

Kjellberg[®] **FINSTERWALDE**



Instruction Manual

iQ-Series

iQ-Gas
Q-Torch
iQ-Port



Art.-No.: .11.038.x12xBA

Rev.-Nr.: 1.1 30.03.2026

Copyright

The reproduction, distribution, and utilization of this document as well as the communication of its contents to others without express authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

Subject to alterations.

© Kjellberg Finsterwalde Plasma und Maschinen GmbH, 2026

Kjellberg Finsterwalde Plasma und Maschinen GmbH
Oscar-Kjellberg-Straße 20
DE - 03238 Finsterwalde

Tel.: +49 3531 500-0
Fax.: +49 3531 500-299
E-Mail: plasma@kjellberg.de
Web: www.kjellberg.de

Contents

1	General information	6
1.1	Warranty claim	6
1.2	Standards and Directives	6
1.3	Information to the instruction manual - Target groups	7
1.4	Software terms of use	9
1.4.1	License information concerning open source software	9
1.4.1.1	Source code	9
1.4.1.2	License terms for the open source software	9
1.4.1.3	Disclaimer of warranty for the open source software	9
1.4.1.4	Limitation of liability for the open source software	10
1.4.2	Notes on manufacturer's own software	10
1.4.2.1	Wording of the software terms of use	10
1.4.2.2	Disclaimer of warranty and limitations of use	10
1.5	Plasma cutting as procedure	11
2	Safety instructions	13
2.1	Explanation of the safety symbols	13
2.2	Endangerment by high contact voltage	20
2.3	Working in environments with increased electric endangerment	20
2.4	Endangerment by high voltage ignition	21
2.5	Endangerment by electromagnetic fields	22
2.6	Endangerment by heat and light radiation	24
2.7	Endangerment by gases, smoke and types of dust	25
2.8	Endangerment by oxyhydrogen	26
2.8.1	Plasma cutting of aluminium	26
2.8.2	Plasma cutting in connection with water	26
2.9	Endangerment by noise	27
2.10	Endangerment by spatter	28
2.11	Handling of pressure reducer	28
2.12	Handling of the coolant "Kjellfrost"	29
3	Maintenance	32
3.1	Maintenance general	32
3.1.1	Intervals of maintenance	32
3.1.2	Cleaning	33
3.1.2.1	Cleaning of the power source	33
3.1.2.2	Cleaning of the gas supply	33
3.1.3	Electrical revision	34
3.1.4	Plasma machine torch	35
3.2	Maintenance special	36
3.2.1	Gas pressure test	36
3.2.2	Preventive periodic maintenance - component change plan	37
4	Customer information on repair processing	39
5	Disposal	40
5.1	Disposal of the packing material	40
5.2	Disposal of the units after decommissioning	40

General information

6	Power source iQ-Source	41
6.1	Technical data	42
6.2	Technical description	46
6.2.1	Setup	46
6.2.2	Electronic control	47
6.2.3	Special parameters of the power source	48
6.3	Plasma marking, Plasma notching, Plasma punching	49
6.4	Putting into operation	51
6.4.1	Check, placement and transport	51
6.4.2	Installation	53
6.4.2.1	Mains connection	53
6.4.2.2	Workpiece connection / current return line / potential equalisation	56
6.4.2.3	Potential equalisation, Earthing	57
6.5	Front wall	60
6.6	Filling up and draining off the coolant	62
6.7	Rear panel	64
6.8	Switching ON the power source	70
6.8.1	Switching ON the control unit	70
6.8.2	Errors and warnings	70
6.8.3	Configuration	70
6.8.4	Switching ON the power unit	71
6.9	Cutting operation	72
6.9.1	Loading the data set	73
6.9.2	Initial position finding	73
6.9.3	Consumable monitoring	73
6.9.4	Cutting	74
6.9.5	Steps of the cutting process	75
6.10	Switching OFF the power source	79
6.11	Combination of the power source with CNC-controls of the guiding systems and robots	80
6.12	Information for trouble shooting	81
7	Q-Desk	89
8	Plasma gas control unit iQ-Gas (Gas console)	91
8.1	Technical data	92
8.2	Technical description	94
8.3	Connection of the iQ-Gas	95
8.4	Connection of the gas hoses between plasma gas control unit and iQ-Gas and iQ-Port	97
8.5	Connection of the gas supply	98
8.5.1	Plasma gases	99
8.6	Handling of plug connections within the device	101
8.6.1	Mounting	101
8.6.2	Dismantling	101
9	Plasma machine torch Q-Torch	103
9.1	Technical data	104
9.2	Technical description	107
9.3	Connection of the plasma torch to Q-Port/ iQ-Port	109
9.4	Consumables and their exchange	111
9.4.1	Plasma machine torch Q-Torch 45x0	115

9.4.2	Replacement of the current socket, current plug and location pin in the torch shaft.....	119
9.4.3	Operation of the torch after consumable change.....	119
9.5	Condition monitoring and protection mechanisms for plasma torches	120
9.5.1	Consumable monitoring	120
9.5.2	Wear condition detection	120
9.6	Information for using of the change heads.....	121
9.6.1	Dismantling of the change head	121
9.6.1.1	Dismantling of the change head Q-Torch 45x0	122
9.6.2	Maintenance of the change head	126
9.6.2.1	Control of the O-rings	127
9.6.3	Add on of the change heads	128
9.6.3.1	Dismantling of the change head Q-Torch 45x0	128
10	Plasma torch connection unit iQ-Port.....	129
10.1	Technical data	130
10.2	Technical description.....	131
10.3	Allowed fitting positions	132
10.4	Connection of the Plasma torch connection unit.....	133
11	Wiring diagrams	140
12	Spare parts lists.....	157
12.1	Spare parts list iQ-Source	158
12.2	Spare parts list iQ-Gas 4500	169
12.3	Spare parts list Q-Torch 4510	177
12.4	Spare parts list Q-Torch 4520	180
12.5	Spare parts list iQ-Port 4500	183
13	Tightening torques	199
14	List of Abbreviations.....	200
15	Index	202

1 General information

1.1 Warranty claim

We point out explicitly that only spare parts and consumables of Kjellberg original and Kjellfrost have to be used! Otherwise a warranty claim does not exist. Kjellberg Finsterwalde as manufacturer of the equipment can not make any guarantees for the safety of the equipment according to the valid regulations.

1.2 Standards and Directives



The CE mark indicated on our plasma cutting and welding machines shows the conformity of our products with the latest effective European CE Directives.



Development and production take place according to the following standard:
IEC 60974 (EN 60974).



All plasma systems and welding systems are in possession of the S-mark and therefore applicable to work places with increased electrical endangerment.



The production takes place according to DIN EN ISO 9001.

All products are manufactured under strict quality assurance control and proved by certificates and product-related test records.

1.3 Information to the instruction manual - Target groups

Our products are of first-rate quality and high reliability and are in operational condition at any time. You fully will enjoy all these benefits, as long as you carefully observe these instructions for operation, maintenance and handling.

For any request you are kindly asked to quote model name and serial number.

ATTENTION



Please keep this instruction manual always carefully!
The instruction manual always must accompany the machine.

ATTENTION



For damages due to misuse or wrong service we will not take any responsibility!

ATTENTION



To avoid danger to yourself and others, work on the system may only be carried out by persons who have read and understood these operating instructions in full as well as were introduced to the correct handling.

General information

Target groups for this instruction manual are:

Operator:

Persons recognising risks and avoiding endangerments by electricity with suitable training and suitable education by which they are enabled to operate the product and to execute basic maintenances and which are informed sufficiently and enabled with that by an authorised electrician.

Authorised electrician:

A qualified professional with sufficient training, knowledge and experience to enable him or her to identify and avoid any electrical hazards that may arise.

Work which may be executed only by authorised electrician is indicated clearly by warning signs and mandatory signs.

Kind of work	Target group	
	Operator	Authorised electrician
Connection and putting into operation		x
Operation of the machine	x	x
Maintenance:		
Basic maintenance	x	
Special marked maintenance		x
Shut down at the end of the lifetime		x

1.4 Software terms of use

1.4.1 License information concerning open source software

1.4.1.1 Source code

Individual components of the plasma cutting unit contain open source software that is licensed by the rights holders as free software or open source software under the GNU General Public License (GPL), version 2 and version 3, or the GNU Lesser General Public License (LGPL), versions 2.1 and 3.0.

You can obtain the source code of these software components from us on a data carrier for a flat-rate. To do so, please contact our customer service at the e-mail address service@kjellberg.de, stating the product name, serial number and delivery date.

This offer is valid for three years from the date of delivery or for as long as spare parts or support for the product are offered.

1.4.1.2 License terms for the open source software

The license terms of the respective rights holders for the open source software can be viewed on the Q-Desk under 'Help'.

The user receives a simple right of use for the open source software used from the respective rights holders under the terms and conditions which the applicable license terms provide for in each case.

The authors of the open source software have asked us to provide the following information in particular regarding the liability and warranty provisions of their license terms.

1.4.1.3 Disclaimer of warranty for the open source software

For license: GPL, versions 2 and 3

"There is no warranty for the program, to the extent permitted by applicable law. Except when otherwise stated in writing the copyright holders and/or other parties provide the program "as is" without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the program is with you. Should the program prove defective, you assume the cost of all necessary servicing, repair or correction."

For license: LGPL versions 2.1 and 3.

"Because the library is licensed free of charge, there is no warranty for the library, to the extent permitted by applicable law. Except when otherwise stated in writing the copyright holders and/or other parties provide the library "as is" without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the library is with you. Should the library prove defective, you assume the cost of all necessary servicing, repair or correction."

General information

1.4.1.4 Limitation of liability for the open source software

For license: GPL, versions 2 and 3

"In no event unless required by applicable law or agreed to in writing will any copyright holder, or any other party who modifies and/or conveys the program as permitted above, be liable to you for damages, including any general, special, incidental or consequential damages arising out of the use or inability to use the program (including but not limited to loss of data or data being rendered inaccurate or losses sustained by you or third parties or a failure of the program to operate with any other programs), even if such holder or other party has been advised of the possibility of such damages."

For license: LGPL versions 2.1 and 3.

"In no event unless required by applicable law or agreed to in writing will any copyright holder, or any other party who may modify and/or redistribute the library as permitted above, be liable to you for damages, including any general, special, incidental or consequential damages arising out of the use or inability to use the library (including but not limited to loss of data or data being rendered inaccurate or losses sustained by you or third parties or a failure of the library to operate with any other software), even if such holder or other party has been advised of the possibility of such damages."

1.4.2 Notes on manufacturer's own software

INFORMATION

▶ The term "manufacturer's own software" (proprietary software) refers to software of Kjellberg Plasma und Maschinen GmbH.

1.4.2.1 Wording of the software terms of use

Our manufacturer's software terms of use applicable to the operation of this system are stored on the Q-Desk under 'Help'. Our software terms of use apply exclusively. Deviating, conflicting or supplementary terms and conditions of third parties do not apply.

Under no circumstances do the provisions of our software terms of use restrict the rights of use for open source software. The relevant open source license provisions take precedence.

1.4.2.2 Disclaimer of warranty and limitations of use

Modifications to proprietary software associated with a library licensed with LGPL 2.1 for the software recipient's own requirements as well as reverse engineering and debugging of these modifications are hereby permitted. However, the knowledge acquired in this process may not be passed on to third parties. In addition, the circulation of modified versions of the software is not permitted. In any case, any warranty for the software expires if modifications have been made and no evidence can be provided that a complaint of defect would have occurred even without the modifications.

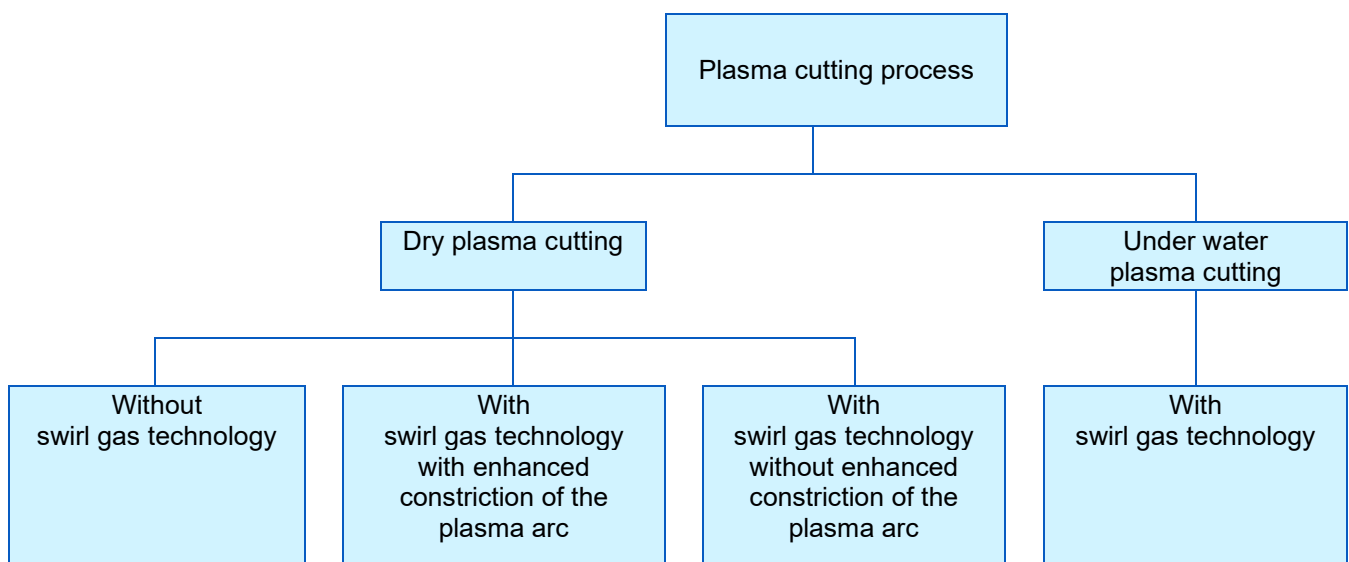
1.5 Plasma cutting as procedure

The plasma is defined as a gas having atoms and molecules which are partly split into ions and electrons and having therefore a high electrical conductivity.

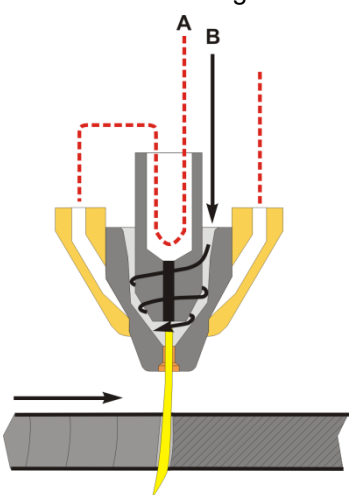
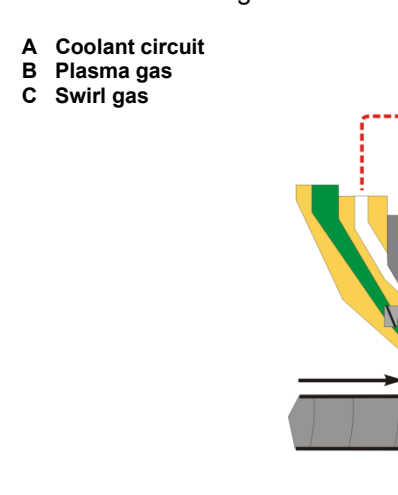
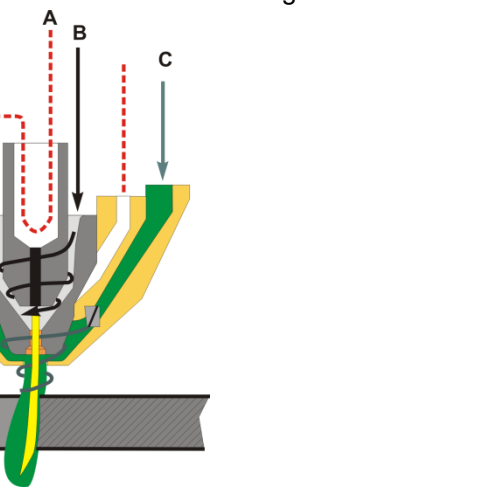
In the plasma torch this gas becomes heated up extremely and leaves it through the nozzle with a high speed. Due to the high heat concentration all electrically conductive materials will melt and due to the high speed and pressure of the plasma arc the molten material will be blown away forming a very small kerf in the material.

The plasma arc hereby is transferred from the cathode, installed in the plasma torch and conducted to the negative pole of the plasma power source, to the workpiece (transferred arc).

The plasma cutting is a technology for cutting of electrically conductive metals, like constructional steels, stainless steels, aluminium, copper, etc. It is suitable for straight, profile, template and bevel cutting. Thus semi-finished products such as sheet metal, sheet metal packages, tubes, profiles, blanks, forged forming parts, cast products and scrap metal can be thermally cut or worked.



General information

Plasma cutting process		
Dry-plasma cutting		Under water-plasma cutting
without swirl gas	with swirl gas	with swirl gas
	A Coolant circuit B Plasma gas C Swirl gas 	
In plasma cutting without swirl gas the plasma arc hits the workpiece immediately after crossing the nozzle. The nozzle can be damaged by Spatter and resulting double arcs. A damage of the nozzle causes a poor cutting quality.	Plasma torches with swirl gas technology are using the swirl gas for shielding the plasma arc from the environment. The nozzle of the plasma torch is protected against spatter by the swirl gas cap and the intermediately streaming swirl gas (vitally important while hole piercing). By the possibility to vary also the swirl gas in composition and flow rate, the cutting quality can be improved further.	The under water plasma cutting process reduces the pollution of the environment by dust, aerosol, and noise level considerably in comparison to the dry plasma cutting process, in addition, ultraviolet radiation is filtered in the water. The distortion of the cutting material is very low. The energy consumption compared with the dry plasma cutting is however higher. By using swirl gas technology the cutting process expires with high process stability. This guarantees also high cutting quality for under water cutting.

Dry plasma cutting process with swirl gas without enhanced constriction of the plasma arc	Dry plasma cutting process with swirl gas with enhanced constriction of the plasma arc (HiFocus-technology)
Angle deviations of the cutting surface are possible, especially at thin materials.	The new HiFocus-technology reduces the angle deviation of the cutting surface by an enhanced constriction and stabilization of the plasma arc.
At sheets up to 5 mm the angle deviation can amount 5 to 10 degrees.	The cutting surfaces in the thin sheet metal range are nearly rectangular, that results in much higher accuracy, comparable with laser cuts.
	Reworking of the metallic blank and dross free cutting surface is normally not necessary.

2 Safety instructions

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

2.1 Explanation of the safety symbols

DANGER, **WARNING** and **CAUTION** are signal words, which describe a degree of exposure.



DANGER



DANGER describes an endangerment with a **high degree of risk**, when it is not avoided, it results in death or a severe injury.



WARNING



WARNING describes an endangerment with a **middle degree of risk**, when it is not avoided, it could result in death or a severe injury.



CAUTION



CAUTION describes an endangerment with a **low degree of risk**, when it is not avoided, it could result in a slight or a moderate injury.

The Safety information are developed after the SAFE-structure:

S ... Symbol with signal word



CAUTION



A ... Art und Quelle der Restgefahr

- Kind and source of the residual danger

F ... Folge bei Missachtung

- Consequence at ignoring

E ... Entkommen

- Escape

Safety instructions

Example:

CAUTION



Endangerment through free standing wheels by manual moving of the unit.

Foot injuries are possible.

Caution by the manual moving of the unit - use foot guard!

WARNING



Warning of dangerous electric voltage

Electric shock can be deadly. Further personal and material damages can result from impact.



Before opening (for example error search) or starting any maintenance and repair work principally the power supply source has to be switched off and visibly disconnected from the mains.

Opening the plasma unit may be carried out only under responsibility of a qualified electrician!

Warning symbols (choice):



A black graphic symbol within a yellow triangle with a black edge defines a safety sign, which describes an endangerment.



Warning of general hazard area



Warning of dangerous electrical voltage



Warning of flammable substances, e.g. hydrogen



Warning of oxidizing substances, e.g. oxygen



Warning of explosive substances



Warning of poisonous substances



Warning of optical radiation



Warning of electromagnetic radiation



Warning of substances and mixtures that are hazardous to health



Warning of gas cylinder



Warning of hot surface



Warning of slip danger

Safety instructions

Mandatory sign (choice):



A white graphic symbol within a blue circle defines a safety sign, which indicates that an action shall be carried out, in order to prevent an endangerment.



General mandatory sign



Use eye shield



Use ear protection



Use inhalation protection



Use foot guard



Use hand guard



Use protective clothing



Before opening disconnect the mains plug



Consider instruction manual



Pressure gas cylinder locked by linkage

Prohibition sign (choice):



A black graphic symbol within a red circle with a red diagonal bar defines a safety sign, which indicates that an action shall be stopped or not be carried out.



Smoking is forbidden



Fire, open light and smoking are forbidden



Contact is forbidden



Meal and drinking are forbidden



Do not use in housing areas

Emergency sign (choice):



First aid

Fire protection sign (choice):



Fire extinguisher

Information is not a signal word that describes a degree of exposure.

INFORMATION



The symbol signalled hints or special useful information.

Safety instructions

Warning label

The warning label is visibly attached on the power source.

The operator and the maintenance personnel must familiarize themselves with the meaning of the symbols before working at the unit.



1. The operator and the maintenance personnel must read and understand the instruction manual as well as learning the operation of the unit before work with it to avoid endangerments. The safety regulations of the respective company must be observed.
2. Smoke, dust and gases developed during the cutting process are harmful for health and may not be breathed in. Principally a suitable fume extraction device must be used.
3. Wear appropriate protective clothing (e.g. headgear, welding suit, possibly leather apron, gauntlet gloves, safety shoes). The protective clothing must be isolating, dry and heavily inflammable.
4. The radiation of the plasma arc can lead to eye injuries and skin burns. Eyes and skin must therefore be protected from the radiation of the plasma arc. Glare protection is provided by safety goggles or welding shields, which must be equipped with sufficiently tinted protective lenses. Noise can damage the hearing! During the plasma cutting operation suitable ear protection must be used.

5. Electric shock can kill! Live parts must not be touched. Wear appropriate protective clothing (e.g. headgear, welding suit, possibly leather apron, gauntlet gloves, safety shoes). The protective clothing must be isolating, dry and heavily inflammable. Opening the plasma unit may be carried out only by an advised electrician. Before maintenance and repair work, always switch off the unit and disconnect it visibly from the mains!
6. Working with plasma cutting systems possibly can lead to fire and explosions. Flammable and explosive materials must therefore be kept away from the cutting area. It must be ensured that suitable and easily accessible extinguishing facilities are located nearby. The relevant fire protection regulations must be observed.
7. Attached warning signs may not be removed, pasted over, painted over or covered up.

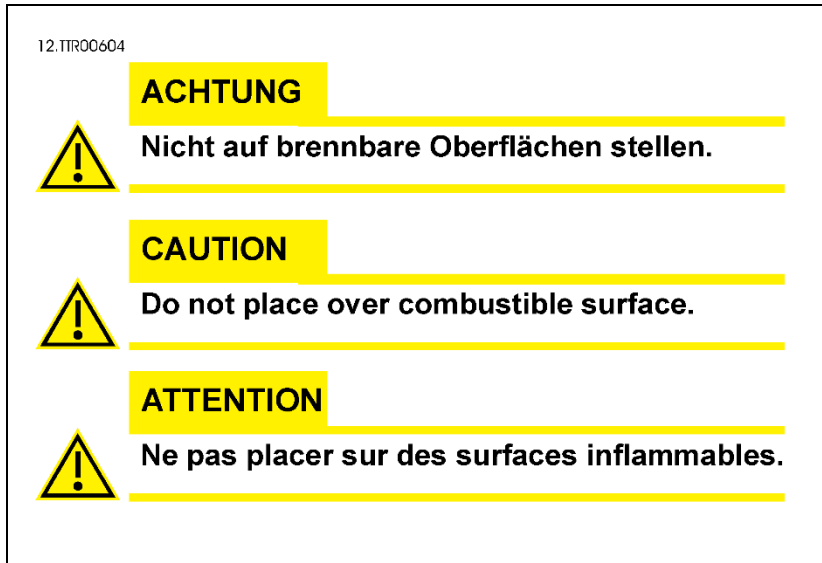


Abb. 1: Label under warning label

Further information and warning:

- to ensure stability of the plasma unit, an inclination of 10° may not be exceeded
- connect the power source only with properly fitted protective conductor
- place the torch on an insulated place, to protect the operator against workpiece and ground potential
- keep dry the working area and all parts of the unit
- don't start the unit if components or parts are defective
- The plasma cutting machine has to be earthed and connected to the workpiece before switching on!
- switch off the unit before touching the plasma torch and prevent accidental restart
- arrange regular electric inspections (by an authorized electronics engineer)
- keep doors and flaps closed as long as the unit is connected to the power supply
- never avoid or suspend the safety interlock
- do not cut closed containers
- The plasma cutting system may be used only for the appointed use. It may not be used e.g. to defrost frozen pipes.
- Do not touch the torch head, the workpiece or the water (if water table is used) when the plasma unit is working.
- Inflammable objects (e.g. lighters, matchsticks) may not be carried by the operator at the body.
- it can come to injuries caused by contacting sharp edges of the workpiece

2.2 Endangerment by high contact voltage



WARNING



Warning of dangerous electric voltage

Electric shock can be deadly. Further personal and material damages can result from impact.



Before maintenance and repair work and before opening the device (e.g. for troubleshooting) it has to be switched off, visibly disconnected from the mains and secured against being switched on again!

Opening the plasma unit may be carried out only under responsibility of a qualified electrician!

Before starting the machine connect the workpiece cable and earth the workpiece!

2.3 Working in environments with increased electric endangerment

The plasma cutting system is built in compliance with valid standards EN 60974-1 and therefore applicable in environments with increased hazard of electric shock.

The conditions for fulfilling these requirements are given by design measures in the plasma cutting system:

- The plasma power source and the plasma torch are forming a safety-proofed installation, which can be separated only by a tool (as far as a central connector with mechanical locking is present).
- The machine cannot be switched on as long no torch is attached, or the attached torch isn't assembled completely.
- Opening the control circuit effects switching off the open circuit voltage, which drops down within the prescribed time below the limit

Therefore, the plasma cutting system is S-marked and applicable in environments with increased hazard to electric shock.

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

2.4 Endangerment by high voltage ignition

For igniting the pilot arc a high voltage igniter is installed in the power source. When pressing the ON-button the high voltage is applied to the cathode and nozzle. After initiating the pilot arc the HV-supply becomes switched off automatically. After the cutting process has started the pilot extinguishes.



WARNING



Electric shock through touching of the torch head, if the plasma unit is switched on. Electric shock can be deadly. Further personal and material damages can result from impact.



Never touch the torch head, if the power source is switched on!



WARNING



Warning of electromagnetic interferences

Through the operation of the plasma cutting system in particular by the temporary high voltage ignition procedure results electromagnetic fields, which can lead to the influencing of an medical equipment (e.g. cardiac pacemakers, hearing aids, insulin pumps) and body implants.

Persons concerned must consult their specialist before beginning of work at plasma cutting system!

2.5 Endangerment by electromagnetic fields

The plasma cutting installation complies with the instructions of the EN 60974-10 (VDE 0544, part 10) "Arc Welding Equipment – part 10: requirements at the Electromagnetic Compatibility (EMC)". This standard is valid for Arc Welding Installations and related processes (e.g. plasma cutting / plasma marking).

The plasma cutting installation complies with the instructions of EN 62822-2 "Electrical welding equipment - Assessment with regard to limitations of exposure of persons to electromagnetic fields (0 Hz up to 300 GHz) – part 2: Arc welding equipment". This standard is valid for Arc Welding Installations and related processes (e.g. plasma cutting / plasma marking).



WARNING

Warning of electromagnetic interferences

Through the operation of the plasma cutting system in particular by the temporary high voltage ignition procedure results electromagnetic fields, which can lead to the influencing of an medical equipment (e.g. cardiac pacemakers, hearing aids, insulin pumps) and body implants.

Persons concerned must consult their specialist before beginning of work at plasma cutting system!



WARNING

The plasma cutting system is an attachment of the class A according to EMC classification to CISPR11:

This class A cutting mechanism is not intended for the use in living quarters, in which the current supply is made by a public low-voltage utility system. It can be possibly difficult, both by line-bound and radiated disturbances, to ensure within these ranges electromagnetic compatibility.



General

The user is responsible for installing and using the installation according to the manufacturer's instruction. If electromagnetic disturbances are detected then the user is responsible to arrange the technical solution with the assistance of the manufacturer.

Recommendations for assessment of the area (EN 60974-10)

Before installing the equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area, and shall take the following into account:

- Other supply cables, control cables, signalling and telephone cables; below and adjacent to the installation
- Radio and television transmitters and receivers
- Computer and other control equipment
- Safety devices, e.g. protections for industrial equipment
- Health of the people around, wearing pacemakers or hearing aids and other body implants
- Equipment for calibration and measuring
- Immunity of other equipment in the environment. The user shall ensure that other additional protection measures in the environment are compatible
- Time of day that cutting has to be carried out.

The size of the observed surrounding area depends on the design of the building and other activities taking place there. The range can extend over the property boundary.

Recommendations of methods to minimize disturbances

If disturbances are detected it may be necessary to carry out further precautions, such as those:

- Filtering of the mains supply
- Shielding the mains cable of the permanently installed plasma cutting (safe contact is necessary between shielding and housing)
- Regular maintenance of the plasma cutting installation
- All cover panels, service openings and flaps have to be closed before starting the unit
- No alternations on adjustments and settings should be done at the plasma unit without the acceptance of the producer
- Cutting cables should be kept as short as possible and closely together or take course close to the bottom
- Potential equalization of all metallic components should be considered inside and adjacent to the installation. The operator should be insulated from all metallic components.
- Earthing of the workpiece
- Selective screening of all other cables and equipment

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

2.6 Endangerment by heat and light radiation

The radiation of the plasma arc can lead to eye injuries and skin burns.

Eyes and skin must therefore be protected from the radiation of the plasma arc.

Safety measures:

- Wear appropriate protective clothing (e.g. headgear, welding suit, possibly leather apron, gauntlet gloves, safety shoes). The protective clothing must be isolating, dry and heavily inflammable.
- Glare protection is provided by safety goggles or welding shields, which must be equipped with sufficiently tinted protective lenses.
- The cutting area should be prepared so that reflections and transmission of ultraviolet light is reduced:
 - use of protective walls
 - arranging painting of walls with dark colour

ACHTUNG



When planning the cutting area please note that persons must not be present in the danger zone of the plasma torch during the start of the cutting process and no persons may be exposed to the dazzling effect of the plasma arc unprotected!

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

2.7 Endangerment by gases, smoke and types of dust

Due to the plasma process itself hazardous substances may be produced. To avoid risks on health the following must be arranged:

- Keep cutting area well ventilated
- Remove fumes, smoke and dust by exhaustion devices
- Removed all chlorinated and other solvents from the cutting area because they could form phosgene gas when exposed to ultraviolet radiation
- Ensure that toxic limits become not exceeded

ATTENTION



In any case the user of the unit installation has to carry out measurements of the concentration of toxic substances to proof the effectiveness of the exhaust equipment!



WARNING



**Danger by gases and fumes when cutting galvanized material
Health damage by inhalation of these gases and fumes
Carry special breathing mask when cutting galvanized material!**



ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

Safety instructions

2.8 Endangerment by oxyhydrogen

Oxyhydrogen is an hydrogen-air mixture, that explosively reacts in a hydrogen proportion between 4 and 76 Vol.-%.



WARNING

Danger of formation of highly explosive oxyhydrogen



- at hollow spaces,
- at the displacing chamber of the water cutting table and
- below the sheet panel lying on the cutting table.

There is danger of injury by exploding oxyhydrogen and flying parts.

The following information has to be observed to avoid the danger!

2.8.1 Plasma cutting of aluminium

ATTENTION



Never cut aluminum in contact with water - neither under water nor on the water or on a water cutting table!

The molten aluminium which is blown out of the cutting kerf collects in water. The aluminium granules oxidize in water very fast because of its large surface. Hydrogen is generated due to the bond of oxygen of the water. This reductive process can last for days in the slag of the water cutting table. This may lead to formation of highly explosive oxyhydrogen.

2.8.2 Plasma cutting in connection with water

If you use process gases which contains hydrogen, for plasma cutting in connection with water, this may lead to formation of highly explosive oxyhydrogen.

For water tables with level control it has to be ensured, that:

- nitrogen is used instead of compressed air for regulating the level.

For water tables without level control it has to be ensured, that:

- hydrogen can escape freely everywhere and is burnt out
- the guiding system has to be positioned after the cutting outside the water table to avoid, that hydrogen or oxyhydrogen (hydrogen-air mixture) can gather in hollow spaces (like switch boxes)
- that no hydrogen can gather below the plate which is placed on the table grating

ATTENTION



It is not allowed to store the plates on the cutting grating for a longer time!

2.9 Endangerment by noise

Plasma cutting generates process-related noise that can cause hearing damage.

The sound level to which exposed persons are subjected is influenced by many factors,

such as:

- The distance from the sound source (plasma arc),
- The technological process (dry cutting, underwater plasma cutting, etc.),
- The process parameters (cutting current, cutting voltage, etc.),
- The nature of the cutting table (dimension, orientation of the blades, water table, etc.),
- Geometry of the workspace (size, ceiling height, window areas, reflective properties of the walls, etc.)
- Other additional factors.

The actual noise exposure is highly dependent on the environment of the plasma cutting system and on the exposure time of the noise and can only be determined on site by the system operator himself or by an expert service provider.

Depending on the technological process and the process parameters, the following sound pressure levels were measured with the plasma cutting units of the iQ-Series under laboratory conditions:

Process: Dry plasma cutting, Mild steel				
cutting current	material thickness	sound pressure level at a distance of:		
		1 m*	3 m**	6 m**
[A]	[mm]	[dB(A)]	[dB(A)]	[dB(A)]
20	1	80	70	64
45	3	91	81	75
60	6	85	75	69
100	10	87	77	71
150	15	90	80	74
200	20	104	94	88
300	30	101	91	85
400	50	107	97	91
450	80	114	104	98

* ... Reference value, measured at a distance of 1 m

** ... calculated

Fig. 2: sound pressure level during dry plasma cutting

ATTENTION



Suitable ear protection measures must be taken in every case (e.g. wearing of ear muffs or ear plugs)!

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

Safety instructions

2.10 Endangerment by spatter

During plasma cutting and hole piercing, sparks, slag and hot metal are produced. The risk of burns and fire exists!

To avoid endangerments the following has to be arranged:

- Removal of all potential flammable materials from the cutting area, at least in a distance of 10 m
- Cool down freshly cut material before handling or storing
- Make fire extinguishers available in the cutting area

2.11 Handling of pressure reducer

ATTENTION



For the gas supply only high- quality pressure regulators have to be used, guaranteeing a constant supply pressure. The quality of the pressure reducer influences the cutting quality and reliability of the complete unit. Furthermore, the user has to follow local and national standards.

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)



WARNING



For the plasma cutting process compressed gases are used.

To avoid endangerments following instructions must be taken:

- Place cylinders in an upright and secure position.
- Don't use damaged cylinders, pressure reducers and armatures.
- Only use the pressure reducer for corresponding gas.
- Never lubricate pressure reducers with grease and oil
- All parts that come into contact with oxygen must be absolutely free of oil and grease.
- When using oxygen, the regulator must be containing an explosion protection. (Flashback Arrestors)
- Perform gas pressure test acc. to chapter "Gas pressure test".

2.12 Handling of the coolant "Kjellfrost"

(only valid for units with liquid cooled torches)



WARNING

Warning against the use of unsuitable and conductive coolants and antifreeze.

Electric shock can be deadly. Further personal and material damages can result from impact.

Therefore, make sure to use exclusively the coolant and corrosion protection agent "Kjellfrost" for Kjellberg plasma cutting units!



For all liquid- cooled plasma torches Kjellberg Finsterwalde is using the coolant "Kjellfrost", suitable as anti-freezer as well.

"Kjellfrost" contains anti- corrosive inhibitors. Thereby all the components of the cooling device are protected effective against corrosion.

Please notice following items particularly:

- "Kjellfrost" is classified as a hazardous substance in sense of the standard for hazardous substances, but not in the sense of the standard for the transportation of hazardous substances.
- Danger dominant ingredient: Ethylenglykol (Ethandiol)
- Never add water to the "Kjellfrost" (for dilution or filling up). Only pure "Kjellfrost" has to be used for filling up!
- The safety data sheet can be requested when required kjellfrost@kjellberg.de .

ATTENTION



When using other coolants, there is a risk of cooling channels becoming clogged with corrosion. This means that the performance parameters of the plasma cutting system can no longer be maintained and the plasma torch can be destroyed.

Safety instructions



CAUTION

All details given on the label of the new anti-freezer must be followed consequently!



- "Kjellfrost" is dangerous to health
- Keep "Kjellfrost" in the original container, do not transfer!
- Don't drink Kjellfrost
- Keep it away from food, drinks and fodder
- Always clean your hands before a break and after end of work
- Avoid the contact with eyes and skin
- Safety goggles recommended during filling
- Wear protection suit
- Wear gloves from Nitril or Viton (see safety data sheet)
- Immediately taking off soiled, watered clothes
- Special danger of skidding by run out or spilled "Kjellfrost"
- Keep away from children!

First aid



- after swallowing
Don't bring up, clean the mouth, drink much water, open the window for fresh air and call the doctor, present packing or label.
- after eye contact
Clean the eyes with much flowing water some minutes and call the doctor
- after skin contact
Quickly clean it with much water and soap



WARNING

Leaked or slopped coolant "Kjellfrost" and evaporation of water portions can cause an increasing concentration of the component ethanediol.



If there is a sufficient energy-rich ignition source, it can cause an inflammation and combustion of the ethanediol-debris.

Absorb leaked or slopped coolant "Kjellfrost" with liquid-binding material (sand, diatomite, oil binder, acid binder, universal binder) immediately.

Dispose the absorbed material according to official regulations.



WARNING

Leaking coolant "Kjellfrost" additional with influence of extreme heat causes a very fast vaporation of water portions and an increasing concentration of the component ethanediol.



This can take place, for instance, if leaking coolant impacts the glowing dross at the cutting table as a result of a damaged plasma torch by collision or above the wear limits driven cathode.

This can cause an inflammation and combustion of the ethanediol-debris.

Absorb leaked or slopped coolant "Kjellfrost" with liquid-binding material (sand, diatomite, oil binder, acid binder, universal binder) immediately.

Dispose the absorbed material according to official regulations.

ATTENTION



Fire-fighting measures against ethanediol-fires

Suitable extinguishing agents:

- water spray
 - alcohol resistant foam
 - carbon dioxide (CO₂)
 - extinguishing powder
- Fight larger fires with water spray or alcohol resistant foam.

Special hazards caused by the substance, its products of combustion or resulting gases:

- carbon monoxide (CO)
- oxides of carbon, nitrogen (NO_x), sulphur
- as well as not identified organic and inorganic compounds.

Special protective measures:

Do not inhale explosion gases or combustion gases.

Additional information:

Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.

3 Maintenance



WARNING



Warning of dangerous electric voltage

Electric shock can be deadly. Further personal and material damages can result from impact.

Before maintenance and repair work and before opening the device (e.g. for troubleshooting) it has to be switched off, visibly disconnected from the mains and secured against being switched on again!

Opening the plasma unit may be carried out only under responsibility of a qualified electrician!

3.1 Maintenance general

3.1.1 Intervals of maintenance

Following measures have to be taken in regular intervals:

Maintenance rate	Maintenance work	Target group	
		Operator	authorized electrical personal
weekly	- visual inspection of the condition of the plasma power source, all system components and the plasma torches - control of the filling level of the coolant (fill up on demand) - inspection of the service units or fine filter for the gas supply on cleanliness (discharge resulted condensation)	x	
monthly	by application of Hydrogen or Oxygen: inspection of the gas supply (see chapter gas pressure test)	x	
all 4 to 6 month	- Cleaning the power source and all components (control of the filter pads) - Cleaning small filters inside the gas connectors of the plasma gas control units		x
		x	
all 6 month	electrical revision		x
yearly	for liquid cooled units: complete change of coolant „Kjellfrost“	x	

3.1.2 Cleaning

3.1.2.1 Cleaning of the power source

From the power source all dust and dirt which has collected inside by the fan have to be removed in intervals of 4 to 6 months. Blowing out should be done carefully with dry compressed air, more effective is to use a vacuum cleaner.

In the same way all components of the system have to be cleaned.

When working in shifts or under unfavourable conditions the regular cleaning should take place in shorter intervalls.

To guarantee optimum cooling, existing filter mats should be vacuumed, knocked out or replaced.

3.1.2.2 Cleaning of the gas supply

Filter regulators and micro filters have to be cleaned weekly. Resulted condensation has to be drained; filter inserts have to be replaced in time.

The small filter screws inside the gas connectors of the plasma gas control units have to be inspected every 4 to 6 months, and cleaned if necessary. For that reason the pressure reducers of the gas cylinders have to be closed and the respective gas hose removed from the control unit. The filter screws only can be taken out by a small screw driver.

3.1.3 Electrical revision**for arc welding installations according to DIN EN 60974-4**

Periodic verification and testing of electrical installations and equipment shall be carried out at prescribed intervals.

These shall be carried out in accordance with IEC 60974-4 "Arc welding equipment – Periodic inspection and testing".

ATTENTION

The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

ATTENTION

The electrical revision of the plasma cutting system and the disposal of the noticed defects have to be carried out according to the statutory provisions via electrical specialist!

The following time periods must be observed (in accordance with IEC 60050-426 and DGUV V3):

- after 6 months, if the unit is frequently relocated
 - after one year, if the installation remains in one location
 - after every repair
-
- a) The visual inspection should concentrate on the following conditions and ensuring that,
 - the plasma cutting unit is in proper working order;
 - ensure the protection against contact with live parts during operation;
 - fuses or overcurrent devices connected to the circuit correspond to the conductor cross-sections;
 - lines and cables are correctly placed, fastened and connected (check the contact points) or
 - cables and lines are undamaged and free of burn marks.
 - b) Measurements must be taken to verify the effectiveness of the protective conductor in protecting against excessive contact voltage on parts that are not normally live during operation (protective conductor test).
 - c) The insulating capacity of the winding and cable insulation must be verified (with suitable measuring devices in accordance with IEC61557-1/-2):
 - Insulation value between windings and housing (protective earth connection) in cold and dry conditions > 2.5 MOhm
 - Insulation value between upper and lower voltage windings of transformer T1 in cold and dry condition > 5 MOhm
 - d) The functional test must be carried out after repairs in accordance with the scope of testing specified in IEC 60974-4 section 6.
 - e) The results of the revision must be documented in accordance with section 7 of IEC 60974-4.

INFORMATION

For points b) and c), please observe the service instructions "Additional instructions of the manufacturer for the periodic inspection and testing"!

3.1.4 Plasma machine torch

The plasma torches have to be handled with care. Powerful treatment and stress load have to be avoided. All consumables have to be in clean condition and carefully changed in time (see instruction manual of the Plasma Machine Torch).

Damages of parts inside the torch, like nozzle holder and cathode tube have to be avoided.

Besides the change of consumables by using the special torch tools no other action to the torch head is allowed! Plasma torches must be transported and stored at protected places with full inserted parts on the torch head only!

Hose parcels have to be protected against damages, like sharp bending, twisting, over rolling, and thermal damages as well. The cleanness of the small filters in the gas connections has to be checked regularly at the plasma machine torch. The small filter is to be screwed in with the thread forward into the connection of the respective gas hose

Defective plasma torches will be repaired exclusively by the service department or authorised repair shops of the company Kjellberg Finsterwalde!

CAUTION



**Coolant does not resign from the operational plasma torches at any time!
See chapter handling of the coolant "Kjellfrost".**

WARNING



**All components and parts coming in touch with oxygen have to be kept free of oil and grease!
This refers specially to the torch head and the consumables.**

ATTENTION



**You are only allowed to use ORIGINAL Kjellberg spare parts and consumables!
The use of other manufacturer consumables leads to the loss of the warranty claim.**

3.2 Maintenance special

3.2.1 Gas pressure test

When using oxygen and hydrogen, it is especially important to check the gas line system. An unnoticed gas leakage may have serious consequences.

Carry out a monthly gas pressure test according to point 1 and 2 for all used process gases:

1.	Check the gas supply lines from the supply to the gas console
	• Make sure that the plasma system is switched off or is in standby mode. • By this the closed input solenoid valves of the gas console prevent the gases from entering the machine. • Open the cylinder valve and the stop valve at the pressure reducer of the gas to be checked. • Close the cylinder valve again and monitor the pressure of the enclosed gas at the manometer of the pressure reducer. The pressure must remain at the set value for at least 3 minutes. • In case of a pressure drop, the cause must be determined and immediately eliminated. After that, the gas pressure test must be carried out once again. • Record the process properly. • In case of a supply via a ring line you should proceed analogously.
2.	Automatic internal gas pressure test
	• At regular intervals, the plasma system carries out an automatic gas pressure test of all gas lines between the input solenoid valves of the gas console and the solenoid valves of the torch. • In case of an impermissible pressure loss the corresponding error message will be displayed.



WARNING



Only regularly performed gas pressure tests are the guarantee for a safe operation of the gas supply system!

Because of the existing risk of fire and explosion by oxygen, hydrogen and inflammable gas mixtures, the gas pressure test has to be carried out carefully and proofed by protocol.

3.2.2 Preventive periodic maintenance - component change plan



WARNING



Warning of dangerous electric voltage

Electric shock can be deadly. Further personal and material damages can result from impact.



Before maintenance and repair work and before opening the device (e.g. for troubleshooting) it has to be switched off, visibly disconnected from the mains and secured against being switched on again!

Opening the plasma unit may be carried out only under responsibility of a qualified electrician!

ATTENTION



Consistent adherence to the specified maintenance measures is necessary to ensure high availability of the system.

Depending on the existing individual operating conditions of the user, it may make sense to carry out preventive periodic maintenance with component replacement according to the following plan in addition to these maintenance measures.

For a detailed list of maintenance measures with current operating hours and consumables information, please refer to the "Maintenance" page of the Q-Desk.

component <i>Article No.</i>	pos.	pcs	time interval					
			1 year or 1000 h	2 years or 2000 h	3 years or 3000 h	4 years or 4000 h	5 years or 5000 h	6 years or 6000 h
coolant "Kjellfrost -15°C" .12.62330			X	X	X	X	X	X
or coolant "Kjellfrost -25°C" .12.62350			X	X	X	X	X	X
Air contactor - auxiliary contactor (Q0, Q4) .10.161.751.24	04.02	2	X	X	X	X	X	X
Suppressor element diode 11BGX78 225 (for Q0, Q4) .10.161.748	04.03	2	X	X	X	X	X	X
Air contactor - main contactor (Q1) Q 1500: .10.161.761.24 Q 3000: .10.161.764.24 Q 1500+, Q3000+, Q 4500: .10.161.765.24	01.18	1				X		
auxiliary contact (Q1) .10.161.697	01.17	1				X		

Maintenance

component Article No.	pos.	pcs	time interval					
			1 year or 1000 h	2 years or 2000 h	3 years or 3000 h	4 years or 4000 h	5 years or 5000 h	6 years or 6000 h
Air contactor - pilot contactor (Q2) .10.161.722.26	04.05	1	X	X	X	X	X	X
auxiliary contact (Q2) .10.161.703	04.06	1	X	X	X	X	X	X
Air contactor – contactor "flying cutting" (Q3) .10.161.722.26	04.05	1	X	X	X	X	X	X
coolant pump, complete, mounted (M16) .11.038.3102..320	01.21	1						X
torch hose package <i>by manufacturer or authorised service</i>						X		
fan - heat exchanger (M12-M15, Ø 172 mm) .11.038.3002..344	03.10	4					X	
fan - inverter module (M1-M9, Ø 172 mm) .11.038.3002..658	04.25	per 3					X	
fan – PCB A3 inverter module (Ø 119mm) .11.412.3002..720	05.20	per 1					X	
fan – PCB A2 inverter module (Ø 119mm) .11.412.3002..725	05.21	per 1					X	
capacitor 7600 µF – intermediate circuit (C1, C2) 671.100.028	05.22	per 2						X
coolant and gas cable <i>condition depending</i>								X

Fig. 3: preventive periodic maintenance / component change plan iQ-Source

The time interval begins on the seventh year all over again (7th year as 1 year, 8 years as 2nd year, etc.).

4 Customer information on repair processing

To ensure effective processing of repair orders, please take note of the following:

INFORMATION

► **Ship without accessories where possible**

- Please send only the components suspected to be defective without any additional accessories.
We do not require workpiece cables, gas hoses, operating instructions, spare parts, custom fittings etc. for the repair.
- The only accessories required are those that have or could have contributed to the defect in the device, for example a torch, remote control set etc.

INFORMATION

► **Detailed description of the error**

Please provide a detailed description of the error on the repair order.
Accurate information helps us to identify the error, reducing both repair times and costs.

INFORMATION

► **Plasma torches**

Please send us defective plasma torches with the consumables unchanged - exactly as the torch was loaded at the time of the error.
Defective consumables provide us with important information on the sources of errors.

INFORMATION

► **Stable packaging and secure shipping**

- Please package the devices and components in suitably sized containers and use non-flaking and non-shredding materials for padding.
- If using styrofoam, ensure that no polystyrene chips can get into the gas or cooling water connections on the devices and components.
- For previously opened devices, please always ensure that the housing and carrying handles have been firmly refastened to all mounting points on the devices. If they are not, there is a risk that the stability of the housing will be insufficient for transport and that additional damage to the device may ensue.
- When sending devices weighing more than 20 kg, make sure to use a shipping company that uses pallets during transportation. This is because shipments sent as parcels are often damaged in transit.

5 Disposal

5.1 Disposal of the packing material

	Packing material
Plasma unit	Wooden pallet or solid wooden box
Plasma components and accessories	Wooden pallet
Consumables	Plastic box (package and keeping)

If packing materials are not needed for repacking or for a possibly necessary storage of the units between intervals of normal use, the materials can properly be recycled and disposed on the basis of regional applicable regulations by a waste management company.

5.2 Disposal of the units after decommissioning

The units of the company Kjellberg Finsterwalde are products which can properly be recycled or disposed after placing out of operation on the basis of regional applicable regulations by a waste management company.



Attention!!

This device is marked with the symbol of the crossed out dustbin. This means that this device need not be disposed of together with the domestic rubbish.

Use the locally available possibilities for the separate free return of electrical old equipment.



