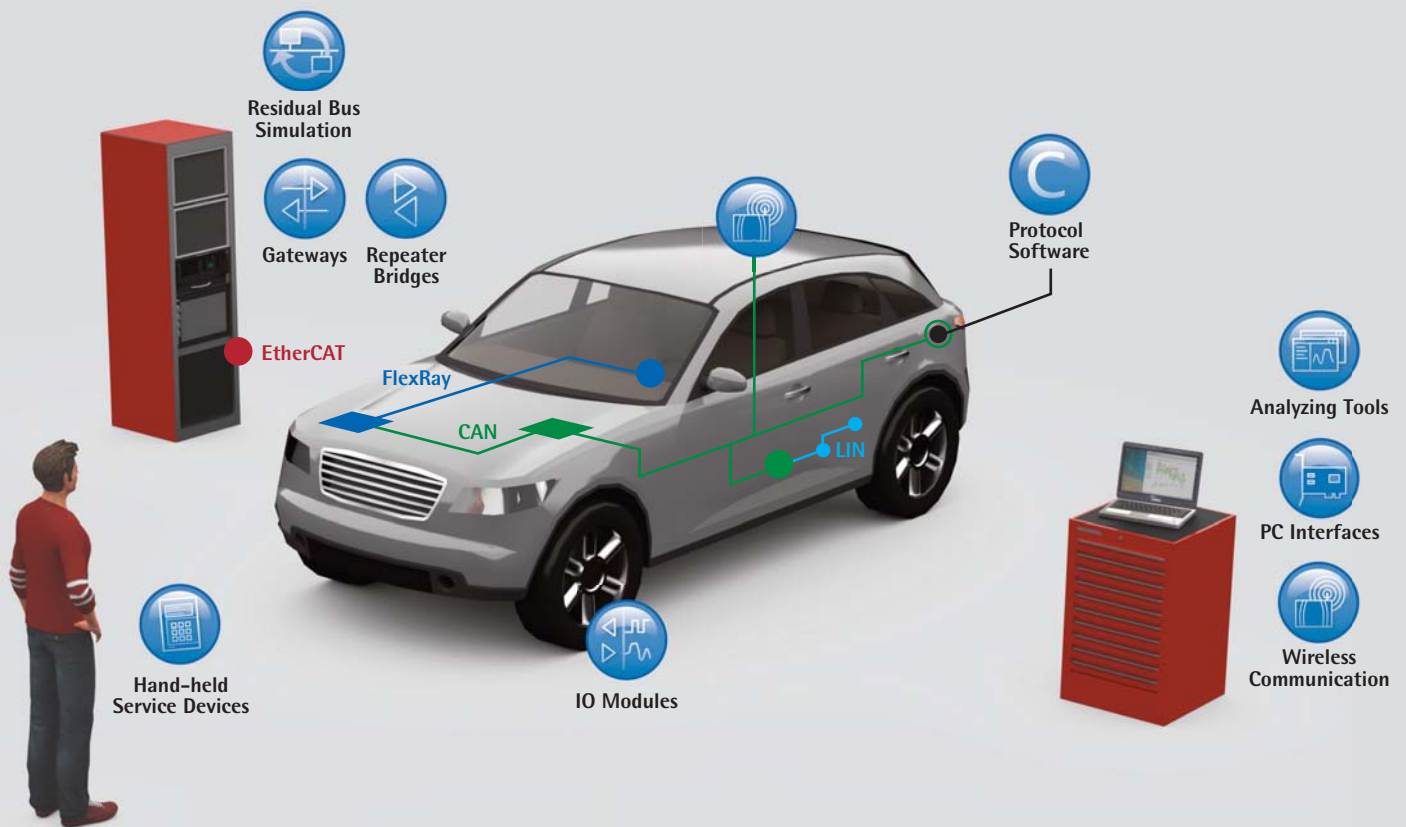




Data Communication for Automotive Applications and Test Benches

Products and Engineering Services

Products and Applications



PC Interfaces: Page 4–5

Network connection of PC-based analysis, simulation and control applications.
CAN, CANopen, SAE J1939, FlexRay, LIN



Wireless Communication: Page 4–5

Wireless connection of PC-based analysis, simulation and control applications as well as bridge solutions.
CAN, CANopen, SAE J1939



Repeater: Page 6

Coupling of CAN networks, electrical isolation and CAN high/low speed conversion.
CAN, CANopen, SAE J1939



Bridge/Gateway Solutions: Page 7, 10–11, 12

Coupling of different networks with filter and signal conversion functionality.
CAN, FlexRay, LIN, EtherCAT



Analyzing Tools: Page 8, 9

PC-based analysis and stimulation.
CAN, CANopen, SAE J1939, FlexRay, LIN



Hand-held Service Devices: Page 9

Mobile test and analysis of networks.
CAN, CANopen



IO Modules: Page 14

Network connection of analog and digital IO signals.
CAN, CANopen, EtherCAT



Protocol Software: Page 13, 15–16

Protocol stacks for the implementation of higher layer protocols into customer hardware.
CANopen, SAE J1939



Residual Bus Simulation: Page 10–12

Residual bus simulation for FlexRay and CAN systems based on the IXXAT Embedded Platform.
CAN, FlexRay, LIN

About IXXAT

A capable partner for embedded system solutions and advanced data communication

IXXAT is one of the leading suppliers of data communication technology for the automation and automotive industry.

With innovative, powerful and cost effective products as well as with high quality standards for our services and products we strive for long-term partnerships with our customers. To this end we continually invest a considerable amount of our resources in the research and development of new technologies and products.

IXXAT belongs to the Swedish listed public HMS group, which is represented worldwide with numerous local branches and distributors to ensure the best possible customer service.

The quality of our products

For many years quality management has been the foundation of our work and an incentive for continual development.

To ensure the high quality of our products and services, we rely on a quality management system according to ISO 9001 since 1996. We further develop processes using defined development directives for hardware, software and standardized review processes. For the development of safety-critical hardware and software pursuant to IEC61508, we also employ a functional safety management system.

Experience and primary applications

As a pioneer of CAN technology, we have made major contributions to the successful growth of CAN in industrial applications. IXXAT has been actively involved in the development of the internationally accepted CANopen standard from the very beginning. Our primary applications in the field of industrial communication systems involve solutions based on CAN (CANopen, DeviceNet), real-time Ethernet (EtherCAT, POWERLINK, EtherNet/IP, PROFINET, Sercos, Modbus-TCP) and Safety (CIP Safety, FSoE, PROFIsafe, openSAFETY).

The development of optimum solutions for tasks and problems at the application and system level is another focus of our activity. Our customers benefit from our experience in the area of embedded systems and data communications.

Industries

IXXAT products are used worldwide in a wide variety of applications, including:

- Automobile and commercial vehicle industry
- Trains and rail-bound vehicles
- Marine and aerospace
- Industrial automation and mechanical engineering
- Medical technology
- Elevators
- Regenerative energy systems
- etc...

Developments on behalf of our customers

As a development service provider, we can look back on more than 25 years of experience. In this period we have implemented more than 500 development projects for renowned international customers with a high level of customer satisfaction.

We support our customers throughout the complete development cycle for all relevant technologies in the field of data communication from system design to development of hardware and software, and series production of hardware assemblies and delivery of complete data communication systems.

Our customers benefit not only from development services, but also significantly from the know-how, we have gained in over 25 years in different industries.

Further information about our services can be found on page 18.



**Dipl.-Ing.
Christian Schlegel**
Managing Director

You can rely on

- ✓ High long-term availability
- ✓ 100 % product testing
- ✓ Fast delivery from stock
- ✓ High quality standard
- ✓ Made in Germany

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PC Interfaces

for analysis and control of CAN, FlexRay, LIN and K-Line systems

IXXAT PC interfaces are used in a wide range of applications, either in test benches to connect the devices to be tested to the test computer or as a control interface in production or handling systems. In combination with the canAnalyser, the interfaces serve as a basis for a powerful CAN and FlexRay analysis system.

The drivers for Windows (VCI), Linux and real-time operating systems (ECI), included in the scope of supply, have an identical programming interface for all CAN interfaces and enable a quick and easy switch between cards without adaptation to the customer's application. Thus the optimum CAN interface in terms of area of application, performance requirements or target unit costs can be selected at any time.

In addition to customized applications, the CAN interfaces also form the basis for our comprehensive tool chain consisting of analysis, configuration, simulation and gateway tools. All IXXAT CAN

interfaces are developed, produced and tested 100 % before delivery in accordance with the highest quality standards.

Software support

Windows

Every CAN interface is delivered with IXXAT's universal "Virtual Communication Interface" (VCI) driver for Windows. This powerful driver package supports all CAN interfaces, regardless of their PC interface format, with a common application programming interface (API). Thereby applications based on the VCI API can be used with all IXXAT CAN interfaces without changing the application program.

The VCI is designed as a system server and allows simultaneous access by several applications to one or more CAN controllers of one or more PC interfaces.

User interfaces:

- C, JAVA and LabView API
- .NET API for integration into Agilent VEE, C#, Visual Basic .NET
- DasyLab (includes drivers for IXXAT's interfaces)
- LabWindows

The VCI CAN driver supports 32 and 64 bit Windows operating systems and also includes a simple CAN bus monitor "miniMon", which enables the transmission and reception of CAN messages.

