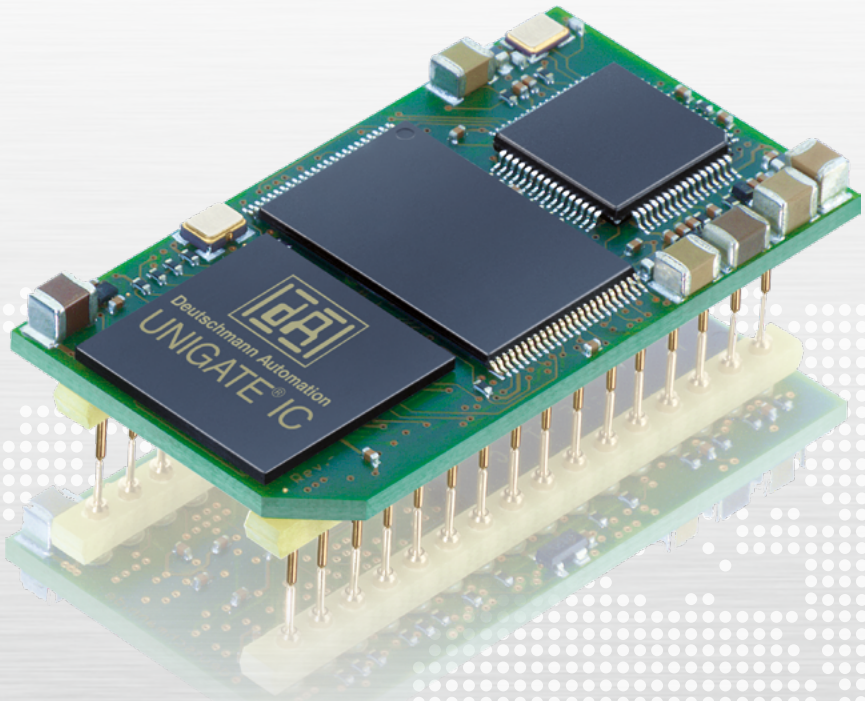
ALL-IN-ONE BUS NODE

UNIGATE® IC



- 32 DIL
- Norm compliant
- Certified
- Programmable
- Designed & manufactured in Germany

READY-TO-INSTALL FOR

CANopen | DeviceNet | EtherCAT | EtherNet/IP | ETHERNET TCP/IP | LONWorks | Modbus | MODBUS TCP | MPI | PROFIBUS | PROFINET

INTEGRATE WITH LITTLE DEVELOPMENT EFFORT

Deutschmann
your ticket to all buses

Protocol Converter | Embedded Solutions | Gateways

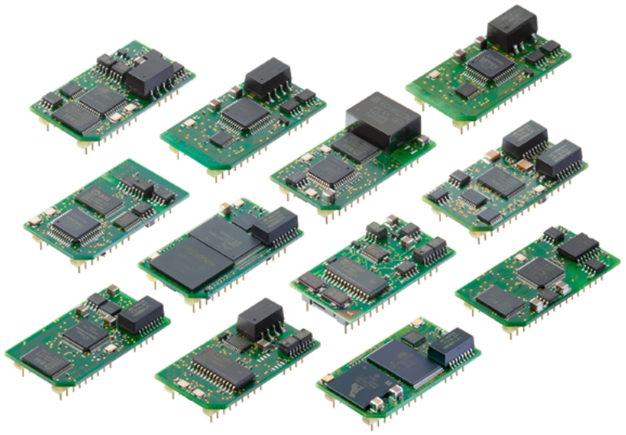
Ready-to-install

UNIGATE® IC – Integrate without much development effort

The UNIGATE® IC is a ready to install fieldbus- respectively industrial Ethernet node in DIL 32 design. The enormous reduction of the development effort up to 70-80% holds a significant advantage in time-to-market.

The hardware development is reduced to the integration of the IC-socket and bus specific connectors.

Covering an area of only 45 x 25 mm, the module includes all necessary components such as microcontroller, Flash, RAM, Ethernet switches or fieldbus ASIC as well as octocoupler and bus driver. It can be connected to the microcontroller of the terminal device, or can operate as stand-alone.



The module handles the entire bus or Ethernet traffic and relieves the terminal device processor of this non-trivial task. The protocol of the terminal device will be implemented with a script. The free of cost PC-tool “Protocol Developer” generates the script and adapts it perfectly to the final product and the requirements of the bus.

Is your host working with a standard protocol such as Modbus? Then it’s even easier, because the Protocol Developer has the protocols Modbus RTU / ASCII as master or slave, and also the 3964 (R) protocol with complete handshake and DLE doubling is already included in a simple script command. Changes to the firmware of the terminal are not necessary.

