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FINSTERWALDE

Short Description

Q-Desk
the Human Machine Interface (HMI)
for plasma cutting units of the Q-series

EcoDesign

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1 Q-Desk

the Human Machine Interface (HMI) for plasma cutting units of the Q-series

1.1 Terms

Terminal

Notebook, PC or tablet with Ethernet connection or WLAN capability

CNC

Control of the guiding system

HMI

Human **M**achine **I**nterface is the user interface for the interaction with the plasma cutting systems of the Q series.

The HMI is hereinafter called Q-Desk, see definition Q-Desk.

MQTT

Message **Q**ueuing **T**elemetry **T**ransport is an open network protocol for machine-to-machine communication that enables the transmission of telemetry data in the form of messages between devices, despite high delays or limited network speed.

Q 3000 / Q-Source

Power source of the Q series

The name Q 3000/ Q-Source is hereinafter used representative of all types of the Q series.

Q-Desk

Is the name for the HMI of the plasma cutting systems of the Q series, see definition HMI

The Q-Desk is accessible through a web browser.

Q-Gas

Gas console of the plasma cutting systems of the Q series, hereinafter called Q-Gas

Q-Port

Plasma torch connection unit (PBA) of the plasma cutting systems of the Q series, hereinafter called Q-Port

Q-Torch

Plasma torch of the plasma cutting systems of the Q series, hereinafter called Q-Torch

1.2 Figures

All figures are exemplary and show a possible configuration of the Q-Desk.

1.3 Commissioning Q-Desk

INFORMATION

The activities described in the following should be carried out by a suitably qualified person, e. g. a network administrator.

To access the Q-Desk, connect a terminal with RJ45 Ethernet connection to the rear port X306 of your Q-Source.

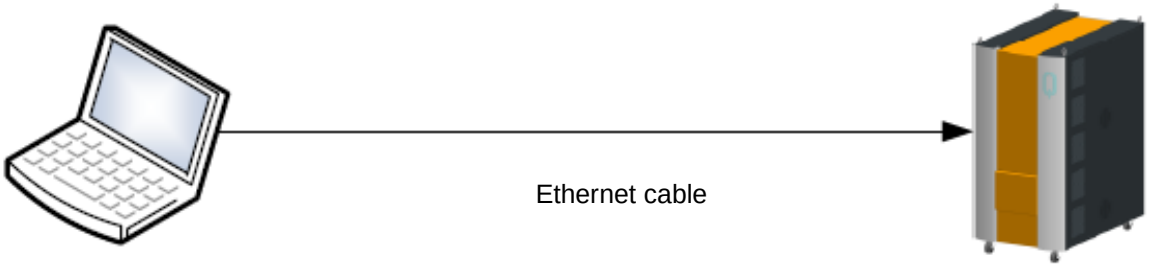
Terminal with Ethernet connection		Q-Source, connection X306
		
DHCP-Client		DHCP Server
IP address: 192.168.5.10 Network mask: 255.255.255.0 Gateway: 192.168.5.1		http://192.168.5.1/Q-Desk or via http://q.desk

Fig. 1: Internal operating mode

Make sure that your terminal has not already been connected to another network but is exclusively connected to the Q-Source.

Select from the network configuration of your terminal: Obtain IP address automatically (DHCP).
Your terminal is now assigned an IP address from the range between 192.168.5.10 and 192.168.5.30.

If your terminal does not obtain an IP address, carry out the following network configuration on your terminal:

IP-address:	192.168.5.10
Network mask:	255.255.255.0
Gateway:	192.168.5.1

Open the following link in your web browser: http://192.168.5.1
or via http://q.desk
(This is the default address of the service network of Q-Source. It can only be accessed by connecting directly to the Service USB/ETH port (X303/305) under the front flap.)

The Q-Desk is tested with the following browsers: Firefox 61.0
Google Chrome 74
(further browsers to follow)

Please use a Firefox version higher than 61.0 or Google Chrome version higher than 74.

1.4 License conditions

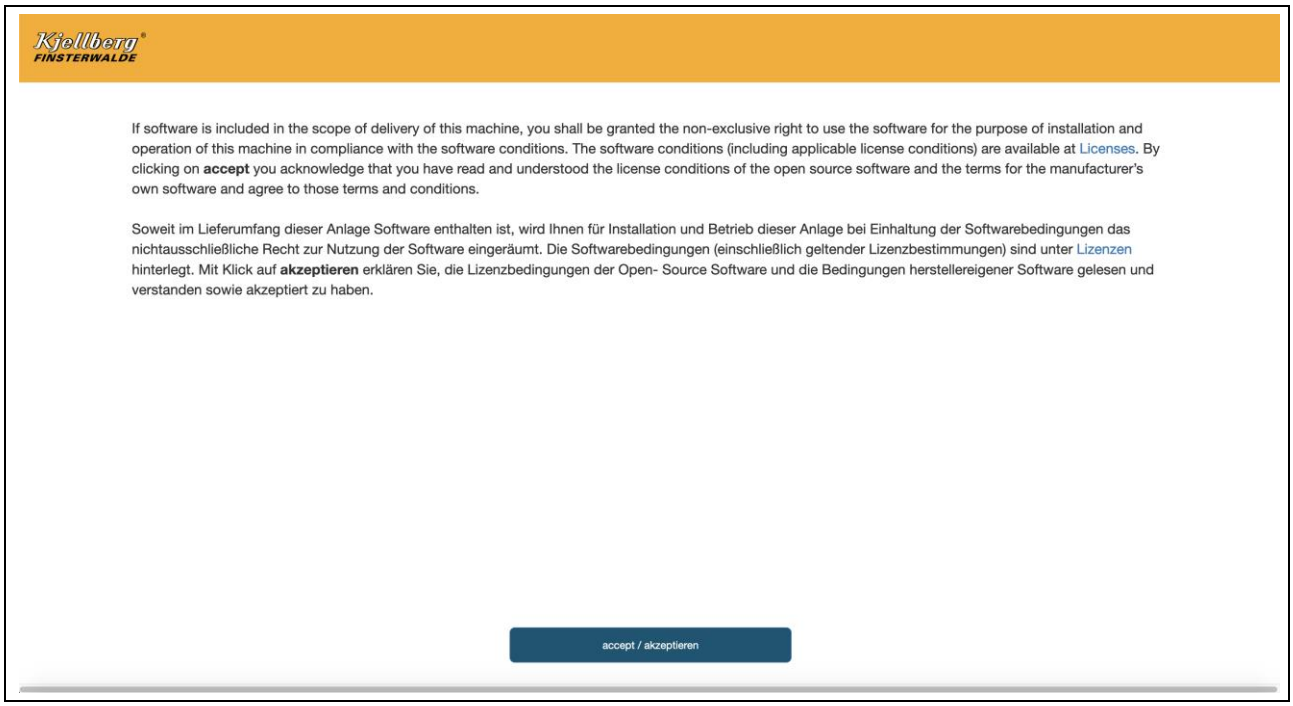


Fig. 2: License conditions Q-Desk

By clicking on „accept/akzeptieren“ you acknowledge that you have read and understood the license conditions of the open source software and the terms for the manufacturer’s own software and agree to those terms and conditions. You are then taken to the "Settings" page for network setup.

The Q-Desk “settings page” appears:

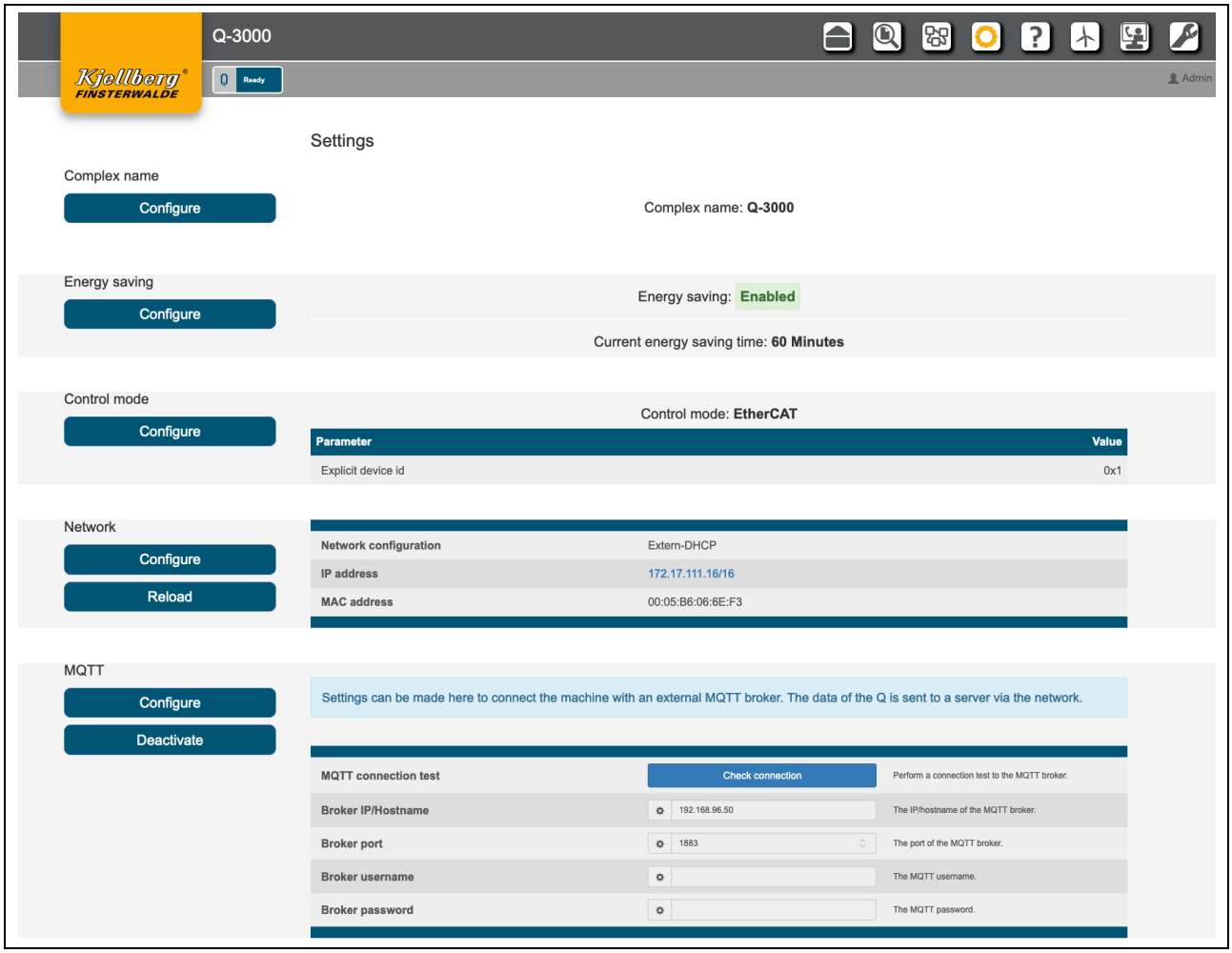


Fig. 3: settings page of Q-Desk

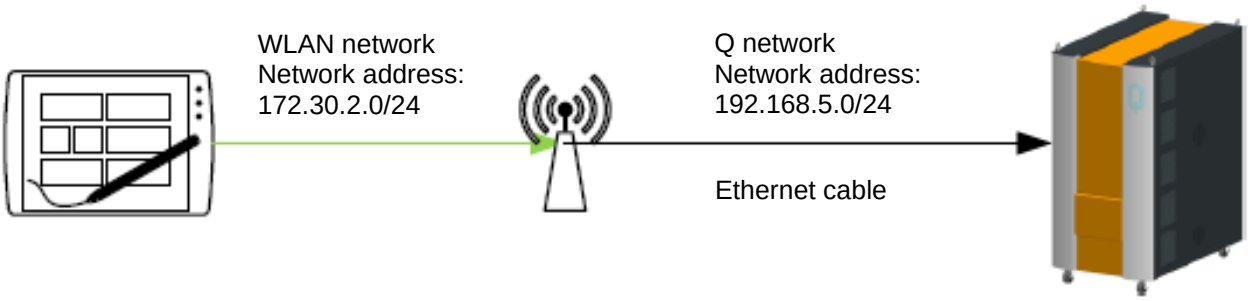
1.5 Access of the Q-Desk via WLAN

To access the Q-Desk from a terminal with WLAN capability you will additionally need a standard access point router.

