

# FRC-EP190

Automotive Platform

## USER MANUAL

4.01.0094.20000 2.6 en-US ENGLISH



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# Important User Information

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# 1 User Guide

Please read the manual carefully. Make sure you fully understand the manual before using the product.

## 1.1 Target Audience

This manual is intended for users who want to use the device during the development and/or testing of their products.

## 1.2 Related Documents

Document	Author
IxAdmin Online Help	HMS
ACT Installation Manual	HMS

## 1.3 Document History

Version	Date	Description
2.0	September 2017	Revised and edited in new design, added CAN-FD
2.1	October 2017	Corrected pin allocation of breakout box for X5
2.2	January 2018	Corrected article number of additional component
2.3	May 2019	Corrections connector number in chapter 7.1, layout changes
2.4	December 2019	Added new hardware variants
2.5	February 2020	Divided in user manual and installation guide for web
2.6	August 2020	Corrections EtherCAT connector, merged user manual and installation guide

## 1.4 Trademark Information

Ixxat® is a registered trademark of HMS Industrial Networks. All other trademarks mentioned in this document are the property of their respective holders.

## 1.5 Conventions

Instructions and results are structured as follows:

- ▶ instruction 1
- ▶ instruction 2
  - result 1
  - result 2

Lists are structured as follows:

- item 1
- item 2

**Bold typeface** indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
This font is used to indicate program code and other  
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: [Conventions, p. 4](#)

This is an external link (URL): [www.hms-networks.com](http://www.hms-networks.com)

Safety advice is structured as follows:



Cause of the hazard!  
Consequences of not taking remediate action.  
How to avoid the hazard.

Safety signs and signalwords are used dependent on the level of the hazard.



*This is additional information which may facilitate installation and/or operation.*



This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.



### Caution

This instruction must be followed to avoid a risk of personal injury.



### WARNING

This instruction must be followed to avoid a risk of death or serious injury.

## 2 Safety Instructions

### 2.1 Information on EMC



Risk of interference to radio and television if used in office or home environment! The product is a class A device.

Use exclusively included accessories or HMS accessories that are intended for use with the device. Use exclusively shielded cables.

Make sure that the shield of the interface is connected with the device plug and the plug on the other side.

### 2.2 General Safety Instructions

- ▶ Protect product from moisture and humidity.
- ▶ Protect product from too high or too low temperature (see [Technical Data, p. 25](#)).
- ▶ Protect product from fire.
- ▶ Do not paint the product.
- ▶ Do not modify or disassemble the product. Service must be carried out by HMS Industrial Networks.
- ▶ Store products in dry and dust-free place.

### 2.3 Intended Use

This manual describes the external interfaces of the device, their functionality and pin allocation. The device does not contain any application beside the operating system. Adding functionality to the device is provided by the Automotive Configuration Tool (ACT) or the Software Development Kit. For further information refer to the corresponding manuals or online help. The device is intended to be used in the office, stationary applications, test benches or test vehicles. Due to the missing E1 certification the usage in series cars is not allowed.

## 3 Scope of Delivery

Included in scope of delivery:

- FRC-EP190 production bundle:
  - selected FRC-EP190 device variant
  - selected optional accessories
  - selected runtime licenses
- *FRC-EP190* User Manual
- power supply cable
- USB cable
- Ethernet cable

## 4 Product Description

The FRC-EP190 is a platform for the analysis, diagnostics and simulation of FlexRay, CAN, CAN-FD, LIN and K-Line networks.

### 4.1 Features of the Basic Unit

- measurement and analysis platform
- up to 8 x high-speed CAN interfaces
- up to 2 x low-speed CAN interfaces
- level and error frame monitoring on up to 2 CAN interfaces
- 2 x LIN interfaces
- 2 x K-Line interfaces
- 1 x RS232 interface
- up to 4 x digital inputs (max. 34 V)
- up to 4 x digital outputs (max. 34 V, 1 ampere)
- up to 4 x differential analog inputs with 12 bit resolution, 0-10 V
- 1 x USB 2.0 device interface
- 1 x USB 2.0 host interface
- 1 x 10/100 Base-T Ethernet interface
- 2 x internal expansion slots (FlexRay, CAN-FD, EtherCAT)
- 8 x LEDs, of which 7 are freely configurable
- real-time clock
- SDHC card slot, up to 32 GByte SD card support for logging data
- 6-36 V DC power supply range with overvoltage and polarity protection
- operating temperature range -40 °C to +80 °C
- all connectors galvanically isolated (optional)

### 4.2 Device Variants

The basic unit can be expanded with expansion cards via the two internal expansion slots.

Article number	Description	Additional features to CANonly variant
1.01.0094.10000	FRC-EP190 CANonly	—
1.01.0094.10020 1.01.0094.10022	FRC-EP190 CAN-FD	4 x CAN-FD interfaces
1.01.0094.10030	FRC-EP190 FlexRay Plus	1 x FlexRay interface 2 x CAN-FD interfaces
1.01.0094.10040	FRC-EP190 EtherCAT	1 x EtherCAT interface 1 x FlexRay interface 2 x CAN-FD interfaces
1.01.0094.10050 1.01.0094.10052	FRC-EP190 FlexRay Plus 4	1 x FlexRay interface 4 x CAN-FD interfaces
1.01.0094.10070	FRC-EP190 Max EtherCAT	1 x EtherCAT interface 1 x FlexRay interface 4 x CAN-FD interfaces



*Device variants are constantly improved and expanded! Check current list on [www.ixxat.com](http://www.ixxat.com) or contact Ixxat support.*



## 5 Connectors

### 5.1 User Interfaces (Front Side)

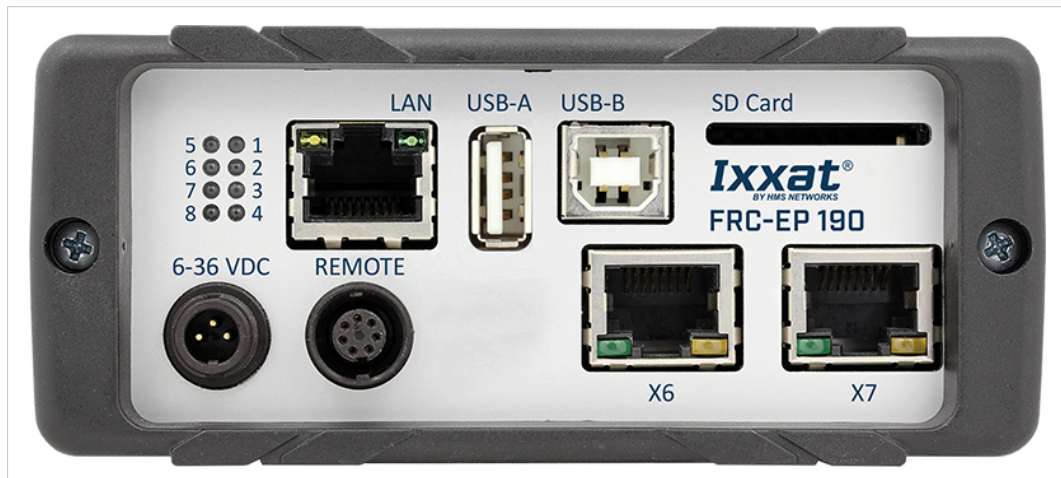


Fig. 1 FRC-EP190 front side

#### 5.1.1 Power Connector (6-36 VDC)

The device is supplied with a DC voltage from 6 V to 36 V. The power supply input is protected against overvoltage and against polarity reversal. The FRC-EP190 provides a 3-pin Binder male panel mount connector, 710 series, 09-0977-00-03. The cable uses a 3-pin Binder female cable connector, 710 series, 99-0976-10x-03.