The hardware and software interfaces of the Deutschmann UNIGATE® IC series are standardized and functionally the same. A guarantee for the interchangeability between the different bus versions.

Design-In

Deutschmann also offers UNIGATE® IC variants as a design-in solution. Design-in allows the customer to fit the design of the module to their needs and optimize for their own system. You’re going to use our always further developed firmware.

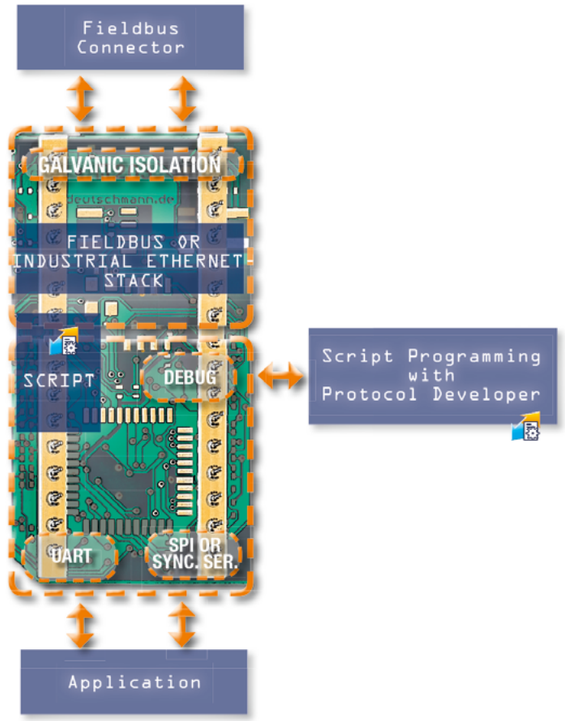
Advantage Deutschmann – Ready-to-install

- 70-80% reduced development effort
- Time-to-Market gain
- Assembly consists of standard components
- Connection to the host processor via UART interface
- Expandable via the synchronous serial interface e.g. for
  - ‚Stand-alone‘-mode (without processor applications)
  - Shift-register connection (e.g. LED activation, read-in of switch positions)
  - Analog/digital converter (e. g. analog sensor, 4-20mA current loop)
- Easy integration into your electronics
- Adaptation of the terminal device firmware is dropped
- All active components are included besides IC PN2Port
- Integrated isolation to FB interface
- Coverage of the major fieldbus and industrial Ethernet protocols with just one development

Hardware overview

Use

The Deutschmann UNIGATE® IC is extremely well suited for the use with terminal devices out of the automation technology. It does not matter whether it is a complex control or a simple actuator or sensor. Even control components – outside the classical automation technology – can be connected to the fieldbus world or Ethernet based buses with the UNIGATE® IC.



Features

The Deutschmann UNIGATE® IC provides a complete fieldbus- respectively industrial Ethernet interface (Slave). The functionality of Ethernet based models includes a FTP- and a web server.

Benefit

A key benefit of the UNIGATE® IC series is the scripting ability. As a result, changes on the terminal device are no longer required. The flexibility of the script language provides the user freedom and opportunities; from a simple transparent data transfer through generating complex protocols up to preparation of the data. Standard protocols such as Modbus RTU (Master/Slave), Modbus ASCII are included as complete script command.

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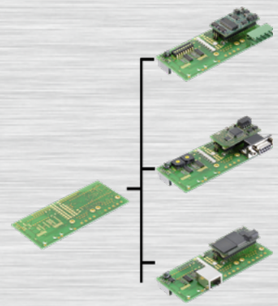
your ticket to all buses

Application example



Example of a customized board. This board can be fitted for different fieldbuses.

Hardware overview

Stand-alone operation

The connection to terminal devices without a processor can be done via the clocked shift-register interface (synchronous serial interface / SPI). It allows the extension of the IC for digital and analog inputs and outputs through the port of shift registers, DA- or AD-converters. This way LEDs can be accessed, switch positions queried or analog signals read-in or read-out. The maximum input and output register width is each 256 bits.