Connect the router to the Q-Source as described in the previous section and carry out the same settings.

Configure the WLAN network as follows:

The access point router creates an additional network, e.g. 172.30.2.0/24, via which the terminal connects itself.

e. g. tablet	Access point router		Q-Source, connection X306
			
IP address / Network mask: 172.30.2.3/24 Gateway: 172.30.2.1	Access point router in the WLAN network IP address: 172.30.2.1	Access point router in the Q network IP address: 192.168.5.10	http://192.168.5.1/Q-Desk or via http://q.desk

Please make sure that the access point router does not create one of the following networks:

192.168.5.0/24

These networks are reserved by the Q-Source.

1.6 Add the Q-Source to a network

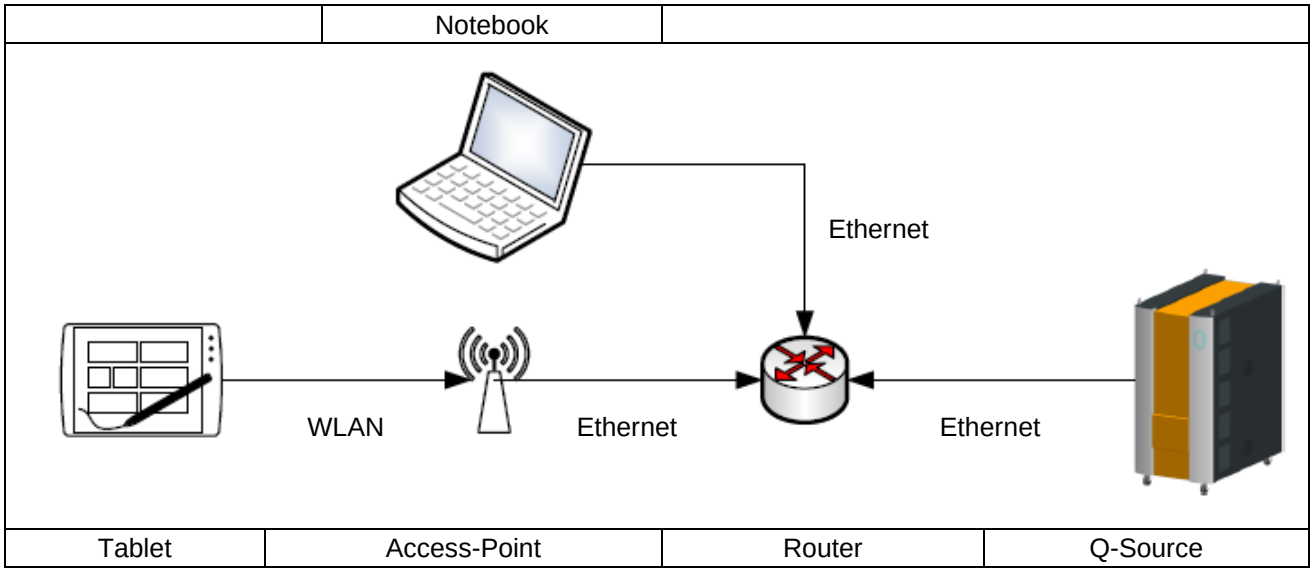


Fig. 4: Integration of the cutting system in an existing network

Please make sure that your DHCP server does not assign IP addresses in the 192.168.2.0 and 192.168.5.0 network, otherwise the system may have problems accessing the network.

Connect the power source at the rear connection X307 with your router. When delivered, the cutting system determines the network configuration via DHCP client at system startup. This requires that your network has a DHCP server.

Set a connection to the Q-Desk (192.168.5.1) with a connected terminal at the rear port (X306) and open the page settings via the icon ⚙.

Under the section Network, you will find the determined network settings, where you can reach the plasma power source at your network. If you see an IPv6 address there, the router could not obtain an IPv4 address from the DHCP server.

If the plasma cutting system does not obtain an IP address, make the network settings manually. When changing the setting from static IP address to a DHCP address, the machine must be restarted.

You can reach the Q-Desk via the Q-Source assigned IP address:

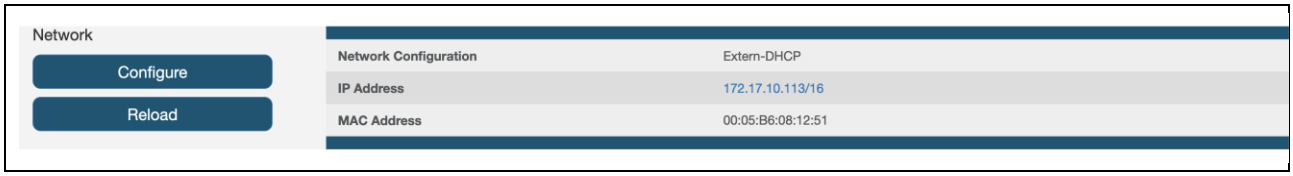


Fig. 5: Network settings e. g. Retrieve the Q-Desk

2 Start Page

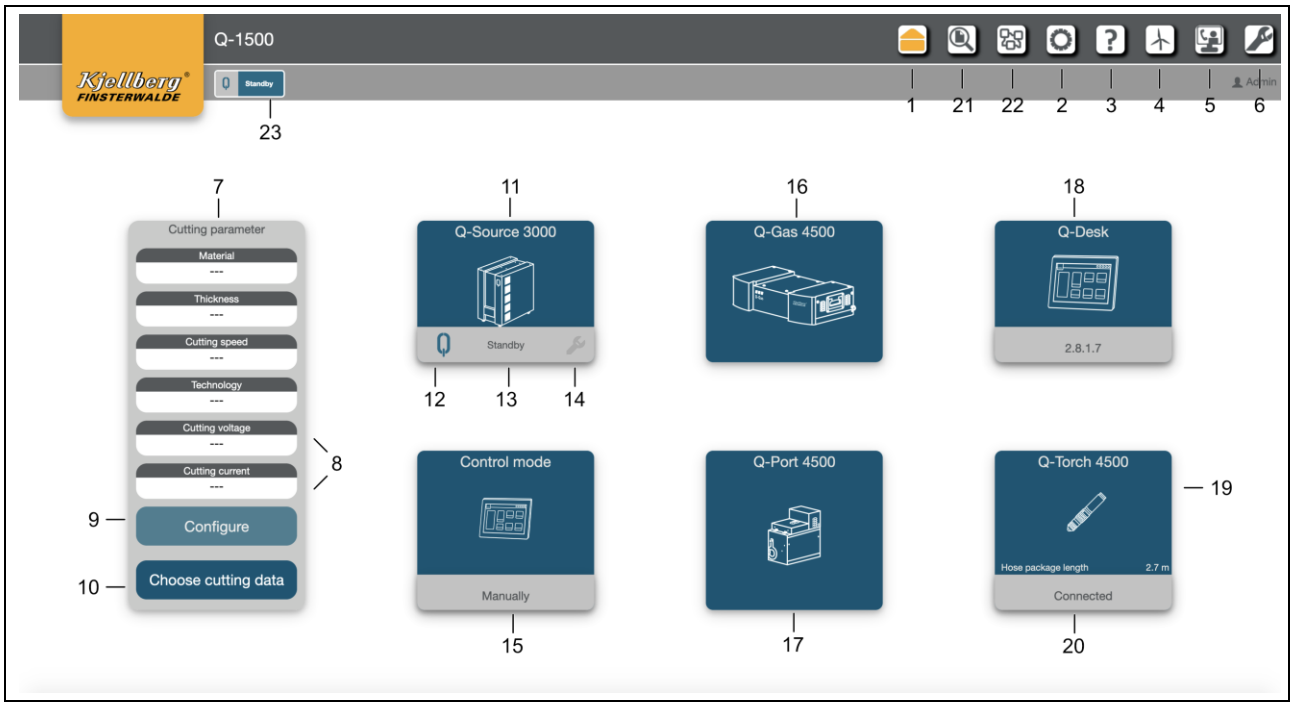
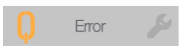
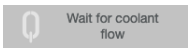


Fig. 6: Start Page

1	Start page				
2	Settings: network, system time				
3	Help: FAQ, maintenance instructions, white papers				
4	Energy efficiency: electrical energy, process gases				
5	Service: software update, remote maintenance				
6	Maintenance information, gas pressure test				
7	Overview of the currently selected cutting parameters				
8	Set value display for cutting voltage and cutting current				
9	Link to detailed cutting parameters, set of consumables and cutting data finder				
10	Cutting data finder: Selection of cutting data, cutting history				
11	Link to detailed information of Q-Source	power source			
12	colored status indicator				
13	verbal status display of the component				
					
14	colored display of the maintenance status and link to the detailed maintenance information				
	 no maintenance required	 maintenance soon due		 maintenance required	
15	Link to detailed information of CNC	guiding system			
16	Link to detailed information of Q-Gas	plasma gas console			
17	Link to detailed information of Q-Port	plasma torch connection unit			
18	Link to detailed information of Q-Desk	Tablet or laptop or PC connected to the power source via Wi-Fi or LAN			
19	Link to detailed information of Q-Torch	plasma torch			
20	Display via connection to the torch				
21	Cutting data finder (Selection of cutting data sets and selection of cutting database version)				
22	Detailed information (Link to detailed information of components)				
23	Status indicator (see 12 and 13)				