##### Pin Allocation

Pin	Signal	Description
1	+VDC	Power supply voltage +
2	- (GND)	Power supply ground
3	KL15	Input to activate the Rescue Kernel

##### Individual Lines of Power Supply Cable

Pin	Color	Signal	Description
1	White (ws/WT)	VDC +	Power supply +6 to +36 V with 4 mm red laboratory plug
2	Brown (br/BN)	Ground -	Power supply ground with 4 mm black laboratory plug
3	Green (gn/GN)	KL15	Digital input with 4 mm green laboratory plug

- Use only the power supply cable that is included in the scope of delivery and available from HMS Industrial Networks.

KL15 is equipped with a pull-up resistor to +VDC (approx. 80 kOhm). It is possible to leave KL15 open, but for security reasons HMS Industrial Networks recommends, to connect VDC+ and KL15 inputs:

- For normal operation plug the green laboratory plug of the power cable into the red laboratory plug.

##### Function KL15 — Rescue Kernel

The KL15 input is checked when the device is switched on or booted and identifies whether the system starts up normal or the rescue kernel is activated. If an active user configuration in the flash storage obstructs external access to the device or if the operating system is corrupted, the Rescue Kernel can be used to fix this situation.

- ▶ To force the device into Rescue Kernel, connect KL15 to ground (plug the green laboratory plug in the black laboratory plug).
- ▶ Switch on the device.
  - Device checks the KL15 input during start-up and starts the Rescue Kernel.
  - LEDs 2-8 are flashing red.
- ▶ Connect IxAdmin via Ethernet.
- ▶ To repair the device see information in online help IxAdmin.
- ▶ Restart the device.

### 5.1.2 Ethernet Connector (ETH)

The standard Ethernet RJ45 connector is galvanically isolated from the other connectors.

### 5.1.3 EtherCAT Connectors (X6 and X7)



*The connectors X6 and X7 are only provided by EtherCAT device variants.*

If connected to a EtherCAT network, the FRC-EP190 represents a EtherCAT Slave. The connector X6 provides the EtherCAT-Slave-OUT function and X7 provides the EtherCAT-Slave-IN function. If the FRC-EP190 is connected to a EtherCAT Master solely, only X7 (IN) is used and X6 remains unconnected. The EtherCAT interfaces are galvanically isolated from the other interfaces.



With older EtherCAT product versions (1.01.0094.10040) the connectors X6 and X7 are switched. X6 provides the IN function and X7 the OUT function.

### 5.1.4 USB Device Connector (USB-B)

The standard USB B type connector is used as a USB device interface to a PC. The USB connector is not galvanically isolated due to system constraints.



Damaged PC because of compensation current between test object and PC through the USB connection.

Provide a grounded connection between the test object and the FRC-EP190, before connecting the PC to the FRC-EP190 via USB.

- ▶ Provide a grounded connection between the test object and the FRC-EP190.
- ▶ Connect the PC via USB to the FRC-EP190.

### 5.1.5 USB Host Connector (USB-A)

The standard USB A type connector is used as a USB host interface to another USB device, for example a USB memory stick.



Damaged USB device because of compensation current between test object and USB device through the USB connection.

When the FRC-EP190 is connected to test object, provide a grounded connection between the test object and the FRC-EP190, before connecting a USB device to the FRC-EP190 (for example a USB based analog input extension).

- ▶ When the FRC-EP190 is connected to test object, provide a grounded connection between the test object and the FRC-EP190.
- ▶ Connect the USB device to the FRC-EP190.
- ▶ Use only FAT32 or NTFS formatted mass storage devices.

### 5.1.6 SD Card Slot (SD Card)

The SD card slot works with SD and SDHC cards.

#### Inserting the SD Card

- ▶ Push SD card in slot until the stop point.
- ▶ Make sure SD card is completely within the housing.

#### Removing the SD Card

- ▶ Push SD card into the slot until the stop point and release again.
  - SD card holder pushes SD card out of the slot.
- ▶ Remove SD card by hand.

### 5.1.7 LED Array

LED 1 is the Power LED and indicates the device status. LEDs 2 to 8 are software-dependent and indicate the communication status.

Power LED (LED 1)	
LED state	Description
Off	No power supply (pin 1 power connector)
Red	Boot mode, operating system is starting.
Green	Boot mode is finished, applications are started or can be started.

#### LEDs 2-8

LEDs 2-8 can be configured via the software.

- ▶ For information about functionality see the specific software manual or online help.

If LEDs 2-8 are red flashing, the Rescue Kernel is executed.

- ▶ Connect IxAdmin via Ethernet.
- ▶ To repair the device see information in online help IxAdmin.
- ▶ Restart the device.

For more information see [Function KL15 — Rescue Kernel, p. 7](#).

### 5.1.8 Remote/Debug Interface (REMOTE)

The function of the remote/debug interface depends on the executed application. The FRC-EP190 provides a 7-pin Binder female panel mount connector, 710 series, 09-9478-00-07. The cable uses a 7-pin Binder male cable connector, 710 series, 99-9475-10x-07.

The following application options are possible:

- If the software application in use supports debugging or control functions via RS232, the cable provided by Ixxat can be used to connect to a PC.
- If the software application in use supports extended I/O functions, additional inputs and outputs can be used via the interface.
- ▶ For detailed information about the function of the interface see specific software manual or online help.