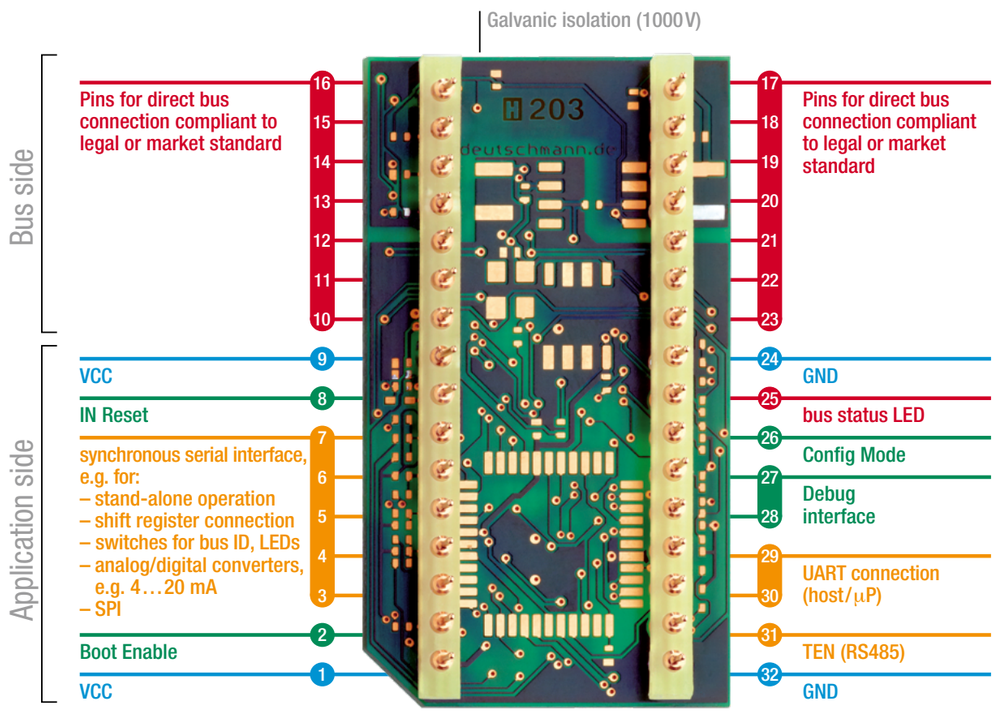
Processor-connection

For the use in systems with its own microprocessor, the UNIGATE® IC is connected via a UART interface with the processor of the final product. The communication between the device processor and the UNIGATE® IC is controlled by the script. With script technology it is possible to simulate complex protocols data can be processed and cached.

The key advantage: The firmware of the terminal device does not need to be touched!

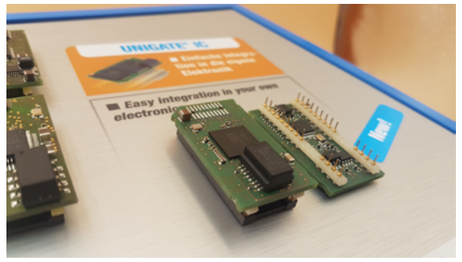
Debug interface

The debug interface of the UNIGATE® IC can be used to test a script, or for diagnostic purposes.



UNIGATE® IC2

New series UNIGATE® IC2



UNIGATE® IC2 - The fast one

The new embedded series UNIGATE® IC2 is equipped with a Cortex-M4 controller and achieves much higher transfer rates for communication via SPI or UART.

The script execution time decreases by a factor of 50-80, depending on the commands used. As a result, the UNIGATE® IC2 are able to process even large scripts very quickly.

With simple scripts, execution times in the microsecond range are possible.

The SPI bus achieves a transfer rate of 12 Mbit/s in Master mode. Further increases up to the maximum transmission rate of 33 Mbit/s are being tested. In slave mode, 10 Mbit/s are achieved. The UART interface supports baud rates of up to 7.5 Mbaud.

The UNIGATE® IC2 series is PIN-compatible with the still available series UNIGATE® IC(1). The scope of the firmware is identical and existing scripts can be reused. Only due to the changed timing are u.U. minor adjustments necessary.

The Deutschmann scripting language and the associated development environment "Protocol Developer" are unchanged and of course also used in the new UNIGATE® IC2 series.

UNIGATE® IC2 is now available in the PROFIBUS and Fast Ethernet/ModbusTCP version and will soon be available for EtherCAT. Further bus variants will follow and will be announced separately.

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- UNIGATE® IC2
- Cortex-M4-Controller
- Script execution time reduced by a factor of 50 to 80

Deutschmann Script language

The heart of the Deutschmann UNIGATE® / Gateway series

- Flexible solutions are needed. With the usual configuration tools for protocol converters and gateways, the user has to work with the specifications of the manufacturer. To change this unfortunate condition Deutschmann developed its own script language as early as in 1999.
- The user only needs to process the data of the bus and barely has to look after the special characteristics of the fieldbus.
- The Protocol Developer supports a variety of functions to fit the received or to send data into the right “form”. Mathematics- or memory processing commands are known from other Script languages and are easy to understand implemented, even for laymen.
- Also the neatly arranged selection of examples enables a quick introduction to laymen.
- Another highlight is the included debug functionality. The common functionalities such as Single-step, running and stopping on break-point are available.
- Great emphasis is put on data security. You can activate special error detection routines on request.

