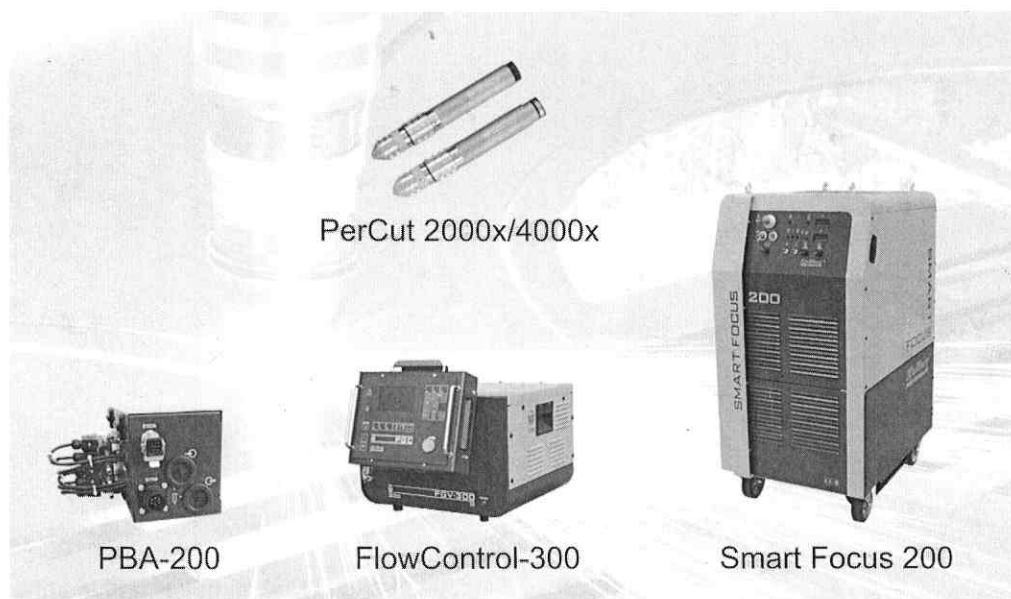


Kjellberg[®]
FINSTERWALDE

the
FINE FOCUS[™]
company

Instruction Manual



- Power source
- Plasma gas control unit
- Plasma machine torch
- Plasma torch connection unit

Smart Focus 200
FlowControl-300
PerCut 2000/2000A
PerCut 4000/4000A
PBA-200

Art.-No.: .11.037.2002BA

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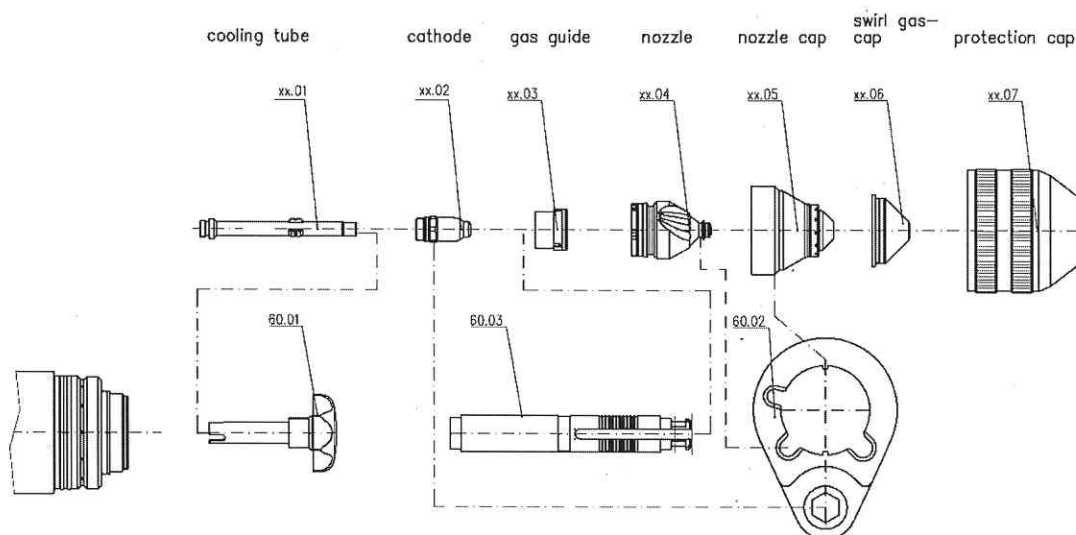
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	<p style="text-align: center;"> WARNING</p> <p>Place the cylinders in an upright position and lock it against tilting over! Don't use damaged cylinders, pressure reducers and armatures!</p>
 	<p style="text-align: center;"> WARNING</p> <p>All parts 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 (protects against backfiring)!</p>
	<p style="text-align: center;"> WARNING</p> <p>Use only „Kjellfrost“ as coolant!</p>
    	<p style="text-align: center;"> CAUTION</p> <p>All details given on the label of the new anti-freezer have to be followed consequently!</p> <ul style="list-style-type: none"> • „Kjellfrost“ is injurious 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
	<p>First aid</p> <ul style="list-style-type: none"> • 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

