition provision is made for low-level, data exchange between an automation device and its much simpler peripherals. This allows a maximum reaction time for alarms to be guaranteed.

Bus access method

PROFIBUS uses a hybrid access method of centralised master/slave and decentralised token passing.

- A logical token ring (token bus) is built by the active devices (masters).
- When a master receives the token it receives the right to control the bus.
- The master can communicate with all devices on the bus for a fixed period of time.
- At the end of this time, the token must be passed on to the next active device in the token ring.

Data Transmission

Data are exchanged over the PROFIBUS by means of standard telegrams which are transmitted via the RS-485 interface.

- User requests are executed by means of standard commands
- Measured values and data are addressed via an object dictionary
- Data is exchanged between participants via predetermined communication relationships
- Both cyclic and acyclic requests are possible.

In order to make process data accessible to higher systems and to aid communication between bus users, the PROFIBUS also offers a number of application services. Details of these can be taken from the DIN standard.

ZA 673 Gateway

Function

The primary function of the ZA 673 Gateway is to provide efficient data exchange between PROFIBUS users and Commutec transmitters. Two independent processors provide the following functions:

- Generation of the live and scan lists
- Cyclic maintenance of the auto-scan buffer
- Direct access to Commutec transmitters.
- Automatic configuration of the object dictionary
- Provision of a default communication relationship list
- Interpretation of the User Command Services

Live list

The live list containing a list of active Commutec transmitters on the Rackbus is generated on command or everytime the start-up switch is toggled. A preset scan list is also generated from the live list when the start-up switch is toggled.

Device Polling

The Commutec transmitters are polled according to the scan list. The poll runs automatically. The resulting data are written into the auto-scan buffer. The scan list can be modified by special configuration software which runs on a personal computer.

Auto-Scan Buffer

In this data buffer every Commutec in the scan list is allocated a data field containing the following information:

- measured value, e.g. level, pressure
- measuring point status, i.e. operational status of the Commutec-Sensor link
- event, i.e. the staus of the limit switches
- communications status, i.e. operational status of the Rackbus link

Each data field is allocated an object, which can be read by selecting the appropriate object index.

Direct Access to Commutecs

In order to enable the configuration of Commutec transmitters and direct access to measured values, every field in the operating matrix of every transmitter can be addressed by selecting its index in the object dictionary.



Block diagram of the ZA 673 gateway. All requests are routed through the communication relationship list to the object dictionary

Implementation



Schematic diagram of communication relationsships between e.g. personal computer, PLC and ZA 673 Gateway

PROFIBUS Services

The ZA 673 Gateway is a PROFIBUS slave which recognises the following services:

• The commands Initiate, Abort, Reject, Status, Identify, Get_OV, Read, Write and Management services

User Command Interface

For Commutec functions which cannot be mirrored by PROFIBUS services, the user command interface allows access to Commutec transmitters by transporting Rackbus commands via the PROFIBUS, e.g. for:

- Up- and download of Commutec data
- Reading of envelope curves from the Nivosonic FMU 67...
- Service commands.

Object Dictionary

The ZA 673 object dictonary comprises up to 32500 object descriptions. Commutec variables, scan and live lists, auto-scan buffer as well as other Rackbus variables are imaged as objects which can be addressed by indices.

In addition to the variable, the object description also gives its data type and attributes. It is either known at the planning stage, can be read during commissioning of the system or can be determined during the course of communication.

Communication Relationship List

A communication relationship list is maintained in all users and allocates the available communication ports to specific PROFIBUS partners and services. The definition requires the:

- PROFIBUS address of the partner
- Port number of the source device
- Port number of the destination device
- Services supported

The ZA 673 Gateway wakes up with a preconfigured communication relationship list defining 64 ports. Ports 2...31 are allocated to cyclic requests, 32...62 to acyclic requests: all users have access.

Measured Value Acquisition

A master acquires data from the ZA 673 by sending out a request which includes the following information:

- Index in communication relationship list
- Index in object dictionary

PROFIBUS tools

Two programs, which can be run on Personal Computers equipped with a PROFIBUS port, are available to the ZA 673 user:

- »Scan list editor«: editor for the scan list.
- »Commutec Operating Software« Display, entry, up- and downloading of Commutec data.

Object Dictionary (OV) of ZA 673 Gateway

Index	Description
0:	OD-Header (DIN 19 245)
115:	Stadard data types
1630:	ZA 673 data types
50: 51: 52:	CRL_Load_Entry CRL_Load_Conf Reinitilization
60: 61: 62:	UCI_Semaphore UCI_Command UCI_Response
70:	Relay_LED
71:	Store Alarm Reason
100163:	ASB.C
200263:	ASB.D
450:	Commutec Live List
500619	Variables Commutec 0*
*Device + 180:	Event
*Device + 185:	Status
*Device + 200 *Device + 319:	Longitudinal Parameters
*Device + 400:	Used V-Positions
*Device + 401412:	Used H-Positions
100032499	ditto Commutecs 163*
**Device = (R *Index = (Rac	ackbus address + 1) x 500 kbus address + 1) x 500

Installation



Wiring diagram for backplane connector. The RS-485 port is also available at the front panel connector

