



Operating instructions
mobileIoT gateway

GB

CR3158

HW version: AC (Rev. 3.0.2)

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1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at www.ifm.com.

1.1 Symbols used

- ✓ Requirement
- Instructions
- ▷ Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance may result in malfunction or interference.
-  Information
Supplementary note

1.2 Warnings used

	ATTENTION Warning of damage to property
	CAUTION Warning of personal injury ▷ Slight reversible injuries may result.
	WARNING Warning of serious personal injury ▷ Death or serious irreversible injuries may result.

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
 - The system architect is responsible for the safety of the system.
 - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.
- Replace damaged units, otherwise the technical data and safety will be impaired.

2.1 Cyber security

ATTENTION

Operating the machine in an unprotected network environment

- ▷ Unauthorised read or write access to data is possible.
- ▷ Unauthorised manipulation of the device function is possible.
- ▶ Check and restrict access options to the device.

2.2 Air traffic

The device must not be operated on board aircraft.

Using it in an aircraft can affect the navigation and communication systems. An offence can lead to legal action against the offender.

3 Intended use

The unit enables wireless transfer of CAN data of a vehicle or machine according to the GSM, UMTS and LTE standards. GPRS, EDGE and HSPA are supported.

It is also possible to receive and transmit GNSS position data.

Available interfaces: Bluetooth, WLAN, GSM, UMTS, LTE

4 Function



The device does not have any buffer capacitor. The time in the real time clock (RTC) is not stored.

The device provides access to CAN data in various operating modes.

Function	CR3158
CAN-CAN-Bluetooth/WLAN bridge	•
CAN-Bluetooth/WLAN interface	•
Antenna	external
Mobile communications	4G worldwide (certified countries only)
Real-time mode	•
Cloud logging mode	•
Input/output functions	3/1
Acceleration sensor	•
Gyro sensor	•
GNSS	•
CAN connections	3
ifm e-SIM	•

• = applicable

4.1 Mobile radio interface

The unit has a mobile radio interface for mobile data transmission.

The unit supports the 4G mobile network. In order to achieve higher network coverage, the unit has a fallback function, allowing it to switch to the 2G or 3G network.

The unit detects the mobile network with the best transmission speed and automatically switches to it. The mobile radio interface supports bidirectional data exchange in the mobile network.

4.2 eSIM card

The unit is equipped with an embedded SIM (eSIM) card. The eSIM card is delivered with an eSIM profile that contains all the necessary communication settings.



The eSIM card of the unit is not activated on delivery. After registering the unit, activation of the eSIM card can take up to 4 hours.

4.3 Connection modes

The device can be operated in the following connection modes:

- Real-time mode
- Cloud logging mode

The connection mode is set as follows:

Object	Index	Subindex	Type	Default	Description
DeviceMode	0x5353	0x00	U8	0x03	0X00 = cloud logging mode 0x01 = reserved 0x02 = real-time mode

Restart the device to update to the newly configured mode.

When bit 7 is written, the device restarts.

4.3.1 Real-time mode

In real-time mode, bidirectional transmission of CAN messages occurs.

The unit can send/receive process data (e.g. machine parameters) via CAN interfaces during operation via Bluetooth/WLAN, the mobile network and the *mobileIoT* platform. Depending on the design, it can transmit data from the GNSS receiver and the input/output functions and forward them via the CAN bus. Alternatively, the unit can receive the data from an external receiver (e.g. CANwireless) via a WLAN or Bluetooth connection and send it to the *mobileIoT* platform.

The data is continuously transmitted and can be evaluated in near real-time. For this function, there must be a permanent connection between the unit and the user software or the *mobileIoT* platform.

This mode also supports a real-time connection from Codesys 2.3. This requires appropriate software and a *mobileIoT* data contract.

The real-time mode can be set locally via an SDO or via the *mobileIoT* suite in the machine properties.

In real-time mode, no data or messages are stored on the *mobileIoT* platform.

4.3.2 Cloud logging mode

The cloud logging mode allows GNSS position data to be sent automatically to the *mobileIoT* platform. In this mode, metrics can be actively generated and sent by the application controller and also allow the gateway to autonomously log data available on the CAN bus.

Data linking to the application controller is configured in the *mobileIoT* suite. There the corresponding source code will be automatically generated, which can be loaded into the controller programme.

