LINCOLN ELECTRIC

OPERATING MANUAL OF THE WELDING SEMI-AUTOMATIC

Compact 185

Thank You
for selecting a QUALITY product by Lincoln Electric.
We want you to take pride in operating this
Lincoln Electric Co. product Compact 185 as much
pride as we have in briging this product to you!

Declaration of confirmity
Konformitätserklärung
Deklaracja zgodności

CE

BESTER S.A.

Declares that the welding machine:
Erklärt, daß die Bauart der Maschine:
Deklaruje, że spawalnicze źródło energii:

Compact 185 **s/n**

conforms to the following directives:
dan folgenden Bestimmungen entspricht:
spełnia następujące wytyczne:

73/23/CEE, 93/68/CEE, 89/366/CEE, 92/31/CEE

and has been designed in conformance with the following norms:
und in Übereinstimmung mit den nachstehenden Normen hergestellt wurde:
i że zostało zaprojektowane zgodnie z wymaganiami następujących norm:

EN 50199, EN 60974-1

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Safety

Warning!
Protect yourself and others from possible serious injury or death. Keep children away. Pacemaker wearers should consult with their doctor before operating.
Pay attention in handling the pieces being worked on, use adequate tools to avoid burns can be caused by the overheating of the piece during the operation of welding and/or cutting.
Be sure that all installation, maintenance, and repair procedures are performed only by qualified individuals.

ELECTRIC SHOCK can kill

- The electrode and work /or ground/ circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- Insulate yourself from work and ground using dry insulation. Make sure the insulation is large enough to cover your full area of physical contact with work and ground.
- **In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions /in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground/ use the following equipment:**
  *** Semiautomatic DC Constant Voltage Wire/ Welder**
  *** DC Manual /Stick/ Welder**
  *** AC Welder with Reduced Voltage Control**
- In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrical "hot".
- Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

- Ground the work or metal to be welded to a good electrical /earth/ ground.
- Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- Never dip the electrode in water for cooling.
- Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.
- When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

ARC RAYS can burn

- Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.
- Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- Protect other nearby personnel with suitable non-flammable screening and/or warn them to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous

- Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding with electrodes which require special ventilation such as stainless or hard facing or on lead or cadmium plated steel and other metals or caotings which produce highly toxic fumes, keep exposure as low as possible and below TLV

/Threshold Limit Values/ using local exhaust or mechanical ventilation. In confined spaces or in some circumstance, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.

- Do not weld in locations near chlorinated hydrocabron vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosogne, a highly toxic gas, and other irritating products.
- Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet and follow your employer's safety practices.

WELDING SPARKS can cause fire or explosion

- Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.
- Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations.
- When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside.

They can cause an explosion even though they have been "cleaned". For information purchase "Recommended Safe Practices for the Preparation for Welding and Cuttig of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society.

- Vent hollow castings or containers before heating, cutting or welding. They may explode.
- Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

CYLINDER may explode if damaged

- Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.
- Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- Cylinders should be located:
  * Away from areas where they may be struck or subjected to physical damage.
  * A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

- Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

FOR ELECTRICALLY powered equipment

- Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- Install equipment in accordance with the U.S.National Electrical Code, all local codes and the manufacturer's recommendations.
- Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

- Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

- Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

- In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenace requiring their removal is complete. Always use the greatest care when working near moving parts.
- Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.
- To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

- To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS may be dangerous

- Electric current flowing through any conductor causes localized Electric and Magnetic Fields /EMF/. Welding current creates EMF fields around welding cables and welding machines.
- EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.
- Exposure to EMF fields in welding may have other health affects which are now not know.
- To minimize exposure to EMF fields all welders should:
  * Route the electrode and work cables together .
  * Never coil the electrode lead around your body.
  * Do not place your body between the electrode and work cables.
  * Connect the work cable to the workpiece as close as possible.
  * Do not work next to welding power source.

General Information and Warning

- Do not install, operate or repair this equipment without reading this Manual and the safety precautions contained throughout. Save this Manual and keep it handy for reference.