What exactly is a script?

A script is a sequence of commands executed in a given order. A command is always a small, firmly outlined task. The script language also knows commands that control the program flow in the script, which is why you can assemble even complex processes with these simple commands.

Command groups overview

Declarations	variable declaration
Flow Control	Subfunction calls, jumps, branches
Math	Mathematical functions, data conversions
Communication	Send and receive data
Device Control	Set and read parameters. For example the baud rate for the serial interface.
Bus Specific	bus-specific values

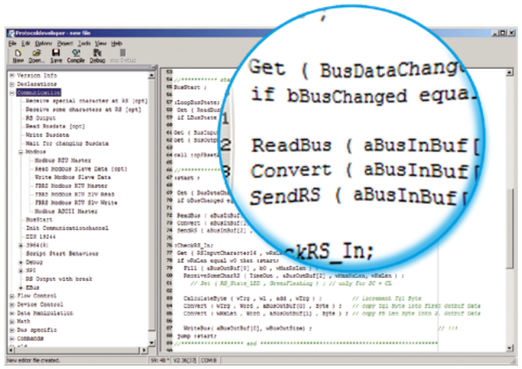
The script programming gives you a flexible possibility to solve your communication task. On both sides, i.e., on the RS-side and on the bus side, data can be edited, converted and arranged.

Protocol Developer

The amount of tasks which can be handled with a script is infinite.

Scripts are imaginable which

- automatically determine a participants data at the serial interface, edit this data and then outline it in the bus
- only carry out action if the bus data is altered
- carry out timed actions
- share communication states
- exchange the data between 2 serial participants (RS485) and present the state in the bus

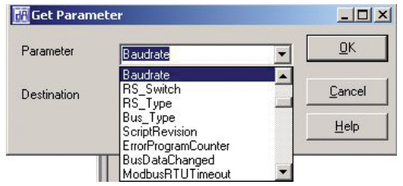


Picture 1: script example in the Protocol Developer

The 1x1 of the Protocol Developer

Picture one shows you an example script in the editor surface and the tree view of all available commands (Command-Tree). It is the tool for easy script generating for our script gateways, its operation is aimed on it.

In addition to programming via text commands, the Command-Tree also offers dialogue-based programming. If defined, and necessary for the correlating command, a dialogue goes through the command parameters (picture 2) and inserts the resulting command into the script.



Picture 2: parameter

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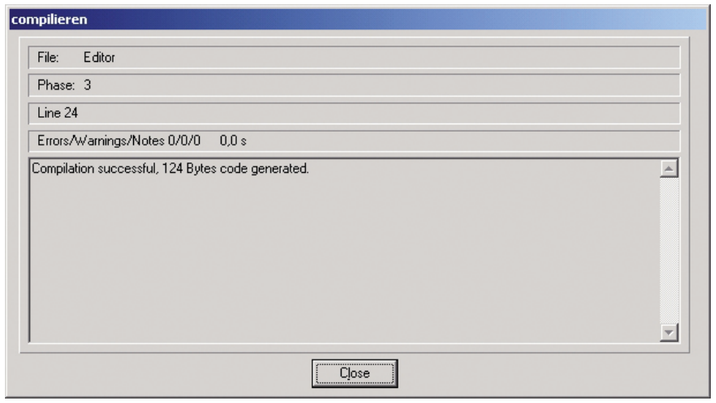
- Comfortable script commands
- Wide range of functions
- Marketable protocols are included as a script command
- Quick induction

Compile

Before a script can be loaded into a UNIGATE®, it has to be compiled. The resulting code is very storage efficient. So even extensive a script fits comfortably in the internal memory of the UNIGATE®.

The loading of a script into the device can be done directly from the Protocol Developer. For serial programming a script-download tool is available.