1.2 Consumable change at the plasma torch

 	<p style="text-align: center;"> WARNING</p> <p>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. pulling out the key of the key-operated switch after switching off the plasma cutting system!</p>
	<p>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.</p>
	<p>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.</p>
	<p style="text-align: center;"> WARNING</p> <p>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.</p>
	<p>Use only exact the consumables which are destined for the technological operation!</p>
	<p>After screwing off the protective cap to replace the swirl gas <u>cap</u> 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!</p> <p><u>apply to plasma torch:</u></p> <p>PerCut 2000 PerCut 4000 PerCut 4000 XS</p>
	<p>Make sure that all wearing parts are complete and correct installed! Especially the cooling tube has to be inserted. Other wise the cooling is ineffective and the torch gets damaged.</p> <p>No other parts as mentioned before have to be changed unauthorised on the plasma machine torch.</p> <p>A further opening of the torch from the front side is not possible.</p>
	<p>You have to mind on tightness of the plasma torch after consumable change, coolant does not leave!</p>
	<p>The discharge chamber between cathode and nozzle has to be blown absolutely dry (press tumbler switch "gas test" approx. 20 seconds - see "operation sequences")</p>

1.2.1 Plasma machine torch PerCut 2000/2000A / PerCut 4000/4000A



Dismounting of used consumables

Before dismounting the consumables of the PerCut please insert the change head in the "Station for the change heads" (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 protective cap (xx.07) together with the swirl gas cap (xx.06). (Press out swirl gas cap from protective cap.)
2. Unscrew nozzle cap (xx.05) by aid of a torch tool - PerCut 440-450* (60.02).
3. Take out the nozzle (xx.04) together with the gas guide (xx.03) by aid of a torch tool - PerCut 440-450* (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 torch tool - PerCut 440-450* (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.

Mounting of new consumables

1. Screw in the cooling tube (xx.01) by aid of a socket wrench (60.01).
2. Tightly screw in the cathode (xx.02) by aid of a torch tool - PerCut 440-450* (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. Position the nozzle cap (xx.05) by aid of a torch tool - PerCut 440-450* (60.02) and fasten hand tight
6. Position the swirl gas nozzle (xx.06) and manually fasten with the protective cap (xx.07).

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

* The torch tool - PerCut 440-450 (60.02) is a multifunctional tool 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 Ø 37 mm.