- Disconnect mains of the welding semi-automatic machine after finishing work or before a longer break.

- Do not make any own modifications of the Compact 185. It may cause changes its features and deterioration of technical data.

- Any adaptations of this machine are prohibited and they cause not only loss of the guarantee rights but they may be a cause of deterioration of using safety and they may expose users to electric shock.

- Any damage of the Compact 185 caused by improper use or through user's fault causes loss guarantee rights.

- It is prohibited switching the semi-automatic machine on at short ciruit of the welding cables.

- Acceptable range of ambient temperature is from - 10 °to + 40 °C.

- Acceptable humidity is up to 90 % at t = 20 °C.

- Producer reserves the right to change specifications without previous notice.

Features

- The welding semi-automatic machine Compact 185 is an adjustable DC power source where the electrode is a wire which is automatically fed to the work piece. The arc is surrounded by the shielding gas.
- It gives proper welding seams for constructional low-carbon and stainless steels, copper, aluminium and their alloys.
- Compact 185 is adopted for mains power supply from an one-phase network 240 V, 50 Hz.
- It enables continuous and spot modes of work.
- The Compact 185 has got a step setting of the welding voltage.
- It enables stepless welding wire feed speed control.
- It has got the thermal overload protection ciruit.
- It is cooled with air.
- The Compact 185 distinguishes with its simply construction, easy to use and high reliability.
- The Compact 185 was designed according to IEC 974-1.

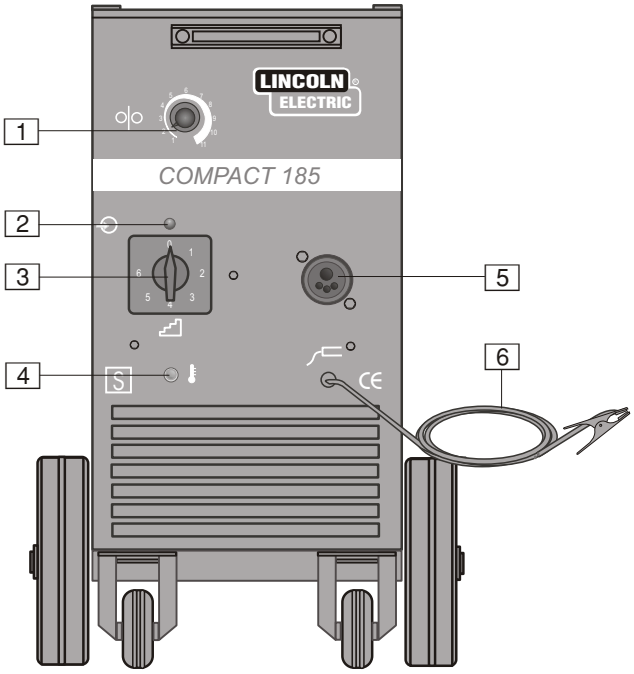
Technical Data

Rated Mains Voltage	240 V AC $^{+7\%}_{-10\%}$, 50 Hz
Power Consumption at Duty Cycle 15%	6.2 kVA
Input Current at Duty Cycle 15%	26 A
Welding Current / Apparent Working Voltage:	
at Duty Cycle 15 %	180A / 23V
at Duty Cycle 60 %	100A / 19V
at Duty Cycle 100 %	70A / 17.5V
Open Circuit Voltage	21 - 37 V
Welding Current Range	35 - 180 A
Number of Welding Voltage Steps	6
Power Factor cosφ at Rated Load	0.93
Electrode Wire Feed Speed	1 - 14 m/min
Electrode Wire Diameter	0.6 - 1.0 mm
Degree of Protection	IP21
Insulation Class	H
Weight /without Cables/	60 kg
Dimensions /WxHXD/	420x650x800 mm

Basic Equipment:

- Ground Cable with the Work Clamp	3 m
- Shielding Gas Hose	2 m
- Mains Cable without the Plug	4 m