6 Power source iQ-Source

according to the version delivered

6.1 Technical data

Art.- no.:	Q 1500 / Q 1500 plus (.11.038.1121 / .11.038.3121)
primary side:	
mains voltage U_1^*:	3~ +PE 400 V $\pm 10\%$, 50/60 Hz
connecting load (100 % DC):	max. 35 kVA (depending on cutting parameters)
fuse, slow:	T 63 A
mains cable, cross section Cu:	4 x 16 mm ²
power factor cos phi:	0,92 at 150 A
efficiency:	0,86
cutting side:	
open circuit voltage (OCV) U_0:	400 V
cutting current I_S:	20 - 150 A
marking current I_M:	5 - 60 A
arc voltage U_S (100 % DC):	82 - 185 V
cutting power P_S:	0,4 - 21 kW
duty cycle X:	100 % at 150 A
pilot arc current I_{PB}:	10 - 50 A
workpiece cable, cross section Cu:	1 x 25 mm ²
cathode cable, cross section Cu:	1 x 50 mm ²
characteristic:	drooping (CC)
ignition process:	pilot arc ignition by high voltage ignition unit
dimensions (lxbxh):	1150 x 695 x 1510 mm (with undercarriage „castors and wheels“)
weight m:	240 kg / 280 kg
protection class:	IP21S
heat resistance class:	F
cooling:	Air cooled by built-in fan
torch cooling:	internal circulating cooling
coolant:	coolant mixture with integrated corrosion protection - „Kjellfrost -15 °C“ (anti freeze protection up to -15 °C) or - „Kjellfrost -25 °C“ (anti freeze protection up to -25 °C)
volume coolant box:	ca. 17 l
pressure:	8 bar at 3,5 l/min
* ... more voltages, see chapter "mains connection"	

Fig. 4: Technical data Q 1500/ Q 1500 plus

Art.- no.:	Q 3000 / Q 3000 plus (.11.038.2121 / .11.038.4121)
primary side:	
mains voltage U_1^*:	3~ +PE 400 V ± 10 %, 50/60 Hz
connecting load (100 % DC):	max. 72 kVA (depending on cutting parameters)
fuse, slow:	T 125 A
mains cable, cross section Cu:	4 x 35 mm ²
power factor cos phi:	0,93 at 300 A
efficiency:	0,89
cutting side:	
open circuit voltage (OCV) U_0:	400 V
cutting current I_S:	20 - 300 A
marking current I_M:	5 - 60 A
arc voltage U_S (100 % DC):	82 - 200 V
cutting power P_S:	0,4 - 60 kW
duty cycle X:	100 % at 300 A
pilot arc current I_{PB}:	10 - 50 A
workpiece cable, cross section Cu:	1 x 70 mm ²
cathode cable, cross section Cu:	2 x 50 mm ²
characteristic:	drooping (CC)
ignition process:	pilot arc ignition by high voltage ignition unit
dimensions (lxbxh):	1150 x 695 x 1510 mm (with undercarriage „castors and wheels“)
weight m:	298 kg / 317 kg
protection class:	IP21S
heat resistance class:	F
cooling:	Air cooled by built-in fan
torch cooling:	internal circulating cooling
coolant:	coolant mixture with integrated corrosion protection - „Kjellfrost -15 °C“ (anti freeze protection up to -15 °C) or - „Kjellfrost -25 °C“ (anti freeze protection up to -25 °C)
volume coolant box:	ca. 17 l
pressure:	8 bar at 5 l/min
* ... more voltages, see chapter "mains connection"	

Fig. 5: Technical data Q 3000/ Q 3000 plus

Power source iQ-Source

Art.- no.:	Q 4500 (.11.038.5121)
primary side:	
mains voltage U_1^*:	3~ +PE 400 V ± 10 %, 50/60 Hz
connecting load (100 % DC):	max. 109 kVA (abhängig von Schneidparametern)
fuse, slow:	T 180 A
mains cable, cross section Cu:	4 x 50 mm ²
power factor cos phi:	0,93 bei 450 A
efficiency:	0,89
cutting side:	
open circuit voltage (OCV) U_0:	400 V
cutting current I_S:	20 - 450 A
marking current I_M:	5 - 60 A
arc voltage U_S (100 % DC):	82 - 200 V
cutting power P_S:	0,4 - 90 kW
duty cycle X:	100 % at 450 A
pilot arc current I_{PB}:	10 - 50 A
workpiece cable, cross section Cu:	2 x 70 mm ²
cathode cable, cross section Cu:	3 x 50 mm ²
characteristic:	drooping (CC)
ignition process:	pilot arc ignition by high voltage ignition unit
dimensions (lxbxh):	1150 x 695 x 1510 mm (with undercarriage „castors and wheels“)
weight m:	355 kg
protection class:	IP 21S
heat resistance class:	F
cooling:	Air cooled by built-in fan
torch cooling:	internal circulating cooling
coolant:	coolant mixture with integrated corrosion protection - „Kjellfrost -15 °C“ (anti freeze protection up to -15 °C) or - „Kjellfrost -25 °C“ (anti freeze protection up to -25 °C)
volume coolant box:	ca. 17 l
pressure:	8 bar at 5 l/min
* ... more voltages, see chapter "mains connection"	

Fig. 6: Technical data Q 4500

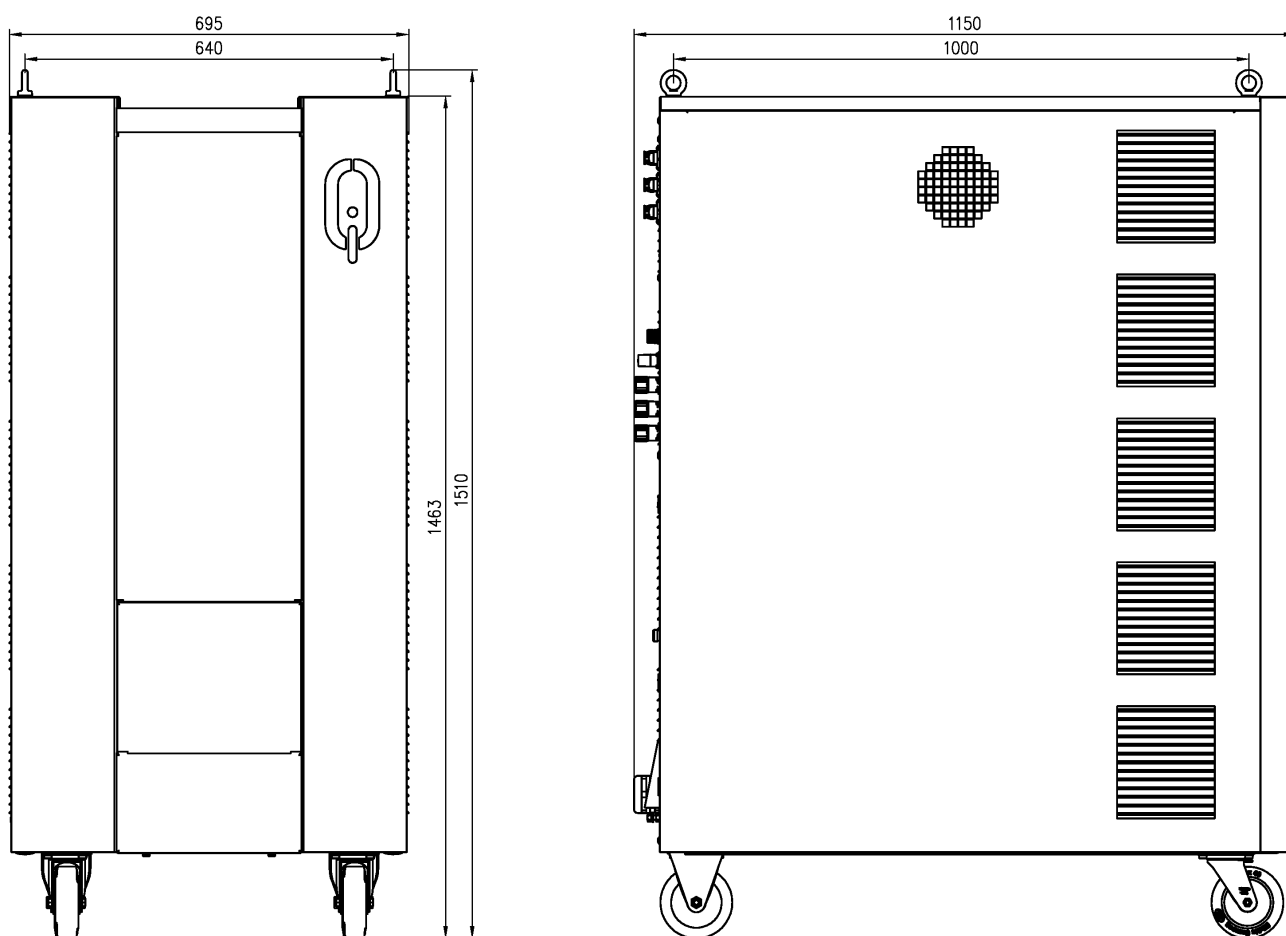


Fig. 7: Dimension diagram

6.2 Technical description

ATTENTION



Only plasma torches of the types Q-Torch 45xx of Kjellberg Finsterwalde are determined for use with power sources Q 1500, Q 1500 plus, Q 3000, Q 3000 plus and Q 4500 by EN 60974-1.

Exclusive these plasma torches forms a safety-related unit with the named power sources in accordance with EN 60974-7!

6.2.1 Setup

- all components of the plasma power source are mounted into a rugged housing, which is movable by hand as well as transportable with the crane
- the entry vents for cooling air are arranged at the front, side and bottom
- at the rear panel are:
 - the connectors for the workpiece and cathode cable,
 - the mains cable entry,
 - the outlet vents for cooling air
 - the CNC-interface,
 - the connectors for the torch connection unit iQ-Port with an integrated high voltage ignition unit
 - the connectors for the plasma gas control unit and reserve

6.2.2 Electronic control

- optimal process sequence by microprocessor control of the power source:
 - automatic monitoring
 - the individual phases of the cutting process and
 - all important processes of the plasma cutting (torch cooling, ignition time, pilot arc time, etc.)
- the electronic control made possible:
 - an optimal process control by a fast regulation of the cutting current
 - fast starting cuts through very short transition periods
 - optimal hole piercing through adjustable current rising
 - adjustable current down slope at corner-signals
- Q-Desk/PC digital display of operating conditions and possible process errors by means:
 - display of the preset current (setpoint) at the cutting break
 - display of the cutting voltage and current (actual value) during the cutting and marking process
 - display of the volume flow, temperature and level of the coolant,
- flexible adjustment of the ignition process to the necessary conditions with the help of the microprocessor control
- increased electrical efficiency in the current source by soft-switch inverter technology with microprocessor control

6.2.3 Special parameters of the power source

- stepless adjustable cutting current from 5 – 150 A, 300 A, 450 A (100 % ED)
- stepless adjustable marking current for optimal process adaptation to the marking job: 5 - 50 A
- interface for the control of the plasma unit from 2D- and 3D-CNC-guiding system, like gas cutting machines, tube cutting machines and robots:
 - interface X302, X304 und RS 485
 - interface EtherCAT
- connecting possibility of a PC for the diagnosis during service
- the operational radius of the device is 15 m, 25 m, 35 m, 45 m or 55 m, depending on the intermediate hose package used
- marking, notching and punching also for coated metallic materials when using the automatically gas console iQ-Gas 4500
- special torches are available on request.

6.3 Plasma marking, Plasma notching, Plasma punching

	definition
Plasma marking (marking)	Marking of electrically conductive materials by means of plasma beam
Plasma notching (notching)	Marking of electrically conductive materials by means of plasma beam with a larger penetration depth
Plasma punching (punching)	Marking of electrically conductive materials by means of plasma beam with a larger penetration depth in a point (punctual notching)

The penetration depth at the punching among other things gets certain also through the residence time of the torch over the centre punch point and with that by the control of the guiding system.

The application of the plasma fine jet principle in plasma marking offers a number of technological advantages:

- small marking lines
- low heat input
- low distortion
- high marking speed
- excellent marking quality

The direct transferred plasma arc enables the marking of all electrically conductive materials with no regard to thickness and quality (Mild steels, high alloyed steels and special alloys). Aluminium is less well suitable due to its specific material properties for marking.

The marking process is applicable at all kind of material, like sheet metal, tubes, profiles, forged and casted parts, laminated sheet packages, scrap metal products and cast iron products.

The marking current can be adjusted continuously, allowing the power to be optimally adapted to the marking task.

Power source iQ-Source

	marking gas	material	penetration depth	electrical power	comment
marking	Ar	Mild steels, high alloyed steels special alloys	+	+	very good marking quality for all materials except aluminium
notching	N ₂	mild steel	++	++	larger penetration depth as with plasma gas Ar
notching+	Air		+++	+++	larger penetration depth as with plasma gas Ar and N ₂
punching	punctual punching (see notching and notching+)				

Fig. 8: used gases for marking and notching (punching)

INFORMATION



The marking record can be used without consumable part changes; **however, the optimal marking quality is not achieved by it in every case.**

INFORMATION



The permanent change between cutting of mild steel (with plasma gas O₂) and marking (with marking gas Ar) may reduce the lifetime of the O₂ cathode to 30%. In this case argon becomes alternatively recommended nitrogen or air instead of the marking gas.

INFORMATION



The use of an Ar/H₂ cathode is recommended for long marking processes with marking gas argon:

- for plasma torch Q-Torch 45xx: cathode E042, E052 oder E065

6.4 Putting into operation

6.4.1 Check, placement and transport

- Please check the delivery directly on the basis of the order and delivery documents on completeness and correctness. In the case of incompleteness or deviations please inform the supplier and the carrier immediately.
- Please check the delivery immediately on damages. Damages have to be announced immediately to the carrier and supplier.
A damage report has to be generated.

The Unit is designed for a service in explosion-proofed rooms or in the free air by using a roofing under following conditions:

ambient temperature:	-10 °C to +40 °C	
transport- and storage temperature:	-15 °C to +55 °C	when first filling with coolant „Kjellfrost -15 °C“ standard filling
	-25 °C to +55 °C	when first filling with coolant „Kjellfrost -25 °C“
relative humidity:	max. 90 % at 20 °C	
	max. 50 % at 40 °C	

Fig. 9: operational conditions

Place the power source so that the air flow is not blocked. The unit is to be set up in such a way that the cooling air can enter and escape unhindered by the ventilation openings. A free distance of at least 250 mm should be kept around all 4 sides of the unit.

The unit has to be installed horizontally.

At maintenance work a distance of approx. 1000 mm should be kept around all 4 sides of the unit.

Avoid that dust (especially metallic particles), acid damp, corrosive substances and gases can enter the unit. The lifetime and the function of the plasma cutting will be influenced.

The plasma cutting system is designed acc. to the requirements of the protection class IP 21S (DIN EN 60529), that means:

- Protected against access to hazardous parts with a finger.
- Protected against solid foreign bodies, 12.5 mm and larger.
- Protected against dripping water.

Power source iQ-Source

It is possible to load the unit by forklift.

WARNING



Danger of tilting at the loading by the fork truck!

Further personal and material damages can result, please note the rules of conduct when dealing with a forklift.

The power source has to be taken from the side, pay attention to the load centre.

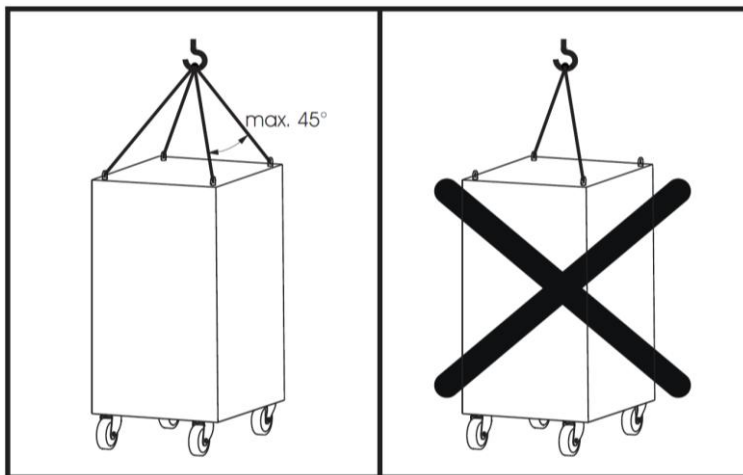
WARNING



Endangerment at the crane transportation by falling down of the unit.

Further personal and material damages can result.

For crane transportation all four lifting eyes have to be used! The angle between the ropes or chains should not exceed 45°! Pay attention for the weight of the unit!



For crane transportation lifting eyes are provided.

Fig. 10: Crane transport

CAUTION



Endangerment through free standing wheels by manual moving of the unit.

Foot injuries are possible.

Caution by the manual moving of the unit - wear foot guards!

6.4.2 Installation

6.4.2.1 Mains connection

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

INFORMATION



Low-interference routing of signal and communication cables

If possible, do not lay any signal and communication cables in the immediate area of other current-carrying cables, e. g. mains cable, workpiece cable, cathode cable.

Use the shortest possible signal and communication cables.

If the signal and communication cables are longer than required, do not lay them coiled up.

The information relates to signal and communication cables at the following connections:
X302, X304, X307, X308, X309, X340, X342, X343, X345

The plasma power source can be delivered by default for the connection to the mains voltage with mains cable (5 m long). The mains cable version mentioned in the following table is only a recommendation. The mains cable has to be connected in compliance with the applicable regulations to a circuit breaker.

You have to add the main fuses to the power switches according to the following table:

Power source iQ-Source

Mains voltage U ₁ (+ 10% / - 10%)	I _{1max}	Fuse, slow	Mains cable, cross section Cu	AWG*	Article number of power source
3~ 380 V, 50/60 Hz	53 A	63 A	4 x 16 mm ²	5	.11.038.1121/ .11.038.3121
3~ 400 V, 50/60 Hz	51 A				
3~ 415 V, 50/60 Hz	49 A				.11.038.11022/ .11.038.3122
3~ 440 V, 50/60 Hz	46 A				
3~ 460 V, 50/60 Hz	44 A				.11.038.1123/ .11.038.3123
3~ 480 V, 50/60 Hz	42 A				

Q 1500/ 1500 plus

Mains voltage U ₁ (+ 10% / - 10%)	I _{1max}	Fuse, slow	Mains cable, cross section Cu	AWG*	Article number of power source
3~ 380 V, 50/60 Hz	110 A	125 A	4 x 35 mm ²	1	.11.038.2121/ .11.038.4121
3~ 400 V, 50/60 Hz	105 A				
3~ 415 V, 50/60 Hz	101 A				.11.038.2122/ .11.038.4122
3~ 440 V, 50/60 Hz	95 A				
3~ 460 V, 50/60 Hz	91 A				.11.038.2123/ .11.038.4123
3~ 480 V, 50/60 Hz	87 A				

Q 3000/ 3000 plus

Mains voltage U ₁ (+ 10% / - 10%)	I _{1max}	Fuse, slow	Mains cable, cross section Cu	AWG*	Article number of power source
3~ 380 V, 50/60 Hz	165 A	180 A	4 x 50 mm ²	1/0	.11.038.5121
3~ 400 V, 50/60 Hz	157 A				
3~ 415 V, 50/60 Hz	151 A				.11.038.5122
3~ 440 V, 50/60 Hz	143 A				
3~ 460 V, 50/60 Hz	136 A				.11.038.5123
3~ 480 V, 50/60 Hz	131 A				

Q 4500

***American Wire Gauge**

If the mains cable is provided by the customer, it has to be selected according to the national and local regulations. The current load of the mains cable must correspond to the rated current of the mains fuse at a permitted operating temperature at the conductor of 90°C.

The mains cable has to be inserted by the cable connection at the rear panel and to connect to the mains terminal clamps (L1, L2, L3 and ).

The installation has to be executed by qualified technical staff.



WARNING



Warning of dangerous electric voltage

The power switch has to be in the “OFF position” by the connection of the main cable and all other installations!

6.4.2.2 Workpiece connection / current return line / potential equalisation

INFORMATION



Low-interference routing of signal and communication cables

If possible, do not lay any signal and communication cables in the immediate area of other current-carrying cables, e. g. mains cable, workpiece cable, cathode cable.

Use the shortest possible signal and communication cables.

If the signal and communication cables are longer than required, do not lay them coiled up.

The information relates to signal and communication cables at the following connections:

X306, X307, X308, X309, X340, X342, X343, (X344), X302, X304

Power source side:

The workpiece cable is connected to the workpiece terminal M 10 behind the door in the rear panel of the power source.

Workpiece side:

- At plasma units, which are equipped with a workpiece cable with clamp, the connection occurs directly and firmly to the workpiece, at the component or at the device at which the cutting current is carried out (for example cutting table).
- At plasma units, which are equipped with a workpiece cable with cable lug, the connection occurs directly and firmly to a M10- thread terminal of the device, at which the cutting is carried out (for example cutting table).

You have to pay attention in each case to metallic contact!



WARNING



It is not allowed to use conductive parts of building, like steel construction, pipes, track ways or similar devices for conducting the power back to the plasma cutting system, as far cutting is not performed at those parts!

6.4.2.3 Potential equalisation, Earthing**INFORMATION****Low-interference routing of signal and communication cables**

If possible, do not lay any signal and communication cables in the immediate area of other current-carrying cables, e. g. mains cable, workpiece cable, cathode cable.

Use the shortest possible signal and communication cables.

If the signal and communication cables are longer than required, do not lay them coiled up.

The information relates to signal and communication cables at the following connections:

X306, X307, X308, X309, X340, X342, X343, (X344), X302, X304

General information**ATTENTION**

The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

ATTENTION

Between workpiece and cutting table must be a good electrical contact!

The potential equalisation of the entire system is the responsibility of the operator and has to be carried out by an electrician *).

When integrating components of other manufacturers into the plant complex (e.g. cutting table, guiding system), it is necessary to follow the specific information given by those other manufacturers.

Protective potential equalisation

The protective potential equalisation for all relevant components of the complex is used as basic provision in case of a failure. It protects persons against electric shock in case of indirect contact *).

Functional potential equalisation

The functional potential equalisation is used in order to reduce the effects that an insulation fault as well as electric and electromagnetic disturbances might have on the operation of the plant.

Normally, the functional potential equalisation is realised by a connection with the protective conductor system. If, however, the electric interference level on the protective conductor system is too high so that the proper operation of the complex is no longer guaranteed, there is the option to install a separate earthing conductor which serves as additional functional earthing (see picture below. ²⁾).

Power source iQ-Source

Potential equalisation and protective conductor guidance

The potential equalisation has to be done in star shape by the shortest possible wires (preferably copper wires) with the largest possible cross section. We recommend a conductor cross section Cu of at least 25 mm² *). The wires have to be marked with the two-colour combination GREEN-YELLOW *).

The potential equalisation between plasma cutting unit, gas console, PBA and cutting table or guiding system is the responsibility of the operator. For this purpose, the plasma cutting unit, the gas console and the PBA are each equipped with a thread bolt size M8. The wires are not part of the delivery content.

The following picture shows an example of potential equalisation and protective conductor guidance. Depending on the configuration of the plant, there may be deviations from this example.

*) Cf. also EN 60204-1 (IEC 60204-1)

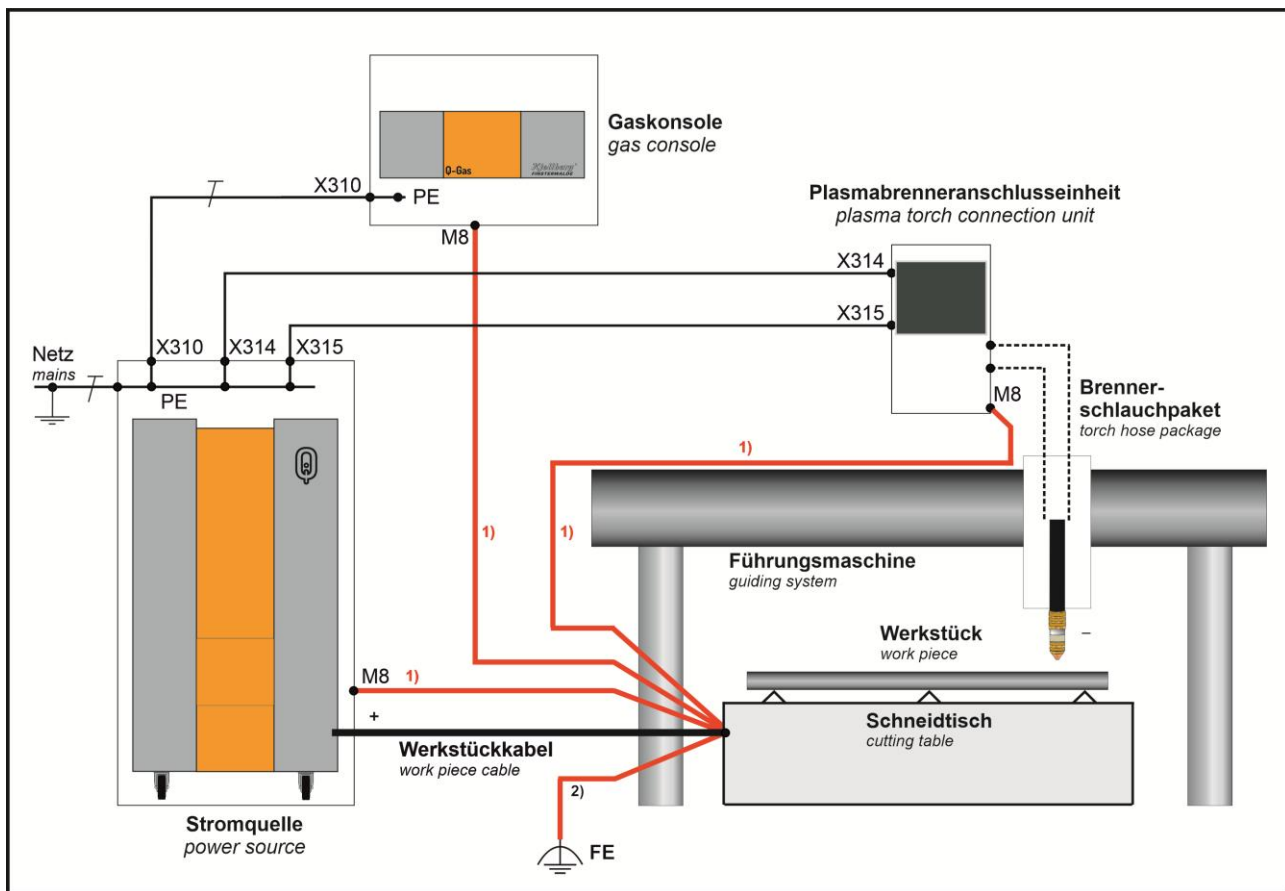


Fig. 11: Potential equalisation and protective conductor guidance, example

Footnote/Term	Explanation	Note
	Symbol for protective earth PE	
	Symbol for functional earth (FE)	
1)	Installation by operator	Wires are not part of the delivery content
2)	External wire for additional functional earthing	Wires are not part of the delivery content
	Installation by the operator. The resistance value between the equipotential bonding bar at the cutting table and the central equipotential bonding system in the building should ideally be less than 1 ohm in order to ensure the effectiveness of the protective measure. All national standards and local utility company regulations must be observed.	

6.5 Front wall

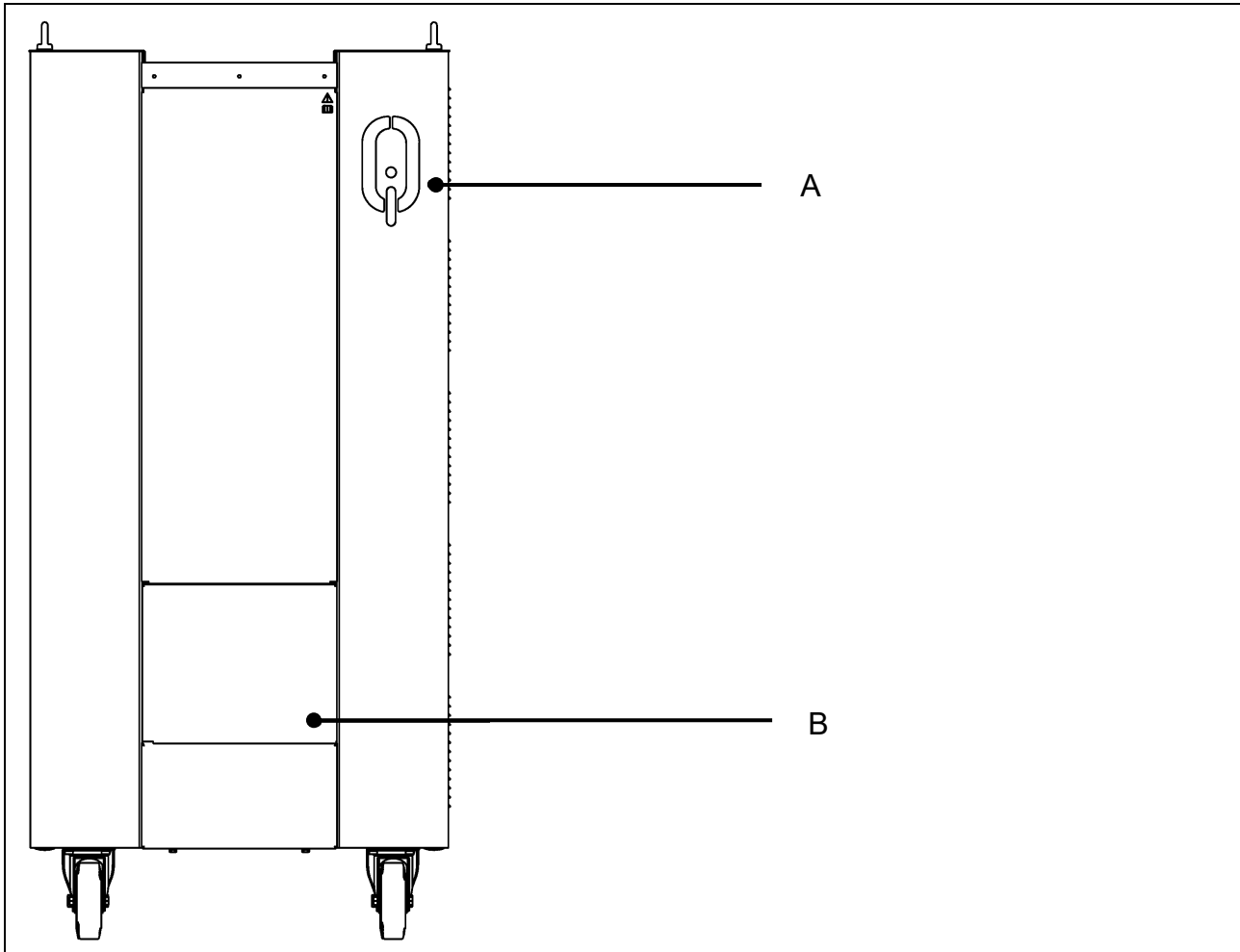


Fig. 12: Display element of iQ-Source

A	Display element iQ-LED indicates status of the plasma cutting unit		
	colour	status	comment
	white	initialization	Switching on of the plasma cutting unit
	blue pulsating	standby	control unit ON/ power unit OFF
	blue	ready	process ready
	green	process ON	cutting / marking process ON
	yellow	error	e. g. coolant fill level too low
	red pulsating	danger	e. g. main contactor does not switch off e. g. emergency stop not executed
	white pulsating	service	e. g. "Wait for data set change" e. g. fill with coolant
	cyan	system - update	Update process of the system

B	Flap		
	detailed view see figure below		
	3	X305	Connection "Service ETH" socket RJ-45
	4	green button "refill coolant"	
	5	yellow button "drain coolant"	

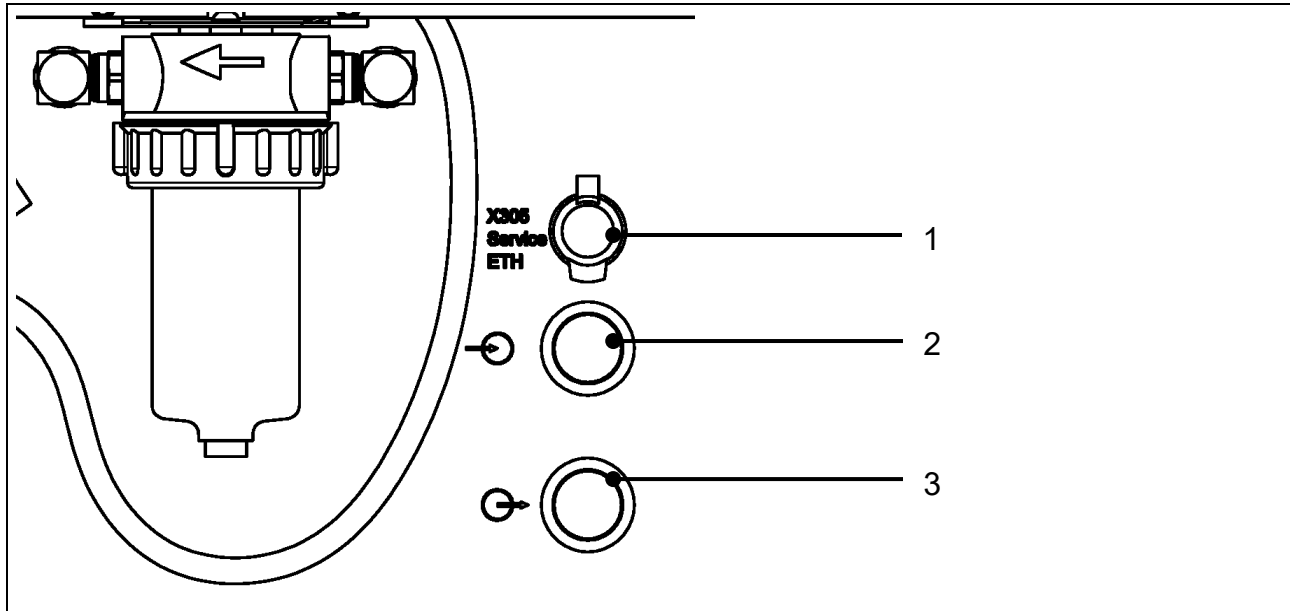


Fig. 13: B – Connections behind the flap

6.6 Filling up and draining off the coolant

The coolant circuit is to be filled with "Kjellfrost -15 °C" (frost-resistant up to -15 °C) or "Kjellfrost -25 °C" (frost-resistant up to -25 °C). In addition to frost protection, these coolants with specially developed corrosion protection are also used for increasing the lifetime of the pump and seals as well as for increasing the service life of the coolant channels of the plasma torch. Therefore, please use exclusively the coolant „Kjellfrost“! The use of simple, standard antifreeze may cause the failure of the plasma system within a very short time.

The volume of the coolant tank amounts to approx. 17 l.

Refilling the coolant

1.	Plasma torch and hose package must be connected.
2.	The power source must be in the state ready or error: cooling level min (E 142)
3.	Open the flap at the front of the power source, by reaching into the flap at the bottom right and open the magnetic lock by pulling.
4.	Remove the end of the hose and put it into a full Kjellfrost canister.
5.	Press the green button „refill coolant“ (S5) briefly. The green button lights up.

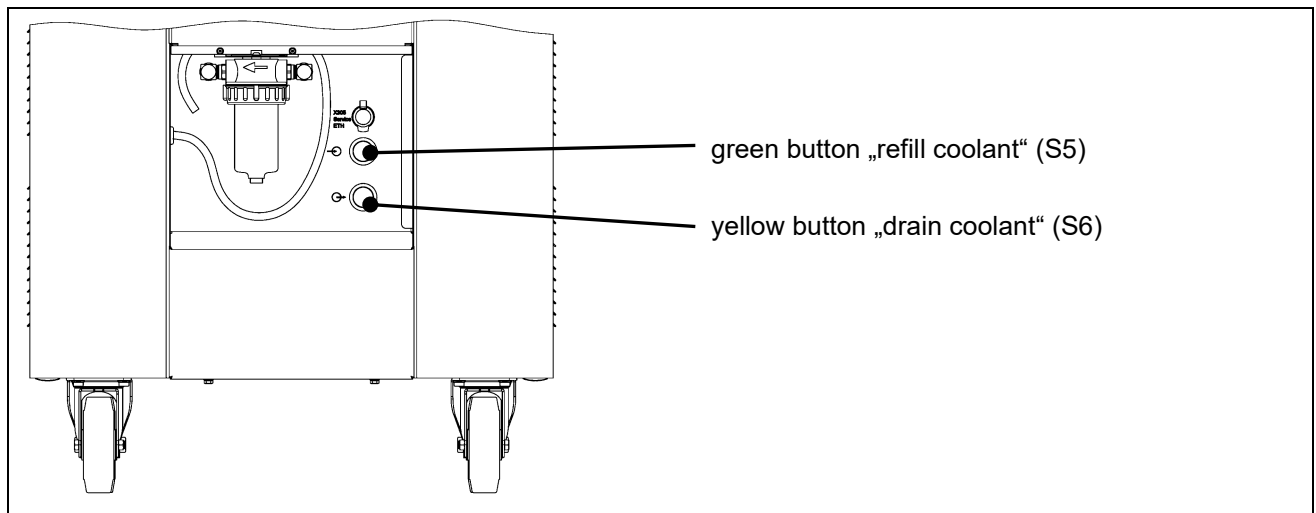


Fig. 14: Coolant flap

6.	The power source is in state service and the coolant tank is filled via the hose package and the plasma torch by means of the coolant pump
7.	As soon as the tank is filled completely, the pump switches off automatically and the green button flashes.
8.	Complete refilling by pressing the green button for at least 2 seconds. The green button goes off and the power source changes to state ready. If the button is pressed for less than 2 seconds, the refilling process starts again (see step 6).
9.	Store the hose back into the starting position and close the flap.

Automatic termination:

- If the Kjellfrost canister is empty before the tank is filled completely, the pump switches off automatically after 3 s. The green button flashes.
- Replace the empty canister by a full one and continue refilling:
continue with step 5 or
- Finish refilling: continue with step 8

Manual termination:

- You can also manually terminate the refilling process by briefly pressing the green button. The green button flashes.
- Continue refilling: continue with step 5 or
- Finish refilling: continue with step 8

Draining the coolant

1.	Plasma torch and hose package must be connected.
2.	The power source must be in the state ready or error: cooling level min (E 142).
3.	Open the flap at the front of the power source, by reaching into the flap at the bottom right and open the magnetic lock by pulling.
4.	Remove the end of the hose and put it into an empty collecting container with a capacity of at least 20 litres.
5.	Press the yellow button „drain coolant“ (S6) briefly. The yellow button lights up.
6.	The power source is in the state “service” and the tank runs empty without the coolant pump.
7.	When the tank is empty, the yellow button flashes for 2 seconds and then goes off. The power source changes to the state error: cooling level min (E 142). The green button flashes.
8.	If you want to refill new coolant now, continue with step 4 of refilling the coolant.
9.	If you don't want to refill coolant, switch off the power source.
10.	Store the hose back into the starting position and close the flap.

Manual termination (i. e. collecting container full):

- You can also terminate the draining process manually by briefly pressing the yellow button. The yellow button flashes.
- Continue draining: → continue with step 5 or
- Finish draining by pressing the yellow button for at least 2 seconds. The yellow button goes off and the power source changes to state ready. If the button is pressed for less than 2 seconds, the draining process starts again (see point 6).

6.7 Rear panel

All connecting and control cables will be placed to the rear panel of the power source.

Voltage and current-carrying parts and the fuses are accessible only after opening the cover plate, which is protected by a safety contact.

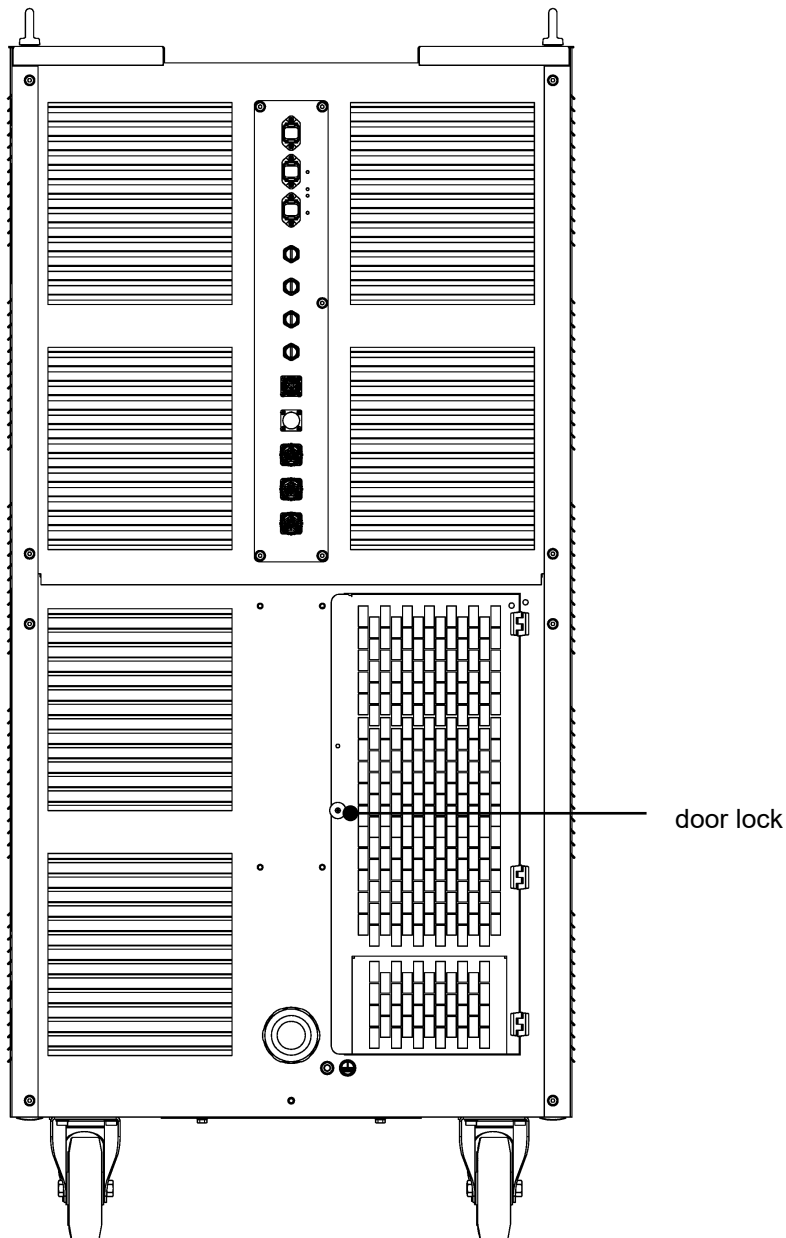


Fig. 15: Rear panel

INFORMATION

► Please note that you can open the door in the rear wall of the power source, which is secured with a door lock, only with a cross-tip screwdriver!
To do this, insert the cross-tip screwdriver into the opening and turn it to the left! Then the door opens easily.

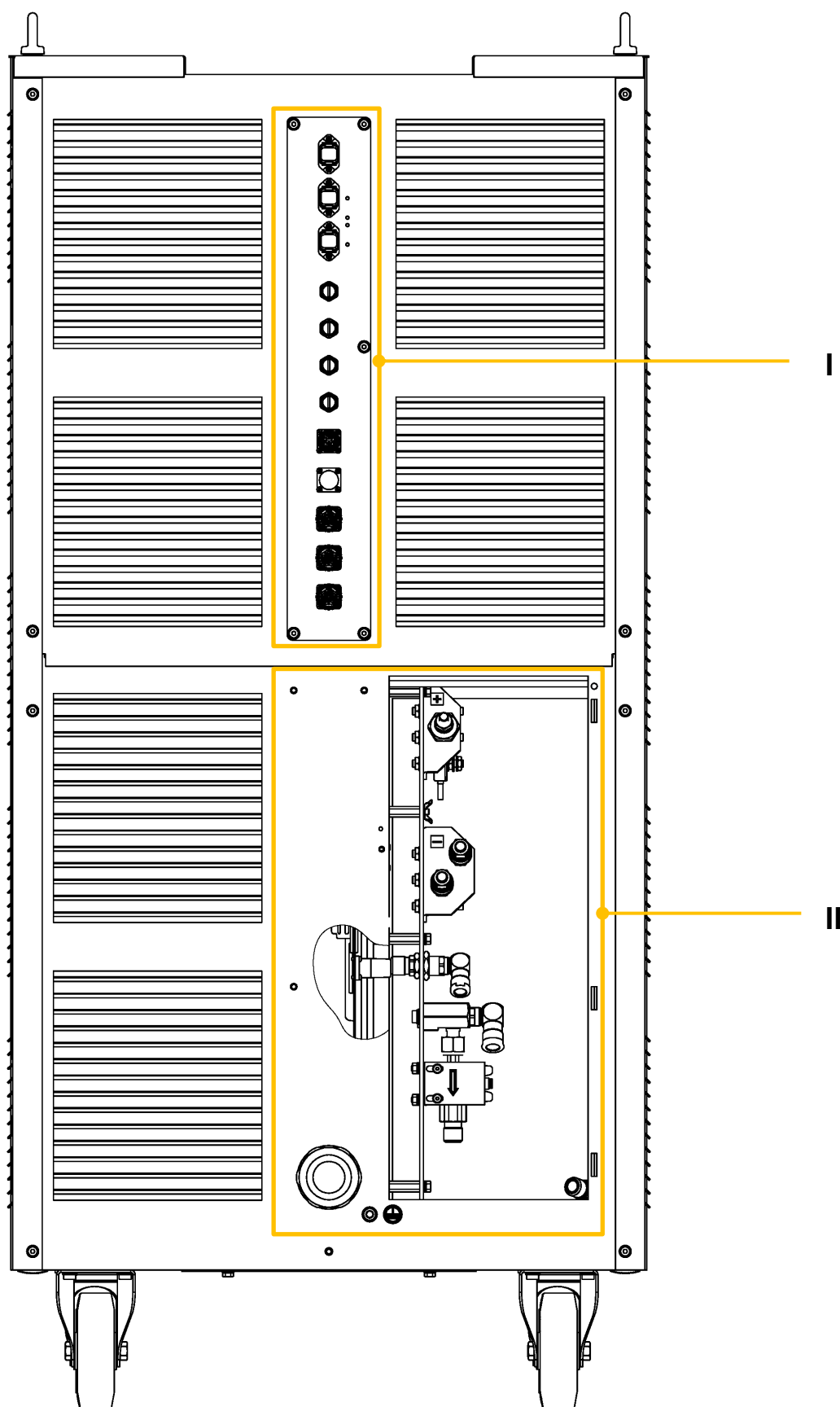


Fig. 16: Rear panel of the power source

Power source iQ-Source

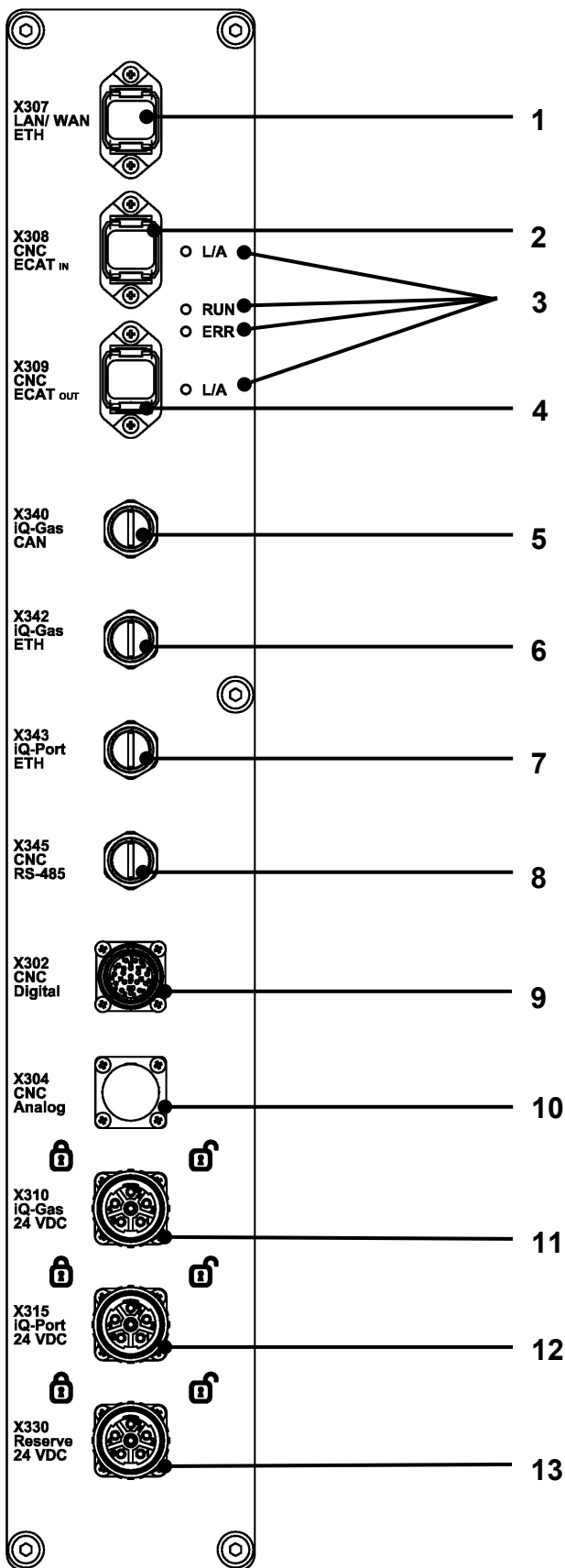


Fig. 17: upper connections (I)

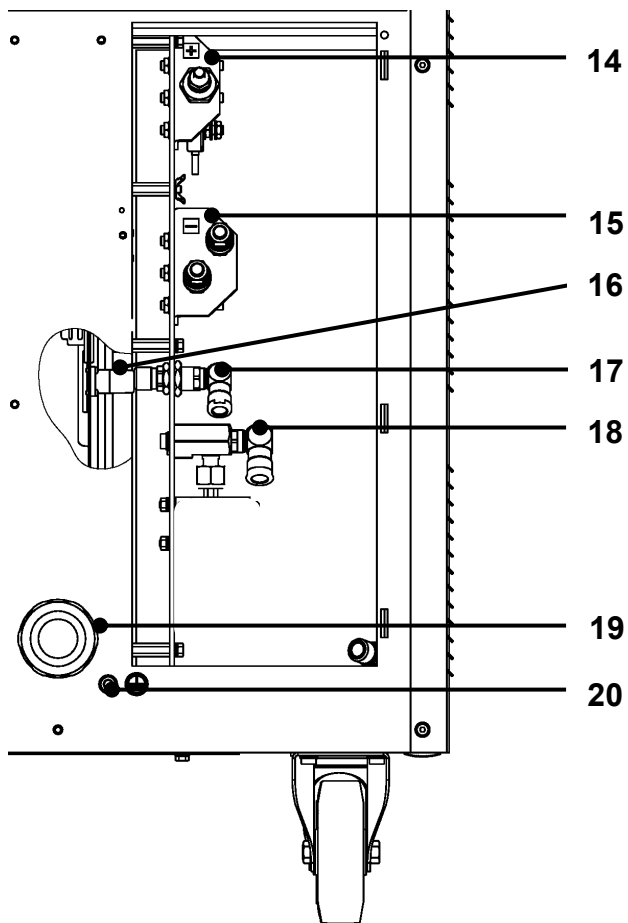


Fig. 18: lower connections (II)



Fig. 19: If necessary, set the cable lugs of the cathode leads (connection 16) against each other.

Power source iQ-Source

upper connections (I)				
11	X307	Connector LAN/ WAN Ethernet		RJ-45 socket
12	X308	Connector CNC EtherCAT IN		RJ-45 socket
13	(X308/ X309)	EtherCAT LED-display (further information see chapter „LED display“) (L/A (Link/Activity))		
	green	<L/A> LED (<IN> Port)	Displays the input status	
	green	<RUN> LED	Displays the operating status	
	red	<ERR> LED	Displays the error status	
	green	<L/A> LED (<OUT> Port)	Displays the output status	
14	X309	Connector CNC EtherCAT OUT		RJ-45 socket
15	X340	Connector iQ-Gas CAN		M12 5-pol. socket
16	X342	Connector iQ-Gas Ethernet		M12 8-pol. socket
17	X343	Connector iQ-Port Ethernet		M12 8-pol. socket
18	X345	Connector CNC RS-485		M12 4-pol. socket
19	X302	Connector CNC digital		M23 17-pol. socket
20	X304	Connector CNC analogue		M17 6-pol. socket
21	X310	Connector iQ-Gas 24 VDC		M17 5-pol. socket
22	X315	Connector iQ-Port 24 VDC		M17 5-pol. socket
23	X330	Connector reserve 24 VDC		M17 5-pol. socket

lower connections (II)				
24	+	Workpiece connection		terminal M10
25	-	Cathode connection		terminal M12 (2x)
26	X314	Connector Q-Port pilot		M17 3-pol. socket
27	blue	Connector coolant supply		Ø 12 socket
28	red	Connector coolant return		Ø 14 socket
29		Mains cable entry		M63x1,5
30		Terminal earthing		terminal M8

Following components are suitable for the connection to the power source

- the torch connection unit Q-Port
- the gas console Q-Gas for the adjustment and the dosage of the process gases

EtherCAT LED display

L/A (Link/Activity)

<L/A> LED (<IN> Port)	Displays the input status		
	Colour	LED status	Description
	green	OFF	Port not connected or no power applied to device
		blinking	Port connected and communication active.
		ON	Port connected, but no communication
<RUN> LED	Displays the operating status		
	Colour	LED status	Description
	green	OFF	INIT (initialization status) or no power applied to device
		blinking (200 ms ON, 200 ms OFF)	PREOP (pre-operational status)
		single flash (200 ms ON, 1000 ms OFF)	SAFEOP (safe-operational status) Communication of cyclic data transfer running. Input values available, output values written to the device but not updated on device output.
		ON	OP (operational status)
<ERR> LED	Displays the error status		
	Colour	LED status	Description
	red	OFF	No error or no power applied to device
		blinking (200ms ON, 200 ms OFF)	Error occurred (see error parameter)
		single flash (200 ms ON, 1000 ms OFF)	Slave device application has changed the EtherCAT state autonomously, due to local error (see error parameter).
		double flash (200 ms ON, 200 ms OFF, 200 ms ON, 1000 ms OFF)	An application watchdog timeout has occurred. Sync Manager Watchdog timeout or communication timeout occurred.
		ON	A critical communication or application controller error has occurred. Application controller is not responding any more (PDI (Process data interface) Watchdog Timeout detected by ESC (EtherCAT-Slave-Controller)).
<L/A> LED (<OUT> Port)	Displays the output status		
	Colour	LED status	Description
	green	OFF	Port not connected or no power applied to device
		blinking	Port connected and communication active.
		ON	Port connected, but no communication

6.8 Switching ON the power source

The power source is switched ON by the guiding machine via the X302.

