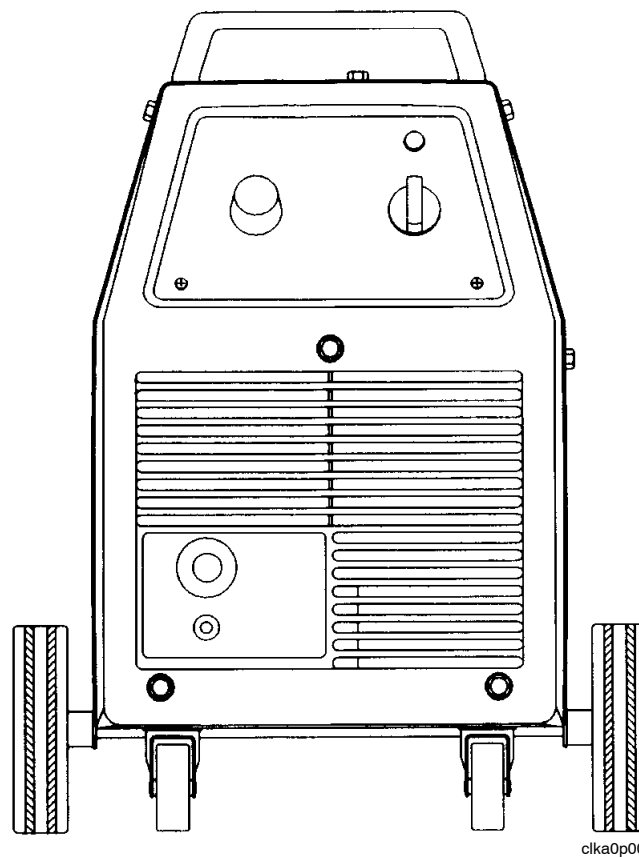


LKA 150



clka0p00

Service manual

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INTRODUCTION

This service manual is intended for use by technicians with electrical training when carrying out fault tracing and repair of the equipment.

At the end of the manual, there is a brief guide to using the machine in order to assist in understanding the machine.

The manual contains all design modifications introduced up to and including September 2004.

Use the diagrams in the manual when tracing faults. The machine components are described in alphabetical order on the pages foregoing the connection diagram.

The LKA 150 is designed and tested in accordance with international standard EN 60974-1, EN 50199.

On completion of service or repair work, it is the responsibility of the person(s) etc. performing the work to ensure that the product does not depart from the requirements of the above standard.



WARNING



ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK – Can kill

- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

FUMES AND GASES – Can be dangerous to health

- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to keep fumes and gases from your breathing zone and the general area.

ARC RAYS – Can injure eyes and burn skin.

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

FIRE HAZARD

- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

MALFUNCTION – Call for expert assistance in the event of malfunction.







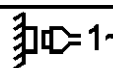

READ AND UNDERSTAND THE OPERATING MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

Rights reserved to alter specifications without notice.

RATING PLATE

The rating plate is secured to the back of the machine. The plate is shown below, with an explanation of how it should be read and interpreted.

	ESAB AB S-402 77 Göteborg Sweden					
1	LKA 150		XXX YYY ZZZ			
2			EN 60974-1 EN 50199			
3		20A/15V - 100A/19V				
			X	20%	60%	100%
		$U_0=28V$	I_2	100A	55A	40A
			U_2	19V	17V	16V
4		$U_1=230V$ 50Hz	I_1	14A	7A	5A
5			IP21			

1. LKA 150 is the type designation for this power source. The first letter, L, indicates that the LKA 150 is a rectifier, while K indicates Compact (Kompakt in Swedish) and A indicates the design generation. The 150 indicates the maximum welding current.

2. These symbols indicate that the LKA 240 incorporates a transformer and rectifier.

3. This section indicates the voltage/current characteristic for MMA welding and a current range of 20 – 100 A. The voltage values of 15 and 19 V in the heading indicate that we comply with the international arc characteristic as defined in IEC 974-1.


X = The duty cycle, indicating for how long a time welding can be carried out at the specified welding data, expressed as a percentage of a ten-minute period.

I_2 = The current at the respective duty factors.

U_2 = The arc line characteristic voltage.

U_0 = The open-circuit voltage.

4. Indicates that the unit is intended for connection to a 230 V single-phase 50 Hz supply.
 I_1 = primary currents at the various load points.
5. IP21 indicates the enclosure class in respect of protection against penetrating objects and water. Enclosure class IP21 indicates that the equipment is intended for indoor use, while IP23 equipment is also suitable for outdoor use.

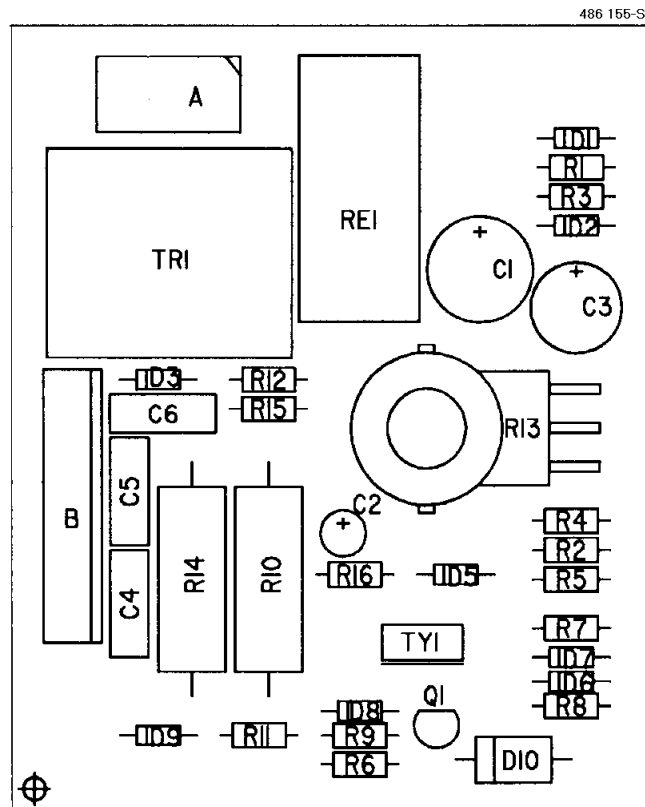
The  symbol indicates that the machine is designed for use in areas of elevated electrical risk.