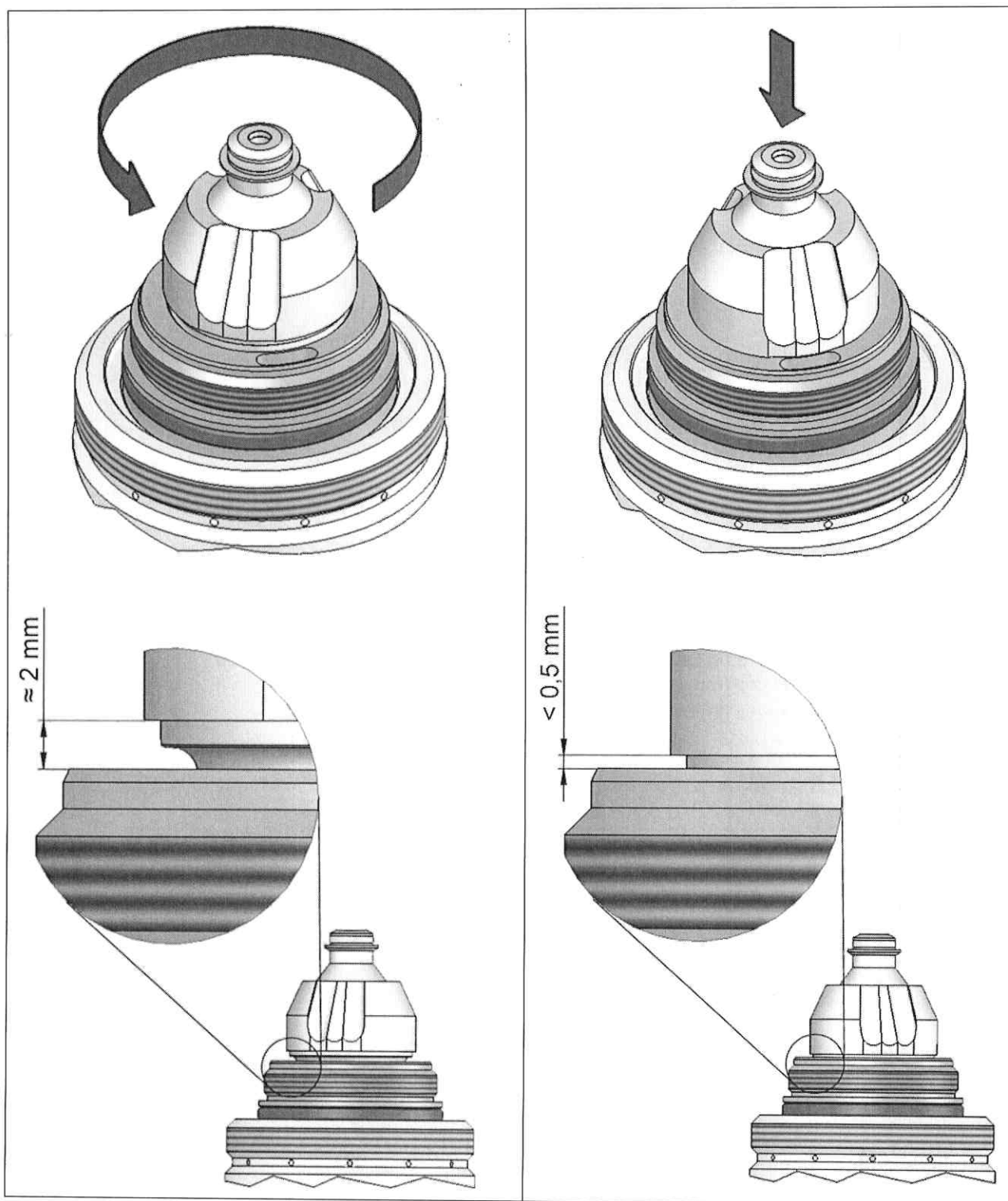


Fig. 1: Insert the nozzle into the torch head

1.3 Operating and display elements of the power source

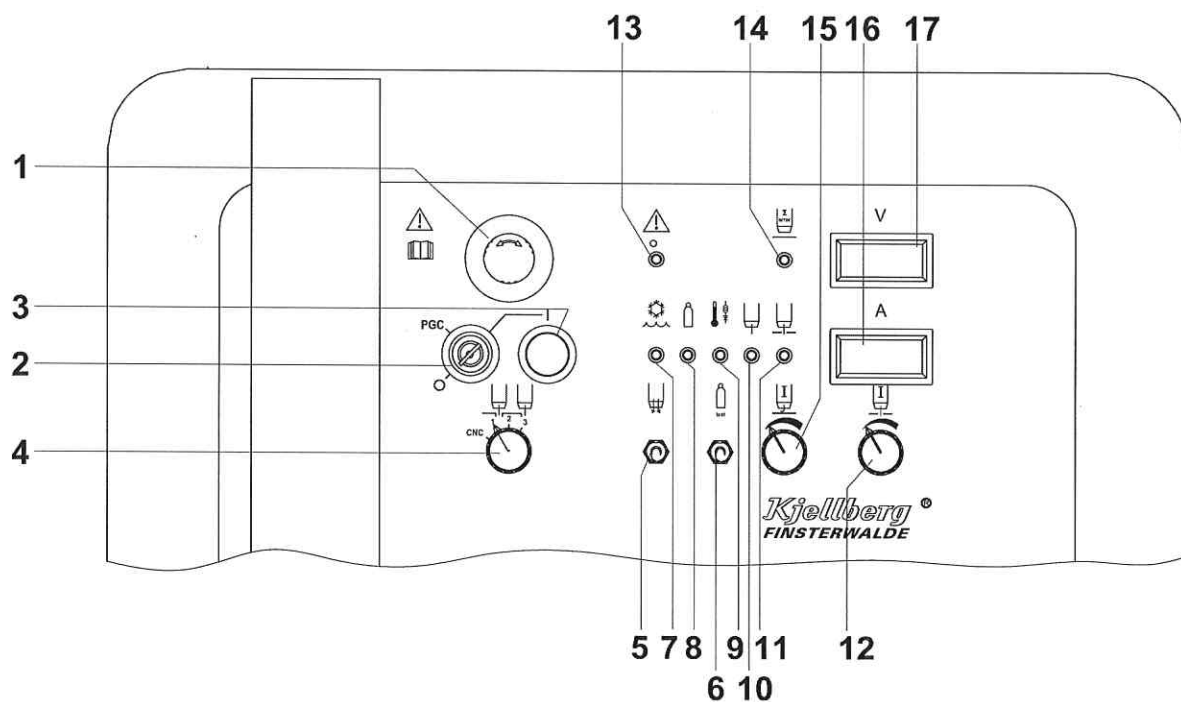


Fig. 2: Control and display elements

Short instruction manual Smart Focus 200 with FC-300

Operation sequences

Check before starting the gas supply, corresponding to the point "connection of the gas supply" of gas console.

1.	Red emergency stop device S3 "emergency stop" (1)	Unlock the button by turning it in one direction.
2.	Key switch S1 "Mains ON" (2)	Turn the key switch to the position „I“. switch to "PGC" when change consumables. <ul style="list-style-type: none"> • Mains voltage is applied to the control transformer. • Display of consumables at operation screen "data set parameter" of the PGC (only for FlowControl).
3.	Illuminated button green S2 „PA ON" (3)	<p>Activate the plasma unit with the illuminated push button. Main transformer, fan, pump and control are switched on.</p> <p>Inspection:</p> <ul style="list-style-type: none"> • The display screens appear for a short moment after starting the unit following messages: • <ul style="list-style-type: none"> at the voltage display (17): <i>U-I</i> = device-no. example: device 1 <i>SF</i> = device typ example: Smart Focus <i>0</i> = voltage actual value example: 0 V at the current display (16): <i>100</i> = software-version example: V 1.00 = max. current power source example: A <i>300</i> = current nominal value example: 300 A • green illuminated push button S2 "PA ON" (3): lights • LED signal lamp green H30 "Temperature OK" (9): lights • LED signal lamp green H29 "Coolant OK" (7): lights • An automated gas purging is started. • LED signal lamp green H28 "Gas OK" (8): lights • LED signal lamp yellow H31 "Cumulative error" (13): does not light <p>Unit is ready for operation!</p>
4.	Selector switch S7 "technology" (4)	Dial the technology range according cutting chart.
5.	Operation gas console	See instruction manual of corresponding gas console. <ul style="list-style-type: none"> • Select the necessary plasma regime. • Adjust plasma - and swirl gases according to the cutting charts.
6.	potentiometer P5 "cutting current" (12)	<ul style="list-style-type: none"> • Adjust the cutting current with the potentiometer. • Look at the value shown at the current display (16).

