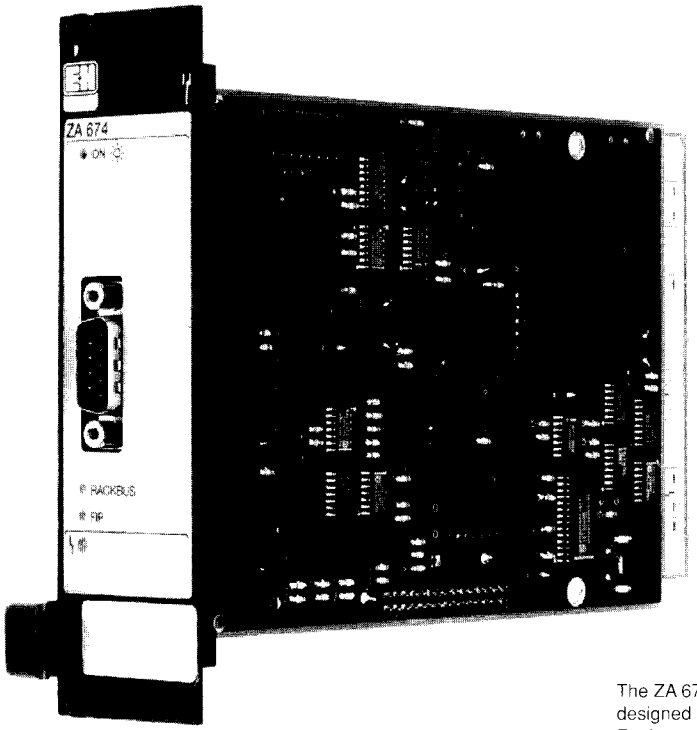
Technical
Information
TI 167F/00/e

Field Communication
ZA 674 FIP gateway

Integrates intrinsically safe Rackbus instrumentation into FIP networks.



The ZA 674 gateway is designed as a 19" Racksyst plug-in module

Application

The ZA 674 Gateway interfaces Commutec measuring points to process control systems, programmable logic controllers and personal computers operating within FIP networks:

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

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

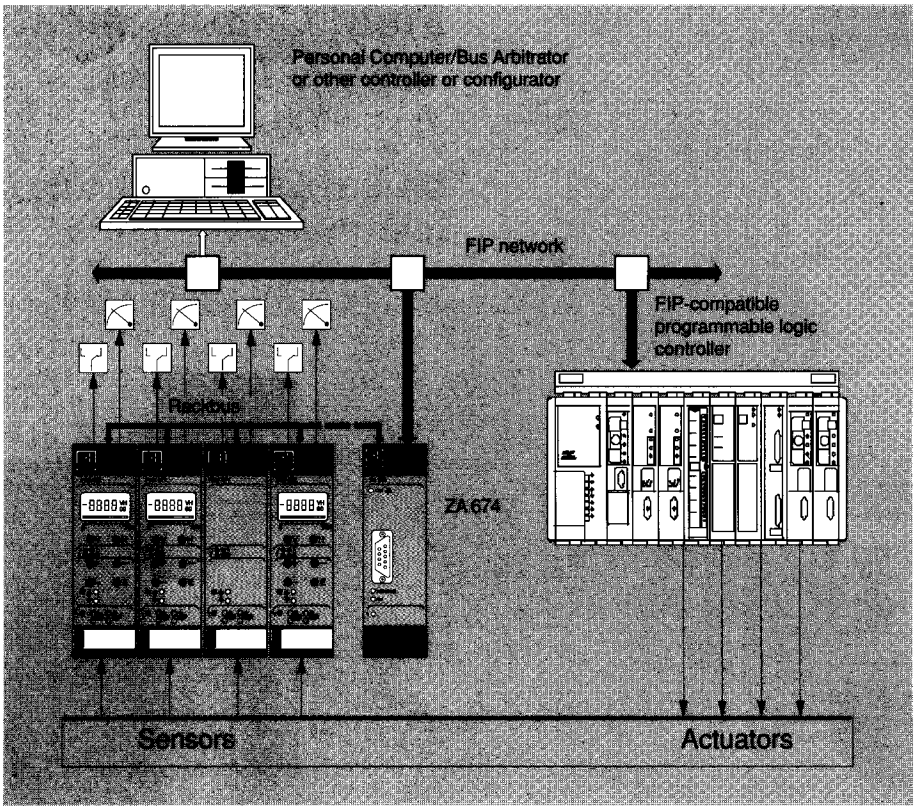
Features and Benefits

- FIP standard:
  conforms to the French FIP standards UTE C46-601...607
- Compatible to Telemecanique FIPIO and supported by TE tools
- Link to field instrumentation:
  allows integration of intrinsically safe Commutec transmitters into FIP-networks
- Auto-scan buffer:
  provides faster access to process data and saves memory and time in the supervisory system
- User command services:
  enables up- and downloading of transmitter configurations and envelope curve display via FIP
- TTL service port
  gives access to operating programs running on a personal computer.

Endress+Hauser

Nothing beats know-how

Measuring System



The measuring system comprises
- up to 64 Commutec transmitters or 128 measuring points
- ZA 674 FIP Gateway
- FIP-compatible personal computer or programmable logic controller

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:

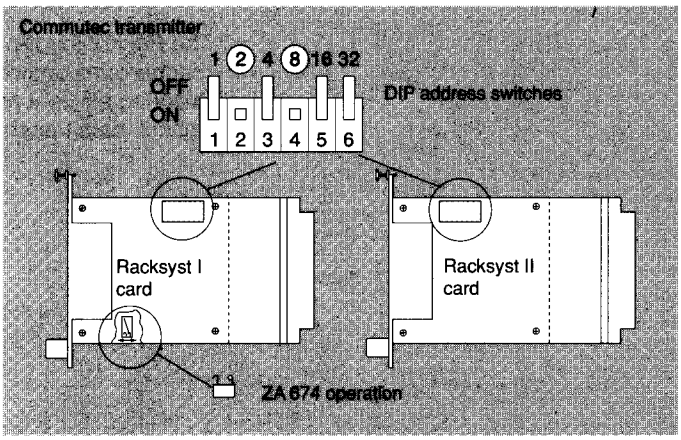
- level measurement (capacitive, conductance, ultrasonic, hydrostatic)
- pressure measurement,
- flow, bulk flow and temperature measurement.
- humidity measurement, water and gas analysis.

The signals sent back from the sensor 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.

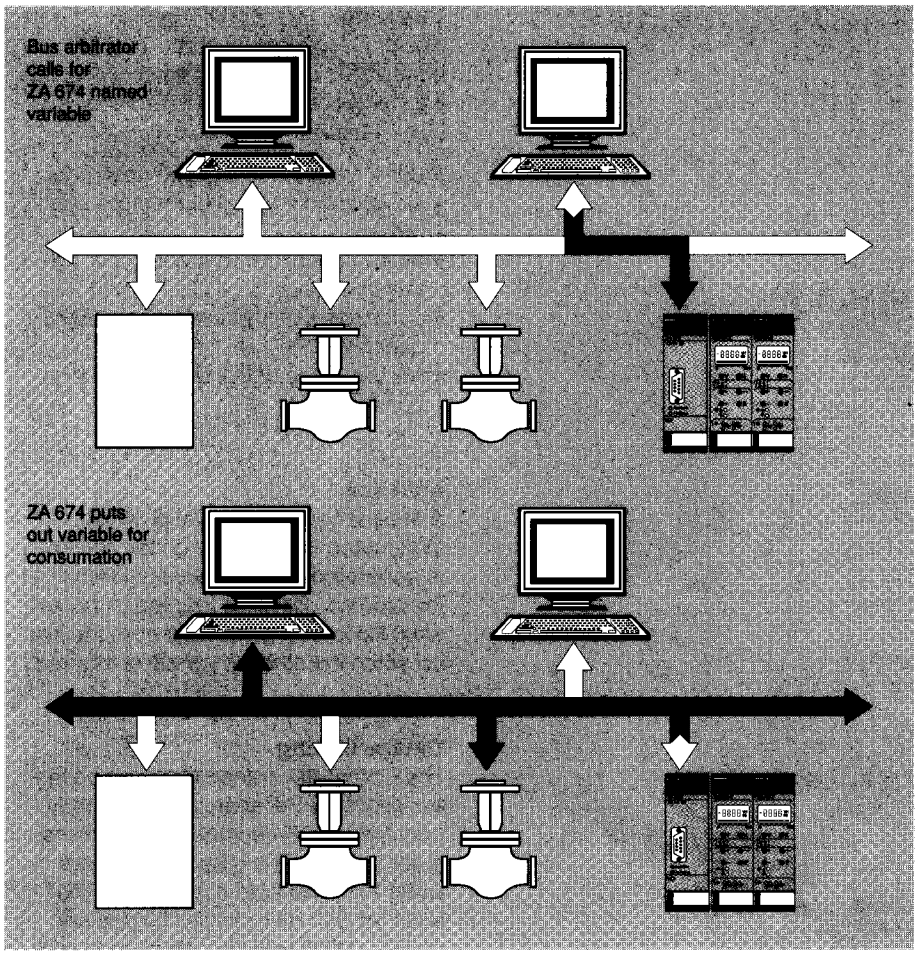
Rackbus
Up to 64 Commutec transmitters can be connected together on the Rackbus system. Using a simple two wire technique, data is passed along the bus at a rate of 19.2 kbits/s. Each transmitter has a unique device address which allows it to be polled by the ZA 674 interface.