Pin Allocation		
Pin	Signal	Description
1	+5 V	+5 V power supply for remote control, maximum current 20 mA
2	REM1/TX	REMOTE1 digital output, RS232 TX transmission signal to PC
3	REM2/RX	REMOTE2 digital input, RS232 RX receive signal from PC
4	REM3	REMOTE3 digital output
5	WKUP	Wake-up option via remote
6	GND	—
7	—	Not used

## 5.2 Field Bus Interfaces (Back Side)

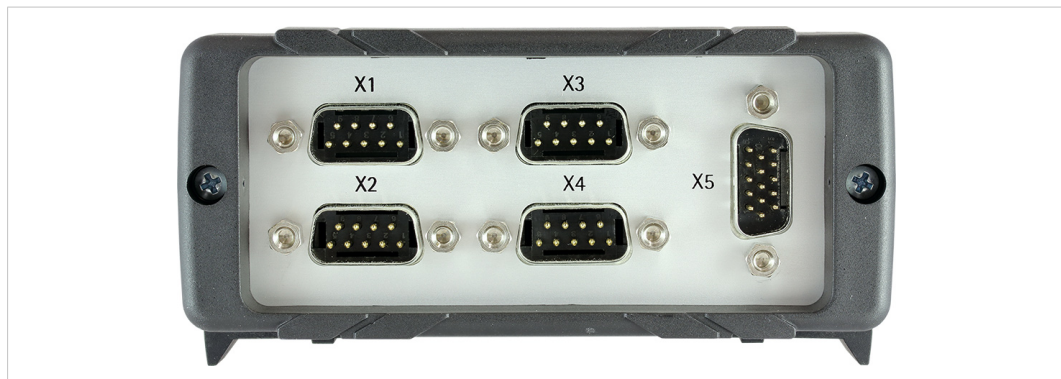


Fig. 2 FRC-EP190 back side

### 5.2.1 CAN

The FRC-EP190 has four interface islands on the D-Sub connectors X1, X2, X3 and X4. On the device variants that provide galvanic isolation, each of the four islands is galvanically isolated from the other islands. Within an island the interfaces for CAN-FD, CAN high-speed, CAN low-speed, LIN and K-Line are galvanically connected to one another. The shielding of the cable and/or the metal collar of a D-Sub connector is directly connected to the housing.

### 5.2.2 Connector X1 and X2

X1 and X2 are D-Sub 9 male connectors, that provide CAN high-speed, CAN low-speed and LIN interfaces with the channels 1 and 2.



*Two CAN controllers, that can be switched via software, are provided for CAN high-speed and CAN low-speed. Only two CAN interfaces can be operated simultaneously.*

#### Pin Allocation X1 and X2

Signal	Pin	Description
CAN LS L	1	Low-speed CAN 1/2 low signal
CAN LS H	4	Low-speed CAN 1/2 high signal
CAN HS L	2	High-speed CAN 1/2 low signal
CAN HS H	7	High-speed CAN 1/2 high signal
GND	3	Common ground
LIN	8	LIN signal 1/2
VBAT/V-LIN	9	Power supply for CAN low-speed and LIN
—	5	Not used
—	6	Not used

#### CAN High-Speed/Low-Speed

The ISO 11898-3 low-speed CAN coupling is connected via two integrated termination resistors of 2 kOhm each (RTH, RTL).

For ISO 11898-2 high-speed CAN no bus termination resistor is integrated in the device.

If a bus termination is required:

- ▶ Connect the bus termination to the cable and/or to the connector.
- ▶ Use suitable cable assemblies for the FRC-EP190, available from Ixxat.

## VBAT

If the FRC-EP190 is not supplied with power via the power cable or if the power of a individual CAN island is turned off (software configuration) VBAT is used to supply the termination resistors of the CAN low-speed coupling (RTH). A voltage of 5 to 24 V can be supplied on VBAT. The LIN driver is also powered with the VBAT connection.

### 5.2.3 Connectors X3 and X4

X3 and X4 are D-Sub 9 male connectors, that provide CAN high-speed interfaces with the channels 3 and 4, CAN-FD with the channels 5 and 6 and K-Line interfaces with the channels 1 and 2.

Pin Allocation		
Signal	Pin	Description
CAN HS L	1	High-speed/FD CAN 5/6 low signal
CAN HS L	2	High-speed CAN 3/4 low signal
CAN HS H	4	High-speed/FD CAN 5/6 high signal
CAN HS H	7	High-speed CAN 3/4 high signal
GND	3	Common ground
K-LINE 1/2	8	K-Line 1/2 signal
VBAT	9	Power supply for K-Line
—	5	Not used
—	6	Not used

### CAN High-Speed/CAN-FD



*CAN interfaces CAN 3/4 and CAN 5/6 are optional and only provided by extended device variants.*

CAN interfaces CAN 3/4 and CAN 5/6 only support physical bus connection as defined in ISO 11898-2. The differential signal pair (CAN-low and CAN-high) and ground are connected at the CAN connector. Additionally, connectors X3 and X4 each supply a K-Line interface.

For ISO 11898-2 high-speed CAN and CAN-FD no bus termination resistor is integrated in the device.

If a bus termination is required:

- ▶ Connect the bus termination to the cable and/or to the connector.
- ▶ Use suitable cable assemblies for the FRC-EP190, available from Ixxat.

The CAN interfaces are galvanically isolated from one another and from all other interfaces.

## LIN

The interfaces can be used either as Master or Slave. In Master mode a 1 kOhm resistor is used on VBAT for LIN. In Slave mode the resistor is not connected.

- ▶ If LIN is used, apply voltage of 12-24 V to the VBAT connection.



For the two LIN interfaces and the two K-Line interfaces only two serial controllers are implemented. Therefore only two interfaces can be operated simultaneously. Interfaces can be switched via software.

### K-Line

Only K-Line is available. The interface can be used either as Master or Slave. In Master mode a 1 kOhm resistor is used on VBAT for K-Line. In Slave mode the resistor is not connected.

- If K-Line is used, apply voltage of 12-24 V to the VBAT connection.



For the two LIN interfaces and the two K-Line interfaces only two serial controllers are implemented. Therefore only two interfaces can be operated simultaneously. Interfaces can be switched via software.

## 5.2.4

### Connector X5

X5 is a D-Sub HD 15 (high-density, 15-pin) male connector without fixed pin allocation. The pin allocation is dependent on the device variant. X5 is used for FlexRay, digital I/O and analog IN interfaces.