2.1 Detailed Information about the components

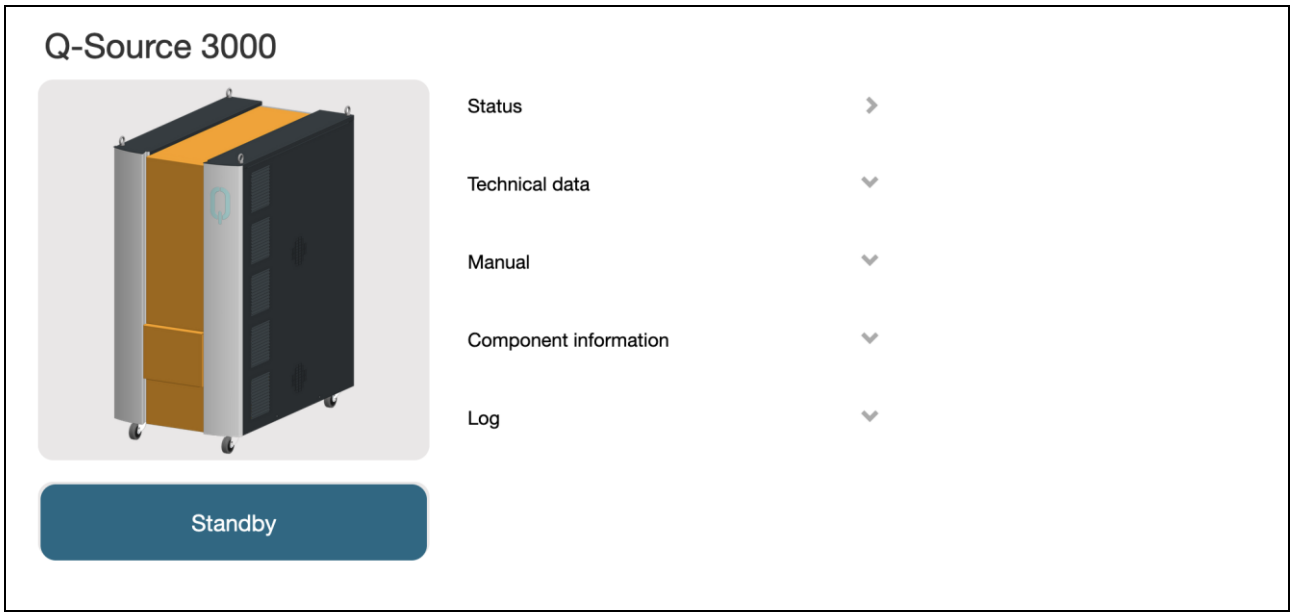


Fig. 7: Detailed information, display example: power source Q-Source

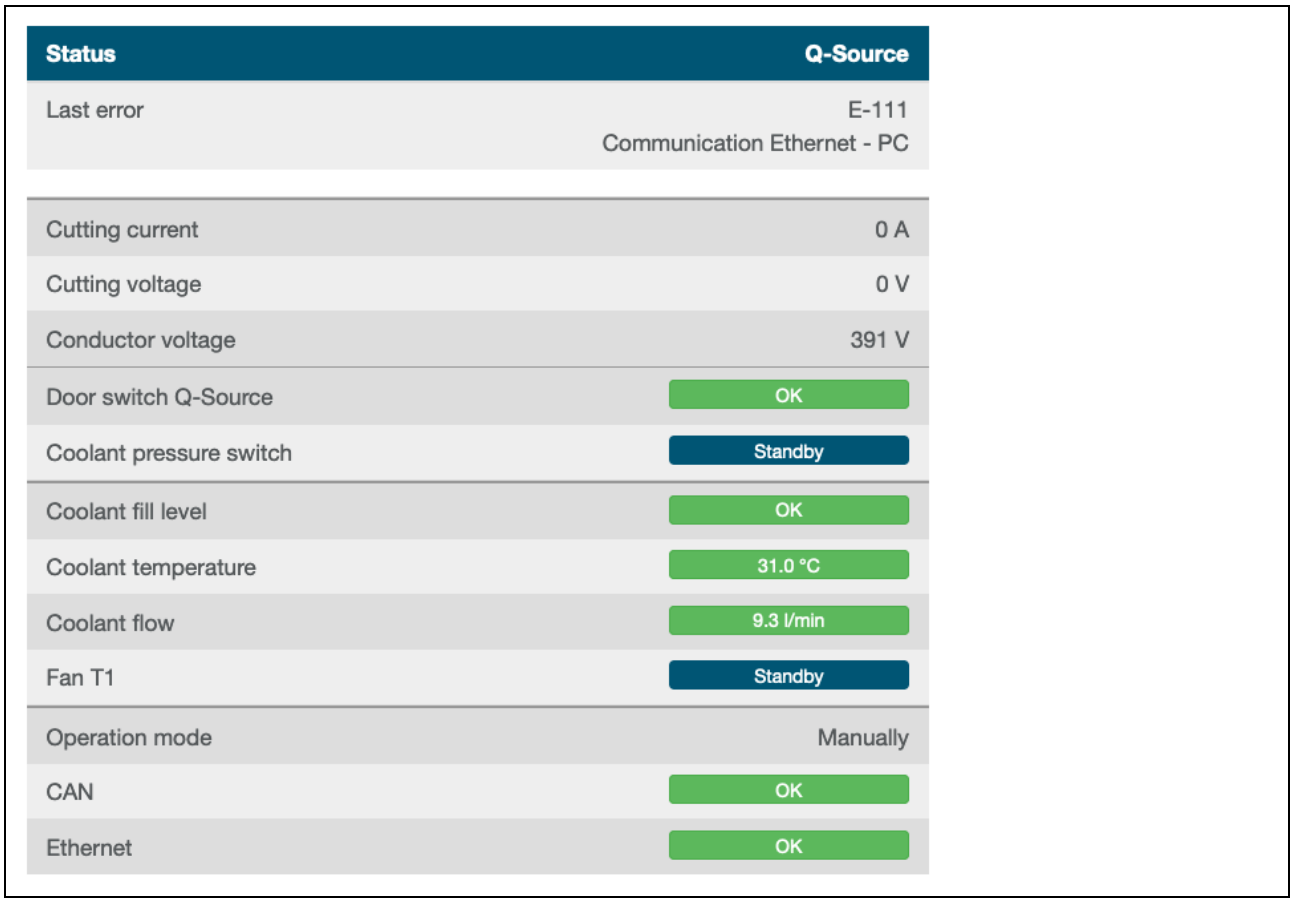


Fig. 8: Detailed information, display example: power source Q-Source – "Status"

Technical data	Q-Source
Mains voltage	3~ +PE 380-400 V (±10 %) 50/60 Hz
Connecting load	max. 72 kVA (100 % ED)
Fuse slow	T 125 A
Cutting current	5 - 300 A
Marking current	5 - 50 A
Arc voltage (100%)	82 - 200 V
Duty cycle	100 % at 300 A
Weight	297 kg
Dimensions (L x W x H)	1100 x 690 x 1430 mm with undercarriage castors and wheels

Fig. 9: Detailed information, display example: power source Q-Source – “Technical Data“

Manual	Q-Source
Q-Series.pdf (Q-Unit 3000)	.pdf

Fig. 10: Detailed information, display example: power source Q-Source – “Link to instruction manual“

Component information			Q-Source
	Hardware version	Software version	Serial number
Q-Source 3000	2.1	1.6.0.8	1900504
M2MI	2.4	1.6.0.70	
GUIDE	1.1	1.6.0.29	
Router	5	5.0/G_FW5	18684181
Power module 1	3.0	6.38.1.0	

Fig. 11: Detailed information, display example: power source Q-Source – “Component information“

Log		Q-Source
Date	Error code	Error description
2022-02-08 08:46:02	103	communication CAN - Q-Port
2022-02-08 08:45:41	103	communication CAN - Q-Port
2022-02-08 08:45:39	103	communication CAN - Q-Port
2022-02-08 07:20:23	121	PA ON in error end
2022-02-08 06:59:04	121	PA ON in error end
2022-02-07 16:07:27	120	emergency stop
2022-02-07 14:38:54	121	PA ON in error end
2022-02-07 13:18:09	121	PA ON in error end
2022-02-07 07:30:20	121	PA ON in error end
2022-02-04 12:57:04	120	emergency stop

Log entries with error codes, error description, date, time

Fig. 12: Detailed information, display example: power source Q-Source – “Log“

3 Settings

On this page you can make settings for your power source.

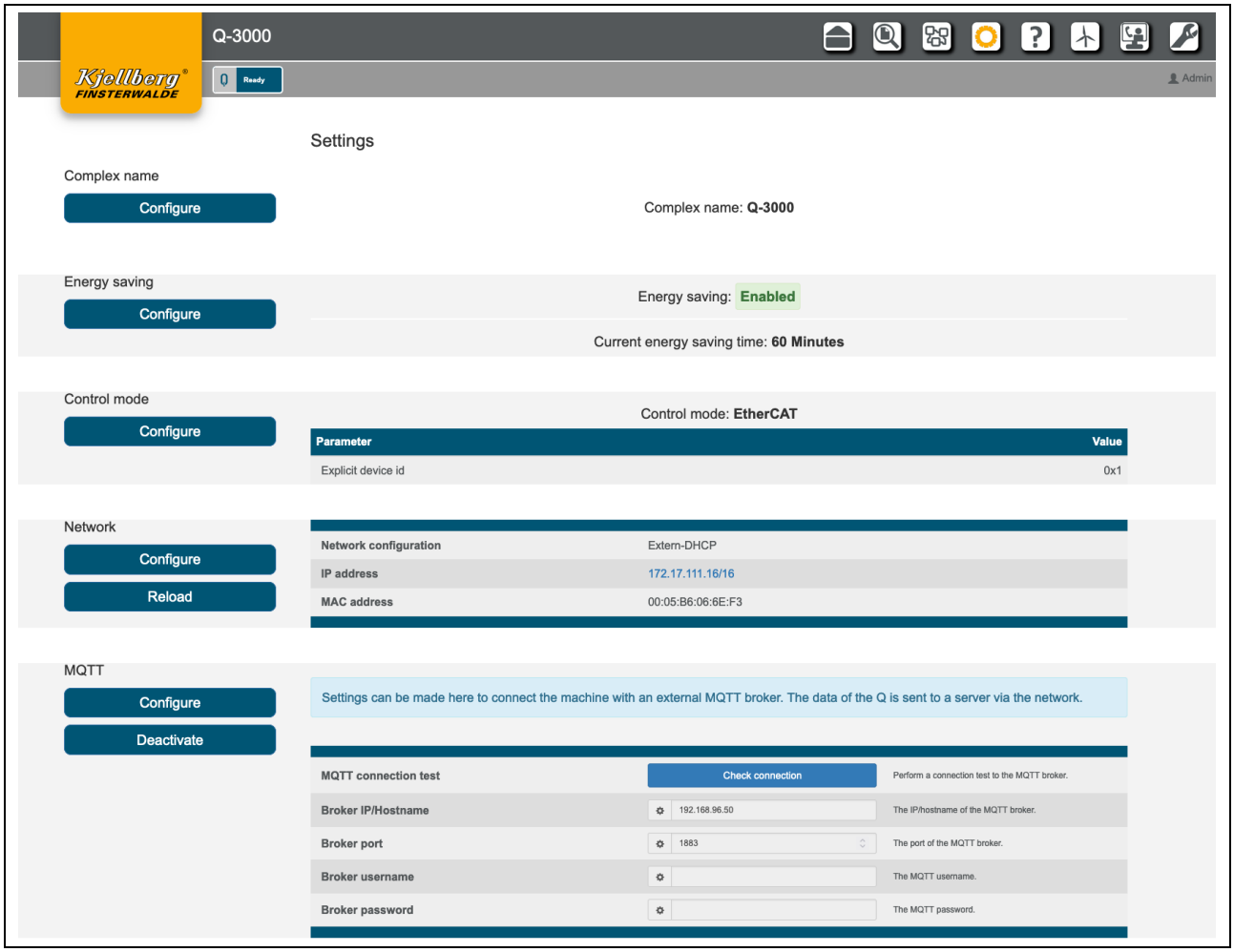


Fig. 13: Overview of the page “Settings”

3.1 Complex name

You can identify the plasma cutting machine by the complex name in the network. You can change the complex name, when you click the button “Configure” at the setting page and enter your desired complex name in the dialog box.

Fig. 14: Selection of the complex name

Then click on “Confirm” and wait until the settings are accepted.

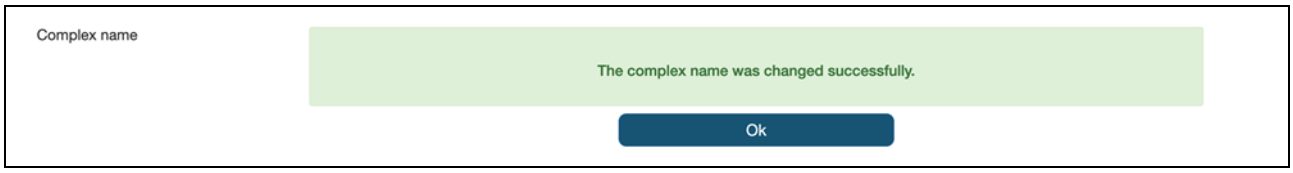


Fig. 15: successful accepting of the complex name

3.2 Energy saving

In the Energy Saving area, the automatic energy saving time of the machine and the activation/deactivation of the energy saving mode can be configured

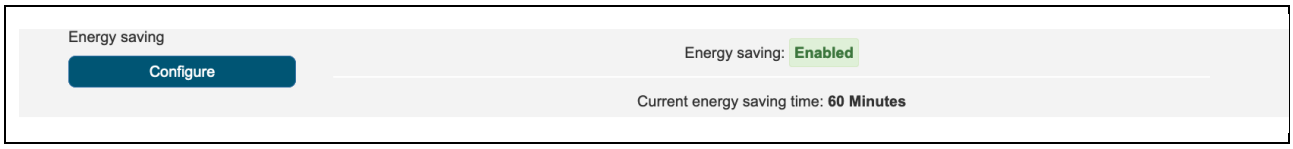


Fig. 16: Overview energy saving

To make a change, click on "Configure". Afterwards, you can activate or deactivate the energy-saving mode via a switch.