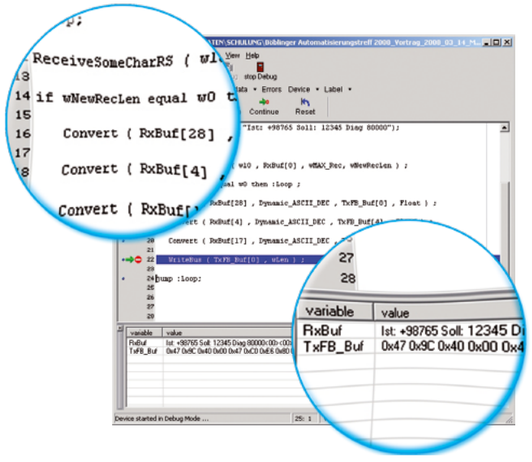


Picture 3: compilation

Debuggen

All UNIGATE® devices have a built-in debugging interface. A special debug software is not needed. To test even extensive scripts quickly you'll find many functions for comfortable debugging, such as

- Breakpoints
- Single-step
- Display of the variables and their values
- Error display



Picture 4: debug window with variables and their content

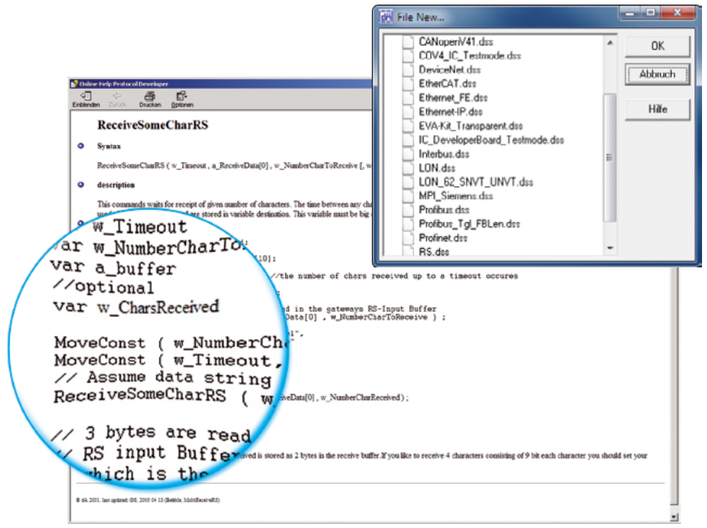
Protocol Developer

Support

The Protocol Developer contains a context-sensitive help function, in which a detailed description of all script commands is included.

Templates for different tasks and bus variants can be transferred directly and adapted to your own needs.

Picture 5: extract of the templates



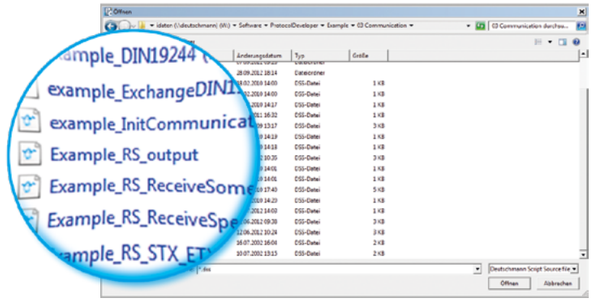
Picture 6: online help

Sample scripts

The free of cost Protocol Developer includes commented script examples for every script command.

In addition to our free hotline, you'll find further support in form of the latest versions of manuals and software tools available for free on our web page.

(www.deutschmann.com)



Picture 7: extensive library with example scripts

Deutschmann
your ticket to all buses

- Integrated debug environment
- Convenient test of the script
- Memory efficient compilation of script code
- Example for each script command
- Templates for each bus variant
- Workshops
- Support by phone / E-Mail

Protocol Developer

Advantage Deutschmann – Flexibility

- No changes in your own firmware necessary
- Flexible and powerful script language, specifically created for the bus communication
- Easy to handle
- Customized commands on demand. For example if functions are missing or an optimization for time critical application is needed.
- You can create your own script, or Deutschmann creates your script for you
- Extensive support through help function, templates, examples, hotline and Workshops
- Devices can also be factory fitted with your script
- Scripts run on the UNIGATE® CL, UNIGATE® IC and UNIGATE® FC series
- Easy adaption for existing scripts to more fieldbuses and industrial Ethernet.

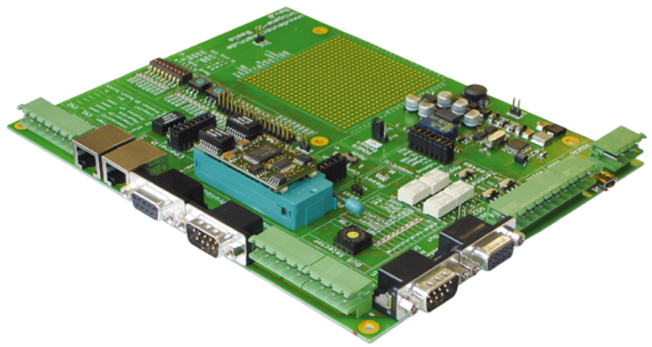
UNIGATE® IC Developer-Board

The developer board was developed to ensure the quick implementation of the Deutschmann All-In-One bus node UNIGATE® IC into your own electronics. The unified interface supports all UNIGATE® IC models.