ZA 674 FIP Gateway
The ZA 674 Gateway interfaces Rackbus equipment to the FIP network. Conforming to UTE C46-601...607, data are transmitted via a built-in FIP port. Special programs allow gateway configuration and Commutec data presentation at personal computers operating with the FIP protocol or, if the TTL service port is used, via a standard RS-232C interface.



The Commutec transmitter is set for ZA 674 operation at the hook switch or by software, a unique address is configured at the DIP-switches. The latest cards switch automatically to Rackbus operation

FIP Description



Schematic diagram of cyclic FIP bus access by broadcast of named variable

Design
The Factory Information Protocol or FIP-bus aims for very fast transmission rates and strictly defined scanning intervals. It stipulates its own transmission cables and connections enabling baudrates of 31.25 to 2000 kbit/s to be attained on copper or glass-fibre cables up to 2000 m long: the standard rate is 1 MBit/s.

Bus Access Mechanism
The FIP-bus protocol defines hybrid centralised/decentralised control based on the broadcasting principle, whereby each device on the bus listens and transmits. Broadcasting is organised by a central unit called the bus arbitrator. Requests are output according to a command table containing predefined named variables. On recognising the variable name of the information it produces, a device broadcasts the current value of the variable over the bus.

Variable Acquisition
The broadcast information is consumed by all receivers which recognise the variable name. The broadcasting principle thus ensures that all consuming devices are updated at the same time. Strict periodicity is ensured by the cyclic scanning of the table; the frequency of acquisition can be increased by naming the variable several times within the cycle. The duration of each cycle is normally freely selectable. In addition to this cyclic traffic the FIP-bus supports acyclic requests and a message service.

Data Security
The FIP-Bus offers extremely secure transmission based on the Manchester II code. For process control applications, however, the lack of an acknowledgment service means that malfunctions or device failures must be recognised by software timeouts, e.g. in a bus monitor. The monitor function may be implemented in the bus arbitrator or as a separate entity. To prevent a breakdown of the network in case of failure of the bus arbitrator, its functions may be implemented in other stations on the bus.

ZA 674 Gateway

Function

The primary function of the ZA 674 Gateway is to provide efficient data exchange between FIP users and Commutec transmitters by:

- generation of the live and scan lists
- cyclic maintenance of the auto-scan buffer
- direct access to Commutec transmitters.
- automatic configuration of the object directory
- interpretation of the User Command Services.

Live List

A 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, which may contain up to 64 entries. 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:

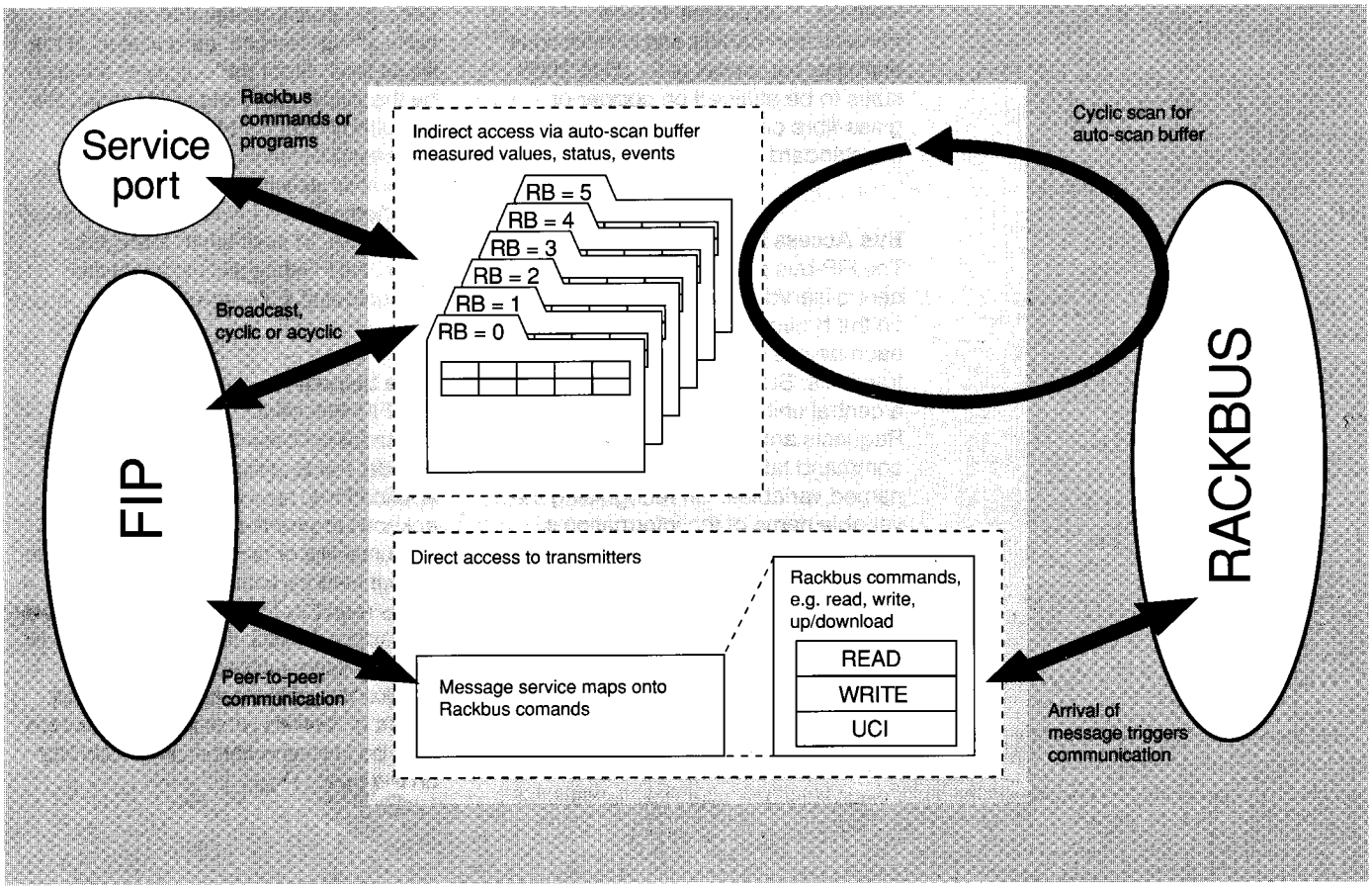
- measured value, e.g. level, pressure
- measuring point status, i.e. operational status of the Commutec-Sensor link
- event, i.e. the status of the limit switches
- communications status, i.e. operational status of the Rackbus link

Each data field is allocated a variable name, the value of which is broadcast when called for by the bus arbitrator. For Telemecanique PLC users, the ASB values are available to the application already decoded.

