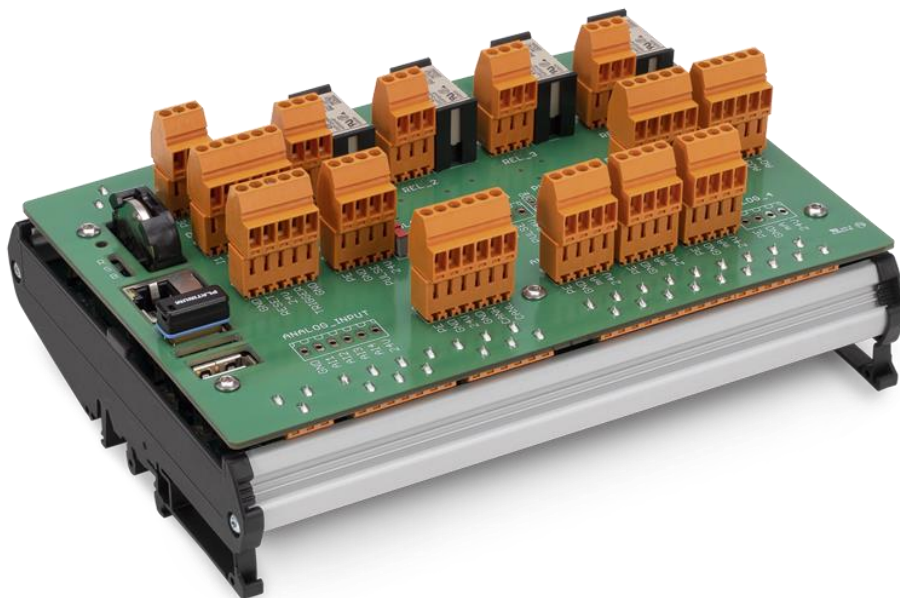**FAUDI** *aviation*

Contamination Control System silver (CCS silver)

Filtration manager for guarding water contamination in aviation fuel by one or two AFGUARD® free water sensors in refuelling applications + guarding of additional information like flow or differential pressure with integrated data logger

Content

Revision History

Rev.	Date of Release	Firmware Version	Comment
4	27/05/2019	2019-08-28.1	First Release
5	30/01/2020	2020-01-22	Default and recommended values for CCS settings have changed compared to previous firmware 2019-08-28.1 See Chapter 4.
6		2021-01-14	Added features: - Modbus Support - Optional Signal Output - Ready Relay - Hardware Override (DI3) - Import / Export of configuration - Simplification of Setup / Installer - FTP access for download of logfiles / history - AFGUARD® optional Alarms - USB drive detection - low battery/invalid date detection Changes: - Different default and recommended values - Bugfixes

Please make sure, the revision of this document matches the firmware version of the CCS Silver. You can find the version number of CCS firmware on the Info Screen in the web visualisation.

1 Foreword

1.1 Purpose

The Contamination Control System has been designed for a continuous evaluating of water contamination in fuel measured by an AFGUARD® - free water sensor. If water contamination is too high for a while it interrupts the refuelling process via a safety relay. Additionally, it can evaluate other sensors like a SLUGGUARD®. The contamination control system is especially made for guarding a filter water separator or a dirt-defence filter system. The CCS will also log information on a USB drive for every refuelling cycle.

1.2 Safety instructions

This manual provides operation and routine maintenance instructions for the FAUDI Aviation Contamination Control System.
Read this manual and ensure that you fully understand its content before you attempt to install, use or maintain the Contamination Control System.
Work on electrical equipment is to be conducted by trained specialists only, according to valid regulations.
Attention must be paid to the requirements of VDE 0100 when setting up high-power electrical units with nominal voltages of up to 1000V, including associated standards and stipulations.
Check the details on the type plate to ensure that the equipment is connected to the correct mains voltage.
Protect against touching dangerously high electrical voltages. Before opening the equipment, it must be switched off and hold no voltages. This also applies to any external control circuits that are connected.
The equipment is only to be used within the permitted temperature and operation ranges.

Check that the location is weather-protected. It is recommended that the Contamination Control System should not be exposed to either direct rain or moisture.
Installation, maintenance, monitoring and any repairs may only be conducted by authorized personnel with respect to the relevant stipulations.
All changes of the standard Contamination Control System with parts which are not specified or approved by FAUDI Aviation GmbH, as well as repair and service with unspecified parts will result in loss of the CE conformity and guarantee.
In case of doubt, please turn directly to FAUDI Aviation GmbH, respectively to your FAUDI Aviation Distributor or Service organization.

1.3 Designated use

The CCS is suitable for indication and measuring operation of the AFGUARD® during the flow of a medium to be monitored (kerosene, diesel, AVGAS, etc..). Its intention is to catch up electrical signals coming from electrical sensors to detect water content values during flow. Additionally, hereto it provides the functionality to detect and give out alarm status if high free water values are detected.
The manufacturer is not liable for damages caused by improper or non-designated use

1.4 Installation, commissioning and operation

Please refer to installation manual for cabling and mechanical setup of CCS.
Installation, electrical connection, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel. The technical personnel must be authorized by the system operator to conduct the specified activities. Technical personnel must have read and understood these Operating Instructions and must adhere to them.

Before commissioning the entire measuring point, check all the connections for correctness. Ensure that electrical cables are not damaged. Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
Measuring point faults may only be rectified by authorised and specially trained personnel. If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

Repairs not described in these Operating Instructions may only be carried out by manufacturer or by a designated service organisation.

1.5 Operational safety

The CCS has been designed and tested according to the state of the art and left the factory in perfect functioning order. Relevant regulations and European standards have been met.

As the user, you are responsible for complying with the following safety conditions:
- Installation instructions
- Local prevailing standards and regulations.

1.6 Return

If the device requires repair, please send it in cleaned condition to the appropriate sales centre. Please use the original packaging, if possible.

When sending for repair, please enclose a note with a description of the error and the application.

1.7 Contact

Contact address of manufacturer: FAUDI Aviation GmbH Scharnhorststrasse 7 B D- 35260 Stadtallendorf Germany	Telephone: Fax: Mail: Web:	+49 6428 4465 - 275 +49 6428 4465 - 221 Sensor@faudi-aviation.com www.faudi-aviation.com

2 Wiring and Assembly

The Circuit board on top of the CCS has inscriptions for the mounting of the signal cables. To prevent damage, please make sure, not to connect power supply during wiring. Connect power supply when all other connections are made.
Please use proper tools for making the connections. Use flexible copper wire to connect signals to the CCS. We recommend flexible wire with a cross-section of 1 mm². It is not recommended to mount wires without ferrules. An appropriate crimping tool must be used to apply the ferrules to the wires.

The wiring diagram is shown in the photography:
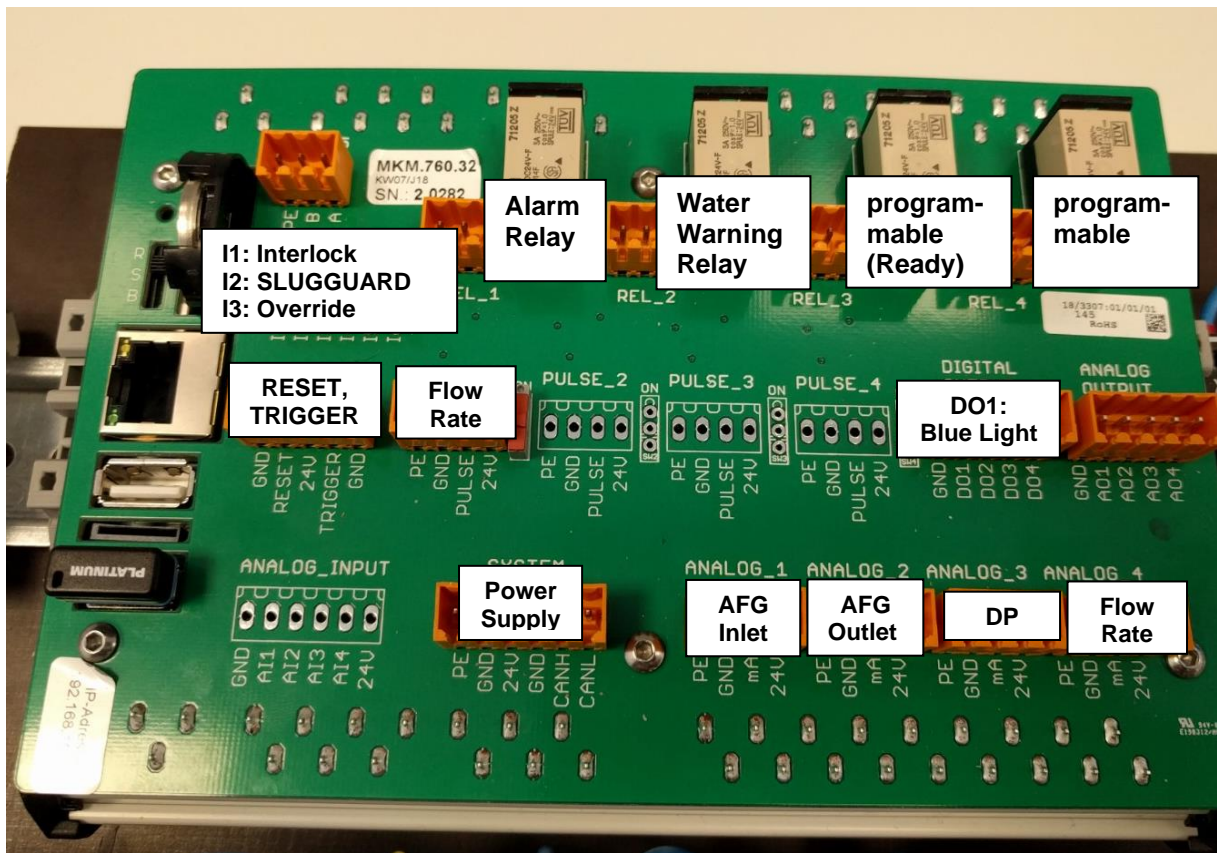
Terminal panel	Inscription	Connected Signal
SYSTEM	24V	Power Supply 24V DC
SYSTEM	GND	Power Supply GND
SYSTEM	PE	PE / GND (optional)
DIGITAL_INPUT	DI1	Interlock
DIGITAL_INPUT	DI2	SLUGGUARD
DIGITAL_INPUT	DI3	Override
CONTROL	RESET	Reset Switch
CONTROL	TRIGGER	Deadman/Trigger
ANALOG_1	mA	AFGUARD Inlet
ANALOG_2	mA	AFGUARD Outlet
ANALOG_3	mA	DP Transmitter
ANALOG_4	mA	Flow (analog) optional
PULSE_1	PULSE	Flow (pulsed) optional
PULSE_2	PULSE	Unused
PULSE_3	PULSE	Unused
PULSE_4	PULSE	Unused
DIGITAL OUTPUT	DO1	Blue LED Flashlight
DIGITAL OUTPUT	DO2	Optional Output, free programmable, 24V
DIGITAL OUTPUT	DO3	Optional Output, free programmable, 24V
DIGITAL OUTPUT	DO4	Optional Output, free programmable, 24V
REL_1	REL_1	ALARM Relay
REL_2	REL_2	WARN Relay
REL_3	REL_3	Optional Output, free programmable, Default: Ready
REL_4	REL_4	Optional Output, free programmable
ANALOG OUTPUT	AO1	Unused
ANALOG OUTPUT	AO2	Unused
ANALOG OUTPUT	AO3	Optional Output, free programmable, 4…20mA
ANALOG OUTPUT	AO4	Optional Output, free programmable, 4…20mA

Please connect all signals according to the table. All sensor signals are optional.

2.1 AFGUARD® Inlet, Outlet

The main application of the CCS is to evaluate water levels measured by the AFGUARD® - free water sensor. You can connect one or two AFGUARD®s to the CCS.
The **ANALOG_1** terminal is for the AFGUARD® in the **Inlet** of the vessel.
The **ANALOG_2** terminal is for the AFGUARD® in the **Outlet**.
The "mA"-Terminal is the path where the given current-signal flows in. For Ex-i Safety, a barrier is needed. The barrier connects between AFGUARD® and CCS ANALOG_1 or ANALOG_2 input. To power and ground the barrier and the sensor, you can use the "24V", "GND", and "PE" connector of the terminal.

2.2 Differential Pressure

The CCS can work with a DP signal. The CCS can use the DP as a trigger for the monitoring. It also logs the DP.

The CCS can work with analog DP transmitters with a current range between 0..20mA and 4..20mA.

The ANALOG_3 terminal is for connecting a DP signal. The "mA"-Terminal is the path where the given current flows in. For Ex-i Safety, a barrier is needed. The barrier connects between DP sensor and CCS ANALOG_3 input. To power and ground the barrier or the sensor, you can use the "24V", "GND", an "PE" connector of the terminal.

2.3 Flow Rate

For basic function of the CCS, a flow signal is not necessary. With a flow signal, the CCS can calculate exact water average values. The flow can also be used as a trigger for the water monitoring, and the flow gets logged by the datalogger, if connected.
When you connect a flow meter, you need to know the signal type. The CCS can work with pulse-based flow meters and with analog flow meters with a current range between 0..20mA and 4..20mA. Please check signal type of your flow meter. Use the upper table to connect the flow signal properly.

2.3.1 Analog Flow Meter

When using an analog flow meter, use the ANALOG_4 terminal panel. The "mA"-Terminal is the path where the given current flows in. For Ex-i safety, a barrier is needed. The barrier connects between flow sensor and CCS ANALOG_4 input. To power and ground the barrier or sensor, you can use the "24V", "GND", an "PE" connector of the terminal.

2.3.2 Pulsed Flow Meter

When using a pulse-based flow meter, use the PULSE_1 terminal panel to connect the sensor. Connect the pulse output of the sensor to the PULSE connector. To power and ground the sensor, you can use the "24V", "GND", an "PE" connector of the terminal.
The Voltage-Level of the Pulses must be between 12V and 24.
The Pulse-Input has an optional 10kΩ-Pull-Up-Resistor, which can be activated by the slide switch. This will connect the PULSE-Input via the Pull-Up-Resistor to 24V.
Use Only for flowmeter output with low-active pulses (NPN)

2.4 SLUGGUARD®

A SLUGGUARD® is a binary sensor which indicates water slug in pipes or vessels. The SLUGGUARD® can trigger water alarms in the CCS. It is an optional sensor. It must be connected to the **DI2** connector in the DIGITAL_INPUT terminal panel. For Ex-i safety, a barrier between SLUGGUARD® and CCS will be needed.

2.5 Interlock

The optional interlock signal is an optional signal which can be connected to the CCS to detect when a refuelling process starts. **This has no effect on the clearance of the alarm and warning relays.**
It effects on the evaluation of the refuelling process (data logging…). When the truck gets parked under the aircraft and the operator takes the refuelling equipment out of its storage place, a binary signal gets created. You can connect a 24V interlock signal to the CCS which tells the system when the refuelling truck refuelling one aircraft. 24V means, refuelling process is active (truck parked under the aircraft). 0V means, that there is no refuelling process and no evaluation.
If you do not connect an Interlock signal, the detection of a refuelling process works in another way (triggered by water monitoring).
The 24V interlock signal gets connected to the DI1 connector in the DIGITAL_INPUT terminal panel.

