

# ALL-IN-ONE BUS NODE

# UNIGATE<sup>®</sup> FC



**CONNECTABLE  
MULTI-PROTOCOL-MODULE**

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

**READY-TO-INSTALL  
FOR**



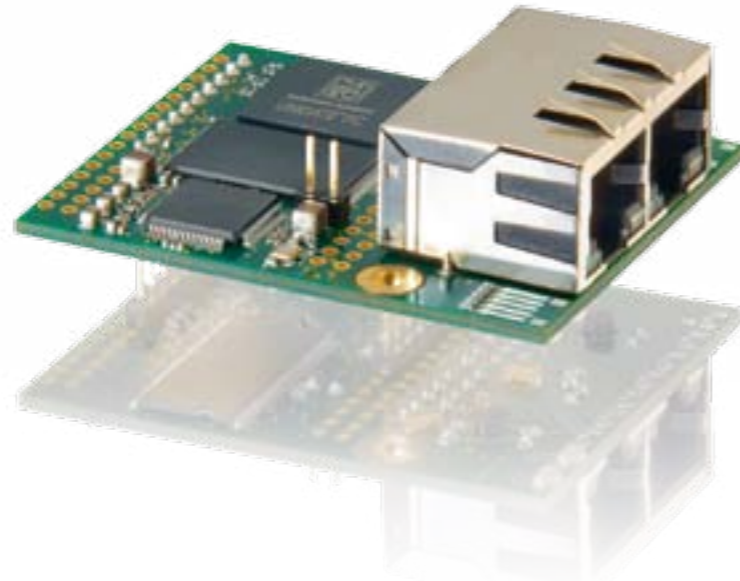
**Deutschmann**  
your ticket to all buses

## Ready-to-install

### UNIGATE® FC – Integrate without much development effort

The ready-to-install UNIGATE® FC combines all components of a 2-Port Industrial Ethernet interface in one module. The enormous reduction of the development effort up to 70-80% holds a significant advantage in time-to-market.

Covering an area of only 47-52 mm x 56 mm, the module includes all necessary components such as microcontroller, Flash, RAM, Ethernet switch and passive components, such as LEDs and Ethernet jacks. 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. Changes to the firmware of the terminal are not necessary.

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

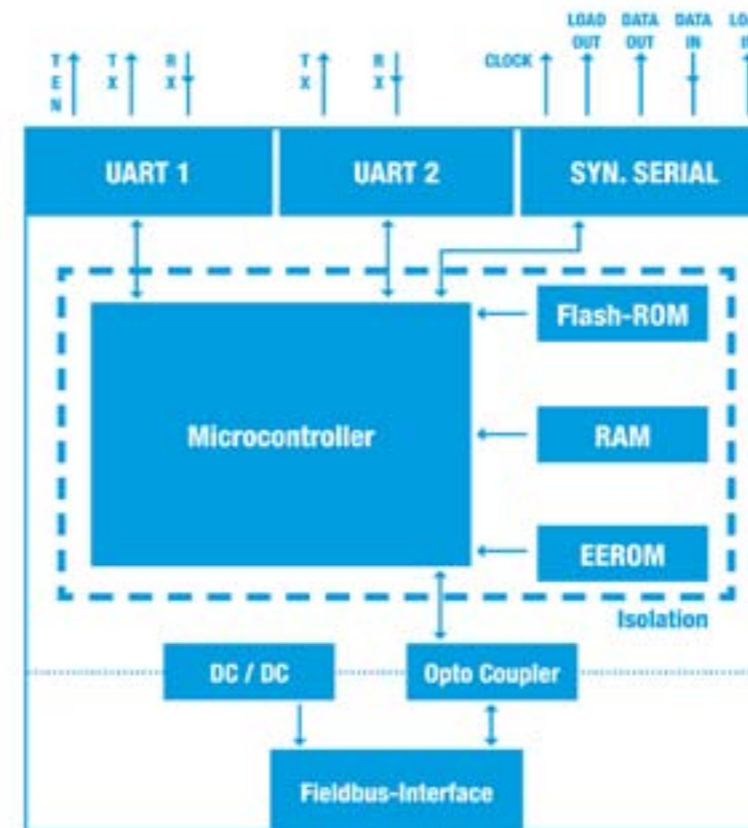
### Design-In

Deutschmann also offers UNIGATE® FC 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 will be using our well kept and continuously developed firmware.

## Hardware overview

### Use

The Deutschmann UNIGATE® FC is particularly 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® FC.