INFORMATION



It is not possible to operate the power source without emergency stop signal from the guiding system!

6.8.1 Switching ON the control unit

When the control unit is switched on, all PCBs and the router boot. It is switched on by applying a voltage of 24 V DC via X302:16 (+24 V/CNC) and X302:17 (GND/CNC), thus activating an auxiliary contactor (Q0) with a power consumption of 3.2 W. During the booting routine, the iQ-LED shows a white light. After completion of the booting routine, the system switches to status "STANDBY" (STANDBY (0x0011)) and the iQ-LED flashes blue.

6.8.2 Errors and warnings

In case of an error, the present status is terminated and the unit changes to the status "ERROR" (ERROR (0xEEEE)). An error code according to the error code list is displayed on the Q-Desk and transmitted via EtherCAT. Depending on the error code, the iQ-LED shows a yellow or red light.

Unlike errors, warnings do not result in the termination of the present status. Warnings are also displayed on the Q-Desk and transmitted via EtherCAT.

6.8.3 Configuration

According to the IM_Q-Desk manual, the following settings can be made via web interface during initial commissioning:

- system time
- control mode (manual / EtherCAT)
 - DHCP server / DHCP client / static IP
- network configuration
 - DHCP Server / DHCP Client / static IP
- remote maintenance
- Complex name

To access Q-Desk, launch it and follow the further instructions in the Q-Desk dialogue box to configure your desired settings..

6.8.4 Switching ON the power unit

The power unit can only be switched on if a Q-Torch is connected and equipped with consumables and the safety circuit (emergency stop, door switch) is closed.

By applying the signal "power unit ON" (X302:4; set_power_unit_on := 1) from the guiding system, the plasma unit changes from the status "STANDBY" (STANDBY (0x0011)) to status "READY" (READY (0x0002)).

At the same time, the coolant pump (M16), main contactor (Q1), power supply (T12) and pilot contactor (Q2) are switched on. The coolant flow and the nozzle voltage are checked, and a software enable signal is sent to release the switching on of the main contactor. Additionally, the Q-Torch is checked for connection, authenticity and safety.

The signal "main contactor" (X302:15; ack_main_contactor_on = 1) is passed to the guiding system. After completion of the switch-on procedure, the plasma unit changes to the status "WAIT" (RECORD_NUMBER_WAIT (0x0013)) and the iQ-LED flashes white.

6.9 Cutting operation



WARNING



It is not allowed to operate the unit with any of the housing cover panels not in place! It is hazardous to the operator and other people in the area, and prevents the equipment from properly cooling the components!

Before cutting can start the following steps have to be taken:

Inspection of the plasma torches:

- the torch must be in a correct and undamaged condition
- the inserted consumables must match the intended cutting technology and have to be in a good shape

Inspection of the plasma power source:

- the mains fuse are of the required size (see chapter “Technical data of plasma machine”)
- the workpiece cable is correct connected (see chapter “connection / current return line”)

Inspection of the installed plasma gas unit:

The gas supply system is correct installed, connections are safe and tight (see chapter „connection of gas supply” – instruction manual of plasma gas unit).

INFORMATION



Please make sure that the doors of the iQ-Source and iQ-Port are closed!

INFORMATION



Please make sure that the emergency stop circuit is closed!

6.9.1 Loading the data set

In the status "Waiting for data set" (RECORD_NUMBER_WAIT (0x0013)), a data set is selected (iQ-LED pulsates white). This is done either via the cutting data finder of the Q-Desk or by transmission of the required parameters via EtherCAT.

The following minimum data set information is required:

- set_database_number [7010:1]
- set_database_version [7010:2]
- set_record_number [7010:3].

Further, variations of the setpoints for cutting currents 1 and 2 and the gas pressures are possible within permissible limits. After allocation of the data set information, the change of the data set is initiated with the respective command:

set_command [7000:1] := RECORD_NUMBER_CHANGE (0x0001)

Together with the loaded data set, the gases are selected according to the gas combination and the lines are rinsed (iQ-LED pulsates white).

After the gas purge, the plasma unit changes to the status „READY“ (READY (0x0002)) (iQ-LED shows a blue light).

The signal "ready for cutting" (X302:10; tack_ready_for_cutting = 1) is transmitted to the guiding system.

A new data set can be selected at any time while the plasma unit is in the status "READY" (READY (0x0002)).

6.9.2 Initial position finding

The plasma cutting unit offers the function of an electric initial positioning. This can be done either during the status "RECORD NUMBER CHANGE" (RECORD_NUMBER_CHANGE (0x000E)), or after a change of a data set in status "READY" (READY (0x0002)) or during an extended gas pre-flow time.

The contact between plasma torch and workpiece is indicated with the signal "initial positioning" (X302:11; ack_initial_positioning = 1).

6.9.3 Consumable monitoring

Consumable monitoring is a function of the plasma cutting system that serves to protect the torch. It is active when cutting with cutting gas "oxygen" in the cutting current range from 300 A and above.

If the consumable wear limit is reached, the error E278 is displayed and the plasma cutting system stops the cutting process. Subsequently the operator must replace the consumables, at least the nozzle and cathode.

The Consumable monitoring can be activated and deactivated via the Q-Desk.

6.9.4 Cutting**WARNING**

Do not level the plasma torch towards the eyes or other parts of the body!



Do not touch the nozzle, because there is an electrical hazard by the high voltage ignition and a risk of burns from the pilot arc!



Avoid "flash burn" of the eyes by wearing safety glasses!

The cutting process is preceded by a gas pre-flow. It is possible to set the gas pre-flow manually with the signal "gas ON" (X302(6); set_gas_on := 1) for a maximum time of 3 minutes. This is necessary, for example, for the UWP technology. When the cutting process is started with the signal "current ON" (X302(5); set_current_on := 1), the gas pre-flow is carried out automatically.

After setting the signal "current ON" (X302(5); set_current_on := 1), a voltage is applied between cathode and nozzle. The electronic ignition unit now creates short high-voltage pulses which results in the ignition of the plasma arc.

First, the plasma arc closes the pilot circuit and burns between cathode and nozzle. This current flow is indicated by the signal "current is ON" (ack_current_on = 1). The gas flow presses the arc out of the nozzle until it transfers to the workpiece. The main circuit is now closed.

The main arc is ramped up to the nominal current. Meanwhile, the signal "ready for moving" (X302(12); ack_ready_for_moving = 1) is sent and the arc pierces the material. The guiding system starts with the movement along the cutting contour.

It is possible to specify two setpoints for the cutting current. The cutting always starts with cutting "cutting current 1" (rx_reference_value_cutting_current_1). During the cutting process, it is possible to switch to "cutting current 2" (rx_reference_value_cutting_current_2). The command used in this case is command "REFERENCE_VALUE_CURRENT_2" (0x0003).

The command "REFERENCE_VALUE_CURRENT_1" (0x0002) is used to switch back to cutting current 1. This switching of the cutting current can, for example, be used for a current reduction at corners or also for a current increase.

The change between the cutting currents is carried out ramp-wise. The ramp time is determined with the parameter "main arc slope" (set_reference_value_main_arc_slope).

For finishing the cutting process, the signal "current ON" must be set to "0" (X302(5); set_current_on := 0). The current is ramped down until the plasma arc is interrupted. The signals "current is ON" and "ready for moving" returns the value "0" ((X302 (13); ack_current_on = 0 and X302(12); ack_ready_for_moving = 0).

If the signal "gas ON" is set to "0" immediately (X302(6); set_gas_on := 0), there will be a minimum gas post-flow time of 3 s. This can be extended to up to 3 min. During the gas post-flow time, it is possible to ignite again.

6.9.5 Steps of the cutting process

		X302 see SP2	or EtherCAT
1.	Set signal "standby"	24 V DC an X302 (16) (+24 V/CNC) X302 (17) (GND/CNC)	
2.	Configure, if necessary: restart	control mode: manual	control mode: EtherCAT
3.	Set signal "plasma unit ON"	X302 (4)	set_power_unit_on := 1
4.	Select data record	via cutting data finder of the Q-Desk	set_database_number [7010:1] set_database_version [7010:2] set_record_number [7010:3]
5.	Wait for signal "ready for cutting"	X302 (10)	ack_ready_for_cutting = 1
6.	Optional: Set signal "gas ON"	X302 (6)	set_gas_on := 1
7.	Optional: Wait for signal "initial positioning"	X302 (11)	ack_initial_positioning = 1
8.	Set ignition height		
9.	Set signal "current ON"	X302 (5)	set_current_on := 1
10.	Wait for signal "ready for moving"	X302 (12)	ack_ready_for_moving = 1
11.	Set pierce height and wait for pierce time		
12.	Set cutting height and cutting speed		
13.	Cutting		
14.	Reset signal "current ON"	X302 (5)	set_current_on := 0
15.	Reset signal „gas ON“ or: Start cutting again (continue with point 7)	X302 (6)	set_gas_on := 0

INFORMATION



Use the signals "Emergency stop 1" X302 (2) and "Emergency stop 2" X302 (3) only for the emergency stop function and never for control purposes!

Power source iQ-Source

Standby function - energy saving mode

The plasma cutting unit has an automatic standby function in accordance with EU directives.

The function ensures that the unit switches to standby mode after 20 minutes after the end of a cutting process without any changed control commands in order to save energy.

Restarting from CNC:

Switch off the plasma cutting unit from the CNC control panel – and switch it on again immediately.

The variation of the auto-standby time is possible via the web interface (Q-Desk).

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

Under water plasma cutting - conductivity of water

INFORMATION



For safe ignition of the plasma arc during UWP cutting, the maximum value of the electrical conductivity of the water in the cutting table must not exceed 1500 µS/cm!

Hole piercing



WARNING



Upcoming hot material can lead to endangerments (risk of burns and fire)!

- when hole piercing above the workpiece the height for ignition has to be adjusted, depending on the material thickness (values are given in the cutting chart).
- after the ignition of the pilot arc the main arc establishes immediately.
- To avoid unnecessary strain on the consumables (nozzle, nozzle cap and swirl gas cap) due to splashing material, move the torch as soon as possible after piercing the hole
- For thicker sheet metal, please note the following information to improve hole piercing:
 - adjust ignition height acc. cutting chart.
 - adhere to the piercing time specified in the cutting chart or adjust it to the cutting task.
 - After the main arc has been formed, raise the plasma torch to the piercing height so that the material splashing up does not damage the torch head.
 - After completing the piercing, move the plasma torch to the cutting height.

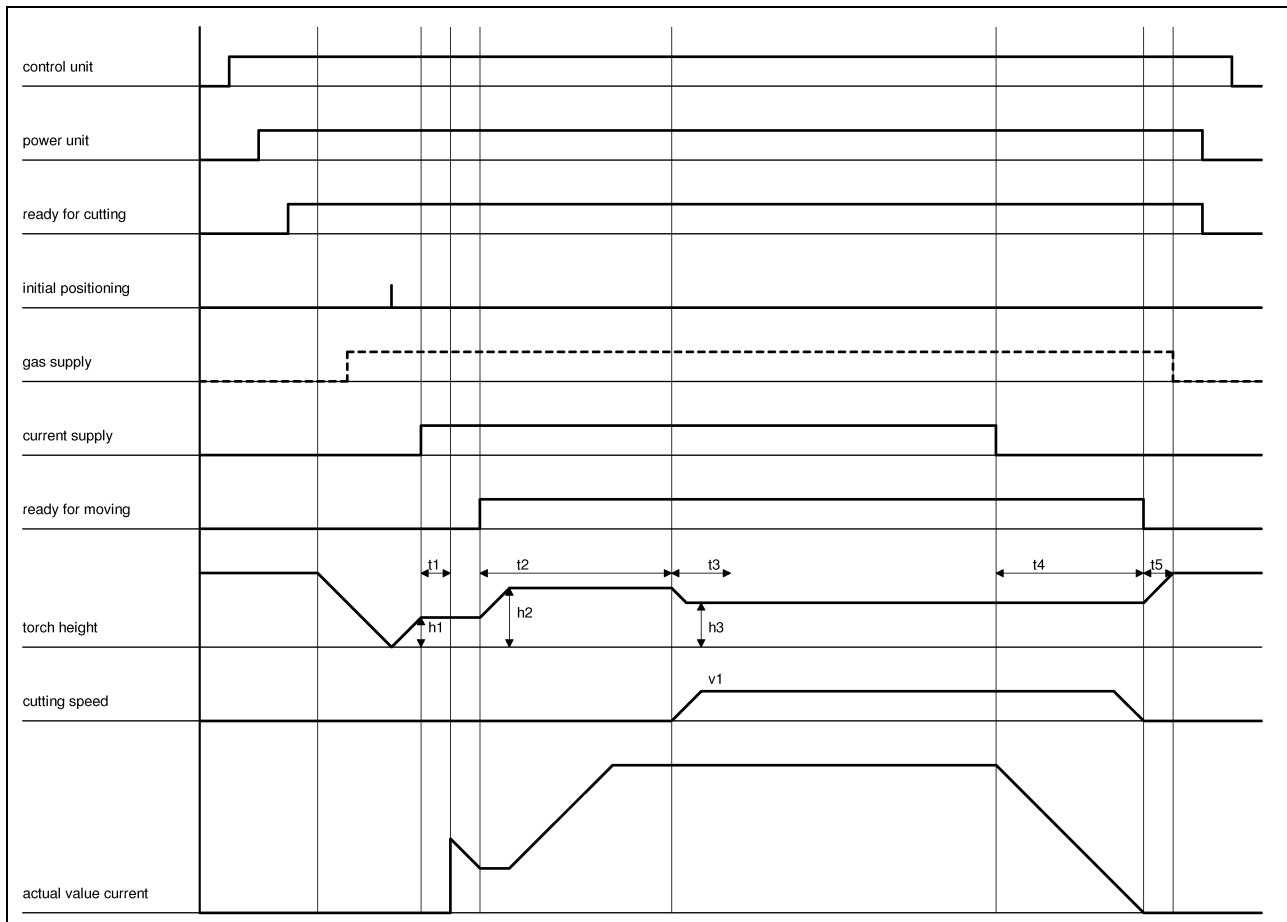


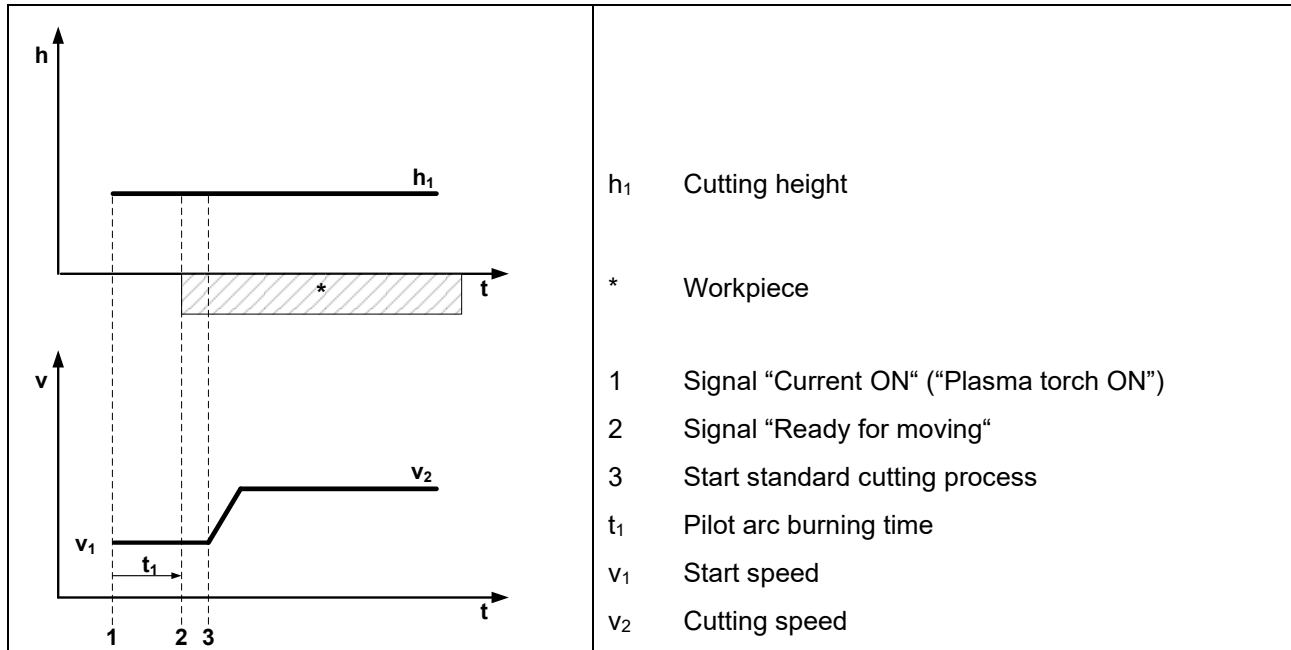
Fig. 20: schematic diagram of a cutting process with height control system

Adjustment parameters	
h1	ignition height of plasma torch
h2	pierce height = elevated torch height at hole piercing (at larger material thickness)
h3	cutting height
t1	gas pre-flow time
t2	pierce time
t3	teach delay time
t4	downslope time
t5	gas post-flow time
v1	cutting speed

Power source iQ-Source

Flying cutting

Cutting data sets with the “Flying cutting” cut start type can be used for cutting jobs where the positioning of the workpiece is not always exact.



Procedure:

- Start the cutting process (ignition of the pilot arc) 10 to 20 mm before the edge of the workpiece with the “Current ON” signal (1) (“Plasma torch ON”) (X302 (5); set_current_on := 1).
- After the pilot arc has formed, the current source sets the “Current is ON” signal (X302 (13); ack_current_on = 1).
- The guiding system then starts the torch feed in the direction of the workpiece at a reduced start speed (v_1) compared to the cutting speed, which depends on the cutting job, material thickness and cutting current.
- If possible, the plasma torch should already be at cutting height (h_1).
- As soon as the transition of the plasma arc to the workpiece is detected by the power source, it switches to the main arc and sends the “Ready for moving” signal (2) (X302 (12); ack_ready_for_moving = 1).
- If the pilot arc does not transfer to the workpiece in a stable manner within 4 seconds (pilot arc burning time $t_1 > 4s$), the power source interrupts the cutting process with error E127 “max. pilot time exceeded”.

- Depending on the material thickness, it may be necessary to remain at the edge of the workpiece for a short time, especially in order to cut through thicker material completely at the edge.
- The reduced start speed should be maintained briefly in the workpiece to stabilise the arc. After that, it can be accelerated to full cutting speed (v_2). The standard cutting process (3) begins.

Information



With the “Flying cutting” cut start type, a reduced lifetime of the consumables, in particular the cathode and nozzle, must be expected.

6.10 Switching OFF the power source

The power unit is switched off by the guiding system by switching off the signal „plasma unit ON“ (X302:4; set_power_unit_on := 0) , see SP2.

The supply voltage for the control unit remains on. The plasma unit is now in the status “STANDBY” (STANDBY (0x0011)).

By switching off the 24 V DC to X302:16 (+24 V/CNC) / X302:17 (GND/CNC), the control unit is also switched off.

INFORMATION



The main control unit is equipped with a voltage maintenance circuit which enables a controlled shutdown of the systems. When doing a restart of the control unit, the waiting time between switching off and switching on should not be less than 10 s

6.11 Combination of the power source with CNC-controls of the guiding systems and robots

INFORMATION

Use the signals "Emergency stop 1" X302 (2) and "Emergency stop 2" X302 (3) only for the emergency stop function and never for control purposes!

The required control cables for the coupling are to be provided by the operator.

Potential-free switching contacts on the user side must be designed for a switching current of at least 500 mA DC and a switching voltage of 24 V.

If relays are controlled on the user side, they must be provided with a free-wheeling diode.

Variant 1: EtherCAT (preferred variant)

The coupling is done via the connections provided in the rear wall:

see section rear panel, upper connections (I)				
3	X308	Connection CNC EtherCAT IN	RJ-45 socket	
4	X309	Connection CNC EtherCAT OUT		
10	X302	Connection CNC Digital only: X302 (1) +24 V/1 X302 (2) emergency stop 1 X302 (3) emergency stop 2 X302 (16) Standby, 24 V / CNC X302 (17) GND / CNC	17-pol. socket	see wiring diagram "iQ-Source - CNC interface" (... SP2)

Variant 2: digital and analogue

Coupling takes place via the connections provided in the rear wall:

see section rear panel, upper connections (I)				
10	X302	Connection CNC digital	17-pol. socket	see wiring diagram "iQ-Source - CNC interface" (... SP2)
11	X304	Connection CNC analogue	6-pol. socket	

6.12 Information for trouble shooting

If during the operation malfunctions are registered the cutting has to be stopped and the reason to be found out.



WARNING



Warning of dangerous electric voltage

Electric shock can be deadly. Further personal and material damages can result from impact.



Before maintenance and repair work and before opening the device (e.g. for troubleshooting) it has to be switched off, visibly disconnected from the mains and secured against being switched on again!

Opening the plasma unit may be carried out only under responsibility of a qualified electrician!

The plasma sequence control of the plasma cutting system is displaying certain warnings and error codes, if during service or operation warnings or errors are noticed.

In this case appear the corresponding warning or error messages at Q-Desk/PC and display of guiding system via Ethernet and EtherCAT and additionally the respective LED light at rear panel of power source.

The description of these warnings and errors and the rectification is given in the following chart:

Error code	Meaning	Elimination
W0	no warning	
W1	Torch could not be identified.	Attach a compatible torch. Check connection LP_Port-Control (X7). Restart the system.

Power source iQ-Source

Error code	Meaning	Elimination
E0	no error	
E100	communication EtherCAT	Check EtherCAT connection from/to CNC, check EtherCAT connection from/to PCB M2MI, check EtherCAT status using the LEDs on X308/X309 (instruction manual -> EtherCAT LEDs) or/ and check the configuration and status of the EtherCAT master (control system).
E102	communication CAN - iQ-Gas	Restart the iQ-Source, check 24 V DC supply, check CAN connection from/to PCB iQ-Gas
E103	communication CAN - iQ-Port	Restart the iQ-Source, check 24 V DC supply, check CAN connection from/to PCB iQ-Port
E105	communication CAN - Module 1	Restart the iQ-Source, check 24 V DC supply, check CAN connection from/to Module 1
E106	communication CAN - Module 2	Restart the iQ-Source, check 24 V DC supply, check CAN connection from/to Module 2
E107	communication CAN - Module 3	Restart the iQ-Source, check 24 V DC supply, check CAN connection from/to Module 3
E109	communication database	Restart the iQ-Source
E114	no cathode voltage in process	Check cathode cable and pilot cable X314 from/to iQ-Source and iQ-Port.
E115	emergency stop 2 no emergency stop 1	Check signal "e-stop 1" from CNC
E116	emergency stop 1 no emergency stop 2	Check signal "e-stop 2" from CNC
E117	no signal "door switch" - iQ-Source	Close door from iQ-Source
E118	no signal "door switch" - iQ-Port	Close door from iQ-Port
E119	no +24 V/2 - iQ-Source	Check power supply T12
E120	emergency stop activated	Check emergency-stop from CNC
E121	signal "power unit ON" in error end	Deactivate signal "power unit ON"
E124	cathode voltage in cutting break	Contact the service!
E125	torch short circuit cathode - nozzle	Check consumables, check pilot cable X314 from/to iQ-Source and iQ- Port

Error code	Meaning	Elimination
E126	pilot plug not plugged in	Check pilot plug X3 (iQ-Port), check pilot cable X314 from/to iQ-Source and iQ-Port
E127	max. pilot time exceeded	Check workpiece cable, check ignition height
E128	max. ignition time exceeded	Check PCB HF (iQ-Port)
E129	main arc interruption	Check cutting height
E130	pilot arc interruption	Check ZG, check consumables
E131	max. gas test time exceeded	Deactivate signal "gas test"
E132	leak in cutting break - PG1	Check PG1 for leak
E133	leak in cutting break - PG2	Check PG2 for leak
E134	leak in cutting break - WG1	Check WG1 for leak
E135	leak in cutting break - WG2	Check WG2 for leak
E136	deviation in process - PG1	Check inlet pressure from PG1
E137	deviation in process - PG2	Check inlet pressure from PG2
E138	deviation in process - WG1	Check inlet pressure from WG1
E139	deviation in process - WG2	Check inlet pressure from WG2
E140	coolant temperature too high	Leave to cool down the iQ-Source
E142	coolant level too low	Fill up coolant
E143	main contactor ON	Check main contactor
E144	main contactor OFF	
E145	max. "gas ON" time exceeded	Deactivate signal "gas ON"
E146	Signal "power ON"	Switch off the 'Power ON' signal.
E147	deviation in process - ZG	Check inlet pressure from ZG
E148	arc interruption in transfer arc	Check the ignition gas. Check the cutting height.
E149	communication CAN - plasma control (PC)	Restart the iQ-Source, check 24 V DC supply, check CAN connection from/to PCB PC
E151	temperature too high - Module 1	Leave to cool down the iQ-Source
E152	primary voltage too high - Module 1	Check main voltage
E153	primary voltage too low - Module 1	

Power source iQ-Source

Error code	Meaning	Elimination
E154	intermediate circuit voltage too high - Module 1	Contact the service!
E155	intermediate circuit voltage too low - Module 1	
E160	arc interruption in upslope phase	Check cutting height
E161	arc interruption in downslope phase	
E162	current in cutting break - Module 1	Contact the service!
E163	current in cutting break - Module 2	
E164	current in cutting break - Module 3	
E166	coolant flow too low	Check coolant hoses, check correct seat of the torch head, check consumables
E168	defective relay PCB K15 emergency stop 1	Check PCB PC K15
E169	defective relay PCB K16 emergency stop 2	Check PCB PC K16
E170	Torch identification failed	Contact the service!
E171	no data set loaded	Transmit valid data set number
E172	leak in cutting break - ZG	Check ZG for leak
E173	no configuration loaded	Restart the iQ-Source
E176	data set with invalid gas code selected	Choose a valid data set.
E177	voltage AS-Card error - Module 1	Check automatic fuse F1 C63A, check fuse F1 - F3 (PCB E-INLE), check fuse F1 (PCB AS-Card)
E178	wrong control mode (manual/ECAT)	Activate manual modus or EtherCAT
E179	record number change not allowed	Transmit data set change on ready status again
E180	check of torch safety interrupted	Lift torch from workpiece
E182	temperature too high - Module 2	Leave to cool down the iQ-Source
E183	primary voltage too high - Module 2	Check main voltage
E184	intermediate circuit voltage too low - Module 2	
E185	intermediate circuit voltage too low - Module 2	Contact the service!
E186	intermediate circuit voltage too low - Module 2	

Error code	Meaning	Elimination
E192	temperature too high - Module 3	Leave to cool down the iQ-Source
E193	primary voltage too high - Module 3	Check main voltage
E194	primary voltage too low - Module 3	
E195	intermediate circuit voltage too high - Module 3	Contact the service!
E196	intermediate circuit voltage too low - Module 3	
E211	voltage error on AS-CARD - Module 2	Check automatic fuse F2 C63A, check fuse F1 - F3 (PCB E-INLE), check fuse F1 (PCB AS-Card)
E212	voltage error on AS-CARD - Module 3	Check automatic fuse F3 C63A, check fuse F1 - F3 (PCB E-INLE), check fuse F1 (PCB AS-Card)
E214	communication Ethernet - GUIDE	Restart the iQ-Source, check Ethernet connection from/to PCB GUIDE and router
E216	Terms and Conditions of Business not accepted	Confirm Terms and Conditions
E217	incompatible unit components	Contact the service!
E218	wrong voltage version - Module 1	
E219	wrong voltage version - Module 2	
E220	wrong voltage version - Module 3	
E222	no main contactor released	
E223	no coolant pressure switch signal	
E224	no data base loaded	Transmit valid data base version/-number.
E236	process not started with "gas ON"	Set the signal "gas ON" at beginning of the process
E237	communication CAN - GUIDE	Restart the iQ-Source, check 24 V DC-supply, check CAN connection from/to pcb GUIDE
E259	signal "Gas ON" set	Disable signal "gas ON"
E261	main contactor not enabled; coolant flow too low	Contact the service!
E262	main contactor not enabled, difference between cathode voltage and nozzle voltage too low	
E263	main contactor not enabled; nozzle voltage limit exceeded	

Power source iQ-Source

Error code	Meaning	Elimination
E268	Impermissible primary voltage on module 1	Check the voltage at the mains connection
E269	Impermissible primary voltage on module 2	
E270	Impermissible primary voltage on module 3	
E272	Impermissible cutting voltage on module 1	Contact the service!
E273	Impermissible cutting voltage on module 2	
E274	Impermissible cutting voltage on module 3	
E278	Consumable wear limit reached	Replace the cathode and nozzle and check all other consumables.
E289	Consumable monitoring not active	The wear condition detection is inactive, even though it is activated. Switch the iQ-Source off, Wait 10 min. before restarting the iQ-Source. In case of repeated error: Contact the service.
E293	iQ-Gas - database could not be loaded.	Contact the service!
E294	iQ-Gas - data set could not be loaded.	
E295	iQ-Port - database could not be loaded.	
E296	iQ-Port - data set could not be loaded.	
E297	Coolant sensor not connected / defect	
E298	Communication flow controller 1	
E299	Communication flow controller 2	
E300	Communication flow controller 3	
E301	Communication flow controller 4	
E302	Communication flow controller 5	

Error code	Meaning	Elimination
E303	Flow ZG too high	Contact the service!
E304	Flow PG1 too high	
E305	Flow PG2 too high	
E306	Flow WG1 too high	
E307	Flow WG2 too high	
E308	Flow ZG too low	
E309	Flow PG1 too low	
E310	Flow PG2 too low	
E311	Flow WG1 too low	
E312	Flow WG2 too low	
E313	Temperature ZG too high	
E314	Temperature PG1 too high	
E315	Temperature PG2 too high	
E316	Temperature WG1 too high	
E317	Temperature WG2 too high	
E318	Temperature ZG too low	
E319	Temperature PG1 too low	
E320	Temperature PG2 too low	
E321	Temperature WG1 too low	
E322	Temperature WG2 too low	
E323	Supply voltage ZG too high	
E324	Supply voltage PG1 too high	
E325	Supply voltage PG2 too high	
E326	Supply voltage WG1 too high	
E327	Supply voltage WG2 too high	
E328	Supply voltage ZG too low	
E329	Supply voltage PG1 too low	
E330	Supply voltage PG2 too low	
E331	Supply voltage WG1 too low	
E332	Supply voltage WG2 too low	
E333	Initial positioning voltage supply missing	Check initial positioning voltage supply on pcb Ignition Control

Power source iQ-Source

Error code	Meaning	Elimination
E334	Inlet pressure ZG too high	Set the correct input pressure and restart the data record change.
E335	Inlet pressure PG1 too high	
E336	Inlet pressure PG2 too high	
E337	Inlet pressure WG1 too high	
E338	Inlet pressure WG2 too high	
E339	Inlet pressure ZG too low	
E340	Inlet pressure PG1 too low	
E341	Inlet pressure PG2 too low	
E342	Inlet pressure WG1 too low	
E343	Inlet pressure WG2 too low	
E344	Digital output error iQ-Gas - error_v_unlocked	Check the power supply to the pcb Gas Control, Check the connection between the pcb Gas Control and the valves for short circuits, Replace the pcb Gas Control.
E345	Digital output error iQ-Gas - error_v_locked_A	
E346	Digital output error iQ-Gas - error_v_locked_B	
E347	Digital output error iQ-Gas - locking	
E348	Digital output error iQ-Port - error_v_unlocked	Check the power supply to the pcb Port Control, Check the connection between the pcb Port Control and the valves for short circuits, Replace the pcb Port Control.
E349	Digital output error iQ-Port - error_v_locked_A	
E350	Digital output error iQ-Port - error_v_locked_B	
E351	Digital output error iQ-Port - locking	
E352	PCB Ignition Control not connected to pcb Port Control	Check connection from pcb Ignition Control to pcb Port Control

7 Q-Desk

the Human Machine Interface (HMI) for plasma cutting units of the iQ-Series

INFORMATION

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

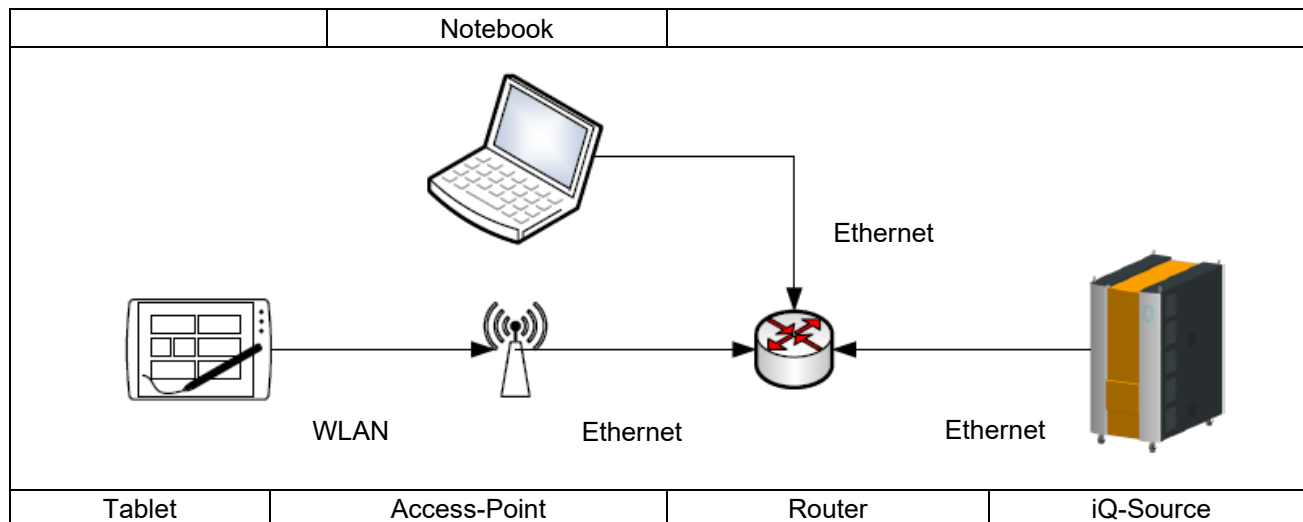


Fig. 21: Integration of the cutting system in an existing network

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.

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 iQ-Source.

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.

Establish a connection to the Q-Desk (192.168.5.1) using a terminal device connected to the service connection (X305) and determine the IP address of the higher-level network assigned by the DHCP server at X307.

The service connection is located under the coolant cover on the front of the power source..

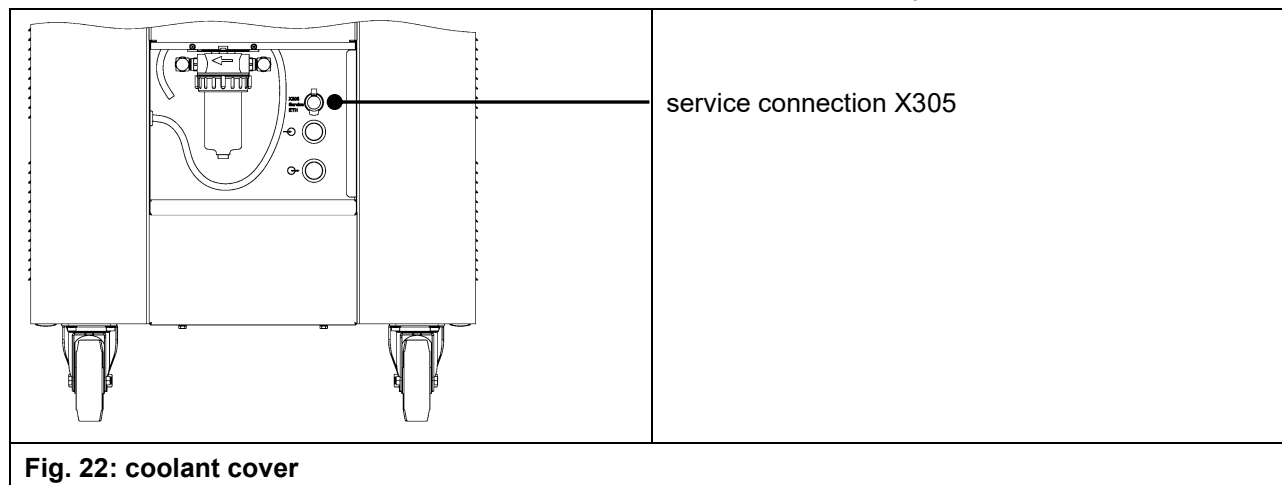


Fig. 22: coolant cover

Q-Desk

Make sure that your terminal has not already been connected to another network but is exclusively connected to the iQ-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 till 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>

(This is the default address of the service network of Q-Source. It can only be accessed by connecting directly to the service connection (X305) under the front flap)

The Q-Desk is tested with the following browsers: Firefox , Google Chrome

We recommend using the web application in modern browsers. Older browsers or outdated versions may have limited functionality!

Start Q-Desk and follow the instructions in the Q-Desk dialogue box to configure your desired settings.

There are different permissions for users and OEMs.

If you have made a mistake in the settings, you can correct it using the ‘**Configure**’ function.



8 Plasma gas control unit iQ-Gas (Gas console)

Plasma gas control unit iQ-Gas (Gas console)

8.1 Technical data

Art.-No.:	iQ-Gas 4500 (.11.825.1302)			
Operating voltage				
Solenoid valves:	24 V DC			
Dimensions (lxbxh):	693 x 370 x 190 mm			
Weight:	ca. 16,8 kg			
Connectable gases:	Air	Argon	Oxygen	Nitrogen
Purity:	1)	99,996 %	99,5 %	99,999%
Information:	dirt, oil and water free		dirt, oil and water free	
Filter / fine filter:	2)		3)	
Flow rate, max.:	70 NI/min	120 NI/min	120 NI/min	200 NI/min
Inlet pressure, max.:	11,0 bar	11,0 bar	11,0 bar	11,0 bar
Inlet pressure, min.:	9,5 bar	9,5 bar	9,5 bar	9,5 bar
Connection:	G1/4"	G1/4"	G1/4"	G1/4"
Usage as:	PG1, PG2	PG1, PG2, WG1	PG2, WG1	PG1, PG2, WG1, WG2
Connectable gases:	Air	Forming gas N ₂ /H ₂ (95/5) %	Hydrogen	
Purity:	1)		99,95%	
Information:	dirt, oil and water free			
Filter / fine filter:	2)			
Flow rate, max.:	120 NI/min	100 NI/min	70 NI/min	
Inlet pressure, max.:	11,0 bar	11,0 bar	11,0 bar	
Inlet pressure, min.:	6,5 bar	9,5 bar	10,0 bar	
Connection:	G1/4"	G3/8" LH	G3/8" LH	
Usage as:	WG1, WG2	PG3	PG3	

1)	Requirements to air quality ISO 8573-1:2010 [1:4:1]				
	max. size of particles:	0,1 – 0,5 µm	0,5 – 1 µm	1 – 5 µm	Klasse 1
	number of particles:	≤ 20.000	≤ 400	≤ 10	
	max. pressure dew point:	+3 °C			Klasse 4
	max. rest oil content:	0,01 mg/m³			Klasse 1
2)	Air: 5/0.01 µm, 17 bar				
3)	O₂: 40/0.01 µm, 40 bar				

Fig. 23: Technical data

Art.-No.:	iQ-Gas O ₂ 4500 (.11.825.1303)		
Operating voltage			
Solenoid valves:	24 V DC		
Dimensions (lxbxh):	693 x 370 x 190 mm		
Weight m:	ca. 16,5 kg		
Connectable gases:	Air	Argon	Oxygen
Purity:	1)	99,996 %	99,5 %
Information:	dirt, oil and water free		dirt, oil and water free
Filter / fine filter:	2)		3)
Flow rate, max.:	70 NI/min	120 NI/min	120 NI/min
Inlet pressure, max.:	11,0 bar	11,0 bar	11,0 bar
Inlet pressure, min.:	9,5 bar	9,5 bar	9,5 bar
Connection:	G1/4"	G1/4"	G1/4"
Usage as:	PG1, PG2	PG1, PG2, WG1	PG2, WG1
Connectable gases:	Nitrogen	Air	
Purity:	99,999%	1)	
Information:		dirt, oil and water free	
Filter / fine filter:		2)	
Flow rate, max.:	200 NI/min	120 NI/min	
Inlet pressure, max.:	11,0 bar	11,0 bar	
Inlet pressure, min.:	9,5 bar	6,5 bar	
Connection:	G1/4"	G1/4"	
Usage as:	PG1, PG2, WG1, WG2	WG1, WG2	

1)	Requirements to air quality ISO 8573-1:2010 [1:4:1]				
	max. size of particles:	0,1 – 0,5 µm	0,5 – 1 µm	1 – 5 µm	Klasse 1
	number of particles:	≤ 20.000	≤ 400	≤ 10	
	max. pressure dew point:	+3 °C			Klasse 4
	max. rest oil content:	0,01 mg/m³			Klasse 1
2)	Air: 5/0.01 µm, 17 bar				
3)	O₂: 40/0.01 µm, 40 bar				

Fig. 24: Technical data

8.2 Technical description

The plasma gas control unit is needed when adjusting and dosing the plasma and swirl gases (process gases) according to operation.

It contains all switching and control elements for the gas flow of the process gases: gas connections, push switches, solenoid valves, also the flow measurements and adjustment equipments.

The adjustment of the required gas parameters occurs through the selection of the suitable record from the CNC.

The plasma gas control unit must only be set up in the standard position!

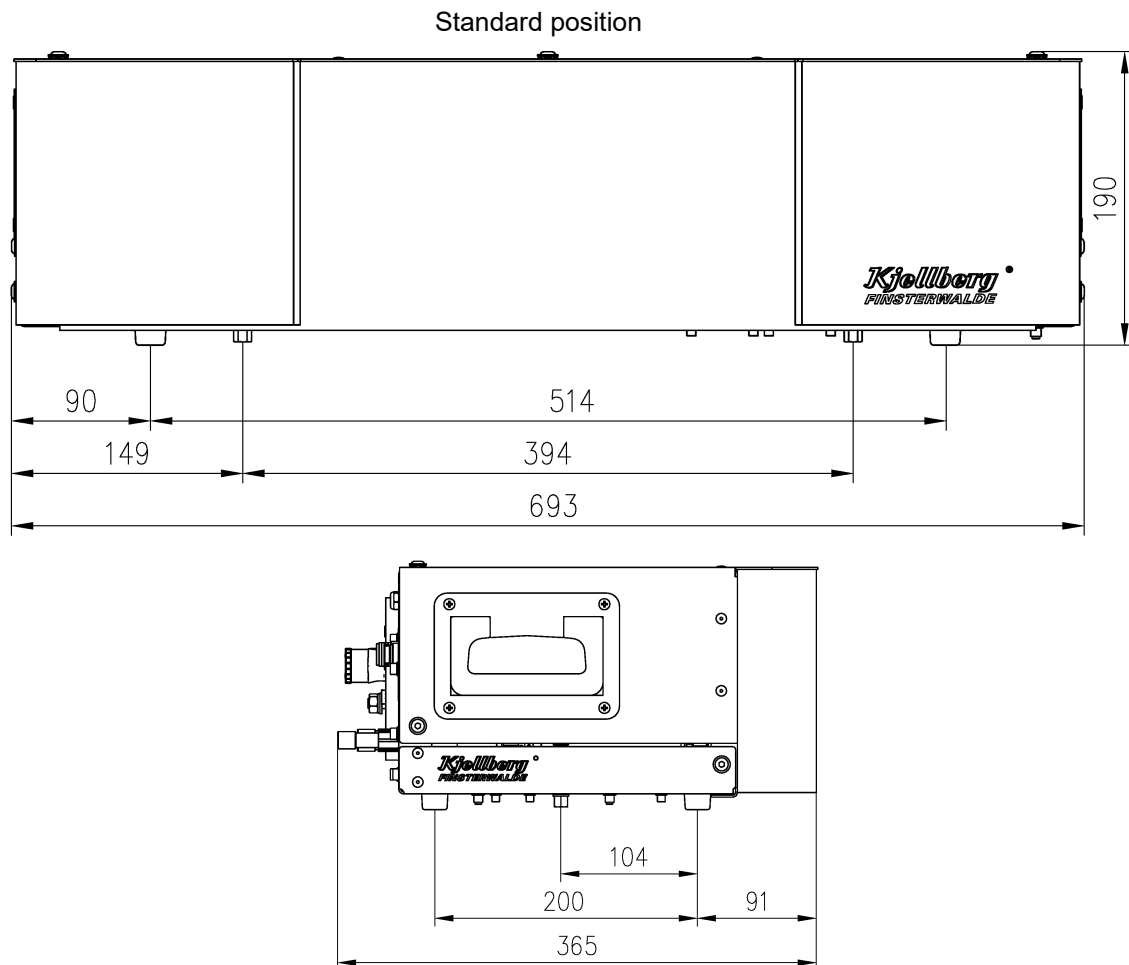


Fig. 25: Dimension diagram

ATTENTION



The component should be positioned so that the cooling air can enter and exit unhindered through the vents. An enclosure of the components is not allowed!

8.3 Connection of the iQ-Gas

Connect the iQ-Gas through a 5+1-pole control cable with the plasma system by interface X310 (7). The gas supply hoses for the plasma gas and swirl gas have to be fitted to connectors (12) to (18). The connectors (1) to (5) are provided for the supply hoses to the torch connection unit iQ-Port.

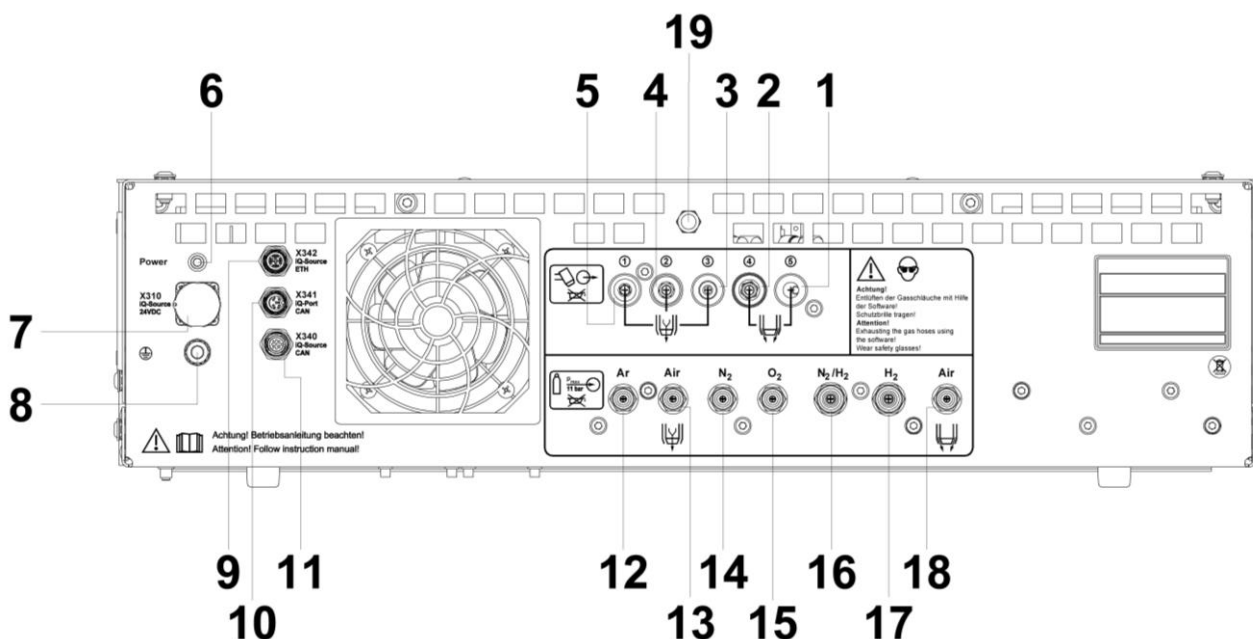


Fig. 26: rear connections of iQ-Gas

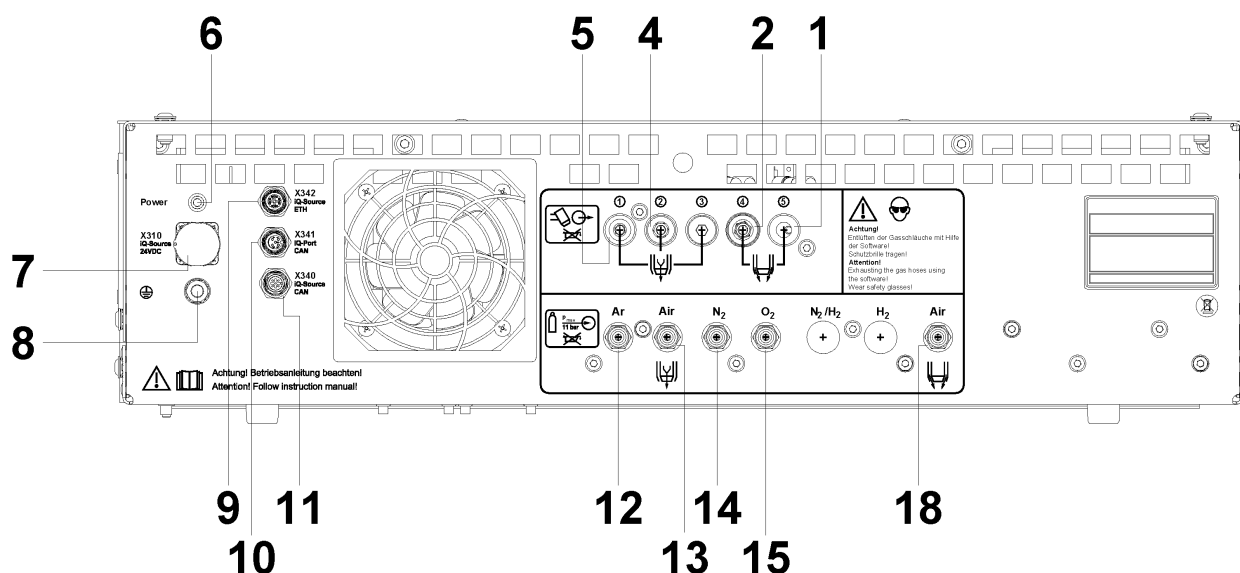


Fig. 27: rear connections of iQ-Gas O₂ 4500

Plasma gas control unit iQ-Gas (Gas console)

1	Outlet swirl gas to iQ-Port (WG2)	5	Ø 3/8" (white)
2	Outlet swirl gas to iQ-Port (WG1)	4	Ø 1/2" (green)
3 *)	Outlet cutting gas/swirl gas to iQ-Port (PG3)	3	Ø 6 (red)
4	Outlet cutting gas to iQ-Port (PG2)	2	Ø 10 (blue)
5	Outlet ignition gas to iQ-Port (PG1)	1	Ø 8 (black)
6	Power-LED – "power ON"		
7	Connection X310 – iQ-Source 24 V DC	5+1-pol. plug	
8	Connection ground terminal	M8	
9	Connection X342 – iQ-Source Ethernet	8-pol. plug	
10	Connection X341 – iQ-Port CAN	5-pol. socket	
11	Connection X340 – iQ-Source CAN	5-pol. plug	
12	Inlet plasma gas/swirl gas	Ar	G1/4"
13	Inlet plasma gas	Air	G1/4"
14	Inlet plasma gas/swirl gas	N ₂	G1/4"
15	Inlet plasma gas/swirl gas	O ₂	G1/4"
16 *)	Inlet plasma gas/swirl gas	N ₂ /H ₂	G3/8" LH
17 *)	Inlet plasma gas/swirl gas	H ₂	G3/8" LH
18	Inlet swirl gas	Air	G1/4"
19 *)	Silencer		

*) Connections 3, 16, 17 and 19 are not used in iQ-Gas O₂.