2.6 Trigger

When there is no possibility to install a flow meter or a DP transmitter, the system needs a binary trigger, otherwise, there is no need to connect it. The trigger tells the system if there is a refuelling now. This condition activates the water monitoring with the AFGUARD®. **Do not mix up the trigger with the interlock signal!**
The trigger is usually the output of a Deadman. It must be a 24V signal. Connect the signal to the **TRIGGER** connector in the CONTROL terminal panel.

2.7 Reset

When an alarm occurs, it must be reset to continue refuelling. You can reset it by software over the web visualisation with a smartphone or a computer by entering a PIN or you can use the hardware reset. This is usually a key switch. In the CONTROL terminal panel, there is a connector called **RESET**, connect the reset switch to 24V and RESET, that the current path gets closed when applying reset.

2.8 Water Indicator

To indicate water warnings and water alarms to the operator, a blue flashlight should be connected to the CCS. The 24V Light must be connected between the **DO1** of the DIGITAL_OUTPUT terminal panel and GND.

2.9 Relay Outputs

The CCS has 4 relay outputs.

REL_1	Water Alarm (AFGUARD®s and SLUGGUARD®)
REL_2	Water warning(s) (AFGUARD®s)
REL_3	Free programable (Default: Ready Relay) The Ready Relay gets activated if the monitoring is active (blue lamp on) and the CCS is NOT in Alarm Mode.
REL_4	Free programmable (Default: deactivated)

REL_1 and REL_2 have an inverted logic. This means, the relays are triggered if everything is okay. The relay releases if a warning/alarm/error occurs.

2.10 Power Supply

The CCS works with a power of 24V DC ±10 %, Residual ripple 5 %.

In the SYSTEM terminal panel, the supply voltage must be connected. Use the 24V and the GND terminal to connect the power supply. Optionally use **PE** to ground the CCS.

2.11 Optional Output Signals

The following Output Signals are free programmable in the web visualisation. This could be useful for mirroring the signal of the AFGUARD® to an external PLC. Go to Setup →Signal Output in the web visualisation.

Digital Outputs

- DO2
- DO3
- DO4

Relay Outputs

- REL_3 (Default: Ready)
- REL_4

Analog Outputs (4..20mA)

- AO3
- AO4

3   Operation

3.1   Connection Settings

You're able to connect a Computer or a Smartphone or Tablet PC to the CCS via Local Area Network. This is necessary for setting up the system. Also, the refuelling process can be guarded via the so-called web visualisation .
The computer or smartphone and the CCS must be in the same IPv4 Network.
For connecting a Smartphone or Tablet PC, a Wi-Fi access point is required.
For an easy connection with a computer, you only need an Ethernet cable (Cat.5 or better).

3.1.1   Direct connection via Ethernet Cable

If you want to connect the computer directly **without** using a router with DHCP Server, follow these instructions:

1. Take your computer / laptop
2. Open the settings of your Ethernet connection (Network Adapter).
3. Choose Internet Protocol Version 4 (TCP/IPv4)
4. Open properties
   - Activate static network settings (no DHCP)
   - Change IP address to   **192.168.10.100**
   - Change Subnet mask to **255.255.255.0**
   - Delete gateway settings
   - Delete DNS settings
   - Settings should be in accordance to the right picture
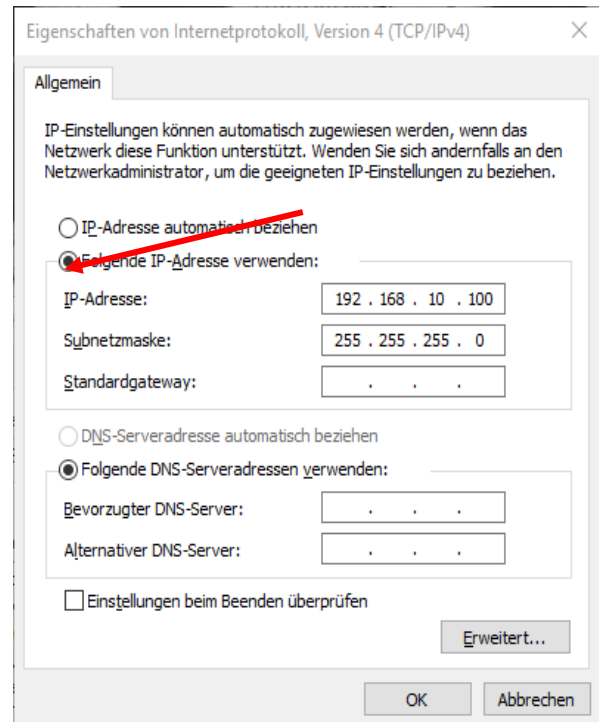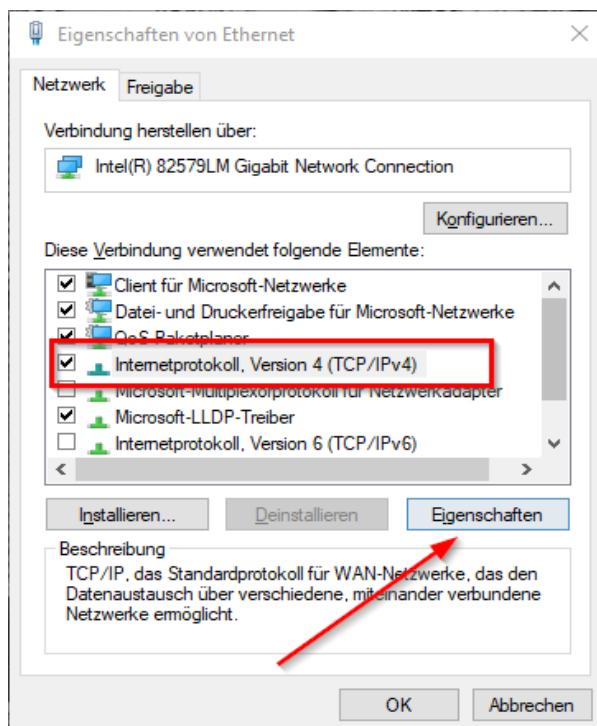
- Press "OK"

Note the original settings e.g. by screenshot and carefully safe the original information to set back your computer when finished with the settings on the CCS.

Connect your computer to the CCS using an Ethernet cable.
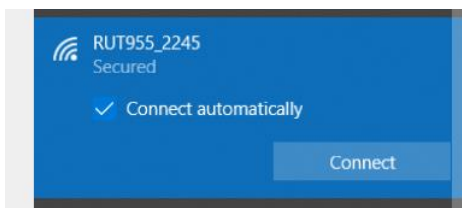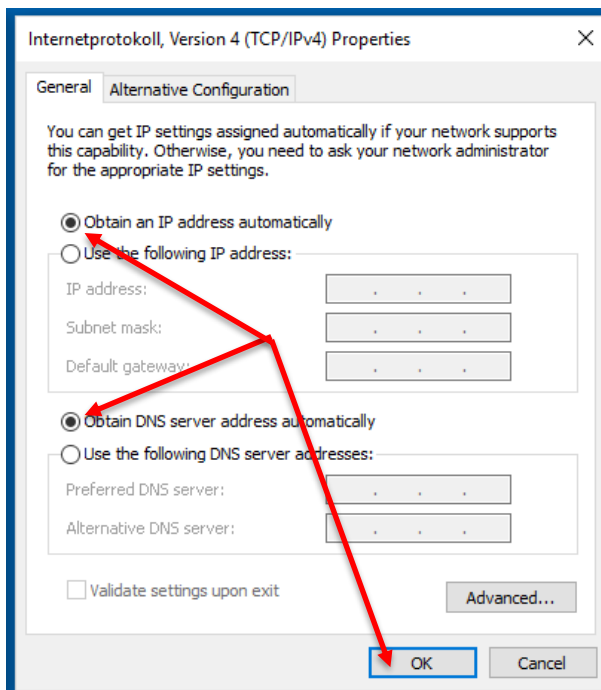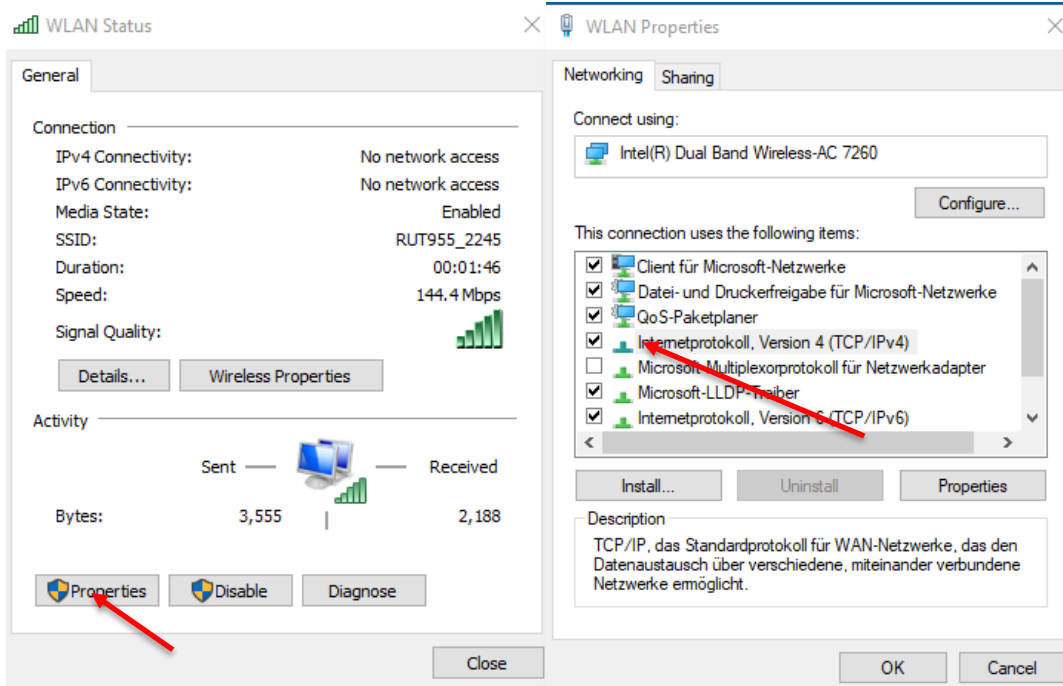
3.1.2 Connection via Wi-Fi

When you want to access to the CCS with a mobile device like a smartphone or a tablet PC or a Laptop using Wi-Fi, you need an **access point or wireless router**.
The most routers support the Dynamic Host Configuration Protocol (DHCP). When you use a router with this feature, you don't need to configure the IP Address of your smartphone / tablet / laptop manually, referring to the last chapter.
In the following steps, we show you how to configure a router. The screenshots show you the setup of the Teltonika® RUT955 router.

1. Connect the CCS to the router via an Ethernet cable
2. Connect your computer to the router (Ethernet or Wi-fi) the following pages show a configuration via Wi-fi using Windows
3. Open the adapter settings of your computer
4. Set the IP settings to automatic (DHCP) referring to the pictures
5. Open the configuration of your router by entering its IP address to your web browser. It is printed to the device
6. Change access password to router configuration and note
7. Set the IPv4 Address of the router to from default to **192.168.10.1**
8. Set the Subnet mask to 255.255.255.0 or set the Prefix length to **24** (depending on the setup of your router)
9. Your router might disconnect because you changed its IP address. Reconnect by typing **192.168.10.1** to your web browser
10. Open the DHCP Settings of your router
11. Set the IP Address range to e.g. 192.168.10.**100** to 192.168.10.**199** (The CCS uses a static IP Address which is by default **192.168.10.231**) The range must not contain the IP address of the CCS
12. Set a Wi-Fi passcode. It's recommended to use **WPA2** or a better encryption
13. Rename the name (SSID) of the Wi-Fi. It is highly recommended to enter a number/code of the vehicle where the CCS is installed. Otherwise it will be difficult to differentiate between the devices if multiple CCS are installed at an airfield.
14. Now take your smartphone / tablet / laptop and access to the Wi-Fi of the router, enter the wi-fi passcode and make sure you are connected to the network.

Note that everybody who knows this passcode gets access to the CCS. For additional security we recommend setting another Wi-Fi code than the User and Administrator PIN of the CCS.
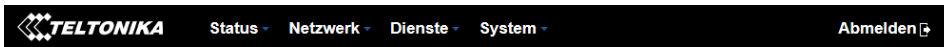
Now the address of the router changed from 192.168.1.1 to 192.168.10.1
You need to reconnect

Wireless Access Point

Here you can configure your wireless settings like radio frequency, mode, encryption etc...

Gerätekonfiguration

Allgemeine Einstellungen | Erweiterte Einstellungen

Enable wireless ☑

Kanal automatisch

Schnittstellenkonfiguration

Allgemeine Einstellungen | WLAN-Verschlüsselung | MAC Filter | Erweiterte Einstellungen

SSID Faudi CCS AP [Number]

Hide SSID ☐

Back to Overview   Speichern

FW ver.: RUT9XX_R_00.06.00

Wireless Access Point

Here you can configure your wireless settings like radio frequency, mode, encryption etc...

Gerätekonfiguration

Allgemeine Einstellungen | Erweiterte Einstellungen

Enable wireless ☑

Kanal automatisch

Schnittstellenkonfiguration

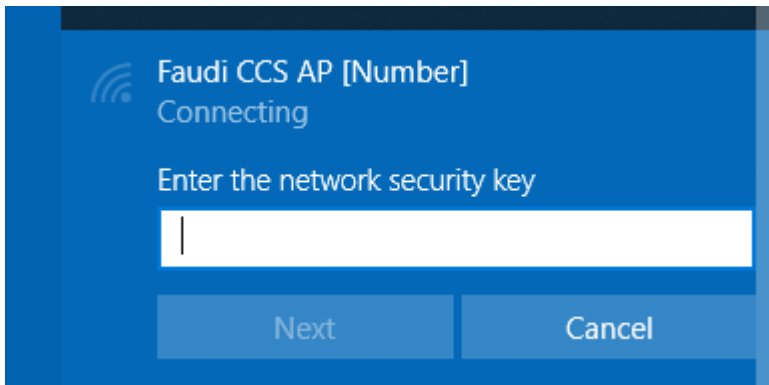Allgemeine Einstellungen | WLAN-Verschlüsselung | MAC Filter | Erweiterte Einstellungen

Verschlüsselung WPA2-PSK

Verschlüsselungsalgorithmus Erzwinge TKIP und CCMP (AES)

Schlüssel ••••••••••

Back to Overview   Speichern

Faudi CCS AP [Number]
Connecting

Enter the network security key
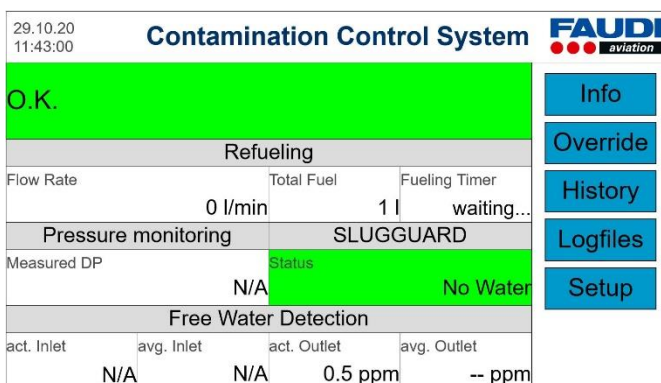
| |

Next   Cancel
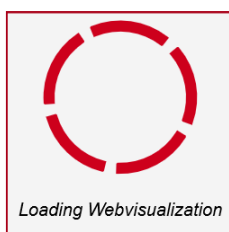
3.2 Web visualisation

When you connected your device to the CCS via Local Area Network, follow these steps:
- Make sure the CCS is powered on and wait about a minute until it has been booted. The status LED on the CCS on the left side of the battery must stop blinking and **stationary light green**.
- Start web browser. **The browser must support HTML5**
- Type in **http://192.168.10.231:8080/webvisu.htm**

Following "dashboard" screen should appear (On first run, the installer appears instead of the dashboard):

29.10.20 11:43:00	**Contamination Control System**	**FAUDI** *aviation*

O.K.			Info
Refueling			Override
Flow Rate	Total Fuel	Fueling Timer	History
0 l/min	1 l	waiting...	
Pressure monitoring	SLUGGUARD		Logfiles
Measured DP	Status		Setup
N/A		No Water	
Free Water Detection			
act. Inlet	avg. Inlet	act. Outlet	avg. Outlet
N/A	N/A	0.5 ppm	-- ppm

If there is a loading logo, try to actualize the site.