7.	potentiometer P7 "marking current" (15)	<ul style="list-style-type: none"> Adjust the marking current with the potentiometer. Look at the value shown at the current display (16).
8.	tumbler switch S2 "gas test" (5)	<p>Adjust the tumbler switch "Gas test":</p> <ul style="list-style-type: none"> press the tumbler switch "gas test" (5) at the power source or the switch/button "gas test" at the gas console <p>The gas test starts automatically:</p> <ul style="list-style-type: none"> when unit becomes switched ON when changing gases of PGV <p>inspection:</p> <ul style="list-style-type: none"> blowing out of the plasma torch for example blowing out of the coolant residue after consumable change LED signal lamp yellow H31 "cumulative error" (13): lights The voltage display (17) shows "GAS" (5A5)
9.	position the plasma torch	<ul style="list-style-type: none"> Bring the plasma torch in the start position. Adjust the ignition height according to the cutting chart. <p>Hole piercing occurs over the work piece.</p> <p>Flying cutting is only possible with switch position 3 of the tumbler switch S7 "technology" (4).</p>
10.	plasma torch ON	<p>Plasma torch can be switched on through:</p> <ul style="list-style-type: none"> the "torch ON"-signal of the CNC-control from the guiding system or pressing the ON-button at the remote control (FB) <p>Pilot arc ignition:</p> <ul style="list-style-type: none"> LED signal lamp white H11 "current flows" (10) : lights after pilot arc contacts work piece, main arc ignites automatically LED signal lamp white H10 "main arc" (11) : lights
11.	plasma cutting	Plasma cutting according to the cutting chart.
12.	plasma torch OFF	<p>Plasma torch can be switched off through:</p> <ul style="list-style-type: none"> discontinuation of the "torch ON"-signal of the CNC-control from the guiding system or pressing the OFF-button at the remote control (FB) <p>Plasma arc extinguishes</p>
13.	plasma unit OFF	<p>Turn key switch S1 „Mains ON" (2) to</p> <ul style="list-style-type: none"> Position „0 " or Position „PGC" (for consumable change) <p>The unit is switched off..</p>
14.	Red emergency stop device S3 "emergency stop" (1)	<p>Press the red emergency stop device S3 "emergency stop" (1).</p> <p>All integrated components of the emergency stop circle are switched OFF, after pressing the button.</p>