**Pin Allocation on 1.01.0094.10000 Devices**

Signal	Pin	Description
ANA_IN3_P	1	Analog input, channel 3, differential plus
ANA_IN3_M	6	Analog input, channel 3, differential minus
ANA_IN4_P	2	Analog input, channel 4, differential plus
ANA_IN4_M	7	Analog input, channel 4, differential minus
GND-ANA	3	Analog ground
ANA_IN1_P	4	Analog input, channel 1, differential plus
ANA_IN1_M	9	Analog input, channel 1, differential minus
ANA_IN2_P	5	Analog input, channel 2, differential plus
ANA_IN2_M	10	Analog input, channel 2, differential minus
DIG_IO1	11	Digital input/output, channel 1
DIG_IO2	12	Digital input/output, channel 2
GNDIO	13	Ground for digital inputs/outputs
DIG_IO3	14	Digital input/output, channel 3
DIG_IO4	15	Digital input/output, channel 4
VBAT	8	Power supply for digital I/O

**Pin Allocation on 1.01.0094.10020/10022 Devices**

Signal	Pin	Description
CAN 7 H	1	High-speed/FD CAN 7 high signal
CAN 7 L	6	High-speed/FD CAN 7 low signal
CAN 8 H	2	High-speed/FD CAN 8 high signal
CAN 8 L	7	High-speed/FD CAN 8 low signal
GND-CAN	3	CAN ground
ANA_IN1_P	4	Analog input, channel 1, differential plus
ANA_IN1_M	9	Analog input, channel 1, differential minus
ANA_IN2_P	5	Analog input, channel 2, differential plus
ANA_IN2_M	10	Analog input, channel 2, differential minus
DIG_IO1	11	Digital input/output, channel 1
DIG_IO2	12	Digital input/output, channel 2
GNDIO	13	Ground for digital inputs/outputs
DIG_IO3	14	Digital input/output, channel 3
DIG_IO4	15	Digital input/output, channel 4
VBAT	8	Power supply for digital I/O

**Pin Allocation on 1.01.0094.10030/10040 Devices**

Signal	Pin	Description
FR1A BP	1	FlexRay channel 1 A, bus plus
FR1A BM	6	FlexRay channel 1 A, bus minus
FR1B BP	2	FlexRay channel 1 B or FlexRay channel 2 A, bus plus (depending on software version)
FR1B BM	7	FlexRay channel 1 B or FlexRay channel 2 A, bus minus (depending on software version)
GND-FR	3	FlexRay ground
ANA_IN1_P	4	Analog input, channel 1, differential plus
ANA_IN1_M	9	Analog input, channel 1, differential minus
ANA_IN2_P	5	Analog input, channel 2, differential plus
ANA_IN2_M	10	Analog input, channel 2, differential minus
DIG_IO1	11	Digital input/output, channel 1
DIG_IO2	12	Digital input/output, channel 2
GNDIO	13	Ground for digital inputs/outputs
DIG_IO3	14	Digital input/output, channel 3
DIG_IO4	15	Digital input/output, channel 4
VBAT	8	Power supply for digital I/O

**Pin Allocation on 1.01.0094.10050/10052/10070 Devices**

Signal	Pin	Description
FR1A BP	1	FlexRay channel 1 A, bus plus
FR1A BM	6	FlexRay channel 1 A, bus minus
FR1B BP	2	FlexRay channel 1 B or FlexRay channel 2 A, bus plus (depending on software version)
FR1B BM	7	FlexRay channel 1 B or FlexRay channel 2 A, bus minus (depending on software version)
GND-FR	3	FlexRay ground
CAN 7 H	4	High-speed/FD CAN 7 high signal
CAN 7 L	9	High-speed/FD CAN 7 low signal
CAN 8 H	5	High-speed/FD CAN 8 high signal
CAN 8 L	10	High-speed/FD CAN 8 low signal
DIG_IO1	11	Digital input/output, channel 1
DIG_IO2	12	Digital input/output, channel 2
GNDIO	13	Ground for digital inputs/outputs
DIG_IO3	14	Digital input/output, channel 3
DIG_IO4	15	Digital input/output, channel 4
VBAT	8	Power supply for digital I/O



## FlexRay



*The FlexRay interfaces are only available in the FlexRay device variants (see [Device Variants, p. 6](#)).*

The two FlexRay interfaces have two independent FlexRay communication controllers. Both controllers work on a shared FlexRay bus that is divided into channels A and B. Via software it is possible to switch the channels to work on individual FlexRay buses. If the channels work on individual buses, channel A is brought to the connector twice. No bus termination resistor is integrated into the device.

If a bus termination is required:

- ▶ Connect the bus termination to the cable and/or to the connector.
- ▶ Use suitable cable assemblies for the FRC-EP190, available from Ixxat.

The FlexRay bus is galvanically isolated from the other interfaces. Channels A and B are at the same potential.

## Digital I/O

Depending of the device variant the FRC-EP190 provides up to four digital I/O channels:

- Each digital I/O channel has an output with a high-side switch (FET) and a comparator input with a Schmitt trigger function.
- Only one VBAT connection is provided for all digital outputs and inputs. All channels work with the same VBAT voltage. The mixture of different voltages (for example TTL and 12 V) is not possible at the same time.
- The power input 6-36 VDC on the power connector and voltage VBAT for digital I/O are internally not connected and can be operated independently of one another.
- The maximum voltage on VBAT is 34 V.
- All four digital I/O channels, including VBAT and GNDIO, are galvanically isolated from the remainder of the circuit.

Observe the following regarding the outputs:

- The output voltage range is between 0 and VBAT, because the high-side switch on the outputs is supplied with VBAT. For example, if a TTL level must be generated, a voltage of 5 V must be connected to VBAT.
- The output power per channel is limited to 1 A.
- Make sure, that the total current on all four channels does not exceed 1 A.
- Make sure, that the outputs are always operated with a load against ground.
- The GNDIO connection cannot be used as the return for this ground. The return for the digital loads must be a separate line for power supply.

Observe the following regarding the inputs:

- Each input is equipped with a comparator with a Schmitt trigger function.
- The switching threshold is half the voltage on VBAT. For example, if a voltage of 12 V is connected to VBAT, then vehicle voltages can be monitored directly and the switching threshold is about 6 V.
- The ground connection GNDIO serves as the reference. All voltages on the digital inputs are relative to the ground connection GNDIO.
- Make sure that GNDIO is always connected to the test object.

### Analog Input

Depending on the device variant the FRC-EP190 has up to four analog inputs with different signal pairs.

- resolution of analog/digital converter: 12 bit
- voltage input: 0 to 10 V
- Negative voltages cannot be measured.
- common mode range of signal pairs: up to 20 V
- formula to calculate the measured voltage from the digital value (AD value):  
$$\text{Voltage} = ((\text{AD-value})/4095) * 2.50 \text{ V} * 4$$

The analog inputs are not galvanically isolated:

- Ground GND-ANA of HD15 connector X5 is used as reference ground.
- Ground is connected to power supply on the 6-36 VDC connector (-GND).
- ▶ Measure voltage between the signal pairs (P and M).
- ▶ Observe, that the reference ground on the power supply must not exceed the common mode range of up to 20 V for the voltage to be measured.
- ▶ To make that sure, connect the analog ground GND-ANA or the ground of the power supply 6-36 V connector (-GND) to the ground of the test object.
- ▶ If the signal pair (M) is not needed, connect (M) to the ground of the test object.