No data is sent to the *mobileIoT* platform during real-time connection. As soon as the real-time connection is terminated, data is captured again and sent to the *mobileIoT* platform.

4.4 Input/output functions

The device has additional input/output functions (3 analogue inputs, 1 digital output). For example, the input function can be used to collect device or machine status information or to directly detect and monitor switch states. The data determined via the input/output functions can be visualised or transferred via the CAN bus.

The input/output functions are accessed via the following objects:

Object	Index	Subindex	Type	Default	Description
Analogue input 1	0x546F	0x14	R32 ro	—	Pin 4 of the 14-pin Micro Timer II connector Raw value of the analogue input measurement (Volt) No filtering applied
Analogue input 2	0x546F	0x15	R32 ro	—	Pin 5 of the 14-pin Micro Timer II connector Raw value of the analogue input measurement (Volt) No filtering applied
Analogue input 3	0x546F	0x16	R32 ro	—	Pin 6 of the 14-pin Micro Timer II connector Raw value of the analogue input measurement (Volt) No filtering applied
IO – clamp 30 voltage	0x3333	0x67	R32 ro	—	Terminal 30 Raw value of the analogue input measurement (Volt)

Object	Index	Subindex	Type	Default	Description
IO – clamp 15 voltage	0x3333	0x66	R32 ro	—	Terminal 15 Raw value of the analogue input measurement (Volt)
IO – clamp 15 (ignition) state	0x3333	0x01	U8 ro	—	Terminal 15 0 = input signal low (< 2.5 V) 1 = input signal high (> 5.5 V)
IO = digital output	0x3333	0x0F	U8 rw	—	Pin 7 of the 14-pin Micro Timer II connector Bit 0: (0 = output signal low, 1 = output signal high) Bits 1...7: reserved, set to 0
IO – digital output status	0x3333	0x10	U8 ro	—	Pin 7 of the 14-pin Micro Timer II connector Bit 0: (0 = output signal error, 1 = output signal OK) Bits 1...7: reserved, set to 0
IO – device temperature	0x3333	0x0E	S16 ro	—	Device temperature in °C

The device can send this data via the CAN interface. The configuration is made via the following objects:

Object	Index	Subindex	Type	Default	Description
CANMode	0x4001	0x02	U8 rw	—	Bit 0: compatibility mode with device CR3114 (1 s cycle) Bit 1: forward device status via CAN bus (1 s cycle) Bit 2: forward complete GNSS data via CAN bus (1 s cycle) Bit 3: forward input/output data via CAN bus (1 s cycle) Bit 4: forward acceleration and gyroscope data via CAN bus (100 ms cycle)
IO BaseID	0x4005	0x05	U16	0x400	COB ID start address for input/output data transmission (1s cycle)



The exact index and subindex can be found in the corresponding EDS file.



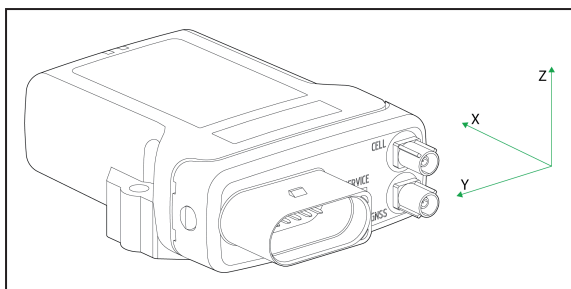
All data available in the respective device mode are sent via the CAN1 interface.

The data of the input/output functions are mapped to the following CAN messages:

COB ID	Start byte	Length (bytes)	Type	Object
IO BaseID + 0x00	0	4	R32	IO – clamp 30 voltage
	4	4	R32	IO – clamp 15 voltage
IO BaseID + 0x01	0	4	R32	Analogue input 1
	4	2	S32	IO – device temperature

4.5 Accelerometers and gyro sensors

The accelerometers measure acceleration along the X, Y and Z axes. The 3-axis gyro sensor determines the angular velocity on the X, Y and Z axes. This data is evaluated and can be forwarded to the controller via CAN bus.