Loading Webvisualization

3.2.1 Structure

The Visualisation of the CCS Silver has the following menu structure:

```
                                    Dashboard
        ┌───────────┬─────────────┬─────────────┬─────────────┬──────────────┐
      Info       Override      History       Logfiles       Setup         Reset
                                                  ┌───────────┬───────────┬───────────┐
                                             Sensor Input   Config & Backup   Language      Signal Output
```

Sensor Input
- Pressure
- Flow Rate
- SLUGGUARD
- AFGUARD Inlet
  - Signal
  - Warning
  - Alarm
  - Slug
- AFGUARD Outlet
  - Signal
  - Warning
  - Alarm
  - Slug

Config & Backup
- Load Defaults
- Export
- Import
- Installer
  - Date + Time
  - Change PIN
  - Units
  - Flow Rate Sensor
  - Pressure Sensor
  - AFGUARD Inlet (1, 2, 3)
  - AFGUARD Outlet (1, 2, 3, 4)
  - SLUGGUARD Settings
  - Filter Parameters
  - Logger
  - Finished

Language

Signal Output
- Analog
- Relay
- Digital

System
- Units
- Date + Time
- Networt
- Change PIN
- Filter Parameter
- Water Monitoring
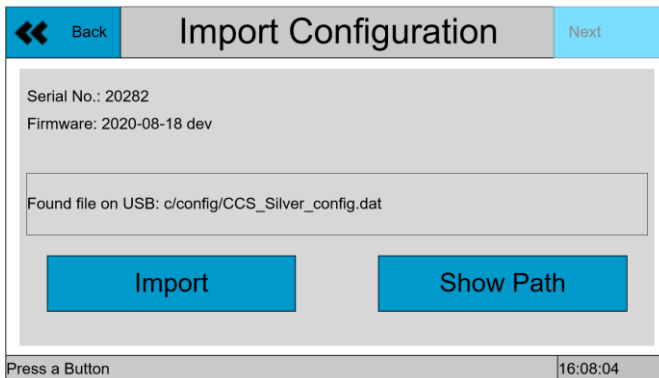- Datalogger
- Modbus

3.2.2 First Start - Welcome screen

When you boot the CCS Silver the first time, the welcome screen will appear.

If you have a config file (backup file), then click on `Import Config`. Otherwise Click on `Launch Installer` to run the installer wizard manually.

3.2.3 Import Config

If you click `Import Config`, the Import screen will appear:

To import the configuration, make sure, the backup file is stored on the USB drive in a folder named "config".
There are two options to move the file to the USB Drive

- Plug the USB drive into your computer and copy the file "CCS_Silver_config.dat" to the USB drive and plug it into the CCS again.
- Move File to USB drive via File Transfer Protocol

For the second option, make sure your computer is connected to CCS via Local Area Network. Start Windows Explorer (or another FTP Client like FileZilla) and enter ftp://192.168.10.231/c into the path field.
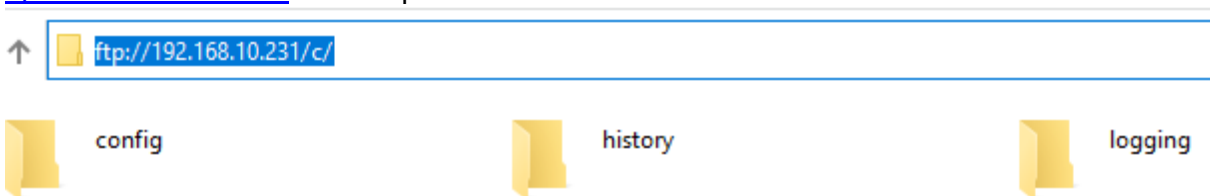
Make a subfolder "config" and drop the backup file "CCS_Silver_config.dat" into this folder.
The full path should be: ftp://192.168.10.231/c/CCS_Silver_config.dat

Then the system displays "Found file on USB: ..:" in the WebVisu.
The import of config file is only possible if the firmware version of your system and the backup file matches! Otherwise the import will fail.
When the import was successful, click "Next". Then you need to set date and time. Then you can finish setup.

3.2.4 Installer

3.2.4.1 Explanation

If you clicked `Launch Installer` the following screen appears.

FAUDI aviation

The installer is a setup wizard which guides you through all necessary settings of the CCS. On the first launch of the CCS the installer starts automatically with the language page. It is highly recommended to use the installer to setup the CCS on installation instead of setting up every menu point individually. **Please go through the Installer meticulously and know what values you set up on every page.** There is a List of Settings at the end of the document which helps you going through the installer.

3.2.4.2 Handling of the installer

In the headline of the screen, there are two navigation buttons. Press the Next >> button to enter next menu step or go back to previous menu with the << Back button. In the installer some configuration dialogs get opened where you must enter some values. You can use the blue keypad on the screen **or the buttons of the NUM Block off your computer keyboard as well.**

Every change you make in the installer will be applied **immediately**. Not at Finishing the installer. At the end of the installer, a reset will be applied to delete cable break errors which could come from configuration routine.

3.2.4.3 Menu structure of the Installer

3.2.4.3.1 Date and Time settings

First menu is Date and Time. Click on change button of Day, Month, Year, Hour or Minute, or press the zero button to Set the Second section to set the Seconds to 00.

If you press a change button, you will enter the appropriate menu. This looks like the following:
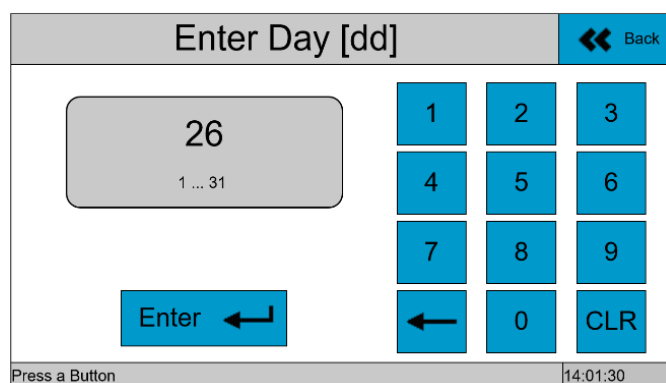
For Setting the year, please only type in the last two digits e.g. **19** for 20**19**. The latest date supported by the system will be in year 2037. For Setting day or month type in the last one or two digits and press Enter ↵ . You will go back to the Date and Time Screen. If the chosen value is 0 or if the value is out of the specified range, a press of Enter ↵ won't be accepted. For setting hours or minutes press on the appropriate change button. The menu for Hour or Minutes will open. Please enter a one- or two-digit value and press Enter ↵. If the value is out of range, the Enter ↵ won't be accepted.
If you finish the Date and Time settings, click the Next >> button.

3.2.4.3.2 Change PIN

Next menu is to change PIN. Click on change button of Administrator or User to set new PIN numbers:
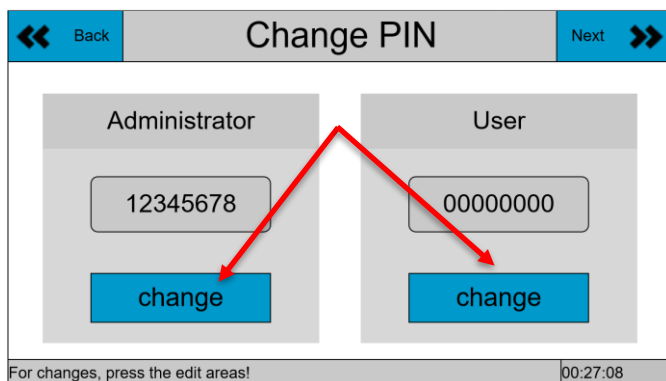
Following PIN numbers are preconfigured:

Administrator – PIN level: 12345678
User – PIN level: 00000000

Make sure to remember changed PIN numbers. In cases of loss of changed PIN numbers only FAUDI Aviation GmbH can reconfigure.

PIN – Insert new PIN
Change PIN number with "Enter new PIN menu":

Enter new PIN	◀◀ Back
87654321	1 2 3
	4 5 6
	7 8 9
Enter ↵	← 0 CLR

Press a Button   14:43:32

The PIN must have **4 to 10** digits. If you have entered a valid PIN, you will go back to the following screen. Changes affect immediately. Please check the new PIN on the following screen:

◀◀ Back	Change PIN	Next ▶▶
Administrator		User
87654321		00000000
change		change

For changes, press the edit areas!   14:47:11

Please repeat the same procedure to change the USER PIN level.

3.2.4.3.3 Units – change units

Choose Next >> button to enter next menu step Units where you are asked to define measuring units for pressure and Volume.

◀◀ Back	Units	Next ▶▶
Pressure Unit:	bar	‹ ›
Fuel Volume Unit:	l	‹ ›
Flow Unit:	l/min	

For changes, press the edit areas!   14:48:42

To switch through the supported units, click on the < > Button

Pressure units: You can choose between:
- bar
- psi   or
- kPa

and fuel volume units between:
- Liter (l)
- US gallon (gal)   or
- Cube meter (m³)
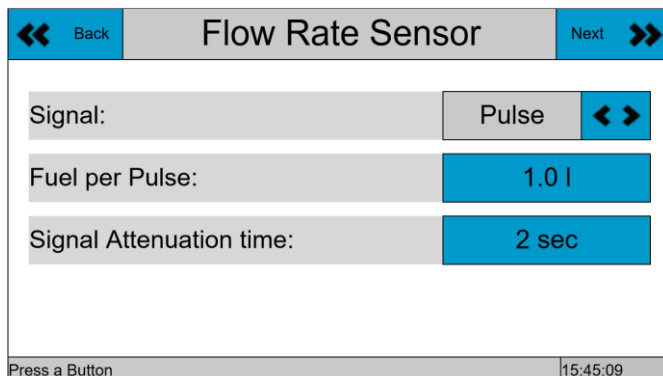
If you change the Volume unit, the Flow unit changes automatically. It will be:
- Liter per minute (l/min)
- US gallon per minute (gal/min)   or
- Cube meter per hour (m³/h)

Choose Next >> button to enter next menu step where you are asked to select the specific type of Pressure Sensor in use:

3.2.4.3.4 Flow Rate Sensor

Select Flow Rate Sensor menu to set up flow sensor.
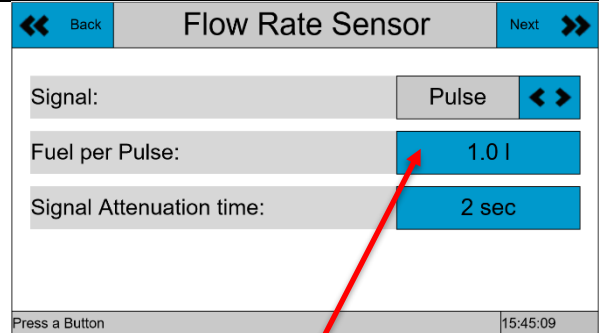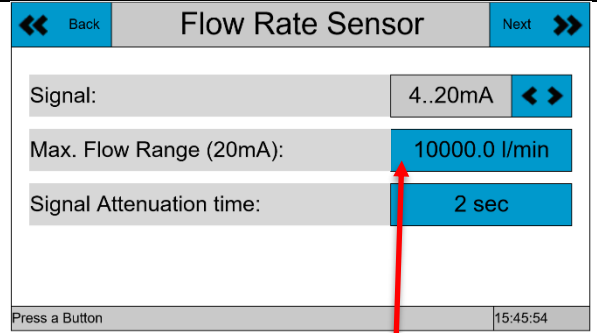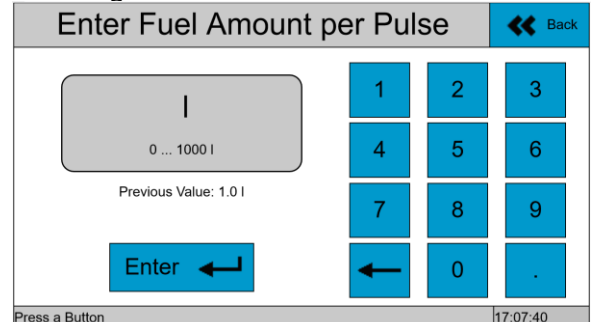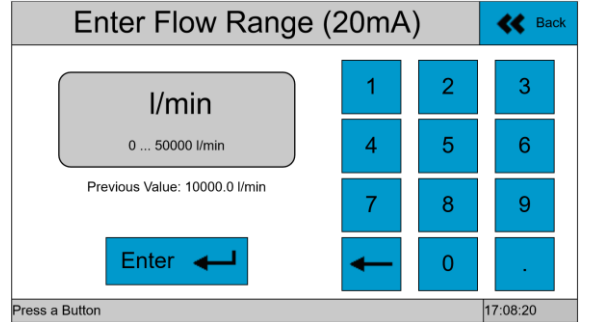
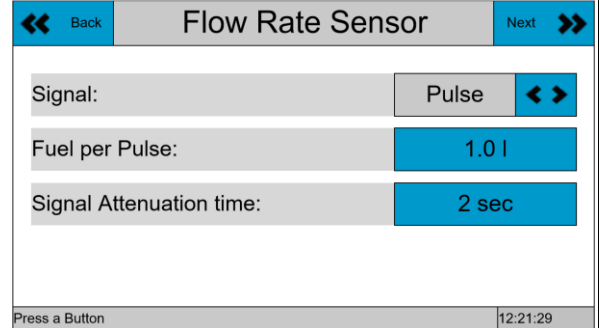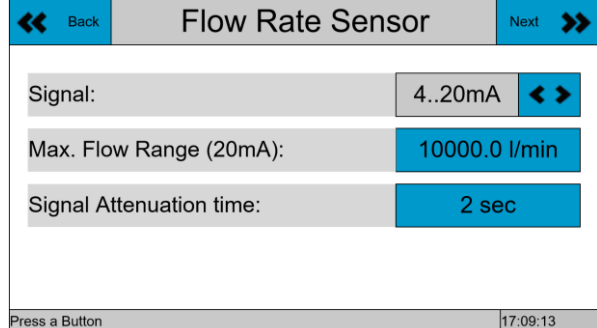You are asked to select:
Signal:
- N/A
- Pulse   (most common type)
- 0..20 mA
- 4..20 mA

For a change click on the < > Button.