The required operating voltage (depending on the IC design either 5 volts or 3.3 volts) is adjustable.

For the connection to a PC (with the DEBUG interface) there is both, an RS232 port and a USB port available.

The application can be connected either via RS232, RS485, RS422, or USB. To test the respective bus side, bus connections according the norm or market standard are available. The Deutschmann add-on packages (bus master simulation) are optionally available.



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- **The add-on has been designed to provide a simple master simulation.**
- **The add-on is quick to install and easy to handle.**
- **The included PC software allows to follow, the data exchange through a serial bus window and a bus windows.**
- **Depending on the bus versions there is technical literature included.**
- **Also you can use the existing bus master instead of the add-on.**

Technical overview

CANopen

5V ◆ Art.-Nr. V3491
3,3V ◆ Art.-Nr. V4346

- Complete CANopen-Slave-interface
- Max. 16 TPDO and max. 16 RPDO process data objects
- Baud rate 10kbit/s to 1 Mbit/s
- Isolated CANopen interface
- CANopen Peer-to-Peer Messaging
- 12 K Memory for Script code
- Number SDO: 1
- Number user objects: 255
- CAN-Layer 2 Support by Script
- Number errors in errofield: 2
- Generic EDS file

CANopen 4X

5V ◆ Art.-No. V3786
3,3V ◆ Art.-No. V3758

- Complete CANopen-Slave-interface
- Max. 32 TPDO and max. 32 RPDO process data objetcs
- Baud rate 10kbit/s to 1 Mbit/s
- Isolated CANopen interface
- CANopen Peer-to-Peer Messaging
- 16 K Memory for Script code
- Number SDO: 2
- Number user objects 65535
- CAN-Layer 2 Support by Script
- Number errors in errorfield: 10
- Generic EDS file
- + LSS, Script can read all Objects (also 1xxxH)
- + 1002H / 1004H / 1010H / 1011H / 1201H
- + On write by SDO
- + SDO-Block-Transfer

DeviceNet

5V ◆ Art.-No. V3264
3,3V ◆ Art.-No. V3800

- Complete DeviceNet interface
- Max. 255 byte input- and 255 byte output data
- Baud rate 125-500 kbit/s
- Isolated DeviceNet interface
- DeviceNet functions: I/O Slave messaging, polling
- Generic EDS file

EtherCAT®

3,3V ◆ Art.-No. V3675

- 100 Mbit/s full-Duplex transmission
- Max. 255 byte input- and 255 byte output data
- Isolated EtherCAT interface with 2x RJ45 connector
- Supports CANopen communication objects, PDO and SDO
- Generic EDS file

IC2 EtherCAT

3,3V ◆ Art.-Nr. V4394

- 100 Mbit/s full-Duplex transmission
- Max. 255 byte input- and 255 byte output data
- UART up to 7,5 MBaud
- SPI-Bus transfer rate in Master mode: 12 Mbit/s
- SPI-Bus transfer rate in Slave mode: 10 Mbit/s
- Isolated EtherCAT interface with 2x RJ45 connector
- Supports CANopen communication objects, PDO and SDO
- Generic EDS file

EtherNet/IP 1Port

3,3V ◆ Art.-Nr. V3677

- EtherNet/IP-Adapter Funktion
- Max. 1060 Bytes Eingangs- und 1060 Bytes Ausgangs-daten
- Bus Baudrate 10 und 100 MBaud autodetect
- Potentialgetrennte EtherNet/IP-Schnittstelle für 1x RJ45 Anschluss
- IT-Funktionen: Web-Server, FTP-Server
- Generische EDS Datei

ODVA CONFORMANT

EtherNet/IP 2Port

3,3V ◆ Art.-Nr. V3803

- EtherNet/IP-Adapter Funktion
- Max. 1060 Bytes Eingangs- und 1060 Bytes Ausgangs-daten
- Bus Baudrate 10 und 100 MBaud autodetect
- Potentialgetrennte EtherNet/IP-Schnittstelle für 2x RJ45 Anschluss
- IT-Funktionen: Web-Server, FTP-Server
- Generische EDS Datei

ODVA CONFORMANT

Fast Ethernet

5V ◆ Art.-No. V3419
3,3V ◆ Art.-No. V3691

- Max. 1540 Bytes Eingangs- und 1540 Bytes Ausgangsdaten
- Baudrate 10/100 Mbit/s
- Potentialgetrennte Fast Ethernet-Schnittstelle für RJ45 Anschluss
- IT-Funktionen: Web-Server, FTP-Server
- 1 MByte Speicher für Datei system
- Script und Config-Update nur via RS232
- Without magnatics: o.r