Furthermore, the energy saving time can be set in minutes. The default value here is 20 minutes. Values from 5 to 60 minutes are allowed. Then click on "Confirm" to apply the settings. The machine must then be restarted so that the new energy saving settings are applied. One minute before the energy saving time expires, the Q Desk will display a warning that the machine is about to switch to energy saving mode.

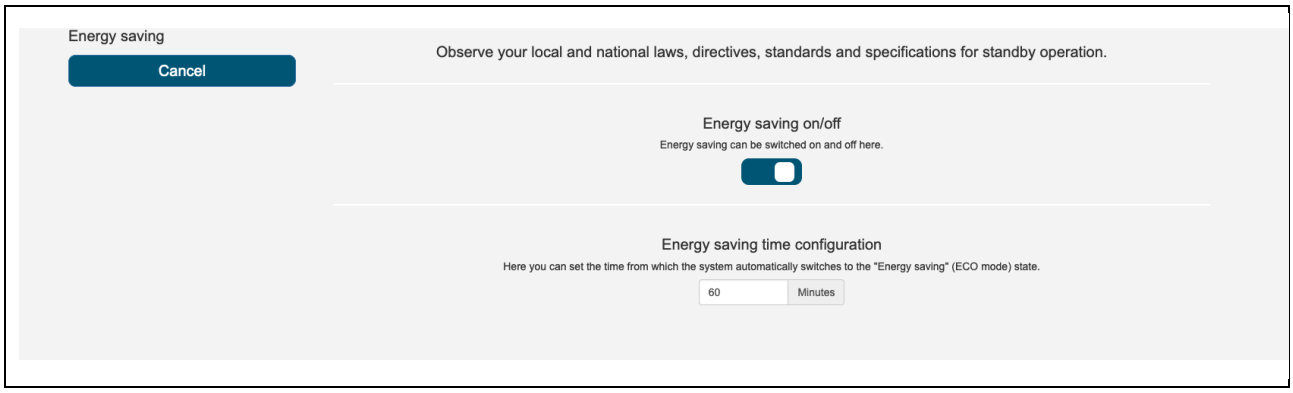


Fig. 17: Settings energy saving

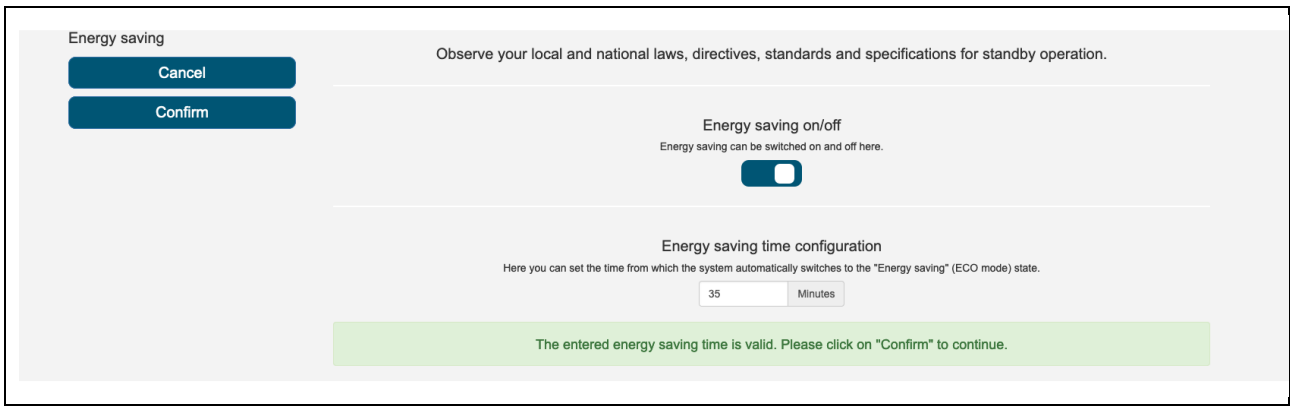


Fig. 18: Settings energy saving valid

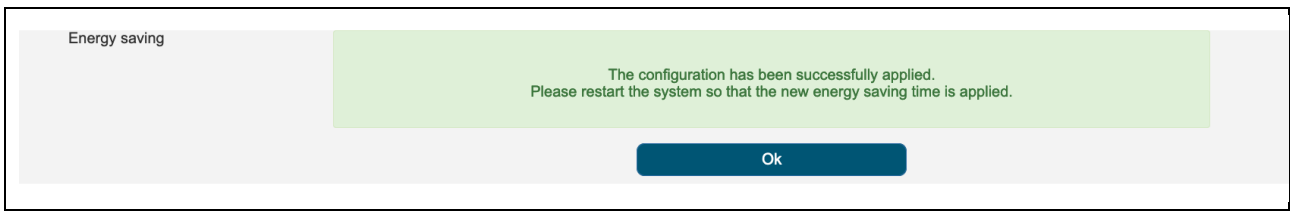


Fig. 19: Settings energy saving applied

3.3 CNC control mode

Configure the CNC control mode to your cutting system under the following setting.
Click “Configure” to choose between the 2 control modes.

Fig. 20: current CNC control mode: manual

control mode	description
Manually	Control of the CNC via the interfaces X302/X304
EtherCAT	Control of the CNC via the interfaces X308/X309

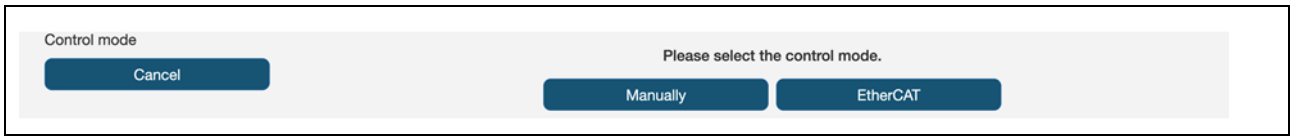


Fig. 21: Selection of operating mode

The settings of the control mode are made after restart of the cutting system.

Control mode EtherCAT

For the operation of the EtherCAT control mode, make the settings to the parameter **explicit device id** or **configured station alias**.

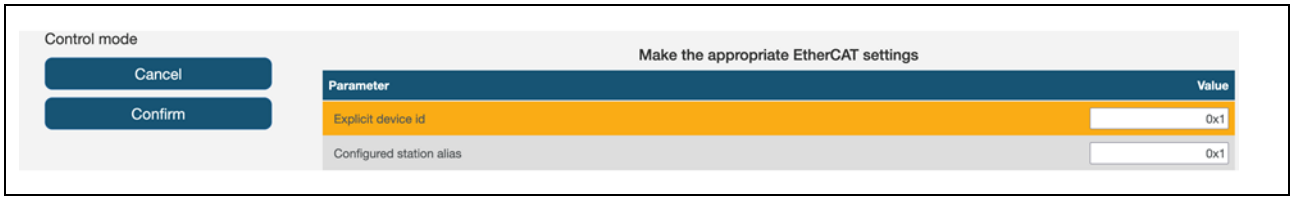


Fig. 22: EtherCAT-parameter settings

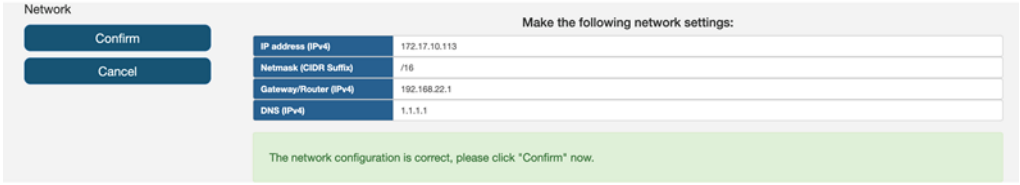
Then click on “Confirm”. The changes take effect after the cutting system has been restarted.

3.4 Network settings

Under the section "Network" you will find the current configuration of the network setting at connection X306 of your cutting system. This connection allows you to integrate your cutting system into an Ethernet-network.

Fig. 23: Network settings: extern-DHCP, Display of the IP and MAC address

Click on “Configure” to choose between the following settings:

Extern-DHCP	The cutting system determines the network settings using a DHCP server. Make sure your network is capable of doing that.
Extern-static	Make the network settings for IP address, network mask, gateway and DNS server manually. 

After clicking on "Confirm" the configurations are made. Wait for the process to complete. If you select the Extern-DHCP configuration, the cutting system must be restarted.

3.4.1 Remote maintenance

The cutting system can establish a VPN connection to Kjellberg customer support via the connection X306 with an existing internet connection. To set up the connection, the following settings are required on your firewall.

Direction	Protocol	Port	Service
OUTPUT	UDP	2392	OpenVPN channel

Please ensure that ping requests are not blocked by your IT department.

MQTT

Here the power source can be connected to an external MQTT broker to send plant data.

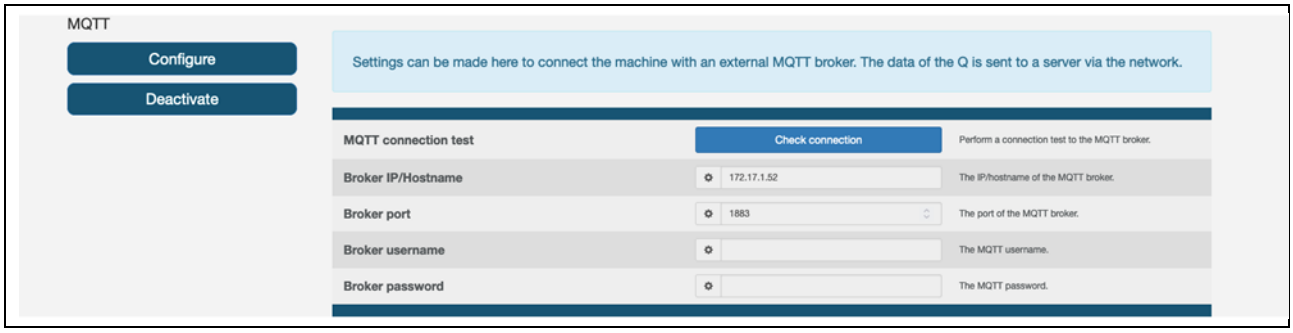


Fig. 24: Settings MQTT

In order to establish a connection, the "Configure" button must be clicked. Then the fields "Broker IP/Hostname" and "Broker Port" must be filled in. The fields "Broker username" and "Broker password" are optional and can also be left empty.

Now enter the "IP address" or the "Hostname" of your MQTT broker as well as the "Port". This is 1883 by default. Then click the "Confirm" button to apply the settings.

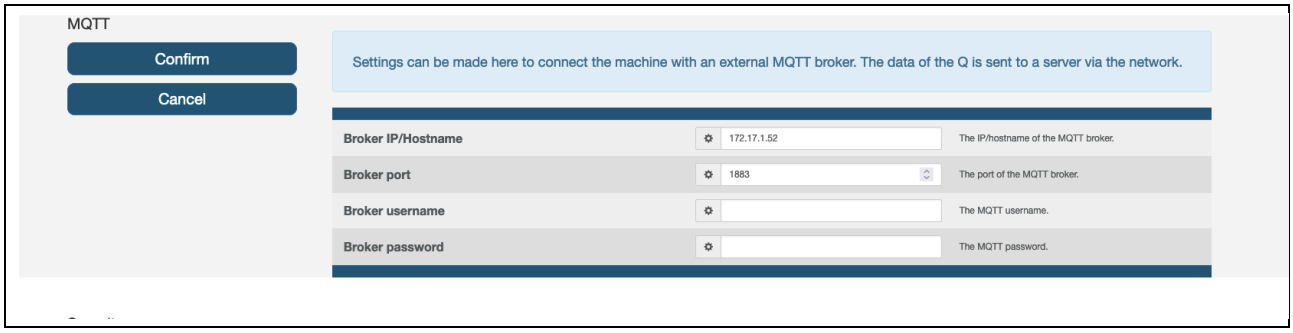


Fig. 25: Configure MQTT settings

If everything was successful, you will see the settings interface with the new configuration. Otherwise, an error message appears.