If you use an analog sensor, it is very important not to mix up the ranges 0..20mA and 4..20mA. Otherwise the system will work with invalid flow values or system will detect a sensor error or a wire break! **Please refer to original documentation of sensors to check for correct settings.**

In case of the Signal type the screen will change:

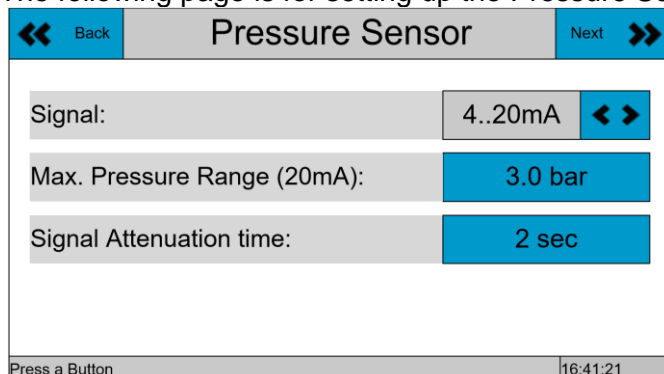| Signal: Pulse	Signal: 0..20mA or 4..20mA
Fuel per Pulse: For change click the blue box. You were asked to enter the amount of fuel which flowed through the pipe when the sensor gave out one Pulse.	**Max. Flow Range (20mA):** For change click the blue box. You were asked to type in the flow, which is represented by a sensor current of 20mA. Enter a value and press Enter ↵.
Enter a value and press Enter ↵. In this case it is 1.0 Liter per Pulse.	In this case it is 10000 Liters per Minute at 20mA.
You will come back to the Screen	You will come back to the Screen

Signal Attenuation time: For attenuating the input signal, you can in insert a value of a few seconds here. It is the time it will need until the step response of the input signal will reach 63% of the end value. For a pulsed flow it is highly recommended not to use 0 sec because the flow will have high peaks and will drop to zero if no pulses are coming. We recommend a time of **2 sec or more** for a pulsed flow signal. Since firmware 2020-10-28 the attenuation time cannot be edit by admin password to simplify configuration

If max values do not fit your needs, please contact FAUDI Aviation GmbH to adapt for your process.

Click Next >>

3.2.4.3.5   Pressure Sensor

The following page is for setting up the Pressure Sensor.

You are asked to select:

Signal:
- N/A
- 0..20 mA
- 4..20 mA

For a change click on the < > Button.

You can use the CCS without a pressure sensor. If no pressure sensor is available, please select N/A. The CCS supports an analog current driven differential pressure sensor with ranges of 0..20mA and 4..20mA.

Max. Pressure Range (20mA): Click on the blue box to change the value of the pressure range. An input dialog will open and ask for a value. Please insert the value given by the documentation of your differential pressure sensor.

Signal Attenuation time: For attenuating the input signal, you can in insert a value of a few seconds here. It is the time it will need until the step response of the input signal will reach 63% of the end value. We recommend a time of 2 sec or more for the signal of differential pressure. Since firmware 2020-10-28 the attenuation time cannot be edit by admin password to simplify configuration

Click Next >>

3.2.4.3.6 AFGUARD® free water sensor

AFGUARD free water sensor is intended to measure the amount of free water in Jet fuel. Therefor the AFGUARD should be located in main stream of distribution path for Jet fuel to detect the amount of free water just in time of delivery. AFGUARD signals could be used to:

- show actual measured amount of free water to address Alarm and/or Warning using every peak in free water crossing the optical path of AFGUARD.
- give out average amount of free water as mathematical result coming from flow and free water measurement to give out averaged free water signal
- - give out ALARM in case of high levels of water (water slug)
- If you do not know about calibration range of AFGUARD® free water sensor - please contact your FAUDI Aviation sales contact. You need to have the serial no of AFGUARD® in use.

The system supports up to **2 AFGUARD®**. One for the inlet and one for the outlet of the filter. Both are optional.
Both sensors can give out warnings and alarms. You can also install only one AFGUARD.

3.2.4.3.6.1 AFGUARD Inlet

For Setting up the AFGUARD Inlet, there are four sheets in the installer. You reach the next one by a click of Next >>
The steps are explained in the following table:

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Sheet 1 of 4

◀◀ Back	**AFGUARD Inlet**	Next ▶▶

Available	☒
Measure range (20mA)	50 ppm
Signal Attenuation time:	1 sec

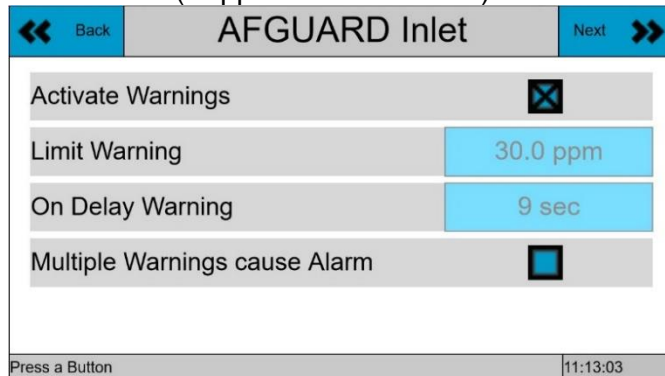Press a Button   11:12:34

Available: If no AFGUARD Inlet is available, please uncheck the box. The following three installer sheets will be skipped

Measure range:
please adjust AFGUARD® calibration range (most of them should be calibrated for 0 to 50 ppm.

Signal Attenuation time:
For attenuating the signal, you can enter a time. The AFGUARD has already an internal attenuation but for a better water analysis we recommend a time of 1 second.

Since firmware 2020-10-28 neither the Measure range nor the attenuation time can be edit by admin password to simplify configuration. If you have special applications where these values must be edited, do not hesitate to contact FAUDI Aviation.

Sheet 2 of 4 (skipped if not available)	**Activate Warning**: Usually the inlet warnings are disabled.
AFGUARD Inlet — Back / Next Activate Warnings ☒ Limit Warning 30.0 ppm On Delay Warning 9 sec Multiple Warnings cause Alarm ☐ Press a Button 11:13:03	**Limit Warning**: A ppm value at which a water warning gets triggered. **On Delay Warning**: The Inlet water contamination must be above the limit for the specified time. Then a warning comes. The warning relay gets released and the blue lamp blinks slowly. **Multiple Warnings cause alarm**: Please activate this setting if you want to have the alarm relay released if there occurred more than one warning. **No. of Warnings to Fuel Stop**: The count of warnings which must occur until the alarm relay gets released and the blue lamp blinks fast. This usually should happen after the second warning.
Sheet 3 of 4 (skipped if not available)	**Activate Alarms**: If you want to have a water alarm at specified value (usually inlet 50ppm, outlet 30ppm)
AFGUARD Inlet — Back / Next Activate Alarms ☐ Press a Button 11:13:28	**Limit Alarms**: The limit at which an alarm gets triggered and the alarm relay gets released. **On Delay Alarm**: The time the water contamination must be above the specified value until the alarm relay gets triggered and the blue lamp blinks fast.
Sheet 4 of 4 this page is skipped for both AFGUARD® because water slug detection is always enabled for both AFGUARD®s.	
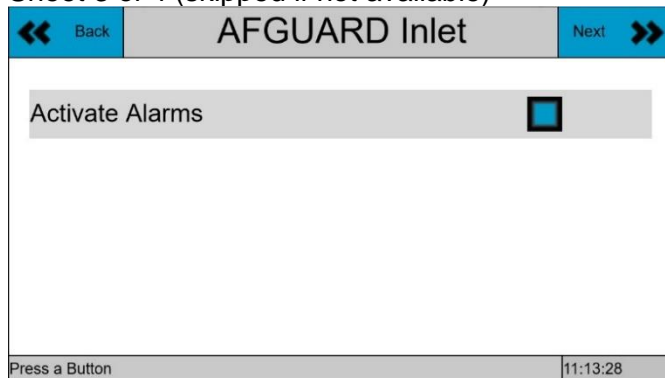
One Warning will release the warn relay (slow blinking LED)
Multiple warnings or one alarm or one water slug will release the alarm relay (fast blinking LED).
This only will happen when the Water Monitoring is activated.

By a click on Next >> the following sheet will appear:

3.2.4.3.6.2 AFGUARD Outlet

Setting up the AFGUARD Outlet is the same procedure as setting up the AGUARD Inlet. There are also 3 sheets (2 of them optional, if AFGUARD Outlet is Available). Please refer to the steps in the last chapter. You can configure the AFGUARD Outlet with different parameters than the AFGUARD Inlet.

3.2.4.3.7 SLUGGUARD Settings

If you finished the setup for the AFGUARD Outlet the next sheet will be:

If you use the system with a SLUGGUARD® then make sure the available box is checked. Otherwise uncheck the box.

For fail-safety, the Inverted logic is used and cannot be edited. This means, that the system recognizes a water slug when there is a low level at the SLUGGUARD® Input.

For realizing a hysteresis, the system has an on and off delay of a few seconds for triggering an alarm. This is preset to 5 and 1 sec and cannot be edited. Contact FAUDI Aviation if you need different values.

If you are finished click Next >>.

3.2.4.3.8 Water Monitoring setup

This menu has been removed from the installer to since firmware 2020-08-28 to simplify the configuration process.
The water monitoring gets automatically started when one of the following conditions fulfilled:
- Trigger signal pressed   or
- Flow greater than the specified value (default: 50l/min)   or
- Differential pressure greater than the specified value (default: 0.05bar)
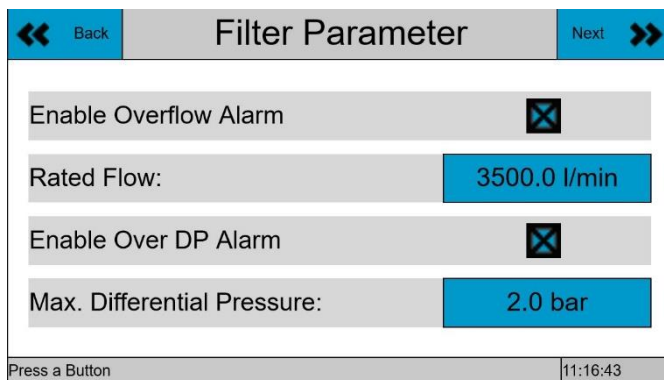
So at least one of the three signals must be connected to the system.

If you have issues due water monitoring or need different values, do not hesitate to contact FAUDI Aviation.

3.2.4.3.9 Filter Parameter

This page is optional and will be skipped if in the last steps of the installer the sensor types of Flow Meter and Differential Pressure sensor were set to "N/A".

3.2.4.3.9.1 Rated Flow

This input box disappears if no Flowmeter is installed (Flow Rate Sensor type "N/A").
Please input the rated flow of your filter vessel or enter the max. achievable (max. necessary) Flow of your refuelling process here. The effect of this value is, to release the alarm relay immediately when the flow is higher than the set limit. The blue lamp will switch off and a reset will be required.

3.2.4.3.9.2 Max. Differential Pressure

This input box disappears if no DP sensor is installed (DP Sensor type "N/A").
Please input the max allowed differential pressure of your refuelling process here. The effect of this value is, to release the alarm relay immediately when the measured DP is higher than the entered value. The blue lamp will switch off and a reset will be required.

Click Next >> to continue.

3.2.4.3.10 Interlock Settings

This menu has been removed from the installer to since firmware 2020-08-28 to simplify the configuration process. it is integrated into "Logger settings" (The next page in the installer).

3.2.4.3.11 Datalogger

The following sheet will open.
The logging cycle is set to 2 Seconds and cannot be edit.

Please have in mind that only logged data could be analysed retroactive. Amount of data increases linear with number of logs.

The logging of a refuelling process and the corresponding calculation for the refuelling history can be started and stopped by the following options depending whether you connect an interlock signal to the CCS Silver or not.
We recommend you connect an interlock signal to the system. The interlock signal will tell the system when a refuelling process starts and when it ends. Also, it is possible to use the CCS without an interlock signal. The differences will be explained in the following Table. As "refuelling process" we call the whole time when the refuelling truck stands under an aircraft and is ready to refuel or is actually refuelling.

Interlock Signal available:	Interlock Signal not available:
If you want to connect a binary interlock signal to the system, then make sure the box is checked	If you don't connect an interlock signal to the system, then uncheck the box.
A hysteresis for the interlock can be configured. You can set the on and off delay by a click on the blue boxes. If you are not sure, we recommend, not to modify the two values.	Since firmware 2020-10-28 the default value for the follow-up-time is preset to 0 sec and cannot be edit. If a failure of detection happens here it does not affect on the safety, but the analysis of the refuelling processes could be wrong. E.g. the system logs the refuelling of two aircrafts in one log file or it divides one refuelling process into two log files.

The refuelling process will be during a high of the interlock signal (regarding the set hysteresis).	The refuelling process starts automatically with the first activation of the monitoring by the trigger, flow or differential pressure. It ends the specified time after the trigger has released **and** the flow **and** the DP are below the set limits in the **Monitoring chapter,** when you do not modify the defaults, the refulling process ends with the water monitoring simultanuosly.
The datalogger will log during the hole refuelling process. It creates one logfile with date and time of begin for each refuelling process.	The Datalogger will also log during the hole refulling process, this means it creates one file when the monitoring starts and continue this file until the follow-up time after the monitoring ends is over.
The history gets one record for the refuelling process	The history gets one record for the refuelling. This means also one record which starts with the first monitoring in the refuelling process and it ends after the set follow-up time after the last monitoring is over.

Ignore missing USB Drive / Battery Error: Since firmware 2020-01-12 the CCS silver generates an error when no USB drive is plugged in, or USB drive is faulty. As well there will be an alarm generated when the battery is low and the date and time have invalid values. In both cases the blue flashlight will stay off and the alarm relay gets released. If the lower Ignore box is checked, no error will be generated and the alarm relay stays unaffected of these cases.

Click Next >> to continue.

3.2.4.3.12 Finished

The following screen appears.
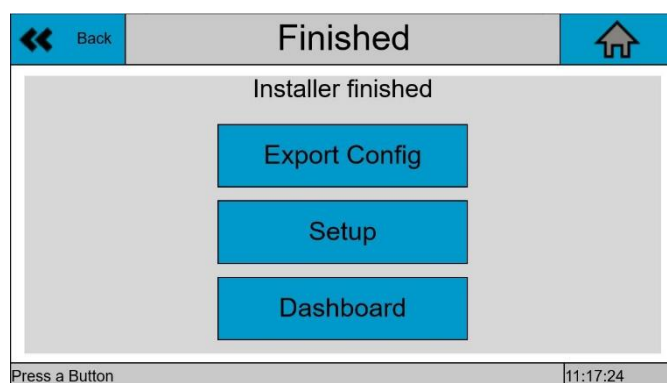
If you like to do some additional settings, which are not part of the installer, like
- Signal Outputs
- Modbus settings
- Network settings
- …

you can click Setup to go through the configuration menu.