Fast Ethernet FEX

5V ◆ Art.-Nr. V3722
3,3V ◆ Art.-Nr. V3766

- Max. 1540 Bytes input- and 1540 Bytes output data
- Baud rate 10 or 100 Mbit/s
- Isolated Fast Ethernet interface with RJ45 connector
- IT functions: Web server, FTP server
- Memory for file system: 1 MByte (o.r. 8 MBytes)
- Script and Config.-Update by RS232 and FTP
- Without magnatics: o.r.
- + Server-Side-Include (SSI)
- + RAM-Disk
- + RAW-mode

IC2 Fast Ethernet /Modbus TCP

3,3V ◆ Art.-Nr. V4360

- Max. 1540 Bytes input- and 1540 Bytes output data
- UART up to 7,5 MBaud
- SPI-Bus transfer rate in Master mode: 12 Mbit/s
- SPI-Bus transfer rate in Slave mode: 10 Mbit/s
- Baud rate 10/100 Mbit/s
- Isolated Fast Ethernet interface with RJ45 connector
- IT-Functions: Web-Server, FTP-Server
- Data-Flash: 1 MByte
- Memory for file system: 1 MByte
- Script and Config-Update via RS232 and FTP
- Without magnatics: o.r
- + RAM-Disk

Modbus RTU

5V ◆ Art.-Nr. V3517
3,3V ◆ Art.-Nr. V3736

- Isolated RS interface (RS232/RS485/RS422)
- Up to 625 kBaud
- Implementation protprietary/complex protocols
- Implementation standard protocols e.g. Modbus RTU (Master/Slave), Modbus ASCII (Master/Slave), 3964 (R) (e.g. for RK512)

Modbus TCP

5V ◆ Art.-Nr. V3722
3,3V ◆ Art.-Nr. V3766

- Complete Modbus- TCP-Slave interface
- Max. 1540 Bytes input- and 1540 Bytes output data
- 10/100 Mbit/s
- UART up to 625 kBaud
- IT-Functions: web server, FTP server

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General specifications

- Serial interfaces 2x UART, 1x SPI or 1 x shift register
- Baud rates: 110 Baud to 625 KBaud
- Debug interface
- 16K Script memory
- Dimensions: 25 x 45 mm (W x H)
- Weight approx. 9 g
- 32 DIL
- Operating temperature: -40°C to +85°C, RJ variants -25°C to +85°C
- CE and bus-specific certifications
- RoHS
- Reach

Technical overview

PROFIBUS

General features:
- Complete PROFIBUS-DP-Slave interface
- Max. 244 Bytes input- and 244 Bytes output, max. 488 Bytes total
- PROFIBUS address adjustable
- Automatical Baud rate recognition (9600 bit/s – 12 Mbit/s)
- Isolated PROFIBUS interface for 9-pin. D-sub connector
- Generic GSD file

PROFIBUS DPL
5V ◆ Art.-No. V3473
3,3V ◆ Art.-No. V3525

PROFIBUS DPL
without RS485 driver
5V ◆ Art.-No. V3626
3,3V ◆ Art.-No. V3631

PROFIBUS DPL LWL
5V ◆ Art.-No. V3743
3,3V ◆ Art.-No. V3742

Additional features for DPL:
- DPV1 / DPV2 Support
- 2 K Memory for Script code
- 1400 Byte Memory for Script variable
- 32 Byte Buffer for Debug-Interface
- Script-Stacksize: 16 Words
- Size Script-Command: 48 Bytes
- 16 Bytes PB-Parameter
- 16 Bytes PB-config data
- 32 Bytes PB-diagnosis
- 256 Bytes RS-buffer size
- Max. 64 Bytes DPV1-buffer size (acyclic)
- Overall height in mm: 12

PROFIBUS DPY
5V ◆ Art.-No. V4263
3,3V ◆ Art.-No. V4262

PROFIBUS DPY
without RS485 driver
5V ◆ Art.-No. V4264
3,3V ◆ Art.-No. V4265

Additional features for DPX:
- DPV1 / DPV2 Support
- 16 K Memory for Script code
- 8 K Bytes Memory for Script variable
- 128 Bytes Buffer for Debug-Interface
- Script-Stacksize: 16 Words
- Size Script-Command: 128 Bytes
- 244 Bytes PB-parameter
- 128 Bytes PB-config data
- 244 Bytes PB-diagnosis
- 1 K RS-buffer size
- Max. 240 Bytes DPV1-buffer size (acyclic)
- Overall height in mm: 12
- EEROM for Script variable: 16 K
- Support I & M: IM0
- Support Testmode by software
- Opcode SWITCH