8.4 Connection of the gas hoses between plasma gas control unit and iQ-Gas and iQ-Port

The length of the gas hoses for the connection of the components of the plasma cutting complex have to be arranged according to the system configuration. The following hoses are used:

		Air	Ar	H ₂	N ₂	N ₂ /H ₂	O ₂	Autogenous hose 4 x 3,5	Connectors
1	Plasma gas PG1	x	x		x			black	Ø 8 – Ø 8
2	Plasma gas PG2	x	x		x		x	blue	Ø 10 – Ø 10
3	Plasma gas, swirl gas PG3 *)			x		x		red	Ø 6 – Ø 6
4	Swirl gas WG1	x	x		x		x	green	Ø 1/2" – Ø 1/2"
5	Swirl gas WG2	x			x			white	Ø 3/8" – Ø 3/8"

Fig. 28: required hoses

The designations "1" up to "5" are located on the back wall of the plasma gas control unit and at the end of the respective hoses.

*) not required for the O₂ variant

8.5 Connection of the gas supply

ATTENTION



For the gas supply only high- quality pressure regulators have to be used, guaranteeing a constant supply pressure. The quality of the pressure reducer influences the cutting quality and reliability of the complete unit. Furthermore, the user has to follow local and national standards.

ATTENTION



Concerning the necessary plasma and swirl gases and the regulated pressures are considered at the cutting charts.

ATTENTION



The quality of the plasma gases must be maintained (see chapter “Technical data”). Using unclean gases can lead to dual arcs, increased deterioration of the nozzles and cathodes and damage to the torch and at the plasma gas console.

In order to protect against coarse dirt, all the plasma gas console and plasma torches are fitted with fine filters. These filters can be removed using a small screwdriver and cleaned when necessary.



WARNING



The maximum input pressure must not exceed 1.2 MPa (12 bar), however it must be at least 0.15 MPa (1,5 bar) more than the designated operating pressure in the cutting chart!

Follow the instructions given by your supplier/manufactures on how to properly use gas cylinders and pressure reducers.

The connections for the plasma gas supply hoses can be found at the rear of the plasma gas console (see upper Fig.).

8.5.1 Plasma gases

Plasma gas		Colour of the gas hose	Marking	Connectors	Number
Air	Air	black	grey	G1/4"	2
Oxygen	O ₂	blue		G1/4"	1
Argon	Ar	black		G1/4"	1
Hydrogen	H ₂	red		G3/8"LH	1
Nitrogen	N ₂	black	green	G1/4"	1
Forming gas	N ₂ /H ₂	red	green	G3/8"LH	1

Abb. 29: Overview of the gas hoses

Air

Requirements to air quality ISO 8573-1:2010 [1:4:1]				
max. size of particles:	0.1 – 0.5 µm	0.5 – 1 µm	1 - 5 µm	category 1
number of particles:	≤ 20.000	≤ 400	≤ 10	
max. pressure dew point:	+3 °C			category 4
max. rest oil content:	0.01 mg/m ³			category 1

Gas supply using compressed air bottle:

- Check cylinder valve to see if clean (free from oil and grease) and clean if necessary.
- Check cylinder valve to see if clean (free from oil and grease) and clean if necessary
- Open the cylinder valve for a short time to blow out dust
- Connect air pressure-reducer to cylinder
- Using the black coloured and grey marked gas hoses G1/4"-G1/4", connect the pressure-reducer to the filter / fine-filter and the filter / fine-filter to the plasma gas console "Air" gas connector
- Open the cylinder valve and adjust the pressure between min. 9,5 bar (at WG = Air min. 6,5 bar) and max. 11 bar, displayed on the manometer

Gas supply using ring mains or compressor:

- The use of an oil and water separator and a cold drier is recommended
- This is to be connected between the ring mains or compressor and the plasma gas console
- If an oil-free compressor is used, the oil separator can be omitted
- Using the black coloured and grey marked gas hoses G1/4"-G1/4", connect the pressure-reducer to the filter / fine-filter and the filter / fine-filter to the plasma gas console "Air" gas connector
- Adjust the gas pressure on the compressor so that a pressure between min. 9,5 bar (at WG = Air min. 6,5 bar) and max. 11 bar is fitted

Plasma gas control unit iQ-Gas (Gas console)

Oxygen



WARNING



All parts that come into contact with oxygen must be kept oil and grease free! When using oxygen, the explosion protection for oxygen must be connected to the pressure-reducer (flashback arrestor)!

Install the fine-filter between the gas supply and the plasma gas console!

- Check cylinder valve to see if clean (free from oil and grease) and clean if necessary
- Open the cylinder valve for a short time to blow out dust
- Connect oxygen pressure-reducer with explosion protection to the gas supply (cylinder, ring mains)
- Using the blue coloured gas hose G1/4"-G1/4", connect the pressure-reducer to the filter / fine-filter and the filter / fine-filter to the plasma gas console "O₂" gas connector.
- Open the valve and adjust the gas pressure on the pressure-reducer so that the pressure shown on the plasma gas console manometer is the same as shown on the cutting chart for flowing gas

Argon, hydrogen, nitrogen, forming gas

- Check the cylinder valve on cleanliness (must be free of oil and grease) and if necessary clean it.
- Open the cylinder valve shortly for blowing out the dust.
- Connect the pressure-reducer for the appropriate gases to the gas cylinder.
- Using the black coloured gas hose G1/4", connect the argon pressure-reducer to the plasma gas console "Ar" gas connector
- Using the black / green coloured gas hose G1/4", connect the nitrogen pressure-reducer to the plasma gas console "N₂" gas connector
- Using red gas hose G3/8"LH connect the hydrogen pressure-reducer to the plasma gas console "H₂" gas connector
- Using red / green coloured gas hose G1/4" connect the hydrogen pressure-reducer to the plasma gas console "N₂/H₂" gas connector
- Open the valve and adjust the gas pressure on the pressure-reducer so that the manometer of the gas cylinder rests an inlet pressure according to the cutting charts

8.6 Handling of plug connections within the device

ATTENTION



Before dismantling components, the system must be completely free of pressure.

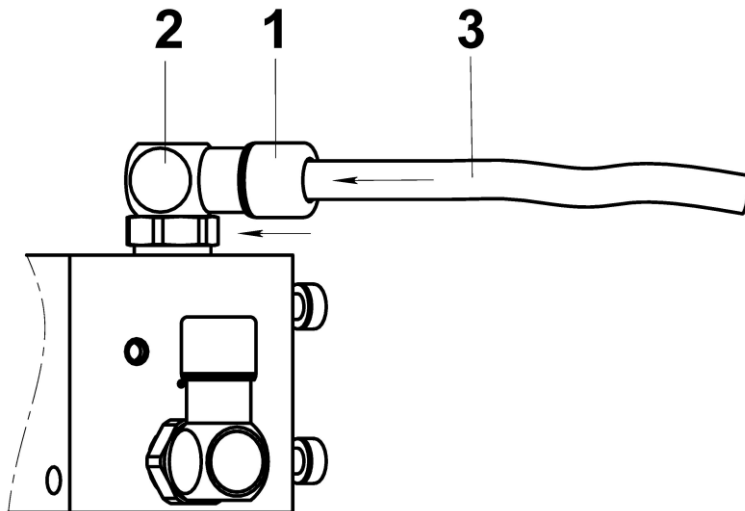
Disconnect the gas supply upstream of the gas console and use "Ventilation" to ensure that all hoses are free of pressure!

Work may only commence once it has been clearly confirmed that the system is free of pressure.

(You can set the 'Ventilation' function on the Q-Desk interface.)

8.6.1 Mounting

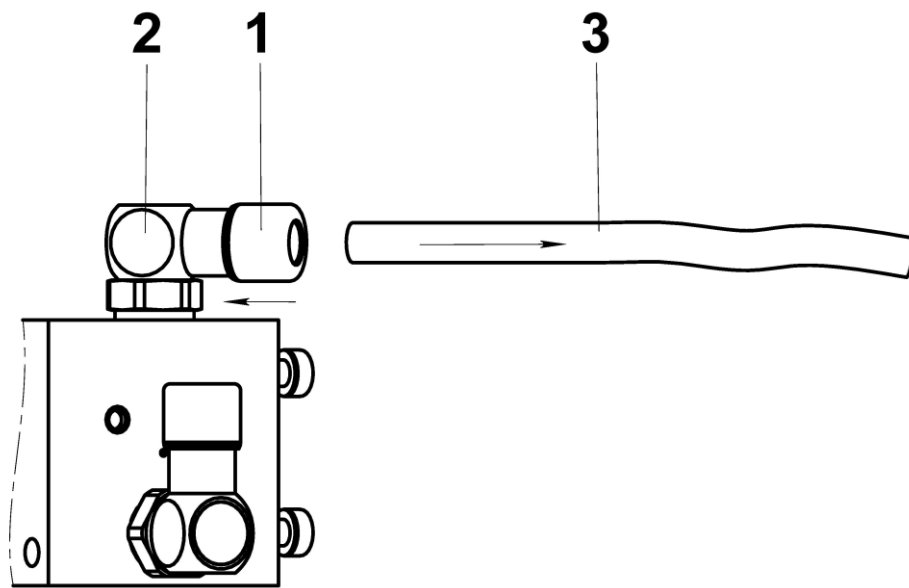
- Press the release sleeve (1) in the direction of the plug connection (2).
- Insert the end of the hose (3) into the plug connection until it stops.
- Then snap the release sleeve (1) back to the starting position.

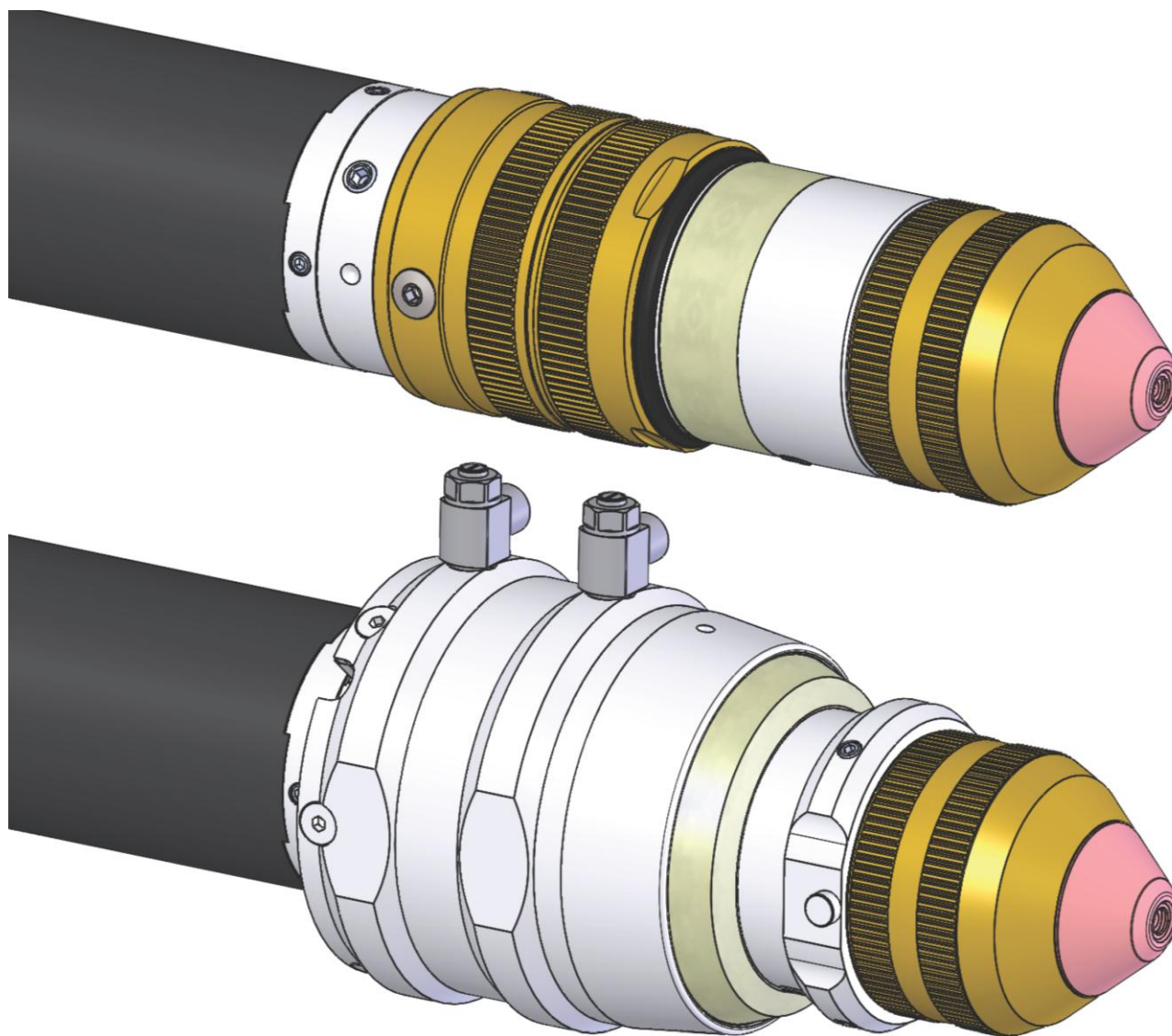


8.6.2 Dismantling

- Press the release sleeve (1) in the direction of the plug connection (2).
- Pull the hose end (3) out of the plug connection.
- Then snap the release sleeve (1) back to the starting position.

Plasma gas control unit iQ-Gas (Gas console)





9 Plasma machine torch Q-Torch

according to the version delivered

Plasma machine torch Q-Torch

9.1 Technical data

Art.-no.:	Q-Torch 4510 (.11.858.401)		Q-Torch 4520 (.11.858.801)	
	Plasma torch with quick change head (Version with bayonet coupling)		Plasma torch with quick change head (Version with fastener for automatic exchange)	
Current carrying capacity, max.	450 A 40 A 100 %			
Cutting current, IS:				
Pilot arc current, IPb:				
Duty cycle	100 %			
Ignition	high voltage ignition (max. 17 kV) by pilot arc			
Clamping diameter	50.8 mm			
Torch cooling	Coolant mixture			
Flow rate coolant	• „Kjellfrost -15 °C“ (freezing protection up to -15 °C) or • „Kjellfrost -25 °C“ (up to -25 °C) with integrated corrosion protection 3,5 – 6,0 l/min (depending on used consumables) at max. 7.5 bar			
Plasma gases	Air, O ₂ and Ar, N ₂ , H ₂ and mixtures of this gases (for quality, pressure and flow rate see particular plasma gas regulate unit or plasma gas control unit)			
Swirl gases	Air, O ₂ and N ₂ and mixtures of this gases (for quality, pressure and flow rate see particular plasma gas regulate unit or plasma gas control unit)			
Length of the hose set:	1.5 m			
Terminals				
Coolant return with cathode cable	KMR	G3/8“		
Coolant supply	KMV	PU-hose AD10 x NW6 bl		
Pilot cable	PI	pilot plug 4 mm		
Control cable	SL	M12 8-pol.plug		
Plasma gases	PG			
Ignition gas	ZG	PU-hose AD6.0 x NW4 sw		
Cutting gas	SG	PU-hose AD6.0 x NW4 bl		
Exhaust	E	PU-hose AD6.0 x NW4 ge		
Swirl gas	WG	PU-hose AD6.0 x NW4 gn		
Initial positioning contact	eEF	blade receptacle 6.3x0.8 mm		
Weight	1.2 kg	(change head)	1,1 kg	(change head)
	0.8 kg	(Shaft without hose set)	2,1 kg	(Shaft without hose set)
	3.8 kg	(Shaft + 1.5 m hose set)	5,1 kg	(Shaft + 1.5 m hose set)

Fig 30: Technical data

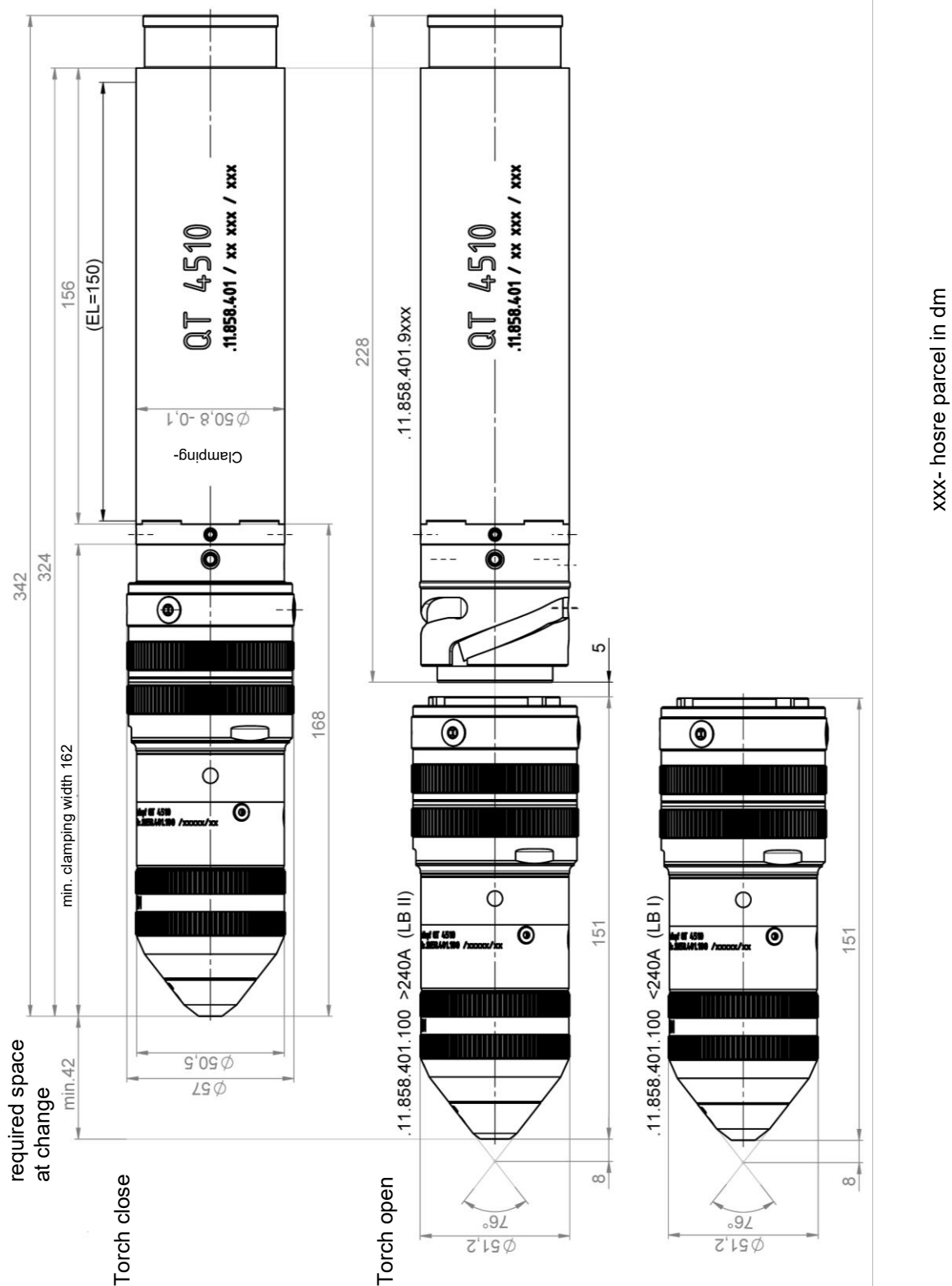


Fig. 31: Dimension diagram QT 4510



106

9.2 Technical description

ATTENTION



Only plasma torches of the types Q-Torch 45xx of Kjellberg Finsterwalde are determined for use with power sources Q 1500, Q1500 plus, Q 3000, Q 3000 plus and Q 4500 by EN 60974-1.

Exclusive these plasma torches forms a safety-related unit with the named power sources in accordance with EN 60974-7!

The plasma machine torch consists of the torch head, the torch shaft, the hose set and the consumables.

The plasma torches are suitable for cutting with the plasma gases air (air), oxygen (O₂), argon (Ar), nitrogen (N₂), hydrogen (H₂) and their mixtures.

Swirl gases can be air (air), oxygen (O₂) and nitrogen (N₂) or their mixtures and forming gas.

The cutting current is transferred to the cathode by a flexible copper cable, which is inserted in the insulating coolant return hose. The pilot current is transferred to the nozzle via a pilot cable.

The nozzle is fixed in the nozzle holder by a detachable nozzle cap. The coolant circulates between nozzle and nozzle cap, a special cooling tube ensures an effective cooling of the cathode. This system ensures an efficient cooling of all thermally stressed torch parts.

Mounting and dismounting of consumables, see corresponding point "Consumables and their exchange".

Plasma machine torch Q-Torch

INFORMATION



The torch has an indirect cooling of the protection cap.

ATTENTION



Before using a plasma torch it is necessary to ensure that the torch is equipped with the suitable parts for the selected plasma gases and cutting procedure! After each consumable change, a “gas test” process (approx. 20 s) by the guide machine or the Q Desk / PC is required to blow out all residual coolant which can damage the torch during the high-voltage ignition!

ATTENTION



You are only allowed to use ORIGINAL Kjellberg spare parts and consumables! The use of other manufacturer consumables leads to the loss of the warranty claim.

ATTENTION



The integrated initial positioning contact of the torch can not be used for the under water initial positioning!



9.3 Connection of the plasma torch to Q-Port/ iQ-Port

 WARNING



Before opening the torch connection unit, the plasma cutting system has to be switched OFF via guiding system and disconnected visibly from the mains!

INFORMATION

- Guide or lay the hose pack of the plasma torch as straight as possible. Avoid multiple bends and offsets. Adjust the mounting position of the Q-Port/ iQ-Port accordingly. Each bend shortens the casing of the hose package and can lead to kinking of the hoses.
- The minimum bending radius of the hose package is 150 mm. It shall not be exceeded during installation or during operation.
- If necessary, catch heavy or long hose packages (> 3m).
- Catch hose packages from a hose package length > 1.5 m additionally, if they are exposed to large accelerations (eg robot applications).

The plasma torch has to be fastened to the support of the guiding system by using an adequate insulation. A special torch holder is available from Kjellberg Finsterwalde.

The plasma torches are connected to the connectors on and in the Q-Port/ iQ-Port. The following connections shall be established:

Plasma machine torch Q-Torch

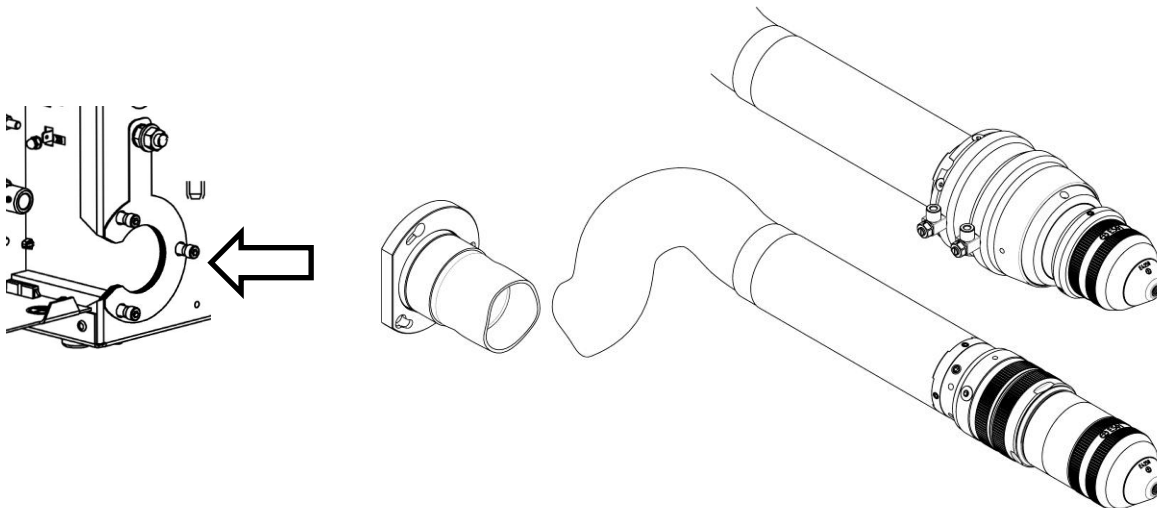
Q-Torch

- Screw connections
 - coolant return (WR) G3/8"
- plug connection
 - coolant supply (WV) PU-hose AD10 x NW6 bl
- electr. plug connections
 - pilot cable (PI) pilot plug 4 mm
 - control cable (SL) M12 8-pol. plug
 - initial positioning contact (eEF) blade receptable 6.3x0.8 mm

Lead the plasma gas hoses and the swirl gas hoses through the corresponding openings of side wall on the outside and insert these with colored coding sleeves on the corresponding plug connections of the torch connection unit

- Plug connector for fluids
 - plasma gas 1 (PG1) PU-hose AD6.0 x NW4 sw
 - ignition gas (ZG)
 - plasma gas 2 (PG2) PU-hose AD6.0 x NW4 bl
 - cutting gas (SG)
 - swirl gas (WG) PU-hose AD6.0 x NW4 gn
 - Exhaust (E) PU-hose AD6.0 x NW4 ge

Relieve the hose assembly via the flange and the hose fitting, which are screwed to the Q-port with M5 screws (hexagon socket 4). (See figure below)



Ensure good electrical contact of the flange with the housing in order to optimally shield the high frequency generated during the ignition process.

9.4 Consumables and their exchange

 WARNING



In order to change consumables, the plasma cutting system shall be switched OFF and secured against any accidental start. An unauthorised start-up is prevented by e.g. visibly isolating the power source from the mains!

 WARNING



All components and parts coming in touch with oxygen have to be kept free of oil and grease!
This refers specially to the torch head and the consumables.

ATTENTION



The operator has to follow national and local regulations! (for example in Germany Employer's Liability Insurance Association and in Canada CAN/CSA-W117.2)

Used or damaged consumables shall be replaced in due time (Reference: visible change of the cutting quality).

The lifetime of the cathode depends on the cutting time, the number of ignitions and the cutting current.

Plasma machine torch Q-Torch



WARNING

If an above the wear limits driven cathode produce a damage of the plasma torch, leaking coolant can impact glowing dross.

Leaking coolant "Kjellfrost" additional with influence of extreme heat causes a very fast vaporisation of water portions and an increasing concentration of the component ethanediol.

This can cause an inflammation and combustion of the ethanediol-debris.

Absorb leaked or slopped coolant "Kjellfrost" with liquid-binding material (sand, diatomite, oil binder, acid binder, universal binder) immediately.

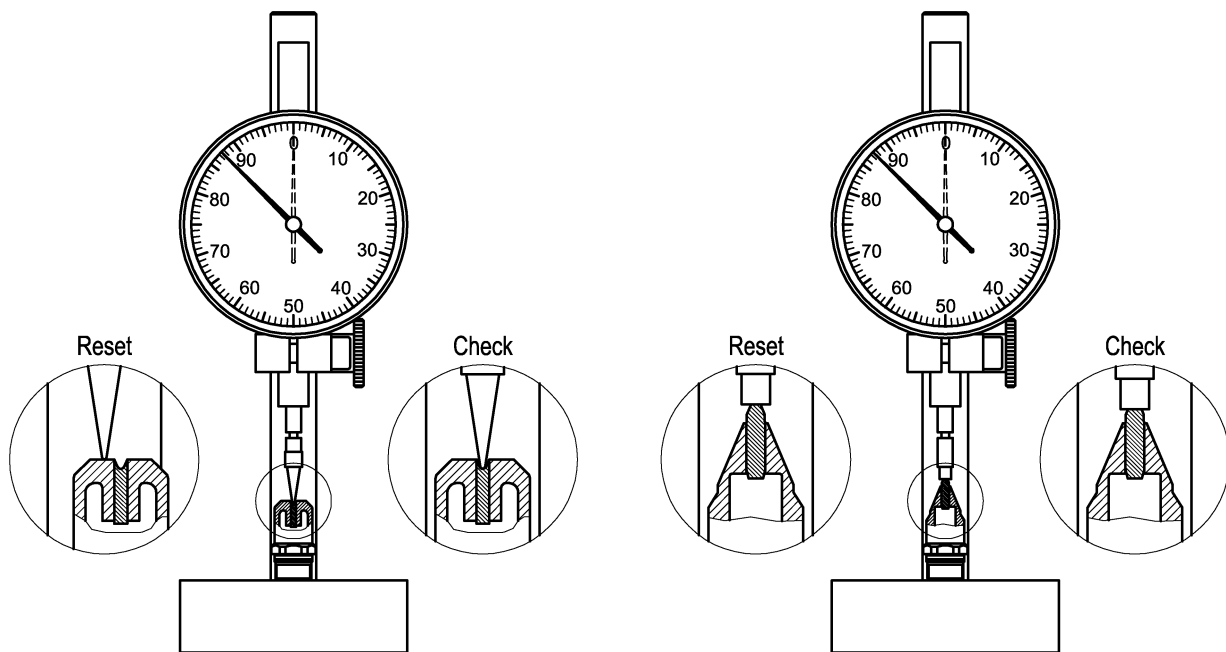
Dispose the absorbed material according to official regulations.



cathode	article no.	cutting range	plasma gas	position no.	plasma unit	max. cathode burn-back [mm]	
						for quality cut	max.)*
E005	.11.858.401.350	≤ 150 A	N ₂	xx.02	Q 1500 Q 1500 plus Q 3000 Q 3000 plus Q 4500	1,30	1,80
E012	.11.858.411.320	≤ 100 A	O ₂			1,50	1,80
E015	.11.858.411.350	≤ 150 A				1,50	1,80
E016	.11.858.411.360	200 A				1,50	1,80
E022	.11.858.421.320	300 A	O ₂ u. N ₂			1,30	1,80
E023	.11.858.421.330		O ₂			1,70	2,00
E025	.11.858.421.350	400 A				1,70	2,00
E032	.11.858.431.320	300 A				1,70	2,00
E042	.11.858.441.520	≤ 80 A	N ₂ /H ₂			< 0,50	0,50
E044	.11.858.441.540		N ₂			1,30	1,80
E052	.11.858.451.520	≤ 150 A	Ar/H ₂			< 0,50	0,50
E065	.11.858.461.550	≤ 450 A	Ar/H ₂			< 1,50	1,50

*) ... Attention: A higher cathode burn-back can lead to the destruction of the torch.

Fig. 33: max. cathode burn-back



Control with sharp meter feeler .16.004.810.2

Control with flat meter feeler .16.004.810.8
Reset only with unused cathode

Fig. 34: Ascertaining of the cathode wear with the cathode dial indicator Art.-Nr. .36.000.015

The lifetime of the nozzle mainly depends on the cutting time, the number of ignitions and the handling of the torch (performance of hole piercing, upcoming spatter, etc.).

Be sure that the consumables are suitable for the intended cutting procedure.

The consumables shall be replaced with great care and only with tools which are part of the delivery.

ATTENTION



Under no circumstances pliers or other unsuitable tools have to be used for consumable change, they entail inevitably the damage of the consumables, for example burr formation and thereby malfunctions of the plasma torch.

ATTENTION



After screwing off the protective cap to replace the swirl gas cap without any further replacement of consumables, the tightness of the nozzle cap must absolutely be checked and, if required, tightened again before mounting the protective cap!

apply to plasma torch:

Q-Torch 45xx

ATTENTION



Make sure that all consumables are complete and correct installed!

Especially the cooling tube has to be inserted. Otherwise the cooling is ineffective and the torch gets damaged.

No other parts as mentioned before have to be changed unauthorised on the plasma machine torch.

A further opening of the torch from the front side is not possible.

9.4.1 Plasma machine torch Q-Torch 45x0

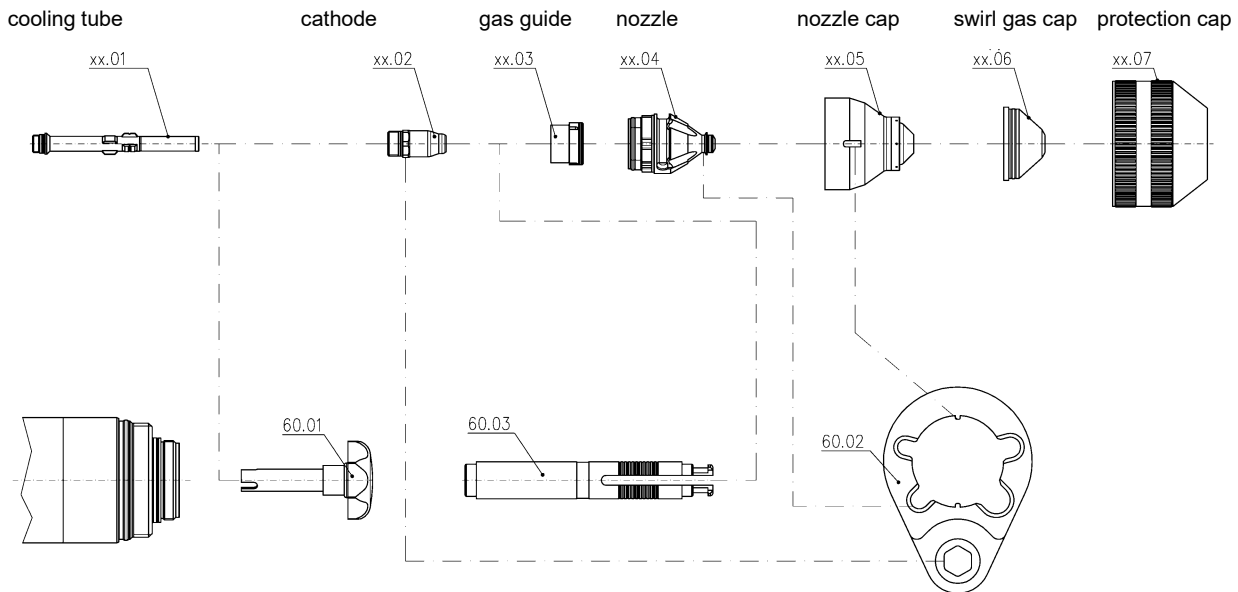


Fig. 35: Tools for changing consumables

The multifunctional torch tool (60.02) is to:

- screw and unscrew the cathode by means of hexagon 11 mm,
- pull out the nozzle by means of the engraved notches 6 mm, 7 mm and 8 mm and
- screw and unscrew the nozzle cap by means of opening $\varnothing$ 37 mm.

Dismounting of used consumables

Before dismounting the consumables of the torch please insert the change head in the “Station for the change head” (see chapter “Dismantling of the change head”) and remove with the aid of compressed air the coolant from the change head.

1. Manually unscrew the protection cap (xx.07) together with the swirl gas cap (xx.06).
(Press out swirl gas cap from protection cap.)
2. Unscrew nozzle cap (xx.05) by aid of a multifunctional torch tool (60.02).
3. Take out the nozzle (xx.04) together with the gas guide (xx.03) by aid of a multifunctional torch tool (60.02).
4. Pull out the gas guide (xx.03) from the nozzle (xx.04) by aid of the specific wrench (60.03).
5. Unscrew the cathode (xx.02) by aid of a multifunctional torch tool (60.02).
6. Remove the cooling tube (xx.01) using the socket wrench (60.01) when changing technology or changing data set in accordance with the cutting data.

Plasma machine torch Q-Torch

Mounting of new consumables

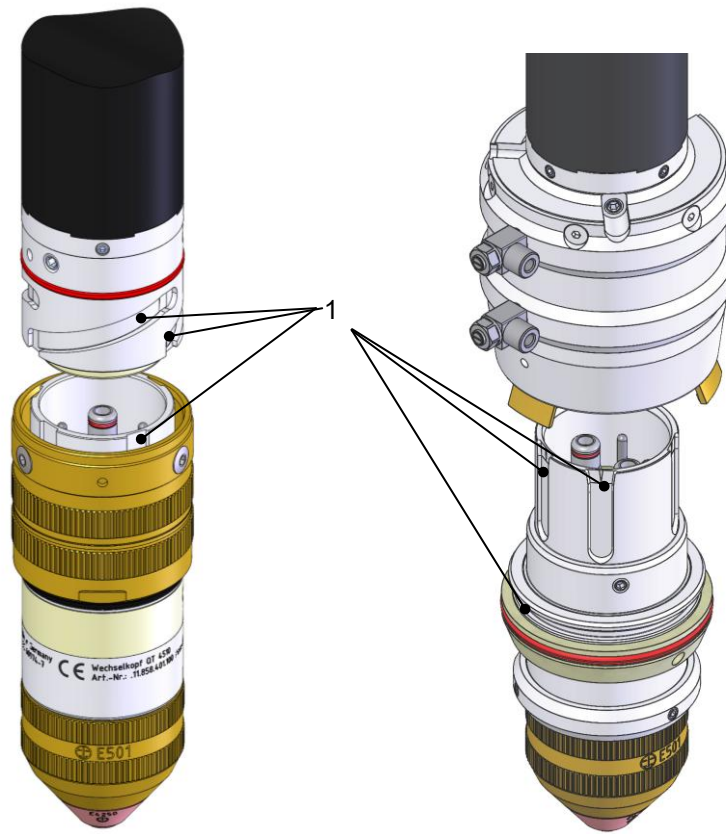
1. Screw in the cooling tube (xx.01) by aid of a socket wrench (60.01).
2. Screw in the cathode (xx.02), tighten the cathode with the multi-function torch tool (60.02).
3. Insert the gas guide (xx.03).
4. Insert the nozzle (**xx.04**) into the torch head (see picture on next page). Turn the nozzle such that the nozzle's wide groove is positioned exactly above the oval opening in the torch head. Then insert the nozzle until stop. Now the nozzle is locked and cannot be turned anymore.
5. Put on the nozzle cap (xx.05), tighten the nozzle cap with the multi-function torch tool (60.02).
6. Press the swirl gas cap (xx.06) into the protection cap (xx.07) and tighten it together by hand.

O-rings only need replacement in case of deformation or damage.

ATTENTION



When changing the consumables, make sure that the used consumables are dry and clean. Before mounting the protection cap, remove any coolant residues and dirt that may be present. For this purpose, use a soft absorbent cloth or compressed air for careful cleaning. Check the correct position of the O rings.



ATTENTION



In case of contamination, make sure to clean the grooves (1) of the bayonet catch regularly. Check the cleanliness of the grooves especially before and after the UWP cutting process to avoid sticking of the torch head.

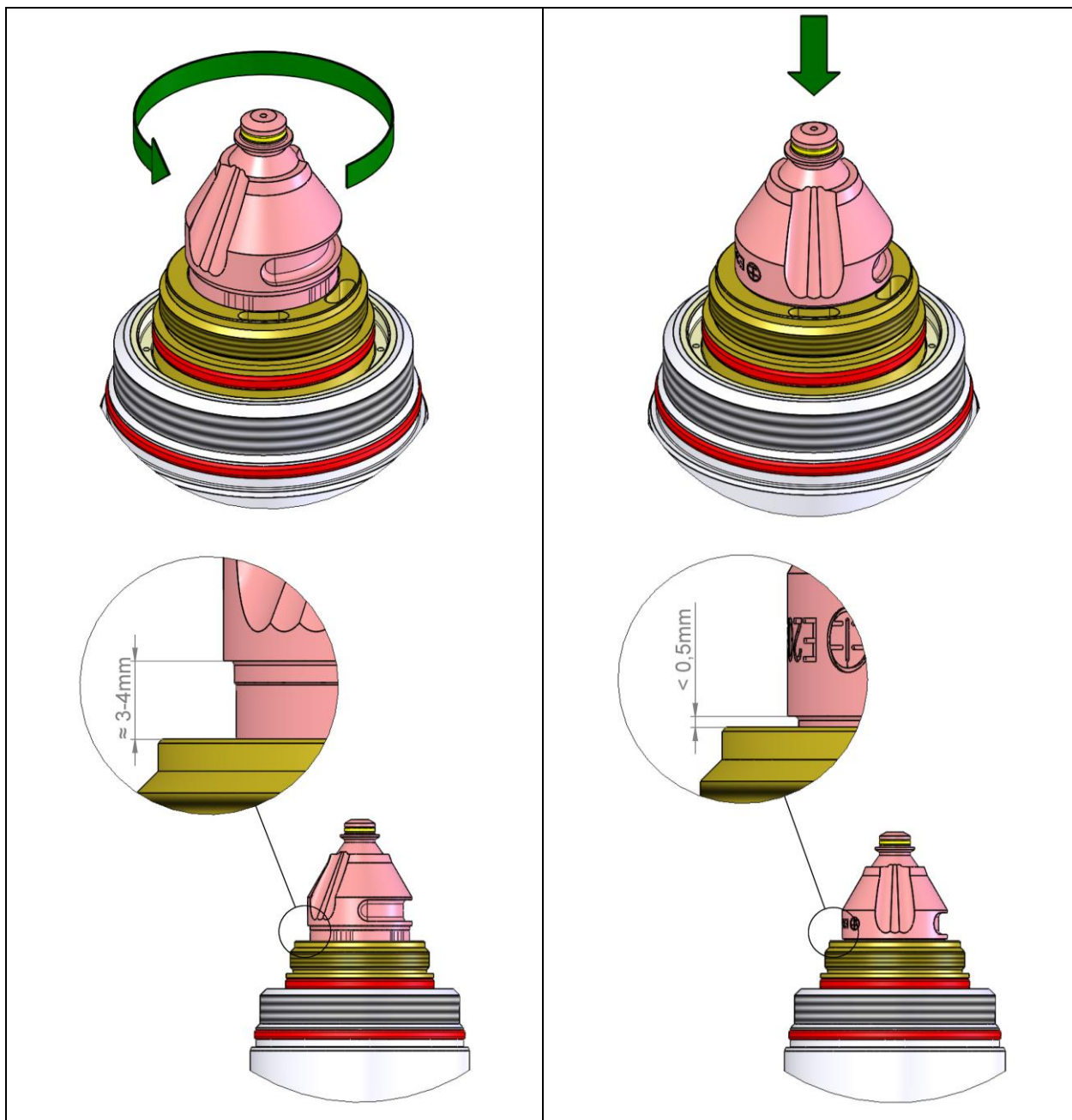


Fig. 36: Insert the nozzle into the torch head

INFORMATION



Please make sure that you push the nozzle into the nozzle receiving of the torch with your hand.

The nozzle cap is used only for fixing the nozzle in the nozzle holder.

Pressing down the nozzle with the nozzle cap can cause may damage it!

This is especially true for the plastic nozzle cap.

9.4.2 Replacement of the current socket, current plug and location pin in the torch shaft



CAUTION



Maintenance and repair work at the current socket, current plug and location pin of the plasma torches may be carried out only by the service department or authorised repair shops of the company Kjellberg Finsterwalde!

9.4.3 Operation of the torch after consumable change

When re-starting the plasma unit after the consumable change, proceed as follows:

1. After switching ON the power source, use the guiding system:
 - automatic short gas test activated
 - no coolant shall leak from the plasma torch (bide until the disappearance of the air bubbles in coolant hoses)
2. Choose the automatic time of gas test on the guiding system or Q-Desk:
 - drain residual coolant from the plasma torch
 - coolant drops can damage the torch during ignition

9.5 Condition monitoring and protection mechanisms for plasma torches

9.5.1 Consumable monitoring

Consumable monitoring is a function of the plasma cutting system that serves to protect the torch. It is active when cutting with cutting gas “oxygen” in the cutting current range from 300 A and above.

If the consumable wear limit is reached, the error E278 is displayed and the plasma cutting system stops the cutting process. Subsequently the operator must replace the consumables, at least the nozzle and cathode. The Consumable monitoring can be activated and deactivated via the Q-Desk.

9.5.2 Wear condition detection

Wear condition detection is a technical monitoring and diagnostic system for assessing the degree of wear on the cathode and nozzle, which are consumables of the torch. The aim is to continuously assess the condition of the consumables and alert the user at an early stage to incipient or critical wear in order to prevent operational failures.

You can view the wear condition detection on the Q-Desk interface.

Status			Assessment
Grey		Not available	No status could be determined. For example, the currently loaded data set is not subject to the defined cutting parameters, or there is switching back and forth between different cutting data sets.
		Disabled	Wear condition detection is disabled. Go to “Settings” to enable this feature.
Green		OK	Consumable kit in good condition
Yellow		Attention	Consumable kit shows some material wear. This includes deposits in or several cases of material fatigue on the nozzle, regardless of cathode wear. It is recommended that the cutting task be completed soon.
Red		Worn out	The consumable kit now shows significant defects. It is recommended that you replace it immediately. Possible causes: <u>Signs of wear on the cathode:</u> • Hafnium deposits on the front surface of the cathode; • Washout of the socket; • Irregularly advanced cathode burn-off; • and others. <u>Signs of wear on the nozzle:</u> • Deformation of the nozzle opening; • Significant hafnium deposits in the nozzle; • Increased cathode wear; • and others. This also includes cathode wear that is not yet sufficiently high (e.g. Rb > 1.8 mm) if the wear on the nozzle is now significantly advanced.

9.6 Information for using of the change heads

9.6.1 Dismantling of the change head



WARNING



Before starting any installation or maintenance work the power source has to be switched off by guiding system and visibly disconnected from the mains (unplug mains cable)!



CAUTION



Endangerment by edges and gaps

There may be hand injuries.

Be careful when assembling and disassembling the change head by hand. Use the hand guard!

ATTENTION



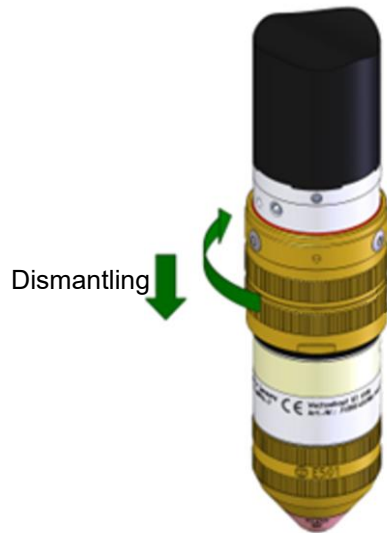
Do not drop the change head, it could be damaged!

The change head is a high-quality precision part and must therefore be handled with care. To prevent damages, it is recommended to store the change head not being used in the optionally available "Parking station for the change heads".

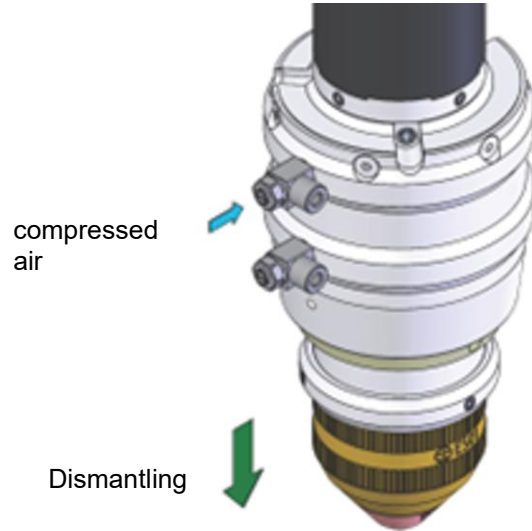
Plasma machine torch Q-Torch

9.6.1.1 Dismantling of the change head Q-Torch 45x0

1. Solving of the change head possible with one hand, due to the 120 ° movement. Remove the change head according to the following figure. Remove the QT 4520 change head from the torch shaft by applying compressed air to the pneumatic connection (open) on the QT changer



Q-Torch 4510



Q-Torch 4520

2. Torch head should be placed on a smooth pad and secured against rolling away. It is recommended to use the "Station for change head".

Please use the designated parking station to store your change head.