Front Panel of the Compact 185



1 knob of the electrode wire feed speed control

2 power supply indicator

3 selector: switch power supply off / change of the welding voltage range

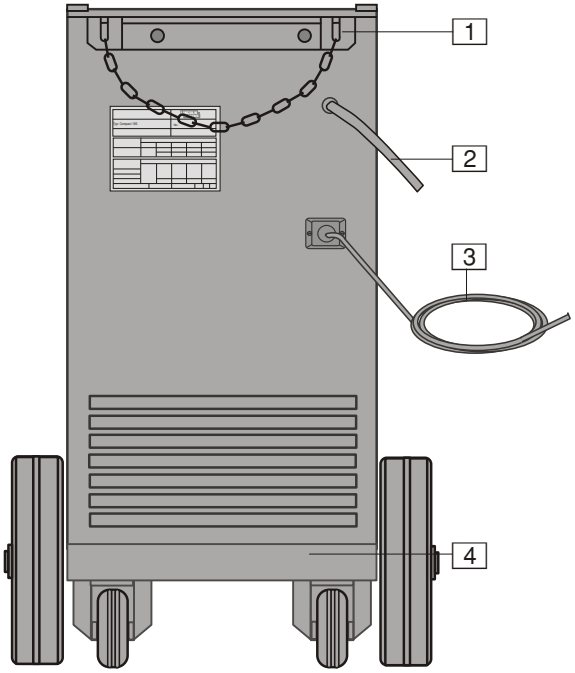
Warning! It is not allowed changing the welding voltage range during welding process!

4 thermal protection idicator

5 "Euro" socket for connecting the welding torch

6 ground welding cable

Rear Panel of the Compact 185



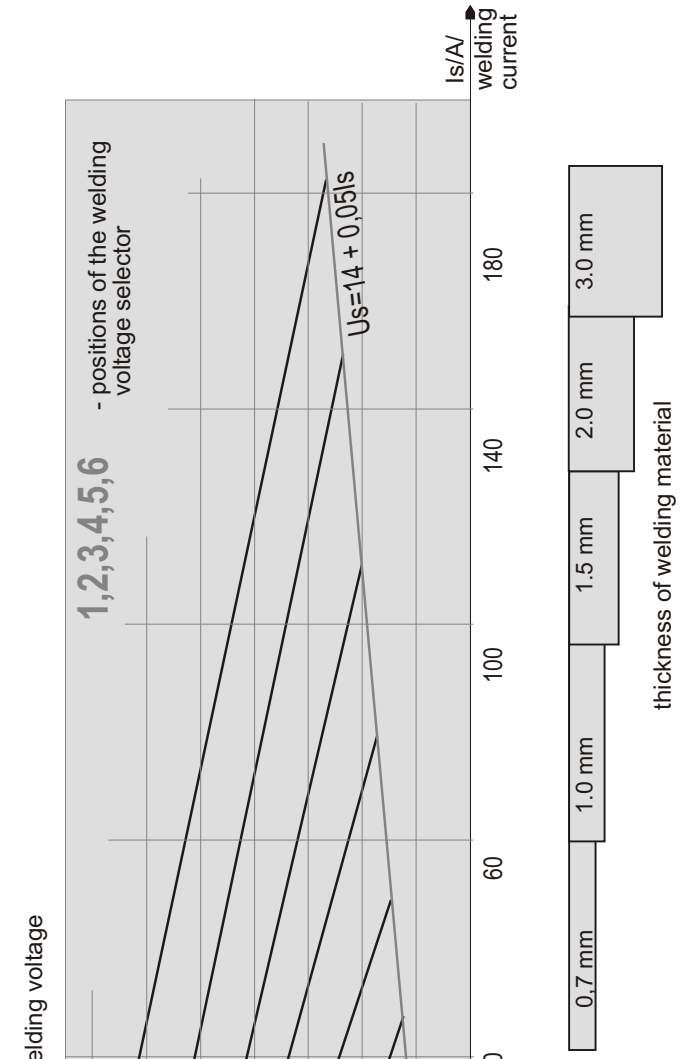
1 bracket for the shielding cylinder
2 hose for gas supply
3 mains cable
4 shelf for the shelding gas cylinder

Caution!