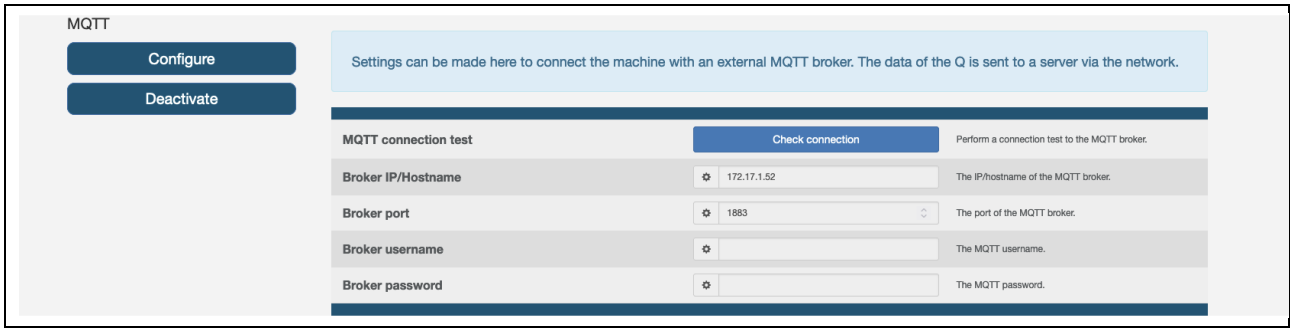


Fig. 26: Settings MQTT successfully adopted

If all settings have been made, you can now perform a connection test to the MQTT broker by clicking on the "Check connection" button. If the test is successful, you will receive a message that the connection could be established, otherwise an error message. In the latter case you should check the settings again or check if the port is blocked by a firewall.

Via the button "Deactivate" you can deactivate the MQTT service of the power source. No more data will be sent to the MQTT broker.

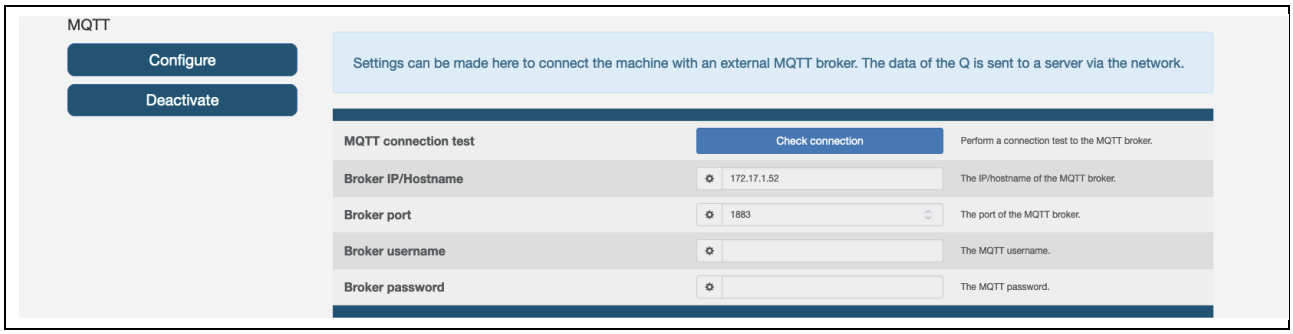


Fig. 27: Settings check MQTT connection / enable & disable service

Network security

An encrypted communication between the Q-Desk and your terminal allows the call.

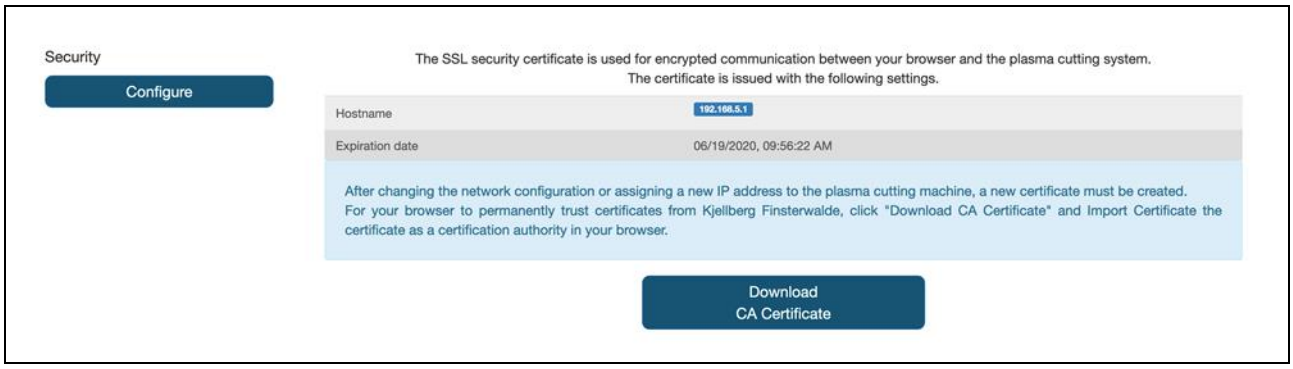


Fig. 28: settings network security

In order to download a valid certificate, you must first click on the "Configure" button and then click on the "Reissue certificate" button in the "security" tab. This will create a new certificate with a validity of one year.
Afterwards you can save it on your client by clicking on the button "Download CA certificate".
Restart the system.

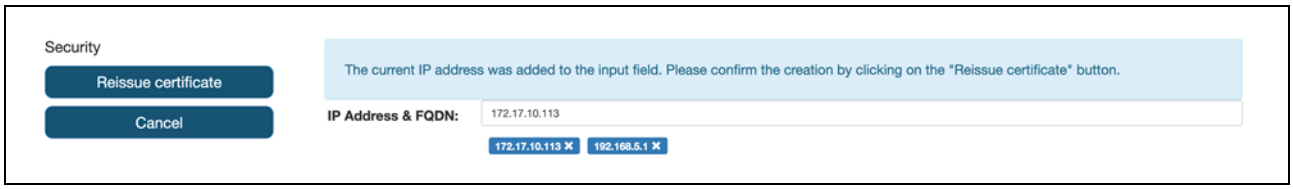


Fig. 29: settings network security

In order for your browser to trust Kjellberg cutting machines, download the Kjellberg-CA-certificate and import it as a certification authority in your browser.

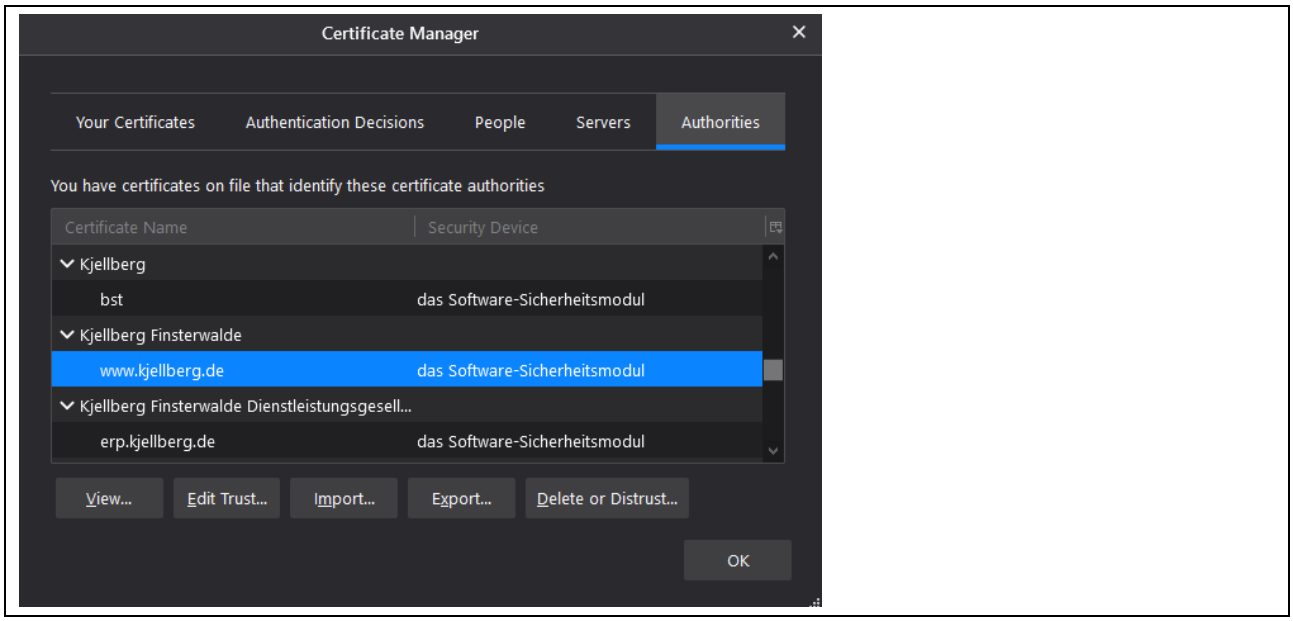


Fig. 30: Import the Kjellberg-CA-certificate in the Firefox browser

After calling up the Q-Desk with the https protocol (e.g. https://192.168.12.6) again, the encryption symbol with a green lock appears in the address bar of your browser.

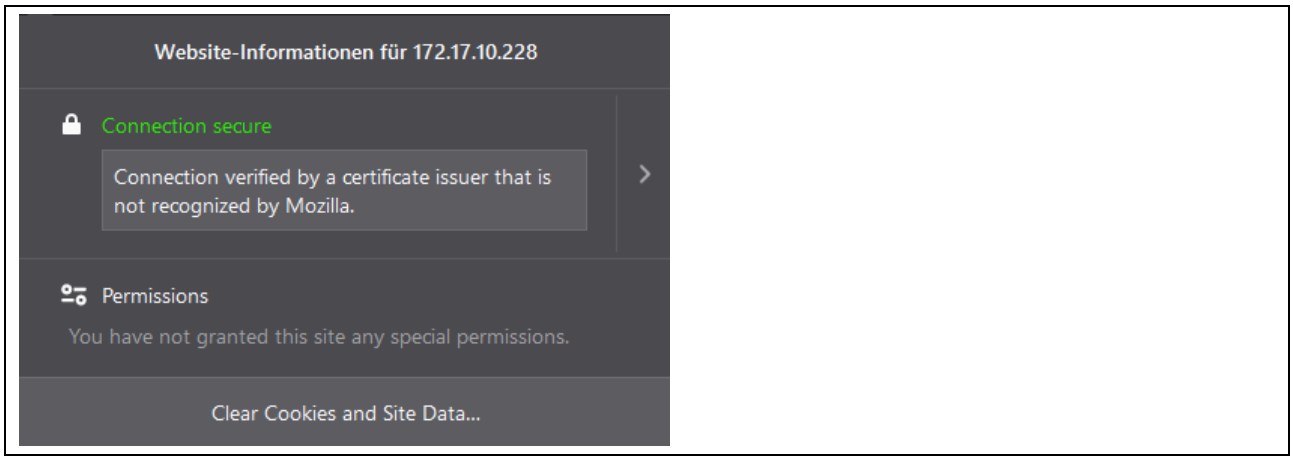


Fig. 31: Import the Kjellberg-CA-certificate in the Firefox browser

3.5 Time

A correctly set time is required to operate the Q-Desk.