The data of the acceleration/gyro sensors is accessed via the following objects:

Object	Index	Subindex	Type	Default	Description
Acceleration – X-axis	0x544D	0x00	R32 ro	—	Current acceleration X-axis (unit: g)
Acceleration – Y-axis	0x544D	0x01	R32 ro	—	Current acceleration Y-axis (unit: g)
Acceleration – Z-axis	0x544D	0x02	R32 ro	—	Current acceleration Z-axis (unit: g)
Gyroscope – X-axis	0x544D	0x03	R32 ro	—	Current acceleration X-axis (unit: °/second)
Gyroscope – Y-axis	0x544D	0x04	R32 ro	—	Current acceleration Y-axis (unit: °/second)
Gyroscope – Z-axis	0x544D	0x05	R32 ro	—	Current acceleration Z-axis (unit: °/second)

The device can send this data via the CAN interface. The configuration is made via the following objects:

Object	Index	Subindex	Type	Default	Description
CANMode	0x4001	0x02	U8 rw	—	Bit 0: compatibility mode with device CR3114 (1 s cycle) Bit 1: forward device status via CAN bus (1 s cycle) Bit 2: forward complete GNSS data via CAN bus (1 s cycle) Bit 3: forward input/output data via CAN bus (1 s cycle) Bit 4: forward acceleration and gyroscope data via CAN bus (100 ms cycle)
Movement BaseID	0x4005	0x06	U16	0x500	COB ID start address for acceleration and gyroscope data transmission (100 ms cycle)



All data available in the respective device mode are sent via the CAN1 interface.



The exact index and subindex can be found in the corresponding EDS file.

The acceleration and gyroscope data are mapped to the following CAN messages:

COB ID	Start byte	Length (bytes)	Type	Object
Movement BaseID + 0x00	0	4	R32	Acceleration – X-axis
	4	4	R32	Acceleration – Y-axis
Movement BaseID + 0x01	0	4	R32	Acceleration – Z-axis
	4	4	R32	Gyroscope – X-axis
Movement BaseID + 0x02	0	4	R32	Gyroscope – Y-axis
	4	4	R32	Gyroscope – Z-axis

4.6 GNSS (global navigation satellite system)

The device has a GNSS receiver. The device can forward the position data determined by the GNSS receiver via the CAN bus or send it via the mobile network.

The device can evaluate signals from GPS, GLONASS and BeiDou satellites. Data from two navigation systems can be evaluated simultaneously. This enhances the accuracy.

The GNSS data is accessed via the following objects:

Object	Index	Subindex	Type	Default	Description
Positioning – antenna status	0x3333	0x13	U8 ro	—	0 = antenna damaged or missing 1 = antenna OK
Positioning – position data valid	0x3333	0x14	U8 ro	—	0 = position data invalid (no position detection) 1 = position data valid (position detection)
Positioning – active satellites	0x5220	0x00	U8 ro	—	Number of currently active satellites
Positioning – mode (GNSS)	0x5200	0x00	U8 rw	—	0 = GPS only 1 = GPS + GLONASS 2 = GPS + BEIDOU 3 = GLONASS + BEIDOU
Positioning – longitude	0x5208	0x00	R32 ro	—	Longitude as a 32-bit floating point number (decimal degrees)
Positioning – latitude	0x5209	0x00	R32 ro	—	Latitude as a 32-bit floating point number (decimal degrees)
Positioning – altitude	0x520A	0x00	R32 ro	—	Height above mean sea level as a 32-bit float (in mm)
Positioning – speed over ground	0x520B	0x00	R32 ro	—	Speed over ground as a 32-bit float (in m/s)
Positioning – GPS odometer	0x520B	0x02	U32 ro	—	Total GNSS based distance as a 32-bit unsigned integer (100 metres per bit)
Positioning – trigger distance for GPS odometer	0x520B	0x03	R32 ro	—	Distance in metres that the device has to be moved to start the odometer count.
Positioning – heading	0x520C	0x00	R32 ro	—	Course with respect to north as a 32-bit float (decimal degrees).
Logging – current GNSS position	0x5200	0xF0	U8 rw	—	If this object is set to any value other than 0, recording of the current GNSS position of the device starts. If the device has no GNSS reference point, it waits for a reference point before logging the position. The flag remains on the written value until the position has been recorded. It is then reset to 0.

The device can send this data via the CAN interface. The configuration is made via the following objects:

Object	Index	Subindex	Type	Default	Description
CANMode	0x4001	0x02	U8 rw	—	Bit 0: compatibility mode with device CR3114 (1 s cycle) Bit 1: forward device status via CAN bus (1 s cycle) Bit 2: forward complete GNSS data via CAN bus (1 s cycle) Bit 3: forward input/output data via CAN bus (1 s cycle) Bit 4: forward acceleration and gyroscope data via CAN bus (100 ms cycle)

Object	Index	Subindex	Type	Default	Description
Position BaseID	0x4005	0x04	U16	0x300	COB ID start address for input GNSS data transmission (1s cycle)



All data available in the respective device mode are sent via the CAN1 interface.