6. The machine's serial number, in the form of three groups of figures (xxx yyy zzz).
The first group (xxx) indicates the version. The figures represent the year and week of approval of the version.
The second group (yyy) shows the year and week of final testing of the machine.
The second group (yyy) shows the year and week of final testing of the machine. For example, 341 indicates Week 41, 1993.
The final group (zzz) consists of three or four figures, and is a serial number in the range 0001 to 9999.
7. Shows that ESAB complies with the international standard, IEC 974-1.

COMPONENT DESCRIPTION, LKA 150

- AP1** Circuit board with control electronics: see the diagram on page 6 and description on page 7.
- C1** Capacitor 0.1 μ F, 400 VDC, transient protection.
- C2** Capacitor 0.1 μ F, 400 VDC, transient protection.
- L1** Inductor.
- M1** Wire feeder motor.
- QF1** Switch, 8-way, for 7-step and Off (main On/Off switch) adjustment of the welding current.
For the Australian market the main On/Off part of the switch is 2-pole.
- SB1** Welding torch trigger switch.
- ST1** Thermal overload cutout, for protection against overload, fitted in the winding of main transformer TM1.
The switch operates (opens) at a temperature of 130 °C.
- ST2** Thermal overload cutout, for protection against overload, fitted on the diode bridge cooling fins (VC1). It operates (breaks) at 110 °C.
- TM1** Main transformer
- V1** LED, yellow.
Lights if thermal overload cutouts ST1 or ST2 operate as a result of high temperature.
- VC1** Diode bridge.
- XS1** 2-pole connector.
- XS2** 5-pole connector.
- XS3** 2-pole connector.
- XS4** Connector, 2-pole.
- XT1** Mains terminal block, 2-pole.
- XT2** Terminals, welding current, positive and negative

COMPONENT POSITIONS, CIRCUIT BOARD AP1



DESCRIPTION OF OPERATION, CIRCUIT BOARD AP1

This description relates to the circuit diagram and the component positions diagram. If the circuit board is faulty, it must be replaced.

1 CONTROL CIRCUIT

Pressing trigger switch SB1 on the welding torch energises relay RE1 from control power transformer TR1. The contacts on the relay connect main transformer TM1 to the mains power supply.

The power supply to RE1 is half-wave rectified by D1. Resistor R1 is connected in series with the relay and drops the voltage to it. Capacitor C1 (220 μ F) smoothes the voltage. It also delays the drop-off of relay RE1 by about 25 ms, to provide a back-burn time.

2 THERMAL OVERLOAD CUTOUT

In the event of a thermal overload, thermal overload cutouts ST1 or ST2 interrupt the secondary circuit from TR1, causing relay RE1 to drop off and de-energising the welding circuit.

When not operated (i.e. with closed contacts), the cutouts short-circuit inputs B6 and B7.

Operation of either of the cutouts is indicated by LED V1. Interruption of the cutout circuit energises the LED via D2, R3 and D3. D2 is a half-wave rectifier, R3 limits the current through the LED and D3 protects it against reverse voltage.

3 RFI SUPPRESSION AND BASE LOAD RESISTORS

Capacitors C4 – C6 protect against RFI. Resistors R12 and R15 provide a minimum base load for the rectifier bridge: in addition, they act as discharge resistors for the capacitors.

4 MOTOR DRIVE CIRCUIT

The wire feed motor is powered by the rectified secondary voltage from main transformer TM1.

Pressing the welding torch trigger switch SB1 provides a supply to thyristor TY1 via contact B4 from the positive side of the main power rectifier VC1.

Resistors R10 and R14 limit the motor starting current: excessive starting current would demagnetise the motor. D9 is a squelch diode protecting against back-emf from the motor.

The ignition circuit for TY1 consists of R2, R4, R5, D5 and C2.

When Q1 is not conducting, operation of the circuit is as follows:

If the voltage at B4 exceeds the motor voltage, C2 charges via R2, R4 and R5.

When the voltage on C2 reaches the trigger voltage (0.5 – 1.5 V), thyristor TY1 fires.

This means that TY1 conducts each half-cycle when Q1 is not conducting.

D5 protects C2 against negative voltage when Q1 conducts.

MOTOR VOLTAGE CONTROL

C3, R11 and potentiometer R13 form a low-pass filter circuit for the motor supply.

R13 picks off a suitable fraction of the motor voltage for connection to the base of Q1 via diode D6. Q1 starts to conduct at a base voltage of 0.7 V.

C2 charges more slowly, which means that thyristor TY1 fires later.