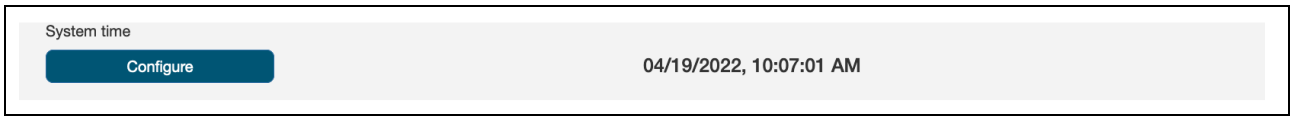


Fig. 32: Setting system time, display of time

Date/Time:

Please set the date on the setting page system time.

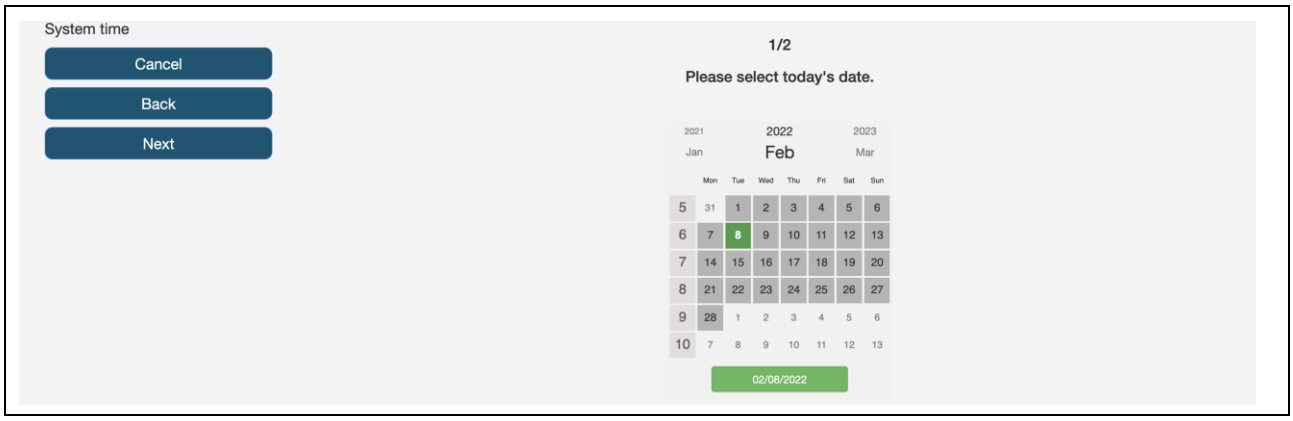


Fig. 33: setting system time, selection of the date

After selecting the "Next" button, you can set the time.

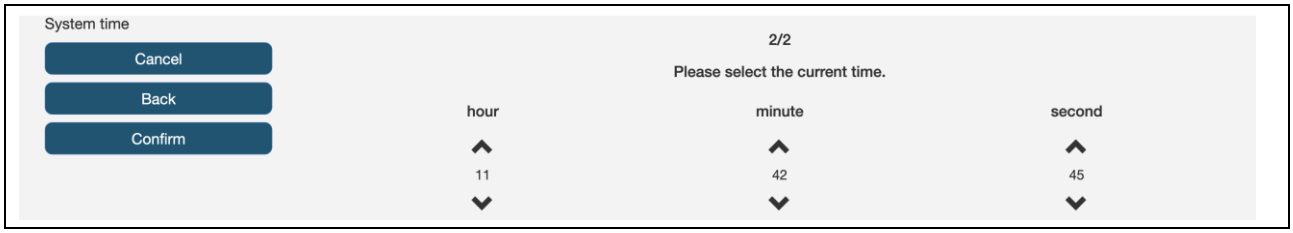


Fig. 34: Setting system time, setting the time

After pressing the "Confirm" button, your selection will be accepted.

4 Cutting parameter

4.1 Process parameter

You will receive a detailed view of the selected cutting data set and the required consumables by clicking the "Configure" button on the start page. If the button is deactivated, no record is loaded. Then select a data record with the help of the cutting data finder.

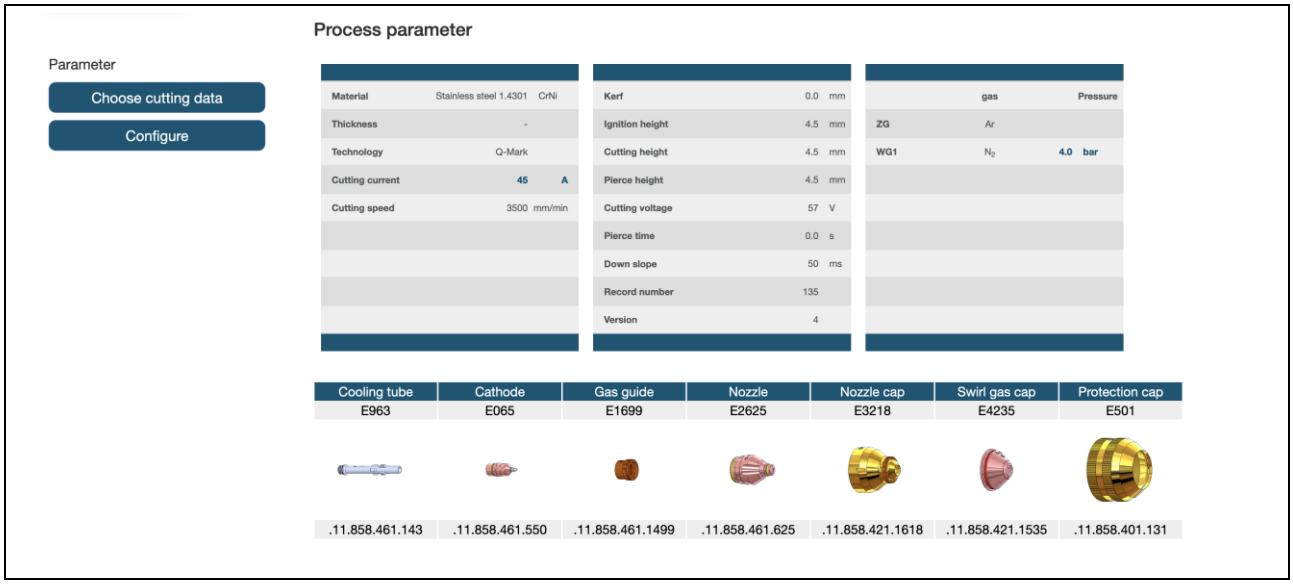


Fig. 35: page process parameter

For the cutting data finder, click on the "Choose cutting data" button or via the "Cutting data finder" icon in the menu bar, to load a new cutting data set.

By pressing the button "Configure" you can edit the process parameters current and gas pressures of the currently loaded data set.

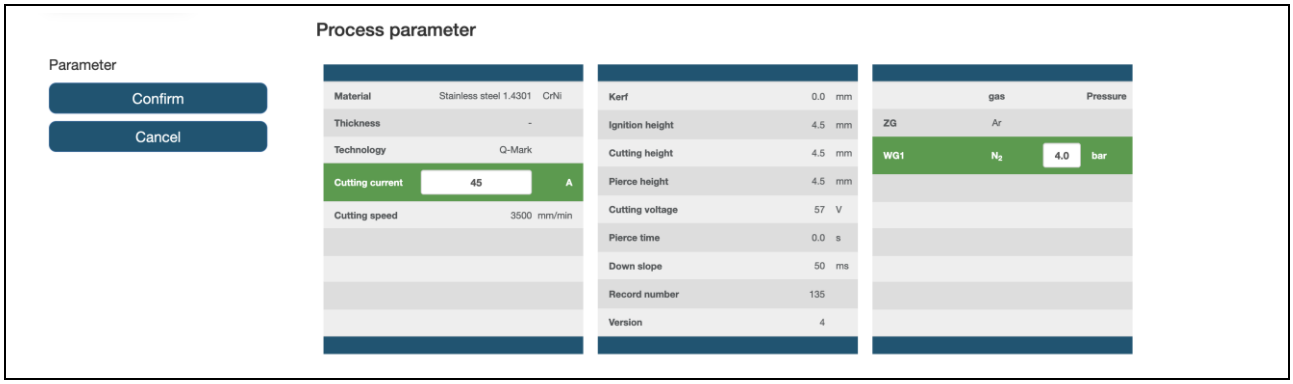


Fig. 36: configure the process parameters

Green marked cutting parameters are within valid limits. If the cutting parameters are outside the limits, these are marked in red and a transfer of the configuration is not possible. Click the "Confirm" button to modify the cutting data set according to your changes. Follow the menu guidance of the record change

INFORMATION

Changes and manual loading of a cutting data set are only possible in manual-control mode.

4.2 Cutting data finder

With the help of the cutting data finder, you can choose from your cutting data sets.

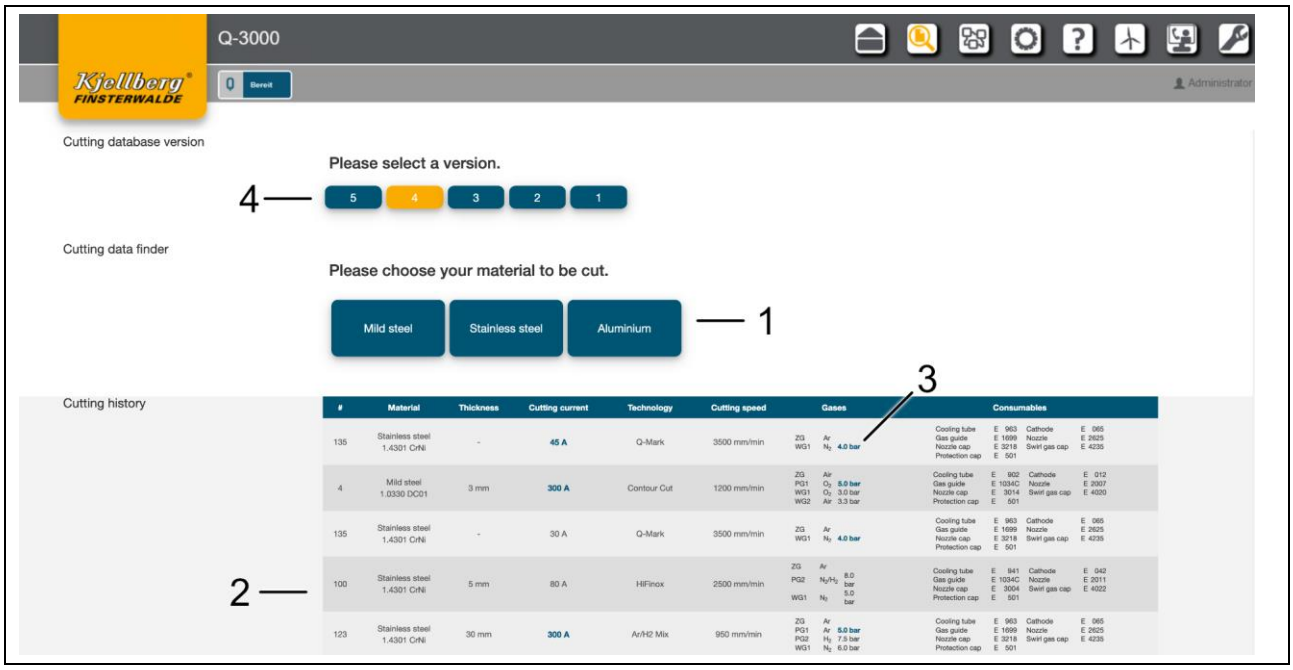


Fig. 37: Cutting data finder and cutting history

1 Selection of the cutting data set to be loaded via selection menu

2 Overview of the 10 last cut cutting values

3 The basic data set was edited by the blue marked parameters.

4 Selection of the cutting database version.

Selection of cutting data

Select the material to be cut.