## 6 Configuration Software

The FRC-EP190 is a Linux platform that is able to work standalone without any connected PC. For the standalone function a configuration is needed, that can be created and downloaded to the device via a the PC based *Automotive Configuration Tool (ACT)*.

The following licence stages are available:

- Freeware: no license dongle needed, all data logging, CAN/CAN FD/LIN/Generic Ethernet/EtherCAT gateway, and user code functions are available
- Lite: all freeware functions are activated, additionally FlexRay/FDX gateway are enabled, and MATLAB/Simulink models are supported
- Standard: all functions are activated, for example creating residual bus simulations and configuring signal manipulation configurations is possible

Via the USB dongle a single ACT user license can be enabled.

For a detailed list of the functions of the different license stages see [www.ixxat.com/products/automotive-products](http://www.ixxat.com/products/automotive-products).

### 6.1 Installing the ACT Tool

The ACT tool can be downloaded on [www.ixxat.com/support](http://www.ixxat.com/support).

- ▶ Plug in the USB dongle in the PC that is used for the configuration.
- ▶ On [www.ixxat.com/technical-support/support](http://www.ixxat.com/technical-support/support) select **Automotive Configuration Tool** and open **Secured Downloads**
- ▶ Download the ACT tool ZIP container from the support area.



To be able to download the ACT, a valid e-mail address must be submitted.

- ▶ Unpack the ZIP container in a user defined folder on the local drive.
- ▶ Execute the included installation file *Ixxat ACT Setup w.x.yyy.z CM.exe*.  
→ ACT setup assistant is started.
- ▶ Follow instructions in ACT setup assistant.
- ▶ When ACT is installed, start ACT.
- ▶ For more information about the available functions of the license in use, select **Help** in the main menu to open the online help.

### 6.2 Downloading a Basic Data Logging Configuration

As a basic configuration of the ACT tool, a data logger that writes all messages of the CAN busses 1 to 4 (500 kBit/s) in ASCII format to the SD card, is provided.

- ▶ Power-up the device.
- ▶ Connect the device via USB to the PC.
- ▶ Start IxAdmin tool.
- ▶ In menu **File** select **Connect New Device**.
- ▶ Select the device type in use in the list and select **USB**.

- To establish the connection to the device, click button **OK**.

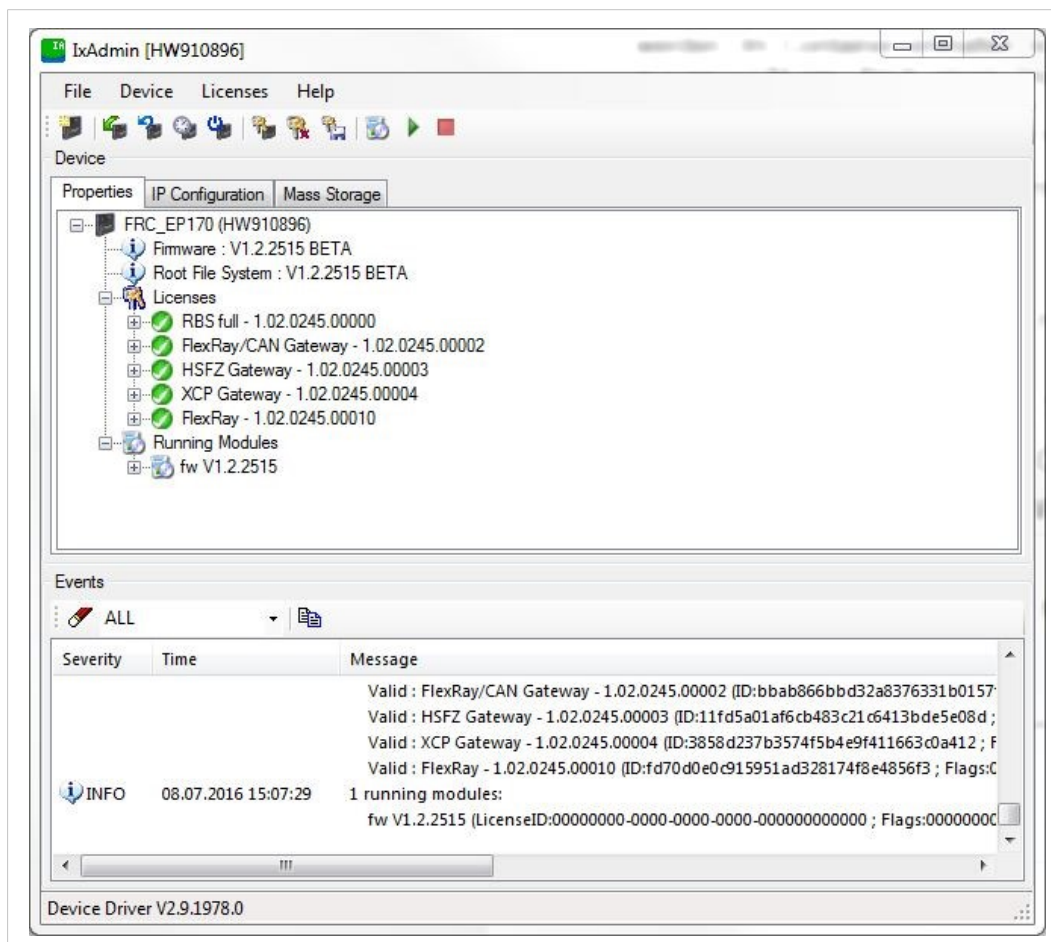


Fig. 3 IxAdmin Device Connect example

- ▶ In menu **Device** select **Add/Remove Application**.
- ▶ Open the device configuration *Basic\_Logger.sdcfg* in directory *c:\Users\Public\Documents\Ixxat\ACT\Projects\BasicLogger\DeviceConfig\*.