- protect the shielding gas cylinder against overturn with the chain

- do not put too a big gas cylinder on the shelf - it may cause overturn of the welding machine

Static Characteristics of the Compact 185



Installation of the Compact 185

Plugging the Compact 185 in

- **Installation and mains outlet socket should be made and protected according to appropriate rules.**
- The welding machine Compact 185 is adopted for mains power supply from an one-phase network 240 V, 50 Hz. It should be protected by 20 A delay fuse.
- Mains socket should have the protected terminal against electric shock.
- Before plugging the welding machine in you should make sure whether it is switched off.

Connecting Shielding Gas

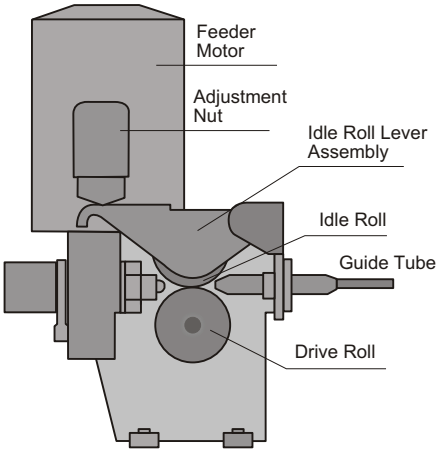
For connecting shielding gas you should:

- Prepare the gas cylinder and protect it against to an overturn or other risk.
- Take off the hub cap of safety valve of the shielding gas cylinder and open it for a moment for remove potential impurities.
- Install the reducer valve on the gas cylinder and secure vertical position for the tube of the rotameter.
- Connect the shielding gas hose of the welding machine to the reducer valve by means of a clamping band.
- The valve of the reducer should be opened constantly only before begining welding process.

Inserting Electrode Wire

For inserting of electrode wire you should:

- Open the cover of the machine so the hub assembly and the wire drive unit are accessible.
- Mount the wire spool on the hub assembly in such a way that, by dragging outer extermity of wire, the spool runs round clockwise; make sure that the refrence injecting on hub assembly goes into the fitting hole.



- Check if the drive roll bears stamped on the outer side the diameter corresponding to the wire used. Otherwise, unscrew the screw holding the roll and turn it or replace it.
- Every roll is provided with two grooves fitted for feedering of wire with different diameters. Special rolls are avaiable for cored and aluminim wires.
- Realse by the suitable lever the pressure roll turning on the ball bearing and lift it.
- Put the wire inside the fitting inlet guide and let it out through the torch adapter.
- Lower the lever regulating the pressure by the adjustment nut.

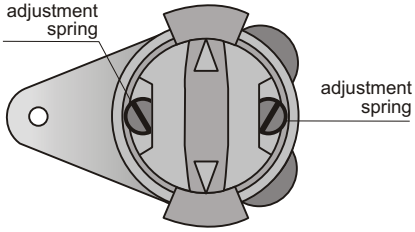
The best thing is to keep the right pressure as it avoids by roll slipping.

- An excessive pressure causes wire distortion, entanglements at the protection entry and tear of the feeding motor.
- Too low pressure may cause welding irregularities.
- Connect the torch to the torch adapter and make sure the wire runs correctly inside the liner of the torch cable.
- Take off the gass guide from the torch extremity and unscrew the contact tip.
- Take the wire come forward as far as it comes out of the torch.

- Mount again the contact tip keeping in mind that it must coresspond, regarding the diameter, to the diameter of the wire used.
- Mount again the gas guide nozzle.
- Connect the earth connection clamp to the work piece to be welded or to the welding table, making sure that clamp is provided with good quality contact.

- Adjustment of braking torque of the sleeve

* for avoiding of spontaneous unrolling of the electrode wire and its tangling the sleeve is equipped with the braking system
* its adjustment is carried by revolution of its two springs, which are placed inside of the sleeve frame
* turning the springs to the left you can increase the braking torque, turning them to the right you can decrease it



Environmental Conditions

Before starting the machine up the following steps must be carried out:

- Secure proper environmental conditions for the welder e.g. rooms should not contain inflammable gases and vapours, conductive dust, caustic fumes and other agents which are harmful for the insulation and mechanical constraction of the welding machine.
- Protect the welder against precipitations when it is used outdoors.
- Place the welder in such a way that it does not hinder its supervision.