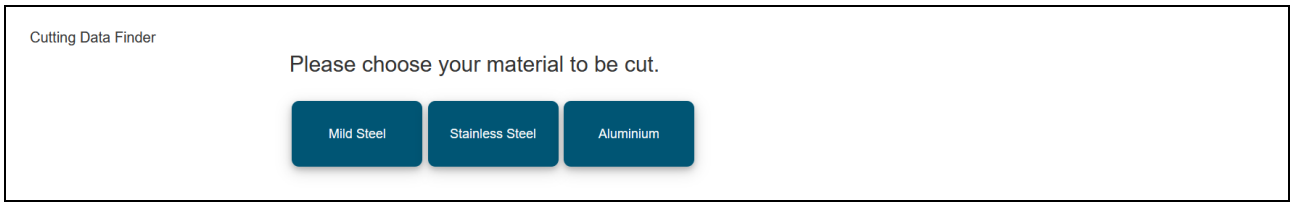


Fig. 38: Cutting data finder, selection of the material to be cut

Select the thickness of the material to be cut from the following selection.

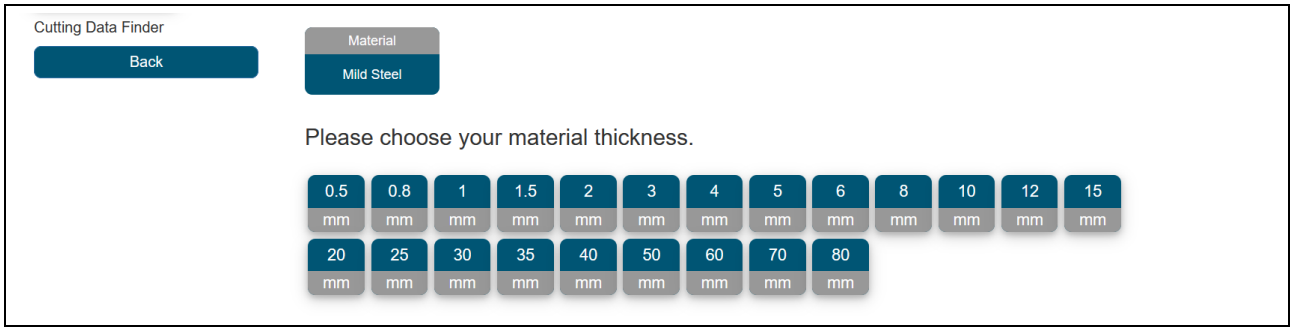


Fig. 39: Cutting data finder, selection of material thickness

Based on their selection, an overview of possible cutting technologies follows.

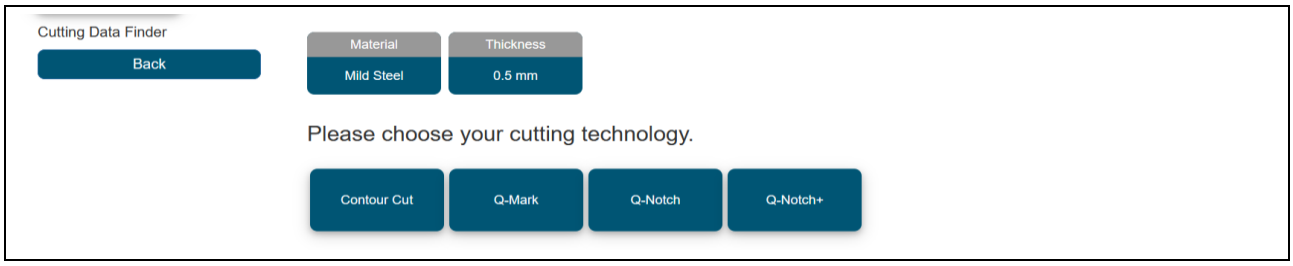


Fig. 40: Cutting data finder, selection of cutting technology

After selecting the cutting technology, you will receive an overview of the possible cutting data sets as well as the required consumables.

Fig. 41: Cutting data finder, selection of the cutting data set

Click on the "Confirm" button to start loading the determined cutting data set. Follow the menu.

4.3 Cutting database version

With the help of the cutting data version, you can select a cutting database version to be activated. You must confirm the change of cutting database version via a dialog.

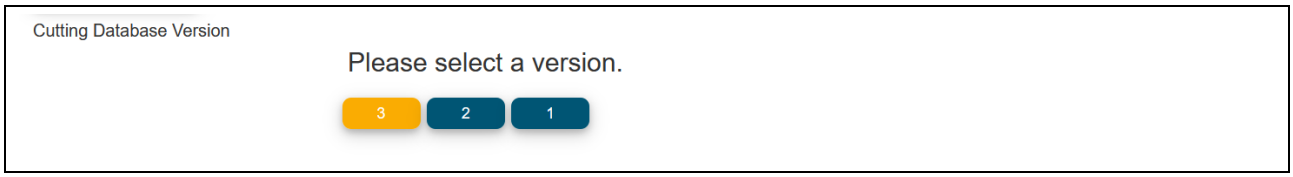


Fig. 42: Select cutting database version

5 Help

On the page "Help" you will find hyperlink to the Helpcentre Q and information about the open source licenses of your cutting system.

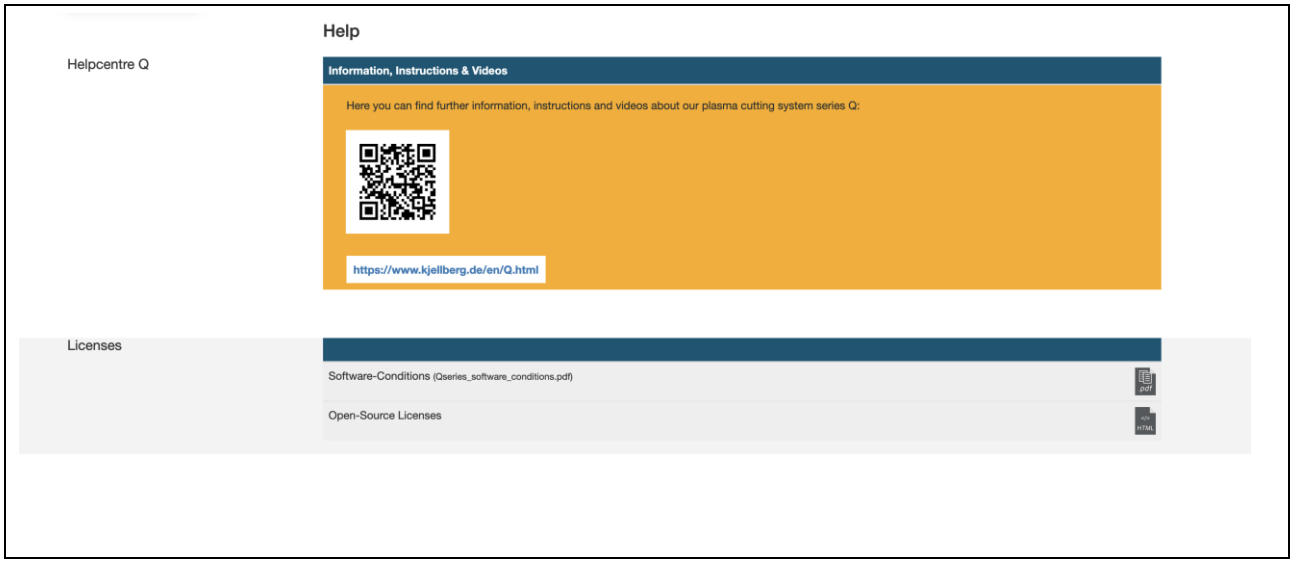
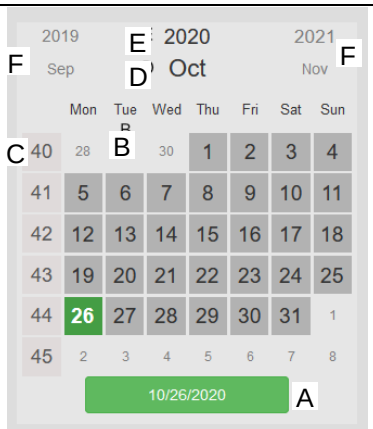


Fig. 43: Helpcentre Q and licenses

6 Energy efficiency

Fig. 44: Energy efficiency with electrical energy and process gases

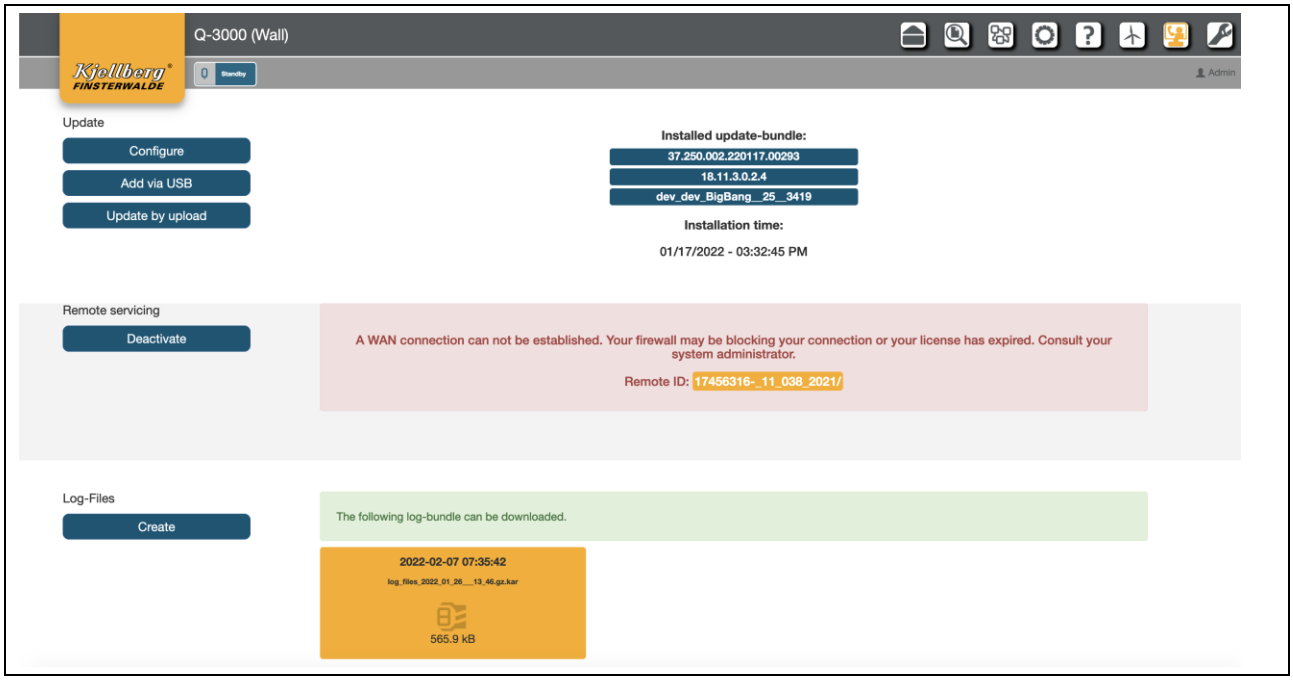
1	Detailed display of energy consumption in kWh over the observation period
2	Detailed display of gas consumption in sl over the observation period
3	Summarized presentation of consumption values over the observation period
4	Menu for selecting the period of observation



A)	Selection of the current day
B)	Selection of the day
C)	Selection of the calendar week
D)	Selection of the month
E)	Selection of the year
F)	Navigation month / year, forward / backward

7 Service

On the service page, you can install software packages and connect to Kjellberg customer support.



7.1 Update

In the Update range, the name of the installed update package of the system appears. Furthermore, new updates can be uploaded to the system here.

To install an update, the system must be switched on and all subcomponents must be connected. However, the system must not cut or mark.

After the update was successful, the system restarts.

Do not turn off the system during the update, otherwise data may be lost.

INFORMATION

If the system is not updatable, a charge animation will be displayed instead of the installed update package.

INFORMATION

Only update packages can be installed which are located on the system! The update can be copied to the system via USB stick or uploaded to the system.

7.1.1 Update via USB

You are on the "Service" page under the section "Updates".

To transfer the update package to the system, first select the "Update via USB" button. Here you will be asked to connect a USB stick with the appropriate update packages to your system, see connection X303.