### Features

The Deutschmann UNIGATE® FC provides a complete Industrial Ethernet interface (Slave). The integrated 2Port-Switch allows you to connect the networks in a linear structure. The line topology reduces cabling costs and the number of additional required components.

The functionality of the firmware also includes a FTP- and a Web Server. Which allows the design of customer specific device Webpages for example for visualization or input of process data.

### Benefit

A key benefit of the UNIGATE® FC 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 commands.



**Deutschmann**  
your ticket to all buses

**Application example - Integrate the UNIGATE® FC directly into your electronic**



**Example of a customized board.**



## 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 incorporated, including Ethernet jacks and LEDs
- ▼ Integrated isolation
- ▼ Coverage of multiple industrial Ethernet protocols with just one development

## 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 FC 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.

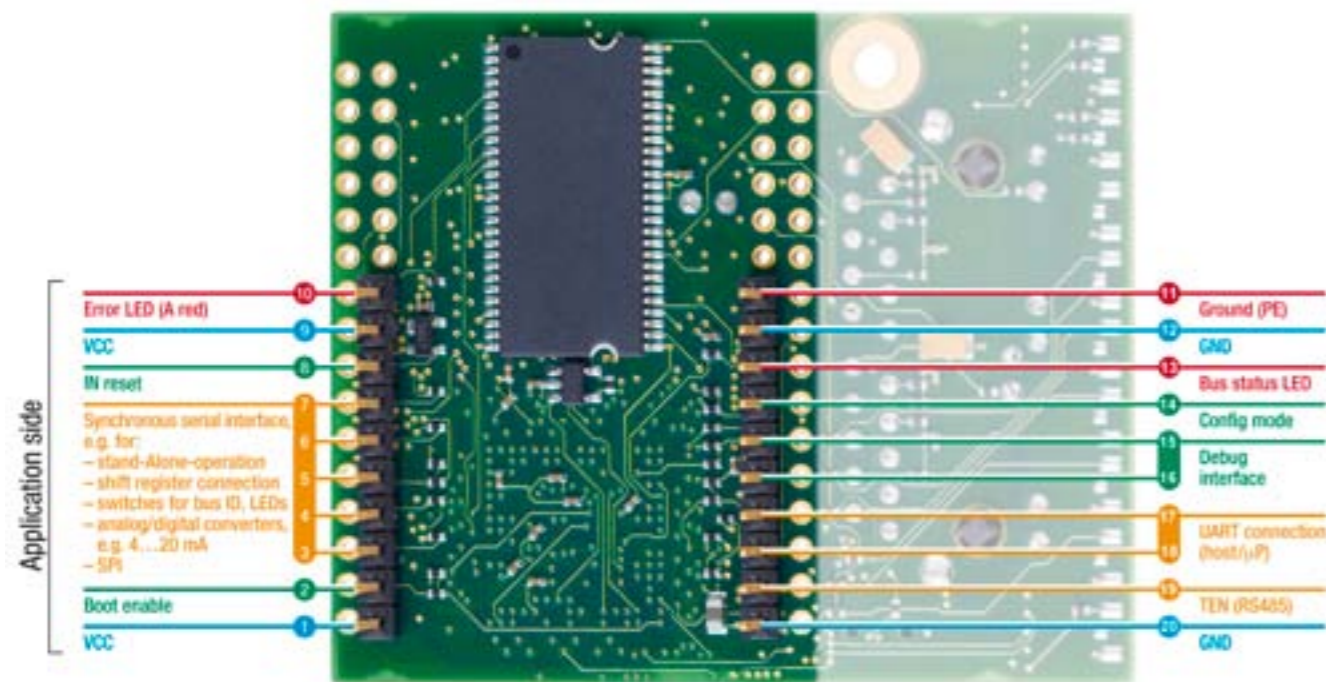
### Processor-connection

For the use in systems with its own microprocessor, the UNIGATE® FC is connected via a UART or a SPI-interface with the processor of the final product. The communication between the device processor and the UNIGATE® FC is controlled by the script. With script technology it is possible to simulate complex protocols and 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® FC can be used to test a script, or for diagnostic purposes.