Linux, INtime, RTX and QNX

For use of the CAN interfaces with Linux or in real-time environments (INtime, RTX, QNX), IXXAT provides the universal "Embedded Communication Interface" driver (ECI) free of charge. As with the VCI, the user interface is identical for all operating systems and interface boards. Thus applications based on ECI can be used directly with all sup-

New



Product	CAN-IB100/PCIe	CAN-IB200/PCIe	CAN-IB500/PCIe CAN-IB600/PCIe	CAN-IB120/PCIe Mini	iPC-I XC16/PCI
PC interface standard	PCI express (V1.1)	PCI express (V1.1)	PCI express (V1.1)	PCI express mini card (V1.2)	PCI (V2.2)
Microcontroller	Passive	32 Bit	32 Bit / Passive	Passive	16 Bit
Fieldbus interfaces	1-4 x CAN	1-4 x CAN 1-4 x LIN/K-Line optional	1 / 2 x CAN	1 / 2 x CAN	2 x CAN 1 x LIN (optional)
CAN interface (controller/interface/ connection)	CAN 2.0 A/B ISO 11898-2, optional switchable to ISO 11898-3 Sub D9 plug acc. to CiA 303-1	CAN 2.0 A/B ISO 11898-2, optional switchable to ISO 11898-3 Sub D9 plug acc. to CiA 303-1	CAN FD and CAN 2.0 A/B ISO 11898-2 Sub D9 plug acc. to CiA 303-1	CAN 2.0 A/B ISO 11898-2 Connection cable with open ends	CAN 2.0 A/B ISO 11898-2, optional switchable to ISO 11898-3 Sub D9 plug (CiA 303-1)
LIN interface (interface/connection)	-	ISO 9141 Sub D9 plug	-	-	ISO 9141 Sub D9 plug
FlexRay interface (controller/interface/ connection)	-	-	-	-	-
Galvanic isolation	optional (1 kV, 1 sec.)	optional (1 kV, 1 sec.)	optional (1 kV, 1 sec.)	optional (1 kV, 1 sec.)	optional (1 kV, 1 sec.)
Temperature range	0 °C ... +70 °C	0 °C ... +70 °C	0 °C ... +70 °C	-40 °C ... +85 °C	-20 °C ... +70 °C
Power supply	3.3 V DC, 350 mA typ.	3.3 V DC, 390 mA typ.	3.3 V DC, 390 mA typ.	3,3 V DC	5 V DC, 100 mA typ. and 3.3 V DC, 200 mA typ.
Certification	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, CSA/UL, FCC, EN 60601-1
Dimensions	approx. 65 x 105 mm	approx. 65 x 105 mm	approx. 65 x 105 mm	30 x 50,95 mm	approx. 89 x 124 mm
Order number	1.01.0231.xxxxx Low Profile: 1.01.0232.xxxxx	1.01.0233.xxxxx Low Profile: 1.01.0234.xxxxx	Active: 1.01.0233.xxxxx Passive: 1.01.0231.xxxxx Low-Profile: on request	1.01.0237.xxxxx	1.01.0047.xxxxx



Embedded version of the USB-to-CAN V2 compact



ported IXXAT CAN interfaces without any changes. The application interface is designed as a "C" interface and contains all necessary functions for CAN-based applications.

SAE J1939 and CANopen

For use of the CAN interfaces with CANopen or J1939 protocols, IXXAT offers driver APIs that provide all protocol specific functions and thus enable quick and easy development of PC-based control and configuration applications.

FlexRay

The FR-IB100/PCIe is a low cost and powerful solution for analysis and control of FlexRay systems. With the integrated asynchronous receiver, it is also possible to analyze the start-up behavior of FlexRay systems in detail. The FR-IB100/PCIe is delivered with the VCI for FlexRay, which comes with a C-API for connection to Windows-based applications. The VCI for FlexRay also supports the FRC-EP 150.

New

New

IPC-XC16/PMC	USB-to-CAN V2 compact	USB-to-CAN V2 automotive	CAN@net II/VCI	CANblue II	FR-IB100/PCIe
PMC (V2.2)	USB (V2.0, Hi-Speed)	USB (V2.0, Hi-Speed)	Ethernet	Bluetooth (V2.1)	PCI express (V1.1)
16 Bit	32 Bit	32 Bit	32 Bit	32 Bit	32 Bit
2 x CAN 1 x LIN	1 x CAN	2 x CAN 1 x LIN (automotive)	1 x CAN	1 x CAN	2 x FlexRay
CAN 2.0 A/B	CAN 2.0 A/B	CAN 2.0 A/B	CAN 2.0 A/B	CAN 2.0 A/B	-
ISO 11898-2 / 11898-3 switchable	ISO 11898-2	ISO 11898-2, optional switchable to ISO 11898-3	ISO 11898-2	ISO 11898-2	-
Sub D9 plug (CiA 303-1)	Sub-D9 oder RJ45-Stecker (CiA 303-1)	2 x RJ45 with Sub-D9 adapter	Sub D9 plug according to CiA 303-1	Sub D9 plug acc. to CiA 303-1	-
ISO 9141	-	ISO 9141	-	-	-
Sub D9 plug	-	Sub-D9 plug (via included adapter cable)	-	-	-
-	-	-	-	-	MFR 4310
-	-	-	-	-	Bus interface opt. with termination Sub D9 plug
yes (1 kV, 1 sec.)	optional (1 kV, 1 sek.)	optional (1 kV, 1 sec.)	yes (1 kV, 1 sec.)	yes (1 kV, 1 sec.)	yes (1 kV, 1 sec.)
-20 °C ... +70 °C	-20 °C ... +80 °C	-20 °C ... +80 °C	-20 °C ... +70 °C	-40 °C ... +85 °C	0 °C ... +70 °C
5 V DC, 100 mA typ. and 3.3 V DC, 200 mA typ.	via USB port, 250 mA	via USB port, 500 mA max.	9-32 V DC, approx. 3 W	9-30 V DC, approx. 0.6 W	3.3 V DC, 400 mA typ.
CE, FCC	CE, FCC	CE, FCC	CE, CSA/UL, FCC	CE, FCC, Telec	CE, FCC
approx. 74 x 149 mm	approx. 80 x 50 x 23 mm	approx. 80 x 50 x 23 mm	approx. 22,5 x 100 x 115 mm	approx. 82 x 64 x 26 mm	approx. 54 x 106 mm (available as standard and low profile version)
1.01.0049.33660	Compact: 1.01.0281.xxxxx Embedded: 1.01.0282.xxxxx	Professional: 1.01.0283.xxxxx Automotive: 1.01.0283.xxxxx	1.01.0086.10200	1.01.0126.12000 1.01.0126.12001 (ext. antenna version, accessories see page 7)	1.01.0103.000xx

Topology components

for test back-ups and system extension

The IXXAT topology components are established successfully in many different application areas, whether in test benches for communication system networks, in production systems or charging station, for system protection and control of noise.

CAN repeaters

In terms of robustness, temperature range and safety, IXXAT repeaters are specially designed for use in an industrial environment. When used, the reliability of a system can be significantly increased while typically saving costs due to simpler wiring.

The CAN repeaters are used to establish a physical coupling of two or more segments of a CAN bus system. They can be used to implement tree or star topologies as well as for long drop lines. Systems connected by repeaters are independent electrical segments that can be optimally terminated in terms of signals. In addition, network segments can be electrically decoupled using a galvanically isolated repeater.

CAN bridges and gateways

The use of bridges and gateways opens up a large number of possibilities. For example, CAN systems can be implemented with a larger sys-

tem expansion, devices without CAN interfaces can be connected to CAN systems or CAN systems can be coupled using different communication technologies.

CAN bridges can link two or more CAN networks that employ different CAN bit rates or protocols. At this, translation and filter rules can also be used, allowing a protocol adaptation to be carried out between the sub-networks. A bridge can thus also provide simple gateway functions. CAN bridges are appropriate for creating hierarchical networks by transferring only the information to the connected sub-networks via bridges which are relevant to the sub-network.



Product	CAN-CR200	CAN-CR210/FO	CAN-CR220
Description	Stackable ISO 11898-2 CAN repeater	Stackable ISO 11898-2 to fiber optic converter	ISO 11898-2 CAN repeater with 4 kV galvanic isolation
CAN bus interface	2 x ISO 11898-2 with CAN choke 1 x ISO 11898-2 DIN rail bus	1 x ISO 11898-2 with CAN choke 1 x ISO 11898-2 DIN rail bus	2 x ISO 11898-2 with CAN choke
CAN connection	Sub D9 plug according to CiA 303-1	Sub D9 plug according to CiA 303-1	Sub D9 plug according to CiA 303-1
Integrated CAN bus termination	Switchable	Switchable	Switchable
Galvanic isolation	CAN 1, CAN 2 (1 kV, 1 sec.)	CAN 1 (1 kV, 1 sec.)	CAN 1, CAN 2 and power supply (4 kV, 1 sec.; optional 3 kV, 3 min.)
LED indicators	Transmission Defect segment	Transmission Defect segment	Transmission Defect segment
Glass fiber connection	-	F-SMA or ST for duplex cable (fiber optic 50/125 µm duplex)	-
Baudrate	up to 888 kbps	up to 888 kbps	up to 888 kbps
Transmission delay	approx. 200 ns (equal to 40 meter bus length)	approx. 300 ns (equal to 60 meter bus length)	approx. 200 ns (equal to 40 meter bus length)
Temperature range	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Power supply	9-32 V DC, 1.5 W typ., via screw terminals	9-32 V DC, 3 W typ., via screw terminals	9-32 V DC, 1.5 W typ., via screw terminals
Certification	CE, FCC	CE, FCC	CE, FCC
Housing, dimensions	Plastic DIN rail housing, approx. 22.5 x 100 x 115 mm	Plastic DIN rail housing, approx. 22.5 x 100 x 115 mm	Plastic DIN rail housing, approx. 22.5 x 100 x 115 mm
Order number	1.01.0067.44010	F-SMA plug 1.01.0068.45010 ST plug 1.01.0068.46010	1.01.0067.44400 Option 3 kV, 3 min. 1.01.0067.44300
Accessories	T bus connector 1.04.0073.00000	T bus connector 1.04.0073.00000	



An adaptation to customer specific requirements can be made by using the Application Development Kit for the CANbridge.

As an extension to the CAN bridges, CAN gateways allow access to CAN networks via other communication systems. In each case, the protocols of the connected bus systems are mapped to the other communication model.