PROFIBUS DPV1
5V ◆ Art.-No. V3218

PROFIBUS DPV1
16K-Scriptmemory
5V ◆ Art.-No. V3629

Additional features for DPV:
- DPV1 / DPV2 Support
- 8 K, optional 16 K Memory for Script code
- 8 K Memory for Script variable:
- 256 Byte Buffer for Debug-Interface
- Script-Stacksize: 256 Words
- Size Script-Command:256 Byte
- 244 Bytes PB-parameter
- 128 Bytes PB-config data
- 244 Bytes PB-diagnosis
- 1 K RS-buffer size
- Max. 240 Bytes DPV1-buffer size (acyclic)
- Overall height in mm: 9
- EEROM for Script variable: 8 K / optional 16 K minus Scriptlength
- Support I & M: IM0
- Support Testmode by software
- Opcode SWITCH

IC2 PROFIBUS
3,3V ◆ Art.-No. V4329

General features:
- Complete PROFIBUS-DP-Slave interface
- Max. 244 Bytes input- and 244 Bytes output, max. 488 Bytes total
- UART up to 7,5 MBaud
- SPI bus transmission rate in Master mode: 12 Mbit/s
- SPI bus transmission rate in Slave mode: 10 Mbit/s
- PROFIBUS address adjustable
- Automatical Baud rate recognition (9600 bit/s – 12 Mbit/s)
- Isolated PROFIBUS interface for 9-pin. D-sub connector
- Generic GSD file

PROFINET 2Port
without transformer
3,3V ◆ Art.-Nr. V3804

- Complete PROFINET-IO-Device interface (slave)
- Max. 1440 Bytes input and max. 1440 Bytes output data
- Isolated PROFINET interface with 2x RJ45 connector (integrated Switch)
- 100 Mbit Full-Duplex transmission
- 32-Bit microprocessor for fast response time
- Generic GSD file

RS (serial interfaces on the bus side)
5V ◆ Art.-Nr. V3517
3,3V ◆ Art.-Nr. V3736

- Isolated RS interface (RS232/RS485/RS422)
- Up to 625 kBaud
- Implementation proprietary protocols
- Implementation standard protocols e.g. Modbus RTU (Master/Slave), Modbus ASCII (Master/Slave), 3964(R) e.g. for RK512

LONWorks
5V ◆ Art.-Nr. V3458

- Complete LONWorks Slave interface
- Max. 512 Bytes input- and 512 Bytes output data, 62 In und Out SNVTs
- Transceiver FTT-10A
- 78 kBit/s
- UART up to 625 kBaud
- Fixed Neuron ID

MPI
5V ◆ Art.-Nr. V3762
3,3V ◆ Art.-Nr. V3570

- Complete MPI-Slave interface
- Isolated MPI interface
- MPI-Master functionality
- Max. 255 Bytes input- and 255 Bytes output data
- UART up to 325kBaud

Deutschmann
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General specifications
- Serial interfaces 2x UART, 1x SPI or 1 x shift register
- Baud rates: 110 Baud to 625KBaud
- Debug interface
- 16K Script memory
- Dimensions: 25 x 45 mm (W x H)
- Weight approx. 9 g
- 32 DIL
- Operating temperature: -40°C to +85°C, RJ variants -25°C to +85°C
- CE and bus-specific certifications
- RoHS
- Reach

Global availability

The company

Deutschmann Automation, a german company based in Bad Camberg is working in the automation technology since 1976 and became known with cam controls in the 1980s.

In 1989 Deutschmann Automation started operating in the fieldbus technology. The development of one's first own bus system DICNET was an essential step. Since 1996 different fieldbus and Industrial Ethernet products are offered under the brand name UNIGATE®.

Thanks to a competent quality management and continuous enhancement Deutschmann became one of the leading suppliers in the automation industry. The entire development and manufacturing takes place in Germany.

We offer workshops for our All-In-One Bus nodes of the UNIGATE® IC series and the Software tool Protocol Developer. In these workshops you will learn everything you need to know about our products and how you can easily realize your projects with Deutschmann.

For all products the necessary documents and tools can be found, free of cost, on www.deutschmann.com. Furthermore on the Deutschmann Technology Wiki, wiki.deutschmann.de, technological information is easily accessible for our customers and users, cross-linking application know-how and ensuring that the information is up to date.

Our experts in development, sales and support have the right solution for your demands.

Deutschmann
your ticket to all buses

UNIGATE® CL

- Protocol Converter for all devices with a serial interface

UNIGATE® IC

- Easy integration in your own electronics

UNIGATE® CX

- Making incompatible networks compatible

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