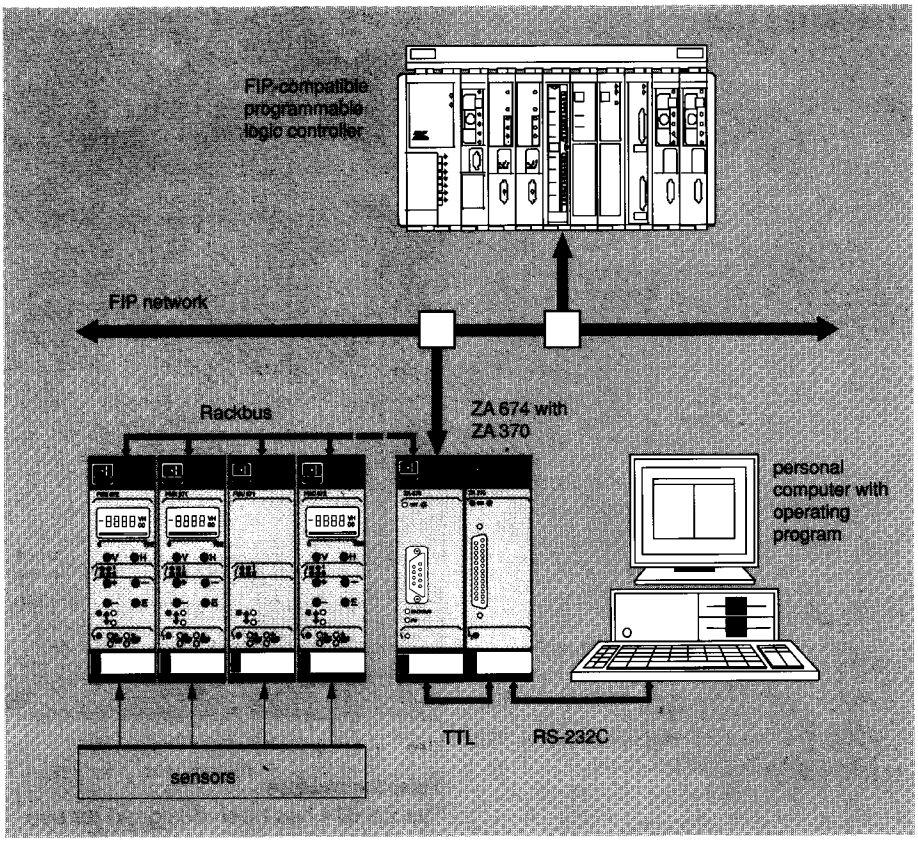
Direct Access to Commutecs

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 an object directory. These objects are accessed by means of the acknowledged message service.

Block diagram of the ZA 674 gateway. Auto-scan buffer data and alarms are accessed via named variables, other parameters via the acknowledged message service



Implementation



Measuring system with addtional interface ZA 370 for connecting a personal computer via its RS 232C port.. The Commutec operating programs allow easy configuration of the Commutec transmitters

Local Network Management

The ZA 674 implementation allows for up to 15 separately addressable gateways within a local network, for Telemecanique FIPIO architectures 3. The Gateway address is set by means of a DIP switch: each gateway occupies 16 consecutive addresses.

Named Variables

Normal traffic on FIP is handled by the periodic broadcasting of named variables. In the ZA 674 Gateway, both auto-scan buffer data and gateway alarms can be accessed in this mode. ASB data, for example are called by broadcasting the indicator:

- 0x3006 +(adr-1)•0x40 + dev_no.•0x10

whereby
adr = start FIP address of gateway
dev_no. = Commutec address (0...63).

For Telemecanique PLCs the ASB data are available to the application already decoded.

Object Directory

Direct access to individual Commutec parameters, e.g. for configuration, is handled by the aperiodic FIP message service. The message contains the address of the gateway to which the Commutec is connected, the index of the parameter in the object directory, the command and if appropriate data.

User Command Interface (UCI)

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

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

FIP Tools

Two programs, which can be run on Personal Computers equipped with a FIP port, are in preparation for the ZA 674 user:

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

TTL Service Port

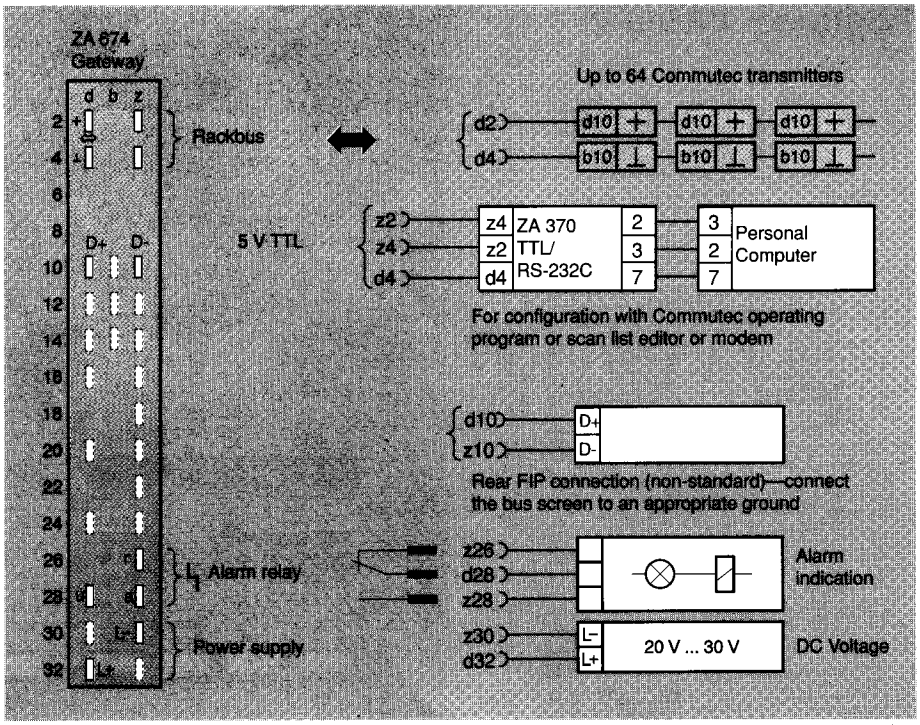
The TTL interface allows the gateway to be connected to the RS-232C port of a personal computer or modem via a ZA 370 interface. The gateway and transmitters can then be commissioned by using the DOS and Windows versions of the scan list editor and Commutec operating program. Since this port competes for processor time with the FIP application its use should be restricted to commissioning and configuration tasks.

Object directory of ZA 674 Gateway

Index	Description
52:	Reset
60:	UCI_Semaphore
61:	UCI_Command
62:	UCI_Response
70:	Relay_LED
71:	Store Alarm Reason
500...619	Variables Commutec 0*
*Device + 180:	Event
*Device + 185:	Status
*Device + 200... *Device + 319:	Longitudinal Parameters
*Device + 400:	Used V-Positions
*Device + 401...412:	Used H-Positions
1000...32499	ditto Commutecs 1...63*

**Device = (Rackbus address + 1) x 500
*Index = (Rackbus address + 1) x 500 + ((V x 10) + H)

Installation



Wiring diagram for backplane connector for FIP copper version. The FIP port is located on the front panel only

Telemecanique

The ZA 674 has been designed for use with Telemecanique

- V5, PMX, PCX processors
- XTEL, PL7-3, SYSDIAG products
- TSX FP ACC2 FIPIO connector.

Electrical Connection

The ZA 674 is connected as shown above. There are two versions:

- with FIP copper port
- with FIP fibre optics port

Rackbus Termination

Set hook switch S 301 as follows:

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

Data Format TTL interface

Gang 3 of switch S 101 sets the format:

- 9600, 7, 1, E — standard for computer
- 9600, 8, 1, N — for modem

FIP Address

Any address between 0 and 255 can be set at DIP-switch S 101 (Telemecanique 1...62), 16 consecutive addresses are occupied.

Gang	1	2	3	4	5	6	7	8
OFF	0	0	0	0	0	0	0	0
ON	1	2	4	8	16	32	64	128

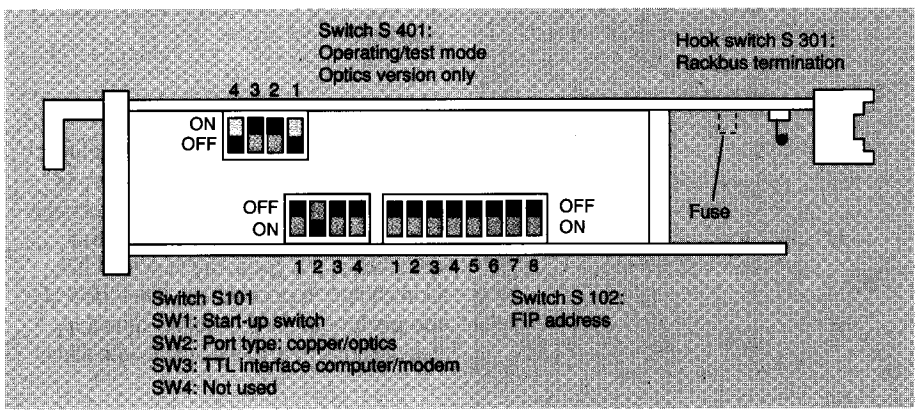
Start-Up Switch

When gang 1 of switch S 102 is toggled the live list is regenerated and the scan list filled with the matrix position V0H0.