Product	CANbridge	CAN@net II/Generic	CANblue II
Description	Configurable CAN/CAN bridge	CAN/Ethernet gateway with ASCII protocol and CAN-Eth-CAN bridge operation mode	CAN/Bluetooth GW with ASCII protocol, CAN-Bluetooth-CAN bridge and PC operation mode
Application field	Extension of the network dimension Network segmentation	CAN connection via Ethernet for Linux or embedded applications Network extension via CAN-Ethernet-CAN bridge	Wireless CAN connection of Windows, Linux or embedded applications Flexible network connection via CAN-Bluetooth-CAN bridge
Functionality	Message filtering Identifier conversion Baudrate conversion	Message filtering Identifier conversion Baudrate conversion	Message filtering Identifier conversion Baudrate conversion
Fieldbus interf.	2 x CAN	1 x CAN	1 x CAN
CAN bus interf.	2 x ISO 11898-2	ISO 11898-2	ISO 11898-2
CAN connection	DIN rail version via screw terminals Alu version via Sub D9 plug acc. to CiA 303-1	Sub D9 plug according to CiA 303-1	Sub D9 plug according to CiA 303-1
Further interfaces	RS232 for the device configuration	10/100 Mbit/s Ethernet, auto negotiation, auto crossover, RJ45 plug	Bluetooth spec. V2.1, Class 1 / +17 dBm
Galvanic isolation	optional	yes	yes
LED indicators	Power, CAN, Serial	Power, CAN, Ethernet, CPU	CAN, Bluetooth, Mode
Temp. range	-20 °C ... +70 °C	-20 °C ... +70 °C	-40 °C ... +85 °C
Power supply	9-36 V, 1.5 W	9-32 V DC, 3 W	9 - 30 V DC, 0.6 W
Housing, dimensions	DIN rail housing approx. 110 x 75 x 22 mm Aluminum housing approx. 100 x 85 x 32 mm	DIN rail housing approx. 22.5 x 100 x 115 mm	approx. 82 x 64 x 26 mm
Configuration SW	9x/Me/NT/2000/XP/Vista/Win7	Via integrated web server	-
Certification	CE	CE, FCC, CSA/UL	CE, FCC, Telec
Order number	1.01.0121.xxxxx 1.01.0120.22020	1.01.0086.10201	1.01.0126.12000 1.01.0126.12001 (ext. antenna version)
Accessories	Application Development Kit 1.03.0270.00000		External antenna 1.04.0085.00001 Screwable antenna foot 1.04.0085.00002 Magnetic antenna foot 1.04.0085.00000

Analysis and diagnostic tools

for testing and optimizing system availability and system performance

The IXXAT analysis and diagnostic tools enable a fast and detailed insight into the system to be analyzed. CAN analysis tools are used for testing and simulation of individual network devices and as a tool to analyze complete networks during the development, start up, service and maintenance phases of a CAN network.

canAnalyser for CAN, CAN-FD and LIN

The canAnalyser is a powerful, versatile tool for development, testing and maintenance of CAN, CAN-FD and LIN networks. The software package is based on a modular concept and employs special features that offer exceptional openness and extensibility.

In the standard version, the analyser offers functions covering many areas of application, such as transmission of individual messages/signals and sequences, reception and interpretation of messages/signals and display of statistical data. Signals are managed through databases and can

be directly defined using the editor or imported via import filters. As import filters the widely spread CANdb format, FIBEX and DIM are supported. From the databases, an export to FIBEX and CANdb data files is supported.

The canAnalyser is based on the VCI driver from IXXAT and can be used with all PC interfaces offered by IXXAT. The new canAnalyser allows to assign a measurement configuration to several IXXAT PC interfaces. Such a configuration can also be easily transferred to other computers and adapted to the local hardware.

Additional functions are provided by optional modules for the canAnalyser, such as the protocol-specific display of messages, e.g. in CANopen or J1939 based systems, or the support of other bus systems like LIN. Customized functions can be easily integrated via an open .NET programming interface in the form of individual modules.

The canAnalyser is offered as bundle with additional modules and PC interfaces at very attractive prices.

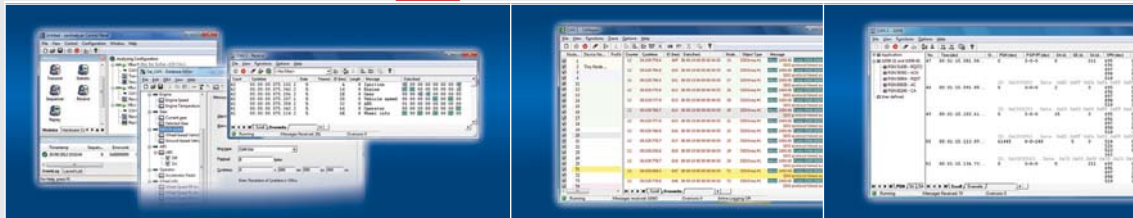
Diagnostic tools

By using IXXAT diagnostic tools, CAN systems can be analyzed and evaluated in operation and during installation. The tools allow long-term recording of the transmitted data and errors as well as detection of signal, transmission and wiring errors.

Based on the analysis results, quick and easy localization and elimination of errors are enabled or an existing system can be optimized to achieve higher reliability.

The CANcheck is a mobile, robust handheld device offered by IXXAT for maintenance and commissioning CAN systems. With this tool the wiring, the line length and the termination resistors as well as the quality of the transmitted signals can be tested.

New
CAN-FD

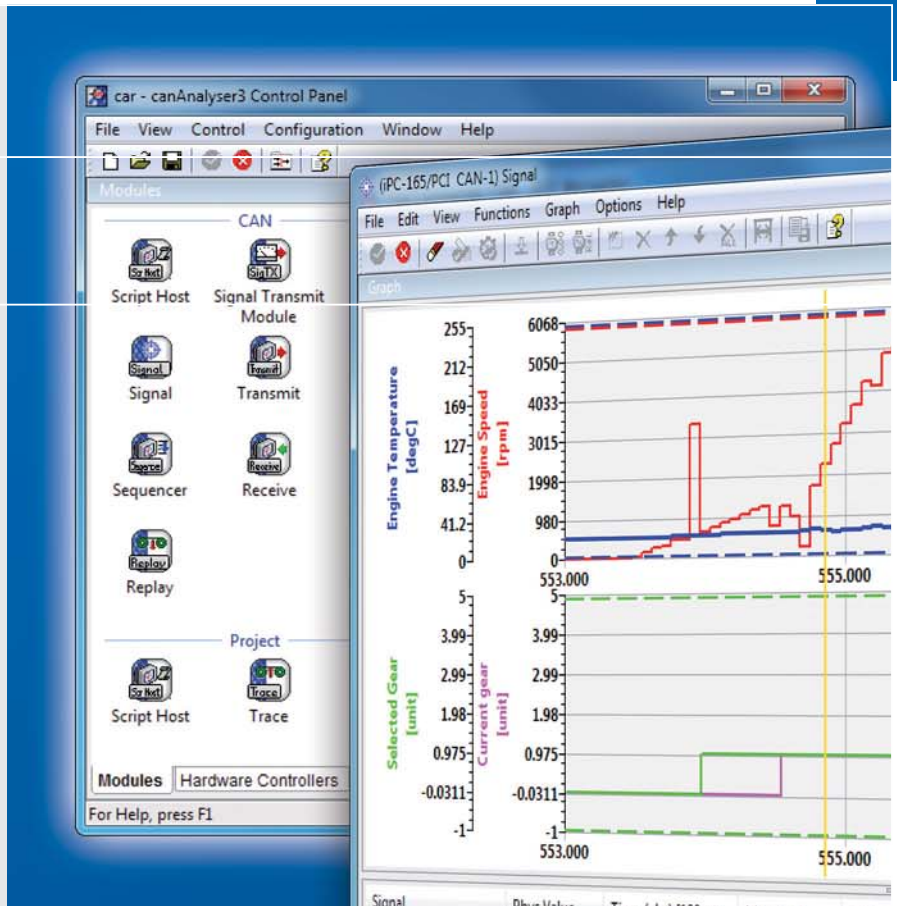


Product	canAnalyser 3.0	CANopen Module	SAE J1939 Module
Description	PC based analyzing tool for CAN, CAN-FD and LIN systems	CANopen extension for canAnalyser	SAE J1939 extension for canAnalyser
Included functions/modules	<ul style="list-style-type: none"> - Reception, Transmission, Trace, Statistic, Sequencer and Replay module for CAN and LIN telegrams - Signal, Graphic and Transmission module for signals - Import of CANdb, DIM and FIBEX files 	Interpretation and display of CAN messages in accordance with the CANopen standard (CIA 301, ...)	Interpretation and display of CAN messages in accordance with the SAE J1939 standard
Features	<ul style="list-style-type: none"> - Online monitoring of bus traffic - Transmission of single-shot or cyclic messages and message sequences - Recording of CAN messages with configurable trigger conditions - Statistical analysis - Creation of command controlled message sequences - Graphical signal presentation - Multi-line and multi-board mode - Multiple module instances - Open programming interface - Scripting host <p>LIN option</p> <ul style="list-style-type: none"> - Support of the LIN specification 1.3, 2.0 - LIN Master/Slave mode support - Transmission of schedule tables in Master mode - Writing of Slave buffer in Master and Slave mode - Recording of LIN messages 	<ul style="list-style-type: none"> - Message display in scroll or overwrite mode - Import of EDS, DCF, XDD files - Export to CSV or clipboard - Change highlighting and receive statistics - Filtering by node number and message type - Interpretation of all relevant protocols (SDO, LSS, EMCY, SYNC...) as well as PDO content - Parallel file recording of the interpreted data - Configurable display colors (foreground, background) 	<ul style="list-style-type: none"> - Message display in scroll or overwrite mode - Interpretation of application, diagnosis and connection management messages - Change highlighting and receive statistics - Filtering by PGN (Parameter Group Number) destination and source address - Parallel file recording of the interpreted data - Export and import of the module configuration and filter settings
OS	XP/Vista/Windows 7/Windows 8	XP/Vista/Windows 7/Windows 8	XP/Vista/Windows 7/Windows 8
Order number	1.02.0133.00000	1.02.0145.00000	1.02.0149.00000

Operation of the device is intuitive via testing processes controlled by a display and keypad. All test results can be saved and printed out on the PC for logging.

The CANcheck comes with calibration documents and therefore can be used as test equipment for manufacturing and assembly according to ISO 9001.

The CAN-Bus-Tester (CBT) and the CANobserver enable detailed analysis of the signals and of the transmission errors occurring in the CAN systems. The CBT is connected to the PC via USB and operated with a Windows program. The software enables online analysis with numerous test functions.