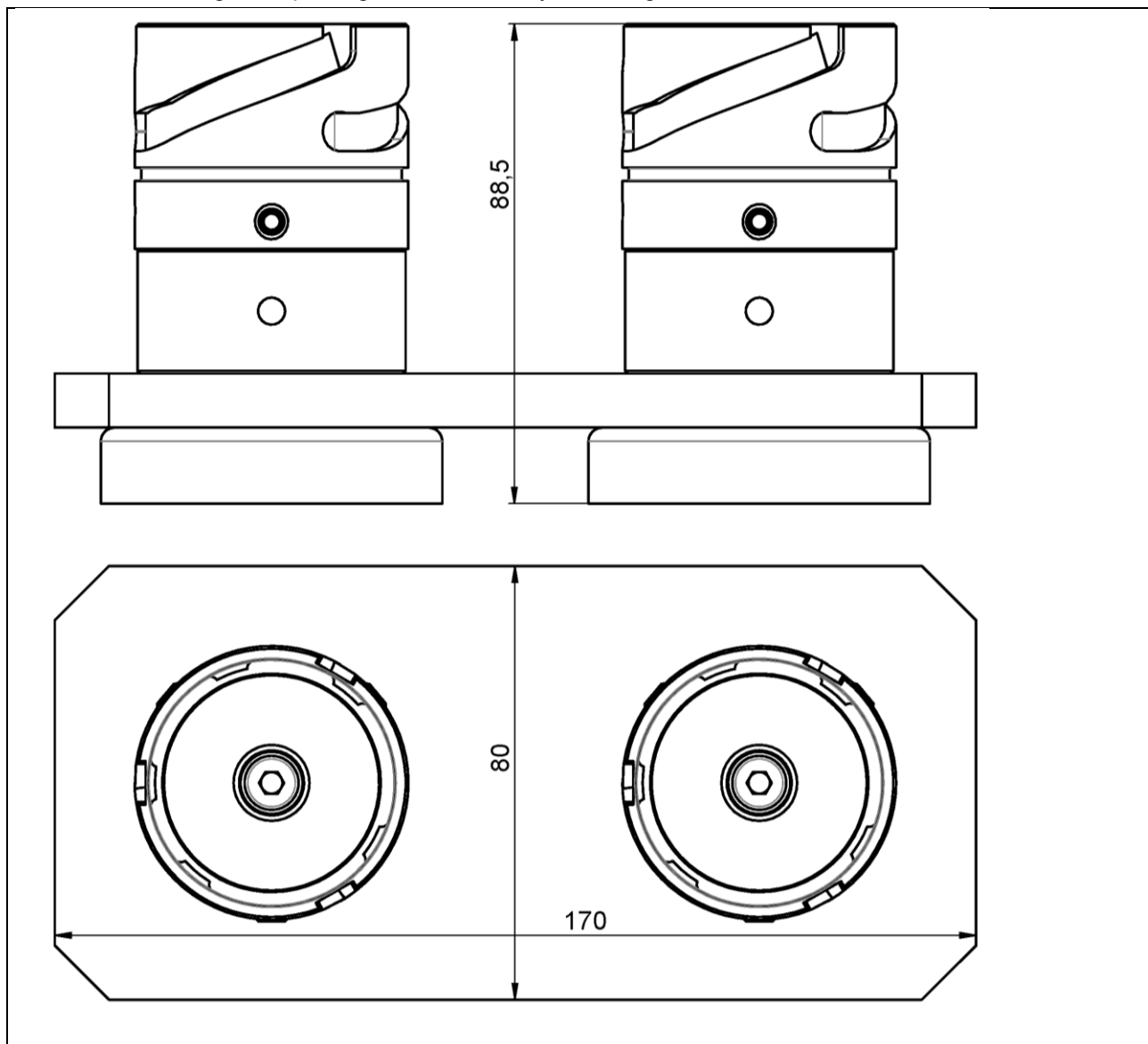


Fig. 37: Parking station without a head .11.858.401.830
suitable for change head Q-Torch 4510

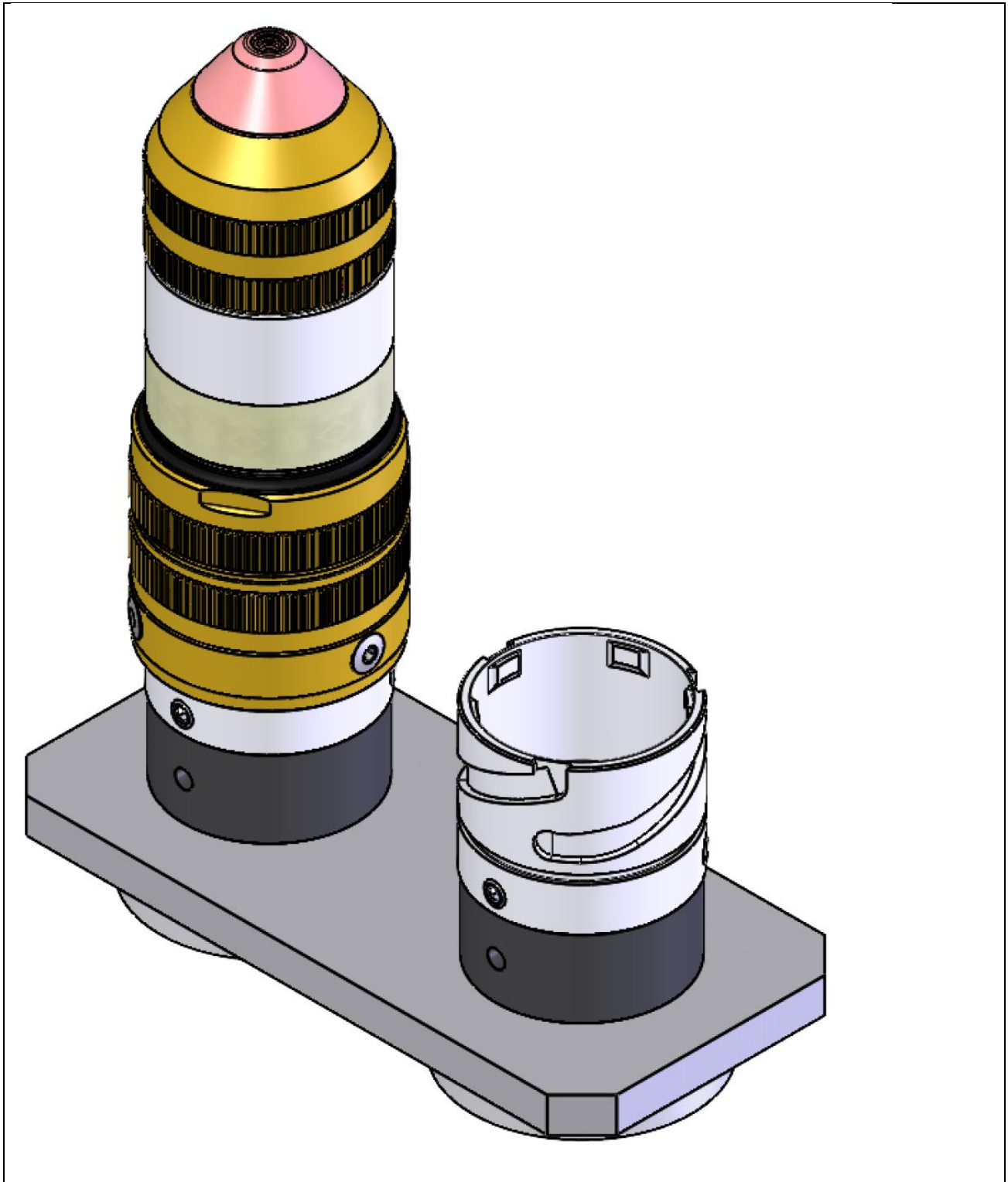


Fig. 38: Parking station .11.858.401.830
suitable for change head Q-Torch 4510

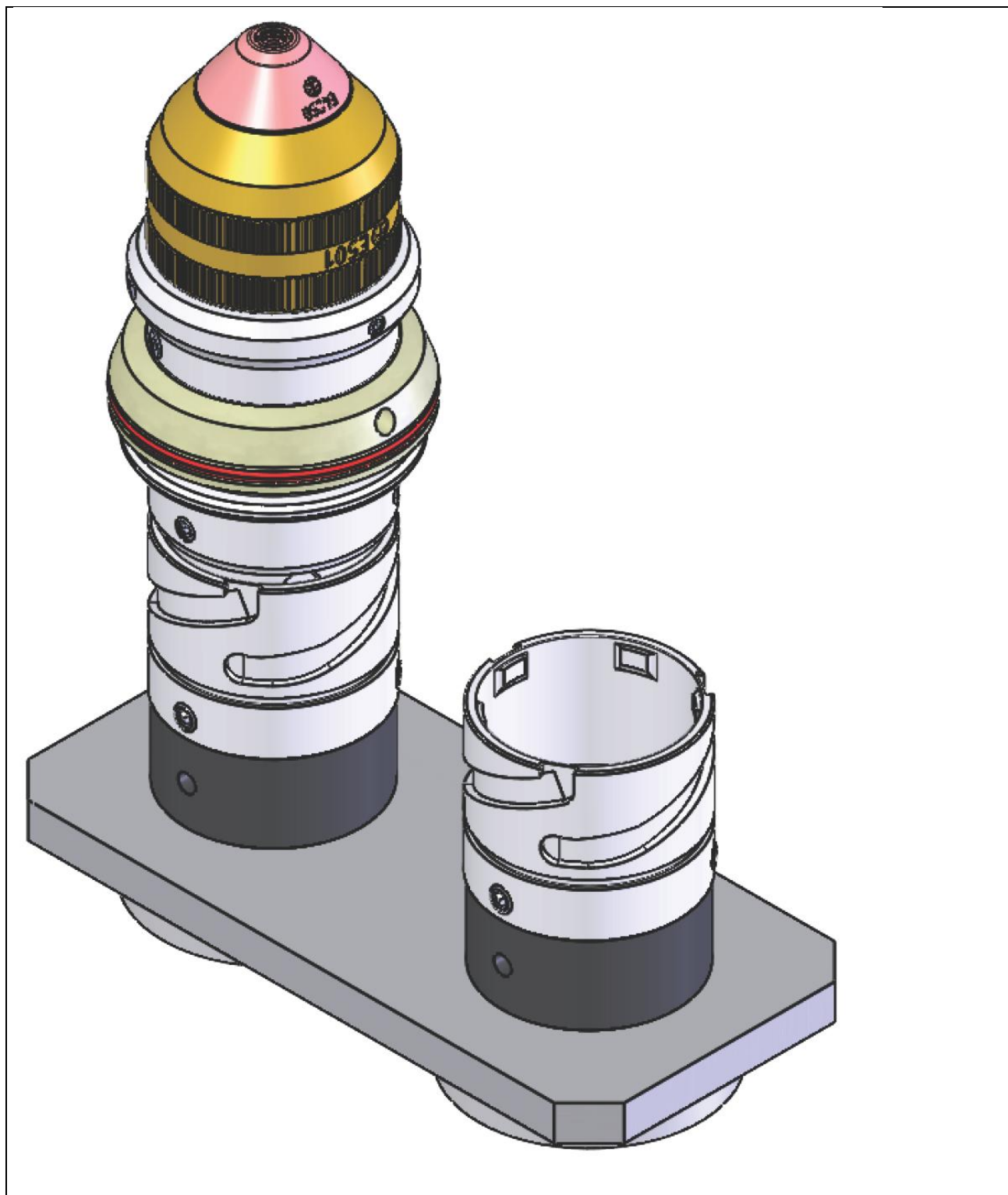


Fig. 39: **Parking station .11.858.401.830**
 suitable for change head Q-Torch 4520

Plasma machine torch Q-Torch**9.6.2 Maintenance of the change head**

Plasma torch:	Q-Torch 4510
Drawing of the spare parts lists:	.11.858. <u>4</u> 01.E0

The position numbers indicated in the sections below, e.g. (01.08), refer to the spare parts drawings above. You will find these spare parts drawings in the appendix „Spare parts lists“.

In order to increase the lifetime of the o-rings we recommend the occasional use of an exclusively oxygen-suitable lubricant:

- Please apply the lubricant only to the o-rings marked with # in the following picture!
- Please wet the o-rings only slightly with the lubricant!
- Please make sure that no lubricant enters the nipples and borings!
- An oxygen-suitable lubricant (e.g. lubricant for O₂ LC 40 Fluid, article no. .10.616.104) can be obtained from Kjellberg Finsterwalde.

ATTENTION**The use of lubricant for o-rings:**

- Please wet the o-rings with oxygen-suitable lubricant only!
- The use of other oils and fats may eventually destroy the quick-change head / plasma torch!
- Please apply lubricant only to those o-rings marked or mentioned accordingly!
- Under no circumstances shall lubricant be applied to the o-rings of the consumables which are subject to high thermal load!

9.6.2.1 Control of the O-rings

Check of the outer o-rings

- 1 x o-ring 28 x 2.0 (01.08)
- 1 x o-ring 42 x 2.0 (01.09)

Please replace the o-rings in case of damage or wear.

Check of the inner o-rings

This list includes only those o-rings that are subject to wear during mounting and demounting of the quick-change head:

- 2 x o-ring 6 x 1.5 (01.12) at KMV-plug (**01.13**) and current-plug KMR (**01.14**), if necessary dismantling of the plug, use socket wrench (**60.20**) for current- / KMV-plug for the mounting / dismantling.
- 2 x o-ring 4.5 x 1.5 (01.22) at nipple WG and PG (**01.24**) required dismantling of the nipple, use torque screwdriver (**60.10**) with hexagonal insert SW6 (**60.14**) at montage with changed o-ring and tighten with 30cNm.
- 2 x o-ring 6 x 1.5 (01.17) at insulating bush PI and insulating bush EF (**01.19**), required dismantling of the socket, use torque screwdriver (**60.10**) with hexagonal insert SW8 (**60.13**) at montage with changed O-ring and tighten with 60cNm.

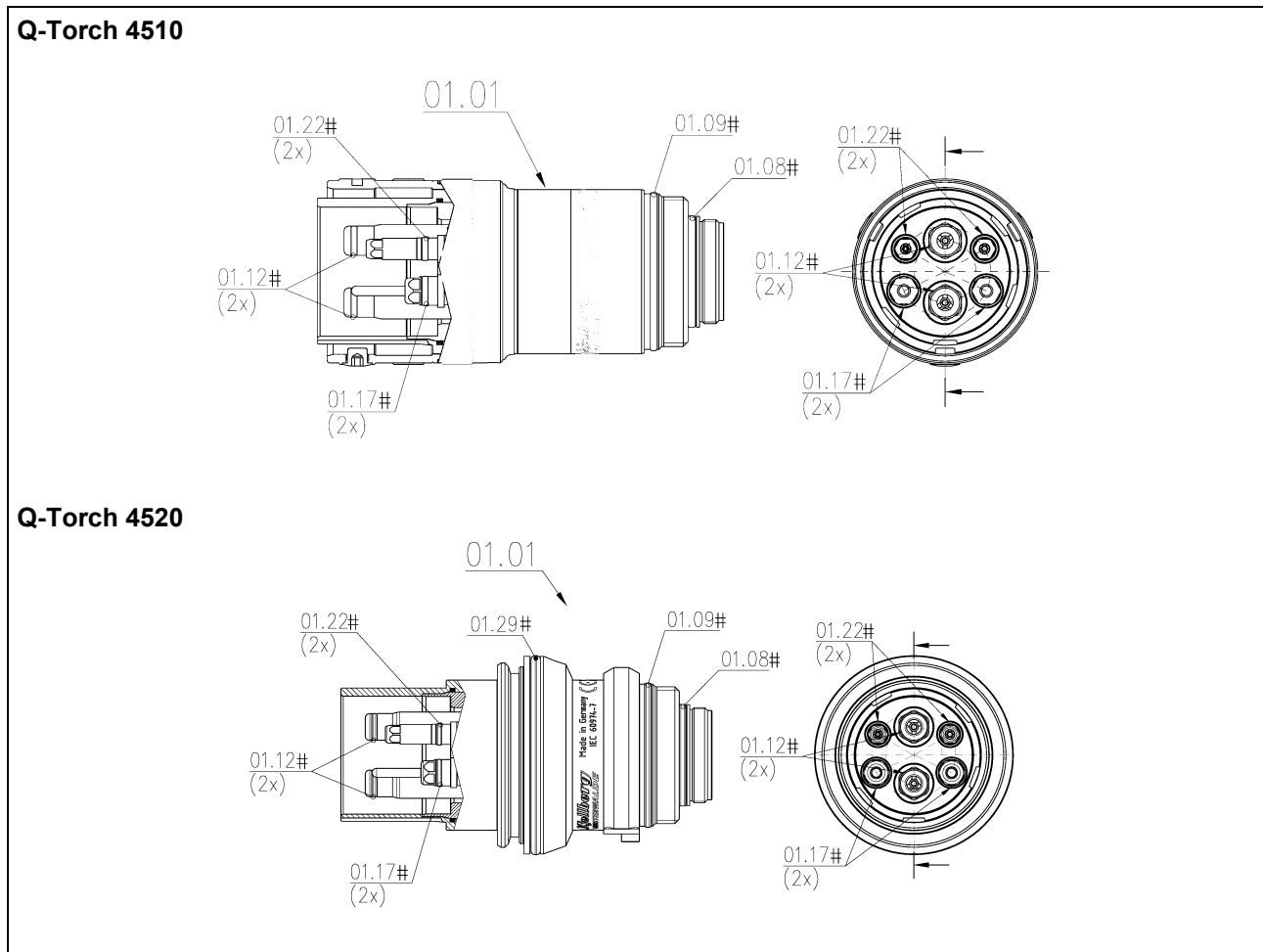


Fig. 40: Inner and outer o-rings of the change head

Plasma machine torch Q-Torch

9.6.3 Add on of the change heads

ATTENTION



Remove the residual coolant from the torch interface (head and shaft) before assembly the change head, for example through the blowing out with compressed air!
Please wear safety goggles!

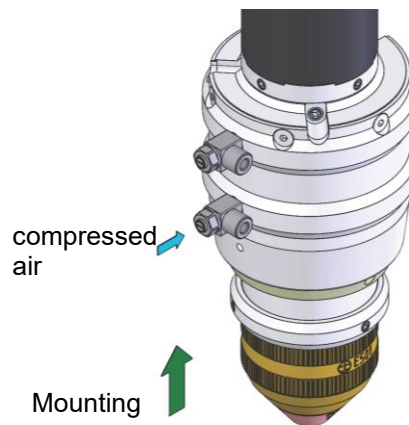
9.6.3.1 Dismantling of the change head Q-Torch 45x0

1. Turn the change head 120 ° (a half turn), according to the following figure, until the noticeable mechanical stop.

Insert the change head into the QT Changer. To close the gripper, switch the compressed air supply, so that the change head is retracted into the QT Changer.



Q-Torch 4510



Q-Torch 4520

ATTENTION



If the torch head cannot be screwed completely on the torch shank (noticeable mechanical stop) it must be controlled whether all inside components are free of impurity and all O-rings are okay. In the case of doubt the contact of the torch has to be cleaned with compressed air. Please wear safety goggles! Afterwards connect the change head without using FORCE with the shaft!



10 Plasma torch connection unit iQ-Port

Plasma torch connection unit iQ-Port

10.1 Technical data

Art.-no.:	iQ-Port (.11.820.262)
Operating voltage	24 V DC
Dimensions (lxbxh):	431 x 258 x 245 mm
Weight:	12,5 kg

Fig. 41: Technical data

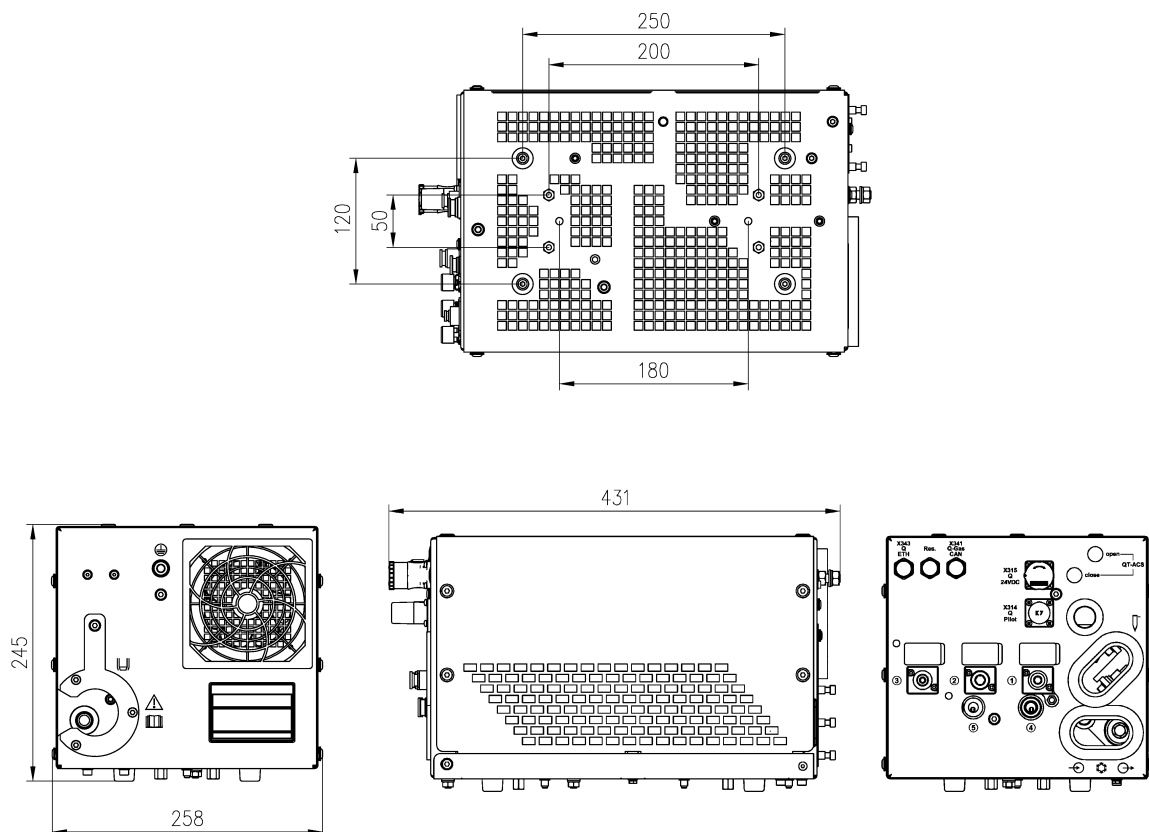


Fig. 42: Dimension diagram

10.2 Technical description

The torch connection unit iQ-Port is the intersection between the plasma torch and the power source. The plasma ignition unit is in the iQ-Port.

The cover must be removed in order to connect the torch, coolant hoses and cathode cables from the power source. The connectors for the plasma gases and the swirl gases are placed at the top of the iQ-Port.

INFORMATION

► Please note that you can open flap of the iQ-Port, which is secured with a door lock, only with a cross-tip screwdriver!
To do this, insert the cross-tip screwdriver into the opening and turn it to the left! Then the door opens easily.

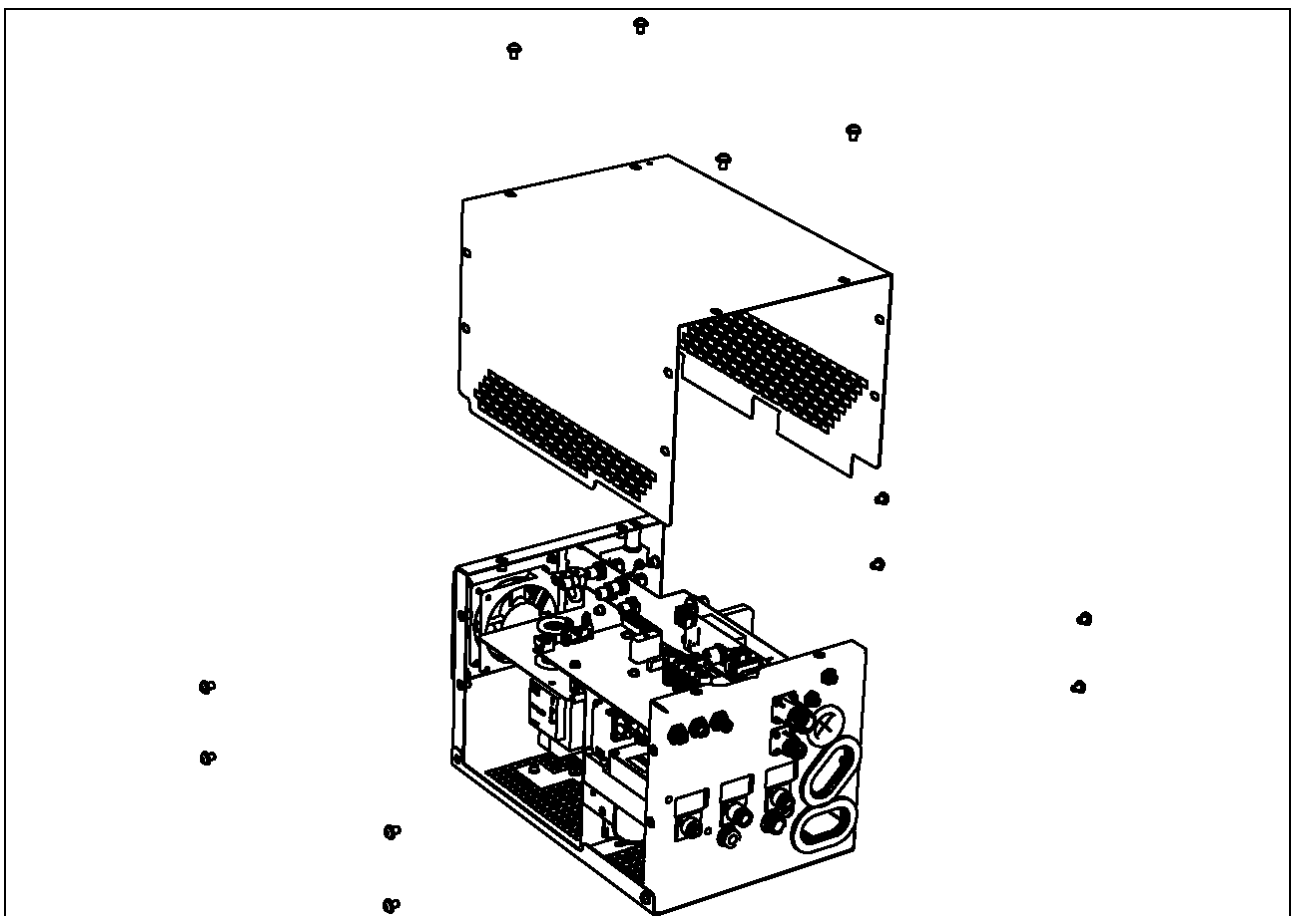


Fig. 43: Removing the iQ-Port cover

10.3 Allowed fitting positions

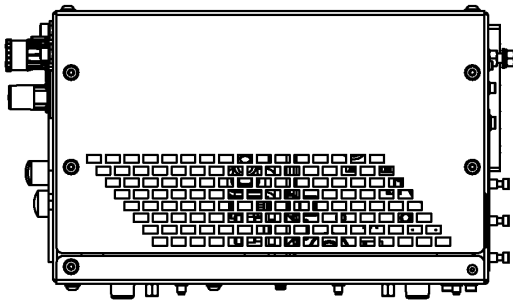
ATTENTION



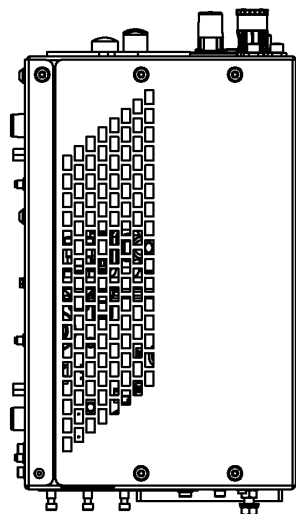
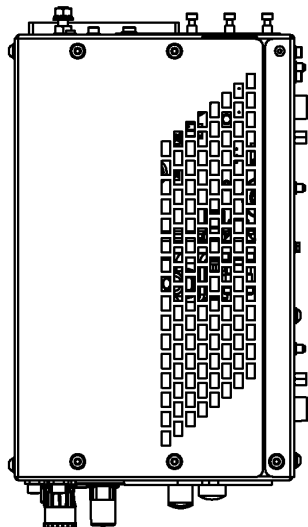
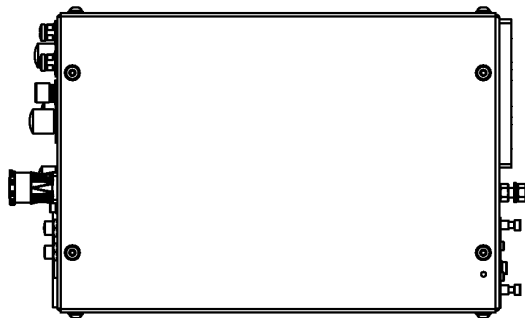
Make sure to use only one permissible installation position!

Otherwise, there is a risk that coolant accidentally escaping when loosening the hose assembly will run over the high-voltage ignition device.

Standard fitting position



other possible fitting positions



10.4 Connection of the Plasma torch connection unit

The iQ-Port has to be fixed to the guiding system or to a robot. For the correct fastening the bottom plate of the iQ-Port is furnished with two distance pieces (with threads M6 inside/outside).

Two attachment variants result:

1. with distance pieces at the supplied condition
2. with turned distance pieces

The connectors for the coolant and the cathode cable are located in the iQ-Port. If several cathode cables are available, please use both cathode connections.

You can connect the control cable X314, supply cable X315 and Ethernet X343 of the power source iQ, as well as the control cable CAN X341 of the iQ-Gas on the outside of the iQ-Port.

The numbered connecting hoses for the plasma gas supply must be plugged into the corresponding gas-tight connections. They are colour-coded according to their different diameters.

Connect the plasma torch to the output side, analog to the hose package at the input side. The hoses and cables can be inserted laterally into the iQ-Port.

Insert the coolant supply hose (PU-hose AD10 x NW6, blue hose) to the plug connection and screw on the coolant return hose (G3/8", black hose).

Insert the pilot plug and the initial positioning contact. Insert the gas hoses (color coded) according to the color on the plug connections AD6.0 x NW4. Relieve the hose assembly via the flange and the hose fitting, which are screwed to the iQ-Port with M5 screws (hexagon socket 4). The contact is used for shielding, so proper contact must be ensured.

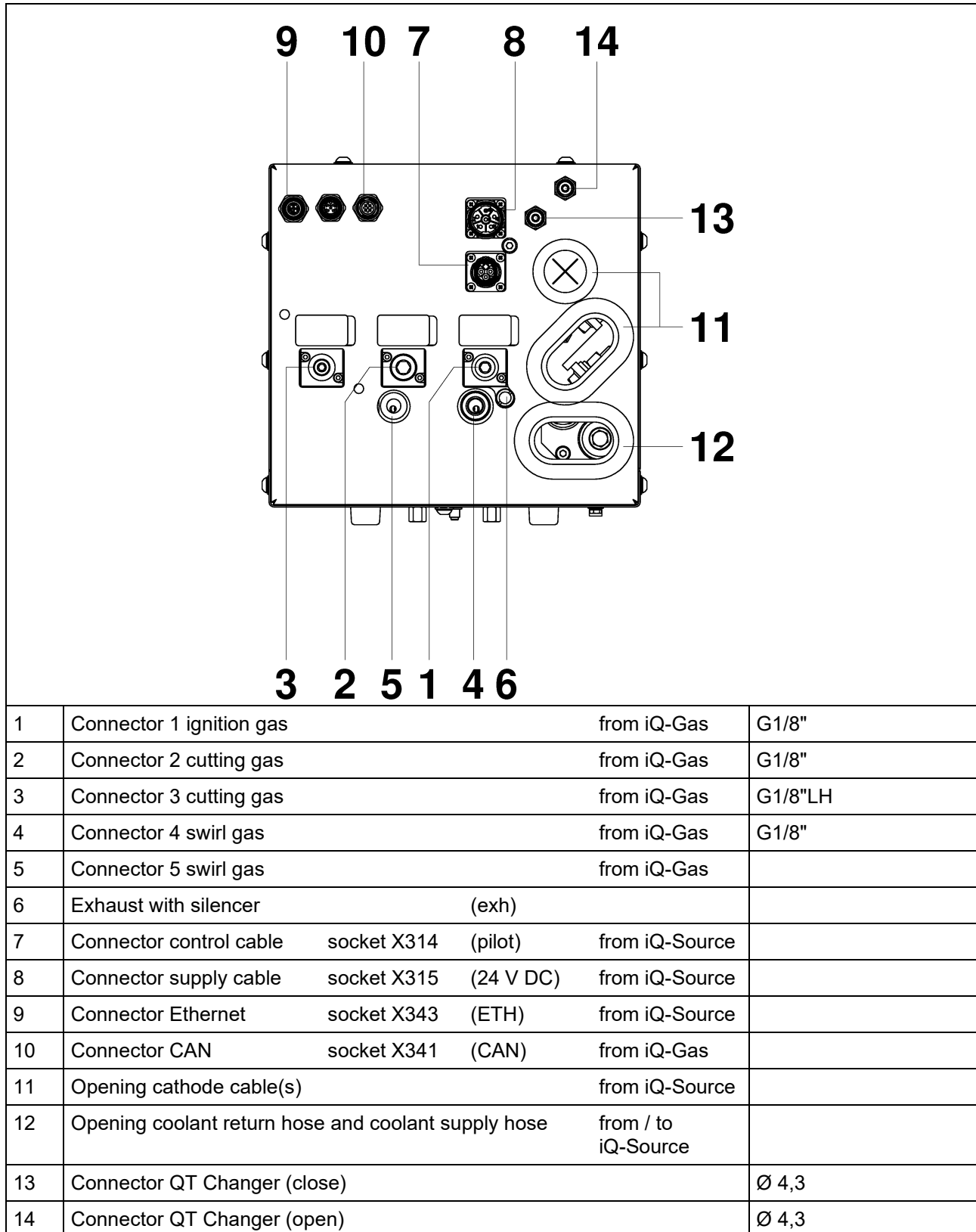
After finishing the installation work close the covers, otherwise the door switch avoids starting of plasma power source!

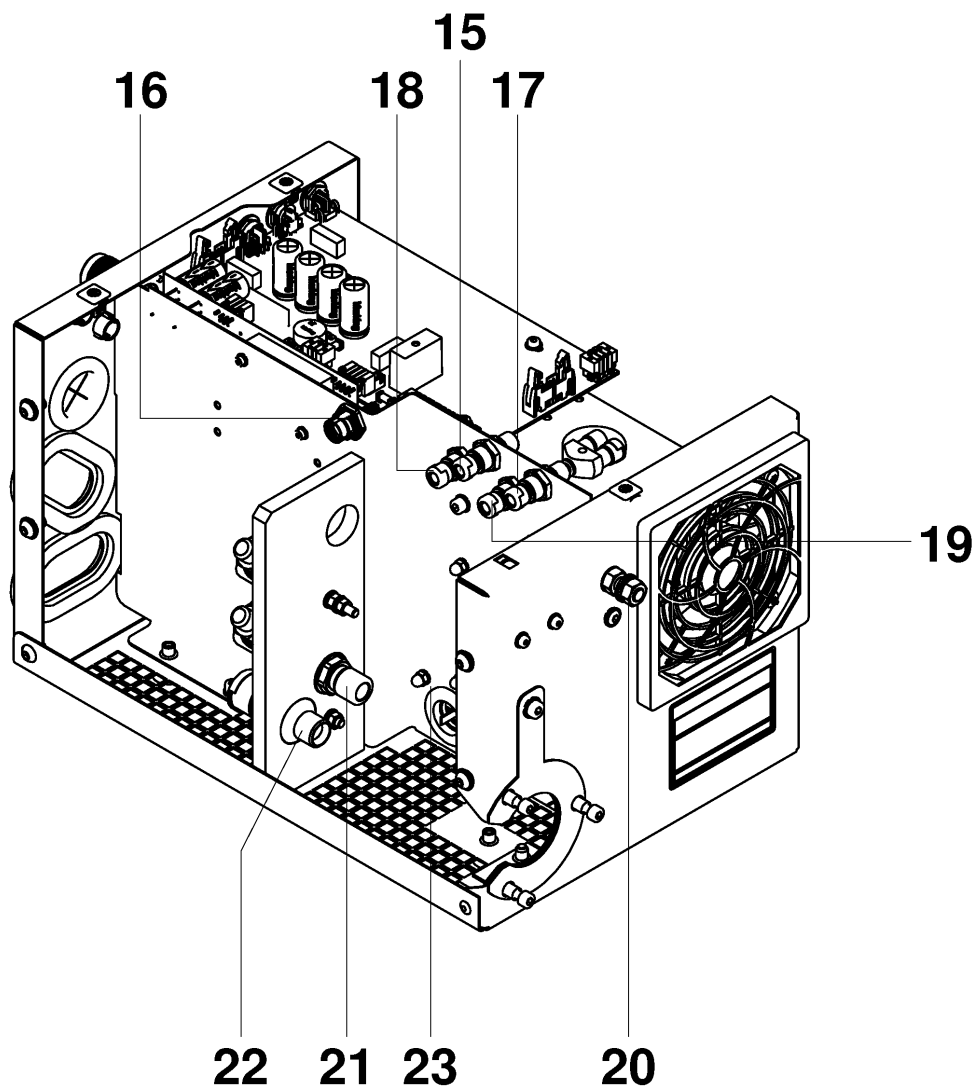
ATTENTION



Once installation is complete, fit the cover, as the door switch prevents the plasma system from starting up when the unit is open!

Plasma torch connection unit iQ-Port





15	Connector swirl gas	(WG)	to Q-Torch	PU-hose AD6,0 x NW4 green
16	Connector torch valves + BDA	socket X321 (valves)	to Q-Torch	8-pol. M12, A-coded
17	Connector cutting gas	(SG)	to Q-Torch	PU-hose AD6,0 x NW4 blue
18	Connector of exhaust hose	(exh)	from Q-Torch	PU-hose AD6,0 x NW4 yellow
19	Connector of ignition gas	(ZG)	to Q-Torch	PU-hose AD6,0 x NW4 black
20	Connector of grounding conductor	(PE)		M8
21	Connector of coolant supply hose		to Q-Torch	PU-hose AD10 x NW6 blue
22	Connector of coolant return hose and cathode cable		from Q-Torch	G3/8"
23	Connector initial positioning contact (inside)		from Q-Torch	flat plug 6,3 x 0,8 mm

Plasma torch connection unit iQ-Port

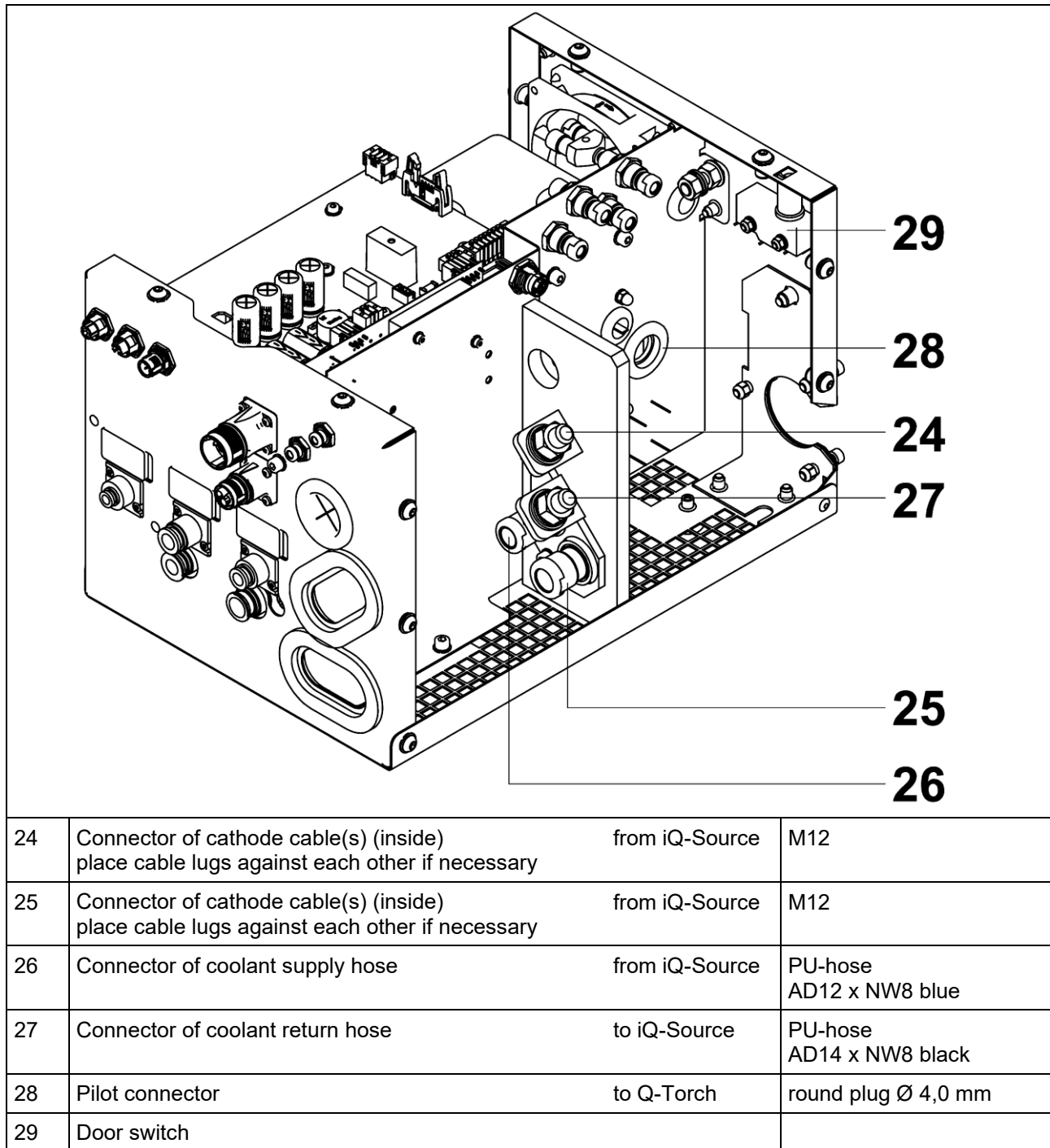
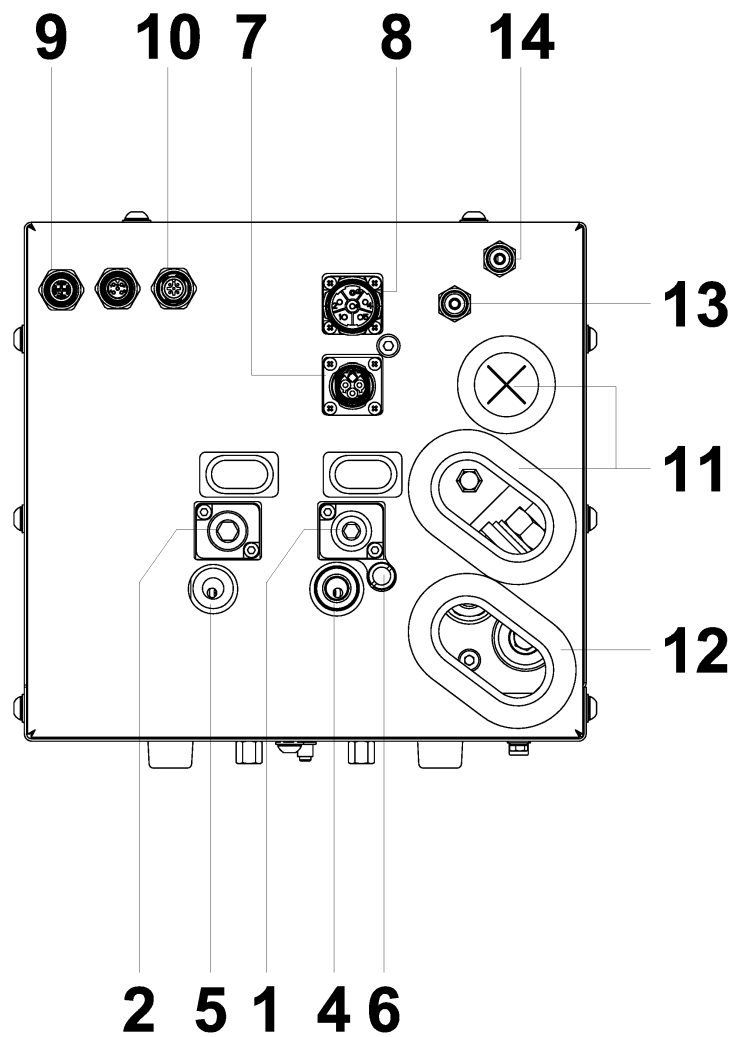
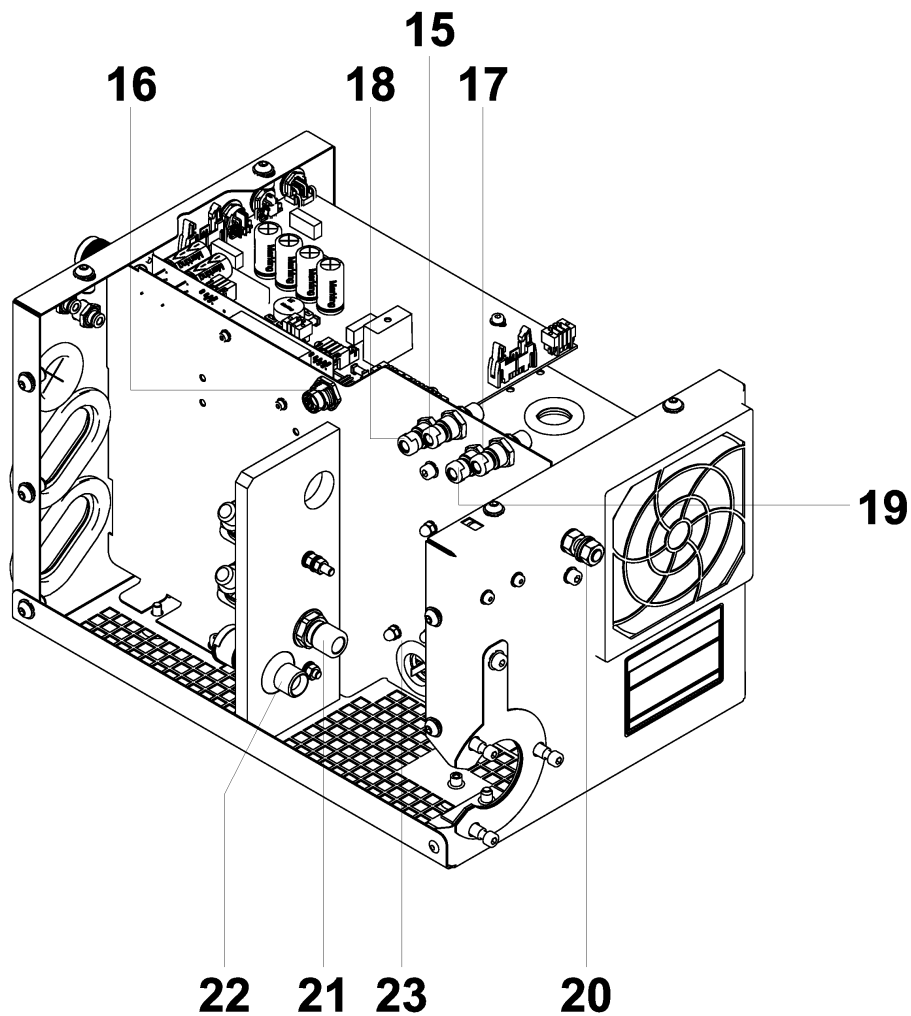


Fig. 44: Connections of iQ-Port

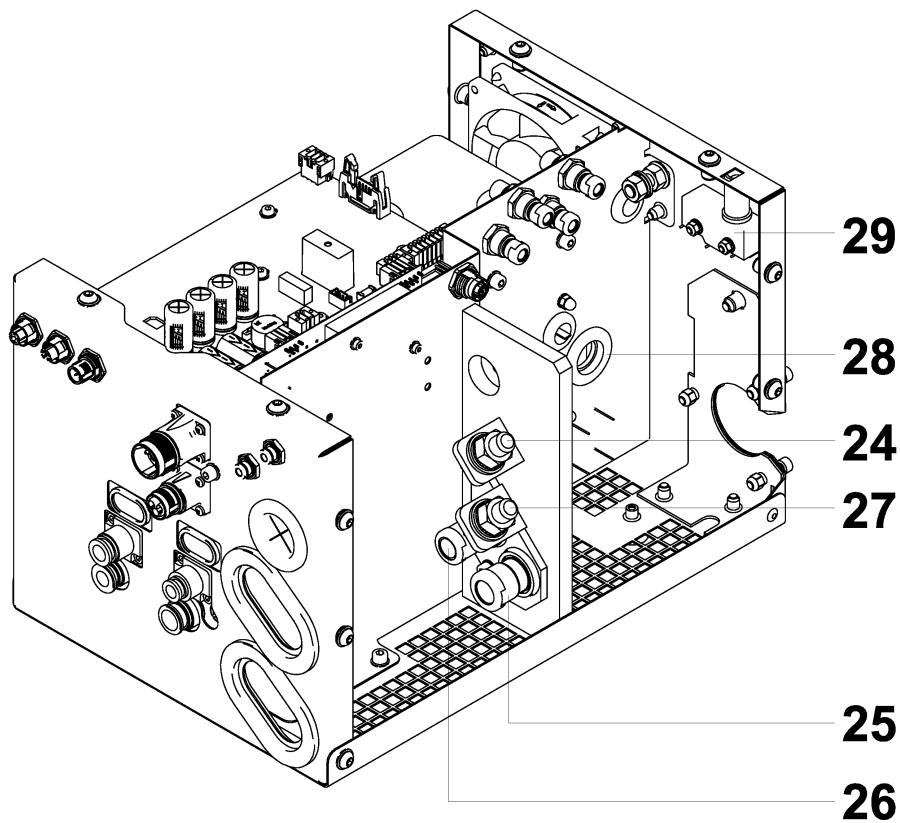


1	Connector 1 ignition gas	from iQ-Gas	G1/8"
2	Connector 2 cutting gas	from iQ-Gas	G1/8"
3	not used		
4	Connector 4 swirl gas	from iQ-Gas	G1/8"
5	Connector 5 swirl gas	from iQ-Gas	
6	Exhaust with silencer (exh)		
7	Connector control cable socket X314 (pilot)	from iQ-Source	
8	Connector supply cable socket X315 (24 V DC)	from iQ-Source	
9	Connector Ethernet socket X343 (ETH)	from iQ-Source	
10	Connector CAN socket X341 (CAN)	from iQ-Gas	
11	Opening cathode cable(s)	from iQ-Source	
12	Opening coolant return hose and coolant supply hose	from / to iQ-Source	
13	Connector QT Changer (close)		Ø 4,3
14	Connector QT Changer (open)		Ø 4,3

Plasma torch connection unit iQ-Port



15	Connector swirl gas	(WG)	to Q-Torch	PU-hose AD6,0 x NW4 green
16	Connector torch valves + BDA	socket X321 (valves)	to Q-Torch	8-pol. M12, A-coded
17	Connector cutting gas	(SG)	to Q-Torch	PU-hose AD6,0 x NW4 blue
18	Connector of exhaust hose	(exh)	from Q-Torch	PU-hose AD6,0 x NW4 yellow
19	Connector of ignition gas	(ZG)	to Q-Torch	PU-hose AD6,0 x NW4 black
20	Connector of grounding conductor	(PE)		M8
21	Connector of coolant supply hose		to Q-Torch	PU-hose AD10 x NW6 blue
22	Connector of coolant return hose and cathode cable		from Q-Torch	G3/8"
23	Connector initial positioning contact (inside)		from Q-Torch	flat plug 6,3 x 0,8 mm



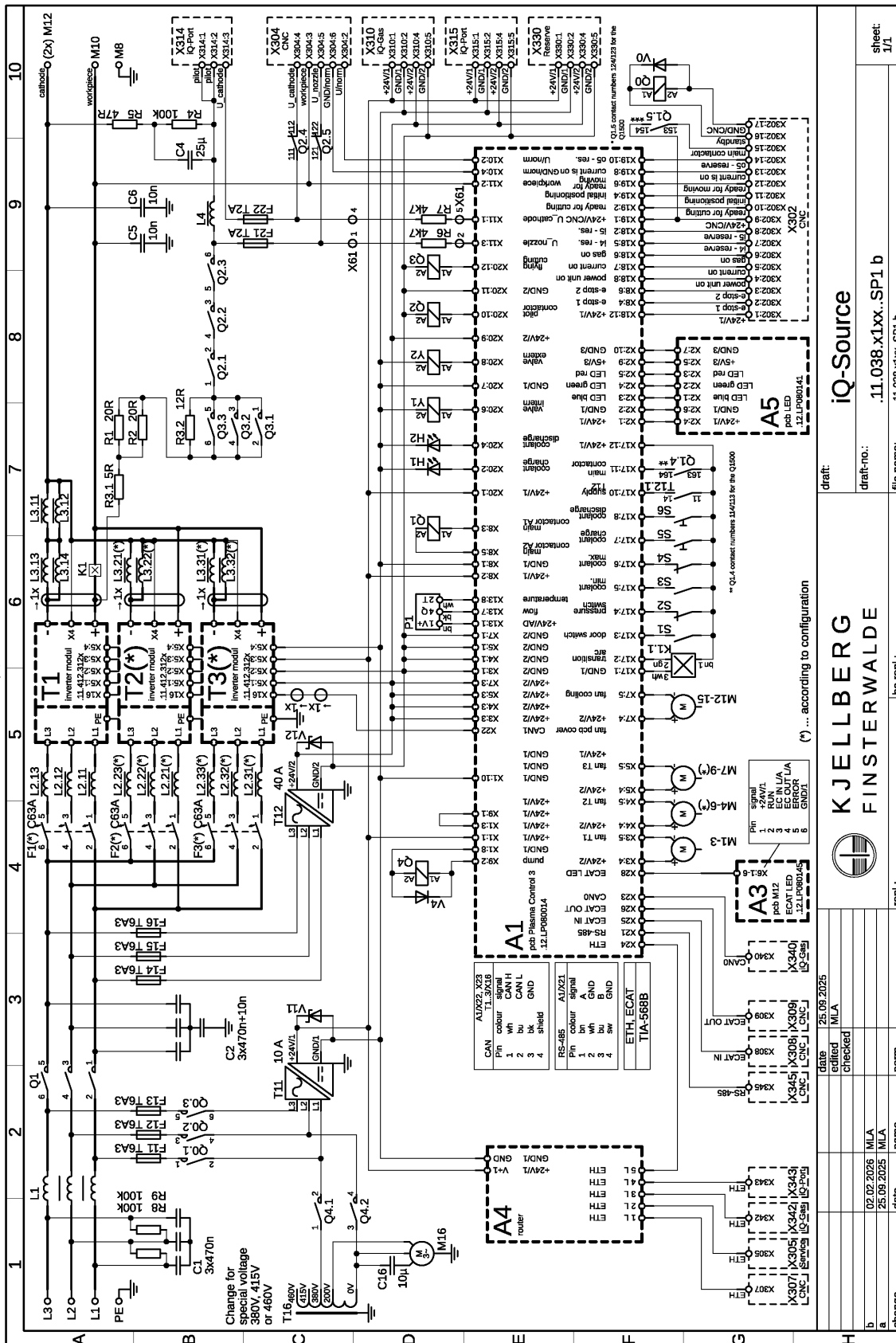
24	Connector of cathode cable(s) (inside) place cable lugs against each other if necessary	from iQ-Source	M12
25	Connector of cathode cable(s) (inside) place cable lugs against each other if necessary	from iQ-Source	M12
26	Connector of coolant supply hose	from iQ-Source	PU-hose AD12 x NW8 blue
27	Connector of coolant return hose	to iQ-Source	PU-hose AD14 x NW8 black
28	Pilot connector	to Q-Torch	round plug Ø 4,0 mm
29	Door switch		

Fig. 45: Connections of iQ-Port O₂

Wiring diagrams

11 Wiring diagrams

for plasma cutting unit Q-Source	drawing number
wiring diagrams of power source	.11.038.30xx..SP1
	.11.038.30xx..SP2
	.11.038.30xx..SP3
	.11.038.30xx..SP4
wiring diagram gas console	.11.825.130xA.SP1
wiring diagram plasma torch connecting unit	.11.820.26xA.SP1
wiring diagram plasma torch	.11.858.x01.SP1
wiring diagram inverter module	.11.412.3xxx..SP1