If you like to export the configuration as a backup to install it on related CCS Silver systems, then click Export Config

3.2.4.3.13 Export Config

If you click Export Config, the following screen appears:

Click Store on USB to export the configuration file. You can get the config file by unplugging the USB drive or easier: by a click on Download. Then you can download the file via your web browser. Note: The browser must allow pop-ups and support File transfer Protocol.
If you are finished click on the Home Button to get to the dashboard or click 2x << Back to get to the setup.

3.2.4.3.14 Check for the right settings

If your sensors are connected wrong, then the dashboard may show you some errors. E.g. if no sensors are connected yet, the screen could look like the following:
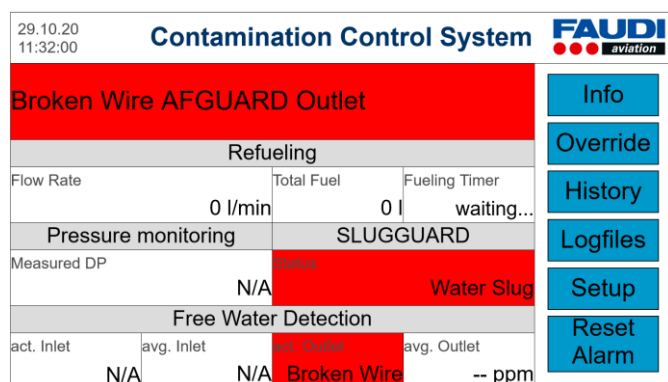
Make sure every sensor is connected properly If you don't connect a sensor which is expected by the system, you will see Broken Wire Errors on the main screen. In this case, check the connections first and apply a reset. You can apply a reset by hardware via the reset input where you can connect a switch or via software by a click on Reset Alarm
If you accidently did not set "**N/A**" for all sensors which are not available to the system you should launch the installer again.

3.2.5 Setup

At the first launch of the CCS you should use the installer to set up the system. If you want to change any settings later, you can go to the CCS setup.

You should never open the setup and make changes during a refuelling process!

There are two levels for the setup:
- User
- Administrator

The User level has the following rights:
- Change language
- Change date and time

The Administrator has the following rights:
- Change language
- Change system settings
    - Date and time
    - Display Units
    - User PIN and Administrator PIN
    - Datalogger settings
    - Network settings
    - Filter Parameter
    - Modbus
- Change sensor inputs
    - Flow Rate
    - Pressure
    - Interlock
    - SLUGGUARD
    - AFGUARD Inlet
    - AFGUARD Outlet
- Change Signal Outputs
    - Analog Output
    - Digital Output
    - Relay Output
- Config & Backup
    - Load Defaults
        - Reset Config
        - Clear History
    - Import Config
    - Export Config
    - Launch Installer

Setup screen – to be addressed from main screen
To enter the setup procedure – please click on Setup button.
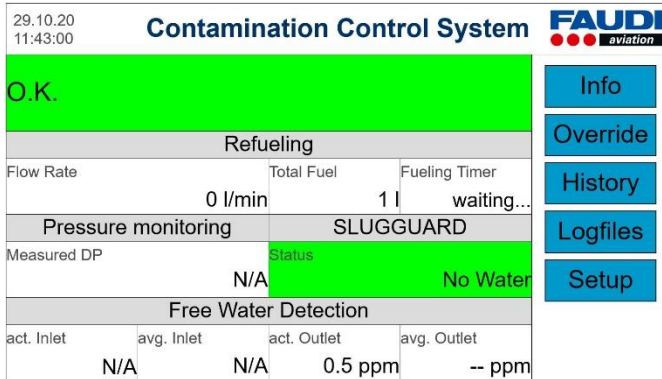
After pressing the Setup button – you are immediately asked to enter your PIN number
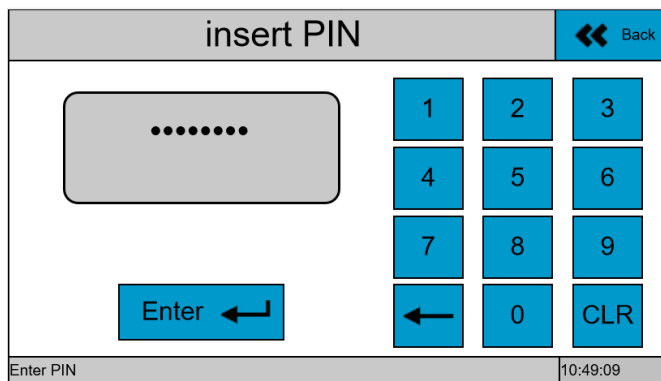
Use the buttons on the right side or your keyboard to type in the PIN. Press Enter ↵ when you are finished.
Following PIN numbers are preconfigured:

Administrator – PIN level: 12345678
User – PIN level: 00000000

After entering your PIN number, you should enter one of the following menu levels:

Admin Level	**User Level**
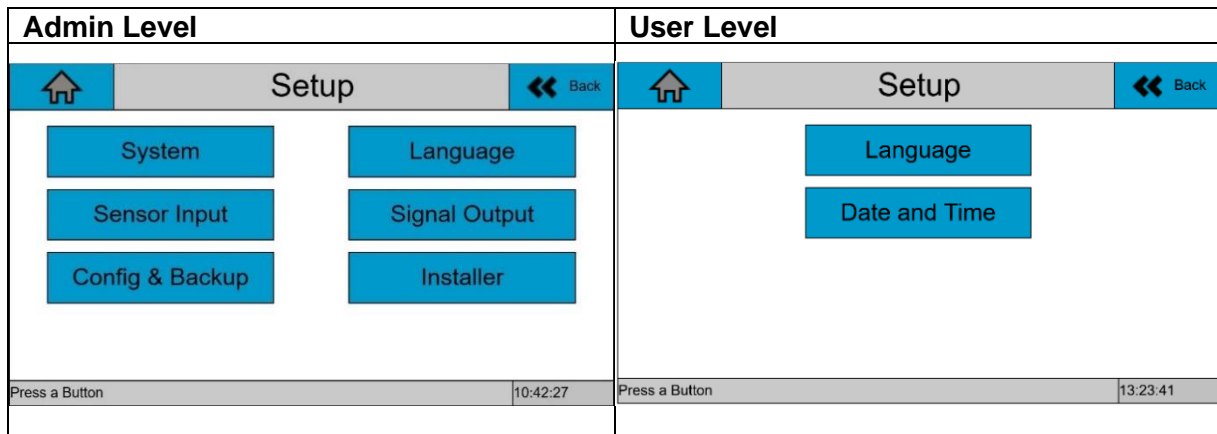
In User Setup you are only allowed to change **language** and **date and time**.
In Admin Menu you can do much more.

Warning: settings in setup have effect to alarm behaviour, data logging and more. Never change settings of the system during operation!
In the following the Admin Setup is explained.

3.2.5.1 Language

For setting up the language, click on the Language Button. Menu will open
Please select language and click back.

3.2.5.2 System

By a click on System, the following submenu gets opened:
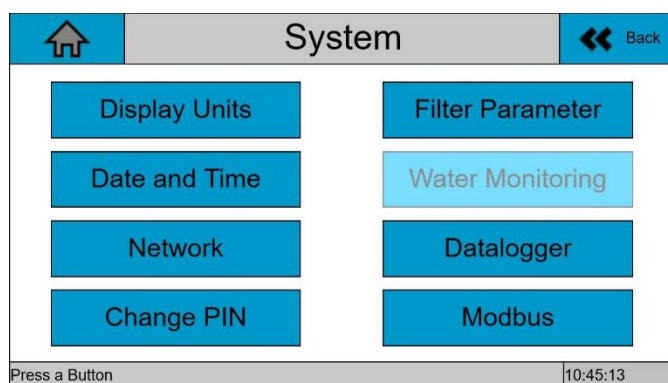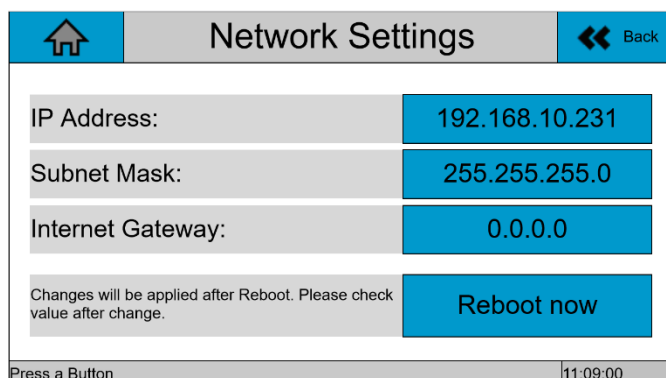
The settings for
- Display Units
- Date and Time
- Change PIN
- Datalogger
- Filter Parameter

Are the same as in the installer. Click on the corresponding button for changes. The sub menu will open. By a click on back in the upper right edge, you will go back to the last menu.

3.2.5.2.1 Network Settings
By a click on Network, the following dialog will open:

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Network Settings

IP Address:	192.168.10.231
Subnet Mask:	255.255.255.0
Internet Gateway:	0.0.0.0
Changes will be applied after Reboot. Please check value after change.	Reboot now

Press a Button   11:09:00
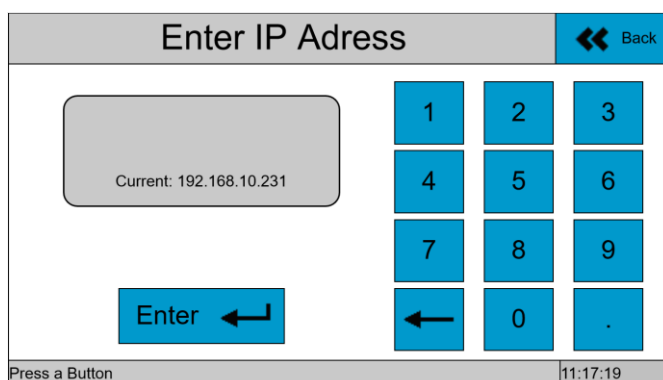
The system has one ethernet interface. For this interface you can change the network settings in this menu.
The Default IP Address is **192.168.10.231** with subnet mask **255.255.255.0** (Prefix length **24**).
The internet gateway could be necessary for future functions of the CCS.
If you want to set the internet gateway, it must be in the same subnet than the system. In this case it should be in range **192.168.10/24**. The internet gateway is the address of the router which connect the subnet with the internet.
To change the IP Address, Subnet mask or Internet gateway, click on the corresponding blue box. A dialog will open.

Enter IP Adress

Current: 192.168.10.231

Enter ←┘

1	2	3
4	5	6
7	8	9
←	0	.

Press a Button   11:17:19

Use the keypad on the right to type in the decimal IPv4 address in four octets separated by a dot and press Enter ↵.
You will go back to the last screen.

It is very important to check the values in the blue boxes again after a click on Enter ↵. If you enter an invalid IP address, it can happen that the blue boxes are blank, or they show a wrong value. **The shown addresses will be set when the system reboots.** You can do this by disconnecting the power supply or by a click on Reboot now.
When you click on Reboot now, a confirm dialog opens:
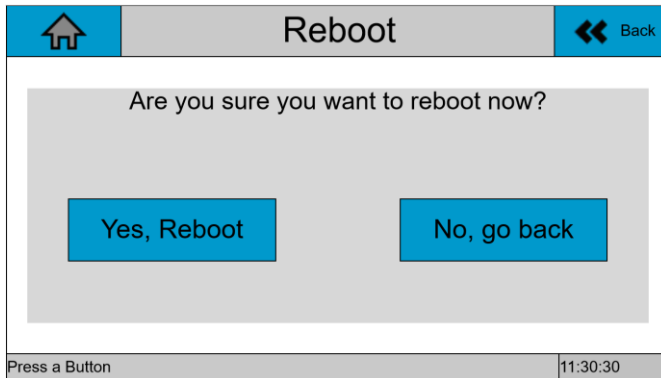
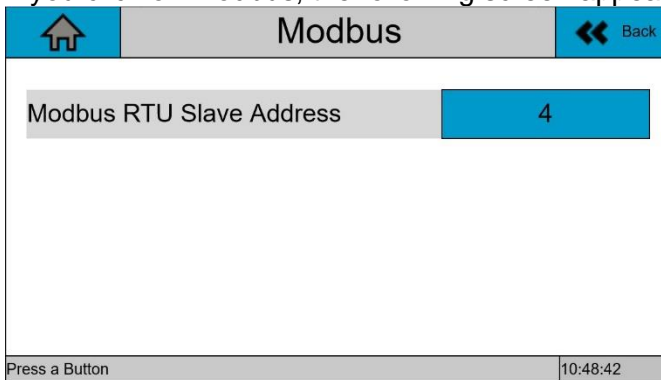
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3.2.5.2.2 Water Monitoring

The Water Monitoring settings are not reachable with Administrator PIN. If you need to modify water monitoring settings please contact FAUDI Aviation.
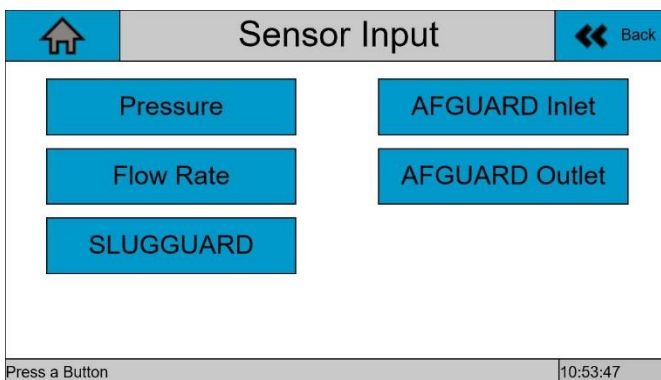
3.2.5.2.3 Modbus

If you click on Modbus, the following screen appears:

you can change the Modbus RTU Slave address here. For more information about the CCS Silver Modbus TCP / RTU interface refer to the CCS Silver Modbus Application Note.

3.2.5.3 Sensor Input

By a click on Sensor Input the submenu gets opened:

If you want to apply changes on Sensor input, you can do this in this submenu.

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Usually all Sensor Input Settings are done in the installer. This submenu is only for modification of the settings. You have random access to all Sensors and to the conditions for triggering the water monitoring and for the interlock. For the meaning of every menu point, please refer to the installer.