Fig. 1: Operation sequences

1.4 Operating and display elements of the gas console

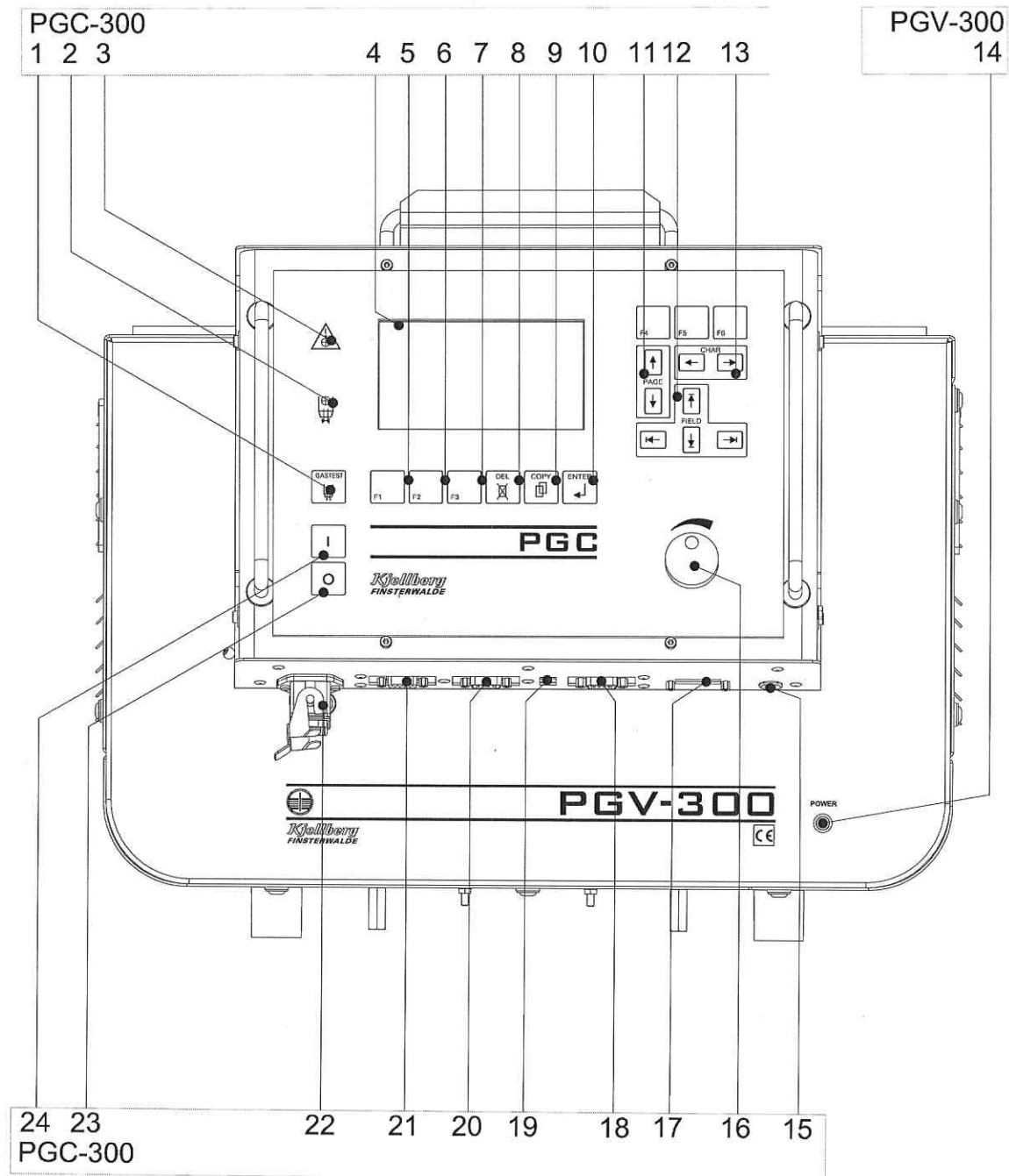


Fig. 3: Control and display elements FlowControl-300

1	button „GASTEST“
2	display for gas control signal
3	display error
4	LCD Display
5	F1 button "technology data"
6	F2 button "to set selection"
7	F3 button "set change"
8	DEL button "delete button"
9	COPY button "new data set"
10	ENTER button "input confirmation"
11	PAGE button "changes display pages"
12	FIELD button "position change field"
13	CHAR-buttons "position change sign modification"
14	LED-Power - power supply ON
15	contrast adjustment display
16	hand wheel for parameter selection
17	option: binary data transmission to guiding system (X6)
18	serial interface RS-232 (X5)
19	switch of interfaces RS-485 – RS-232
20	connection to power source RS-485 (X4)
21	CAN1 signal connection to PGV (X2)
22	socket current supply PGC (X1)
23	store key of data set 0
24	store key of data set I

1.5 Filling up 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. The filler neck (2) is at the rear panel of the power source.

Please connect the plasma torch and fill in the coolant until it reaches the upper mark (max) of the filling level indicator (1) before switching on the plasma system.