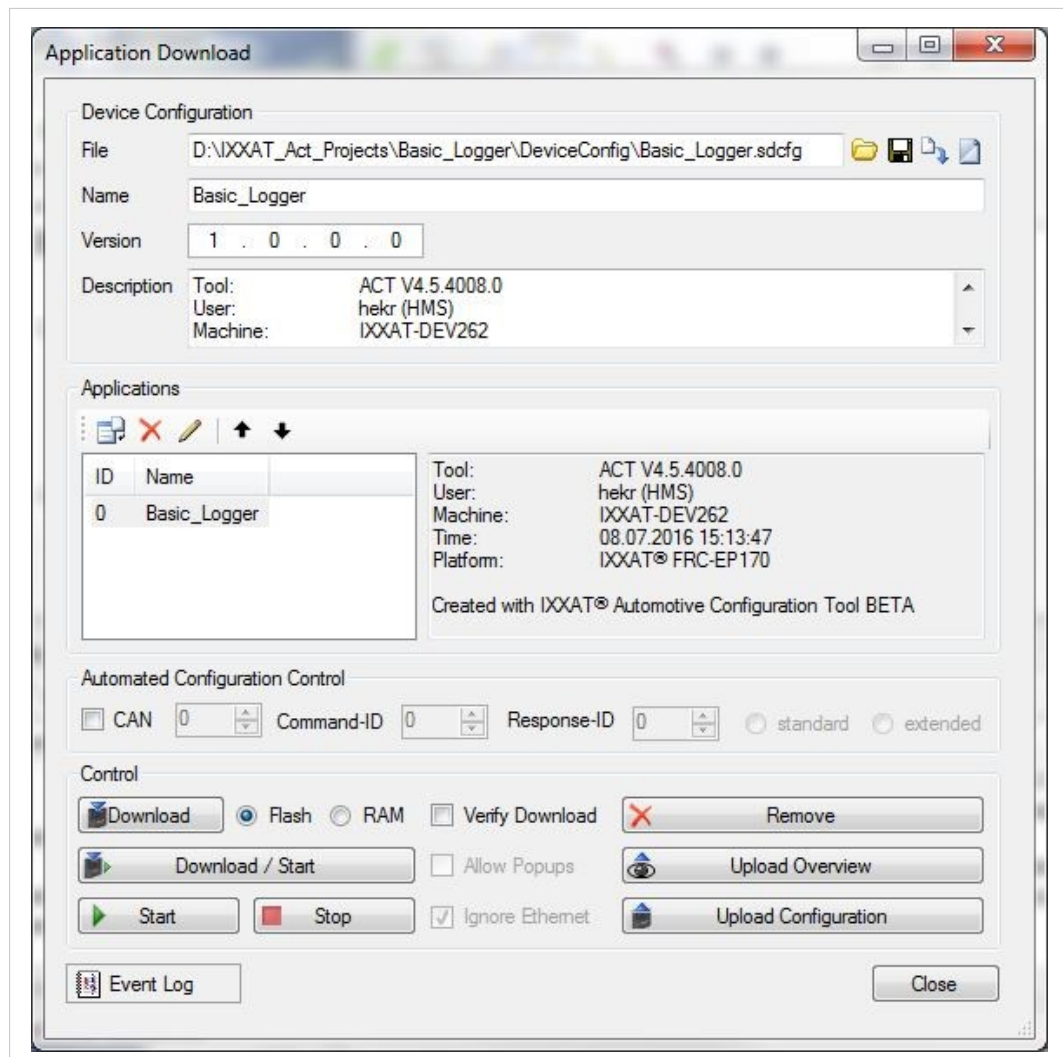


Fig. 4 IxAdmin Application Download example

- ▶ To load the application to the device, click button **Download/Start**.
  - Application is started.

For more information about the possibilities to change the CAN baudrate, to start and stop the logger and to upload the logged data refer to the IxAdmin online help.

## 7 Additional Components

HMS Industrial Networks offers the following additional components.

Connector	Description	Article number
POWER	Cable with 3 banana plugs, 2.0 m	1.04.0089.00001
REMOTE	Debugging cable with D-Sub 9 for RS232 for connection to PC	1.04.0089.00301
X1-X4	Dual CAN cable with D-Sub 9 and 2 x D-Sub 9, 1.5 m (see <a href="#">Dual-CAN Cable, p. 22</a> )	1.04.0089.00201
X1-X4	CAN, LIN and K-Line breakout cable with D-Sub 9, 1.5 m (see <a href="#">Breakout Cable for X1 to X4, p. 24</a> )	1.04.0089.00200
X1-X4	CAN, LIN and K-Line breakout cable with D-Sub 9, 0.5 m (see <a href="#">Breakout Cable for X1 to X4, p. 24</a> )	1.04.0089.00203
X1-X4	CAN, LIN and K-Line breakout box with D-Sub 9 and 3 x D-Sub 9, 0.5 m (see <a href="#">Breakout Box for X1 to X4, p. 23</a> )	1.01.0081.00100
X5	FlexRay-1A cable with D-Sub 15 HD and 1 x D-Sub 9, 1.5 m (see <a href="#">FlexRay-1A Cable, p. 20</a> )	1.04.0089.00102
X5	FlexRay/IO breakout cable with D-Sub 15 HD, 1.5 m (see <a href="#">Breakout Cable for X5, p. 22</a> )	1.04.0089.00100
X5	FlexRay/IO breakout cable with D-Sub 15 HD, 0.5 m (see <a href="#">Breakout Cable for X5, p. 22</a> )	1.04.0089.00103
X5	FlexRay breakout box with D-Sub 15 HD and 5 x D-Sub 9, 0.5 m (see <a href="#">Breakout Box for X5, p. 21</a> )	1.01.0081.00200

### 7.1 FlexRay-1A Cable

HMS Industrial Networks offers for the FlexRay device variant a ready-made cable to provide the FlexRay-1A interface of the connector X5 at a standard D-Sub 9 connector. The FlexRay termination resistor is integrated in the cable in the connector housing at the device side.

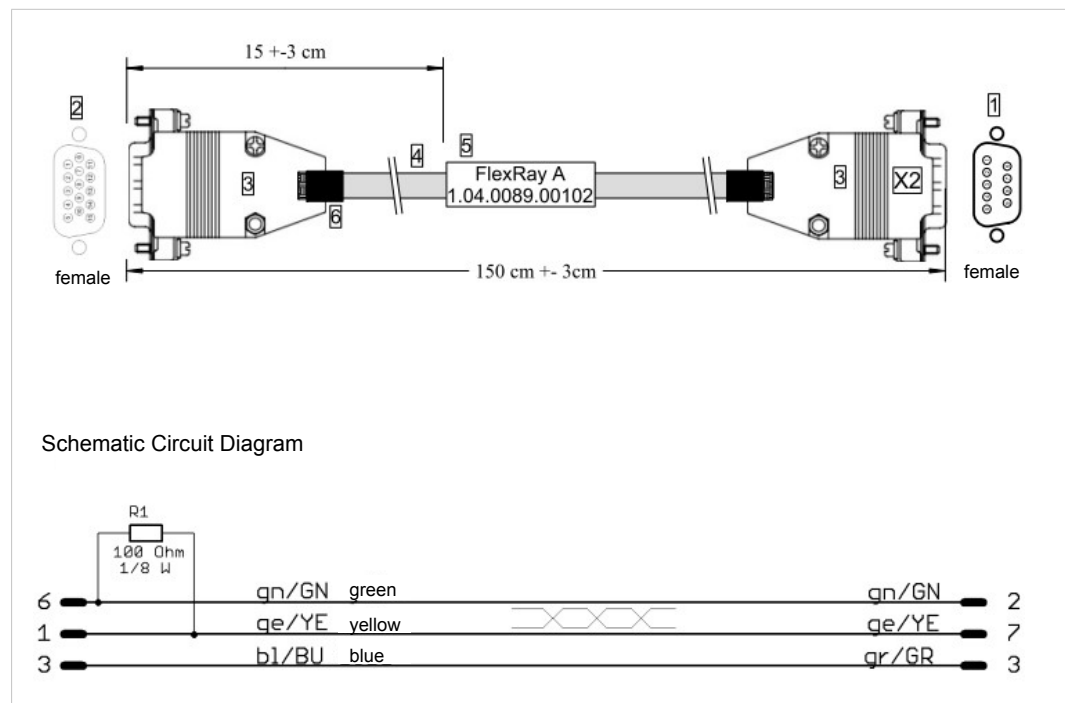


Fig. 5 FlexRay-1A cable

## 7.2 Breakout Box for X5

Depending on the device variant several interfaces are connected to the connector X5. HMS Industrial Networks offers a breakout box to provide each of the interfaces on one dedicated connector.