Product	CANcheck	CAN-Bus-Tester (CBT)
Description	Hand-held installation tester for CAN systems for commissioning, troubleshooting and maintenance	Powerful tool for the CAN bus physics and protocol analysis
Functionality	<ul style="list-style-type: none"> Test of wiring, terminators, cable length, impedance Measurement of signal level and bus load Determination of the transmitted identifiers and display of reception frequency Display of error frames per time unit Autom. baudrate detection Operation via LCD display/keypad CANopen mode: Message display according to the node number Storage of measurement results and transm. via USB 	<ul style="list-style-type: none"> Analysis of the signal quality (levels, slopes, faults) Integrated oscilloscope Powerful trigger functions Monitoring of bus status, bus load, error messages Wiring test Integrated CAN monitor for transmission and reception Automatic baudrate detection Creation of inspection reports
Display	LCD display with backlight	-
Fieldbus interfaces	1 x CAN	1 x CAN
CAN bus interface	1 x ISO 11898-2	ISO 11898-2
CAN connection	Sub D9 plug according to CiA 303-1	Sub D9 plug according to CiA 303-1 as well as various adapter cables
Further interfaces	USB 2.0 for PC based control and message download; BNC trigger output for the oscilloscope	USB 2.0 for PC connection; BNC trigger output for the oscilloscope
Temperature range	0 °C ... +50 °C	+5 °C ... +40 °C
Power supply	4 x 1.5 V AA battery or USB	9 - 36 V DC; Power supply included
Housing, dimensions	approx. 116 x 160 x 34 mm	approx. 40 x 134 x 170 mm
Software for operation and configuration	Also possible via terminal program	Win XP/Server2003/ Vista & Win7 (32/64 Bit)
Order number	1.01.0097.00000	1.04.0402.00000 (also for rental)
Accessories		Add-ons for higher layer protocols (CAN-open, DeviceNet, SAE J1939) and monitor

Automotive Tools

for configuration and operation of the IXXAT Embedded Platform

Residual bus simulation for FlexRay and CAN systems

The residual bus simulation provides a simulation environment for one or more control devices that can be tested independently of other nodes. This includes the generation of the message traffic that is necessary for the device to be tested and the reaction on messages transmitted by the control devices under test.

The residual bus simulation is based on the description of the communication network via a CANdb or Fibex file. The description file is imported and analyzed by the IXXAT RBS configuration software. With a few logically consecutive steps, the user can graphically configure the residual bus simulation.

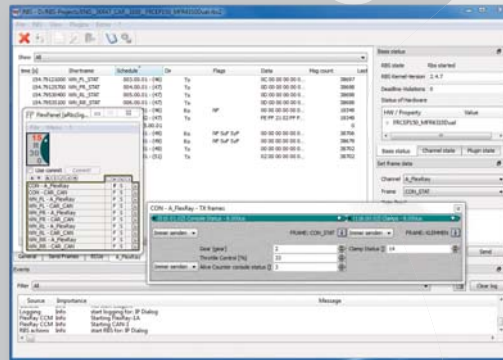
The configuration software then generates the actual residual bus simulation including signal specific CRCs or alive counter.

An integrated cross-compiler translates the residual bus simulation into a file which can run on the target hardware. After transfer to the IXXAT Embedded platform, the RBS can be performed without a PC connection in real time.

In addition, it is possible to extend the RBS with user-specific elements within pre-generated "user code skeletons". Thereby it is possible to react to specific signals and, if required, send a message on the bus in the same cycle.

XCPonEthernet

With the XCPonEthernet extension it is possible to control the residual bus simulation via a standardized protocol or to evaluate communication data. For this purpose, all signals of the CANdb and/or



Residual Bus Simulation - Configuration Tool

Fibex file are compiled in an A2L file. This A2L file can then be imported by other commercial software solutions. Thereby it is possible to display all signals present on the bus and to manipulate all signals sent by the residual bus simulation. An extension of existing logger solutions with further FlexRay and CAN interfaces is equally as possible as the defined stimulation of transmission signals at a physical level.

HiL signal manipulation

Based on a FlexRay/CAN residual bus simulation and the XCPonEthernet extension, it is possible to manipulate the signals transmitted in a defined way.

This includes e.g. on/off switching of signals for a defined time or number of cycles, transmission of defined substitute values for switched off signals and the defined corruption of CRCs and Alive counters for all signals transmitted by the RBS.

The signal manipulation can be controlled via user code, the Gateway or XCPonEthernet.

Gateway

With the Gateway Configuration Tool, gateway solutions can be implemented quickly and easily. The software is available in different versions and for different hardware platforms. The configuration can be made very easily via drag&drop and allows the stand-alone operation on the target platform.

In the simplest and free available version, the Gateway Configuration Tool can be used for the configuration of pure CAN/CAN gateways. Configuration can be carried out on the basis of existing CANdb bus description files or manually. Mapping of messages of a source bus to a target bus is carried out via

drag&drop on the graphical interface of the Gateway Configuration Tool. The configuration thus created can be loaded to the IXXAT CANbridge or an Embedded Platform from IXXAT and can be executed stand-alone.

For complex gateways, the full version of the Configuration Tool is required that also enables creation of signal-based gateways. Depending on the requirements the gateway can run stand-alone or based on the residual bus simulation. Running the gateway based on the RBS, the transmission data is hand-over by the gateway to the RBS which is responsible for the timely transmission.

Mapping is carried out by drag&drop, as with the CAN/CAN gateway. With the signal-based gateway it is possible to combine signals of various source messages to form a target message. Transmit triggers and possible default values can be freely selected.

If the signal description of the source and target signal do not match, an automatic signal transformation is generated optional. This ensures that the interpretation of the source and target signal is identical. Signal-based gateways will run on IXXAT's Embedded Platforms as target hardware. In addition to FlexRay and CAN the following described protocols are supported depending on the used target hardware.

Generic Ethernet

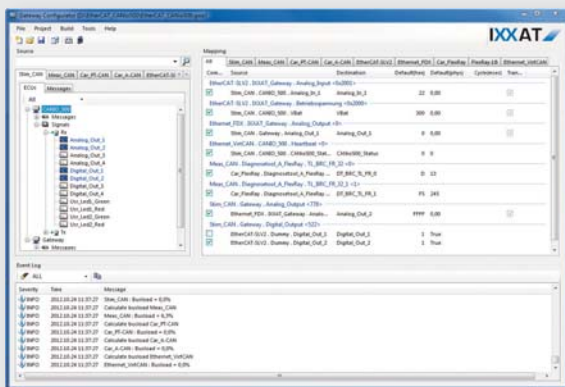
In addition to the built-in CAN interfaces, it is possible to define up to 16 "virtual CAN on Ethernet" interfaces on all IXXAT Embedded Platforms. At this, the IXXAT CAN@net protocol is used, enabling the reception and transmission of CAN messages on up to 16 different IP addresses. The Gateway Configurator generates a CANdb bus description file for each virtual CAN bus. The CANdb allows the remote station to interpret the data stream similar to a real CAN bus. Depending on requirements, the virtual CAN bus can directly be interpreted by the control PC, analyzed via canAnalyser, or via CAN@net II converted to CAN.

SDHC Card

In conjunction with the FRC-EP170/190 devices, it is possible to use an SDHC card as a virtual bus within the gateway. Mappings can be defined from and to all bus systems.

The assigned messages or signals are recorded in MDF4, ASCII or canAnalyser format on the memory card, furthermore it is possible to record data parallel to the gateway or bus simulation operation.

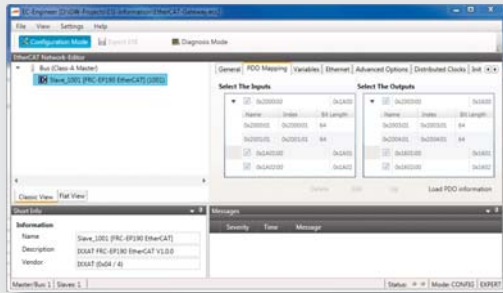
Also, records can be sent in the correct time order.



Gateway Configuration Tool

FDX

The Fast Data Exchange protocol is a communication interface based on Ethernet and offers an affordable alternative to XCPonEthernet to access physical signals. Main advantage is that FDX does not require a complex communication stack and therefore can be implemented very easily on any target platform. The Gateway Configuration Tool generates an XML description file for the FDX interface which can be read and used to interpret the Ethernet data flow.



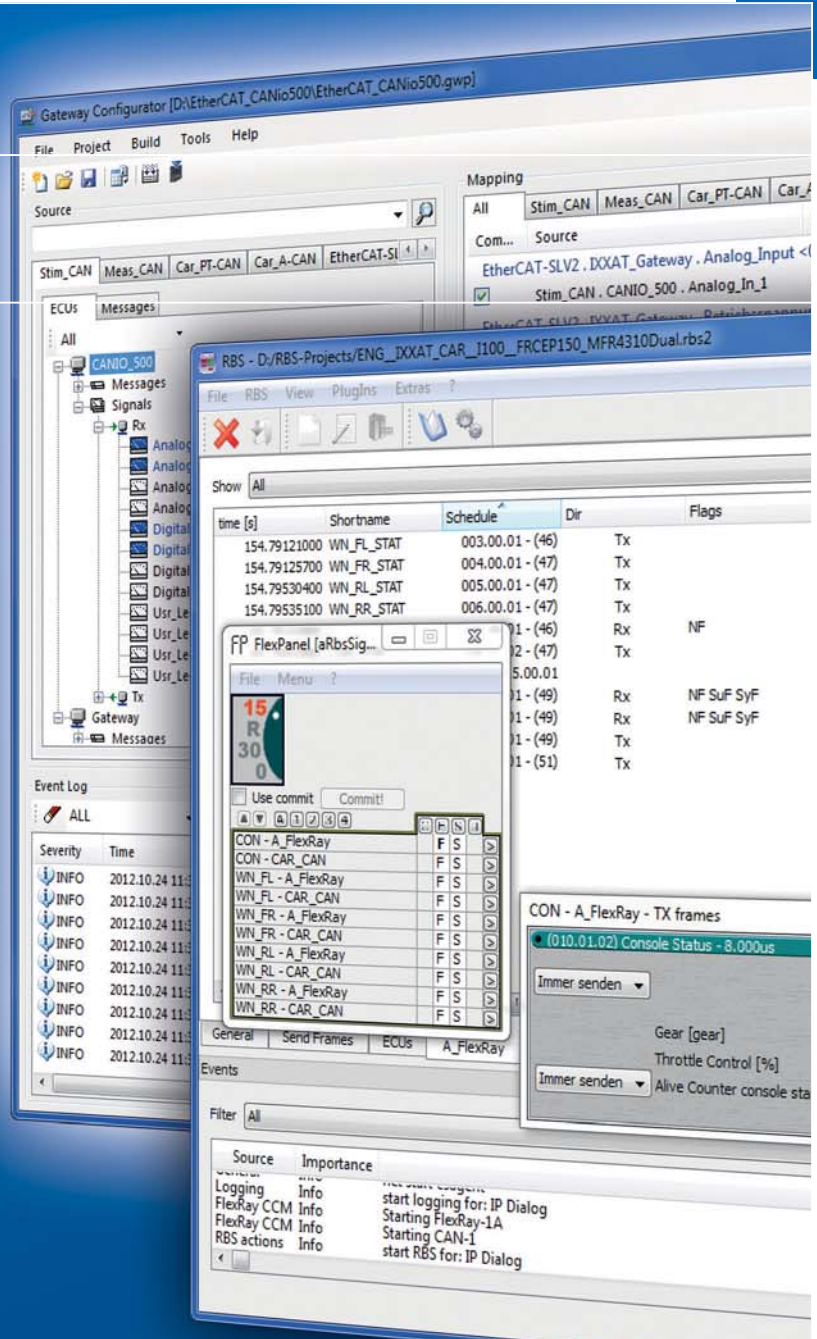
EtherCAT Configuration Tool – EC-Engineer