The menu structure is:
- Sensor Input
    o Flow Rate
        ▪ Signal Type: N/A, Pulse, 0..20mA, 4..20mA
        ▪ Fuel per Pulse or Max. Flow Range (20mA)
        ▪ Signal Attenuation time
    o Pressure
        ▪ Signal Type: N/A, 0..20mA, 4..20mA
        ▪ Max. Pressure Range (20mA)
        ▪ Signal Attenuation time
        ▪
    o SLUGGUARD
        ▪ Available / Not available
        ▪ Invert Signal
        ▪ On Delay
        ▪ Off Delay
    o AFGUARD Inlet
        ▪ Signal Settings
        ▪ Water Warning Settings
        ▪ Water Alarm Settings
        ▪ Water Slug Settings
    o AFGUARD Outlet
        ▪ Signal Settings
        ▪ Water Warning Settings
        ▪ Water Alarm Settings
        ▪ Water Slug Settings
    o Water Monitoring
        ▪ Limits for activation
        ▪ Off Delay Monitoring

3.2.5.4 Signal Output

By a click on Signal Output, a submenu gets opened:
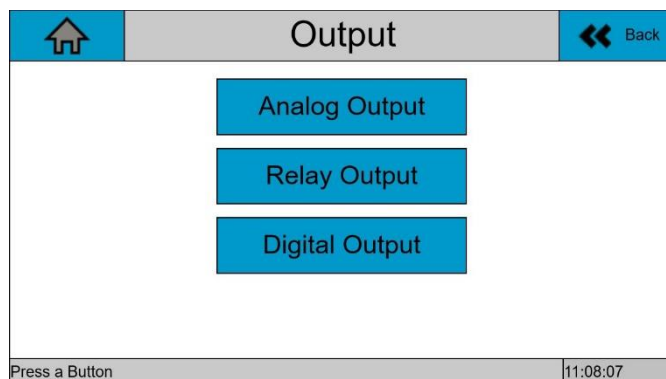
Click on one of the three buttons to open the submenu

3.2.5.4.1 Analog Output
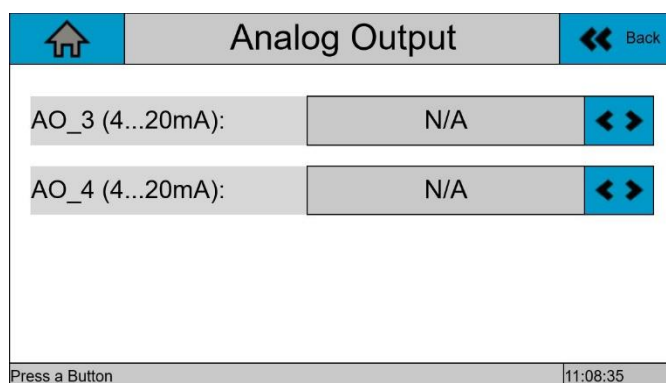
The output channels AO_3 and AO_4 are configured to give out a 4…20mA-Signal. Click on the < > button to change the functionality. You can give out following signals (if connected, otherwise, they were skipped)

- AFGUARD Inlet
- AFGUARD Outlet
- Flow
- DP

If you use a pulsed flowmeter and want to give out the flow signal, the system will ask you for a range (20mA).

3.2.5.4.2 Relay Output
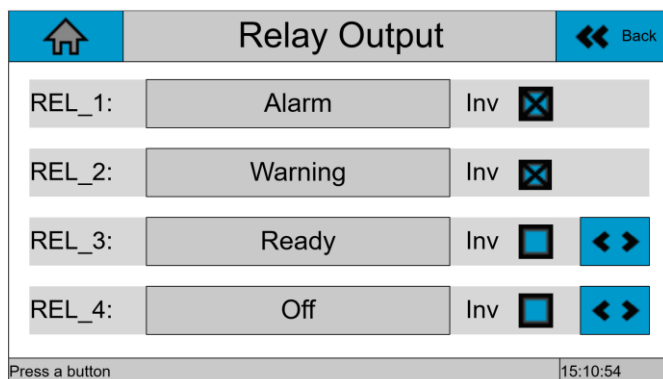
The relays REL_1 and REL_2 cannot be changed. REL_3 and REL_4 can now be freely configured. press the < > button to change the binary value, you want to map to the corresponding relay. Default value of REL_3 is Ready.
With < > you can switch trough all values:

No.	Value	Comment
1.	Off	
2.	Monitoring active	
3.	Monitoring active, AFGUARDs armed	Usually same as Monitoring active, there's only a difference between them if water monitoring on delay is specified (minimum fuel, minimum time)
4.	Refuelling active (Logging)	If no interlock is activated in setup, the logging begins with Monitoring and ends after off delay of monitoring
5.	SLUGGUARD: Water Slug	direct signal from SLUGGUARD® sensor
6.	SLUGGUARD: Water Slug, delayed	Signal with on and off delay (default: 5 sec, 1 sec)
7.	Fast Blink water alarm (AFG or SLG)	
8.	Alarm	Fast Blink water alarm or overflow / dp alarm or cable break / sensor error. Same value as REL_1
9.	Warning	same as REL_2
10.	AFGUARD Inlet Warning	
11.	AFGUARD Inlet Alarm	
12.	AFGUARD Inlet Water Slug	
13.	AFGUARD Outlet Warning	
14.	AFGUARD Outlet Alarm	
15.	AFGUARD Outlet Water Slug	
16.	Override active	
17.	Over DP Alarm	
18.	Overflow Alarm	
19.	Ready	= Monitoring active and no Alarm

Every value can be inverted by enabling the Inv x checkbox.

3.2.5.4.3 Digital Output

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	Digital Output		《《 Back
DO1:	Flashlight		
DO2:	Monitoring active	Inv ☐	‹ ›
DO3:	Off	Inv ☐	‹ ›
DO4:	Off	Inv ☐	‹ ›

Press a Button   11:09:19
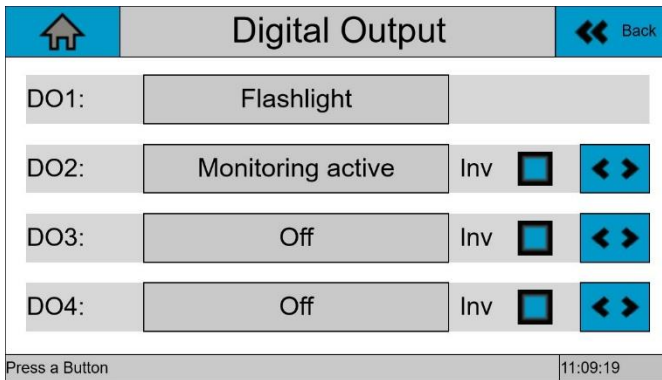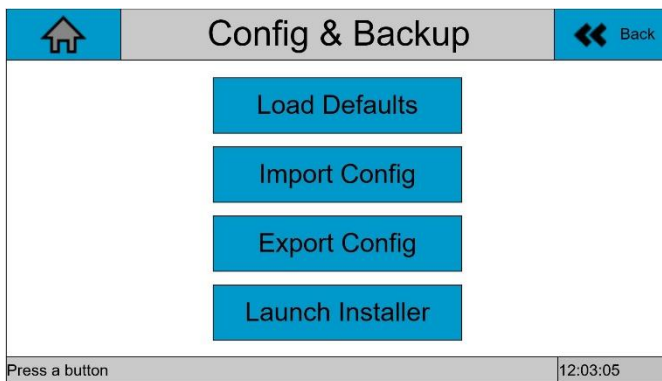
The Output DO1 cannot be changed. It is for connecting the blue LED-Flashlight.
The configuration of Digital outputs DO2, DO3 and DO4 is the same procedure than Relay Outputs.
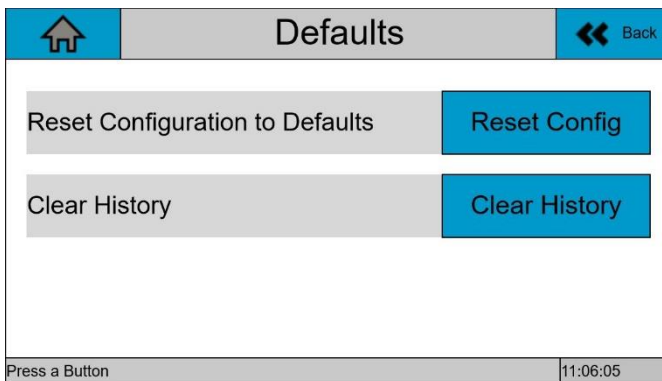
3.2.5.5 Config & Backup

By a click on Config & Backup the submenu gets opened:

	Config & Backup	《《 Back
	Load Defaults	
	Import Config	
	Export Config	
	Launch Installer	

Press a button   12:03:05

3.2.5.5.1 Load Defaults

By a click on Load Defaults, you can set the system to defaults and delete the History
A dialog will open:

	Defaults	《《 Back
Reset Configuration to Defaults	Reset Config	
Clear History	Clear History	

Press a Button   11:06:05

It is possible to reset the Configuration of the CCS to defaults. Click on Reset Config, a confirm dialog will open.
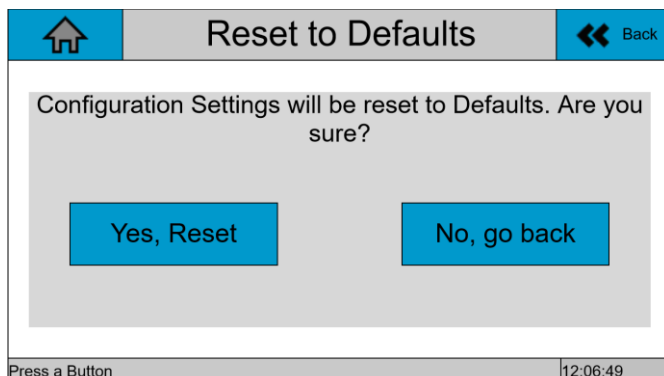
Click Yes, Reset for defaults. The Welcome Screen gets opened. You must launch the installer again or import a configuration.

Caution: The configuration reset does not affect on:
 Date and Time
 Network settings
 History

The configuration reset affects on PIN Numbers. They will be reset to defaults.

3.2.5.5.2 Import Config

To load a config file into CCS click Import Config. More information in chapter 3.2.3

3.2.5.5.3 Export Config

To store a config file as a backup or to transfer it to related CCS Silver systems, click Export Config. More Information in chapter 3.2.4.3.13

3.2.5.5.4 Reset History

By a click on Reset History a confirm dialog will open:
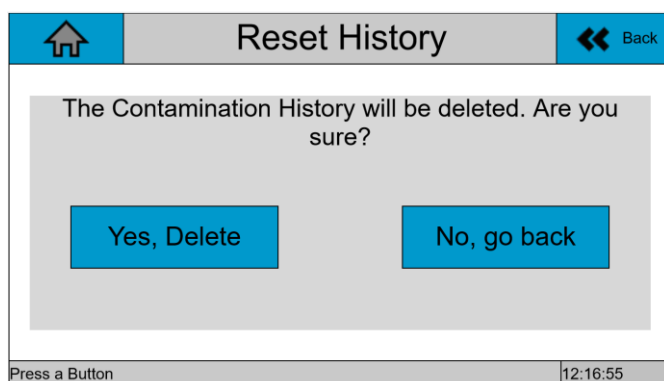
Please confirm by a click on Yes, Delete. The history gets cleared. This will delete the local history (last 50 fuellings), not the history.csv file on the USB drive.

3.2.6 Dashboard (main screen)

The Dashboard is the main screen of the visualisation. It shows several information about status and sensor signals.
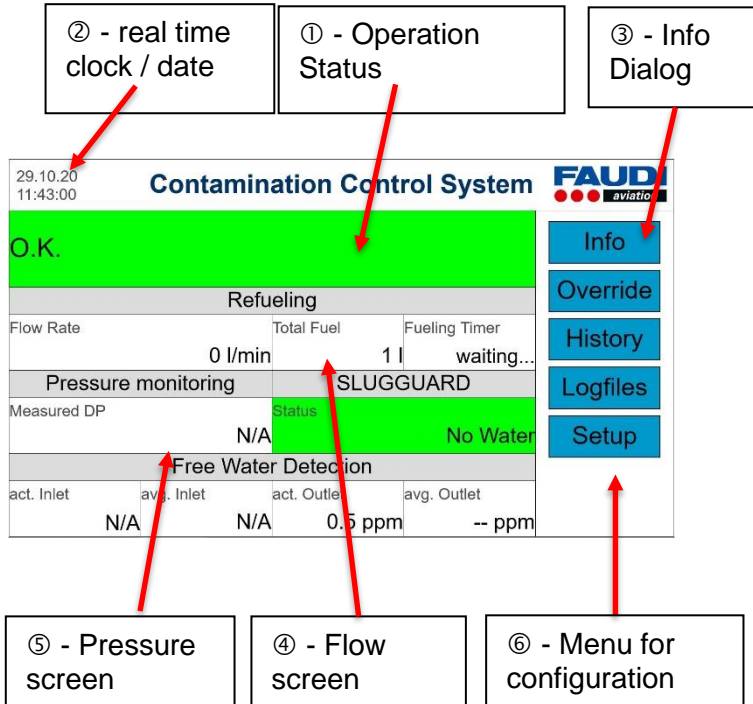
①	Operation Status, telling if everything is O.K. or if there is an alarm.
②	Real clock for data logger and evaluation of logged data
③	Info Dialog with information of the system, IP settings and contact to the manufacturer
④	Flow screen with actual flow rate and total fuelled volume for actual refuelling process
⑤	Pressure screen with measured differential pressure across filter elements
⑥	Setup Dialog will be opened after asking for the User / Admin PIN

①	Water screen with actual detected content of free water and averaged free water content for actual fuelling process
②	Reset Button which is only visible if there actually is an alarm or warning.
③	The water detection screen. You get information about the water contamination in the inlet and outlet and the current sensor status. Also, you get the averaged contamination during the refuelling process. Condition for this feature is the availability of a pulsed or analog flow signal.
④	Override Button

3.2.6.1 States of CCS

3.2.6.1.1 O.K.

Under normal circumstances – all sensor signals (pressure sensors, flow signal and AFGUARD free water content) are OK, with no Alarm and Warning to inform about critical situations – the CCS main screen should look as following:

3.2.6.1.2 Warning
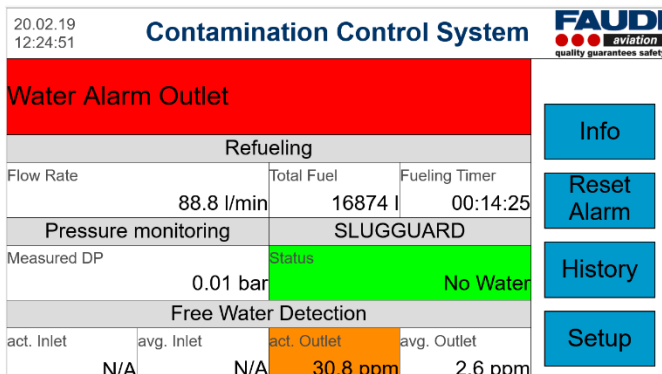
When water warning levels are achieved by an AFGUARD– Headline colour changes from green into yellow:

In this example there is a warning from the Outlet AFGUARD.
When Alarm levels are achieved – headline colour changes from green / yellow into red with blinking of screen. The warning relay releases and the blue flashlight blinks slowly. When multiple warnings occur, then the headline changes colour from yellow to red, the alarm relay releases, the flashlight blinks fast. The headline text changes to "Water Warning: Fuel Stop!"