Fibre Optics Version

Gang 2 of switch S102 is set to off for the fibre optics version. Switch S401 (optics version only) can be used to test the optical interface:

Switch 401	1	2	3	4
Operating mode on	off	on	on	off
Test mode on	on	off	off	on



ZA 674 Gateway configuration switches, card viewed from top

Technical Data

Mounting

The ZA 674 FIP 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.

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
- Relative humidity to DIN 40 050: Class F (15...95%)

Electrical Connection

- Backplane connector: multipoint plug to DIN 41612, Part 3, Type F (28-pole), see »Installation«
- Front panel connector: 9-pin female connector as per UTE C46-604 (copper) or UTE C46-407 (fibre optics)

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.

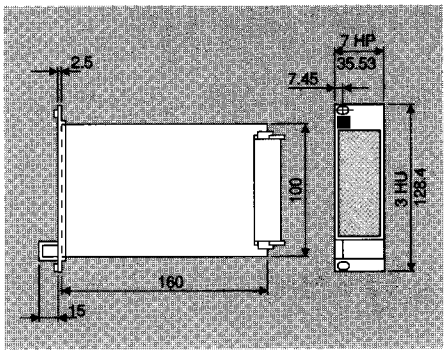
Fault Indication

Relay with potential-free changeover contact:

- Max. switching capacity:
  - 2.5 A, 100 VAC, 250 VA at cos φ = 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)
25.4 mm = 1 in

TTL Interface

For connection to the RS-232C port of a personal computer or modem via a ZA 370 interface:

- Baudrate: 9600
- Format 7, 1, E (computer) or 8, 1, N (modem) selectable at S 101, gang 3.

FIP Configuration

Configurable by DIP-switches on the ZA 674 board, see »Installation«:

- Baudrate: fixed 1MB/s
- Live list generation: by toggling Gang 1 of DIP-switch S 101
- Gateway address 0...255, for Telemecanique FIPIO 1...62, selectable at Gang 1...8 of DIP-switch S 102 — the gateway occupies 16 consecutive addresses starting at the set address

Transmission Medium

Depending on version:

- FIP copper medium as per UTE C46-604
- FIP fibre optics as per UTE C46-607, test mode selectable at DIP-switch S 401
- Max. cable length: 2 km

For further details see standards.

Gateway Performance

- Function: Producer and consumer
- Start-up: remote configuration of live list
- Supported services: cyclic and aperiodic broadcast, acknowledged messages
- 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
  For Telemecanique PLCs the auto-scan buffer variables are presented to the application already decoded.

Product Structure

ZA 674 FIP Gateway

Interface to FIP network
1 Copper (UTE C46-604)
2 Optical fibre TP (UTE C46-607)

Language
E English
D German
F French
I Italian

ZA 674-R0E	☐	☐	1	Complete order code

Accessories

Commutec Operating Program	014880-0000
Commutool	015789-0000
Commuwin	016303-0000

WorldFIP

More information on manufacturers and products for FIP networks can be obtained from WorldFIP:

WorldFIP
3 bis, rue de la Saltpêtrére
54 000 Nancy
France

Supplementary Documentation

FIP Standard
☐ UTE C46-601...607 available in english from WorldFIP

Commutec Transmitters
☐ Commutec Transmitters
System Information SI 012F/00/e

Rackbus
☐ Rackbus
System Information SI 014F/00/e

☐ Interface ZA 370
Technical Information TI 152F/00/e

☐ Integration of intrinsically safe field instrumentation into industrial networks
Special Documentation SD 027F/00/e

☐ Digital process control with analogue and digital instrumentation
Special Documentation SD 043F/00/e

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08.93/MTM

TI 167F/00/e/01.95
Printed in FR of Germany/GW (VPW)