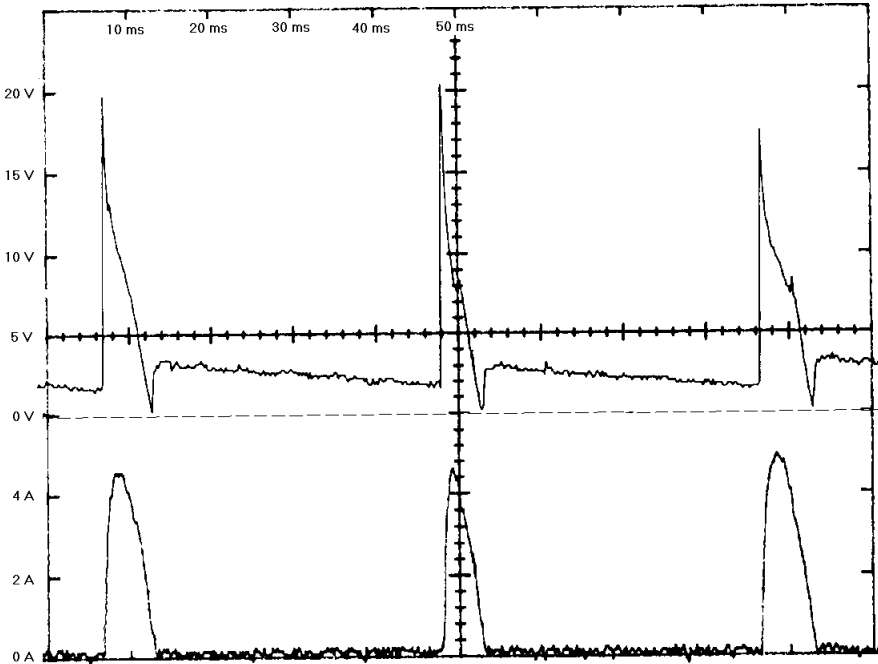
Motor voltage is lowest when R13 is in its upper position, the minimum position.

The base voltage is then high and Q1 conducts. The charging time for C2 becomes so long that thyristor TY1 misses some half cycles, firing only (for example) on every third cycle.

When R13 is in its lower (= maximum) position, the base voltage on Q1 is low and Q1 does not conduct. In this state, zener diode D7 determines the maximum motor voltage.

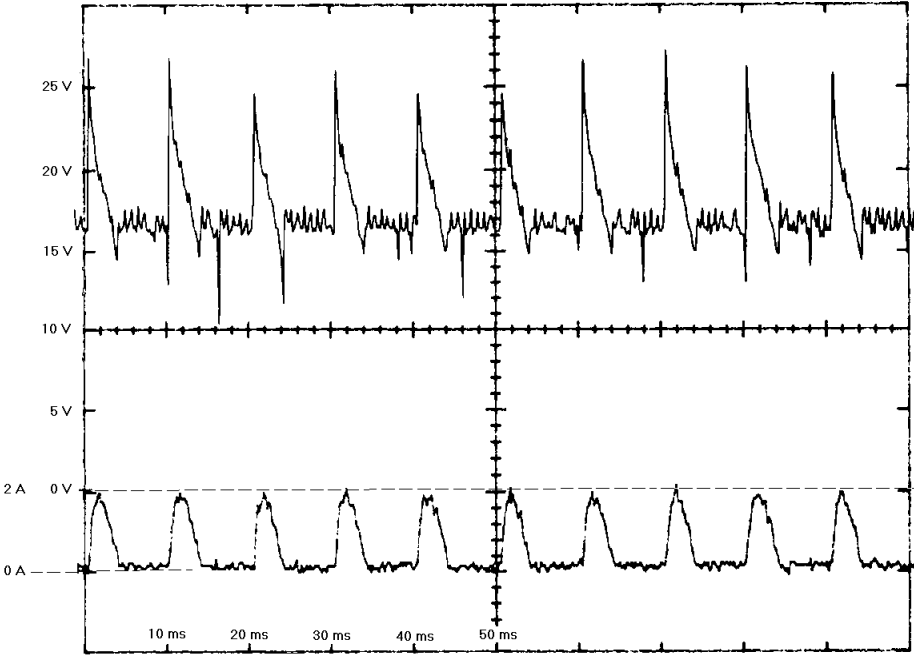
See on page 10 for the motor voltage and current waveforms.

MOTOR DIAGRAMS



clka0p04

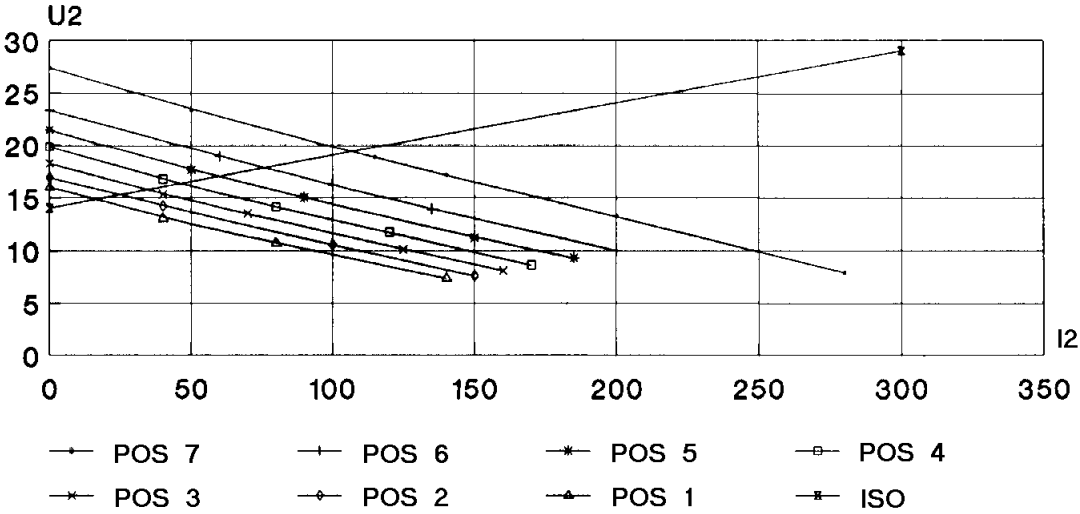
Motor voltage and current when R13 is at its minimum position and QF1 is in position 3. The motor is unloaded.