EtherCAT

IXXAT offers an EtherCAT expansion for the FRC-EP190. This allows connection of the automotive part with the industrial environment in test benches. Using the Gateway Configuration Tool, the user selects the signals from the vehicle or control unit which have to be stimulated or analyzed on EtherCAT. The EtherCAT configuration can be read directly from the device or provided by an ESI file which is generated by the Gateway Configuration Tool.

Development Tool

For the FRC-EP170/190, an Eclipse-based development environment is available for PCs. It can be used to extend the IXXAT applications or to develop own applications for the IXXAT embedded platform. The development package includes a comfortable editor, a cross-compiler as well as a high-level language debugger. The developed Linux based applications can be executed or can run stand-alone on the IXXAT embedded platforms.



Product	Embedded Platform Toolsuite		
	FlexRay/CAN Resid. Bus Simulation	Gateway	Development Tool
Description	Residual bus simulation for FlexRay and CAN systems based on the IXXAT Embedded Platform	Universal configuration tool for the message/signal conversion on the IXXAT Embedded Platform or CANbridge	Development environment for implementation of specific requirements on the embedded platform
Features	<ul style="list-style-type: none"> Generation of FlexRay and CAN messages as well as reaction to messages received Provision of two cold starter nodes for starting up a FlexRay system PC controlled and stand alone operation Easy configuration based on FIBEX or CANdb file data Signal manipulation for all signals transmitted by the RBS Stimulation via XCPonETHERNET and commercial third-party software 	<ul style="list-style-type: none"> Message or signal conversion between all bus systems on the target hardware Support of FDX and EtherCAT Creation and download of the configuration via Windows Gateway Configuration Tool Easy allocation of signals from the source to the target bus via drag & drop, optional based on a Fibex or CANdb bus description file Optional automatic signal conversion Automatic plausibility and consistency check of the configuration Configuration download also possible via FlexRayDeviceAdmin 	<ul style="list-style-type: none"> Eclipse-based development environment Application development for Linux user mode Cross compiler for the IXXAT embedded platforms 190/170 Remote debugging via Ethernet or USB High-level code debugging API for connecting your own application to the IXXAT bus simulation
Order number	Embedded Platform Toolsuite: <i>on request</i>		
	FlexRay and CAN Residual Bus Simulation 1.02.0243.00002 On the target device a corresponding runtime license is required	Gateway Configuration Tool 1.02.0244.00000 On the target device a corresponding runtime license is required	Development Tool: <i>on request</i> No runtime license is required on the target device for pure Linux user mode applications

Embedded Platform

for use in vehicles and test benches

The IXXAT Embedded Platform has been proven in all applications where several bus systems must be merged within one device which has its own computing power. At this, the PC is only required to setup the device or for data stimulation and visualization. The intelligence, for example to handle the transport protocols, is available on the Embedded Platform. The Embedded Platform has a very powerful micro processor and uses a real-time operating system. This allows to set-up stand alone applications, e.g. to connect several vehicle bus systems via a gateway without requiring a control PC. The required functionality can be activated on the device using appropriate runtime licenses.

Test bench

Within test benches, individual parts of a vehicle - e.g. electronic servo steering - can be tested isolated from the remaining vehicle. Especially FlexRay requires to locate the Embedded Platform nearby the device under test, to keep the interference with the bus topology as low as possible. For operation, most of the control units require - from their point of view - a simulation of the remaining vehicle bus system. Using the appropriate IXXAT tools, the Embedded Platform can be configured without own coding effort and provides the desired signals on the best possible interface for the test bench computer.

Functional simulation

The connected control units sometimes require a real time response on specific events. The response from a connected PC is often too slow or transmission times are not accurate definable. In these cases, functional simulations can be used on the devices, which allow realistic and very timely reactions.

Analysis

The analysis of the communication buses is another application of the Embedded Platform. This can be either the pure interface function with the corresponding analysis software on the PC or the preprocessing of the data received to only send selected physical signals to the PC for evaluation. For connecting the PC Ethernet is recommended, since the data can be transmitted galvanically isolated, fail-safe and over long distances.

Development platform

For most applications, IXXAT offers the appropriate configuration and analysis tools for the Embedded Platform. Nevertheless, there are very specific applications where it is necessary to provide an accurate customized solution. The open architecture of the IXXAT Embedded Platform allows providing adaptations or extensions very quickly. If necessary this can also be performed by the user based on the software development kit.

As an alternative to the Embedded Platform IXXAT offers a pure PC-based solution for FlexRay analysis based on the FR-IB 100 interface (see PC interfaces).



Product	FRC-EP150	FRC-EP190
PC connection	Ethernet 10/100 MBit/s	Ethernet 10/100 MBit/s or USB 2.0
Interfaces	<ul style="list-style-type: none"> - 1 x FlexRay A/B channel with each 10 MBit/s - 4 x CAN <ul style="list-style-type: none"> - 2 x High-Speed CAN - 2 x High-Speed and Low-Speed CAN, via SW switchable - 4 Digital output - 2 Digital input 	<ul style="list-style-type: none"> - Up to 2 x FlexRay A/B channel with each 10 MBit/s - Up to 8 High-Speed CAN interfaces - Up to 2 Low-Speed CAN interfaces - Up to 2 CAN-FD interfaces - 2 x LIN interface - 2 x K-Line interface - 1 x RS232 interface - Up to 4 x diff. analog input (12 Bit) - Up to 4 digital input (max. 34 V) - Up to 4 digital output (max 34 V, 1 A) Optional: EtherCAT Slave In/Out
Functionality	<ul style="list-style-type: none"> - Cold start capability via two FlexRay nodes - All interfaces galvanically isolated 	<ul style="list-style-type: none"> - Hibernate Mode - Real-time clock - Wakeup via interfaces and timer - Level and error frame monitoring on up to two CAN interfaces - Cold start capability via two FlexRay nodes - Optional remote control
Connectors	- All connectors with Lemo plugs	<ul style="list-style-type: none"> - Standard connectors for PC interfaces - DSub connectors for fieldbus interfaces
Expansion slots and extensions	-	<ul style="list-style-type: none"> - SDHC slot - 2 int. expansion slots (FlexRay, CAN, CAN-FD, EtherCAT) - Prepared for WLAN, Bluetooth, GSM/GPS
Temp. range	-40 °C ... +70 °C	-40 °C ... +80 °C
Power supply	6.5 - 50 V DC; 400 mA typ. at 12 V	6 - 36 V DC; 420 mA typ. at 12 V
Dimensions	158 x 140 x 36 mm	182 x 113 x 50 mm
Order number Hardware	<ul style="list-style-type: none"> - FRC-EP150 [MFR4310 Dual-Chip]: 1.01.0102.00014 	<ul style="list-style-type: none"> - FRC-EP190 Standard with galv. isolation: 1.01.0094.00000 - FRC-EP190 Standard: 1.01.0094.00001 - FRC-EP190 FlexRay with galv. isolation: 1.01.0094.00010 - FRC-EP190 FlexRay: 1.01.0094.00011 - FRC-EP190 Plus with galv. isolation: 1.01.0094.00020 - FRC-EP190 Plus: 1.01.0094.00021
Order number Runtime licenses	<ul style="list-style-type: none"> - RBS Runtime Full License: 1.02.0245.00000 - GW Runtime License Bundle: 1.02.0245.00005 - FlexRay Runtime License Bundle: 1.02.0245.00006 - XCP Runtime License: 1.02.0245.00008 - IEEE1588-V1 Runtime License: 1.02.0245.00009 	

SAE J1939

Protocol Software, Tools, Windows API

IXXAT offers a comprehensive, cost-effective tool chain for SAE J1939 applications. This ranges from the protocol software, analysis and configuration tools to the Windows API based test destination device.

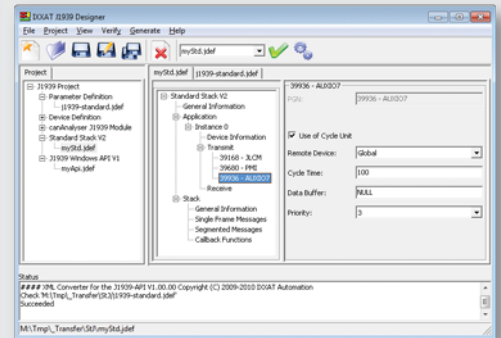
Thanks to a central definition of all relevant parameters based on a database, header files can be generated for the protocol software and configuration files for the Windows API and canAnalyser. This avoids errors due to inconsistent data.

In addition, IXXAT offers its SAE J1939 protocol software for a large number of platforms. This reduces the amount of adaptation required during implementation and thus considerably shortens the time-to-market.