The exact index and subindex can be found in the corresponding EDS file.

The GNSS data is mapped to the following CAN messages:

COB ID	Start byte	Length (bytes)	Type	Object
Position BaseID + 0x00	0	1	U8	Positioning – position data valid
	1	1	U8	Positioning – active satellites
	2	1	U8	Positioning – mode (GNSS)
Position BaseID + 0x01	0	4	R32	Positioning – longitude
	4	4	R32	Positioning – latitude
Position BaseID + 0x02	0	4	R32	Positioning – altitude
	4	4	R32	Positioning – heading
Position BaseID + 0x03	0	4	R32	Positioning – speed over ground
	4	4	R32	Positioning – GPS odometer

4.6.1 Automatically send GNSS data to the mobileIoT platform

The device can automatically determine the GNSS position and send it to the *mobileIoT* platform.

The configuration is made via the following objects:

Object	Index	Subindex	Type	Default	Description
GNSS-interval	0x4009	0x02	U32 rw	900,000	Interval of the GNSS position logging (in ms). Set to 0xFFFFFFFF to deactivate this function. Min. value = 60,000
GNSS-distance	0x4009	0x03	U32 rw	0xFFFFFFFF	Distance between the most recent position determined and the current position (linear distance). The minimum distance is 3 metres.
Logging – file upload period	0x3333	0x1C	U16	0x01	Period in minutes. When this time has elapsed, the logged file is closed and transmitted to the server. Set this value to 0 to deactivate the period.



All data available in the respective device mode are sent via the CAN1 interface.



The exact index and subindex can be found in the corresponding EDS file.

4.7 Energy management

Different energy modes control the energy consumption of the unit. In addition to the standard mode, the unit also features a sleep mode. In this mode, some functions are deactivated to save energy. Specific events cause the unit to return to the standard mode.



No mobile radio connection is possible in sleep mode.

Energy management is accessed via the following objects:

Object	Index	Subindex	Type	Default	Description
Power management – deep sleep flag	0x3333	0xF3	U8 wo	—	If this flag is set, the unit can only be woken up from sleep mode via clamp 30, clamp 15 or CAN1. The unit will not make up from sleep mode cyclically or on a vibration event. Use e.g. during transport ► Set this flag before changing to sleep mode.
Power management – time to sleep	0x3333	0x08	U8 wo	—	Time in seconds until switching to sleep mode. The unit only changes to sleep mode if clamp 15 is set to low and no CAN message is present at the corresponding CAN interface. A CAN message can wake the unit from sleep mode. Depending on the device design, a level change at clamp 15 or the detection of a certain acceleration force can wake the unit from sleep mode. With this setting, CAN messages are sent if clamp 15 is set to high.
Power management – sleep timer status	0x3333	0x29	U8 ro	—	0: sleep timer deactivated 1: sleep timer activated The object can be read if clamp 15 is set to high.
Power management – shutdown delay time	0x3333	0x32	U16 rw	—	Delay time in seconds After detecting the ignition input (clamp 15) and the CAN off state, the unit continues to operate for the specified time and then goes to sleep mode.
Power management – cyclic wake-up time	0x3333	0x35	U32 rw	—	Time in seconds After the specified time period in sleep mode, the unit automatically wakes up and changes to standard mode. This function is only active with a value > 0.
Power management – accel. wake-up force	0x3333	0x36	R32 rw	—	Force in g If the accelerometer detects an acceleration force greater than this value, the unit wakes up and changes to standard mode. This function is only active with a value > 0.
Power management - CAN sleep time	0x3333	0x41	U32 rw	—	Time in milliseconds If the unit does not receive any CAN messages within the specified time period, it changes to sleep mode. This function is only active with a value > 0.