clka0p05

Motor voltage and current when R13 is in its maximum position and QF1 is in position 3. The motor is unloaded.

LOAD CHARACTERISTIC, LKA 150



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TECHNICAL DATA

Load capacity

At 8% duty cycle	150 A / 16 V
At 60% duty cycle	55 A / 17 V
At 100% duty cycle	40 A / 16 V

No-load voltage 16 – 28 V

Wire feed speed 2,5 – 15 m/min

Wire sizes

Non-alloyed	0,6 – 0,8 mm
Stainless	0,6 – 0,8 mm
Aluminium	1,0 mm *
Gasless wire	0,8 mm

* Teflon wire guide, feed roller for 1.0 mm wire and contact tip for 1,0 mm wire are required.

Voltage steps 7

Wire bobbin capacity 1 – 5 kg (maximum spool diameter 200 mm)

Power supply

Voltage	230 V
Primary current	22 A
Frequency	50 Hz
Fuse	10 A slow-blow **
Mains cable, area	3 x 1,5 mm ²

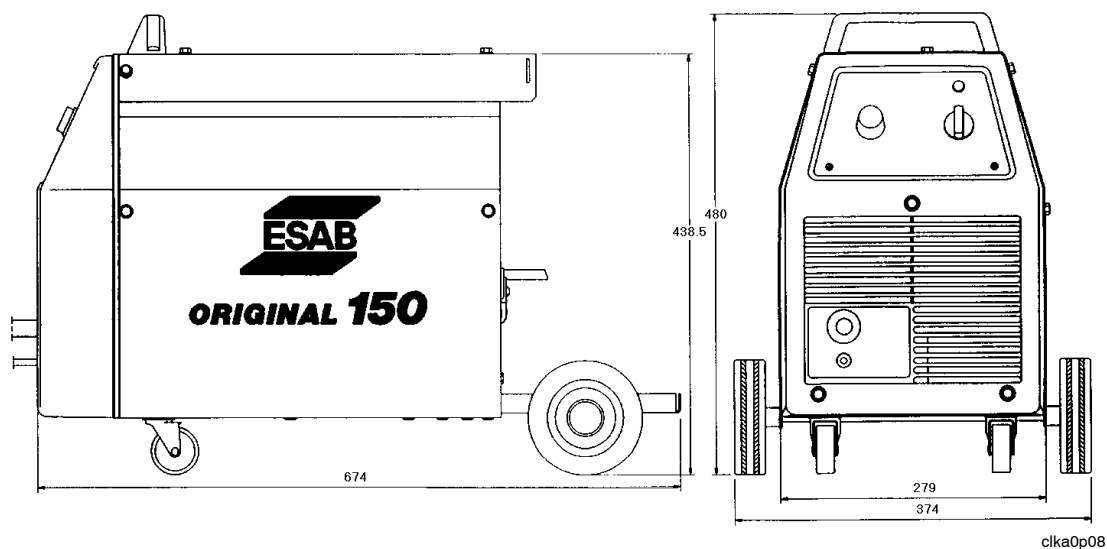
** See also 'INSTALLATION' on page 13.