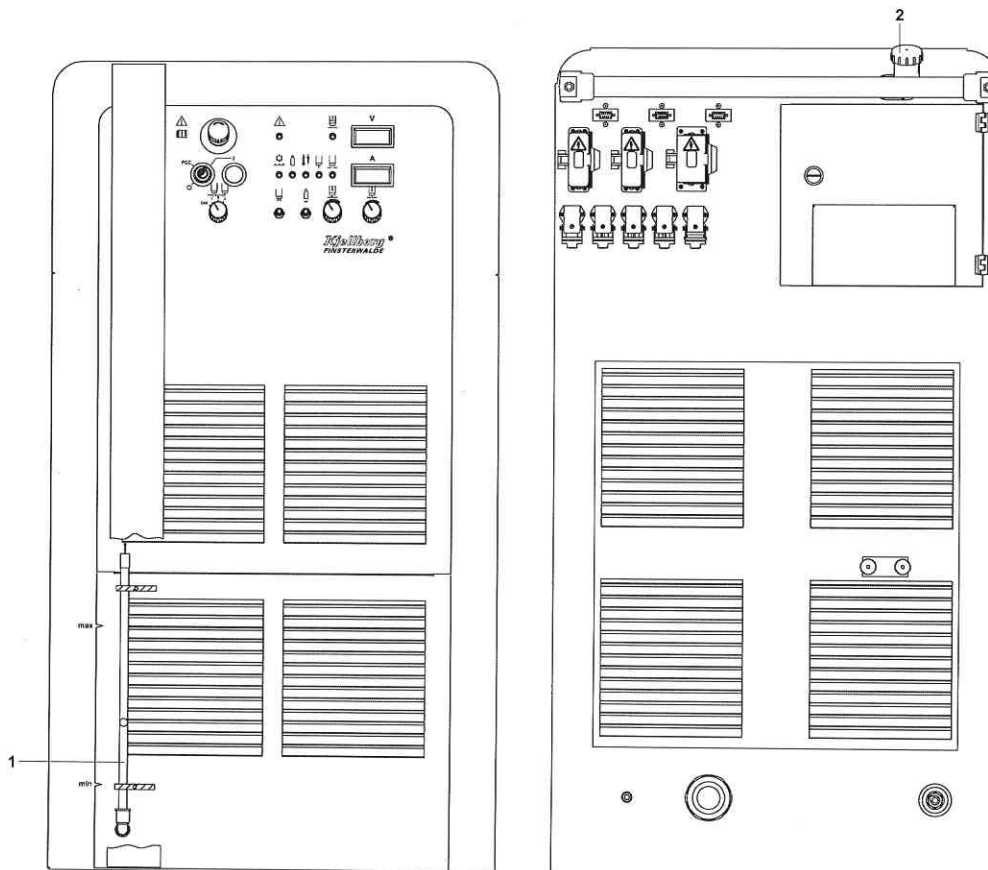
Warning: If the maximum filling quantity is exceeded, the coolant will exit the tank through the overflow and run on the floor.

Switch on the plasma system and watch the filling level indicator.

After the pump has vented the coolant hoses and the plasma torch and the coolant level does not go down any further, please refill „Kjellfrost" up to the upper mark.

Changing the consumables and the plasma torch causes losses of the coolant. Therefore it is necessary to control the coolant level regularly and to refill the coolant before it reaches the lower mark (min) of the filling level indicator.

Regardless of the service life of the plasma system, the coolant has to be changed completely at least every 12 months.



1.6 Information for trouble shooting

error	reason / solution
1. After activating the key switch S1 "mains ON" (2) to position „I" and switching on the green illuminated push button S2 "PA ON" (3), Pa does not switch ON	<ul style="list-style-type: none"> • emergency-stop device S3 "emergency stop" (1) is activated (reset switch) • „emergency stop" of CNC is activated • link X102 (C3-C4) and X106 (1-2) for operation without CNC • cover plate on back wall of PA or door of PBA open • control cable plasma torch not connected to X121/X122 • filling level in the coolant tank to low
2. LED signal lamp yellow H31 "cumulative error" (13) is ON and LED signal lamp green H28 "Gas OK" (8) is OFF	<ul style="list-style-type: none"> • low pressure of selected gases (see cutting chart)
3. LED signal lamp yellow H31 "cumulative error" (13) is ON and LED signal lamp green H29 "Coolant OK" (7) is OFF	<ul style="list-style-type: none"> • coolant flow < 3.0 l/min • no or less coolant filled up
4. LED signal lamp yellow H31 "cumulative error" (13) is ON and LED signal lamp green H30 "Temperature OK" (9) is OFF	<ul style="list-style-type: none"> • thermal overload on rectifier → cool down by running fan
5. LED signal lamp white H11 "Pilot arc" (10) OFF:	<ul style="list-style-type: none"> • no ignition • check the pilot current
6. LED signal lamp white H10 "Main arc" (11) OFF: plasma cutting machine switches OFF after ca. 10 s	<ul style="list-style-type: none"> • no cutting power, main power source OFF • pilot arc time > 10 s; • pilot arc without contact to workpiece • no current flow to workpiece <ul style="list-style-type: none"> - workpiece cable not connected - ignition height not correct