Fig. 6 Breakout box

Pin Allocation Breakout Box for X5

Connector	Variant 1.01.0094.10000	Variants 1.01.0094.10030 1.01.0094.10040	Pin allocation D-Sub 9	
			Pin	Signal
Y1	Analog-IN 1	FlexRay-1A	2	FR BM or ANA M
			7	FR BP or ANA P
			3	GND-FR
			6	GND-IO
Y2	Analog-IN 2	FlexRay-1B/2A		See Y1
Y3	Analog-IN 3	Analog-IN 1		See Y1
Y4	Analog-IN 4	Analog-IN 2		See Y1
Y5	Digital-I/O	Digital-I/O	1, 2, 4, 5	DIG_IO1..4
			6, 9	VBAT
			3	GND

Pin Allocation Breakout Box for X5

Connector	Variants 1.01.0094.10020 1.01.0094.10022	Variants 1.01.0094.10050 1.01.0094.10052 1.01.0094.10070	Pin allocation D-Sub 9	
			Pin	Signal
Y1	CAN 7	FlexRay-1A	2	FR BM or CAN L
			7	FR BP or CAN H
			3	GND-FR/CAN
			6	GND-IO
Y2	CAN 8	FlexRay-1B/2A		See Y1
Y3	Analog-IN 1	CAN 7		See Y1
Y4	Analog-IN 2	CAN 8		See Y1
Y5	Digital-I/O	Digital-I/O	1, 2, 4, 5	DIG_IO1..4
			6, 9	VBAT
			3	GND

### 7.3 Breakout Cable for X5

Depending on the device variant several interfaces are connected to the connector X5. HMS Industrial Networks offers breakout cables in different lengths to allow the creation of specific adapters.

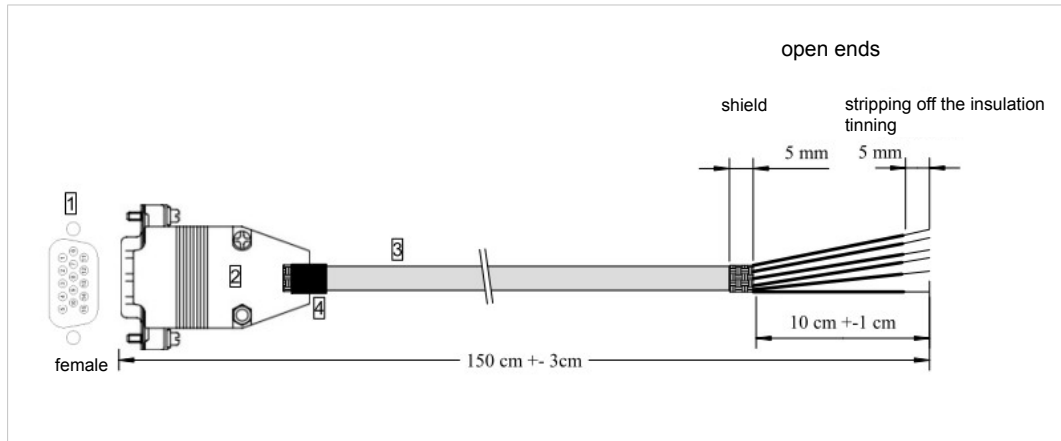


Fig. 7 Breakout cable

Pin	Color	Pin	Color
1	WT	9	PK
2	GN	10	RD
3	SW	11	GY-PK
4	GY	12	RD-BU
5	BU	13	WT-YE
6	BN	14	WH-GN
7	YE	15	BN-GN
8	VT		

### 7.4 Dual-CAN Cable

The ready-made cable can be used to separate two different CAN interfaces. Depending on the device variant different interfaces are provided at the connectors of the dual-CAN cable.

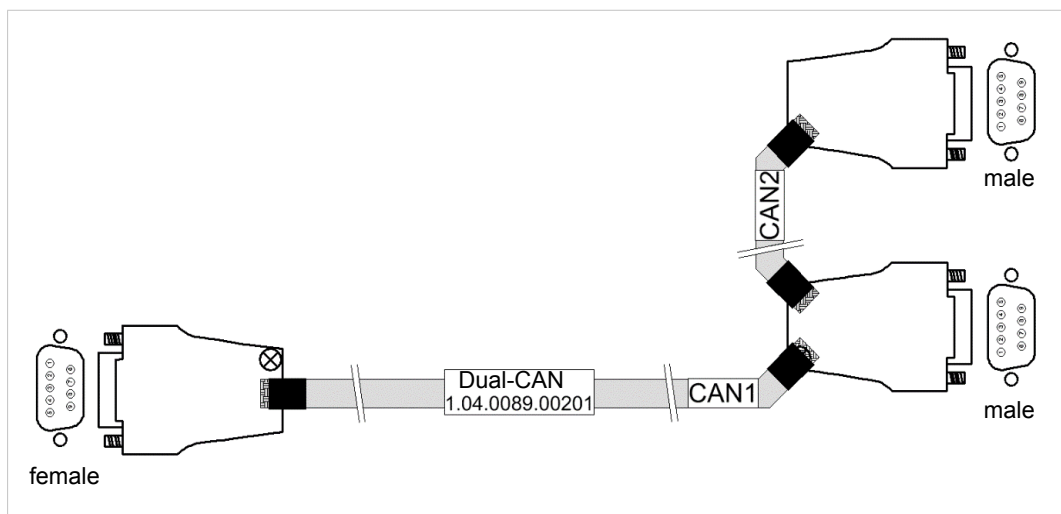


Fig. 8 Dual-CAN cable



**Pin Allocation Cable Connector on the FRC-EP190**

FRC-EP190 connector	Cable connectors CAN 1	Cable connectors CAN 2
X1	HS-CAN1	LS-CAN1
X2	HS-CAN2	LS-CAN2
X3	HS-CAN3	HS-CAN5 (only for device variants with 6 x CAN interfaces)
X4	HS-CAN4	HS-CAN6 (only for device variants with 6 x CAN interfaces)

**Pin Allocation Cable Connector on the CAN Cable**

Pin	CAN 1	CAN 2 (standard)	CAN 2 (6 x CAN variant)
2	CAN HS L	CAN LS L	CAN HS L
7	CAN HS H	CAN LS H	CAN HS H
3	GND	GND	GND
9	—	VBAT	—

## 7.5 Breakout Box for X1 to X4

Depending on the device variant several interfaces are connected to the connectors X1 to X4. HMS Industrial Networks offers a breakout box to provide each of the interfaces on one connector.