4.8 Device status

The device can send this data via the CAN interface. The configuration is made via the following objects:

Object	Index	Subindex	Type	Default	Description
CANMode	0x4001	0x02	U8 rw	—	Bit 0: compatibility mode with device CR3114 (1 s cycle) Bit 1: forward device status via CAN bus (1 s cycle) Bit 2: forward complete GNSS data via CAN bus (1 s cycle) Bit 3: forward input/output data via CAN bus (1 s cycle) Bit 4: forward acceleration and gyroscope data via CAN bus (100 ms cycle)
Status BaseID	0x4005	0x03	U16	0x200	COB ID start address for device status transmission (1s cycle)



All data available in the respective device mode are sent via the CAN1 interface.



The exact index and subindex can be found in the corresponding EDS file.

The device status data are mapped to the following CAN messages:

COB ID	Start byte	Length (bytes)	Type	Object
Status BaseID + 0x00	0	1	U8	Network state 0: not connected 1: registered with home network 2: not registered, searching for network 3: registration refused by network provider 4: Unknown 5: registered in external network
	1	1	U8	Signal quality 0: -115 dBm or less 1: -111 dBm 2...30: between -110 and -54 dBm 31: -52 dBm or more 99: unknown
	2	1	U8	Modem result 8: fatal error 9: initialisation 10: Internet connection active 11: <i>mobileIoT</i> server TCP connection active
	3	1	U8	Current network mode
	4	2	U16	State machine error code
	6	1	U8	Current connection mode 0x00: cloud logging mode 0x01: reserved 0x02: real-time mode
Status BaseID + 0x01	0	4	U32	CMS error number
	0	4	U32	CME error number
Status BaseID + 0x02	0	4	U32	Device time (Unix format)
	4	4	U32	Total operation time in seconds

4.9 Compatibility mode

In compatibility mode, the device transmits the data via the CAN bus in the same way as the CR3114 device.

The compatibility mode data is mapped to the following CAN messages:

COB ID	Start byte	Length (bytes)	Type	Object
0x180 + NodeID	0	1	U8	Network state 0: not connected 1: registered with home network 2: not registered, searching for network 3: registration refused by network provider 4: Unknown 5: registered in external network
	1	1	U8	Signal quality 0: -115 dBm or less 1: -111 dBm 2...30: between -110 and -54 dBm 31: -52 dBm or more 99: unknown
	2	1	U8	Modem result 8: fatal error 9: initialisation 10: Internet connection active 11: <i>mobileIoT</i> server TCP connection active
	3	1	U8	File transfer receive indication
	4	1	U8	File transfer transmit command
	5	1	U8	SMS transmit request
	6	1	U8	SMS receive indication
	7	1	U8	Device mode
0x280 + NodeID	0	4	U32	GNSS – latitude
	0	4	U32	GNSS – longitude
0x380 + NodeID	0	4	U32	Fixed to 1
	4	4	U32	Device time (Unix format)

4.10 CAN-CAN-Bluetooth/WLAN bridge

Wireless transfer of CAN data between two devices with Bluetooth/WLAN interface, e.g. as a replacement for CAN cables in drag chains or for remote controls.

4.11 CAN-Bluetooth/WLAN interface

The unit can be operated wirelessly via the Bluetooth or WLAN interface.

4.12 CAN-Bluetooth interface

The use as CAN-Bluetooth interface allows wireless bidirectional transfer of CAN data to other Bluetooth capable devices with the support of the Byte Command Protocol. The unit supports Bluetooth and Bluetooth Low Energy (LE).

4.13 CAN-WLAN interface

The use as CAN-WLAN-interface allows wireless bidirectional transfer of CAN data to other WLAN capable devices with the support of the Byte Command Protocol. The CAN-WLAN interface provides two operating modes:

- Infrastructure mode
Data transfer via one or more access points.
- Mini access point mode
The unit also provides the wireless LAN access point function.

5 Installation



- ▶ Disconnect the power of the machine before installation.



The device must be installed in a horizontal position. Installation with the connectors facing upwards or downwards is not permitted.

The device must be fixed with the rear facing the mounting surface.

ATTENTION

Higher impact stress > IK07

- ▷ Damage possible
- ▷ Protection rating and electrical protection might be impaired
- ▷ Risk of injury possible
- ▶ If necessary, the system creator must take external measures to protect the device depending on the requirements of the corresponding application.
- ▶ Replace damaged devices, otherwise the technical data and safety will be impaired.