Wiring diagrams

.11.038.x1xx..SP1

Code	Beschreibung	Description
A	Leiterplatte	printed circuit board
A1	LP Plasma Control (PC)	PCB plasma control (PC)
A3	LP ECAT LED	PCB ECAT LED
A4	Router	router
A5	LP iQ-LED	PCB iQ-LED
C	Kondensator	capacitor
C1	3 x 0,47 µF Netzfilter	3 x 0,47 µF line filter
C2	3 x 0,47 µF + 10 nF Netzfilter	3 x 0,47 µF + 10 nF line filter
C4	25 µF Puffer, Pilotstrom	25 µF pilot current buffer
C5	10 nF Filter	10 nF filter
C6	10 nF Filter	10 nF filter
F	Sicherung	fuse
F1	C 63 A Invertermodul T1	C 63 A inverter module T1
F2	C 63 A Invertermodul T2	C 63 A inverter module T2
F3	C 63 A Invertermodul T3	C 63 A inverter module T3
F11,12,13	T 6,3 A Netzteil T11	T 6,3 A power supply T11
F14,15,16	T 6,3 A Netzteil T12	T 6,3 A power supply T12
F21	T 2 A Kathodenspannung	T 2 A cathode voltage
F22	T 2 A Düsenspannung	T 2 A nozzle voltage
H	LED	LED
H1	24 V DC, grün, Kühlmittel auffüllen	24 V DC, green, coolant charge
H2	24 V DC, weiß, Kühlmittel ablassen	24 V DC, white, coolant discharge
K	Relais	relays
K1	2 A DC, 1Ö, Übergangsbogen	2 A DC, 1nc, transfer arc
L	Drossel	choke
L1	Entstördrossel, Netzstrom	suppressor choke, line current
L2.11-13	Primärdrossel, Invertermodul T1	primary choke, inverter module T1
L2.21-23	Primärdrossel, Invertermodul T2	primary choke, inverter module T2
L2.31-33	Primärdrossel, Invertermodul T3	primary choke, inverter module T3
L3.11-14	Sekundärdrossel, Invertermodul T1	secondary choke, inverter module T1
L3.21-22	Sekundärdrossel, Invertermodul T2	secondary choke, inverter module T2
L3.31-32	Sekundärdrossel, Invertermodul T3	secondary choke, inverter module T3
L4	Entstördrossel, Pilotstrom	suppressor choke, pilot current

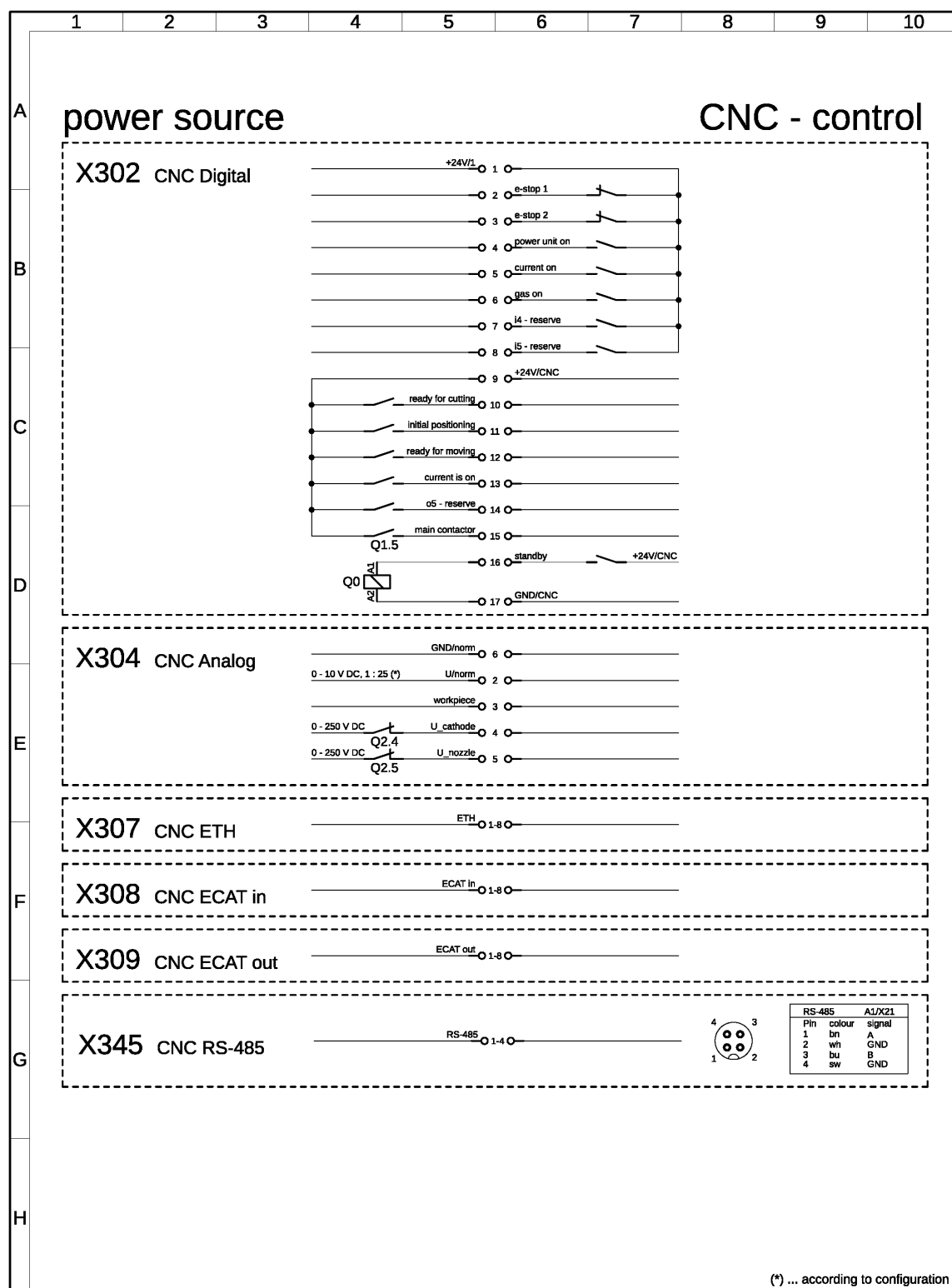
.11.038.x1xx..SP1

Code	Beschreibung	Description
M	Motor	motor
M1-3	Lüfter Invertermodul T1	fan inverter module T1
M4-6	Lüfter Invertermodul T2	fan inverter module T2
M7-9	Lüfter Invertermodul T3	fan inverter module T3
M12-15	Lüfter Wärmetauscher	fan heat exchanger
M16	Pumpe Kühlkreislauf	pump coolant circuit
P	Messung	measurement
P1	Temperatur, Durchfluss, Kühlmittel	temperature + flow of coolant
Q	Schütz	contactor
Q0	24 V DC, 3S, Hilfsschütz	24 V DC, 3no, auxiliary contactor
Q1	24 V DC, 3S + 2S, Hauptschütz	24 V DC, 3no+2no, main contactor
Q2	24 V DC, 3S + 2Ö, Pilotschütz	24 V DC, 3no+2nc, pilot contactor
Q3	24 V DC, 3S, „Fliegendes Anschneiden“	24 V DC, 3no, flying cutting
Q4	24 V DC, 3S, Kühlmittelpumpe	24 V DC, 3S, coolant pump
R	Widerstand	resistor
R1	20 Ω Pilotwiderstand	20 Ω, pilot resistor
R2	20 Ω Pilotwiderstand	20 Ω, pilot resistor
R3.1	6 Ω Pilotwiderstand, eingestellt auf 5 Ω	6 Ω pilot resistor, adjusted to 5 Ω
R3.2	12 Ω Pilotwiderstand	12 Ω, pilot resistor
R4	100 kΩ Entladewiderstand	100 kΩ, discharging resistor
R5	47 Ω Ladewiderstand	47 Ω, charging resistor
R6	4,7 kΩ Vorwiderstand, Düsenspannung	4,7 kΩ, series resistor nozzle voltage
R7	4,7 kΩ Vorwiderstand, Kathodenspannung	4,7 kΩ, series resistor cathode voltage
R8	100 kΩ Entladewiderstand	100 kΩ discharging resistor
R9	100 kΩ Entladewiderstand	100 kΩ discharging resistor
S	Schalter	switch
S1	Schalter, 1S, Türschalter	switch, 1no, door switch
S2	Schalter 1S, Druckschalter	switch, 1no, pressure switch
S3	Schalter 1S, Kühlmittel min.	switch, 1no, coolant min.
S4	Schalter 1S, Kühlmittel max.	switch, 1no, coolant max.
S5	Taster, 1S, grün, Kühlmittel auffüllen	button, 1no, green coolant charge
S6	Taster, 1S, weiß, Kühlmittel ablassen	button, 1no, white coolant discharge

Wiring diagrams

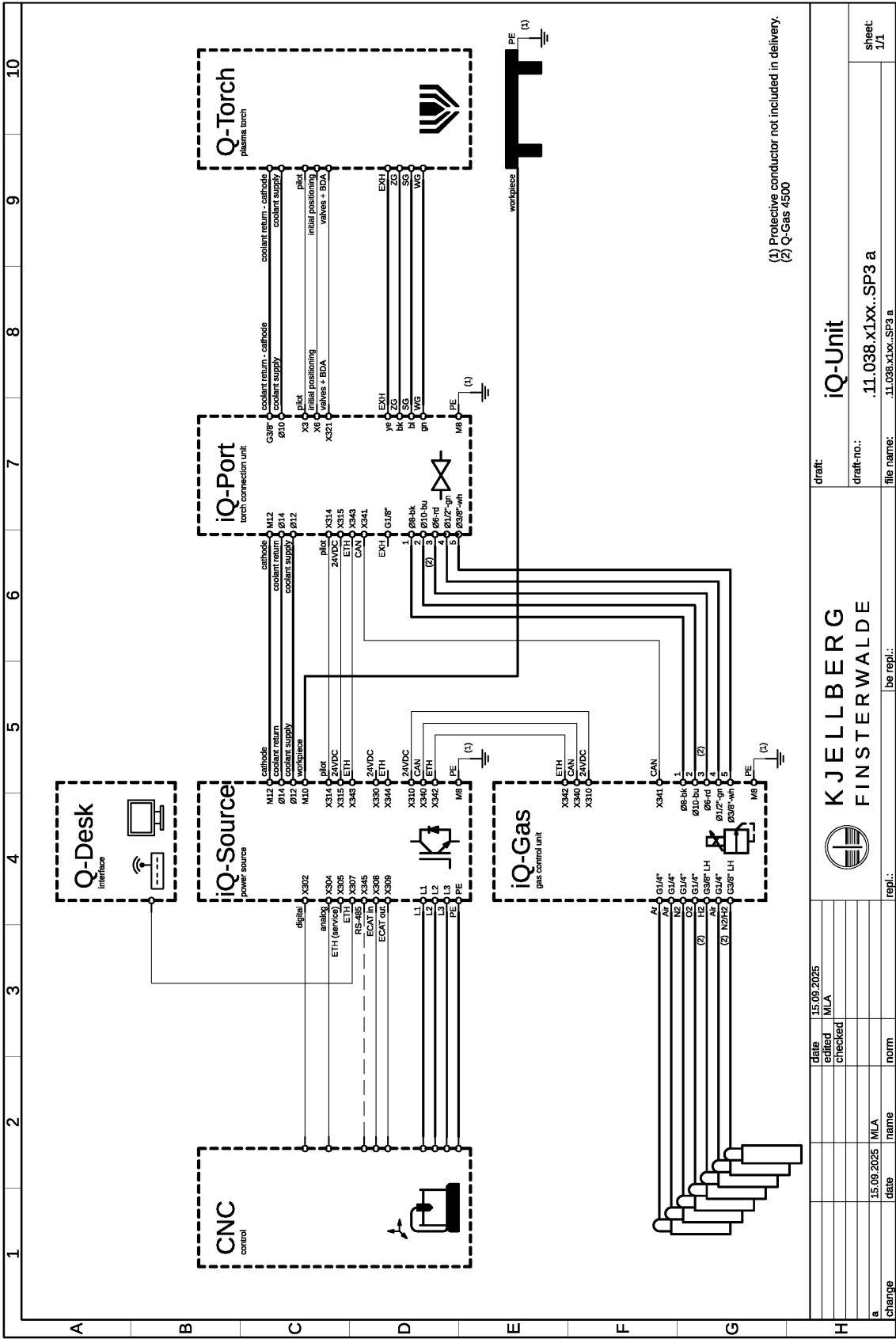
.11.038.x1xx..SP1

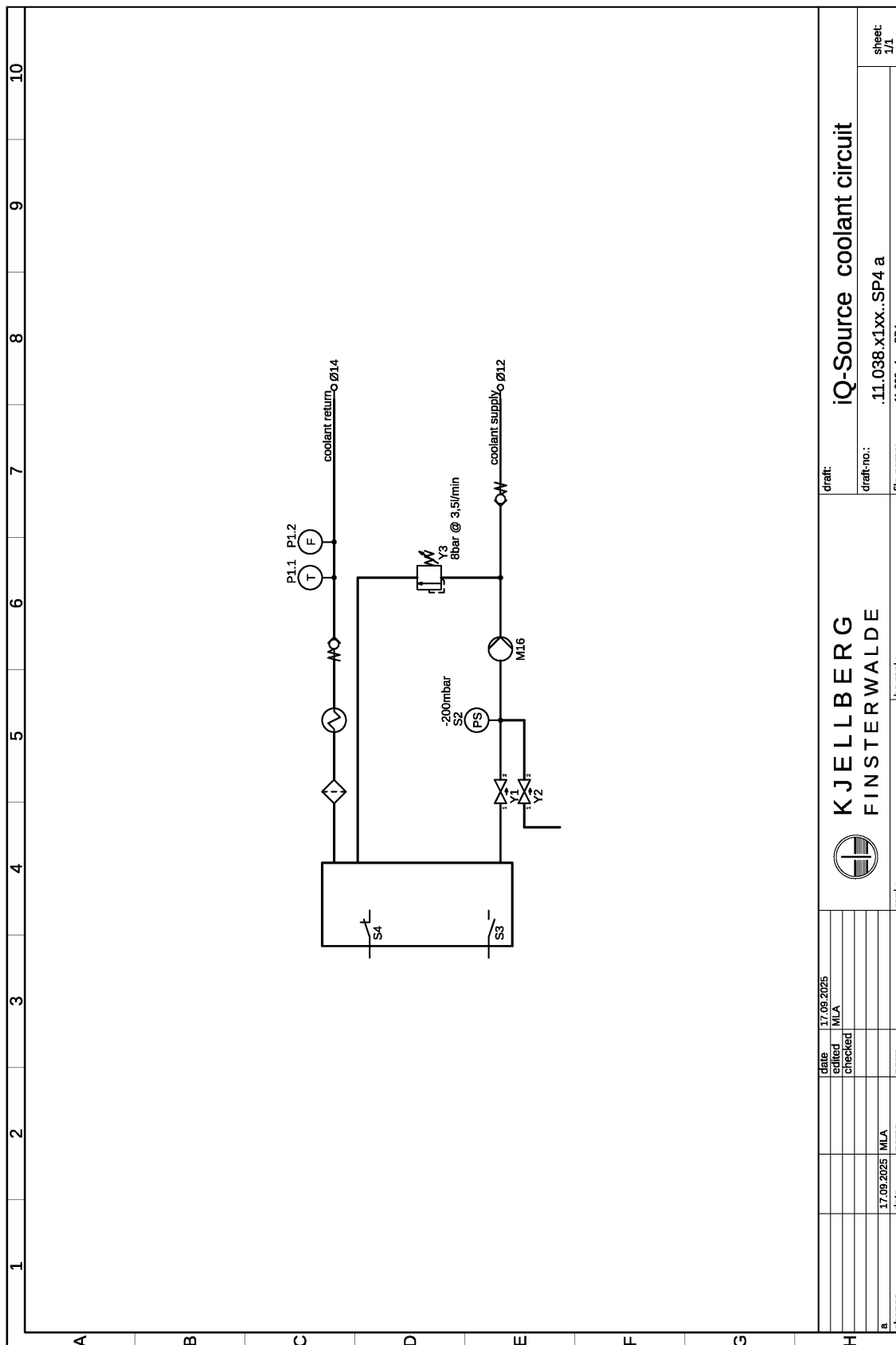
Code	Beschreibung	Description
T	Energieumwandler	power supply
T1	Invertermodul, Master	inverter module, master
T2	Invertermodul, Slave	inverter module, slave
T3	Invertermodul, Slave	inverter module, slave
T11	Netzteil, +24 V/1	power supply, +24 V/1
T12	Netzteil, +24 V/2	power supply, +24 V/2
T16	Spartransformator Pumpenspannung	pump voltage
V	Diode	diode
V1	Freilaufdiode, Überspannungsschutz	Flyback diode overvoltage protection
V4	Freilaufdiode, Überspannungsschutz	Flyback diode overvoltage protection
V11	Suppressordiode, Überspannungsschutz	suppressor diode overvoltage protection
V12	Suppressordiode, Überspannungsschutz	suppressor diode overvoltage protection
X	Klemmen	terminal
X302	17-pol. Buchse, Anschluss CNC Digital	17-pol. socket, connection CNC Digital
X304	6-pol. Buchse, Anschluss CNC Analog	6-pol. socket, connection CNC Analog
X305	RJ-45 Buchse, Anschluss Service Ethernet	RJ-45 socket, connection Service Ethernet
X307	RJ-45 Buchse, Anschluss CNC Ethernet	RJ-45 socket, connection CNC Ethernet
X308	RJ-45 Buchse, Anschluss CNC EtherCAT IN	RJ-45 socket, connection CNC EtherCAT IN
X309	RJ-45 Buchse, Anschluss CNC EtherCAT OUT	RJ-45 socket, connection CNC EtherCAT OUT
X310	5-pol. Buchse, Anschluss iQ-Gas 24 VDC	5-pol. socket, connection iQ-Gas, 24 VDC
X314	3-pol. Buchse, Anschluss iQ-Port Pilot	3-pol. socket, connection iQ-Port, Pilot
X315	5-pol. Buchse, Anschluss iQ-Port 24 VDC	7-pol. socket, connection iQ-Port, 24 VDC
X330	5-pol. Buchse, Anschluss Reserve 24 VDC	5-pol. socket, connection reserve, 24 VDC
X340	5-pol. Buchse, Anschluss iQ-Gas CAN	5-pol. socket, connection iQ-Gas CAN
X342	8-pol. Buchse, Anschluss iQ-Gas Ethernet	8-pol. socket, connection iQ-Gas Ethernet
X343	8-pol. Buchse, Anschluss iQ-Port Ethernet	8-pol. socket, connection iQ-Port Ethernet
X345	4-pol. Buchse, CNC, RS 485	4-pol. socket, CNC, RS 485
Y	Ventil	valve
Y1	2/2 Wege intern	2/2 way intern
Y2	2/2 Wege extern	2/2 way extern



(*) ... according to configuration

			date	name	draft:
			created	10.09.2025	MLA
			edited	09.10.2025	MLA
			checked		
			norm		
			KJELLBERG FINSTERWALDE		draft-no.: .11.038.x1xx..SP2 a
a	09.10.2025	MLA			Sheet: 1/1
change	date	name	file name: .11.038.x1xx..SP2 a		







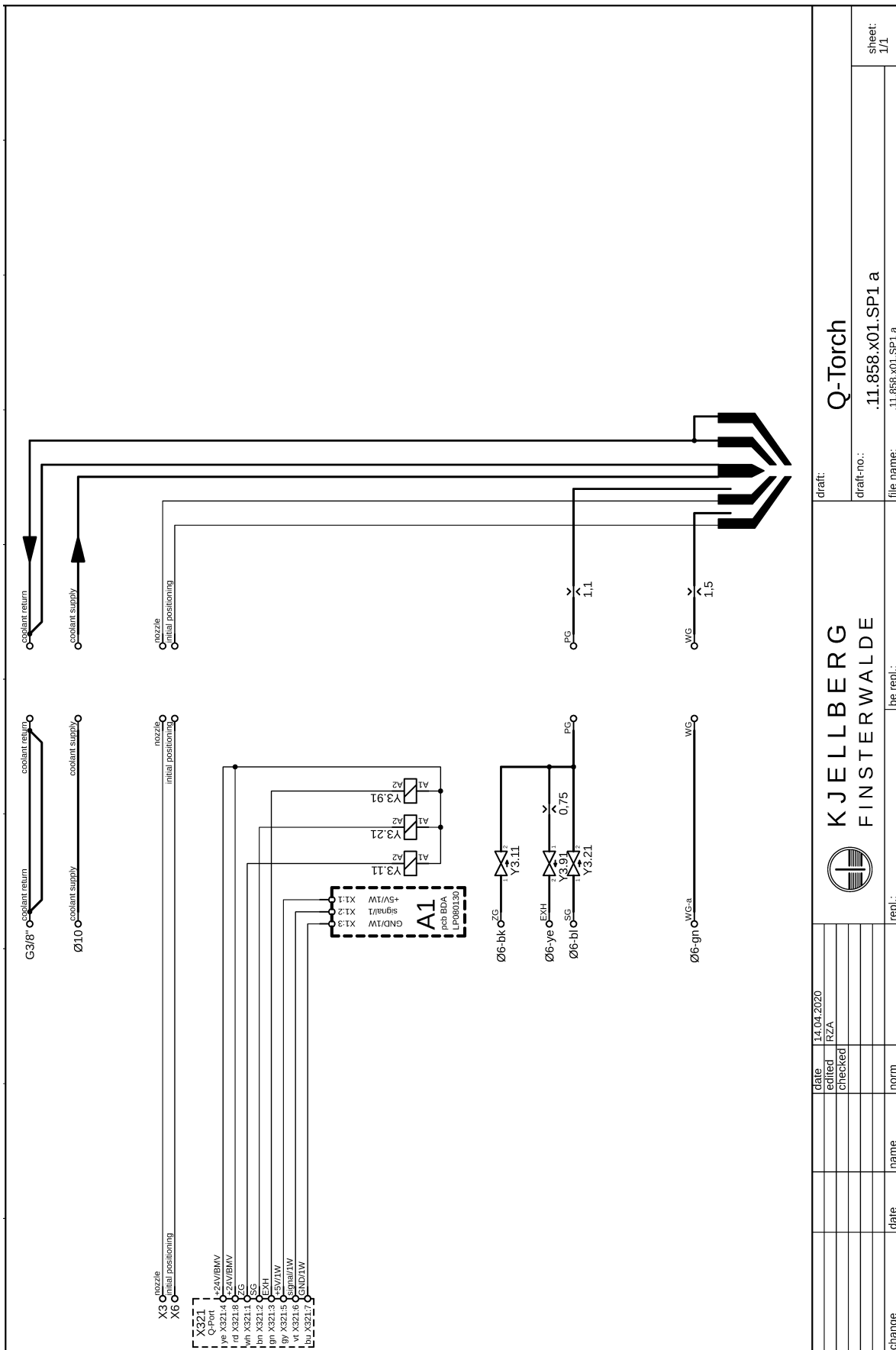
.11.825.1302/3.SP1

Code	Beschreibung	Description
A	Leiterplatte	printed circuit board
A1	LP Gas Control	PCB Gas Control
A2	LP Gas Power	PCB Gas Power
B	Transmitter	Transmitter
B1.1	Drucktransmitter ZG	Pressure transmitter ZG
H	LED	LED
H1	24 V DC, grün, +24 V/2	24 V DC, green, 24V/2
M	Motor	motor
M1	Lüfter, Gehäuse	fan, case
X	Klemmen	terminal
X310	5-pol. Stecker, Anschluss iQ-Source 24 VDC	5-pol. plug, connection iQ-Source 24 VDC
X340	5-pol. Stecker, Anschluss iQ-Source CAN	5-pol. plug, connection iQ-Source CAN
X341	5-pol. Buchse, Anschluss iQ-Port CAN	5-pol. socket, connection iQ-Port CAN
X342	8-pol. Stecker, Anschluss iQ-Source Ethernet	8-pol. plug, connection iQ-Source Ethernet
Y	Ventil	valve
Y1.11	2/2 Wege R1-Ar	2/2 way R1-Ar
Y1.12	2/2 Wege R1-Luft	2/2 way R1-Air
Y1.13	2/2 Wege R1-N2	2/2 way R1-N2
Y1.21	2/2 Wege R2-O2	2/2 way R2-O2
Y1.22	2/2 Wege R1=R2	2/2 way R1=R2
Y1.31	2/2 Wege R3-N2/H2	2/2 way R3-N2/H2
Y1.32	2/2 Wege R3-H2	2/2 way R3-H2
Y1.33	3/2 Wege R3-ENTL	3/2 way R3-EXH
Y1.40	Regelventil, Regler 4	control valve, controller 4
Y1.41	2/2 Wege R4-N2	2/2 way R4-N2
Y1.42	2/2 Wege R4-O2	2/2 way R4-O2
Y1.43	2/2 Wege R4-Bp1	2/2 way R4-Bp1
Y1.44	2/2 Wege R4-BP2	2/2 way R4-Bp2
Y1.50	Regelventil, Regler 5	control valve, controller 5
Y1.51	2/2 Wege R5-Luft	2/2 way R5-Air
Y1.52	3/2 Wege R5-Out5	3/2 way R5-Out5
Y1.53	2/2 Wege R5-Bp1	2/2 way R5-Bp1



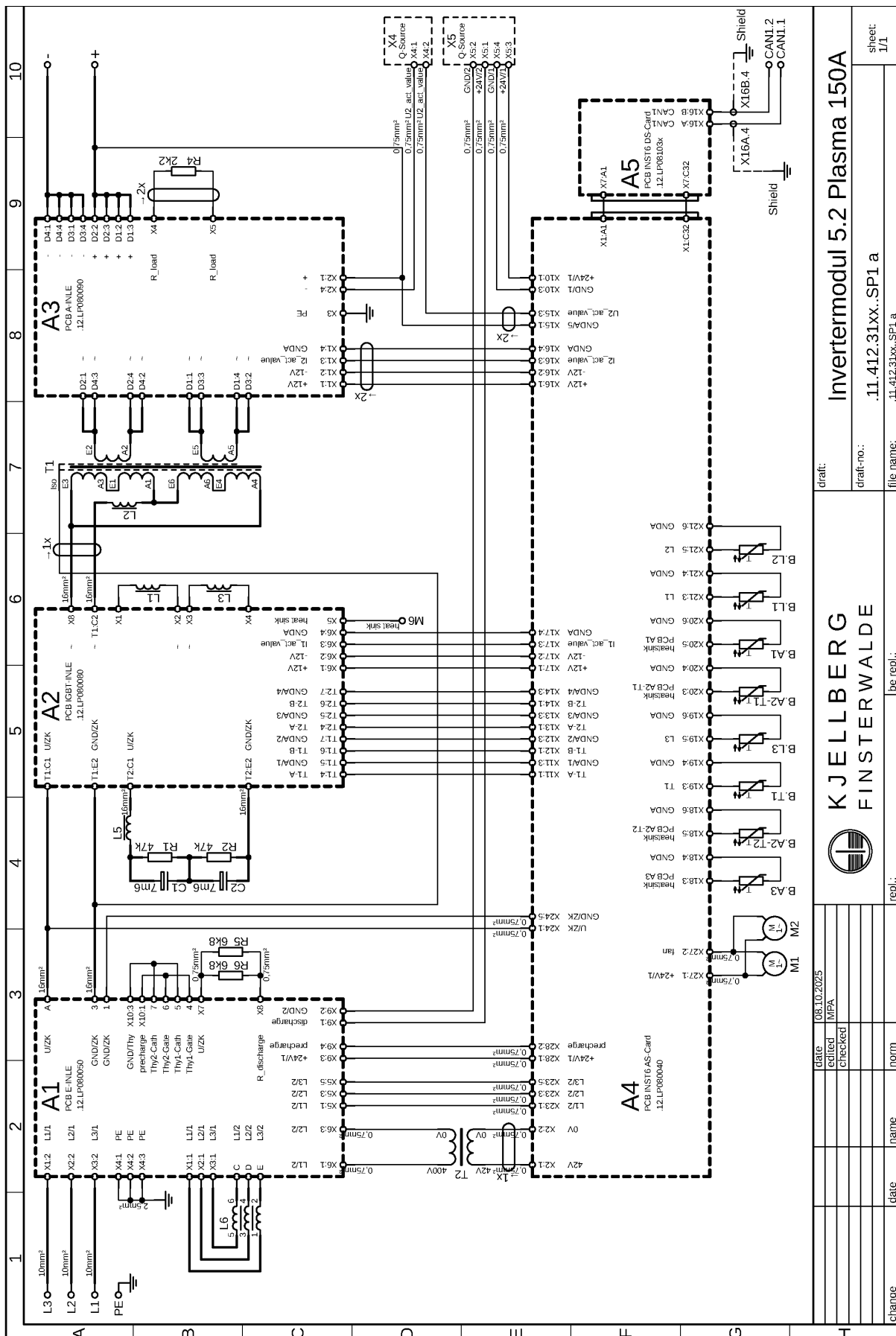
.11.820.262/3.SP1

Code	Beschreibung	description
A	Leiterplatte	printed circuit board
A1	LP Port Control	PCB port control
A2	LP Ignition Control	PCB ignition control
R	Widerstand	resistor
R2	220 Ω Ladewiderstand	220 R charging resistor
S	Schalter	switch
S1	Schalter, 1S, Türschalter	switch, 1no, door switch
X	Klemmen	terminal
X314	3-pol. Stecker, Anschluss iQ-Source Pilot	3-pol. plug, connection iQ-Source pilot
X315	7-pol. Stecker, Anschluss iQ-Source 24 VDC	7-pol. plug, connection iQ-Source 24 VDC
X321	8-pol. Buchse, Anschluss Q-Torch Ventile	8-pol. socket, connection Q-Torch valves
X341	5-pol. Stecker, Anschluss iQ-Gas CAN	5-pol. plug, connection iQ-Gas CAN
X343	8-pol. Stecker, Anschluss iQ-Source Ethernet	8-pol. plug, connection iQ-Source Ethernet
Y	Ventil	valve
Y2.31	2/2 Wege R3-Bp1	2/2 way R3-Bp1
Y2.41	2/2 Wege R4/5-WG	2/2 way R4/5-WG
Y2.42	2/2 Wege R3-WG	2/2 way R3-WG
Y2.41	2/2 Wege R2-WG	2/2 way R2-WG
Y2.91	2/2 Wege R1-ENTL	2/2 way R1-EXH



.11.858.x01.SP1

Code	Beschreibung	description
A	Leiterplatte	printed circuit board
A1	LP BDA	PCB BDA
Y	Ventil	valve
Y3.11	2/2 Wege ZG	2/2 way SG
Y3.21	2/2 Wege SG	2/2 way SG
Y3.91	2/2 Wege ENTL	2/2 way SG



date		08.10.2025	draft:		Invertermodul 5.2 Plasma 150A
edited		MPA	draft-no.:		.11.412.31xx.SP1 a
checked			file name:		.11.412.31xx.SP1 a
norm			sheet:		1/1
name			repl.:		
date			change		

.11.412.31xx..SP1

Code	Beschreibung	Description
A	Leiterplatte	printed circuit board
A1	LP E-INLE (Eingang-Inverter Leistungsteil)	PCB E-INLE (input-inverter power section)
A2	LP IGBT-INLE (IGBT-Inverter Leistungsteil)	PCB IGBT-INLE (IGBT-inverter power section)
A3	LP A-INLE (Ausgang-Inverter Leistungsteil)	PCB A-INLE (output-inverter power section)
A4	INST6-AScard (Invertersteuerung 6-Analog Signal card)	INST6-AScard (inverter control6-analogue signal card)
A5	INST6-DScard (Invertersteuerung 6-Digital Signal card)	INST6-DScard (inverter control6-digital signal card)
B	Sensor	sensor
B.A1	NTC, Kühlkörper LP A1	NTC, heatsink PCB A1
B.A2-T1	NTC, Kühlkörper LP A2-T1	NTC, heatsink PCB A2-T1
B.A2-T1	NTC, Kühlkörper LP A2-T2	NTC, heatsink PCB A2-T2
B.A3	NTC, Kühlkörper LP A3	NTC, heatsink PCB A3
B.L1	NTC, Drossel L1	NTC, choke L1
B.L2	NTC, Drossel L2	NTC, choke L2
B.L3	NTC, Drossel L3	NTC, choke L3
B.T1	NTC, Transformator T1	NTC, transformer T1
C	Kondensator	capacitor
C1	Zwischenkreiskondensator 7,6 mF	DC link capacitor 7,6 mF
C2	Zwischenkreiskondensator 7,6 mF	DC link capacitor 7,6 mF
L	Drossel	choke
L1	Hilfsdrossel LP A2-T1	auxiliary choke PCB A2-T1
L2	Hilfsdrossel Transformator T1	auxiliary choke transformer T1
L3	Hilfsdrossel LP A2-T2	auxiliary choke PCB A2-T2
L5	Hilfsdrossel Zwischenkreis	auxiliary choke DC link
L6	Entstördrossel Netzstrom	suppressor choke, main current
M	Motor	motor
M1	Lüfter LP A3	fan PCB A3
M2	Lüfter LP A2	fan PCB A2

Wiring diagrams

.11.412.31xx..SP1

Code	Beschreibung	Description
R	Widerstand	resistor
R1	47 kΩ Symmetrierwiderstand	47 kΩ symmetry resistor
R2	47 kΩ Symmetrierwiderstand	47 kΩ symmetry resistor
R4	2,2 kΩ Lastwiderstand	2,2 kΩ load resistor
R5	6,8 kΩ Entladewiderstand	6,8 kΩ discharging resistor
R6	6,8 kΩ Entladewiderstand	6,8 kΩ discharging resistor
T	Energieumwandler	power supply
T1	Transformator Sekundärkreis	transformer secondary circuit
T2	Transformator Steuerkreis	transformer control circuit
X	Klemmen	terminal
X4	2-pol. Stecker, Anschluss iQ-Source U2	2-pol. plug, connection iQ-Source U2
X5	4-pol. Stecker, Anschluss iQ-Source 24 VDC	4-pol. plug, connection iQ-Source 24 VDC

12 Spare parts lists

for the plasma cutting unit
iQ-Source
with plasma gas console:
iQ-Gas 4500 iQ-Gas 4500 O ₂
with plasma machine torch entsprechend Liefervariante
Q-Torch 4510 Q-Torch 4520
with plasma torch connection unit
iQ-Port 4500 iQ-Port 4500 O ₂

Dear customer,

With the plasma cutting system you have purchased a quality product from the Kjellberg Finsterwalde Plasma und Maschinen GmbH.

When ordering spare parts, please mention the complete article no. of the torch and also the complete designation with article no. of the spare parts according to this list.

This information is required to be able to fulfil your wishes at short notice.

We reserve ourselves for technical reasons conditioned changes in the quantity production.

Claims of whatever kind can't be derived from this spare parts list. Please direct your order straight to us or to your distributor.

For more information we are always at your disposal.

Spare parts lists

12.1 Spare parts list iQ-Source

.11.038.X12X (iQ-Series)

22.01.2026

pos	article no.	designation	code	pcs.
01.00	.16.500.368	Front wall		1
01.01	.10.504.638	Q-Profile design element		1
01.01	.10.504.638.1	iQ-illuminated dot 25mm (17mm), PC		1
01.02	.10.110.317	Pressure button	S5, S6	2
01.03	.10.110.311	LED green 24VAC/DC	H1	1
01.04	.10.110.319	Button cap, green	(S5, H1)	1
01.05	.10.110.322	LED white 24 V AC/DC	H2	1
01.06	.10.110.323	Button cap, yellow	(S6, H2)	1
01.07	.10.108.425	Lamp socket ML BA9s 250V/2W	(H1, H2)	2
01.08	.10.504.607	Holding magnet M4		2
01.09	.10.164.882	RJ 45 flush-mounted socket, with cap, CAT5		1
01.10	.12.LP080141	PCB080141 iQ-LED	A5	1
01.11	.10.504.624	Slotted nut 13.8x7.8 E-slot, M6, ESD		1
01.12	.11.038.3002..352	Level switch, with plug-in contact	S3, S4	2
01.13	.10.504.633	Slotted nut 11x4,1 F-Nut, M6, ESD		1
01.14	.10.129.107	Fixed resistor 12 OHM 5A 420W 29X300	R3.2	1
01.15	.10.129.104	Fixed resistor 6 Ohm 5A 420W 29x300	R3.1	1
01.15	.11.038.3002..240.38	interference suppression choke 20 A, 10 mH	L4	1
01.16	.10.129.923	Fixed resistor 20 Ohm 5A 420W, 29x300	R1, R2	2
01.16	.11.038.3002..240.50	Filter 3 x 470 nF +10 nF	C1, C2	1
01.17	.11.038.3002..350	Coolant tank 20L, mounted		1
01.17	.10.161.697	Auxiliary contact BFX12C20	(Q1)	1
01.18	.10.639.783	Double solenoid valve block for coolant circuit G3/8"	Y1, Y2	1
01.18	.10.161.765.24	Contactorm BF195 24V AC/DC, 3 pol.	Q1	1
01.19	.10.500.176	Angle screw-in connection 45°, G3/8" AD14		1
01.19	.11.038.3002..240.47	Ring-necked thrush 200 A, 3 x 1,5 mH	L1	1
01.20	.10.500.157	Angle screw-in connection G3/8 AD14, 2x sealing ring		1
01.21	.11.038.3102..320	Pump compl., mounted	(M16)	1
01.22	.11.038.3102..320.1	Pump complete, without engine	M16	1
01.22	.11.038.3002..320.2	Overflow valve completely, mounted	Y3 (M16)	1
01.22	.11.038.3002..320.3	Pressure switch completely, mounted	S2 (M16)	1
01.22	.10.640.200.1	Spare part motor rotary vane pump Ms 0,245kW/230V 50Hz	M16	1
01.23	.10.504.625	Slotted nut 13,8x7,8 E-Nut, M8, ESD		1

.11.038.X12X (iQ-Series)

22.01.2026

pos	article no.	designation	code	pcs.
02.00	.16.500.369	Rear wall		1
02.01	.10.164.996	Mounting frame for RJ45 coupling	X307, X308, X309	3
02.02	.10.164.994	ETH cable RJ45 - 1.20 m NBC-R4ACS/1.2-94F/F8AQ - pre-assembled	X307	1
02.03	.10.164.995	ETH cable RJ45 - 1.40 m NBC-R4ACS/1.4-94F/F8AQ - pre-assembled	X308, X309	2
02.04	.10.164.973	Communication cable, M12 - open end, 5-pin, A-coded, purple, CAN, 1.50 m		1
02.05	.10.164.972	Network cable, Industrial RJ45 - M12, Cat.6, X-coded, water blue, ETH, 1.00 m		2
02.06	.10.164.974	Communication cable, M12 - open end, 4-pin, A-coded, black, RS-485, 1.50 m		1
02.07	.12.LP080154	PCB080154 - M23 Adapter-LP	X302	1
02.08	.10.164.755	Device connector M17 socket straight 6+PE-pol.	X304	1
02.09	.10.164.809	Dust cap for M17 device connector	(X304)	1
02.10	.10.164.853	Device connector M23 plug g 5+PE-pol VW B	X310, X315, X330	3
02.11	.10.109.503	Micro switch with plunger 1004.1002 250/4	S1	1
02.12	.10.504.604	Flex fastener 9.5; 1-034SL; 0,5-5,5mm		1
02.13	.11.038.3002..455	Choke L0	L2.xx	3
02.14	.11.038.3002..005	Strain relief, mounted		1
02.15	.10.502.576	Gable clip SQ-10, 9,5 - 12 mm		1
02.16	.10.502.577	Gable clip SQ-17 LGR		5
02.17	.10.502.578	Gable clip SQ-20, 20-23 mm		2
02.18	.10.502.579	Nut SQ M6		8
02.19	.10.603.008R	Cable gland M63x1.5 27-48mm		1
02.20	.10.603.017	Nut M 63x1.5		1
02.21	.11.038.3002..450	Choke L4	L3.xx	8

Spare parts lists

.11.038.X12X (iQ-Series)

22.01.2026

pos	article no.	designation	code	pcs.
03.00	.16.500.505	Power source, left side panel		1
03.01	.10.184.763	Spring catch		2
03.02	.10.108.105	Current sensor 3 A completely assembled	K1	1
03.03	.10.500.168	Angled screw-in connection G3/8 AD12, 1x sealing ring		1
03.04	.10.500.157	Angled screw-in connection G3/8 AD14, 2x sealing ring		1
03.05	.10.148.924	Flow sensor G1/2A	P1	1
03.06	.10.504.885	Sealing EPDM 65 3mm Dm.18/10		1
03.07	.10.500.169	Straight screw connection, G1/2-I, Ø12/9		1
03.08	.10.501.005	Check valve G3/8" A		2
03.09	.10.615.065	Heat exchanger 290x598x160mm		1
03.10	.11.038.3002..344	Flattened fan 172 mm with socket connection	M12, M13, M14, M15	4
03.11	.10.256.350	Sheet metal screw 4,8x13-C-T25 DIN 7981 TORX vz		12
03.12	.11.038.3002..347	Fan plate for cooling module		1
03.13	.12.LP080014	PCB080014 - Plasma Control 3	A1	1
03.14	.10.102.036.2	3-phase switching power supply, 10ADC, 575VAC; 22,5 - 29V	T11	1
03.15	.10.102.038.2	3-phase switching power supply, 40ADC, 575VAC; 22,5 - 29V	T12	1
03.16	.11.038.3102..906	MRX 2 LAN router, configured	A4	1
03.17	.10.190.384	Autotransformer E120/53 480V/60Hz 230V/2,5A	T16	1

.11.038.X12X (iQ-Series)

22.01.2026

pos	article no.	designation	code	pcs.
04.00	.16.500.504	Power source, right side panel		1
04.01	.101.30.029	Resistance ceramic 4K7 4,00 W 5% TK 200	X61 (R6, R7)	2
04.02	.10.161.751.24	Contactactor 3-pol. NO 11BG0601D024	Q0, Q4	2
04.03	.10.161.748	Interference suppression component 11BGX78225 (diode 225VDC) for BG contactors	(Q0, Q4)	2
04.04	.10.189.305	G-Fuse T 2 A, 6.3x32 mm 500 V	F21, F22	2
04.05	.10.161.722.26	Contactactor BF25 01 24V DC, 25A 3 pol.	Q2,Q3	2
04.06	.10.161.703	Auxiliary contact G481 02 for type CF/BF	(Q2)	1
04.07	.10.189.309	G-Fuse T6.3A (Ø6.3x32mm) 500V	F11, F12, F13, F14, F15, F16	6
04.08	.10.147.821	Circuit breaker P1MB3PC63, 63A, Char. C, 3-pol.,	F1, F2, F3	3
04.09	.11.038.3002..240.50	Filter 3 x 470 nF +10 nF		0
04.10	.11.038.3002..240.38	suppressor choke 20 A, 10 mH		1
04.10	.11.038.1002..240.48	toroidal choke 200 A, 3 x 1,5 mH		1
04.11	.10.161.765.24	Contactactor F195 24V AC/DC, 3 pol.		1
04.11	.10.161.761.24DC	Contactactor BF65 00 24VDC		1
04.12	.10.161.697	Auxiliary contact BFX12C20		1
04.12	.10.161.701	Auxiliary contact 11G48120 for type CF/BF (2xS)		1
04.13	.10.164.958	3-pole terminal protection BFX835 for contactors BF160 - BF230		2
04.14	671.100.025	Capacitor 25 uF 400 V M8		1
04.15	.11.038.3102..240.47	toroidal choke 200 A, 3x1,5 mH	C4	1
04.16	.11.038.3102..240.68	resistor 47 Ohm, 100 W	R5	1
04.17	.11.038.3002..240.49	Filter 3 x 470 nF +10 nF, resistor 100 kOhm, 4 W	C1, C2	1
04.18	.10.164.138	Protective terminal 4mm ² WK 4 SL/U		2
04.19	.10.164.079	Terminal strip 70qmm WKN 70/U SELOS		3
04.20	.10.164.078	Protective terminal 70mm ² WKN 70 SL/U		1
04.21	.10.164.115.1	Protective terminal 35mm ² WKN 35 SL		1
04.22	.10.580.580	Castor L-ALEV 125K		2
04.23	.10.580.579	Wheel B-ALEV 125K 200kg		2
04.24	.11.038.3002..655	Fan plate for centre partition, fitted	M1-M9	3
04.25	.11.038.3002..658	172 mm modular fan with plug connection	M1-M9	9
04.02	.10.161.751.24	Contactactor 3-polig normally open contact 11BG0601D024	Q0, Q4	2
04.03	.10.161.748	Interference suppression component 11BGX78225 (diode 225VDC) for BG contactors	(Q0, Q4)	2
04.04	.10.189.305	G-Fuse T2A (Ø6.3x32mm) 500V	F21, F22	2
04.05	.10.161.722.26	Contactactor BF2501D024, 24V DC, 25A 3 pol.	Q2,Q3	2

Spare parts lists

.11.038.X12X (iQ-Serie)

22.01.2026

pos	article no.	designation	code	pcs.
05.00	.16.500.506	Power module		1
05.00	.11.412.3121	Invertermodul 5.2 Plasma 150 A 380-400V/50-60Hz	T1, T2, T3	1
05.00	.11.412.3122	Invertermodul 5.2 Plasma 150 A 415-440V/50-60Hz	T1, T2, T3, alternative	1
05.00	.11.412.3123	Invertermodul 5.2 Plasma 150 A 460-480V/50-60Hz	T1, T2, T3, alternative	1
05.01	.12.LP081031	PCB081031 INST6 DS-Card 2 380-400V	TX/A5	1
05.01	.12.LP081032	PCB081032 INST6 DS-Card 2 415-440V	TX/A5, alternative	1
05.01	.12.LP081033	PCB081033 INST6 DS-Card 2 460-480V	TX/A5, alternative	1
05.02	.12.LP080040	PCB080040 INST6 AS-Card	TX/A4	1
05.03	.12.LP080050	PCB080050 E-INLE	TX/A1	1
05.04	.12.LP080080	PCB080080 IGBT-INLE	TX/A2	1
05.05	.12.LP080090	PCB080090 A-INLE	TX/A3	1
05.06	.10.190.021	Mains transformer 400V/42V 0,8A, 50/60 Hz	TX/T2	1
05.06	.10.190.385	Mains transformer 0-440V-480V/42V 0,8A, 50/60 Hz	TX/T2, alternative	1
05.07	.10.190.036	toroidal choke RK80 3x3mH/60A/10qmm	TX/L6	1
05.08	.101.40.149	High-performance resistor 6K8 50,00 W 5% TK 50		2
05.09	.101.40.148	High-performance resistor 2K2 50,00 W 5% TK 50		1
05.10	.11.412.3002..011	NTC with plug connector		4
05.11	.11.412.3002..100	Transformer module Plasma 150A 380-400V/50-60Hz	TX/T1	1
05.11	.11.412.3022..100	Transformer module Plasma 150A 415-440V/50-60Hz	TX/T1, alternative	1
05.11	.11.412.3023..100	Transformer module Plasma 150A 460-480V/50-60Hz	TX/T1, alternative	1
05.12	.11.412.3002..460	Choke L5	TX/L5	1
05.13	.11.412.3002..470	Choke L1 module	TX/L1	1
05.14	.11.412.3002..480	Choke L2	TX/L2	1
05.15	.11.412.3002..490	Choke L3 module	TX/L3	1
05.16	.11.412.3002..510	Secondary rectifier, mounted		1
05.17	.11.412.3002..520	IGBT-assembly 2 centre		1
05.18	.11.412.3002..530	IGBT-assembly 1 outside		1
05.19	.11.412.3002..540	Primary rectifier mounted		1
05.20	.11.412.3002..720	Fan mounted	TX/M1	1
05.21	.11.412.3002..725	Fan mounted	TX/M2	1
05.22	671.100.028	Capacitor 7600 µF 400 V 77x131,M12X16	TX/C1, TX/C2	2
05.23	671.100.028.1	Resistor 47k 11W 5% axial 10x50mm	TX/R1, TX/R2	2

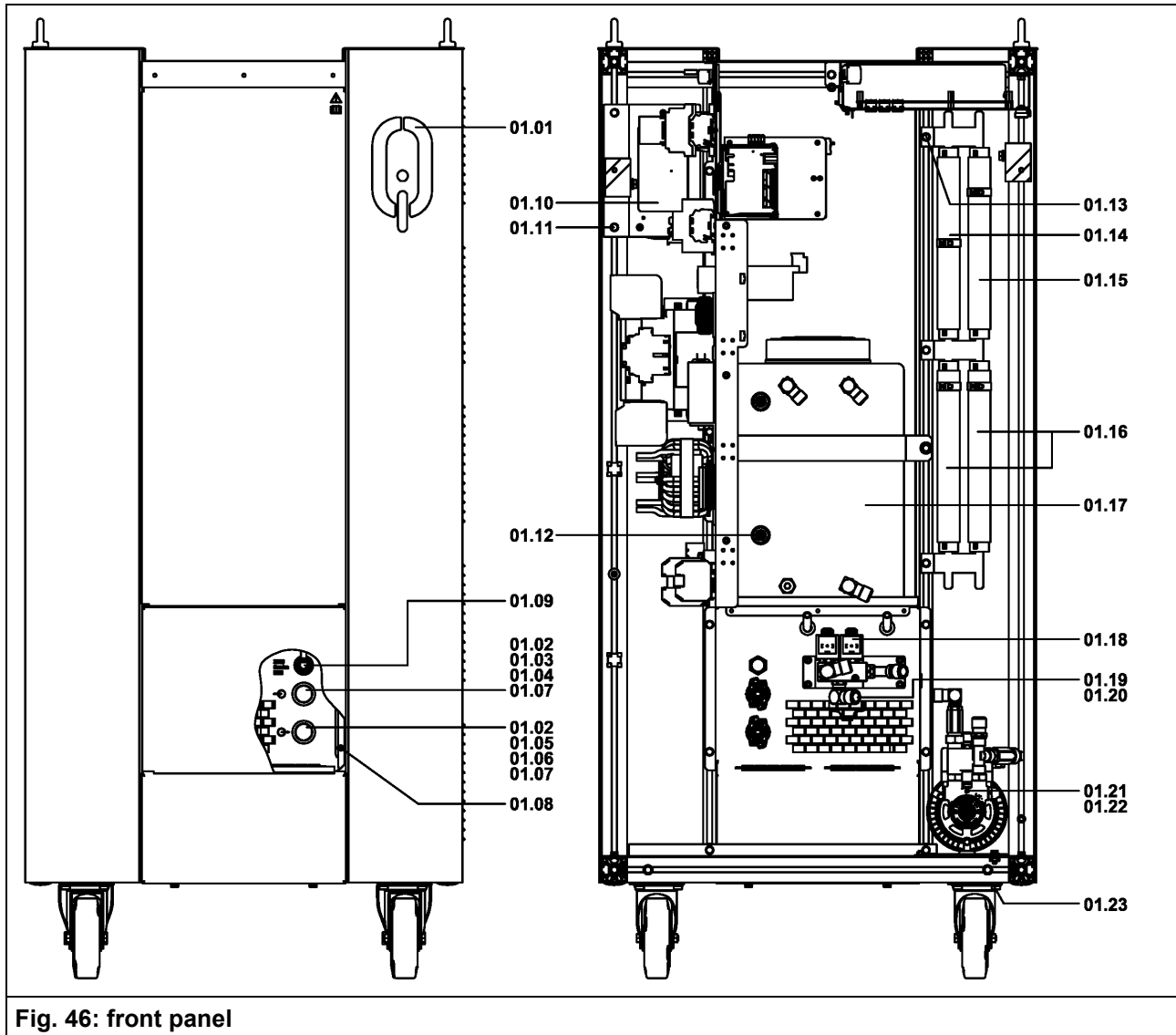
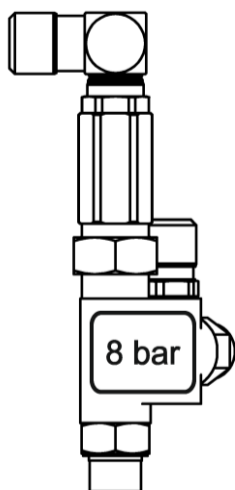