Enclosure class IP21

Application class 

Weight 36 kg

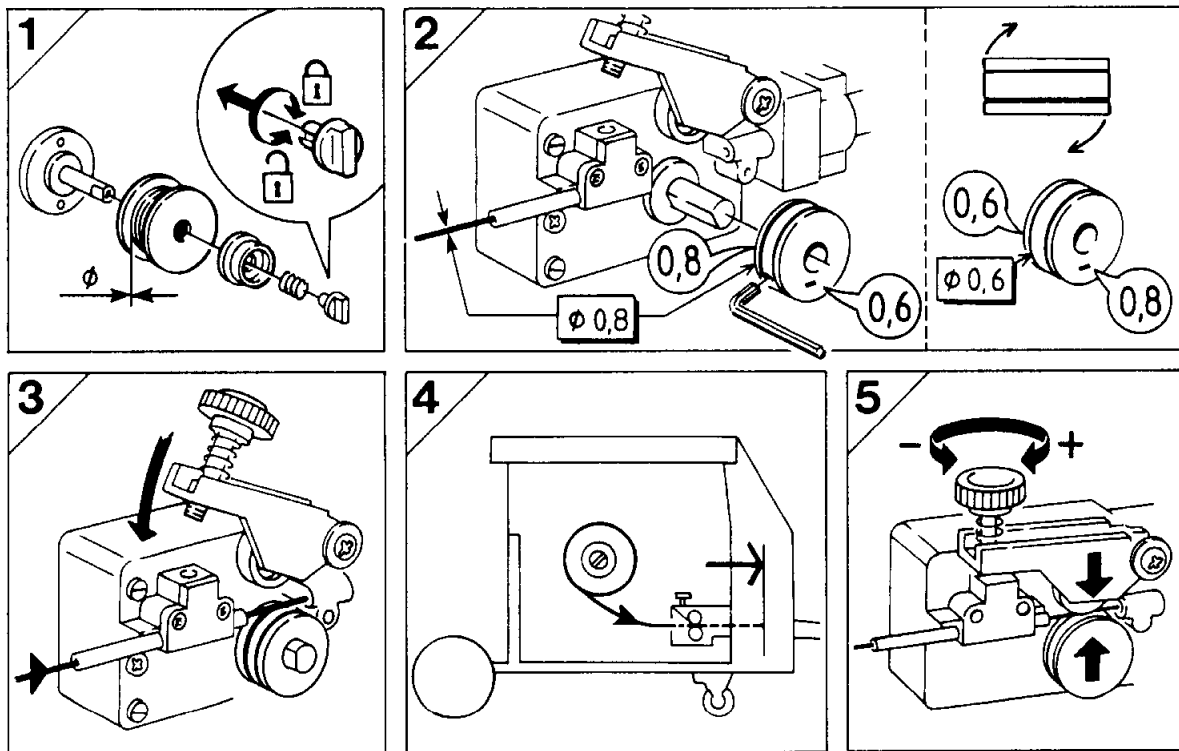
Dimension drawing



INSTALLATION

To be able to operate the LKA 150 at maximum power (position 7), it must be supplied via a 16 A slow-blow fuse. However, a 10 A slow-blow fuse is sufficient for welding at currents up to about 100 A.

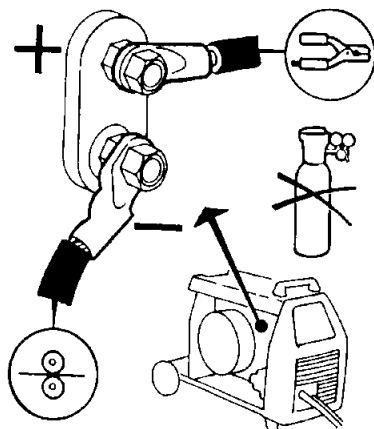
- Place the machine in a suitable position and check that cooling is not obstructed.
- Check that the mains voltage is 230 – 240 V.
Make the necessary earth connections in accordance with safety regulations.
- Fit the filler wire as shown below.



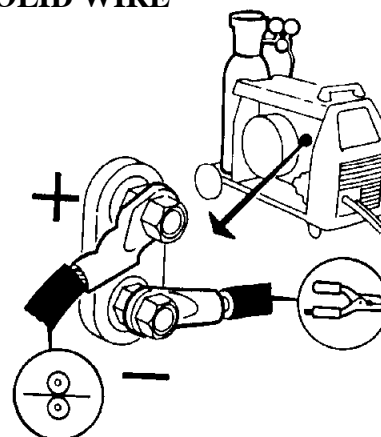
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If the drive rollers slip or wire feed does not work properly, it may be necessary to adjust the roller pressure, as shown in Figure 5 above.

GASLESS WIRE



SOLID WIRE

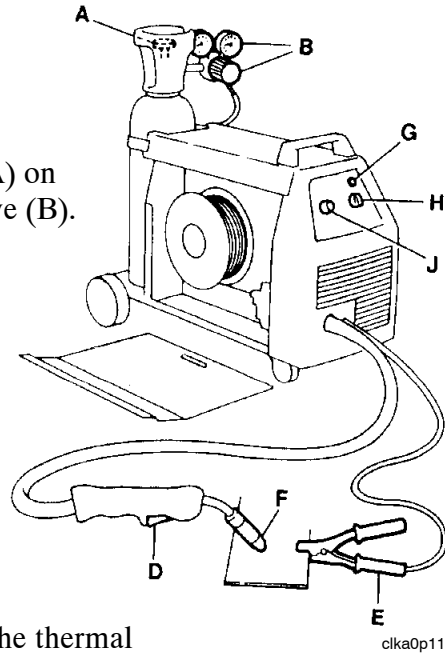


clka0p10

When welding with gasless wire, the return current cable must be connected to the positive terminal on the terminal block above the wire feed unit.

OPERATION

- Connect the return current conductor clamp (E) to the workpiece.
- When welding with solid wire, open the gas valve (A) on the gas bottle and adjust the gas flow by reducer valve (B). The gas flow must be 8 – 12 litres per minute.
- Turn on the power unit and set a suitable voltage with knob (H).
- Hold the welding torch trigger switch (D) pressed until filler wire is fed out through the contact tip (F).
- Select suitable welding data with the voltage control selector (H) and the wire feed control knob (J), as shown in the table on page 15.
- Start welding. Adjust the settings if necessary.
- The yellow LED (G) on the front panel will light if the thermal overload cutout operates as a result of overload. The overload cutout resets automatically when the machine has cooled to a safe temperature.



MAINTENANCE

- **Cleaning away dust**
Blow the unit clean with compressed air at reduced pressure.
- **Wire feed mechanism**
The wire feed mechanism should be cleaned, and wearing parts replaced, at regular intervals in order to ensure smooth, reliable wire feed.
Do not tension the pressure roller too hard, as this will result in abnormal wear to the pressure roller, the feed roller and the wire guide.
- **Welding torch**
Blow the wire guide clean and clean the gas nozzle at regular intervals.