Once you have connected the USB-stick to the system, click the "Copy" button on the Q-Desk, then an info dialog box will open. Now all update packages are transferred from the USB-stick to the power source.

During the copying process, the USB-stick must not be disconnected from the system.

As soon as the dialog window closes automatically, the copying process is finished and the copied update packages can be installed.

INFORMATION

The update files, which are located on the USB stick, must not be stored in subfolders, but must be located in the root directory of the drive.

7.1.2 Update via Upload

You are on the "Service" page under the section "Updates".

To transfer the update package to the system, first select the "Update via Upload" button. Here you are asked to select an update file with the file extension "kar". Once you have selected the file, the file name (e.g. 37.250.002.200724.00210.18.11.3.0.2.0.kar) is displayed. Next you can confirm by clicking the button "Upload". The upload starts and shows 3 different steps (1. memory check, 2. bundle upload, 3. bundle copy). After successful completion you can select the bundle to be installed and start the update process by clicking the button "Install". Then the installation process starts.

INFORMATION

The update files, which are located on the USB stick, must not be stored in subfolders, but must be located in the root directory of the drive.

7.1.3 Configure/ delete update packages

Select the button "Configure". An overview of the available update packages will appear. First select an update from the list. Then the button "Install" appears. After you select it, a dialog box appears to confirm the installation start.

The info dialog provides information about the progress of the update process.

Do not switch off the system during the update process, otherwise data loss can occur.
The update may take a few minutes. After the update has been successfully installed, the system restarts automatically.

Alternatively, you can also delete an update package. To do this, press the "Delete" button in the configuration menu after you have selected a package from the list of update packages. To confirm the deletion process, click on "Delete" in the following dialogue. This removes the package from the system.

INFORMATION

If the update was unsuccessful, a backup is brought in after a system restart to put the system in a defined state.

INFORMATION

The update process can be forced. For this purpose, a dialog box with the corresponding button appears. The installation in this way may only be carried out by trained personnel. It is imperative and conscientious to ensure that the system does not cut or mark and all components are connected.

7.1.4 Synchronisation of system components

After replacing components (e.g. gas console), it is necessary to reinstall the currently installed software bundle. This automatically synchronises the software status of all components.

The storage location of software bundles on the machine is the main control (LP Plasma Control). The exchange of a component and a subsequent installation of a software bundle therefore causes a synchronisation to this version.

ATTENTION

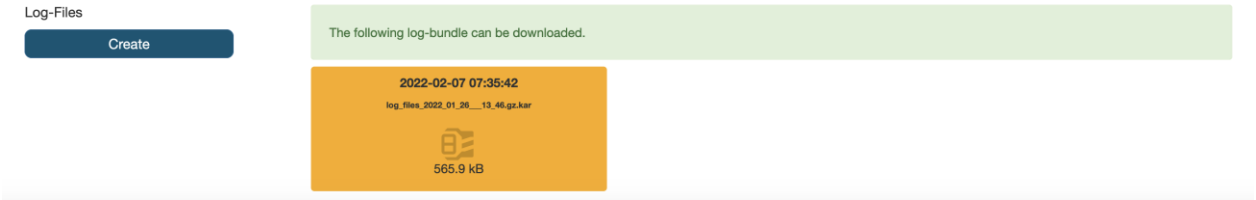
Replacing the main control unit with subsequent synchronisation of the software can result in an upgrade or downgrade of the entire system!

7.2 Remote maintenance

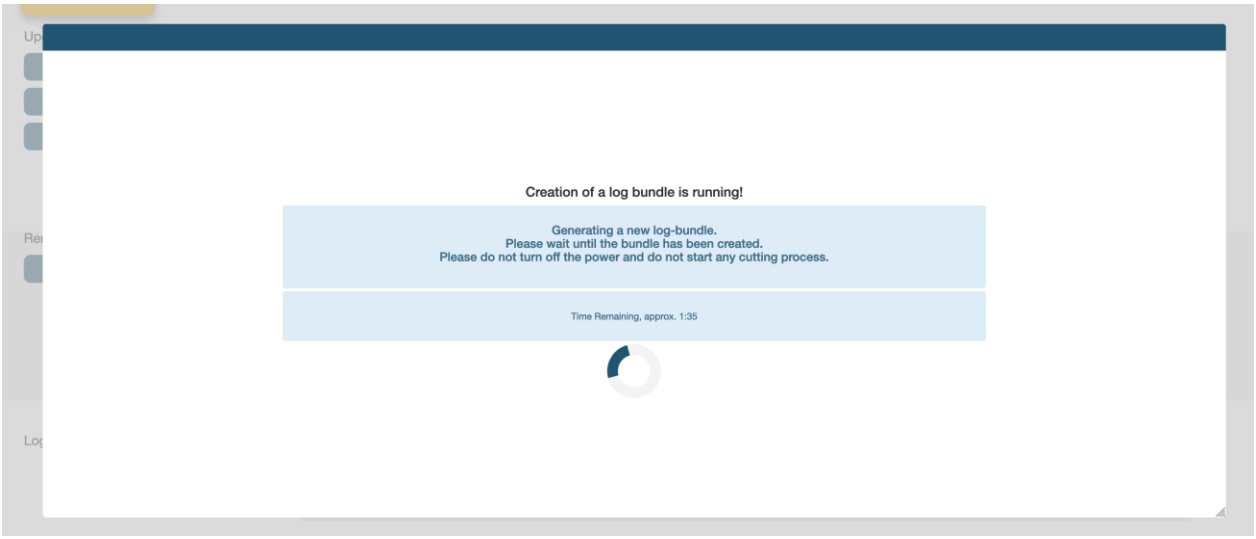
By clicking the "Activate" button, your cutting system will establish a VPN remote maintenance connection to the Kjellberg customer support. Make the settings required in section 3.3.1 Remote maintenance.

7.3 Creating log files

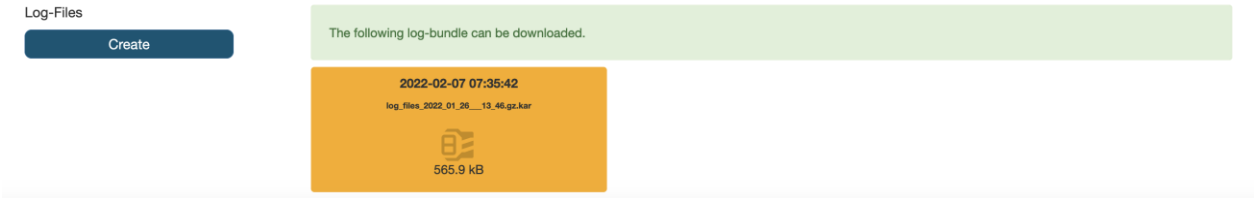
In the "Log Files" section, you can create an archive for error analysis of the installation.



By pressing the button "Create" a log file archive is created. This contains all collected log files of your system. When you have clicked the button, you will see the following figure, which signals the start of the log file creation.



Wait until the creation is complete (duration: approx. 5 minutes). After the archive has been completed, you will see the following figure.



The orange card shows the created archive with timestamp and the size of the archive. If you click on this button, you can now download the archive with the log files (e. g. file name: "log_files_2020_09_25___07_48.kar") The created file (Kjellberg archive / kar) is encrypted and can be unpacked and analysed by the Kjellberg customer service. Please send it to your customer service employee.

8 Maintenance

On this page you will find information about the maintenance tasks to be performed and the wear of consumables

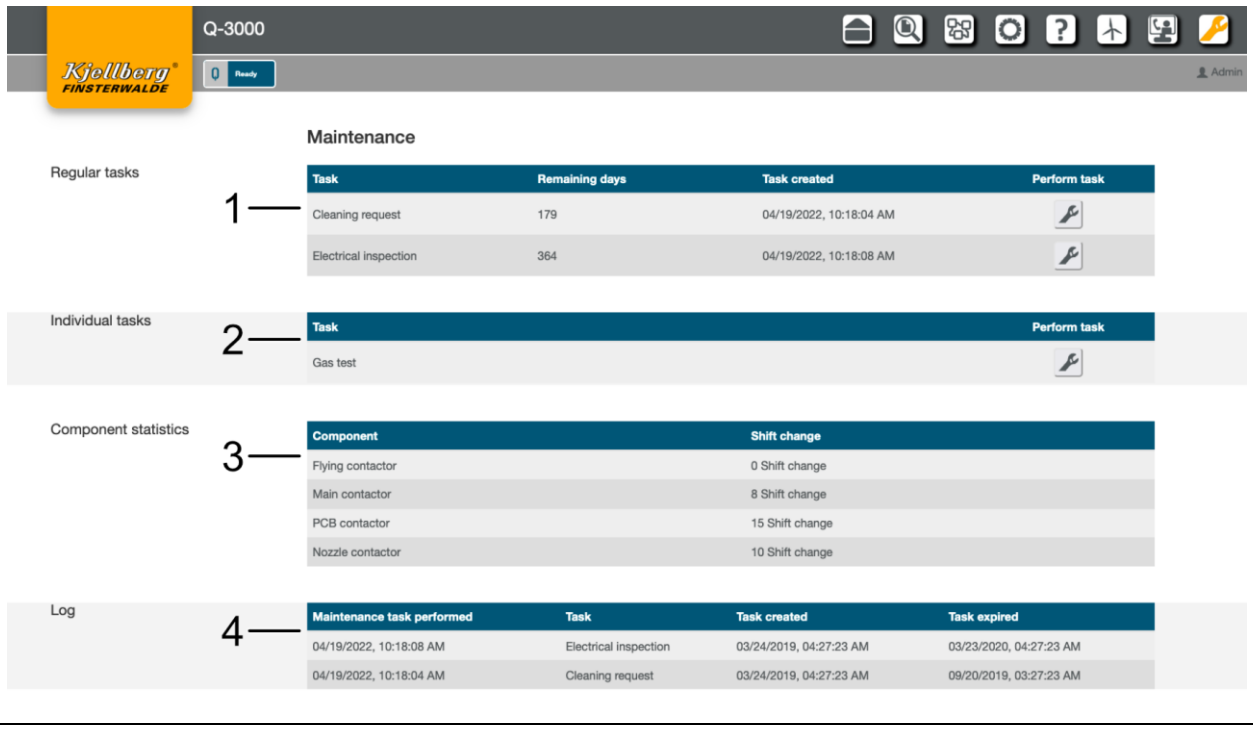


Fig. 45: Maintenance with regular tasks, individual tasks and components statistics, also maintenance tasks carried out

1	**Regular tasks**
	• Perform the maintenance task when the remaining days have expired by clicking the icon and following the instruction. red marking, The maintenance task is overdue yellow marking, The maintenance task has to be carried out in the next few days Regular Tasks  e. g.: The cleaning has been overdue for 5 days and the electrical inspection must be completed within 2 days at the latest.
2	**Individual tasks**
	• Perform the task if necessary, by clicking on the icon . • The individual maintenance task – gas test - is not possible in the CNC control mode EtherCAT.
3	**Device lifespan**
	• The lifespan has expired when the percentage bar has reached 100%
4	**Maintenance tasks carried out**
	• Shows the logbook of the regularly performed maintenance tasks

9 Quick start

Connect to a terminal via the rear connection of your cutting system.
Open the address http://192.168.5.1 in your browser.
Open the page setting via the icon . Make the following settings:

1. **Complex name:**

   Select an unique complex name for your cutting system, e. g. serial number
2. **Control mode (manual or EtherCAT)**
3. **Network configuration at connection X306 (extern DHCP or extern-static)**
4. **System time**

   Select your current time zone

Switch the power source OFF. Wait about 3 minutes.
Switch the cutting system on again.
Make the following settings:

1. **System time**

   Set the correct date and time.
2. **Saftey**

   From the Network section, determine the IP address assigned via connection X306.
   Configure the security certificate with the assigned IP address.

10 Index