Fig. 46: front panel

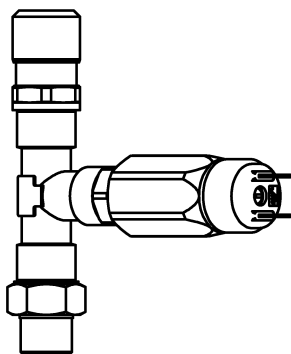
Spare parts lists



01.22

.11.038.3002..320.2

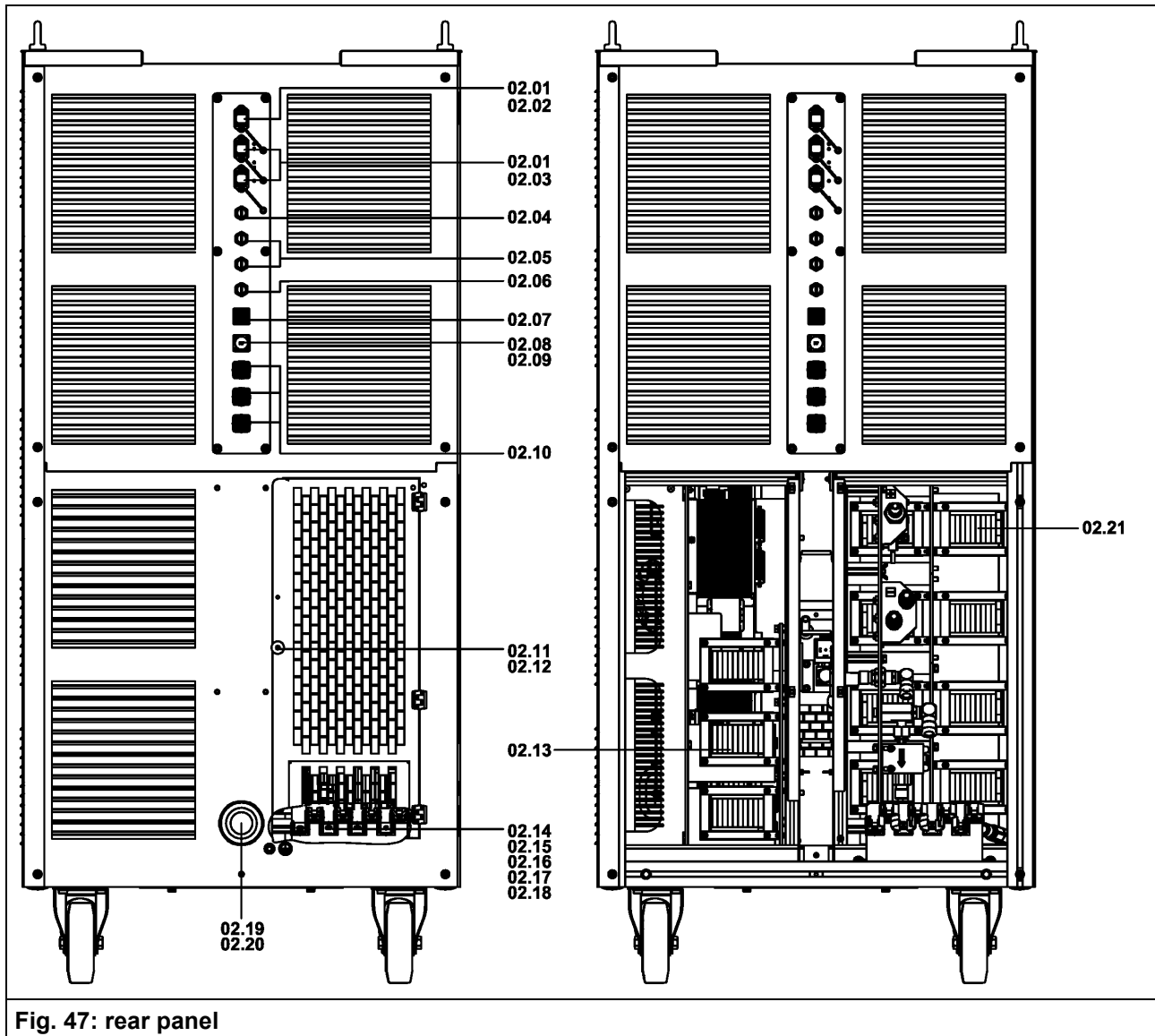
Overflow valve completely, mounted



01.22

.11.038.3002..320.3

Pressure switch completely, mounted



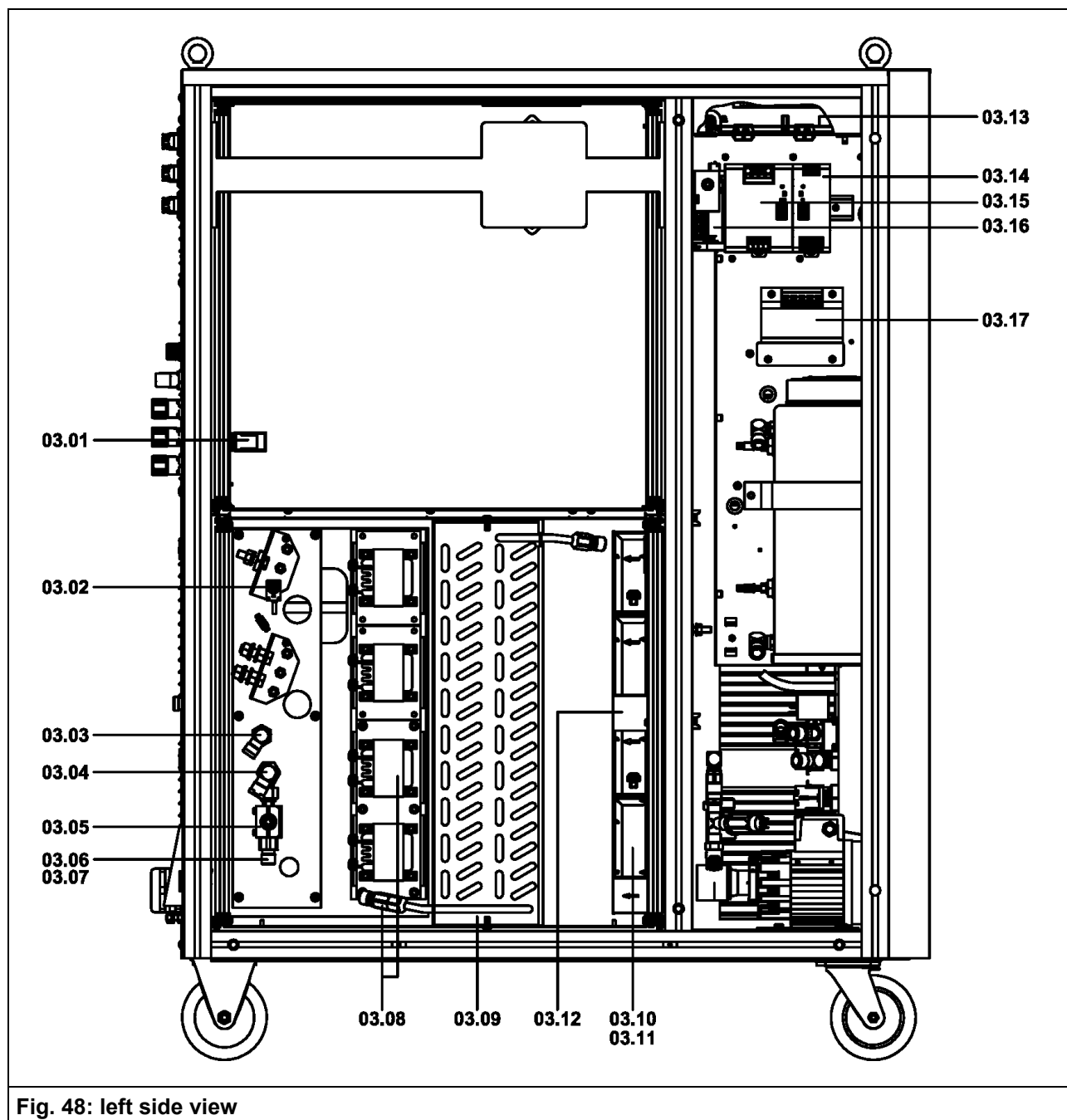
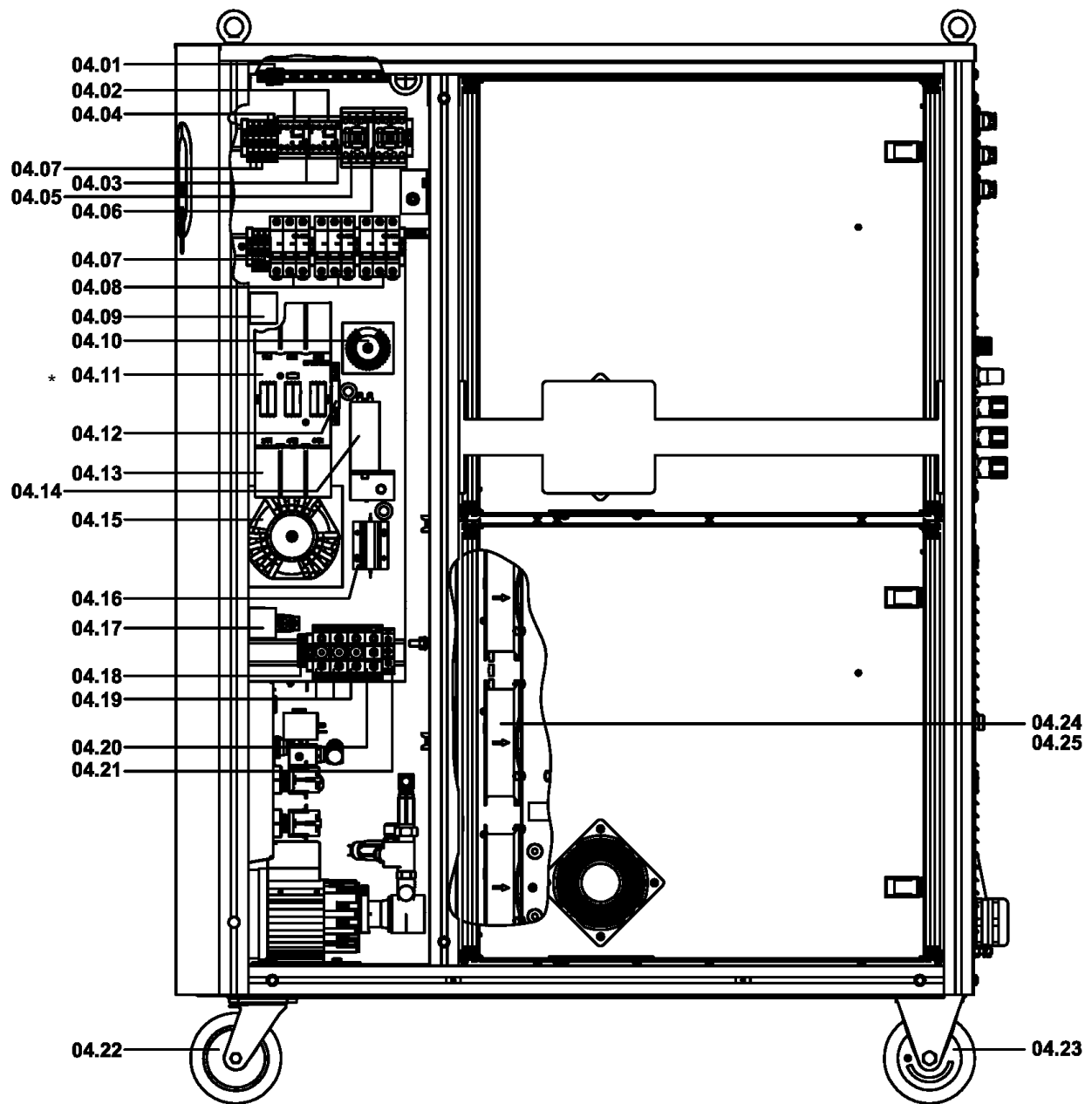


Fig. 48: left side view



* corresponding to delivery version

Fig. 49: right side view

Spare parts lists

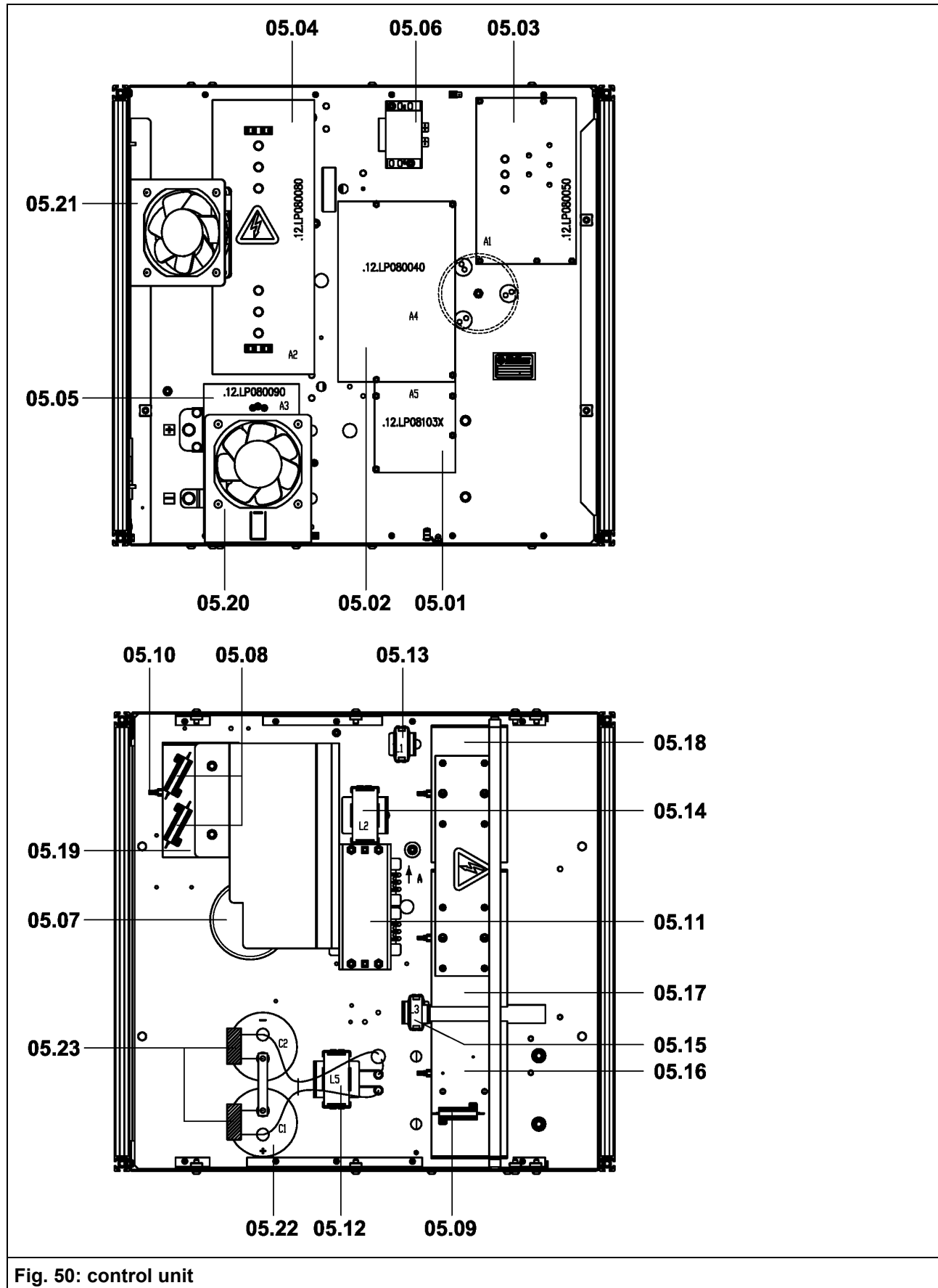


Fig. 50: control unit

12.2 Spare parts list iQ-Gas 4500

.11.825.1320

27.01.2026

pos	article no.	designation	code	pcs.
01.01	.10.105.625	LED dia. 5mm green 24 VAC metal housing	H1	1
01.02	.10.140.736	Fan grille 120 x 120 with replaceable filter		1
01.03	.10.140.736.1	Replacement filter for LFT-120-FI-45		1
01.04	.10.163.904	Acoustical filter 1/8"		1
01.05	.10.164.889	EMC nut M15X1-EMC	X340, X341, X342	3
01.06	.10.184.827	Distance bolt M6x10 , I/A galvanised		2
01.07	.10.500.129	Angle screw in connections M5 SW8 AD6		2
01.08	.10.500.132	Angle screw in connections swivelling SW13 G1/8"		7
01.09	.10.500.133	Angle screw in connections swivelling SW17 G1/4"		4
01.10	.10.500.145	Straight screw joint G1/4" SW5		4
01.11	.10.500.919	Sleeve nut G1/8"		1
01.12	.10.502.670	Straight screw joint G1/8"x 6 mm IG		1
01.13	.10.504.600	Folding handle with recessed tray, with spring loaded return.		2
01.14	.10.504.867	Rubber foot 4,5 x 20 x 12		4
01.15	.10.535.614	Fan 92x92x25mm 24VDC 2,9 W 73,1m3/h	M1	1
01.16	.10.639.758	Pilot solenoid valve 24 V DC CEME	Y1.11-1.13, Y1.21, Y1.22, Y1.31, Y1.32, Y1.41-1.44, Y1.51, Y1.53,	13
01.17	.10.639.775	Pilot solenoid valve 3/2-way 24V DC 7W	Y1.33	1
01.18	.10.639.780	Solenoid valve 3/2-way 24V DC NW 2,0mm	Y1.52	1
01.19	.11.825.1302..240.2	Connecting cable MFC iQ-Gas	Y1.40, Y1.50	1
01.20	.11.825.1302..810.1	Gas inlet iQ-Gas 4500	Y1.11-13, Y1.21+22, Y1.31-33, Y1.41- 44, Y1.51, Y1.53	1
01.21	.11.825.1302..840.1	Flow regulator WG1 for iQ-Gas 4500	Y 1.40	1
01.22	.11.825.1302..840.2	Flow regulator WG2 for iQ-Gas 4500	Y 1.50	1
01.23	.11.825.1302..850.1	Gas outlet iQ-Gas 4500	Y1.52	1

Spare parts lists

.11.825.1320

27.01.2026

pos	article no.	designation	code	pcs.
01.24	.12.29270	Filter M5 x 22		5
01.25	.12.49050	Filter M8 x 25		2
01.26	.12.117.130	Cone fitting for sleeve nut G1/8" with M5i		1
01.27	.12.LP080105	PCB080105 Gas Control 2	A1, X340, X341, X342	1
01.28	.12.LP080158	PCB080158 24 V Booster	T1	1
01.29	.12.TTR00561	TTR-label QG & iQG 4500 - Codes / Labelling		1
02.00	.10.502.935	Polyamide plastic hose ProWeld 6/4 mm blue		1
02.01	.10.502.948	Polyamide plastic hose ProWeld 6/4mm red		1
02.02	.10.502.945	Polyamide plastic hose ProWeld 6/4 mm black		1
02.03	.10.502.946	Polyamide plastic hose ProWeld 6/4mm green		1
02.04	.10.502.947	Polyamide plastic hose ProWeld 6/4 mm white		1

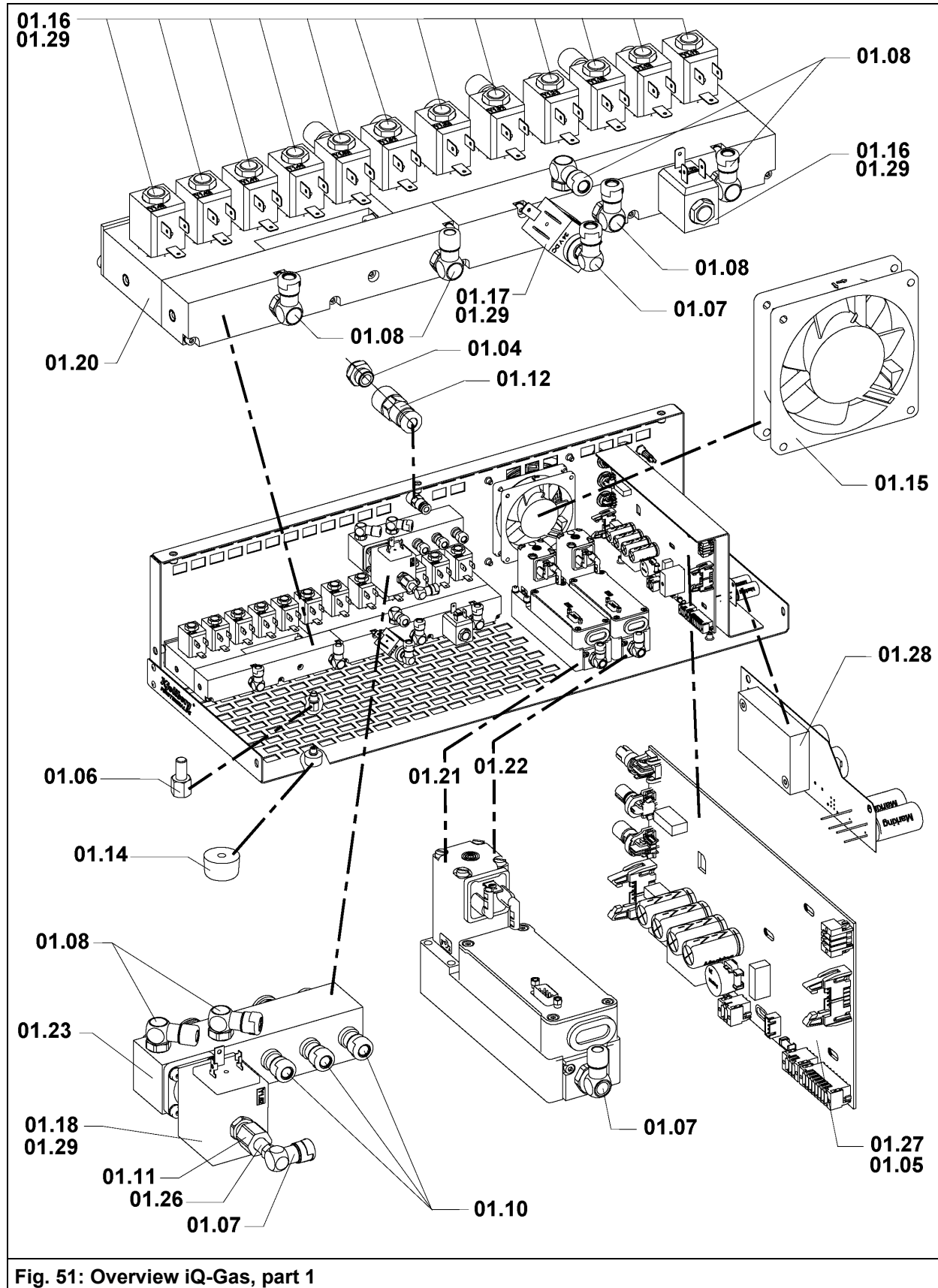


Fig. 51: Overview iQ-Gas, part 1

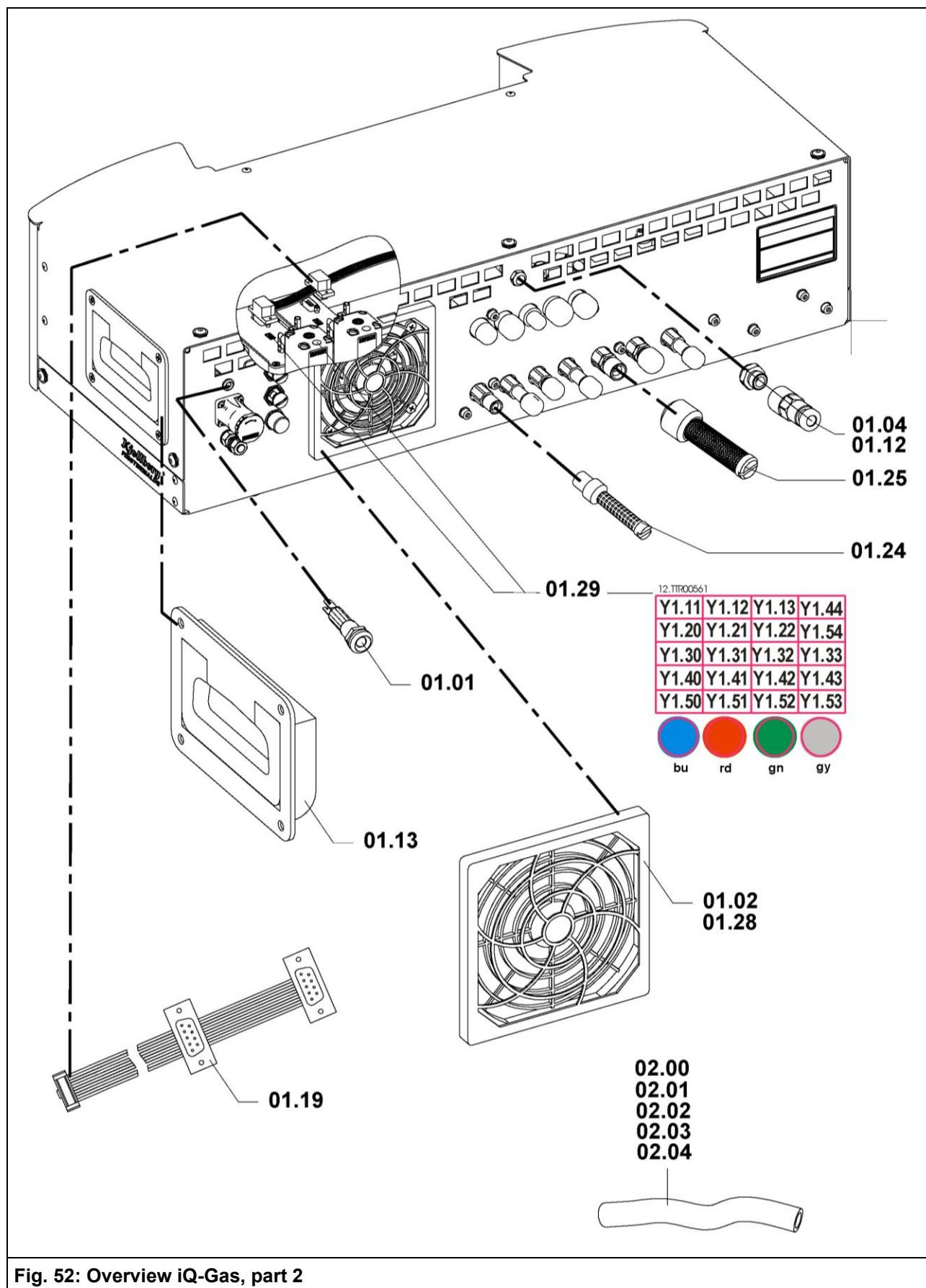


Fig. 52: Overview iQ-Gas, part 2

.11.825.1303

27.01.2026

pos	article no.	designation	code	pcs.
01.01	.10.105.625	LED dia. 5mm green 24 VAC metal housing	H1	1
01.02	.10.140.736	Fan grille 120 x 120 with replaceable filter		1
01.03	.10.140.736.1	Replacement filter for LFT-120-FI-45		1
01.04	.10.164.889	EMC nut M15X1-EMC	X340, X341, X342	3
01.05	.10.184.772	Cover cap Dm 12,7 DP-500 SW		3
01.06	.10.184.776	Cover cap Dm 17-18 DP-687 SW		2
01.07	.10.184.778	Cover cap Dm 9,5-10,5 sw		1
01.08	.10.184.785	Cover cap Dm 7,6 - 9,0mm sw		2
01.09	.10.184.827	Distance bolt M6x10 , I/A galvanised		2
01.10	.10.500.129	Angle screw in connections M5 SW8 AD6		1
01.11	.10.500.132	Angle screw in connections swivelling SW13 G1/8"		6
01.12	.10.500.133	Angle screw in connections swivelling SW17 G1/4"		4
01.13	.10.500.145	Straight screw joint G1/8, 6/4		3
01.14	.10.500.919	Sleeve nut G1/8"		1
01.15	.10.504.600	Folding handle with recessed tray, with spring loaded return		2
01.16	.10.504.867	Rubber foot 4,5 x 20 x 12		4
01.17	.10.535.614	Fan 92x92x25mm 24VDC 2,9 W 73,1m3/h	M1	1
01.18	.10.639.758	Pilot solenoid valve 24 V DC CEME	Y1.11-1.13, Y1.21, Y1.22, 1 Y1.41-1.44, Y1.51, Y1.53,	11
01.19	.10.639.780	Solenoid valve 3/2-way 24V DC NW2,0mm	Y1.52	1
01.20	.11.825.1302..240.2	Connecting cable MFC iQ-Gas	Y1.40, Y1.50	1
01.21	.11.825.1302..840.1	Flow regulator WG1 for iQ-Gas 4500	Y1.40	1
01.22	.11.825.1302..840.2	Flow regulator WG2 for iQ-Gas 4500	Y1.50	1
01.23	.11.825.1303..810.1	Gas inlet iQ-Gas O2	Y1.11-13, Y1.21+22, Y1.41-44, Y1.51, Y1.53	1
01.24	.11.825.1303..850.1	Gas outlet iQ-Gas 4500 O2	Y1.52	1

Spare parts lists

.11.825.1303

27.01.2026

pos	article no.	designation	code	pcs.
01.25	.12.29270	Filter M8 x 25		5
01.26	.12.117.130	Cone fitting for sleeve nut G1/8" with M5i		1
01.27	.12.LP080105	PCB080105 Gas Control 2	A1, X340, X341, X342	1
01.28	.12.LP080158	PCB080158 24V Booster	T1	1
01.29	.12.TTR00602	TTR-label QG & iQG 4500 - Codes / Labelling		1
02.00	.10.502.935	Polyamide plastic hose ProWeld 6/4 mm blue		1
02.01	.10.502.948	Polyamide plastic hose ProWeld 6/4mm red		1
02.02	.10.502.945	Polyamide plastic hose ProWeld 6/4 mm black		1
02.03	.10.502.946	Polyamide plastic hose ProWeld 6/4mm green		1
02.04	.10.502.947	Polyamide plastic hose ProWeld 6/4 mm white		1

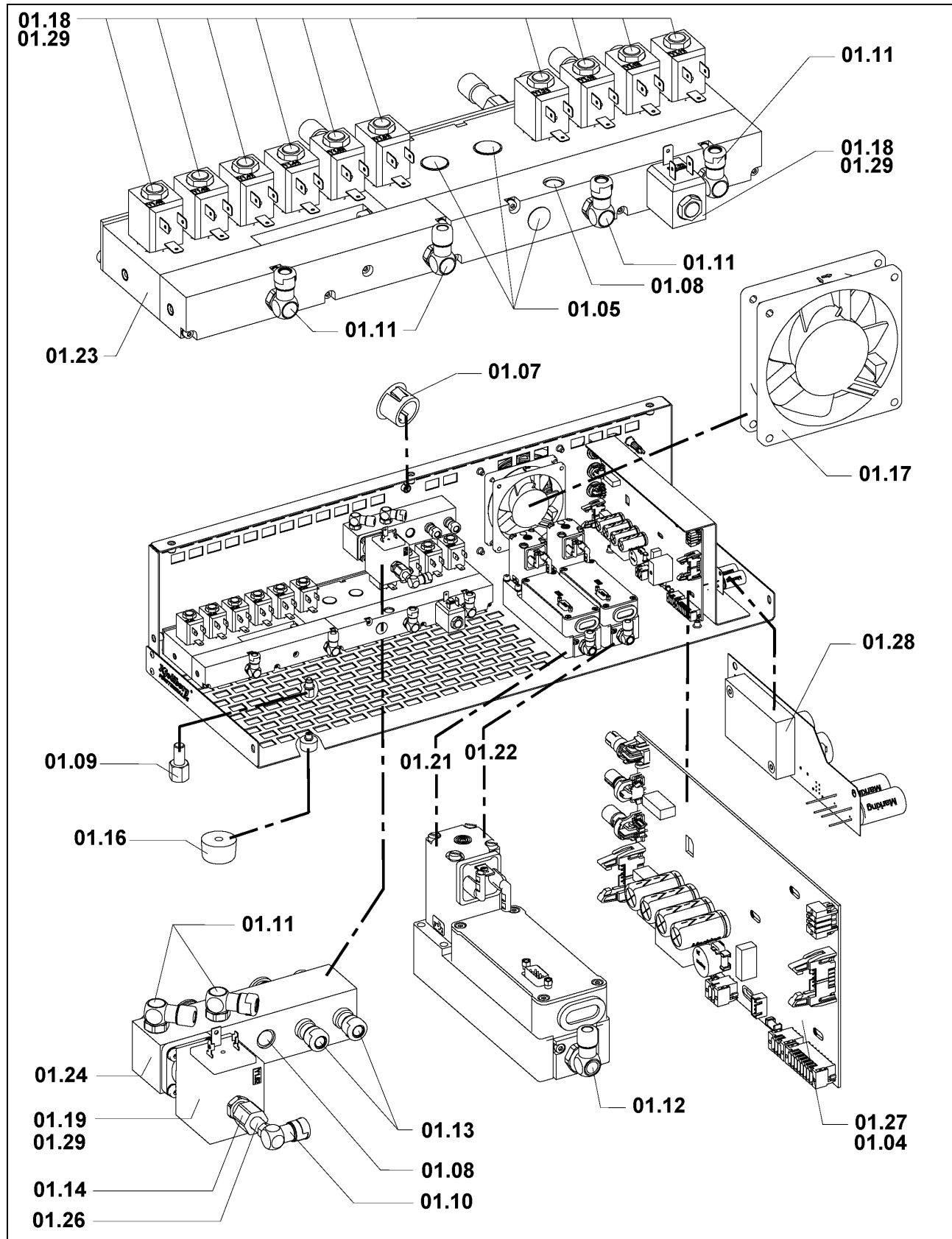
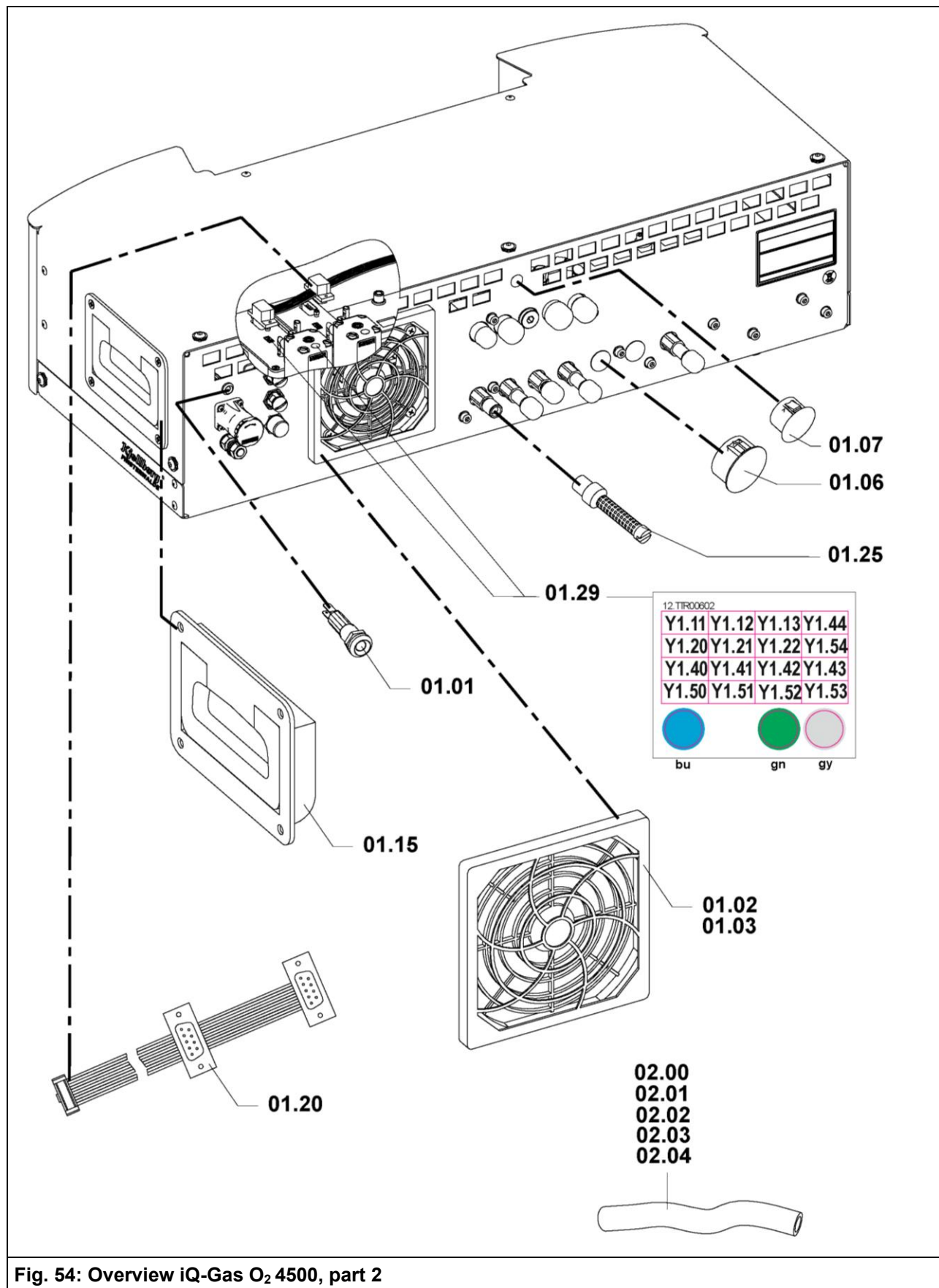


Fig. 53: Overview iQ-Gas O₂ 4500, part 1

Fig. 54: Overview iQ-Gas O₂ 4500, part 2

12.3 Spare parts list Q-Torch 4510

.11.858.401.E0

28.08.2023

pos	article no.	designation	code	pcs.
00.01	.11.858.401.9010	Shaft - QT 4510 - 450A/C/1,0m		1
00.01	.11.858.401.9013	Shaft - QT 4510 - 450A/C/1,25m		1
00.01	.11.858.401.9015	Shaft - QT 4510 - 450A/C/1,5m		1
00.01	.11.858.401.9020	Shaft - QT 4510 - 450A/C/2,0m		1
00.01	.11.858.401.9025	Shaft - QT 4510 - 450A/C/2,5m		1
00.01	.11.858.401.9030	Shaft - QT 4510 - 450A/C/3,0m		1
00.31	.11.858.401.970	Bolt carrier- QT 4510		1
00.32	.11.848.401.972	Stop screw - PerCut 450M		1
00.33	.10.505.958	O-ring 42x2 VMQ ISO 1629 70 shore		1
00.35	.10.505.944	O-ring 35x1,5 VMQ ISO 1692 70 shore		1
00.36	.11.848.401.971	Threaded pin M6x8 - PerCut 450M		3
00.37	.10.257.543	Threaded pin M4x4 DIN913		4
00.41	.10.505.869	O-ring 10 X 1 VMQ ISO 1629 70 shore		1
00.42	.11.852.401.956	WV socket PerCut 451		1
00.43	.11.852.401.955	Current socket B10 - PerCut 451		1
00.44	.10.505.873	O-ring 12x1 VMQ ISO 1629 70 shore		1
00.45	.10.505.981	O-ring 5,0x1,5 VMQ 70 shore red		1
00.46	.11.852.401.9554	Valve tappet for socket - PerCut 451		1
00.47	.10.221.504	Compression spring d=0,5; De=5,5; Lo=14,0		1
00.48	.11.852.401.9553	Guide valve tappet - current socket		1
01.01	.11.858.401.100	Change head - QT 4510		1
01.08	.10.505.923	O-ring 28x2,0 VMQ ISO 1629 70 shore		1
01.09	.10.505.958	O-ring 42x2 VMQ ISO 1629 70 shore		1
01.12	.10.505.826	O-ring 6x1,5 VMQ ISO 1629 70 shore		1
01.13	.11.852.401.182	Current plug S10 - PerCut 451		1
01.14	.11.852.401.182	Current plug S10 - PerCut 451		1
01.15	.10.505.034	O-ring 9x1,5 VMQ ISO 1629 70 shore		1
01.16	.10.505.831	O-ring 7x1,5 VMQ ISO 1629 70 shore red		1
01.17	.10.505.826	O-ring 6x1,5 VMQ ISO 1629 70 shore		1
01.18	.10.505.913	O-ring 8x1 VMQ ISO 1629 70 shore, red		1
01.19	.11.852.401.174	PI- insulating socket - PerCut 451		1
01.20	.11.848.401.178	Pilot plug - PerCut 450M		1

Spare parts lists

.11.858.401.E0

28.08.2023

pos	article no.	designation	code	pcs.
01.21	.11.855.401.1781	ele. initial pos.-plug - PerCut 4000		1
01.22	.10.505.818	O-ring 4,5x1,5 VMQ ISO1629 70Shore red		1
01.23	.10.505.981	O-ring 5,0x1,5 VMQ 70 shore red		1
01.24	.11.852.401.181	Nipple PG/WG - PerCut 451		1
01.28	.11.858.401.079	Locking sleeve - QT 4510		1
01.29	.11.858.401.078	Locking ring - PerCut 4510		1
01.30	.11.848.401.080	Sealing ring - PerCut 450M		1
01.31	.11.858.401.071	Locking screw - QT 4510		3
01.40	.10.505.869	O-ring 10 X 1 VMQ ISO 1629 70 shore		1
60.00	.16.500.006	Torch tools		1
60.01	.12.38180	Socket wrench f. cooling tube		1
60.02	.11.848.401.810	Torch-Multitool		1
60.03	.11.848.401.815	Gas guide puller PerCut 440-450		1
60.10	.10.615.909	Torque screwdriver		1
60.11	.10.615.909.1	Connecting shaft E 6,3 / 1/4"		1
60.13	.10.615.909.6	Hexagon application, long 1/4" SW 8		1
60.14	.10.615.909.4	Hexagon application, long, 1/4" SW 6		1
60.20	.11.852.401.860	Socket wrench f. current- / WV-plug		1
60.30	.11.852.401.865	Socket wrench f. current- /WV-socket		1
70.00	.16.500.129	Accessories:		1
70.01	.10.616.104	Lubricant for O2 LC 40 Fluid 25 ml		1
70.10	.11.858.401.830	Parking station for change head - QT 4510		1

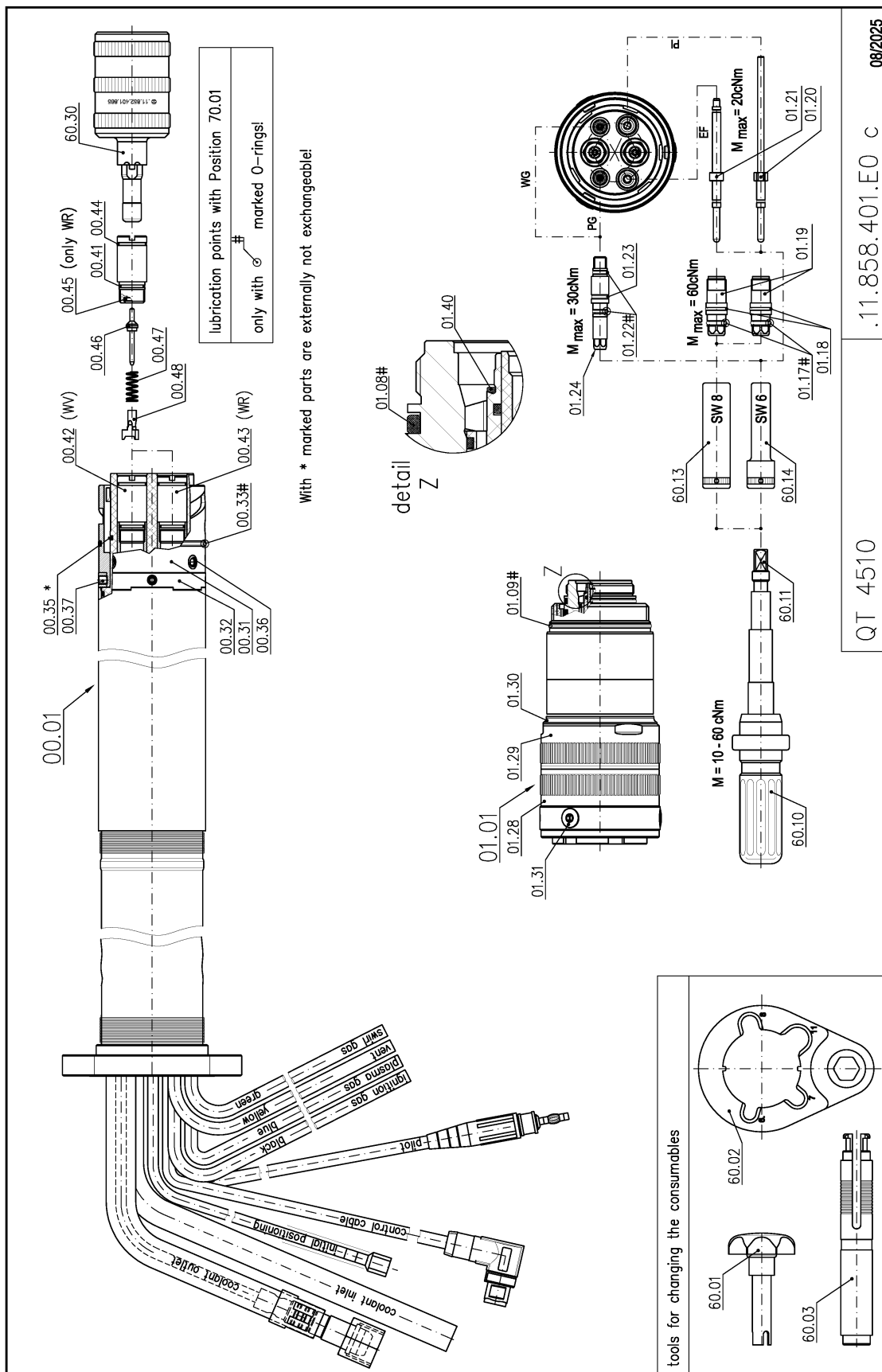


Fig. 55: Overview Q-Torch 4510

Spare parts lists

12.4 Spare parts list Q-Torch 4520

.11.858.801.E0

04.08.2025

pos	article no.	designation	code	pcs.
00.01	.11.858.401.9010	Shaft - QT 4510 - 450A/C/1,0m		1
00.01	.11.858.401.9013	Shaft - QT 4510 - 450A/C/1,25m		1
00.01	.11.858.401.9015	Shaft - QT 4510 - 450A/C/1,5m		1
00.01	.11.858.401.9020	Shaft - QT 4510 - 450A/C/2,0m		1
00.01	.11.858.401.9025	Shaft - QT 4510 - 450A/C/2,5m		1
00.01	.11.858.401.9030	Shaft - QT 4510 - 450A/C/3,0m		1
00.01	.11.858.401.9035	Shaft - QT 4510 - 450A/C/3,5m		1
00.01	.11.858.401.9040	Shaft - QT 4510 - 450A/C/4,0m		1
00.01	.11.858.401.9045	Shaft - QT 4510 - 450A/C/4,5m		1
00.01	.11.858.401.9050	Shaft - QT 4510 - 450A/C/5,0m		1
00.31	.11.858.801.970	QT-Changer		1
00.32	.11.848.401.972	Stop screw - PerCut 450M		1
00.33	.10.502.601	One-way flow control valve GRLA-M5-QS-6-D		2
00.35	.10.505.944	O-ring 35x1,5 VMQ ISO 1692 70 shore		1
00.36	.11.848.401.971	Threaded pin M6x8 - PerCut 450M		3
00.37	.10.257.543	Threaded pin M4x4 DIN913		4
00.41	.10.505.869	O-ring 10 X 1 VMQ ISO 1629 70 shore		1
00.42	.11.852.401.956	WV socket PerCut 451		1
00.43	.11.852.401.955	Current socket B10 - PerCut 451		1
00.44	.10.505.873	O-ring 12x1 VMQ ISO 1629 70 shore		1
00.45	.10.505.981	O-ring 5,0x1,5 VMQ 70 shore red		1
00.46	.11.852.401.9554	Valve tappet for socket - PerCut 451		1
00.47	.10.221.504	Compression spring d=0,5; De=5,5; Lo=14,0		1
00.48	.11.852.401.9553	Guide valve tappet - current socket		1
01.01	.11.858.401.100	Change head - QT 4510		1
01.08	.10.505.923	O-ring 28x2,0 VMQ ISO 1629 70 shore		1
01.09	.10.505.958	O-ring 42x2 VMQ ISO 1629 70 shore		1
01.17	.10.505.826	O-ring 6x1,5 VMQ ISO 1629 70 shore		1
01.18	.10.505.913	O-ring 8x1 VMQ ISO 1629 70 shore, red		1
01.19	.11.852.401.174	PI- insulating socket - PerCut 451		1
01.20	.11.848.401.178	Pilot plug - PerCut 450M		1

.11.858.401.E0

04.08.2025

pos	article no.	designation	code	pcs.
01.21	.11.855.401.1781	ele. initial pos.-plug - PerCut 4000		1
01.22	.10.505.818	O-ring 4,5x1,5 VMQ ISO1629 70Shore red		1
01.23	.10.505.981	O-ring 5,0x1,5 VMQ 70 shore red		1
01.24	.11.852.401.181	Nipple PG/WG - PerCut 451		1
01.28	.11.858.801.072	Protection - QT 4520		1
01.29	.10.505.972	O-ring 60x3 VMQ ISO1629 70Shore rot		1
01.30	.11.858.801.084	Alignment ring - QT 4520		1
01.31	.10.257.543	Set screw M4x4 DIN 913 I-6KT CrNi A1		3
01.40	.10.505.869	O-ring 10 X 1 VMQ ISO 1629 70 shore		1
60.00	.16.500.006	Torch tools		1
60.01	.12.38180	Socket wrench f. cooling tube		1
60.02	.11.848.401.810	Torch multi tool		1
60.03	.11.848.401.815	Gas guide puller - PerCut 4xx / QT 45xx / K-Torch		1
60.10	.10.615.909	Torque screwdriver		1
60.11	.10.615.909.1	Connecting shaft E 6,3 / 1/4"		1
60.13	.10.615.909.6	Hexagon application, long 1/4" SW 8		1
60.14	.10.615.909.4	Hexagon application, long, 1/4" SW 6		1
60.20	.11.852.401.860	Socket wrench f. current- / WV-plug		1
70.00	.16.500.129	Accessories:		1
70.01	.10.616.104	Lubricant for O2 LC 40 Fluid 25 ml		1
70.10	.11.858.401.830	Parking station for change head - QT 4510		1



12.5 Spare parts list iQ-Port 4500

.11.820.262

26.03.2026

pos	article no.	designation	code	pcs.
01.01	.10.164.889	EMC nut M15X1-EMC		3
01.02	.10.164.890	Housing screw connection M-M12/M15	X341	1
01.03	.10.164.891	Housing screw connection F-M12/M15	X343, Res.	2
01.04	.10.500.254	bulkhead connection Ø 4,3		2
01.05	.10.164.856	Device connector M23 plug g 5+PE-pol. VW S	X315	1
01.06	.10.164.786	Device connector M17 straight plug 3+PE-pol.	X314	1
02.01	.10.296.518	Spacer bolt M4x25, I/I, SW7 M4 thread throughout, galvanised		3
02.02	.10.502.602	plug connection Ø 8 mm - G1/4" - KQB2S08-G02	X2.10	1
02.03	.10.502.604	plug connection Ø 10 mm - G1/4" - KQB2S10-G02	X2.20	1
02.04	.10.502.606	plug connection Ø 6 mm - G1/4" - KQB2S06-G02	X2.30	1
02.05	.11.820.262.805	spacer bolt M3/M4 - M6		3
02.06	.11.820.262.910	volume flow controller X2.10 iQ-Port 4500	X2.10	1
02.07	.11.820.262.911	volume flow controller X2.20 iQ-Port 4500	X2.20	1
02.08	.11.820.262.912	volume flow controller X2.30 iQ-Port 4500	X2.30	1
02.09	.12.LP080115	PCB080115 Port Control 2	A1	1
02.10	.11.820.262.240.09	control cable X2.10/X2.20/X2.30 iQ-Port 4500		1
02.11	.10.500.250	spacer bolt M4x10 I/A PA6.6, black, SW 8		4
02.12	.10.500.251	spacer bolt M4x10 I/A brass, SW 7		1