- In case an excessive overheating is stated or smoke or fire is observed as well as when the smell of burnt insulation is noticed and an excesive trembling, vibrations or noise take place the operation of the machine must be stopped and detailed survay or in case of necessity a test of technical state must be carried out.

- The same refers to a situation when interlocking of current circuit or a voltage on the cabinet is stated.

- In case of mechanical damage e.g. after a fall of the welder from a considerable hight follow as above.

- Too high humidity may lead to the deterioration of the state of insulation of the machine and can create electric shock hazard.

- During the operation some of internal parts of the welder get hot. Their temperature can reach up to 100°C - it is normal and the machine is protected against overheating by means of the temperature limiter.

- Too high temperture should not occure in connection contacts and if the contacts get very hot it is a sign that their condition is bad.

Preparation for Welding Works

- Connect the return welding cable to the welding piece by means of the clamp.
- Connect the shielding gas cylinder to the gas input through thereducer.
- Connect the mains cable of the welding machine to the mains socket of an one-phase network 240V, 50Hz.
- Switch the machine on by means of the selector  - the power supply indicator lights.
- Insert the electrode wire.
- Choose suitable settings of welding parameters according to the selecting mode and thickness of welding elements.
- Select the range of the welding voltage by means of the selectr  .
- Adjust the welding current by means of the knob of the electrode wire feed speed control  .
- Obeying the appropriate rules you can begin to weld.

Welding Parameters

- The MIG/MAG welding method requires adjusting only two parameters:
  - welding voltage Us
  - electrode wire feed speed Vd
- Increasing of the electrode wire feed speed causes shorten the arc lenght, increasing of the welding current and increasing of the depth of filling up.
- Decreasing of the wire feed speed causes lenghten the arc lenght, decreasing of the weleding current and decreasing ot depth of filling up.
- Increasing of the welding voltage causes lenghten of the arc lenght.
- Decreasing of the welding voltage causes shorten of the arc lenght.
- Too high electrode wire feed speed causes "pushing up" of the torch. The electrode wire falls behind to melt into the arc and pushes back the torch.
- Too low the electrode wire feed speed or too high welding voltage creates big drops of melted metal on the end of the wire, which fall down into the lake of liquid metal.
- Too big splashes show that the welding voltage is too low or the electrode wire feet speed is too high.
- You may increase the welding voltage about 1-4 V during making filling welding seams /set the welding voltage switch in the upper position/.

  Caution!

  Surface of the work piece must be clean and must not show any rust, paint or oily stains.

Spot Welding

The welding machine Compact 185 can use to spot welding. The spot welding process is recommended to join thin elements e.g. sheet metal.
For this you must replace the nozzle with a special one, which is equipped with pins. Those pins enable to tighten joining elements and free flow of the shielding gas.
Recommendation:

- Set the welding parameters as above.
- Quality of the welding seams depend on the welding time.
- Too long the welding time may cause smelting of the material.
- Too short the welding time may cause no connection.

Storage and Transportation

- The welding machine should be stored in close rooms featering temperatures ranging from -10 ℃ to +40 ℃ and relative humidity up to 80 %.
- The room should be free of caustic, conducting dust and other environ-

- It is recommended to store welders in their packagings.
- Transportation inside the factory can be carried out by using own chassies of the machine provided the roads are rather smooth and at low speed up to 5 km/h, optionally a crane or an overhead trevelling crane can be used.
- For transportation on longer distances the welder should be packed in the way protecting it against mechanical damages.
- For transportation any means of transport can be used.
- During the transport welding machines should be placed along the moving direction and protected against rolling or moving as well as against precipitations.

Care and Maintenance

Warning!
Only qulified personnel should perform maintenance and service!
Mains of the welding rectifier must be unplugged during maintenance and service!