Protocol software

With the cross-platform **SAE J1939 Protocol Software** J1939 devices can quickly and easily be developed. The software is available for various CPUs and in three variants: "Micro" for 8-bit systems, "Single Channel" for solutions with one CAN channel and "Multi Channel" for solutions with more than one channel. In addition, extension packages for NMEA 2000 and ISO 15765-2 are offered.

The **SAE J1939 CAN Driver** serves as the basis for the J1939 protocol software (single/multi channel) and also contains the abstraction modules for the CPU and operating system. The driver is available for various CAN controllers.



SAE J1939 Designer

Tools and APIs

With the **SAE J1939 Designer**, IXXAT offers an editor and code generator for J1939 projects. It is used to produce J1939 network descriptions and to generate code and configuration files for the various IXXAT J1939 products.

The **SAE J1939 API** is a Windows DLL based on the IXXAT J1939 protocol software for the development of SAE J1939 service and test applications. The DLL offers convenient interfaces at the signal level for the development of applications in C/C++ or Python.

With the optional **SAE J1939 Module** the canAnalyser allows the interpretation and display of CAN messages according to the SAE J1939 standard (see also page 8).

New

FRC-EP170
Ethernet 10/100 MBit/s or USB 2.0
<ul style="list-style-type: none"> - 1 x FlexRay A/B channel with each 10 MBit/s - Up to 4 High-Speed CAN interfaces - Up to 1 Low-Speed CAN interfaces - 1 x LIN interface - 1 x K-Line interface - 1 x RS232 interface - 1 x USB 2.0 Host - 4 x digital input/output (5 V TTL)
<ul style="list-style-type: none"> - Hibernate Mode - Real-time clock - Wakeup via interfaces and timer - Cold start capability via two FlexRay nodes - Optional remote control
<ul style="list-style-type: none"> - Standard connectors for PC - DSub connectors for fieldbus
<ul style="list-style-type: none"> - SDHC slot - 2 int. USB expansion slots - Prepared for WLAN, Bluetooth, GSM/GPS
-40 °C ... +80 °C
6 - 36 V DC; 350 mA typ. at 12 V
142 x 113 x 40 mm
- FRC-EP170: 1.01.0142.00000

Product	SAE J1939 Protocol Software	SAE J1939 API for Windows	SAE J1939 Designer
Description	Software package for the development of J1939 devices	DLL for the development of J1939 service and test applications	Editor and code generator for J1939 projects
Included functions	Transmission and reception of application specific messages (confirmed and unconfirmed) Processing of the J1939 transport protocols for large data blocks (message/node oriented) Simultaneous communication with multiple nodes Support of the "address claiming" procedure Cyclical transmission and reception of messages with timeout monitoring Optional: - J1939 CAN driver - Extensions: ISO 15765-2, NMEA2000, Diagnostics	Supports all the features of the protocol software Automatic conversion of received messages into signals and vice versa Use of the J1939 designer data base for signal interpretation Supports multiple CAN channels and therefore also J1939 networks	Definition of parameters (SPNs), messages (PGNs) and devices Configuration of the J1939 protocol software (generation of H- and C-files) Configuration of the J1939 API for Windows Configuration of the J1939 canAnalyser module Storage of the configuration as XML file
Order number	- Single Channel Version: 1.02.0351.00000 - Multi Channel Version: 1.02.0351.00001 - Micro Version: 1.02.0286.ITDDC - J1939 CAN Driver: 1.02.0350.00TTT - ISO 15765-2 Extension: 1.02.0352.00000 - NMEA2000 Extension: 1.02.0353.00000 - Diagnostics Ext. (J1939-73): 1.02.0354.00000	1.02.0287.00000	1.02.0360.00000

I/O Modules

Universal I/O gateways for CAN, CANopen and EtherCAT systems

With CANio 250/500 and EtherCAT I/O, IXXAT offers three modules enabling the quick and easy connection of analog and digital input and output signals to CAN, CANopen and EtherCAT systems – whether in experimental setups, test benches or vehicles.

An important key feature of the modules are the inputs and outputs for digital and analog (only CANio 500 and EtherCAT I/O) signals, which can be flexibly configured. The analog interfaces provide a precise 12 bit resolution.

A special focus, during the development of the CANio 250/500, was the device operability within CANopen and also standard CAN systems. For this reason, the CANio 250/500 was designed as a self-starting CANopen slave, with all important parameters, such as Node-ID, sampling rates for the analog inputs or voltage range of the analog outputs, stored as default values on the device. This enables the devices to operate directly after start up without further settings in accordance with basic CAN operation.

The individual configuration of the CANio 250/500 for different applications can be done either by loading configuration data via a CANopen master or by sending configuration messages in a pure CAN network or offline via the free CANio configuration tool. Configurations that have been created with the CANio configuration tool can be saved as a project and on customer request pre-installed on ordered devices before delivery.

The configuration of the EtherCAT I/O module is performed by using an EtherCAT master with a special XML configuration file (ESI file).

Customer specific solutions

Based on our years of experience, we also work for our customers to develop solutions that, in terms of interfaces, construction, and protocols supported, are adapted optimally to customer requirements.

- Specific form factor, housing
- Analog in-/outputs
- Digital in-/outputs
- CAN, CANopen, SAE J1939, DeviceNet
- Real-time Ethernet (e.g. EtherCAT)
- ...



All three devices are delivered in a rugged aluminum housing with a wide power supply voltage and temperature range allowing for easy integration into existing applications in the industrial and automotive area.

Beside a standard version with aluminum housing, IXXAT offers the I/O modules also as "plug-in" versions, which can be, due to the small footprint, easily integrated into customer specific devices.

CANio Application Development Kit (ADK) For the simple development of customized applications on the CANio 250/500

As a standard product, the CANio 250/500 represents an I/O gateway implementation in which the analog and digital inputs/outputs can be queried or triggered via CAN messages.

The Application Development Kit enables creation of custom device applications with customer-specific functionality in the C programming language. Industrial controls or vehicle control devices can therefore be simply implemented without own hardware.

The CANio ADK contains all drivers required for communication via the CAN bus and for triggering the various inputs and outputs, which allows development of custom applications even without specific hardware know-how.

The drivers are delivered as a binary library together with a comprehensive C-source demo application. The demo application demonstrates the usage of the various functions and can be very easily extended according to individual requirements.

As development platform an evaluation kit of the CANio 250/500 is included in the scope of supply.

Together with a development environment, available for free, and a low-cost hardware debugging solution, custom applications can thus be created, uploaded to the target and verified.

On completion of the test and verification phase, the application can be loaded to standard CANio 250/500 devices. This is carried out via the CAN bus with the aid of the CANio configuration tool and the bootloader permanently installed on the devices.

We will be pleased to develop adapted software solutions for customers based on the CANio 250/500. The custom software is delivered with documentation that allows further modification by the user.



Product	CANio 250
CAN protocols	CAN, CANopen
CAN bus interface	ISO 11898-2
Galv. CAN isolation	yes (500 V DC)
IE interface	-
Digital inputs	Up to 16 x + clamp 15 (5 V CMOS compatible)
Digital outputs	Up to 16 x, max. 30 mA, 5 V CMOS signal levels
Analog inputs	-
Analog outputs	-
GPIO's	-
Further interfaces	- 2 user programmable LEDs - Measur. of power supply
Temperature range for operation	-40 °C to +70 °C
Power supply	6-32 V
Types of plugs	CAN: D-SUB-9 I/O: D-SUB-9
Protection class	IP42
Dimensions	75 x 82 x 32 mm
Order number	1.01.0099.00000

Product	CANio Application Development Kit (ADK)
Description	Package for the easy development of customized applications on the CANio 500 and CANio 250
Content of delivery	CANio evaluation kit I/O drivers, boot loader, demo application Programming manual The development environment and the debugger are not included in the scope of delivery
Order number	CANio500 ADK: 1.03.0098.00000 CANio250 ADK: 1.03.0099.00000

Further Products

Solutions for test benches
and production automation

EtherCAT  CANopen 

IXXAT offers a wide range of solutions for CAN and real-time Ethernet in the industrial sector.

EtherCAT Master Protocol Software

IXXAT offers an EtherCAT Master software package for a wide variety of platforms enabling the development of controls in EtherCAT-based systems.

The EtherCAT Master software complies with ETG.1000 supporting CAN Application over EtherCAT (CoE), Ethernet over EtherCAT (EoE) and Distributed Clock (DC).

The EtherCAT Master Stack is specially optimized for operation in embedded operating systems (or real-time operating systems) and is characterized by its modular structure, its high performance with low CPU load and low memory requirement.

Due to the support of standard Ethernet controllers, no other special hardware is required. The interfaces of the individual modules are „open“, which means that sub-components can be easily replaced if required and adapted to the relevant requirements.

The EtherCAT Master Stack is directly available for many different target systems, but can also be easily ported to any embedded operating system. If required, IXXAT offers implementation and adaptation as a service.

EtherCAT Analyser

The EtherCAT Analyser enables optimization of the system functions – comparable with the IXXAT Analysers for CAN and FlexRay. Due to the use of the EtherCAT Analyser it is possible to ensure that your EtherCAT system is operated continuously and with optimum efficiency.