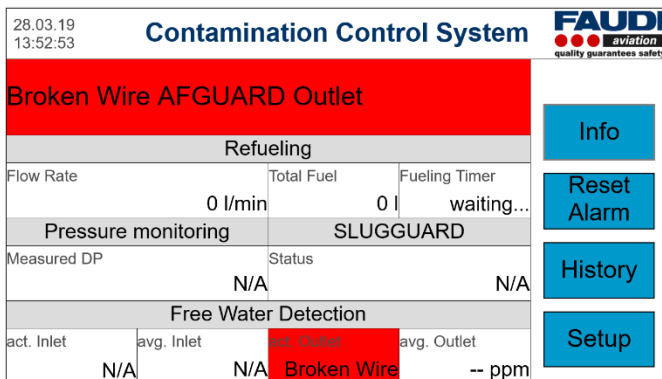### 3.2.6.1.3 Water Alarm and Water Slug

Here the headline blinks red to indicate a water alarm.
The CCS shows the same behaviour when a water slug occurs. The alarm relay releases and the blue Flashlight blinks fast.

3.2.6.1.4 Broken wire

When signal of a sensor is below preconfigured signal quality (e.g. 4 to 20 mA with signal heights of less than 4 mA) an alarm will be displayed.

The Headline shows "Broken Wire" or "Sensor Error" and the sensor name. If there are more than one wire break or sensor errors, the headline shows only the most critical one. Also, in the field of the sensor in the display, the field blinks red and the text "Broken Wire" or "Sensor Error" is shown. Please consider that the state in the sensor text fields shows the situation at the moment only. If an error occurs and then it got fixed, then it will only be shown in the headline.

Broken wire and sensor error can only get detected for current sensors with signal range "4..20 mA". It is not possible to detect a wire break on a pulse flowmeter, a 0..20mA sensor or a binary 24V High/Low voltage input like trigger, reset or interlock.
The table explains the states of a 4..20mA sensor:

| 0 – 3.6 mA | No sensor connected or wire break | Check connection, power supply of sensor / barrier |
| 3.6 – 4mA | Sensor or barrier connected, error | Please refer to the manual of the sensor or barrier |

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4 – 20 mA	Sensor works properly	

Please consider that in Ex safe areas a safety barrier is mounted between sensor and CCS. The problems don't need to come from the sensor, it can also come from the barrier or connection between.

Please check cabling to make sure that all connections are OK.
Faulty alarm could either be caused by wrong pre-setting of sensor signals. In this case we recommend launching the installer again.
For the SLUGGUARD there is also a fail-safe option which allows to show a wire break. The SLUGGUARD should output 24V if everything is ok (no water). It should output 0V when it detects water. In this case the CCS shows a SLUGGUARD alarm, when it comes to a cable break. Make sure the SLUGGUARD® is programmed with this logic and the wiring matches the fail-safe requirements.

3.2.6.2 Reset Alarm

3.2.6.2.1 Reset Alarm by Software

Water Alarm (above 30ppm for 10 sec) in the outlet

Reset Button

In any case of activated alarm – additional touch button appears to reset alarm manually by a touch on screen. Alarm could either be deactivated using external reset button. Please consider that a SLUGGUARD alarm could not be reset through hardware reset switch or reset button in the visualisation. A SLUGGUARD alarm resets automatically when water gets drained at the SLUGGUARD mounting position.
By a press on the Reset Alarm button in the visualisation, a PIN Dialog appears.

You are asked to enter a PIN. For a reset you can insert the User PIN or the Admin PIN as well. When the PIN is correct, there will be a dialog telling you to fix any . The dialog looks like:

Reset Alarm   ◀◀ Back

Make sure everything is fixed. Otherwise the Reset won't be accepted!

Reset

Press a Button   13:21:44

This means:
- When Water Monitoring is active at the moment:
  - No Water warnings Inlet/Outlet
  - No Water alarm Inlet/Outlet
  - No Water slug Inlet/Outlet
- No SLUGGUARD alarm
- No wire breaks ($I < 3.6mA$) or sensor errors ($I < 4mA$) on **all expected** sensors
- No Overflow
- No Over DP

If the listed conditions don't match, the reset won't be accepted, affecting to the state of the relays and depending on the reason of the alarm to the blue flashlight

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3.2.6.2.2 Reset Alarm using external switch

Alarm could either be reset using an external reset switch.
CCS consists of different digital inputs. Digital input RESET has been setup to reset Alarm or Warning via external switch, e.g. a key switch. Please refer to CCS installation instructions for hardware setup.

3.2.6.2.3 Reset Alarm via Modbus

Please refer to Modbus Application note.

3.2.6.3   History

The CCS logs data through every refuelling process You can see the average and maximum water contamination measured by the AFGUARD® for the Inlet and the Outlet of the filter (provided the corresponding sensor is installed). The history can be shown on the screen. The last 50 refuelling processes are stored on the intern memory of the CCS. A USB drive is not required for showing the last 50 refuelling processes on the screen.
To call the history, click on the History button on the dashboard.

The history page opens. You see a bar chart there, which shows the maximum / average contamination.
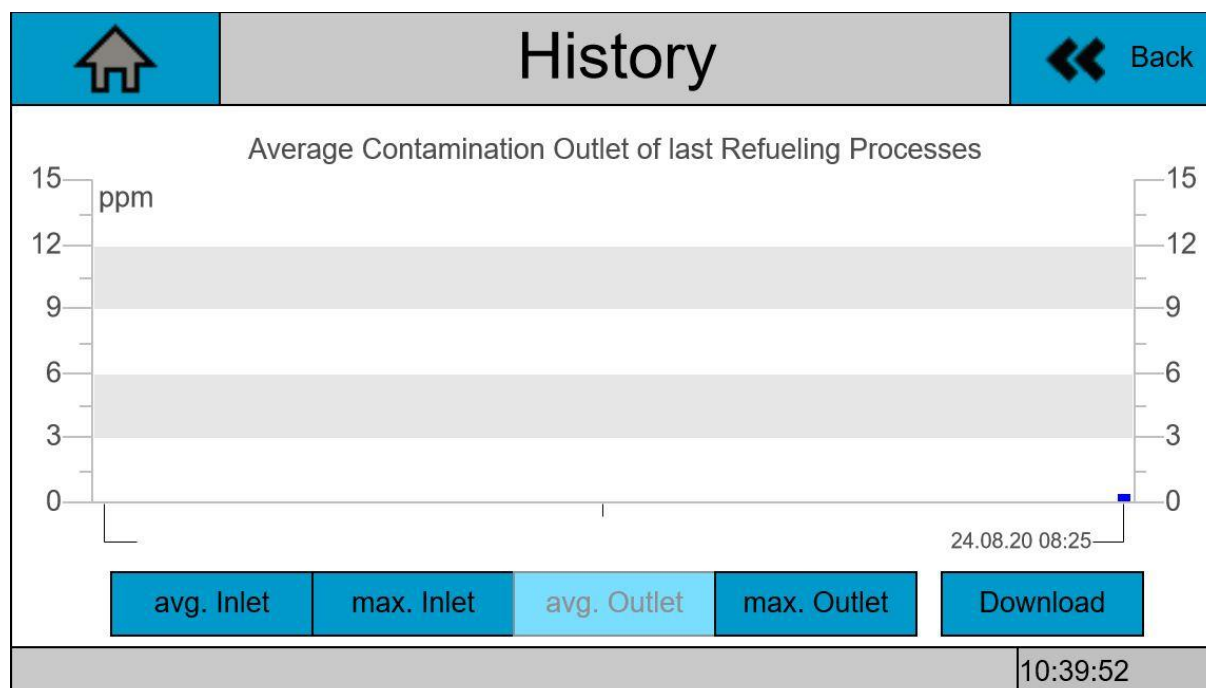
With the buttons below, you can switch the view to Inlet and Outlet and between average and maximum values. If there is no AFGUARD® installed in Inlet or Outlet, the corresponding buttons disappear.
The chart begins with a bar on the right side. At the end of a refuelling process, the bar is shifted one step to the left. If the left edge of the chart is reached, the last data set gets deleted, so the history diagram acts as a FIFO Memory.

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CCS Silver
Firmware 2021-01-14

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For calculating the avg. values, the CCS uses two different algorithms depending on whether a flow signal is connected or not.

If a flow signal (analog or pulsed) is connected to the system, the avg. contamination is weighted with the current flow rate. For an exact result of the average contamination, a flow meter is required.

If no flow signal is connected, the avg. value is the arithmetic medium of the contamination during the refuelling process.

If a USB drive is plugged and a history file is available, you can download it by a click on Download. Make sure your browser allows pop-ups and supports File Transfer Protocol. You can download the history also by entering the URL ftp://192.168.10.231/c/history.

3.2.6.4 Logfiles

Since firmware 2020-10-28 you can comfortably download logfiles via web browser. You don't need to unplug the USB drive anymore.

Click Logfiles. If your browser allows pop-ups and supports FTP it shows all logfiles saved on the USB drive.

Index von ftp://192.168.10.231/c/logging/

In den übergeordneten Ordner wechseln

Name	Größe	Zuletzt verändert	
Datei: CCS_Logging_20282_2020-08-18_153457.csv	17 KB	18.08.2020	17:42:00
Datei: CCS_Logging_20282_2020-08-18_172629.csv	22 KB	18.08.2020	19:31:00
Datei: CCS_Logging_20282_2020-08-18_173208.csv	7 KB	18.08.2020	19:33:00
Datei: CCS_Logging_20282_2020-08-24_082552.csv	7 KB	24.08.2020	10:27:00

You can click each file to download / open it.

For a more comfortable file management of logfiles, we recommend Windows Explorer or another tool like FileZilla. Enter the path ftp://192.168.10.231/c/logging/ in one of these programs to download logfiles.

3.2.6.5 Info screen

When pressing the Info button on the main screen – all relevant contact info's are displayed on this screen

Contamination Control System

FAUDI *aviation*

Version: 2020-10-28
Serial No.: 20282

Uptime: 4h 18m 31s

FAUDI Aviation GmbH
Scharnhorststraße 7B
D-35260 Stadtallendorf

Fax: +49 6428 4465 - 221
Email: sensor@faudi-aviation.com
Web: www.faudi-aviation.com

IP Address: 192.168.10.231
Subnet Mask: 255.255.255.0
Internet Gateway: 192.168.10.1

29.10.20 12:25:29

When contacting FAUDI Aviation GmbH for service purposes – please make sure to have data on info screen prepared. These data are relevant to make online service available.

Also, you see Firmware Version Number, Serial No. of the system and Uptime (since last boot).

Clicking on the screen again or pressing the ESC-button on your keyboard will bring you back to main screen.

3.2.6.6 Software Override

In some cases, it can be helpful to deactivate the alarm functionality of the System. The CCS supports an Override feature. To open the override mode, click on Override

You are asked for a PIN, Please enter the **Admin** PIN then the Override dialog will open.
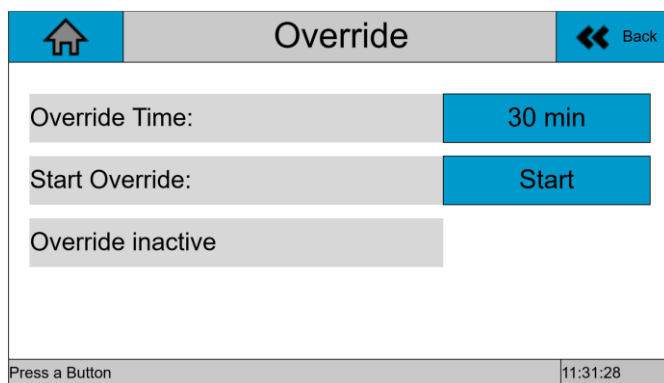
With the button in the Override Time section, you can set up a time up to 60 min.
For this time, both relays REL_1 and REL_2 will stay in On-position, they won't get released when an alarm / water slug / warning / error appears. To indicate the unreadiness of the system, the blue lamp stays off.
The time begins with a click on Start.
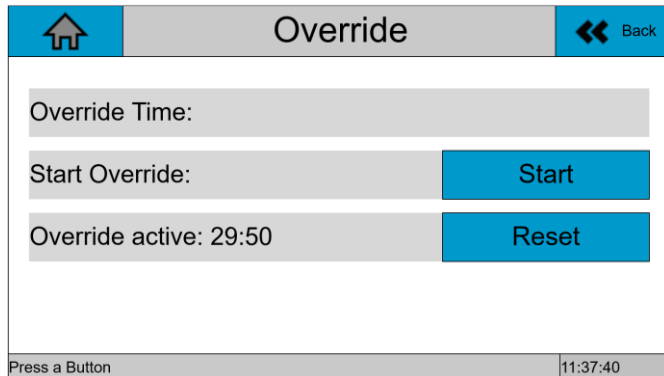
The screen shows "Override active" and a countdown. Another Reset Button appears. By a click on **Reset** the override mode will end immediately. The standard behaviour of the system, the relays and the lamp come back. **A click on Reset has the same behaviour than a hardware reset applied by a key switch.** You can also use the hardware reset to end the override. Additionally, all alarms will be deleted.
It is very important to check if the blue indicator lamp gets back to the ready blink pattern.
By a click on **Start** the countdown starts again by the set time.
By repowering the system during the override period, the system starts again without override.

3.2.6.7 Hardware Override

There is also the possibility to activate Override by a Digital Input. The input DI3 activates the Override as well and holds it as long as DI3 is in High-State (24V). For Hardware Override you don't need to open the web visualisation to set an Override time.

3.2.7 Datalogger

The CCS consists about a built-in data logger. All relevant data are stored there.

This data is stored during the process on a USB memory stick located on the PCB of the CCS below the Ethernet port.
To get access to these data, remove the USB memory stick and plug it into a computer.
Caution: **Do not remove the USB drive during a refuelling process of the system! This can cause in data loss of the currently opened logfile.**

Logged data could be analysed with every computer-based software that is able to read CSV data or Excel files. A simple text editor like Microsoft Notepad will do it as well. For a more comfortable evaluation we recommend Excel or an equivalent tool.