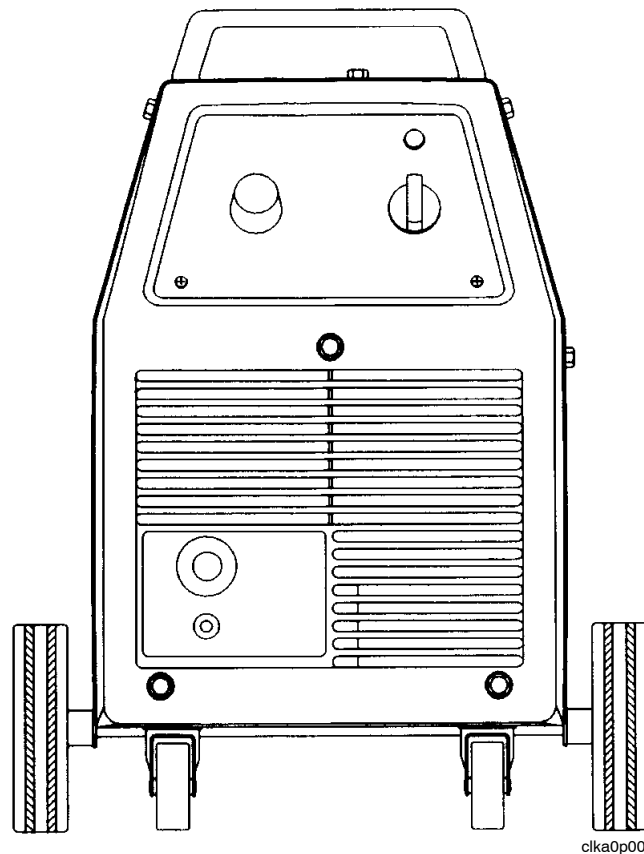
WELDING DATA SELECTION

LKA 150		T mm	TRAD WIRE DRAHT FIL	MIX		CO ₂		Ar		
Fe		0,6	Fe 0,6	5,5	3					
			Fe 0,8	3,5	3					
	0,8	Fe 0,6	5,5	4	6	6				
		Fe 0,8	4,5	3			5	1		
	1,0	Fe 0,6	6,5	5	6,5	6				
		Fe 0,8	5	4	4,5	6				
	1,5	Fe 0,6	7	6	7,5	7	5,5	2		
		Fe 0,8	6	5	5	6				
	2,0	Fe 0,6	8	6			6	4		
		Fe 0,8	7	6	6,5	6				
	3,0	Fe 0,8	8	7	7,5	7	6	5		
		Gl 0,8					8	7		
	Al				Ar					
			1,0	Al 1,0	7,5	2				
1,5			Al 1,0	8	4					
2,0			Al 1,0	8	6					
Ss				Ar + O ₂						
		1,0	Ss 0,6	6,5	4					
			Ss 0,8	6	4					
		1,5	Ss 0,6	8	5					
			Ss 0,8	6,5	5					
		2,0	Ss 0,6	8,5	6					
			Ss 0,8	7	6					
		3,0	Ss 0,6	10	7					
Ss 0,8	8		7							

469 387-001

clka0p13

SPARE PARTS LIST, LKA 150



Edition 040928

Ordering no.	Denomination	Notes
469 375-880	LKA 150	
469 375-881	LKA 150	Only for the Danish market Position 205 deviates from version -880
469 375-882	LKA 150	Only for the Australian market Position 102, 201 and 205 deviates from version -880
469 375-883	LKA 150	Only for the British market Position 205 deviates from version -880

Spare parts list - Reservdelsförteckning - Ersatzteilverzeichnis - Liste de pièces détachées

Spare parts are to be ordered through the nearest ESAB agency as per the list on the back of the cover. Kindly indicate type of unit, serial number, denominations and ordering numbers according to the spare parts list.

Reservdelar beställs genom närmaste ESAB-representant, se sista sidan. Vid beställning var vänlig uppgge typ och tillverkningsnummer samt benämningar och beställningsnummer enligt reservdelsförteckningen.

Die Ersatzteile können bei der nächsten ESAB-Vertretung bestellt werden, siehe letzte Seite. Bitte geben Sie Typenbezeichnung und Herstellungsnummer sowie Bezeichnungen und Bestellnummern laut Ersatzteilverzeichnis an.