ZA 673 Connection

The diagram above shows the wiring of the ZA 673 PROFIBUS Gateway

- The RS-485 port is provided both at the backplane or front panel connector
- The terminal resistance, see DIN 19245, is set at DIP-switch S 502 as follows:

PROFIBUS Address

Baudrate

S 401

1 2

off off off

off off on

off

jumper X 401:

3

off

on

Any address between 0 and 126 can be set at DIP-switch S 501:

Gang	1	2	3	4	5	6	7
OFF	0	0	0	0	0	0	0
ON	1	2	4	8	16	32	64

The baudrate is set according to the following table at switch S401 and

X 401

16 MHz

16 MHz

16 MHz

Baudrate

500 kHz

19.2 kHz

9.6 kHz

Termination	Switch S 502 pole				
	1	2	3	4	
None	off	off	off	off	
Terminal	off	on	on	off	
Powered terminal	on	on	on	on	

Rackbus Termination

Set hook switch S 301 as follows:

- Closed: < 32 Commutecs on Rackbus
- Open: > 32 Commutecs on Rackbus





 on
 off
 off
 12 MHz
 187.5 kHz

 on
 off
 on
 12 MHz
 93.5 kHz

16 MHz is selected when the jumper is fitted over the top two pins, see diagram.

Start-Up Switch

When gang 5 of switch S 401 is toggled the live list is regenerated, the scan list fitted with V0H0 and a default communication relationship list is generated.

ROM-Page-Switch

Gang 6 of switch 401 controls the ROM-page size range. It is set at the factory:

- ON: 0 64 kB
- OFF: 64 128 kB

Technical Data

Mounting

The ZA 673 PROFIBUS Gateway 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 (7HP) for single or multiple mounting at the measuring point.

Construction

Plug-in card to DIN 41494 (Eurocard).

- Frontpanel: black synthetic with blue
- field inlay, grip and tag space
 Degree of protection to DIN 40050: 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
- Relative humidity: 15...95%

Electrical Connection

- Backplane connector: multipoint plug to DIN 41612, Part 3, Type F (28-pole), see »Installation«
- Front panel connector:
 9-pin D-sub female connector as per DIN 41612 as RS-485 port, for wiring see »Installation«

Power Supply

Electrically isolated power supply:

- Voltage: 24 VDC (-4...+6 VDC) Residual ripple: max 2 V_{pp} within tolerance
- Current: max. 125 mA, integrated fine-wire fuses (160 mA)
- Consumption: 3.0...3.5 W
- Status: green LED lights when on.

Fault Indication

Relay with potential-free changeover contact:

- Max. switching capacity: - 2.5 A, 100 VAC, 250 VA at $\cos \varphi = 1.0$ - 100 VDC, 90 W
- Status: red LED lights on alarm

Rackbus Interface

- Devices: max. 64 Commutec transmitters
- Baudrate: 19.2 kbits/s
- Termination selectable at hook switch S 301: 1...32 or 33...64 Commutecs



Card dimensions (mm)

PROFIBUS Configuration

Configurable by DIP-switches on the ZA 673 board, see »Installation«:

- Termination: 3 modes, none, single, powered, selectable at DIP-switch S 502
- Baudrate selectable at DIP-switch S 401 and jumper X 401:
 9.6, 19.2, 93.75, 187.5 and 500 Kbd
- Live list generation: by toggling gang 5 of DIP-switch S 401
- Profibus address selectable at DIP-switch S 501: 0...126

Transmission Medium

- RS-485 port on backplane and front panel connector
- Bus cable: shielded twisted pairs, unshielded permitted where no severe EMI to be expected
- Impedance: 100...130 Ω (f > 100 kHz)
- Capacitance: < 60 pF/m
- Conductor section: ≥ 0.22 mm² (24 AWG)
- Max. cable length: 1.2 km (depends on baudrate)

Gateway Performance

- Function: PROFIBUS slave only
- Start-up: remote configuration of live list
- Supported services: INITIATE, ABORT, REJECT, STATUS, IDENTIFY, GET_OV, READ, WRITE, FMA_LOAD-LOCAL
- Additional services: User Commands for up-/downloading and visualization.
- Configuration: with »Scan list editor«
- Response times (guidelines): Direct Rackbus access: ca. 250 ms/value

Via auto-scan buffer: ca. 50 ms/value set

How to Order



Accessories

»Scan list editor« software »Commutec Operating« software

In preparation In preparation

PROFIBUS User Organisation



Supplementary Documentation

More information on manufacturers and products for PROFIBUS networks can be obtained form the PROFIBUS User Organisation: PROFIBUS User Organisation Herseler Straße 31 D 5047 Wesseling F. R. Germany

PROFIBUS Standard

- DIN 19 245, Part 1 and Part 2 available in english Beuth Verlag GmbH, Berlin
- PROFIBUS, The Fieldbus for Automation (German)
 K. Bender
 Hanser Verlag, Munich

Rackbus

- Rackbus System Information SI 014/00/e
- Integration of intrinsically safe field instrumentation into industrial networks
 Special Documentation SD 027/00/e

Racksyst

Racksyst

System Information SI 008/00/e

Technical Information TI 047/00/e

Commutec Transmitters

Commutec Transmitters System Information SI 012/00/e

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