Please insert the memory stick into a computer. You can see following data structure:
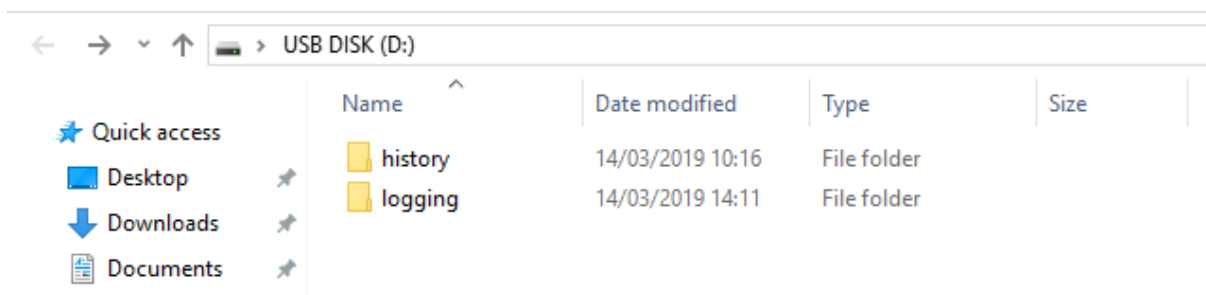

There are two directories:
1. history
2. logging

3.2.7.1 History

Directory „history" contains logged data that belongs to every refuelling process. It has one file "history_XXXXX.csv" (XXXXX represents the Serial no. of the CCS) which has an entry for every refuelling process with following data:
- Total fuel
- Average water contamination Inlet
- Maximum water contamination Inlet
- Average water contamination Outlet
- Maximum water contamination Outlet

The history file (opened with Notepad) looks like:

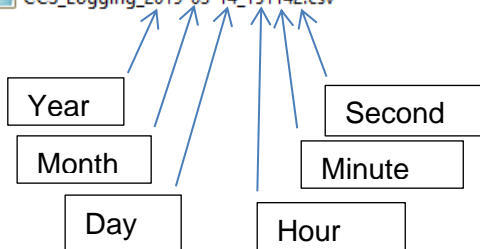You can download the history file via FTP. The URL is: ftp://192.168.10.231/c/history/

/
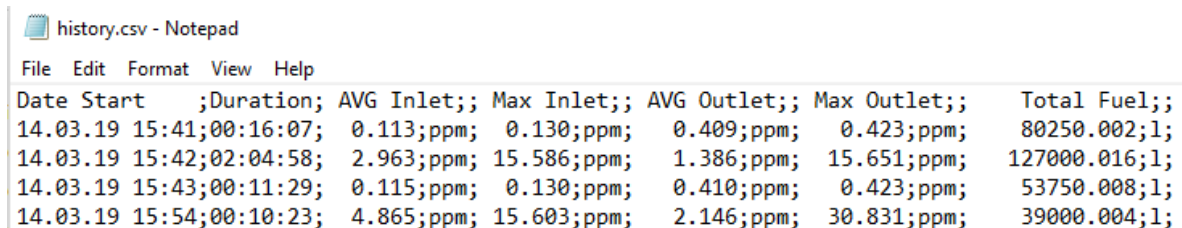
3.2.7.2 Logging

In the directory "logging" there is a file for every refuelling process, which contains logged information of the refuelling.

Every time when the refuelling starts (by interlock or monitoring), then a new file will be created. The filename contains the date and time of the **begin** of the refuelling process. **If the timestamp is wrong, this can be a sign that the system time of the CCS is set wrong or the battery for the real time clock is discharged.**
If you open a logfile with Notepad, it looks like:

All sensors are optional. If no sensor is connected to the system, there will be no entry in the log. In this case, there is no DP Sensor and no SLUGGUARD connected.

You can download the logfiles via FTP as well. The URL is: ftp://192.168.10.231/c/logging/

3.2.7.3 Note

It is highly recommended to check data on USB regularly e.g. every few weeks if data is still consistent. Flash-based USB drives can wear out over time!

3.3 Update via USB

A very comfortable way to do update whenever program changes or program updates are due could be done using built-in USB-connector.

Please replace the memory stick against the one with updated software and close the housing.
You should only proceed in the way described when there is no process running. Do not remove memory stick under process conditions (when CCS Silver is working or logs should be done)

For further update instructions contact FAUDI Aviation sensor.
Whenever update is applied, please make sure that no fuelling is ongoing.

4 List of settings

Attached you will find a list of settings to be used for setup procedures.

4.1 Basic Settings (installer)

All Settings, which are not editable with Admin PIN are shown in grey. If you need to modify these values contact FAUDI Aviation.

Section	Menu Point	Default Value	Recommended Value
Language	Language	English	English
Date and Time	Year		Current Date
	Month		
	Day		
	Hours		Current Time
	Minutes		
	Seconds		
PIN	PIN User	00000000	Change and note
	PIN Admin	12345678	
Units	Pressure Unit	bar	
	Volume Unit	Liters (l)	
Flow Rate Sensor	Signal (Sensor type)	Pulse	Check flow meter documentation
	Measure range (20mA)	10000 l/min	Check flow meter documentation
	Volume per Pulse	1 l	Check flow meter documentation
	Attenuation time	5 sec	5 sec
Pressure Sensor	Signal (Sensor type)	N/A	Check DP sensor documentation
	Measure range (20mA)	2.5 bar	Check DP sensor documentation
	Attenuation time	2 sec	2 sec
AFGUARD Inlet	Available	no	Check assembly
	Measure range (20mA)	50 ppm	50 ppm
	Signal Attenuation time	1 sec	1 sec
	Activate Warnings	no	no
	Limit Warning	30 ppm	30 ppm
	On Delay Warning	9 sec	9 sec

	Multiple Warnings cause Alarm	no	no	
	No. Of Warnings for Alarm	2	2	
	Activate Alarms	no	no	
	Level Alarm	50 ppm	50 ppm	
	On Delay Alarm	9 sec	9 sec	
	Available	yes	Check assembly	
	Measure range (20mA)	50 ppm	50 ppm	
	Signal Attenuation time	1 sec	1 sec	
	Activate Warnings	yes	yes	
	Limit Warning	15 ppm	15 ppm	
	On Delay Warning	9 sec	9 sec	
AFGUARD Outlet	Multiple Warnings cause Alarm	yes	yes	
	No. Of Warnings for Alarm	2	2	
	Activate Alarms	yes	yes	
	Level Alarm	30 ppm	30 ppm	
	On Delay Alarm	9 sec	9 sec	
	Level Water Slug	50 ppm	50 ppm	
	On Delay Water Slug	4 sec	4 sec	
	Available	yes	Check assembly	
SLUGGUARD	Invert Signal	yes	yes	
	On Delay	5 sec	5 sec	
	Off Delay	1 sec	1 sec	
	Enable Overflow Alarm	yes	yes	
Filter Parameter	Rated Flow	5000 l/min	Check Filter documentation	
	Enable Over DP Alarm	yes	yes	
	DP Changeout	2.0 bar	Check Filter documentation	
	Logger Interval	2 sec	2 sec	
	Interlock Signal Available	no	Check assembly	
	On Delay	5 sec		
Datalogger	Off Delay	5 sec		
	End Refuelling Process after	0 sec	0 sec	
	Ignore missing USB Drive / Battery Error	no	no	

4.2 Additional Settings (not included in installer)

All Settings, which are not editable are shown in grey. If you need to modify these values contact FAUDI Aviation.

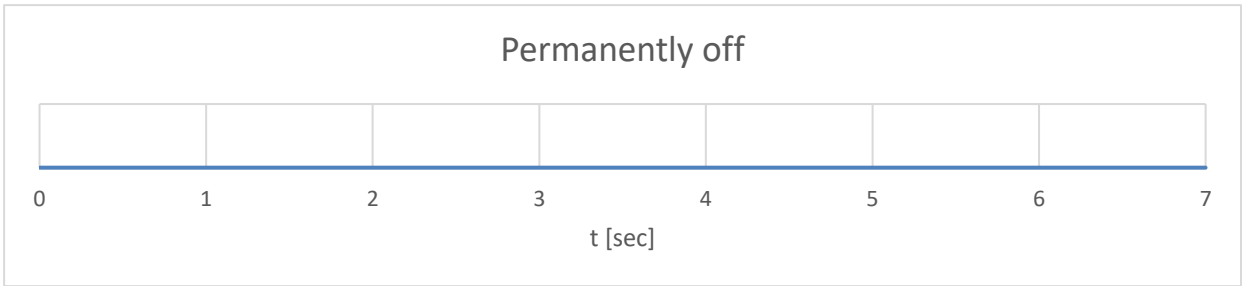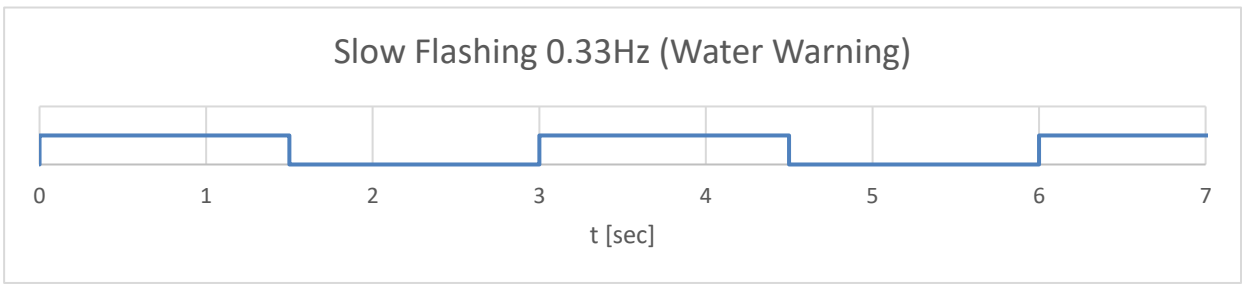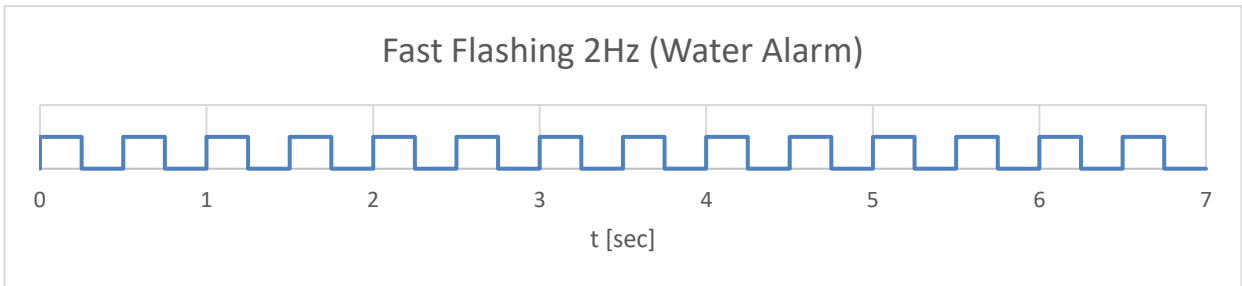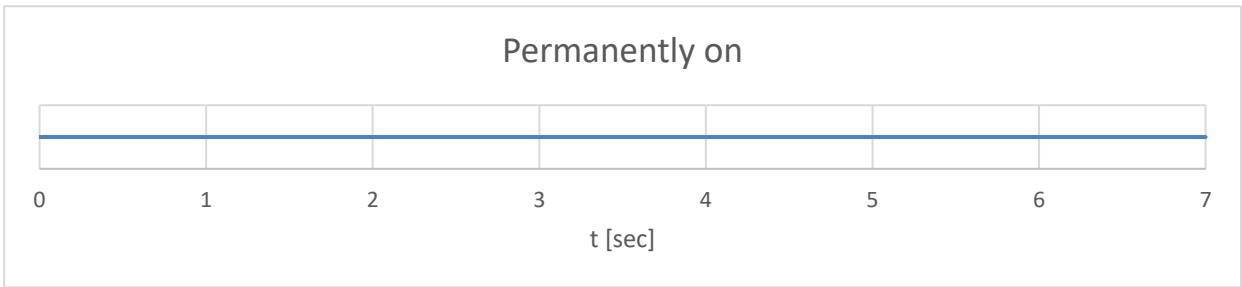|			
Network	IP Address	192.168.10.231	Change only if necessary
	Subnet Mask	255.255.255.0	
	Internet Gateway	0.0.0.0	
Modbus	Modbus RTU Slave Address	4	4
Analog Output	AO_3	N/A	optional
	AO_4	N/A	optional
Relay Output	REL_1	Alarm, Inv	unchangeable
	REL_2	Warning, Inv	unchangeable
	REL_3	Ready	optional
	REL_4	Off	optional
Digital Output	DO1	Flashlight	unchangeable
	DO2	Off	optional
	DO3	Off	optional
	DO4	Off	optional
Water Monitoring	Min. Flow for Monitoring	50 l/min	50 l/min
	Min DP for Monitoring	0.05 bar	0.05 bar
	Off delay Monitoring	300 sec	300 sec
	Delay Begin of Monitoring	0 sec	0 sec
	Minimum Fuel for Monitoring	0.0 l	0.0 l
AFGUARD Inlet	Level Water Slug	50 ppm	50 ppm
	On Delay Water Slug	4 sec	4 sec
AFGUARD Outlet	Level Water Slug	50 ppm	50 ppm
	On Delay Water Slug	4 sec	4 sec

5 Operational States

This page describes the different states of the blue LED flashlight (water indicator) There are 5 different light patterns of the water indicator:

Type	Meaning
Ready blinking	- System ready, waiting for trigger condition (Water Monitoring inactive)
Permanently on	- Actually refuelling, monitoring active (AFGUARDs armed, if "Delay Begin of Monitoring" and "Minmum Fuel for Monitoring" are unset)
Slow flashing (0.33Hz)	- Water warning
Fast flashing (2Hz)	- Water Alarm (multiple Warnings, Alarm, Slug) - Caused by an AFGUARD or SLUGGUARD
Permanently off	- Overflow Alarm, - Over DP Alarm, - Sensor Error, - Sensor cable break, - CCS unpowered - Override active - No USB drive plugged - invalid date and time / battery empty

Caution: When you begin refuelling, by pressing the deadman, please check, that the blue indicator lamp turns on permanently within a few seconds. This is very important. When the lamp is not lighting permanently, this means, that the water monitoring is inactive. The measured water values by the AFGUARD®(s) would be ignored and no Alarms / Warnings were generated!

The different flashing patterns are shown in the following diagrams:

Ready Blinking

Permanently on

Fast Flashing 2Hz (Water Alarm)

Slow Flashing 0.33Hz (Water Warning)

Permanently off

6 Troubleshooting

Issue	Reason	Solution
I cannot reach the web visualisation with my computer or smartphone	The system has not been booted yet	Wait until the CCS has been booted. The Status LED must light green permanently. This can take up to 2 minutes
	The PC or Smartphone is not in the same network with the CCS	Make sure the devices are connected, directly with an Ethernet cable or via a Wi-Fi router in between. Make sure the PC, or smartphone has a valid IP address. If you connect directly to the CCS with an Ethernet cable, make sure the network adapter of the PC has a static IP Address, no use of DHCP. Maybe a restart of the PC is necessary after change. Apply a ping command to the IP address of the CCS to check the connectivity.
	The browser is too old and does not support HTML5	Get the latest version of your web browser.
	The URL of the web visualisation is miswritten	The URL is: http://192.168.10.231:8080/webvisu.htm Only if the IP Address of the CCS didn't get changed since delivery in factory condition. Otherwise, replace the IP address in the shown URL
The status LED of the CCS is blinking. The CCS does not boot.	There is a failure of the device. Usually this should not happen.	Note the blinking pattern and contact the manufacturer.
The CCS shows wrong values for analog sensors.	Wrong signal type is set	Do not mix up ranges 0..20mA and 4..20mA. go To Setup -> Sensor Input and fix it.
	Wrong signal limits are set (Value for 20mA)	To Setup -> Sensor Input and fix it. Refer to the datasheet of your sensor
The alarm relay is still released.	The system has not booted yet	Wait until the CCS has been booted.
	There is an alarm in memory.	Open the web visualisation (Dashboard) to find the reason for the alarm.
The blue indicator lamp is permanently off.	The system has not booted yet	Wait until the CCS has been booted.
	Interlock signal is installed but it is 0V	Check wiring. check source of interlock signal. If there is no interlock signal, go to Setup -> Interlock and check settings.
	Lamp or wiring is broken	Check functionality of lamp
	No USB drive plugged	Plug USB drive for datalogger or disable check in "Datalogger" section
	Date and time invalid	See "Wrong date and time"

Wrong date and time	never set correctly / wrong timezone	set date and time again in webvisu
	Battery empty	Replace Battery (type: CR2032) and set date and time again

7 Index