EtherCAT Slave Test Center (AT-STC)

The EtherCAT Slave Test Center is aimed mainly at the vendors of EtherCAT Slave devices for carrying out tests. The AT-STC is used typically during the development of the Slave software and for quality assurance in production.

www.ixxat.com/ethercat

...continued on page 16



CANio 250 - Plug-In	CANio 500	ETCio 100
CAN, CANopen	CAN, CANopen	-
ISO 11898-2	ISO 11898-2	-
-	yes (500 V DC)	-
-	-	EtherCAT
-	4 x + clamp 15 (between 0-34 V, threshold at 50 %)	6 x (between 0-34 V, threshold at 2.5 V)
-	4 x, max. 1 A, output voltage free selectable, up to 32 V	4 x, max. 2 A, output voltage free selectable up to 32 V
-	4 x, 12 bit resolution +/- 5 V, or 0-10 V, or +/- 100 mA	2 x, 12 bit resolution 0-10 V
-	4 x, 12 bit resolution +/- 5 V, or +/- 10 V, or 0-5 V, or 0-10 V, switchable via software	2 x, 12 bit resolution 0-10 V, 20 mA (optional 16 bit resolution)
25 x, free configurable as analog input, digital in-/output or SPI, 3V3 CMOS	-	-
- 2 user programmable LEDs	- 2 user programmable LEDs - Measurement of power supply	- 4 LEDs
-40 °C to +70 °C	-40 °C to +70 °C	-40 °C to +70 °C
6-32 V or 3V3	6-32 V	6-32 V
Socket board with 2.54 mm contact spacing	CAN: D-SUB-9 I/O: D-SUB-HD15	16 pin plug for the digital/analog signals; Phoenix-Contact RM 3,81
-	IP42	IP42
77 x 59 mm	120 x 82 x 32 mm	120 x 82 x 32 mm
1.01.0099.00001	With 0 to 10 V analog inputs 1.01.0098.00000 With -5 bis +5 V analog inputs 1.01.0098.00001 With +/- 100 mA analog inputs 1.01.0098.00002	Aluminum case 1.01.0250.20001 Board level version 1.01.0250.21001

Further Products

from page 15...

CANopen Protocol Software

To implement CANopen in automotive devices and test equipment, IXXAT offers optimized protocol software packages for a large number of micro-controller platforms.

In addition to the standard CANopen Protocol Software for the implementation of CANopen Slave or simple Master devices, specific software packages, such as the CANopen Manager Software for complex manager devices (e.g. IEC 61131 programmable controls) or the CANopen Real-Time Software for use with real-time operating systems are available.

The software packages offered by IXXAT are characterized by their high modularity and scalability, which enable optimum adaptation to customer requirements. In this way, both simple applications can be implemented with extremely low resources and complex applications with a comprehensive scope of functions.

CANopen APIs

For the development of Windows PC-based applications, IXXAT offers the CANopen Master API and the CANopen Manager API. The Master API provides all CANopen relevant functions for the development of control, service and test programs. In addition, complex PC-based control solutions can be implemented with the Manager API.

www.ixxat.com/canopen

Complete control solution for EtherCAT and CANopen

With the IXXAT Econ 100 we provide a complete control solution for CAN- and EtherCAT-based systems. The optimized system architecture of the IXXAT Econ 100 enables the device to control fast networks by having also a very compact design with many expansion possibilities.

Special ADKs enable furthermore the quick and easy adaptation to different application fields, whether data acquisition, gateway applications or the control of test systems.

www.ixxat.com/econ

Additional information about Ethernet and CAN solutions is available in the IXXAT catalog "Industry" or at www.ixxat.com or call IXXAT for assistance with your application.

CAN Accessories

Termination Resistors and Cables



Product	Sub-D9 Connector with Termination	CAN Termination	CAN Termination
Plug/Sockets	Sub D9 Male/Female	Sub D9 male	Sub D9 female
Termination	120 Ohm	120 Ohm	120 Ohm
Dimensions	-	-	-
Further information	-	-	-
Order number	1.04.0075.03000	1.04.0075.02000	1.04.0075.01000

* Customer specific length on request.

FlexRay Accessories

Cables for the FRC-EP150















Product	FlexRay Y Cable	FlexRay 1:1 Cable
Plug/Sockets	Lemo plug (5 pins, type FGB.0B.305) to Sub-D9 socket and Sub-D9 plug	Lemo plug (5 pins, type FGB.0B.305) to Sub-D9 socket
Dimensions	2 m	2 m
Order number	1.04.0092.00001 1.04.0092.00011 - With open ends	1.04.0092.00000 1.04.0092.00010 - With open ends





Cables for the FRC-EP190



Product	FlexRay 1:1 Cable	Double CAN Cable
Plug/Sockets	D-SUB-HD15 socket to D-SUB9 socket	D-SUB9 socket (double CAN) to 2 x D-SUB9 plug (single CAN)
Dimensions	1.5 m	1 m
Order number	1.04.0089.00102	1.04.0089.00201

					
CAN Cable	CAN Adapter Cable	CAN Y Cable	T-Bus Connector	Glass Fiber Cable F-SMA	Glass Fiber Cable ST
Sub D9 male to female	RJ45 plug to SUB D9 plug	Sub D9 socket to socket/plug	-	F-SMA; Preassembled with two plugs per side	ST; Preassembled with two plugs per side
-	-	-	-	-	-
2 m	20 cm	22 cm	-	2 m *	2 m *
1-to-1 connection with shielding	Set of two cables	1-to-1 connection	T-Bus connector for creating star couplers in conjunction with the IXXAT CAN repeaters	Duplex cable; Wave length 820 nm; Glass fiber 50/125 µm; Attenuation 3 dB/km	Duplex cable; Wave length 820 nm; Glass fiber 50/125 µm; Attenuation 3 dB/km
1.04.0076.00180	1.04.0074.01000	1.04.0076.00001	1.04.0073.00000	1.04.0003.01012	1.04.0003.01022

					
CAN 1:1 Cable	CAN T Cable	Trigger Cable	Trigger Cable	Ethernet Cross Cable	Power Cable
Lemo plug (8 pins, type FGC.1B.308) to Sub-D9 plug	Lemo plug (8 pins, type FGC.1B.308) to two Sub-D9 plugs	Lemo plug (8 pins, type FGB.1B.308) to 4 BNC plugs	Lemo plug (8 pins, type FGB.1B.308) to 5 banana plugs	Lemo plug (8 pins, type FGG.1B.308) to RJ45 plug	Lemo socket (2 pins, type FGJ.1B.302) to two 4 mm banana plugs
1 m / 3 m	1 m	2 m	2 m	3 m	2 m
1.04.0093.00000 - 1 m length 1.04.0093.00003 - 3 m length	1.04.0093.00001	1.04.0094.00000	1.04.0094.00001	1.04.0090.00000	1.04.0091.00000

			
Remote/Debug Cable	Power Cable	FlexRay/IO Breakout Box	CAN/LIN Breakout Box
7 pin Binder plug REMOTE to D-SUB9 socket (RS232)	3 pin Binder socket (Power) to 3 x 4 mm banana plugs	FRC-EP190 connection via HD-DSub15 Box with 5 x DSub9: - 2 x FR1A/B or Analog-In 3/4 - 2 x FR2A/B or Analog-In 1/2 - 1 x Digital I/O	FRC-EP190 connection via DSub9 Box with 3 x DSub9 - 2 x CAN-HS or CAN-LS - 1 x LIN or K-Line
2 m	2 m	0.5 m	0.5 m
1.04.0089.00301	1.04.0089.00001	1.01.0081.00200	1.01.0081.00100

Engineering Services

We support you in all phases of your development

For well over twenty-five years, development services have been an important part of IXXAT's activities. More than 80 % of our 80 employees are electronics engineers and computer scientists. About half of our development engineers support our customer projects with their experience.

IXXAT offers services in all phases of development, beginning with the definition phase of products or systems. As a discussion partner, IXXAT is available to produce studies, to develop concepts, create requirement specifications and to review your internally-development requirements with regard to the most suitable technologies and appropriate solutions.

IXXAT delivers the optimal solution including the application development. Designing and developing turnkey systems is an important strength that extends to the integration of hardware and software and the responsibility for the system operation and performance. IXXAT ensures that its customers receive the optimum solution with maximum protection of their investment.

In the implementation phase, IXXAT develops hardware and software for embedded systems and PCs from scratch or from modified versions of existing IXXAT designs. In the test phase, IXXAT is able to define and perform tests.

With IXXAT as your partner and hardware supplier, you'll benefit from long-term availability, high quality, lifetime support, short delivery times, and "Made in Germany" quality. With our subsidiaries, our sales offices and worldwide distributors we are able to provide on-site support around the world.

Developing with IXXAT means

- ✓ Shorter time to market
- ✓ Avoiding development risks
- ✓ Predictable development costs
- ✓ Competitive advantage through use of modern technologies
- ✓ Focus on core competencies

Our range of services

- Customized OEM hardware and devices (e.g. control units, single board computers, I/O modules, gateways, interface modules)
- Application development
- Embedded software (e.g. drivers, protocol software, application software)
- Safety-related hardware and software according to IEC61508
- Devices and systems for test and service
- Analysis and configuration applications

Project Examples

DPA 05

With the DPA 05, IXXAT developed a universal gateway for a leading manufacturer of commercial vehicles that is used in various forms for the diagnosis in commercial vehicles.

The DPA 05 employs a variety of interfaces such as CAN, ISO 9141 (K-Line and L-Line), J1708, USB 2.0, RS232, digital inputs and outputs as well as analog inputs. A boot loader is used to easily update the firmware and thus to individually adapt the device to new requirements.

IXXAT manufactures and provides long-term maintenance of this product for the customer. This ensured that the customer was able to easily order the device over a period of 10 years.

The increasingly difficult order situation for certain electronic components required the development of a successor product in close cooperation with the customer.

For this development, the embedded platform FRC-EP190 from IXXAT has been used as basis device. As the hardware and the operating system were already available, the development effort could be reduced to a few, limited adaptations. Parallel to the design of the DPA 06, the customer application could be adapted on the FRC-EP190 basis device.

AZG3000

Test and diagnosis device for testing vehicle control units with CAN-, K-Line and FlexRay interface

According to the requirements of a leading automotive supplier, IXXAT developed a universal testing device used in the fields of development,

testing and service as well as functional testing and debugging in vehicles or test benches.

Based on a graphic touch screen, the device employed an easy-to-use user interface. The device supports a variety of functions, such as the reading of ECU fault memory, display and output of configurable metrics, reading and writing of ECU parameters as well as CAN monitor functions.

In addition to the development and testing, IXXAT furthermore manufactures and maintains the product.

FPGA-based interface module for prototype ECUs

For a leading manufacturer of vehicle ECU prototypes IXXAT has developed a powerful interface module based on the specific customer requirements. The device supports different bus systems, including CAN, FlexRay and XCPonEthernet. In order to reach the desired flexibility, the module was designed with a FPGA and an operating system independent software interface, enabling advanced features like performing measurement tasks as well as applying of configuration and measurement values and software updates.