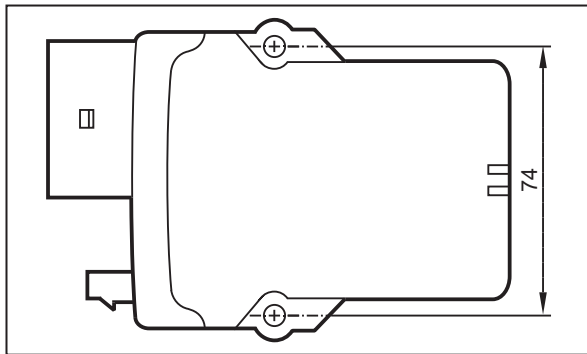


Fig. 1: Holes for mounting

- ▶ Use 2 M5x30 cylinder head bolts to fix the device on an even surface.
Tightening torque: 2.2 Nm

5.1 Mounting the antennas

- ▶ When mounting the antennas in vehicles avoid the vicinity of fuel tanks, vessels with explosives or insufficiently screened electronic components (→ 2 Safety instructions).
- ▶ Position the antennas so that a permanent distance of min. 0.2 m from people is ensured during operation.
- ▶ Do not install the antennas in closed metal constructions such as the driver's cab.
- ▶ To reliably receive the GPS signals, position the GPS antenna with unrestricted access to the sky.
- ▶ Please observe the antenna manufacturer's notes.



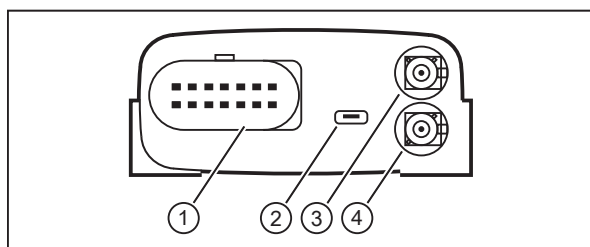
Stable data transmission requires a good antenna signal. In case of problems change the position of the antennas or the mobile equipment if necessary.



A loosely tightened antenna connector also causes signal loss.

6 Electrical connection

6.1 Connectors



- 1: Micro Timer II connector, 14-pin (CAN, supply, inputs, outputs)
- 2: USB socket (Micro-AB type)
- 3: FAKRA connector, D-coded
- 4: FAKRA connector, C-coded

6.1.1 Operating voltage, CAN interface, inputs and outputs

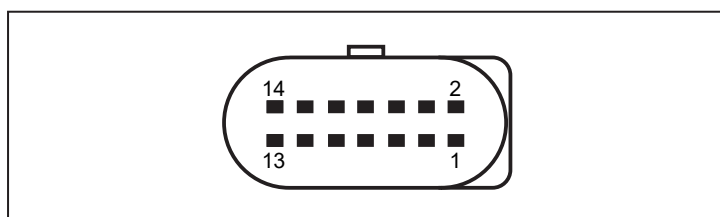


Fig. 2: Micro Timer II connector, 14-pin

- 1: VCC / clamp 30 (supply)
- 2: CAN3_L (CAN interface 3 (low) bidirectional)
- 3: GND / clamp 31 (supply)
- 4: analogue input 1
- 5: analogue input 2
- 6: analogue input 3
- 7: digital output
- 8: digital output / clamp 15 (input, ignition signal)
- 9: CAN3_H (CAN interface 3 (high) bidirectional)
- 10: CAN2_GND
- 11: CAN2_H (CAN interface 2 (high) bidirectional)
- 12: CAN2_L (CAN interface 2 (low) bidirectional)
- 13: CAN1_H (CAN interface 1 (high) bidirectional)
- 14: CAN1_L (CAN interface 1 (low) bidirectional)

6.1.2 GNSS antenna connection

The GNSS antenna connection is supplied with a voltage of approx. 3.3 V and can supply active antennas with a maximum current of 40 mA. The connection is short-circuit-proof and detects that an antenna is present when the current is greater than approx. 2 mA.



Make sure that the unit is switched off during installation.