Routine maintenance

- general rules of personal and fire protection referring to welding operations must be observed
- check condition of insulation and connections of the current cables, welding torch and power supply cable
- remove the metal spatters from the gas nozzle of the welding torch - they may cause disturbances in the shield of the lake of liquid metal
- grease the gas nozzle of the welding torch with an antisplashing agent
- in case when any metal fillings of the electrode wire are noticed it is necessary to check whether the pressure of the driving roll is proper to the wire diameter and decrease it properly
- before installing a new reel of the electrode wire it is necessary to unscrew the gas nozzle and the contact tip and to clean the shield runner using compressed air - it should prevent from electrode wire blocking
- check state of the welding torch - it must be cleaned if necessary
- check condition and work of the cooling fan - ventilator slots cannot be blocked
- if any damage appears you should give the welder back to the service

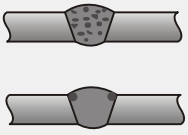
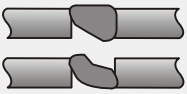
Periodic maintenance

- dust all parts and the cabinet of the welding machine very methodically and wash a refill of the welding torch with petroleum spirits
- check the state of all connections - they must be change if necessary
- check and straighten all of screw connections
- after each repair perform proper measurements of using safety

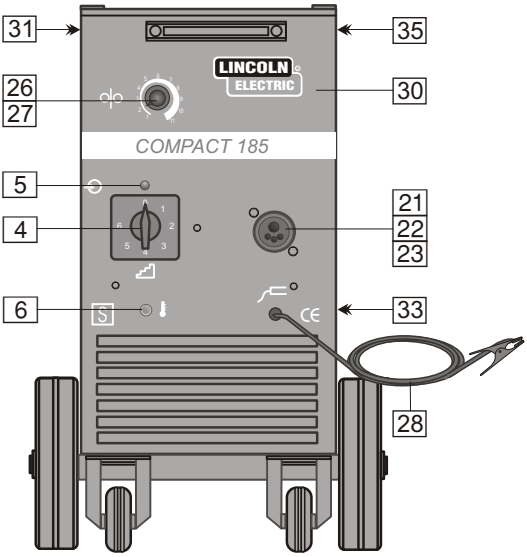
Trouble Shooting Guide

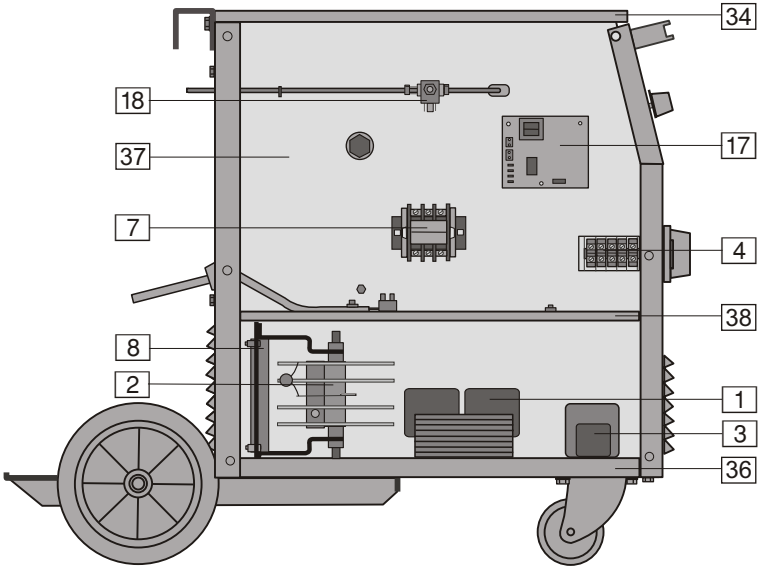
Fault	Cause	Remedy
Lack of the electrode wire feeding /motor does not work/	Work clamp is too weakly fasten	Fasten the clamp properly
	Shield runner of the electrode wire is contaminated	Clean the shield runner of the electrode wire
	Groove of the roll is not compatible to the wire diameter	Use the roll with the groove according to the wire diameter
	Electrode wire is blocked into the contact tip	Unblock the electrode wire into the contact tip
	Motor is damaged	The machine should be given to the service back
	The control circuit US-45S is damaged	The machine should be given to the service back
Irregular feed of the electrode wire	Contact tip is damaged	Change the contact tip for the new one
	Groove of roll is dirty, damaged or it is not compatible to the wire diameter	Clean the groove of the roll or change it according to the wire diameter
Arc does not start	Lack proper contact of the work clamp	Straighten contact of the work clamp
Too long or irregular arc	Welding voltage is too high	Decrease the welding voltage
	Wire feeding speed is too low	Increase the wire feed speed
Too short arc	Welding voltage is too low	Increase the welding voltage
	Wire feeding speed is too high	Increase the wire feed speed
After switching on the idicator lamp does not light	Lack of supply voltage Damaged switch Damaged idicator lamp	Connect supply voltage Change the switch Change the bulb