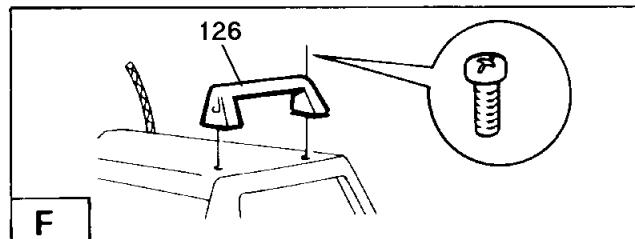
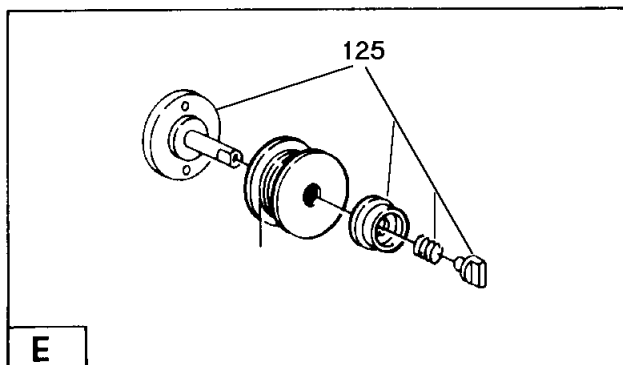
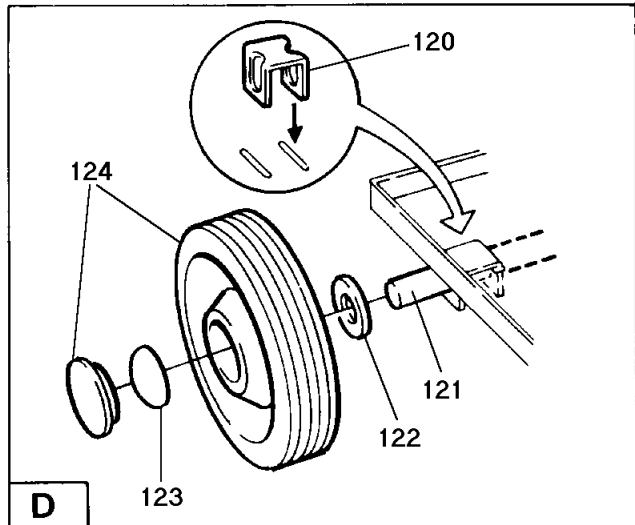
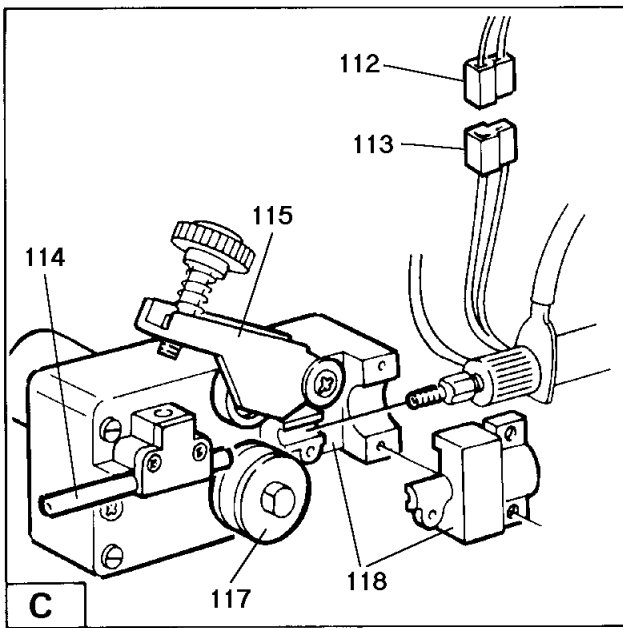
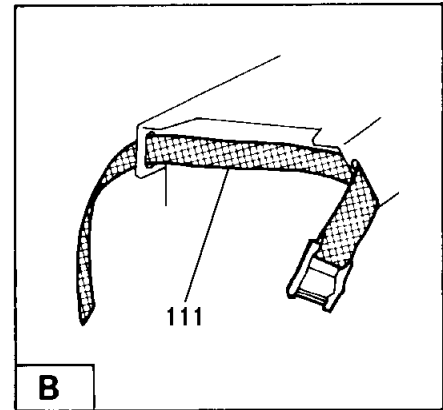
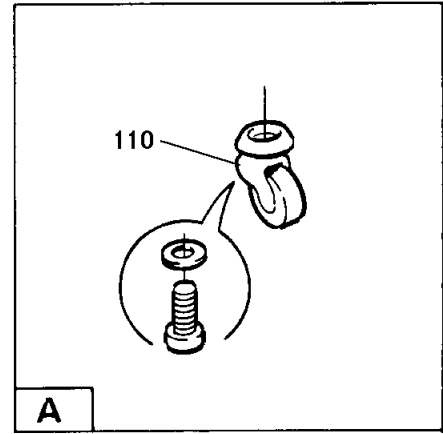
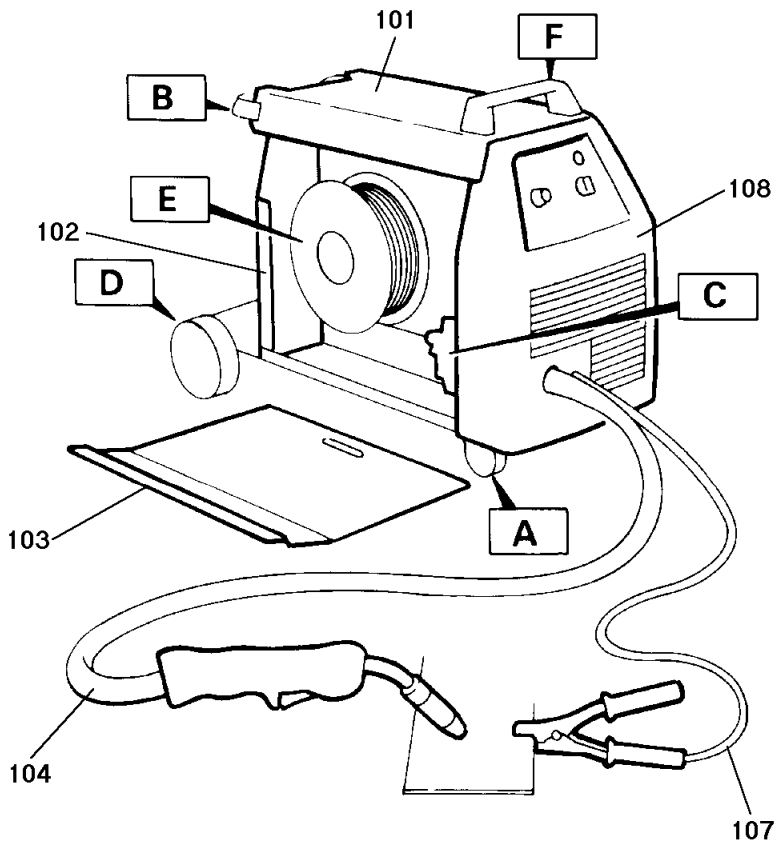
Au dos de la brochure, vous trouverez l'adresse du représentant ESAB le plus proche. Prière de lui adresser votre commande, après avoir pris le soin de mentionner le type et le numéro de série de l'unité ainsi que le numéro de commande et la désignation conformément à la liste de pièces détachées.