## Protocol Developer

### 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 breakpoint 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



**Deutschmann**  
your ticket to all buses

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

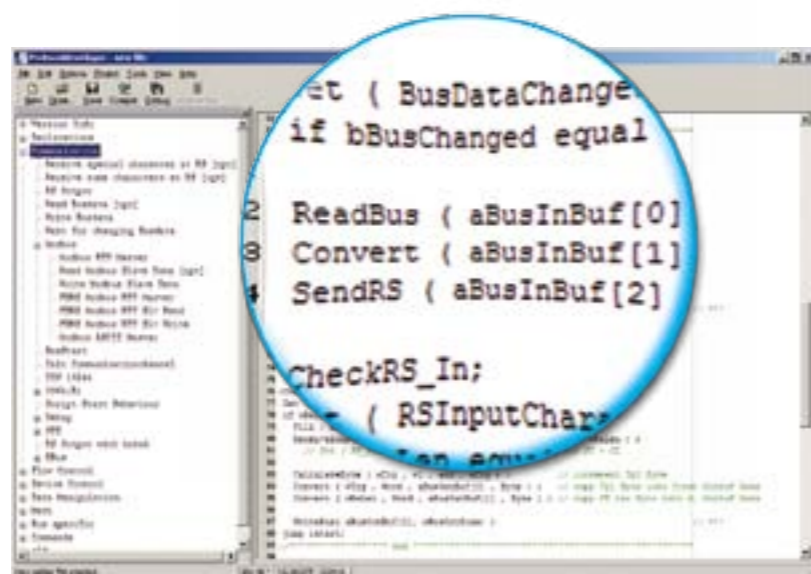


## The amount of tasks which can be handled with a script is infinite.

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

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.