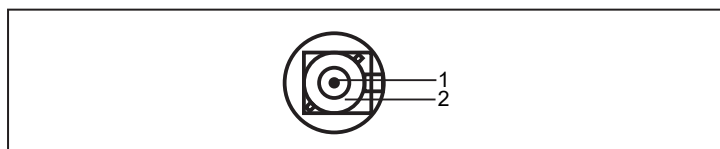


Fig. 3: FAKRA connector, C-coded

- 1: Signal — GNSS signal, supply voltage 3.3 V
- 2: GND — shielding / housing

6.1.3 GSM antenna connection

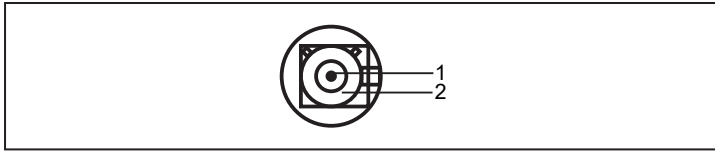


Fig. 4: FAKRA connector, D-coded

1: Signal — mobile radio

2: GND — shielding / housing



The unit detects an antenna if it has a built-in diagnostic resistor (10 k Ω).

6.1.4 USB connection

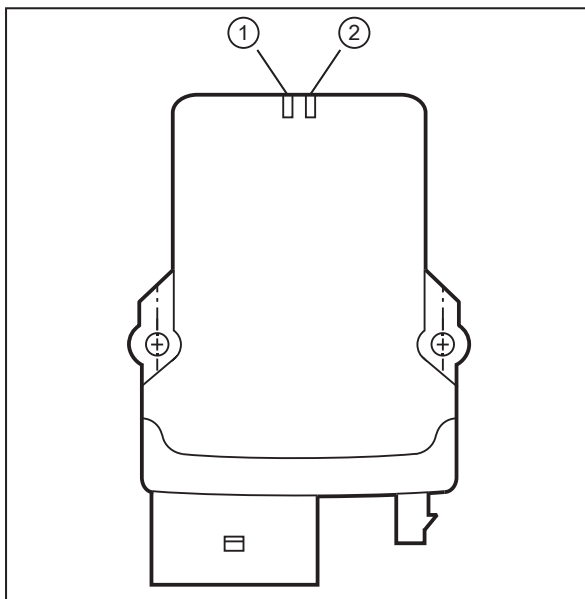
The USB connection (Micro-AB) is used for diagnostics and updates of the bootloader and firmware.



Protection rating IP6K7 is also guaranteed without the connected USB cable.

Always protect the USB connection with the matching protective plug to prevent soiling.

7 Light indicators



- 1: ON LED
2: STATUS LED

7.1 ON LED

The ON LED indicates the status of the power supply.

Colour	State	Meaning
-	Off	Unit switched off or in sleep mode
Green	On	Unit switched on, clamp 30 voltage in permissible range
Red	On	Unit switched on, clamp 30 voltage outside the permissible range or unit in battery mode
Green	Flashing	Unit in diagnostic or update mode

Tab. 1: ON LED

7.2 STATUS LED

The STATUS LED indicates the operating status of the active connections. The different colours are displayed according to priority, from 5 (low) to 1 (high). If several operating states are active at the same time, the STATUS LED always indicates the state with the highest priority.

Colour	State	Connect	Priority	Meaning
-	Off	-	-	If ON LED is also off: The unit is switched off.
Green	On	Various	-	Connected with the ifm <i>mobileIoT</i> server.
Blue	On	Mobile radio / Internet	1	Not connected with the ifm <i>mobileIoT</i> server.
Orange	On	CAN1	2	Connection faulty.
Red	On	CAN2	3	Connection faulty.
Magenta	On	GNSS	4	No position/antenna detected.
-	Off	Bluetooth/WLAN	5	Not connected to a network/device.

Tab. 2: STATUS LED

7.3 Indication of the operating modes

LED	State	Meaning
ON		A configuration update is carried out via the CAN interface.
STATUS		
ON		Active file transfer in logging mode. A configured CAN message is received (orange flashing) and sent to the ifm <i>mobileIoT</i> data portal (blue flashing).
STATUS		
ON		Active data transfer in real-time mode.
STATUS		
ON		Initialisation after power on.
STATUS		
ON		A configuration update is carried out via the ifm <i>mobileIoT</i> data portal.
STATUS		
ON		A remote firmware update is carried out via the ifm <i>mobileIoT</i> data portal.
STATUS		
ON		Reset of the unit via the slide switch on the D-Sub connector (CAN1).
STATUS		
ON		Reset (0x1011 0x64) of the unit via CAN.
STATUS		
ON		Transmission of the GPS position and the keepalive message. Display varies depending on the configured polling interval.
STATUS		

Tab. 3: Operating modes

8 Set-up

8.1 Necessary components

The following components are needed to configure and set up the device:

- Hardware
 - CR3158
 - suitable antennas / combined antenna for navigation and mobile radio
 - connection cable
 - voltage supply 8...32 V DC
 - PC
 - for further configuration (optional):
 - CAN/PC interface (e.g. CAN/RS232 USB interface CANfox, art. no.: EC2112) and adapter cable for CANfox (art. no.: EC2113)
 - CAN bus terminating resistors (2 x 120 Ω)
- ifm *mobileIoT* suite

To register and activate the unit, access to the *mobileIoT* suite is required. You will receive the access data from your local ifm contact. The documentation for the *mobileIoT* suite and for activating the unit can be found in the *mobileIoT* suite.