Should coolant leak out, the cutting machine has to be switched off immediately, resolve the error and dry the cutting machine!

The plasma sequence control of the plasma cutting system is displaying certain error codes, if during service or operation errors are noticed. The current display indicates the corresponding error messages and additionally the respective LED light.

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

Short instruction manual Smart Focus 200 with FC-300

current-display	relevance	LED-display	cause	end or fault clearance	
Er 2	Error power source	LED-signal lamp yellow H31 "Cumulative error" (13) lights and LED-signal lamp yellow H32 "Process error" (14) flashes	current relay K1.x "main source" or K2 "current flows" or K3 "current pilot source flows" is pulled or voltage at the torch without "torch ON"-signal	remote control: press "FB OFF" stop "torch ON"	inform the service!
Er21	Transfer arc		current relay K3		
Er22	Main arc		current relay K1		
Er24	Pilot arc		current relay K2		
Er25	Actual current detected		Current flow without ON signal		
Er27	Fuse PBA defect		check measuring cable cathode voltage and fuse F1 in PBA		
Er28	Torch solenoid valve		Voltage of torch solenoid valves not OK		
Er 3	Error torch	LED-signal lamp yellow H31 "cumulative error" (13) ON	current flow during gas preflow →short circuit at the torch	switch OFF unit, check torch and consumables	
Er31	Transfer arc		Current relay K3		
Er32	Main arc K1		Current relay K1		
Er34	Pilot arc		Current relay K2		
Er35	Actual current detected		Current flow with ON signal		
Er 4	Pilot arc time	LED-signal lamp yellow H32 "Process error" (14)	pilot arc time exceeded	remote control: press FB OFF CNC: stop ON	
Er 5	Ignition time	LED-signal lamp yellow H32 "Process error" (14)	HV ignition time exceeded or no ignition	remote control: press FB OFF CNC: stop ON	
Er 6	Main arc interruption	LED-signal lamp yellow H32 "Process error" (14)	arc interruption during cutting (main source)	end after ca. 1 s	

current-display	relevance	LED-display	cause	end or fault clearance
Er 8	Gas test period	LED-signal lamp yellow H32 "Process error" (14)	max. time exceeded, stop gas test and start again if required	tumbler switch "gas test" OFF
Er 9	Pilot arc interruption	LED-signal lamp yellow H32 "Process error" (14)	plasma arc interruption during ignition (pilot source) main arc is not formed	end after ca. 1 s
Er 10	Communication error	LED-signal lamp yellow H32 "Process error" (14)	CAN communication between PGC and PGV interrupted <u>or</u>	Control connection PGC (X2) – PGV (X2)
			RS-485-communication between PGC (Master) and power source interrupted	Control connection PGC (X4) - power source (X4.2)
Er 43	Coolant error	LED-signal lamp yellow H31 "Cumulative error" (13) ON and green H29 "coolant OK" (7) OFF	coolant quantity not enough	settle disturbances
Er 51	Temperature error	LED-signal lamp yellow H31 "Cumulative error" (13) ON and green H30 "temperature OK" (9) OFF	high temperature	settle disturbances
Er 60	Sequence error	LED-signal lamp yellow H32 "Process error" (14)	Error in the cutting sequence	external release missed
Er 70	Gas error	LED-signal lamp yellow H31 "Cumulative error" (13) ON and green H28 "gas OK" (8) OFF	gas missing	check gas bottle if necessary replace
Er 71			gas missing at start of power source	open gas bottle
Er 72			gas pressure too low	check gas, start the power source again

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