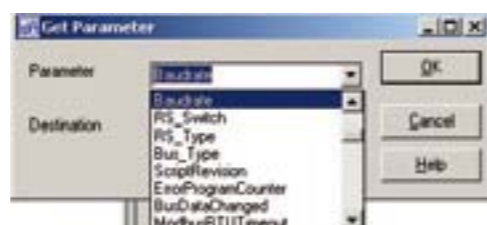


Picture 1: script example in the Protocol Developer

## 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.



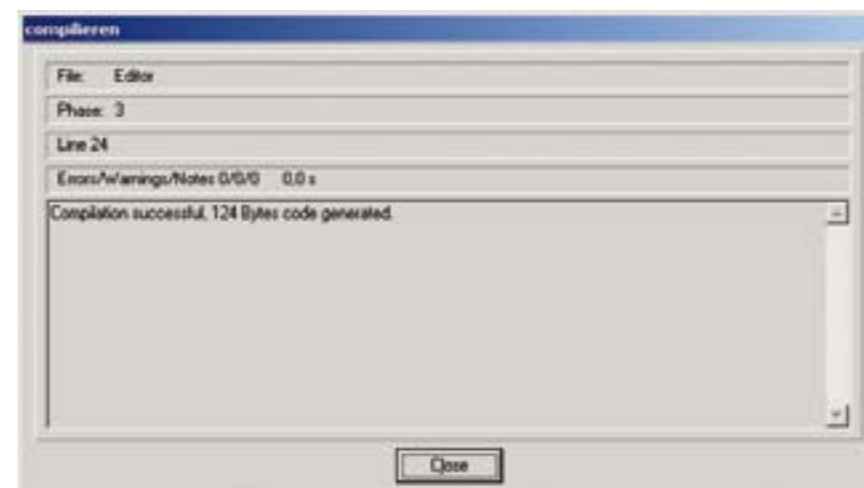
Picture 2: parameter



## 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.

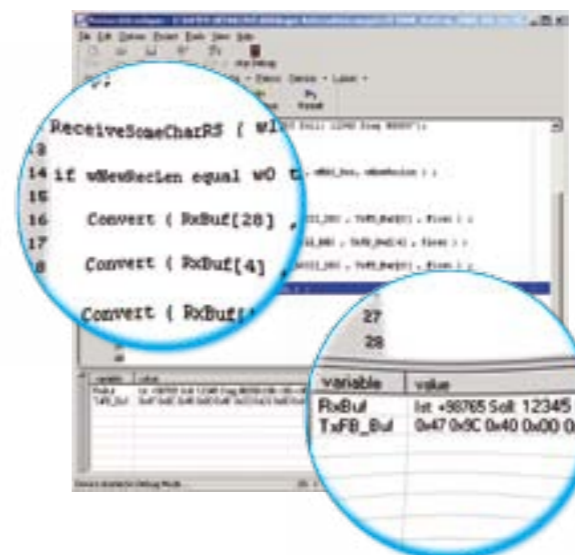


Picture 3: compilation

## 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



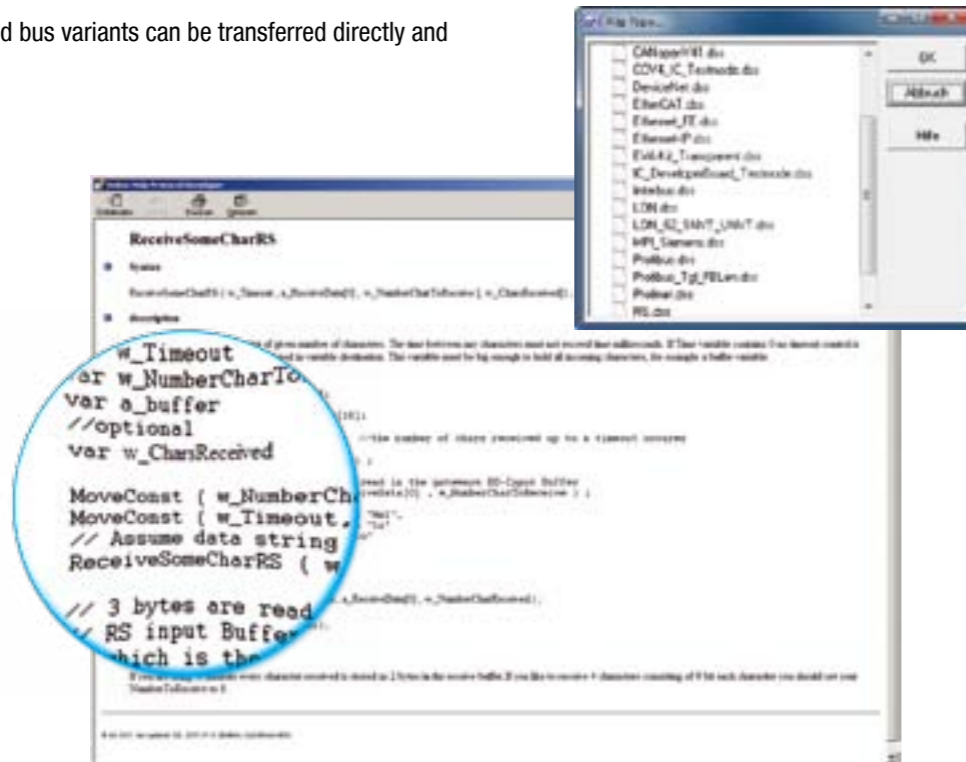
- ▼ Integrated debug environment
- ▼ Convenient test of the script
- ▼ Memory efficient compilation of script code
- ▼ Example for each script command
- ▼ Templates for each bus variant
- ▼ Workshops
- ▼ Hotline by phone / E-Mail