CANopen/SAE J1939 interface for joystick

For a manufacturer of joysticks used for the control of special vehicles, IXXAT developed an interface providing a CANopen and J1939 connection for the devices. The necessary hardware and software were specified and developed by IXXAT. Besides the microprocessor board, an additional I/O board provides a variable number of digital and analog I/Os, which enable customer-specific modifications of the joystick handle with additional control elements.

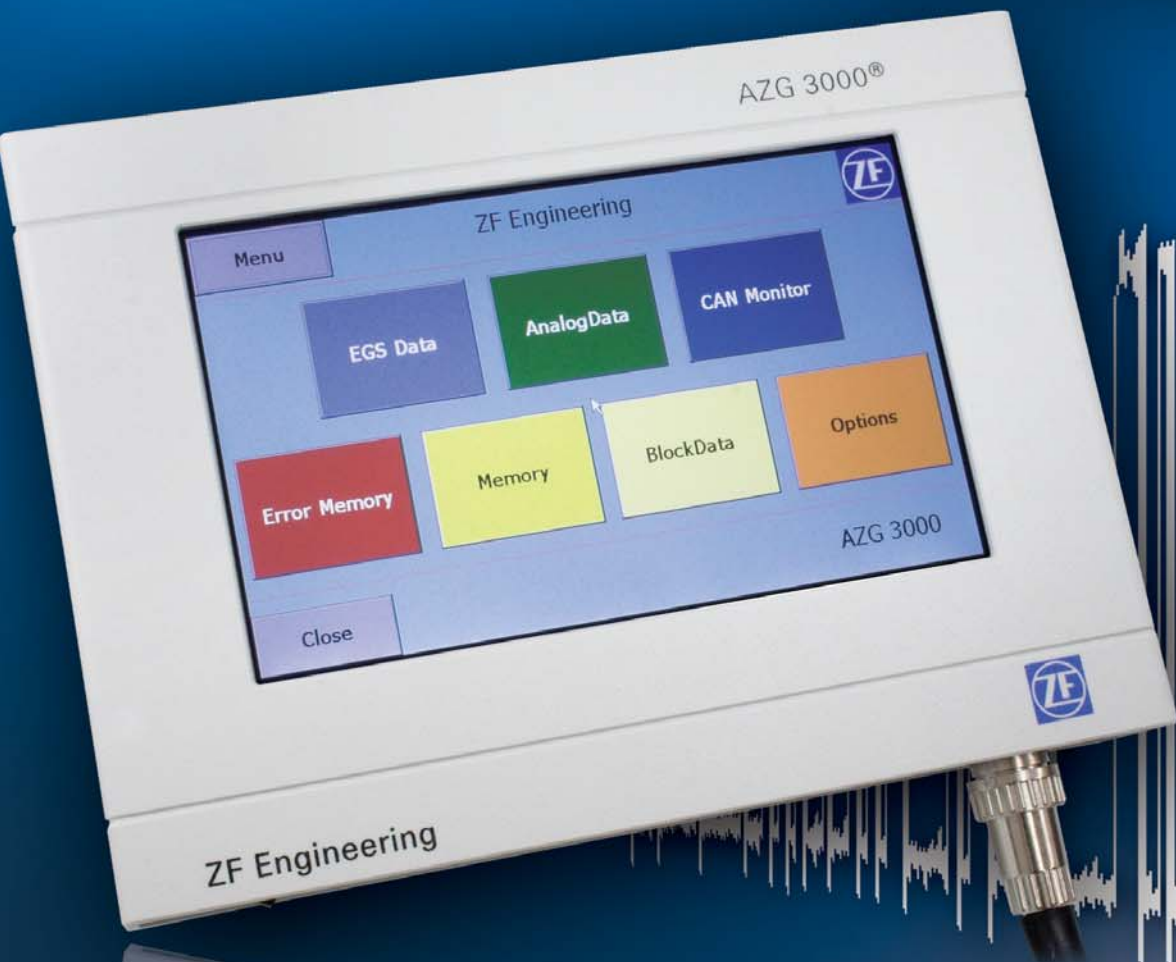
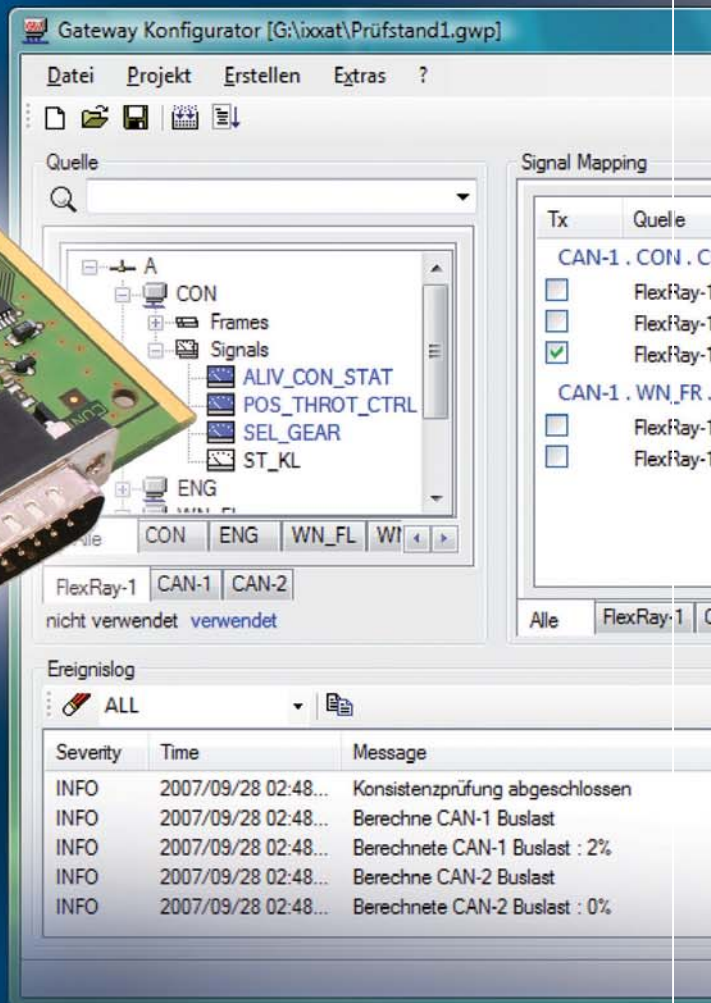
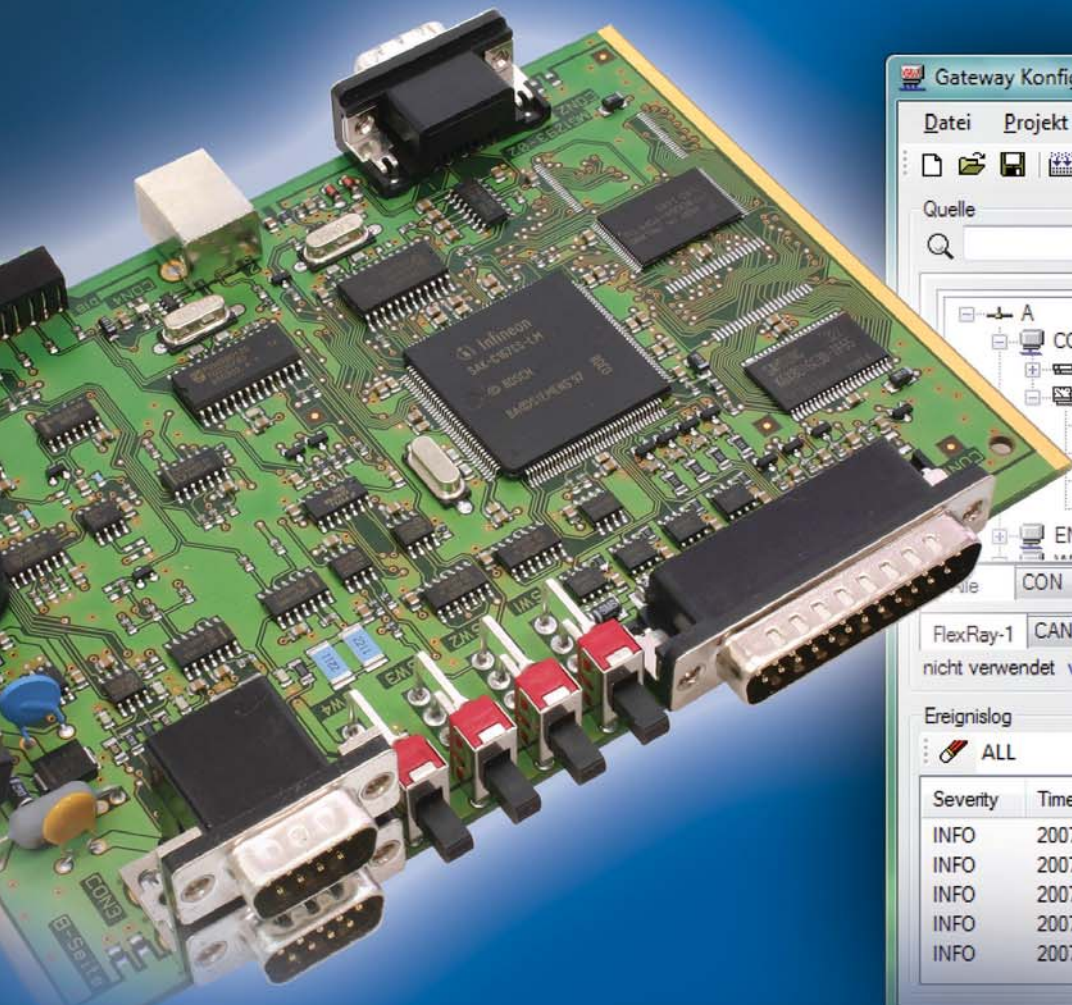
FlexRay/CAN Gateway

Based on the FlexRay/CAN gateway solution, IXXAT adapted a gateway configuration especially for use in test benches for a tier-one automotive supplier.

In this application, the FlexRay messages of the device under test were translated to the corresponding CAN messages of the existing test system as specified by the customer.

With this gateway developed by IXXAT the customer benefitted from using existing CAN technology for its new FlexRay based control units without making any change.

IXXAT provided pre-configured FRC-EP150 devices, enabling the customer to put the new test benches into operation in time.



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