Defects of Weldig Seams

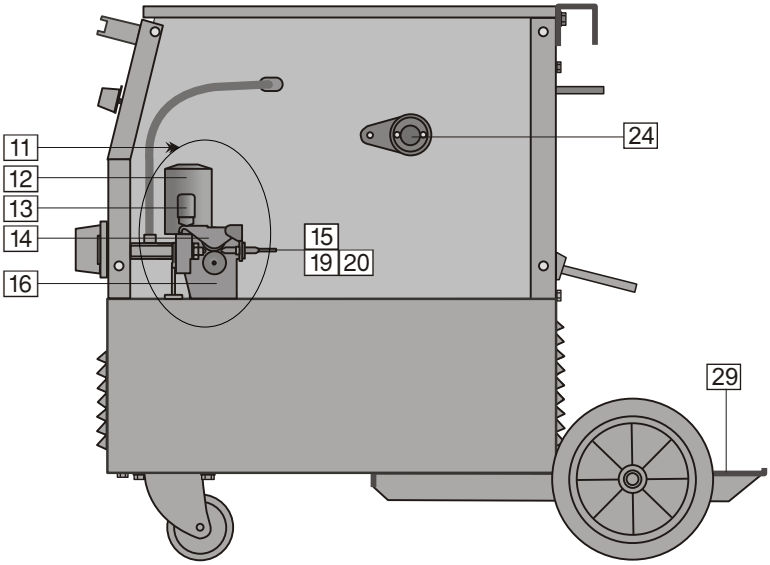
Defect	Appearance	Possible cause
pores		Inncorrect gas flow. Rec. 10-15 l/min
		Inadequate gas shielding due to spatter in nozzle
		Draughty workplace
		Welding distance too long and/or welding torch wrongly held
		Damp, oily, rusty workplace
poor filling up		Welding speed too high
		Current too low relative to welding speed
bindinig faults		Irregular movement of torch
		Voltage too low
spatter		Voltage too high
unevent joint		Current too high relative to voltage
		Welding speed too low
poor penetration		Current too low relative to voltage

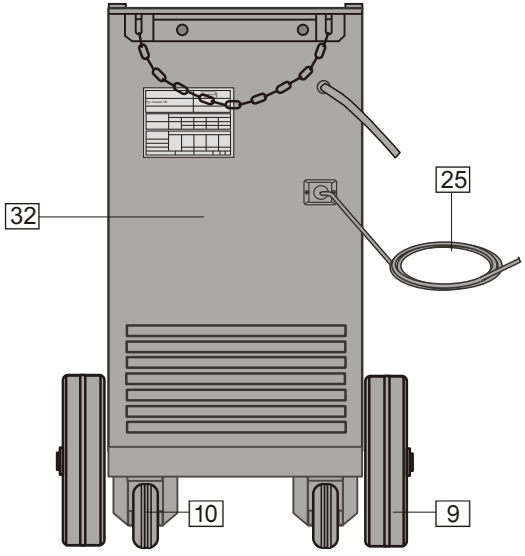
Spare Parts List





Spare Parts List (con't)