### 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



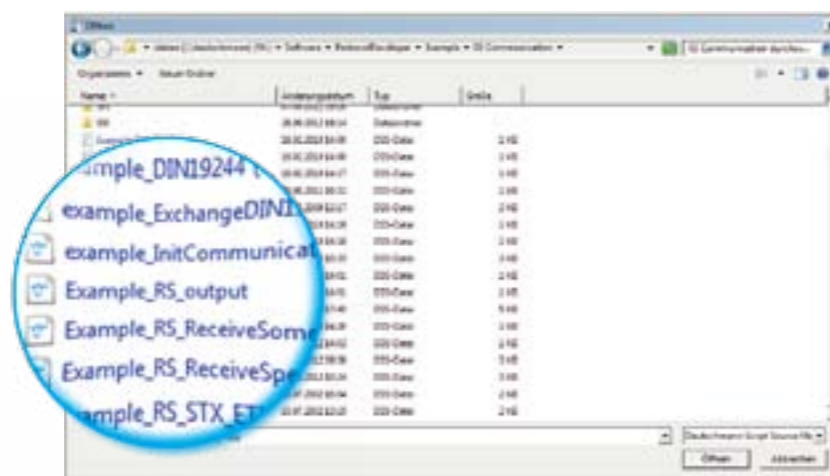
Picture 6: online help

### 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

### 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.

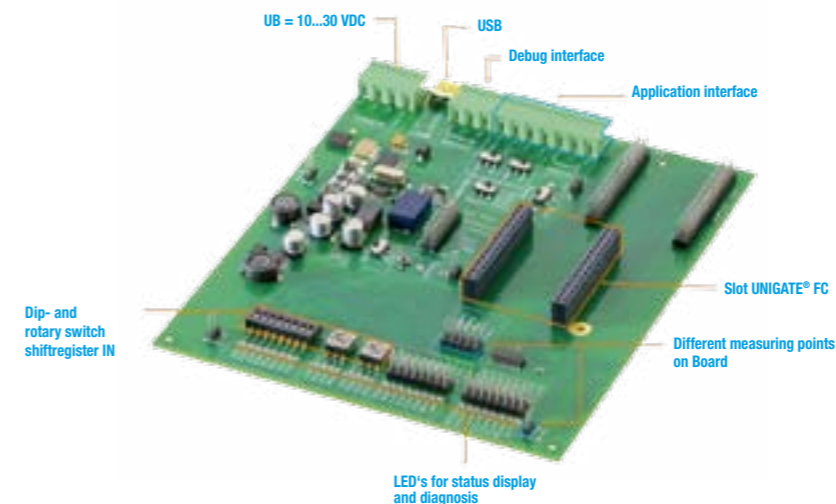
### UNIGATE® FC Developer-Board

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

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.

The board also provides shift register, switches and LEDs. The Synchronous Serial Interface of the UNIGATE® FC can thus read 32 digital inputs, and set 16 digital outputs. Part of these digital IOs, as well as the signals of the synchronous serial-, the application- and the debugging interfaces can be taken from the pin strip.



**Deutschmann**  
your ticket to all buses

- 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

### BACnet/IP

from IV / 2016

Article-No.: V3935



- › BACnet/IP interface (Server)
- › 2x RJ45 (integrated Switch)
- › 100 Mbit Full-Duplex-transmission
- › 32-Bit micro processor

### EtherNet/IP 2Port

Article-No.: V3897



- › EtherNet/IP-Adapter function
- › Max. 500 Byte input- and 500 Byte output data
- › Baud rate up to 100 Mbit/s Baudrate
- › Isolated Ethernet interface with 2x RJ45 connector
- › IT-Funktionen: Webserver, FTP Server
- › Generic EDS-file



### Fast Ethernet

Article-No.: V3933



- › Max. 1024 Byte input- und 1024 Byte output data
- › Baud rate 10/100 Mbit/s
- › Isolated Fast Ethernet interface for 2x RJ45 connector
- › IT-functions: Webserver, FTP Server

### Developerboard for all offered UNIGATE® FC variants

Article-No.: V3852



- › Suitable for all bus variants
- › Serial ports to the application side
- › Debug interface
- › Different measuring points

### Modbus TCP

Article-No.: V3934



- › Complete Modbus- TCP slave-interface
- › Max. 252 Byte input- und 252 Byte output data
- › Isolated Ethernet interface

### PROFINET 2Port

Article-No.: V3851



- › Complete PROFINET-IO-Device-interface (Slave)
- › Max. 1440 Byte input/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



**Deuschmann**  
your ticket to all buses

#### General specifications

- serial interfaces 2x UART, 1x SPI or 1 x shift register
- Baud rates: 50 Baud to 520 KBAud
- Debug interface
- 16K Script memory
- Dimensions: 47-52 x 56 x 18 mm (W x D x H)
- Weight approx. 25 g
- Operating temperature: -40°C to +85°C, RJ45 variants: -25°C to +85°C
- CE and bus-specific certifications
- RoHS
- Reach

### PROTOCOL CONVERTER UNIGATE® CL – The solution for all devices with a serial interface



- › RS232, RS485, RS422, SSI (encoder interface) on board
- › Standard protocols can be configured (e.g. Modbus RTU, Modbus ASCII, 3964R...), more protocols can be included if needed
- › Flexible protocol adaption via Deutschmann script language
- › Module consists of standard components
- › Designed and manufactured in Germany

### UNIGATE® CM – CANopen to all Fieldbuses and Ethernet



- › Application-side: CANopen, RS232, RS485, RS422, SSI (encoder interface) on board
- › Transport protocols can be configured (e.g.: CANopen mapping, Universal (L2 11Bit) COB-ID, Universal (L2 11/29Bit) COB-ID, L2 11Bit (Tgl+FBlen))
- › Flexible protocol adaption via Deutschmann script language
- › Module consists of standard components
- › Designed and manufactured in Germany

### ALL-IN-ONE-BUS NODE UNIGATE® IC – Ready-to-install



- › Easy integration into your own electronics
- › Module consists of standard components
- › Connection to your host processor via UART or SPI
- › Flexible protocol adaption via Deutschmann script language
- › Standard protocols like Modbus, 3964R, etc. included
- › Designed and manufactured in Germany