**Fig. 9 Breakout box for X1 to X4**

**Breakout Box Connectors**

FRC-EP190 connector	BOB connector Y1	BOB connector Y2	BOB connector Y3
X1, X2	HS-CAN1/2	LS-CAN1/2	LIN1/2
X3, X4	HS-CAN3/4	HS-CAN5/6 (only for device variants with 6 x CAN interfaces)	K-Line1/2

**Pin Allocation Breakout Box**

BOB connector	Pin allocation D-Sub 9	
	Pin	Signal
Y1	2	CAN HS/LS L
	7	CAN HS/LS H
	3	GND
Y2		see Y1
Y3	8	LIN/K-Line
	9	VBAT
	3	GND

## 7.6 Breakout Cable for X1 to X4

Depending on the device variant several interfaces are connected to the connectors X1 to X4. HMS Industrial Networks offers breakout cables in different lengths to allow the creation of specific adapters.

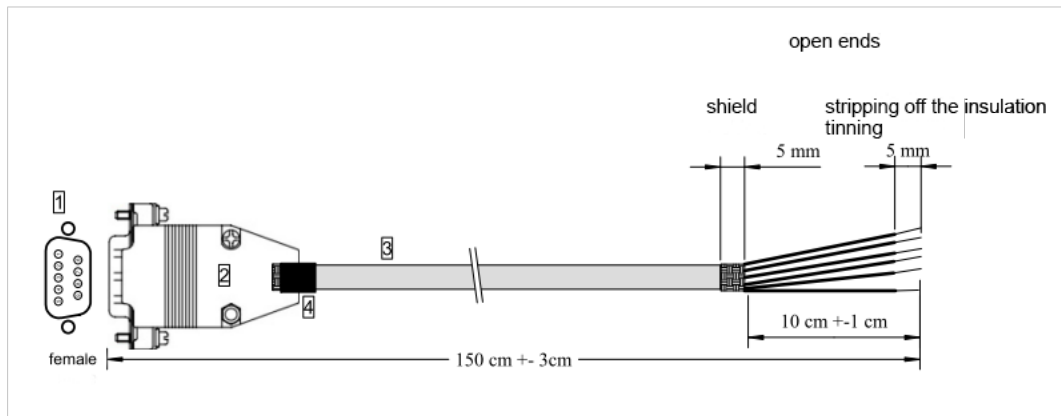


Fig. 10 Breakout cable

### Pin Allocation

Pin	Color	Pin	Color
1	WT	6	PK
2	GN	7	YE
3	BU	8	GY
4	BN	9	RD
5			

## 8 Technical Data

Basic Unit	
Dimensions (L x W x H)	180 x 110 x 50 mm
Weight	Approx. 630 g
Operating temperature	-40 °C to +80 °C
Storage temperature	-40 °C to +85 °C
Power supply	6-36 V DC
Current consumption	Typ. 420 mA at 12 V
Housing material	Aluminium
Relative humidity	10-95 %, non-condensing
Host system	Power PC, 256 MByte RAM, 256 MByte Flash
Ethernet	10/100 MBit/s, RJ45
USB	2.0 high-speed device, USB-B 2.0 high-speed device, USB-A
FlexRay communication controller	2 x Freescale MFR 4310
FlexRay transceiver	NXP TJA1080
CAN transceiver high-speed and CAN-FD	Texas Instruments SN65HVD251
CAN-FD transceiver (1.01.0094.10022/10052/10070 devices)	Microchip MCP2562FD
CAN transceiver low-speed	NXP TJA1054T
CAN bus termination resistor	High-speed/CAN-FD: none Low-speed: RTH=RTL=2 kΩ
CAN and FlexRay signal delay with galvanic isolation:	Typ. 27 ns
LIN transceiver	NXP TJA1020
K-LINE transceiver	Vishay SI9243AEY
System startup time	< 5 sec from power-on

## 9 Support/Return Hardware

### 9.1 Support

- ▶ For problems or support with the product request support at [www.ixxat.com/support](http://www.ixxat.com/support).
- ▶ If required use support phone contacts on [www.ixxat.com](http://www.ixxat.com).

### 9.2 Return Hardware

- ▶ Fill in the form for warranty claims and repair on [www.ixxat.com/support/product-returns](http://www.ixxat.com/support/product-returns).
- ▶ Print out the Product Return Number (PRN resp. RMA).
- ▶ Pack product in a physically- and ESD-safe way, use original packaging if possible.
- ▶ Enclose PRN number.
- ▶ Observe further notes on [www.ixxat.com](http://www.ixxat.com).
- ▶ Return hardware.

## 10 Disposal

- ▶ Dispose of product according to national laws and regulations.
- ▶ Observe further notes about disposal of products on [www.ixxat.com](http://www.ixxat.com).

## A Regulatory Compliance

### A.1 EMC Compliance (CE)



The product is in compliance with the Electromagnetic Compatibility Directive. More information and the Declaration of Conformity is found at [www.ixxat.com](http://www.ixxat.com).

### A.2 Disposal and recycling



You must dispose of this product properly according to local laws and regulations. Because this product contains electronic components, it must be disposed of separately from household waste. When this product reaches its end of life, contact local authorities to learn about disposal and recycling options, or simply drop it off at your local HMS office or return it to HMS.

For more information, see [www.hms-networks.com](http://www.hms-networks.com).

## B Open Source Software

The software of the Ixxat FRC-EP190 contains software components that are licensed as Free Software or Open Source Software by the rights holders. The corresponding licenses are available on the support area of the FRC-EP190 on [www.ixxat.com](http://www.ixxat.com). (Included in Firmware Download Package as well as included in Offline Help Package). You may obtain the complete corresponding source code of the software components from us on a data carrier and within three years as of the distribution of the software by us or at least for as long as we offer support and spare parts for the software, if you make a request to HMS Industrial Networks AB at the following address:

HMS Industrial Networks AB  
Box 4126  
SE-300 04 Halmstad  
Sweden

The source code is also available at the support area of the FRC-EP190 on [www.ixxat.com](http://www.ixxat.com).