After you have activated the unit, an *mobileIoT* data contract will be concluded.

After successful registration and activation, the unit establishes a connection to the ifm *mobileIoT* data portal and enables bidirectional data transfer.
- Configuration software
 - ifm Maintenance Tool
 - *mobileIoT* device configuration addin for ifm Maintenance Tool

For details on how to configure the unit, see the ifm Maintenance Tool documentation.

8.2 Connect the unit

- ▶ Connect the GPS and GSM antennas to the unit.
- ▶ Provide the CAN bus with 120 Ω terminating resistors.
- ▶ Connect the CAN/PC interface with the CAN adapter cable to the unit and connect it to the PC.
- ▶ Apply the supply voltage.

The following table provides an overview of some CAN baud rates in relation to the cable length:

CAN baud rate	Cable length CAN bus
800 kbit/s	50 m
500 kbit/s	100 m
250 kbit/s	250 m
125 kbit/s	500 m
50 kbit/s	1000 m

Tab. 4: CAN baud rate

8.3 Factory reset

The following reset variants can be triggered via the CAN interface:

Function	Index	Subindex	Description
Revert to factory configuration	0x1011	0x01	The factory configuration is restored. All recorded data is deleted.
Delete all log files	0x1011	0x62	All recorded data is deleted.
Revert to firmware defaults remote	0x1011	0x63	The default configuration of the current firmware is restored. All recorded data is deleted. CAN, WLAN, Bluetooth and mobile radio settings as well as the factory configuration are retained.
Revert to firmware defaults plus format remote	0x1011	0x64	The default configuration of the current firmware is restored. All recorded data and the factory configuration are deleted. CAN, WLAN, Bluetooth and mobile radio settings are retained.
Revert to firmware defaults local	0x1011	0x65	The default configuration of the current firmware is restored. All recorded data and settings are deleted. The factory configuration is retained.

To carry out the factory reset via the CAN interface, CANopen software (e.g. maintenance tool) and a communication gateway (e.g. CANfox, part no. EC2112) are required. The CANopen software writes the value 0x64616F6C into the CANopen object index 0x1011 to trigger a specific reset variant.

The following example shows the factory reset via the sub-index 0x65 (restoration of the default configuration):

- ▶ Connect the unit with a PC. [Connect the unit \(→ 21\)](#).
- ▶ Start the CANopen software.
- ▶ Write the value 0x64616F6C into the object index 0x1011, subindex 0x650 via the CANopen software.
- ▶ Write the value to the object dictionary of the unit.
- ▶ Wait until the unit sends the CANopen boot-up message on COB-IDs 0x727 and 0x728.
- ▷ The unit is reset to the firmware default settings (object 0x1011 0x65).
- ▷ The ON LED lights green.
- ▷ The STATUS LED lights blue.
- ▷ The unit has adopted the firmware defaults (baud rate 250 kbit/s, node ID 39 etc.).

9 Repair, maintenance and disposal

The unit is maintenance-free.

- ▶ Contact ifm in case of malfunction.
- ▶ Do not open the housing as the unit does not contain any components which can be maintained by the user. The unit must only be repaired by the manufacturer.
- ▶ Clean the device using a dry cloth.
- ▶ Dispose of the unit in accordance with the national environmental regulations.

Glossary

mobileIoT data contract

Contract required for the mobile radio connection between the mobileIoT gateway and the mobileIoT server

mobileIoT data portal

Portal that processes/applies the data

mobileIoT platform

The complete cloud solution including backend (mobileIoT server), infrastructure, frontend for the machine management portal (mobileIoT suite) and data processing portal (mobileIoT data portal)

mobileIoT server

Cloud server on which the metrics are stored and to which the mobileIoT gateways connect

mobileIoT suite

Machine management portal