### UNIGATE® FC - The connectable Multi-Protocol-Module



- › Easy integration into your own electronics
- › Module consists of standard components
- › Connection to your host processor via UART or SPI
- › Flexible protocol adaption via Deutschmann script language
- › Standard protocols like Modbus, 3964R, etc. included
- › Designed and manufactured in Germany

### UNIGATE® CX - The flexible Gateway to make incompatible networks compatible



- › Modular Gateway concept
- › Currently approx. 120 versions available
- › Easy configuration
- › Wide voltage and temperature range
- › Designed and manufactured in Germany

### UNIGATE® EL – Fast Ethernet to all Fieldbuses



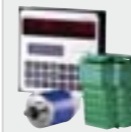
- › Application-side: Fast Ethernet, RS232, RS485, RS422, SSI (encoder interface) on board
- › Transport protocols can be configured (e.g. TCP server (port23) default, UDP, TCP server, TCP client, Modbus TCP server, Modbus TCP client)
- › Flexible protocol adaption via Deutschmann script language
- › Module consists of standard components
- › Designed and manufactured in Germany

### Option I/O 8



- › 24V / 0,7 mA (short term 1A) at max. 3A for all 8 Outputs
- › Short circuit protection
- › Available for the UNIGATE® CL, CM, EL series
- › Designed and manufactured in Germany

### ELECTRONIC CAM CONTROLS - Still an essential tool



- › Diverse devices
- › Logic functionalities
- › Dynamic idle time compensation
- › Short, constant cycle times and a high number of outputs



**Deutschmann**  
your ticket to all buses

- Protocol Converter
- Embedded Systems
- Gateways
- Electronic Cam Controls
- Option I/O 8



UNIGATE® FC now with



**What is PriorityChannel?**

PriorityChannel eliminates the effects of network traffic loading on the device – ensuring accurate cycle-time response and safeguarding against unwanted disconnects. Industrial Ethernet has many network traffic components. In addition to the time critical cyclic messages, there are standard Ethernet messages being routed, Network Management protocols running, and Application Layer sending messages. All of these other components can interfere with the cyclic messages causing them to be delay and introducing jitter.

PriorityChannel is a combination of software optimized on the unique, patented architecture of the fido1100 communication controller to separate non real-time Ethernet traffic from real-time Industrial Ethernet traffic. This is not just a special queue or sophisticated filtering. The silicon provides a separate data pathway and a separate on-chip execution environment for real-time messages to tunnel straight to the device application. Non real-time messages can never interrupt real-time messages making it possible to stay well within 160 µs of the desired EtherNet/IP cycle time, and within 10 µs of the desired Profinet cycle time.

**Why do you need PriorityChannel?**

Conventional Industrial Ethernet solutions have difficulty dealing with critical messages when network traffic increases, resulting in unpredictable packet delays, excessive latency, or even connection failure. You can't rely on the fact that factory networks will be properly segmented to keep traffic well behaved. Given the flexibility and myriad of capabilities Industrial Ethernet brings to the factory, you don't know how the network will morph over time. How do you know your device will survive?

You need PriorityChannel to protect your device from the uncertainties on the factory floor. Regardless of the network condition or load, PriorityChannel to eliminate the effects of network traffic now and in the future. Critical messages are delivered on-time, every time without packet delays or excessive latency. The bottom line is, Priority Channel ensures your device will never disconnect from the network.

PriorityChannel is a feature of the FIDO products from Innovasic.

PriorityChannel™ is integrated in all Deuschmann PROFINET & EtherNet/IP products.





## 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. 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](http://www.deutschmann.com). Additionally the Deutschmann Technology Wiki, [wiki.deutschmann.de](http://wiki.deutschmann.de), makes technological information 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 into your own electronics



### UNIGATE® FC

- Connectable Multi-Protocol-Module



### UNIGATE® CX

- Making incompatible networks compatible



### UNIGATE® EL

- Fast Ethernet to all Fieldbuses



### UNIGATE® CM

- CANopen to all Fieldbuses and Ethernet



### ELECTRONIC

- CAM CONTROLS

Deutschmann Automation GmbH & Co. KG  
Carl-Zeiss-Straße 8  
65520 Bad Camberg  
Tel.: +49 6434 9433-0  
Fax.: +49 6434 9433-40  
[info@deutschmann.de](mailto:info@deutschmann.de)  
[www.deutschmann.com](http://www.deutschmann.com)