Spare Parts List (con't) - CODE NO 1095, K NO K10314-1

Pos.	Description	Type	Index	Qty
1	main transformer T		C-4244-329-1R	1
2	rectifying set V		D-4639-030-1R	1
	temperature sensor	CZOT AO2/96-103	1115-769-087R	1
3	induktor L		C-4244-330-1R	1
4	switch S1	£K15/5.8718	1115-260-053R	1
5	lamp H1	LS3P1	0917-421-041R	1
6	lamp H2	LS3N1 with yellow diode	0917-421-043R	1
7	contactor K	CI 16 220-230 V	1115-212-211R	1
	auxiliary contact block	CB-NC	1115-212-206R	1
8	fan motor M1	MEZAXIAL 3141	0873-100-092R	1
9	wheel	Fi200	1029-660-200R	2
10	turning wheel	SCP80	1029-660-080-R	2
11	feeding unit		B-6713-009-1R	1
12	motor		1111-722-045R	1
13	fixing arm		D-2535-012-1R	1
14	pressure arm		D-4732-003-1R	1
15	inlet guide		1361-599-397R	1
16	feed plate		C-2774-081-1R	1
17	control ciruit	US-45S	0918-432-076R	1
18	gas valve	ELRA 5536, 230V	0972-423-004R	1
19	active roll V	V 0.6-0.8-1.0-1.2	BP10084-1	1
19a	ring		1361-599-364R	1
20	active roll U/Al/	U0.8-1.0-1.2-1.6	BP10115-1	1
20a	ring		1361-599-646R	1
21	EURO socket		C-2985-005-5R	1
22	outlet guide		D-1829-066-1R	1
23	Euro cover		1361-599-708R	1
24	sleeve		C-3891-001-1R	1
25	mains cable		D-5578-094-2R	1
26	potentiometer	P162KC 10kA20%KCF1 6x16	1158-113-005R	1
27	knob		1158-910-025R	1
28	return cable		D-5578-049-2R	1

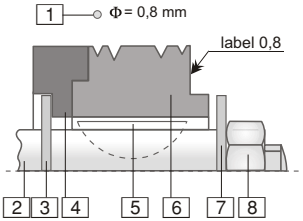
Spare Parts List (con't) - CODE NO 1095, K NO K10314-1

Pos.	Description	Type	Index	Qty
29	lower shelf		D-3721-319-1/08R	1
30	front panel with label, S		D-3721-343-1R	1
31	left side panel with label		D-2721-966-1R	1
	label		2719-107-234R	1
32	rear panel		D-3721-326-1/08R	1
33	side panel		C-2721-884-2/33R	1
34	top panel		C-2773-084-1/08R	1
35	side panel with label		D-2721-965-1R	1
	label		2719-107-234R	1
36	base		C-2774-087-1/08R	1
37	divider panel		D-3721-325-1/08R	1
38	shelf		C-2722-080-1/08R	1
39	harness		B-7639-377-1R	1

Assembly of the Drive Roll of the Feeding Unit

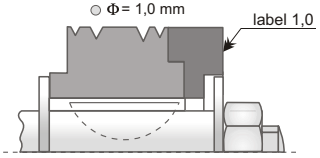
Drive roll should be assembled properly:

Wire roll for the wire with 0,8 mm diameter - producer setting

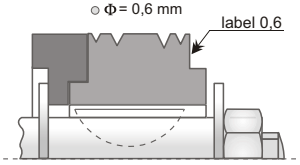


1. wire
2. motor shaft
3. mount ring
4. ring
5. key
6. drive roll
7. washer
8. M6 nut

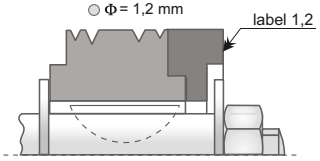
Wire roll for the wire with 1,0 mm diameter



Wire roll for the wire with 0,6 mm diameter



Wire roll for the wire with 1,2 mm diameter



Notes

producer

I-207-327-1
Rev.1 12.2008