Spare parts lists

.11.820.262

26.03.2026

pos	article no.	designation	code	pcs.
03.01	.10.500.129	Angle screw-in fitting M5 SW8 AD6		1
03.02	.10.502.618	plug connection Ø3/8" G1/4 NPT KQB2S11-N02S		1
03.03	.10.502.619	plug connection Ø1/2" G1/4 NPT KQB2S13-N02S		1
03.04	.10.505.820	O-ring 4x1 VMQ ISO1629 70Shore red	Y2.31, Y2.41, Y2.42, Y2.51,Y2.91	5
03.05	.10.639.758	Pilot solenoid valve 24 V DC CEME	Y2.31, Y2.41, Y2.42, Y2.51,Y2.91	5
03.06	.11.820.262.240.03	resistance R2 iQ-Port 4500	R2	1
03.07	.11.820.262.815	Connecting tube solenoid valve assembly iQ-Port 4500		3
03.08	.12.190.001.15	Valve seat Ø1,5, turned	Y2.31, Y2.42	2
03.09	.12.190.001.18	Valve seat Ø1,8, turned	Y2.41, Y2.51, Y2.91	3
03.10	.12.259.800	angle plug Ø6 blue		1
03.11	.12.259.801	Angle screw-in connection, long version M5 Ø6 red		1
03.12	.12.259.802	Angle screw-in connection M8x1 Ø6 green		1
03.13	.12.259.803	Angle screw-in connection M5 Ø6 yellow		1
03.14	.12.259.804	Angle screw-in connection M8x1 Ø6 black		1
03.15	.10.502.935	Polyamide plastic hose ProWeld 6/4 mm blue		0,35
03.16	.10.502.945	Polyamide plastic hose ProWeld 6,0x4-black		0,35
03.17	.10.502.946	Polyamide plastic hose ProWeld 6,0x4-green		0,4
03.18	.10.502.948	Polyamide plastic hose ProWeld 6,0x4-red		0,4
03.19	.10.502.950	Polyamide plastic hose ProWeld 6,0x4-yellow		1

.11.820.262

26.03.2026

pos	article no.	designation	code	pcs.
04.01	.10.140.736	Fan grille 120 x 120 with replaceable filter		1
04.02	.10.140.736.1	Replacement filter for LFT-120-FI-45		1
04.03	.11.820.260.240.9	Single cable X321 Q-Port 4500	X321	1
04.04	.11.820.262.240.08	Fan iQ-Port 4500	M1	1
04.05	.11.820.262.550	Ignition PCB, mounted	A2	1
04.06	.12.259.904	Micro switch KSA4F with sleeve	S1	1
04.07	.12.LP080158	PCB080158 - 24V Booster	A3	1
05.01	.10.500.152	Straight screw fitting G3/8 SW20, AD10		1
05.02	.11.820.262.705	Torch connection iQ-Port 4500, mounted		1
05.03	.12.259.805	Straight screw fitting G3/8" Ø12 blue		1
05.04	.12.259.806	Straight screw fitting G3/8" Ø14 red		1
05.05	.12.259.807	bulkhead connection Ø6 black		1
05.06	.12.259.808	bulkhead connection Ø6 yellow		1
05.07	.12.259.809	bulkhead connection Ø6 green		1
05.08	.12.259.810	bulkhead connection Ø6 blue		1
05.09	.12.259.811	Y-piece Ø6 red/blue		1

Spare parts lists

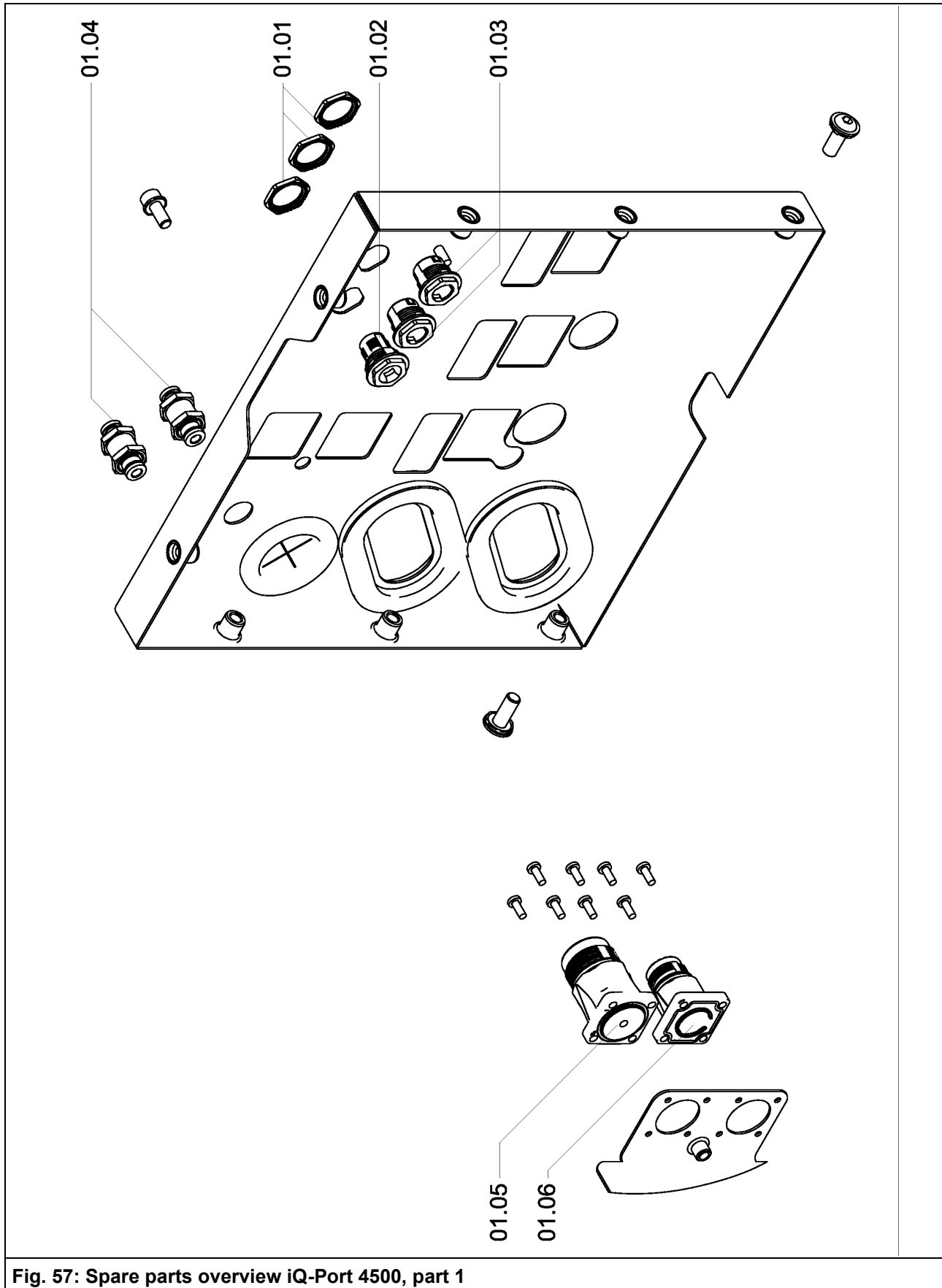


Fig. 57: Spare parts overview iQ-Port 4500, part 1

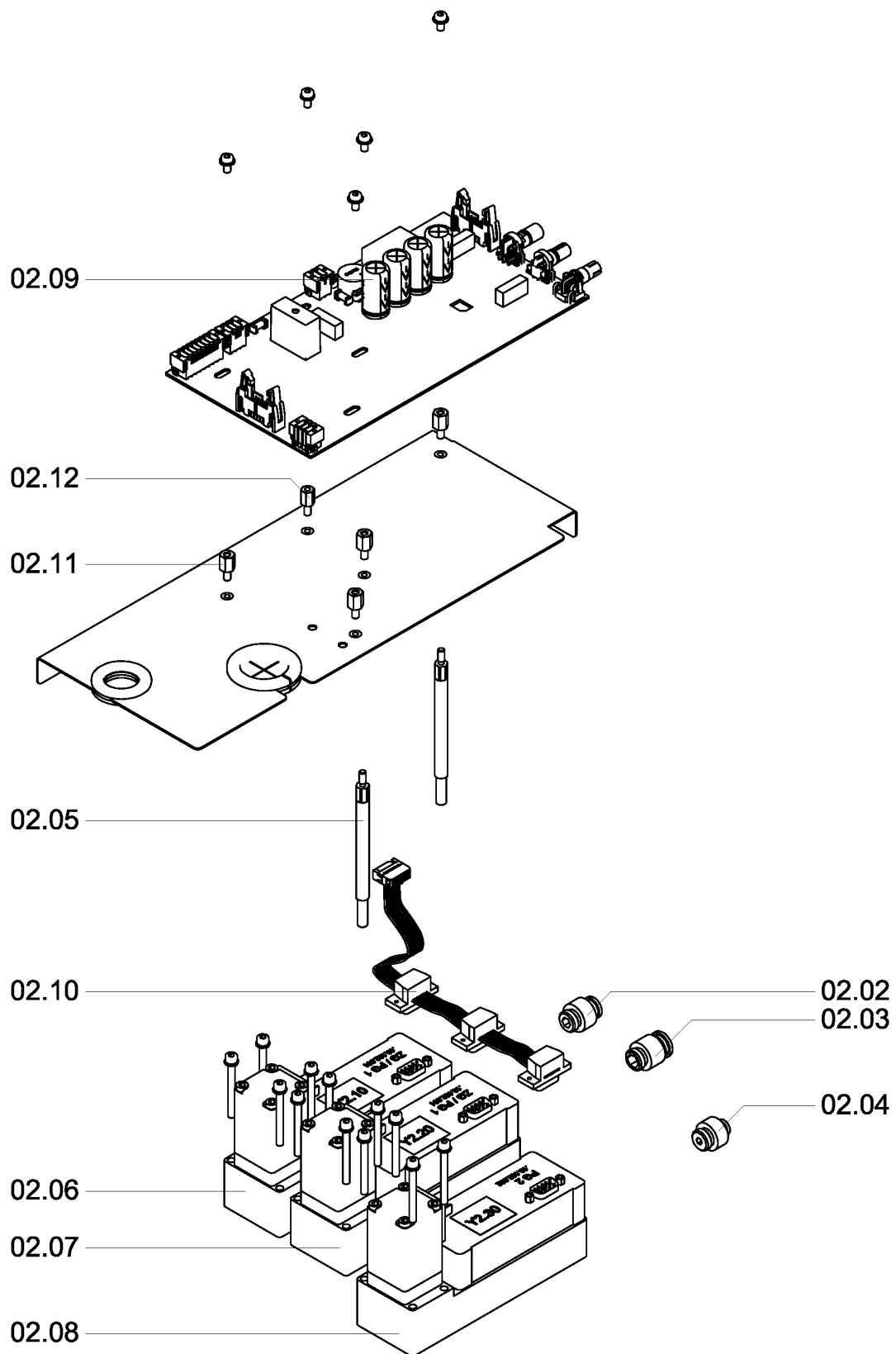


Fig. 58: Spare parts overview iQ-Port 4500, part 2

Spare parts lists

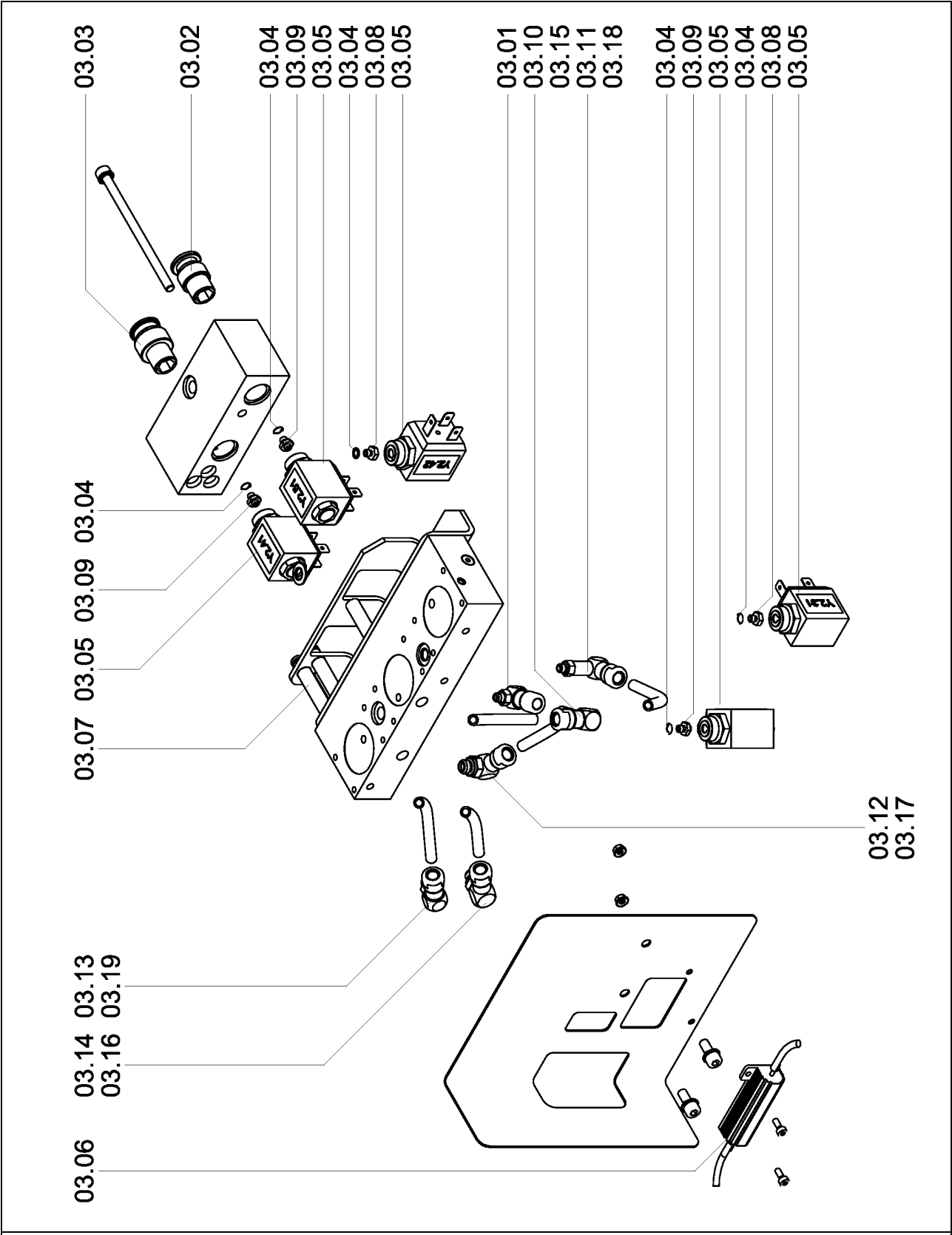
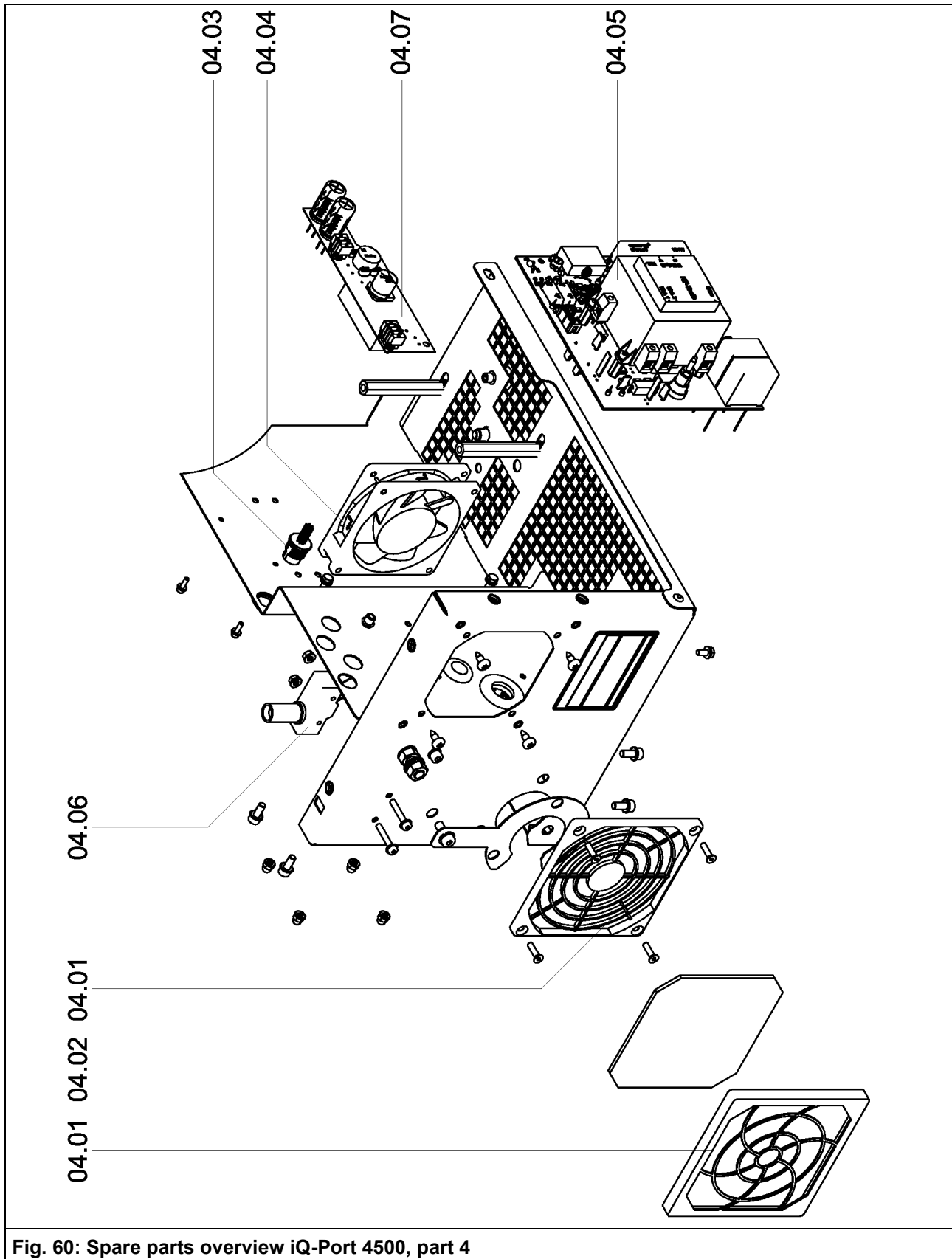


Fig. 59: Spare parts overview iQ-Port 4500, part 3



Spare parts lists

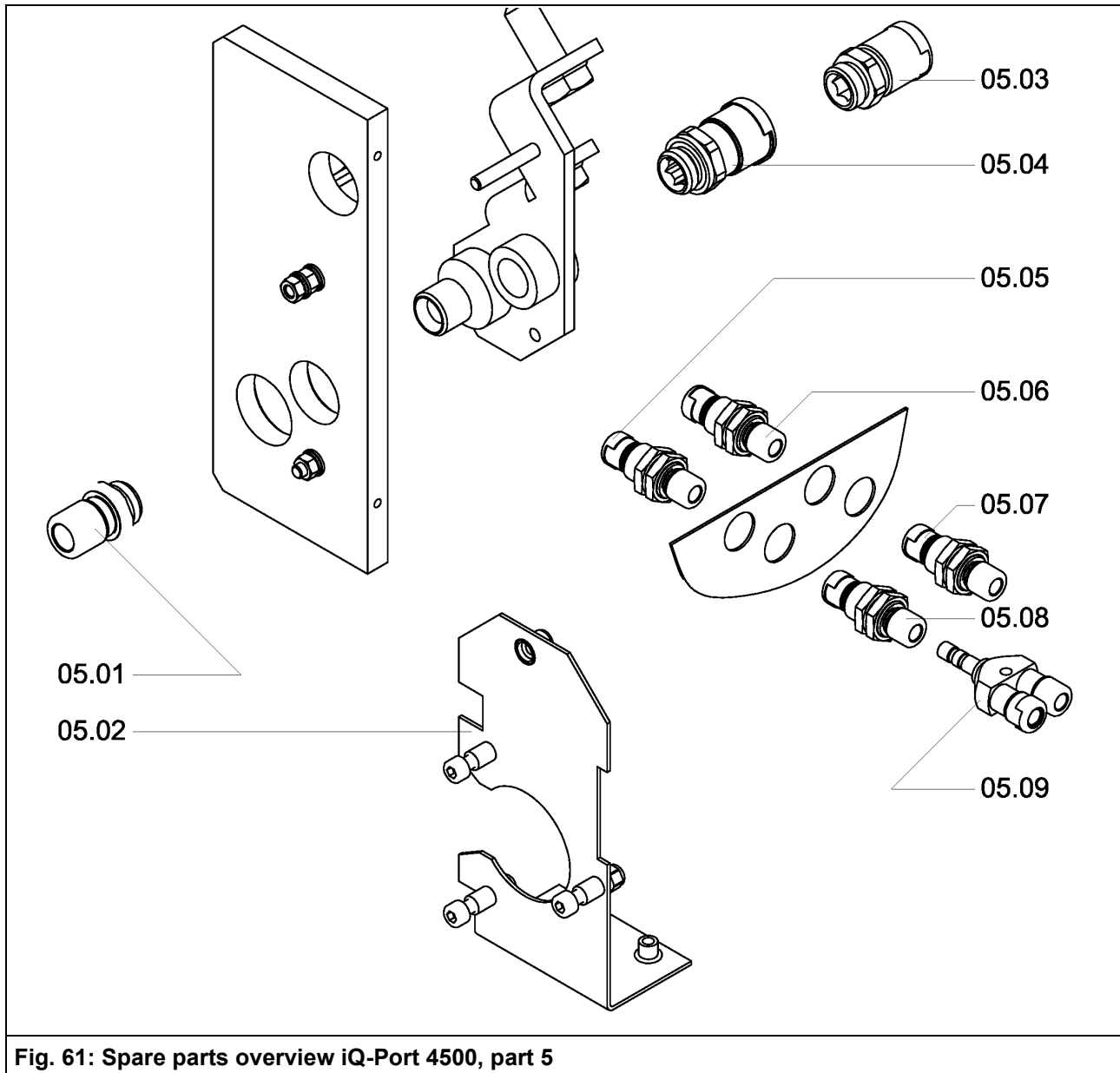


Fig. 61: Spare parts overview iQ-Port 4500, part 5

.11.820.263

25.03.2026

pos	article no.	designation	code	pcs.
01.01	.10.164.889	EMC nut M15X1-EMC		3
01.02	.10.164.890	Housing screw connection M-M12/M15	X341	1
01.03	.10.164.891	Housing screw connection F-M12/M15	X343, Res.	2
01.04	.10.500.254	bulkhead connection Ø 4,3		2
01.05	.10.164.856	Device connector M23 plug g 5+PE-pol. VW S	X315	1
01.06	.10.164.786	Device connector M17 straight plug 3+PE-pol.	X314	1
02.01	.10.296.518	Spacer bolt M4x25, I/I, SW7 M4 thread throughout, galvanised		3
02.02	.10.502.602	plug connection Ø 8 mm - G1/4" - KQB2S08-G02	Y2.10	1
02.03	.10.502.604	plug connection Ø 10 mm - G1/4" - KQB2S10-G02	Y2.20	1
02.04	.11.820.262.805	spacer bolt M3/M4 - M6		3
02.05	.11.820.262.910	volume flow controller X2.10 iQ-Port 4500	Y2.10	1
02.06	.11.820.262.911	volume flow controller X2.20 iQ-Port 4500	Y2.20	1
02.07	.12.LP080115	PCB080115 Port Control 2	A1	1
02.08	.11.820.262.240.10	control cable X2.10/X2.20/X2.30 iQ-Port 4500	Y2.10, Y2.20	1
02.09	.10.500.250	spacer bolt M4x10 I/A PA6.6, black, SW 8		4
02.10	.10.500.251	spacer bolt M4x10 I/A brass, SW 7		1

Spare parts lists

.11.820.263

25.03.2026

pos	article no.	designation	code	pcs.
03.01	.10.500.129	Angle screw-in fitting M5 SW8 AD6		1
03.02	.10.502.618	plug connection Ø3/8" G1/4 NPT KQB2S11-N02S		1
03.03	.10.502.619	plug connection Ø1/2" G1/4 NPT KQB2S13-N02S		1
03.04	.10.505.820	O-ring 4x1 VMQ ISO1629 70Shore red	Y2.31, Y2.41, Y2.42, Y2.51, Y2.91	5
03.05	.10.639.758	Pilot solenoid valve 24 V DC CEME	Y2.31, Y2.41, Y2.42, Y2.51, Y2.91	5
03.06	.11.820.262.240.03	resistance R2 iQ-Port 4500	R2	1
03.07	.11.820.262.815	Connecting tube solenoid valve assembly iQ-Port 4500		2
03.08	.12.190.001.18	Valve seat Ø1,5, turned	Y2.41, Y2.51, Y2.91	3
03.09	.12.259.800	Valve seat Ø1,8, turned		1
03.10	.12.259.802	angle plug Ø6 blue		1
03.11	.12.259.803	Angle screw-in connection, long version M5 Ø6 red		1
03.12	.12.259.804	Angle screw-in connection M8x1 Ø6 green		1
03.13	.10.502.935	Angle screw-in connection M5 Ø6 yellow		0,35
03.14	.10.502.945	Angle screw-in connection M8x1 Ø6 black		0,35
03.15	.10.502.946	Polyamide plastic hose ProWeld 6/4 mm blue		0,4
03.16	.10.502.950	Polyamide plastic hose ProWeld 6,0x4-yellow		1

.11.820.263

25.03.2026

pos	article no.	designation	code	pcs.
04.01	.10.140.736	Fan grille 120 x 120 with replaceable filter		1
04.02	.10.140.736.1	Replacement filter for LFT-120-FI-45		1
04.03	.11.820.260.240.9	Single cable X321 Q-Port 4500	X321	1
04.04	.11.820.262.240.08	Fan iQ-Port 4500	M1	1
04.05	.11.820.262.550	Ignition PCB, mounted	A2	1
04.06	.12.259.904	Micro switch KSA4F with sleeve	S1	1
04.07	.12.LP080158	PCB080158 - 24V Booster	A3	1
05.01	.10.500.152	Straight screw fitting G3/8 SW20, AD10		1
05.02	.11.820.262.705	Torch connection iQ-Port 4500, mounted		1
05.03	.12.259.805	Straight screw fitting G3/8" Ø12 blue		1
05.04	.12.259.806	Straight screw fitting G3/8" Ø14 red		1
05.05	.12.259.807	bulkhead connection Ø6 black		1
05.06	.12.259.808	bulkhead connection Ø6 yellow		1
05.07	.12.259.809	bulkhead connection Ø6 green		1
05.08	.12.259.810	bulkhead connection Ø6 blue		1

Spare parts lists

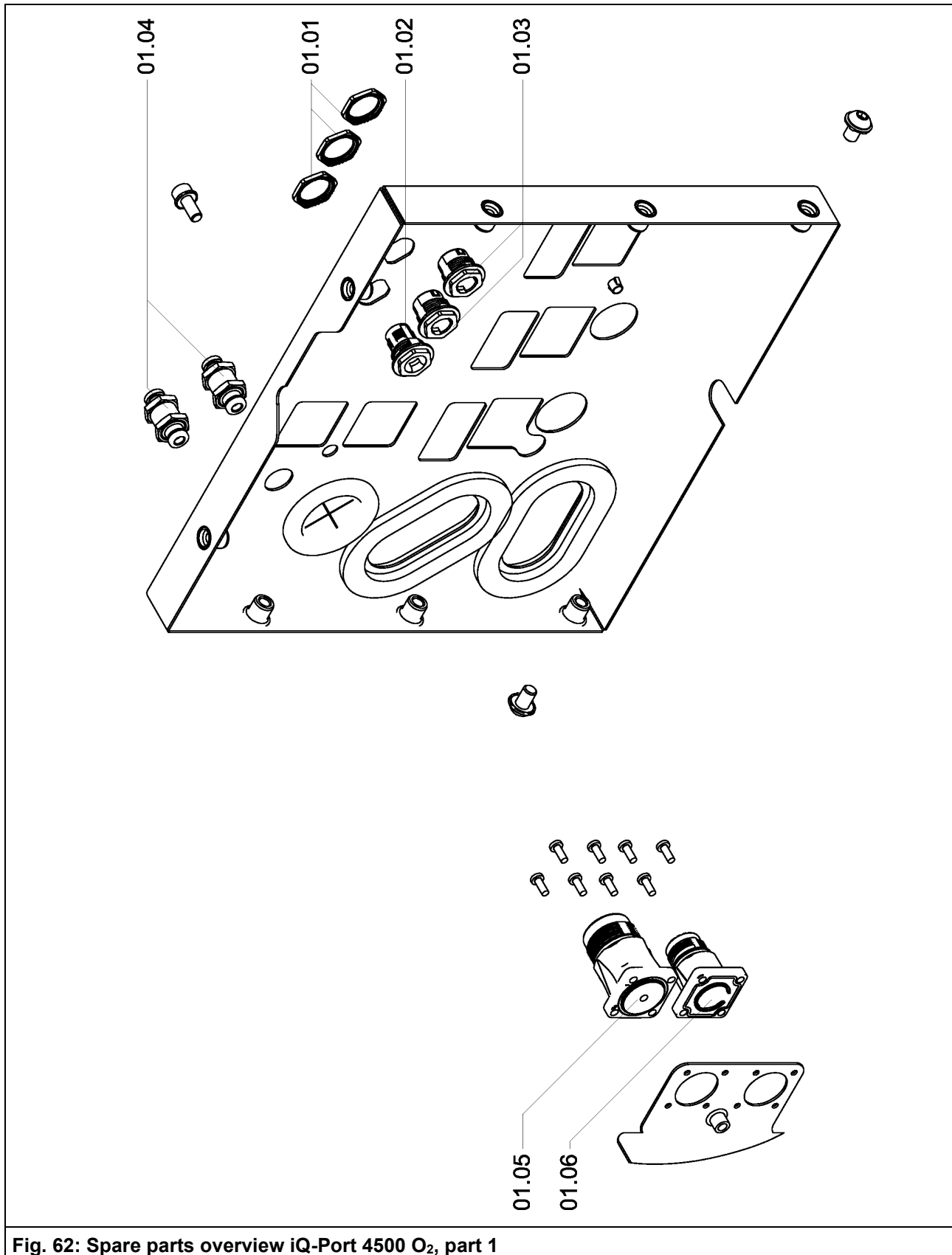


Fig. 62: Spare parts overview iQ-Port 4500 O₂, part 1

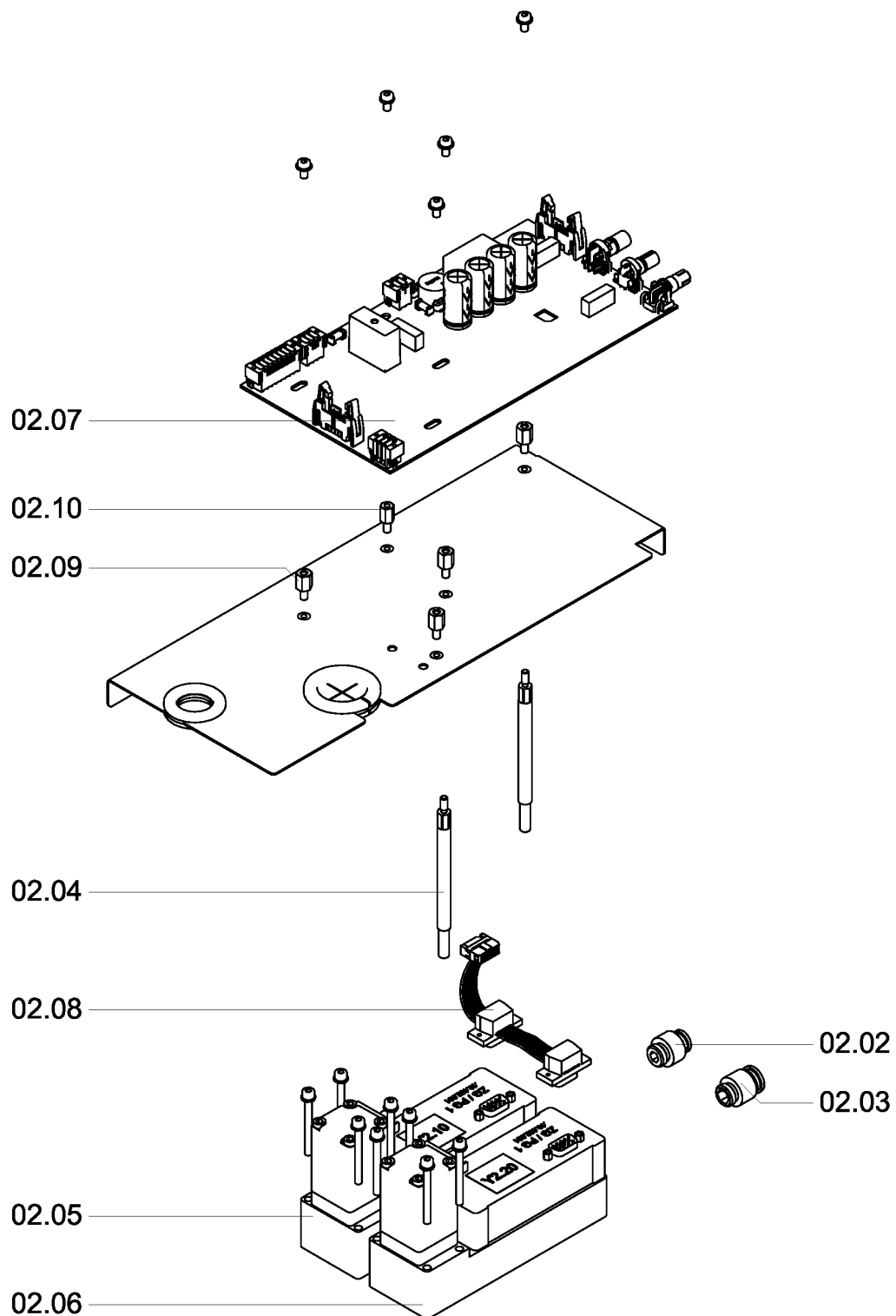


Fig. 63: Spare parts overview iQ-Port 4500 O₂, part 2

Spare parts lists

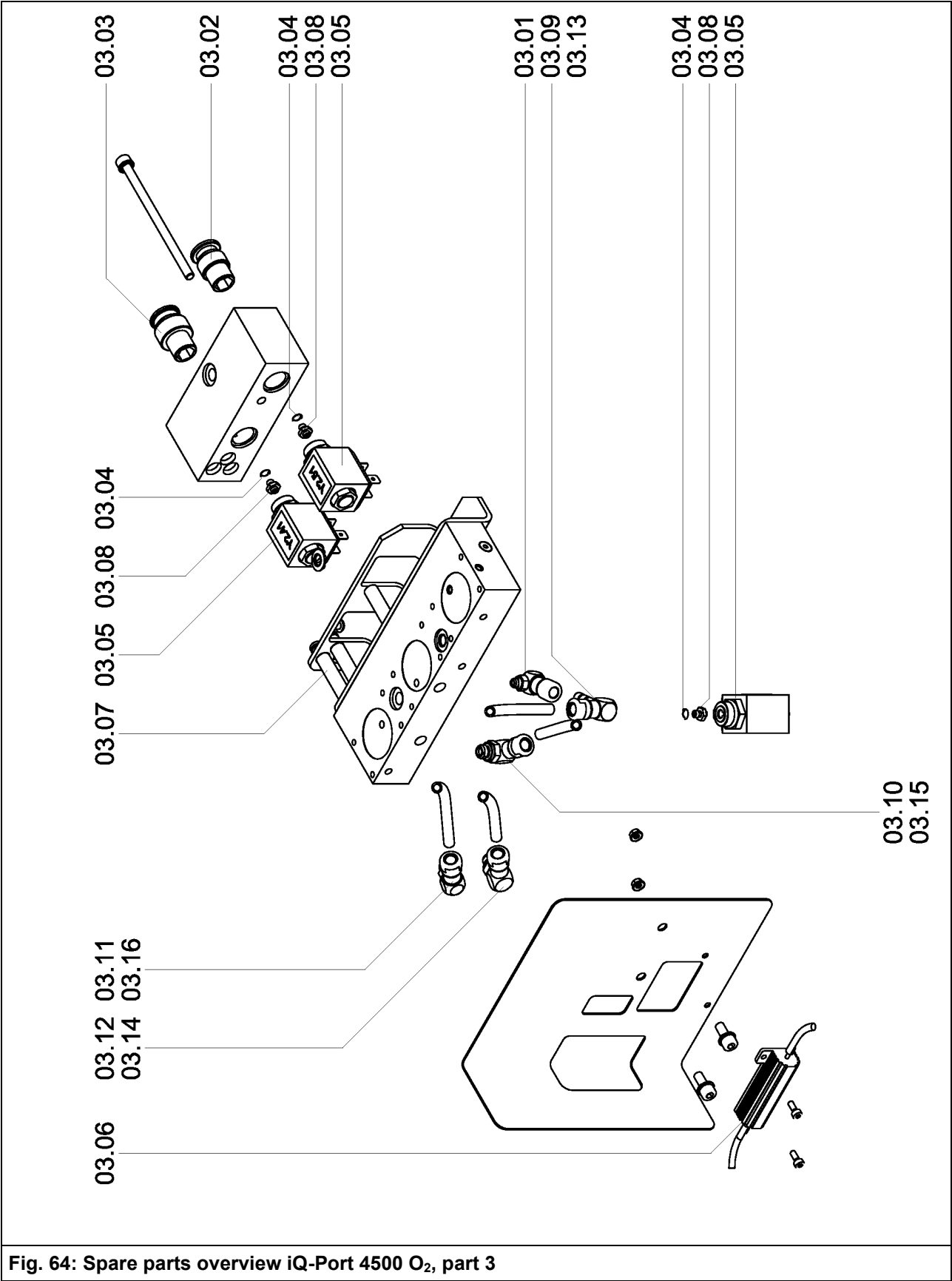


Fig. 64: Spare parts overview iQ-Port 4500 O₂, part 3

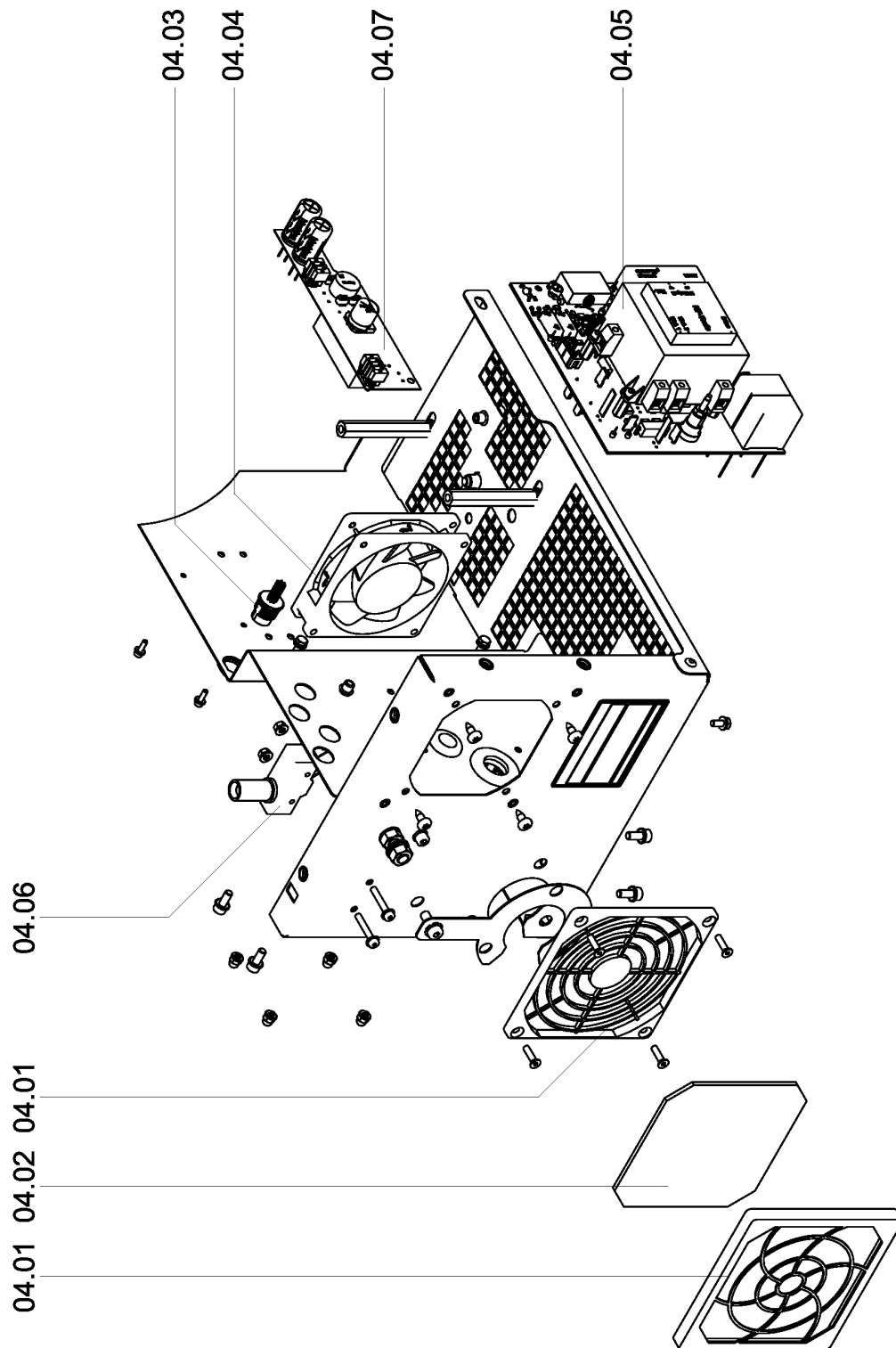


Fig. 65: Spare parts overview iQ-Port 4500 O₂, part 4

Spare parts lists

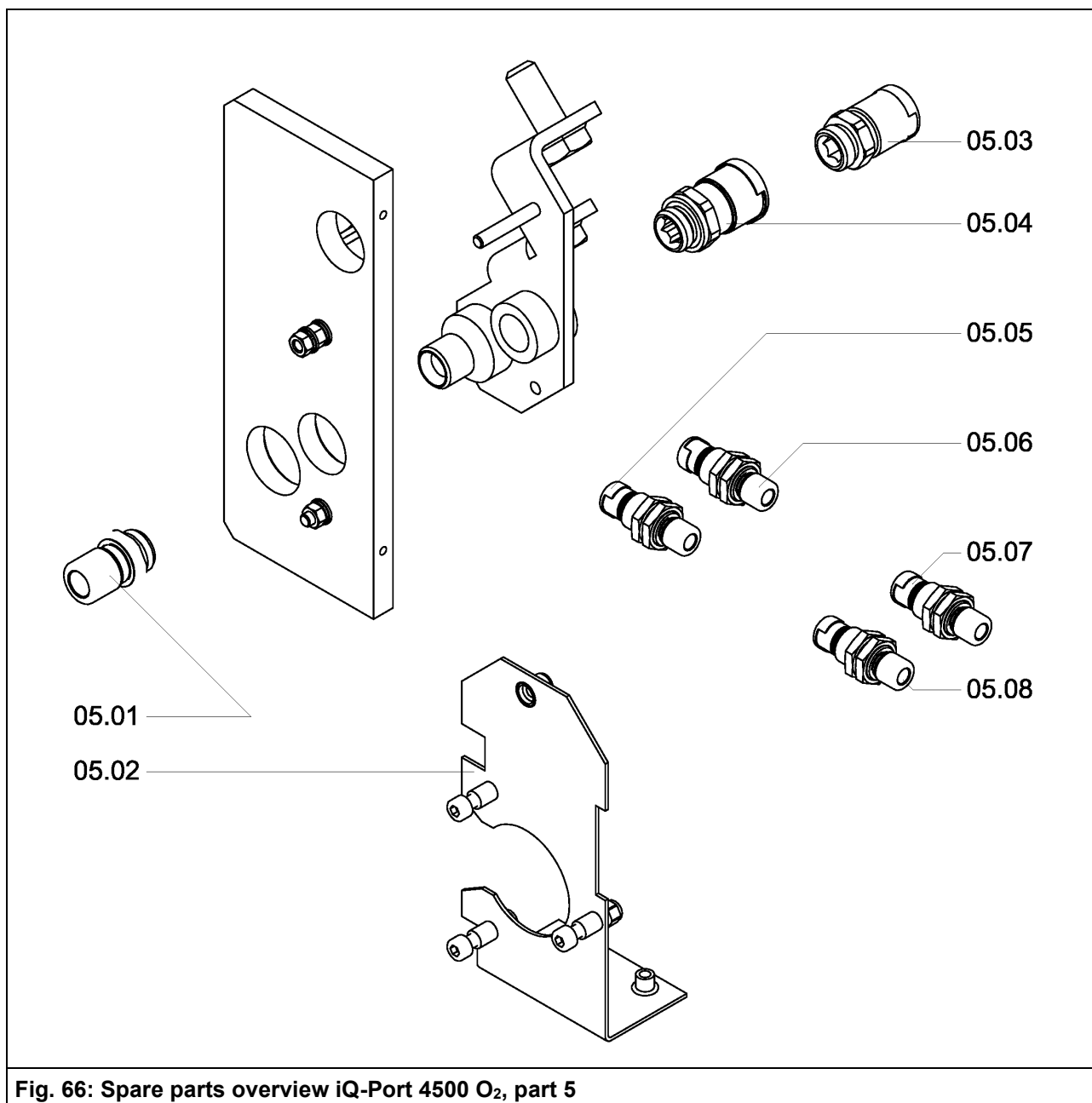


Fig. 66: Spare parts overview iQ-Port 4500 O₂, part 5

13 Tightening torques

electrical components and hose connections

thread	tightening torque	unit of measurement	spanner size
M8x1	1,5 – 2,0	NM	SW10
G1/8"	6,0 - 7,0	NM	SW14
G1/8"LH	4,5 – 5,5	NM	SW12
M12x1	6,0 – 7,0	NM	SW14
G1/4	13,0 – 14,0	NM	SW17
G1/4"LH	12,5 – 13,5	NM	SW17
G3/8"	14,9 – 15,0	NM	SW19
G3/8"LH	16,0 – 17,0	NM	SW19
M18x1,5	20,0 – 21,0	NM	SW24
G1/2	23,0 – 24,0	NM	SW24

14 List of Abbreviations

Abbreviation	German	English
Air	Luft	Air
BV	Brennermagnetventil	Torch solenoid valve
CAN	CAN-Bus	Controller Area Network
ccw	linksdrehend, entgegen Uhrzeigersinn	counterclockwise
cw	rechtsdrehend, im Uhrzeigersinn	clockwise
E	Entlüftung	Exhaust
eEF	elektrische Erstfindung	Elect. initial positioning
EF	Erstfindung	initial positioning
EMV	Elektromagnetische Verträglichkeit	Electromagnetic compatibility (EMC)
ENTL	Entlüftung	Exhaust
EXH	Entlüftung	Exhaust
FB	Fernbediensatz	Remote control
GND	Masse, Bezugspotential, 0 V	Ground, reference potential, 0 V
HB	Hauptbogen	Main arc
HF	Hochfrequenz	High frequency
IG	Identgas	Identification gas
KCU	Kjellberg Verbindungseinheit	Kjellberg connection unit
KG	Kontrollgas	Control gas
KMR	Kühlmittelrücklauf	Coolant return
KMV	Kühlmittelvorlauf	Coolant supply
KWE	Kühleinheit	Cooling unit
LP	Leiterplatte	Printed Circuit Board (PCB)
MG	Markiergas	Marking gas
MGC	Gasdruckregler	Microgascontroller
MR	Mikrorechner	Microprocessor
MV	Magnetventil	Solenoid valve

Abbreviation	German	English
PA	Plasmaschneidanlage	Plasma cutting system
PBA	Plasmaprenneranschlusseinheit	Plasma torch connection unit
PFC	Plasmagasregeleinheit	Plasma flow control
PG	Plasmagas	Plasma gas
PGA	Plasmagasanschlusseinheit	Plasma gas connection unit
PGC	Plasmagassteuerung	Plasma gas controller
PGE	Plasmagaseinstelleinheit	Plasma gas control unit
PGV	Plasmagasventileinheit	Plasma gas valve unit
PI	Pilotleitung	Pilot cable
PM	POWER MODUL	POWER MODUL
PZE	Plasmazähleinheit	Plasma counter unit
PZL	Leitungssatz zur Plasmazündeinheit	Cable set for plasma ignition unit
QD	Q-Desk	Q-Desk
QG	Q-Gas	Q-Gas
Q-LED	Anzeigeelement an der Frontwand	Display element at front wall
QP	Q-Port	Q-Port
QT	Q-Torch	Q-Torch
RV	Rückschlagventil	Non-return valve
SG	Schneidgas	Cutting gas
SL	Steuerleitung	Control cable
SpG	Sperrgas	Sealing gas
StG	Startgas	Start gas
WG	Wirbelgas	Swirl gas
ZG	Zündgas	Ignition gas

15 Index

A

Abbreviations, List of200

C

Change head

Add on of the change heads128

Dismantling of the change head121

Q-Torch 45x0.....122, 128

Information for using of the change heads ...121

maintenance of the change head.....126

Check.....51

Cleaning.....33

CNC-control, combination with80

Condition monitoring for plasma torches120

conductivity of water76

Configuration70

Connection

Gas supply98

iQ-Gas.....95

Plasma torch connection unit133

Connection of the gas hoses97

Consumable monitoring.....73, 120

Consumable overview

Q-Torch 45x0115

Consumables of the torch, exchange111

Contact voltage, Endangerment by high20

Control

O-rings.....127

Coolant

Draining off.....62

Filling up.....62

Handling of29

Current plug exchange119

Current return line56

Current socket exchange.....119

Cutting.....74

Cutting operation72

Cutting process, steps75

D

Directives, European6

Disclaimer of warranty9

Dismantling101

Disposal40

Dust.....25

E

Earthing.....57, 58

Electrical revision34

Endangerment

by electromagnetic fields.....22

by gases, smoke and types of dust.....25

by heat and light radiation24

by high contact voltage.....20

by high voltage ignition.....21

by noise27

by spatter.....28

increased electric20

Endangerment

by formation of oxyhydrogen26

energy saving mode.....76

Errors and warnings.....70

F

Field, electromagnetic.....22

Fitting positions132

Flying cutting78

Front wall60

G

Gas.....25

Gas pressure test.....36

General information6

Guiding system, combination with80

H

High voltage ignition.....21

HMI..... see Q-Desk

I

Initial position finding.....73

Installation53

iQ-Gas..... see Plasma gas control unit

iQ-Port..... see Plasma torch connection unit

iQ-Source..... see Power source

K

Kjellfrost, Coolant.....29

L

License terms.....9

Limitation of liability	10
Loading the data set	73
Location pin exchange	119

M

Mains connection	53
Maintenance	
General	32
Intervals of	32
Plasma machine torch	35
Marking	see Plasma marking
Mounting	101

N

Noise level	see Sound level
Notching	see Plasma notching

O

Open source software	9
O-rings	127
Oxyhydrogen	26

P

Placement	51
Plasma cutting as procedure	11
Plasma gas control unit iQ-Gas	91
Plasma machine torch Q-Torch	103
Plasma marking	49
Plasma notching	49
Plasma punching	49
Plasma torch connection unit iQ-Port	129
Plug connections	101
Plug connections within the device	101
Potential equalisation	56, 57, 58
Power source iQ-Source	41
Pressure reducer	28
Protection mechanisms for plasma torches	120
Protective conductor guidance	58
Punching	see Plasma punching
Putting into operation	51

Q

Q-Desk	89
Q-Torch	see Plasma machine torch

R

Rear panel	64
Repair processing	39
Revision, electrical	34
robots, combination with	80

S

Safety instructions	13
Safety symbols	13
Smoke	25
Software terms of use	9
Sound level	27
Source code	9
Spare parts list	
iQ-Port 4500	183
Spare parts lists	157
iQ-Gas 4500	169
iQ-Source	158
Q-Torch 4510	177
Q-Torch 4520	180
Spatter	28
Standards	6
Standby function	76
Switching OFF the power source	79
Switching ON the control unit	70
Switching ON the power source	70
Switching ON the power unit	71

T

Target groups for this instruction manual	7
Technical data	
Plasma gas console	92
Plasma torch	104
Power source	42
Torch connection unit	130
Technical description	
plasma gas console	94
plasma torch	107
power source	46
torch connection unit	131
Tightening torques	199
Torch	see Plasma machine torch
Transport	51
Trouble shooting	81

U

Under water plasma cutting	76
----------------------------------	----

W

Warranty claim	6
Wear condition detection	120
Wiring diagrams	140
Workpiece connection	56

Revision history

16 Revision history

03/2026 – Rev. no.: 1.1

page

- Addition Q-Port O₂

from 184/191