C = component designation in the circuit diagram

Item no	Qty	Ordering no.	Denomination	Notes	C
101	1	469 358-001	Cover plate		
102	1	469 356-001	Rear panel		
	1	469 821-001	Rear panel	Only for the Australian market	
103	1	469 386-001	Side panel	With text	
104	1	0700 200 001	Welding gun MXL 150v	Complete	
107	1	469 571-880	Return cable	Complete	
108	1	469 360-001	Front panel		
110	2	469 478-001	Link wheel		
	2		Screw	M6 x 16 mm	
	2		Washer	D 6,5/16,5	
111	1	368 265-001	Securing strap		
112	1	193 498-104	Connector		XS4
113	1	193 498-107	Connector		
114	1		Inlet nozzle	See item 150	
115	1		Pressure arm	With pressure roller, See item 150	
117	1		Feed roller	See item 150 and 151	
118	1	469 475-880	Wire feed unit	Complete	
120	2	469 391-001	Attachment		
121	1	469 390-001	Shaft		
122	2		Washer	D 10.5/22	
123	2	192 859-115	Locking washer		
124	2	469 467-001	Wheel		
125	1	469 310-880	Brake hub	Complete (1 – 5 kg)	
126	1	469 437-001	Handle		
	2		Screw	M6 x 16 mm	

SPARE PARTS SETS

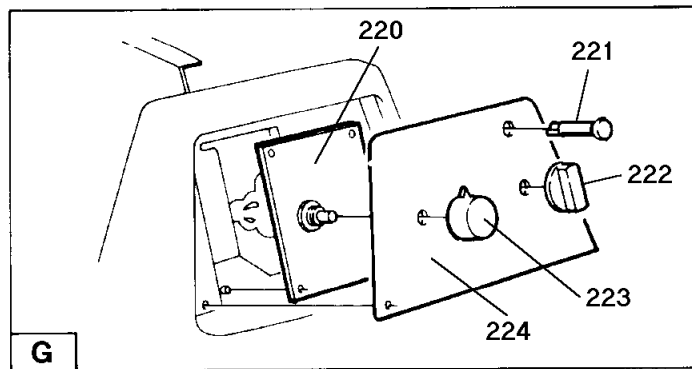
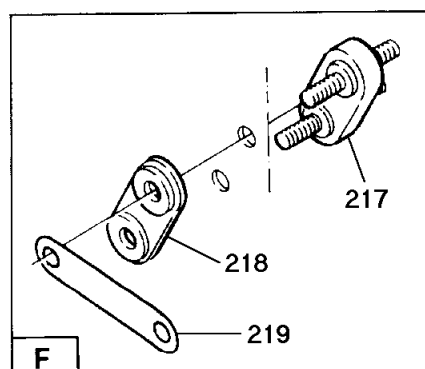
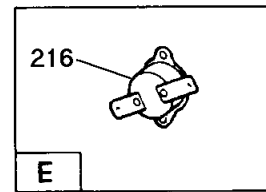
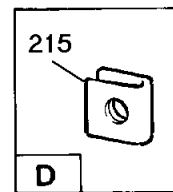
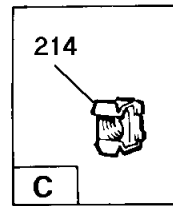
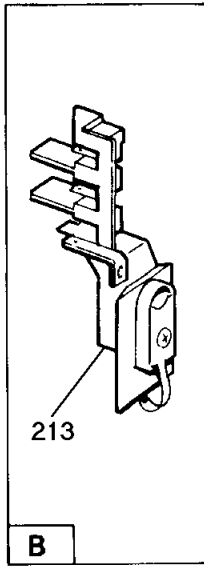
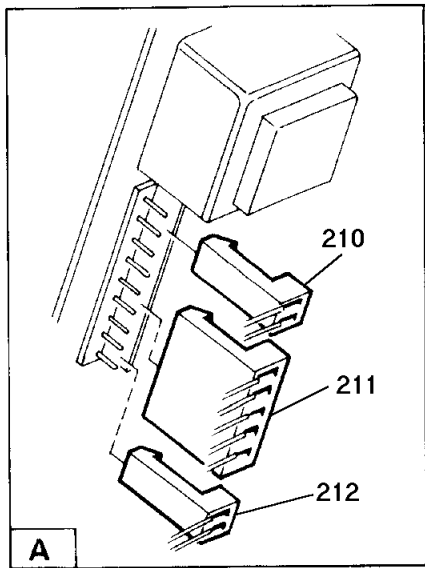
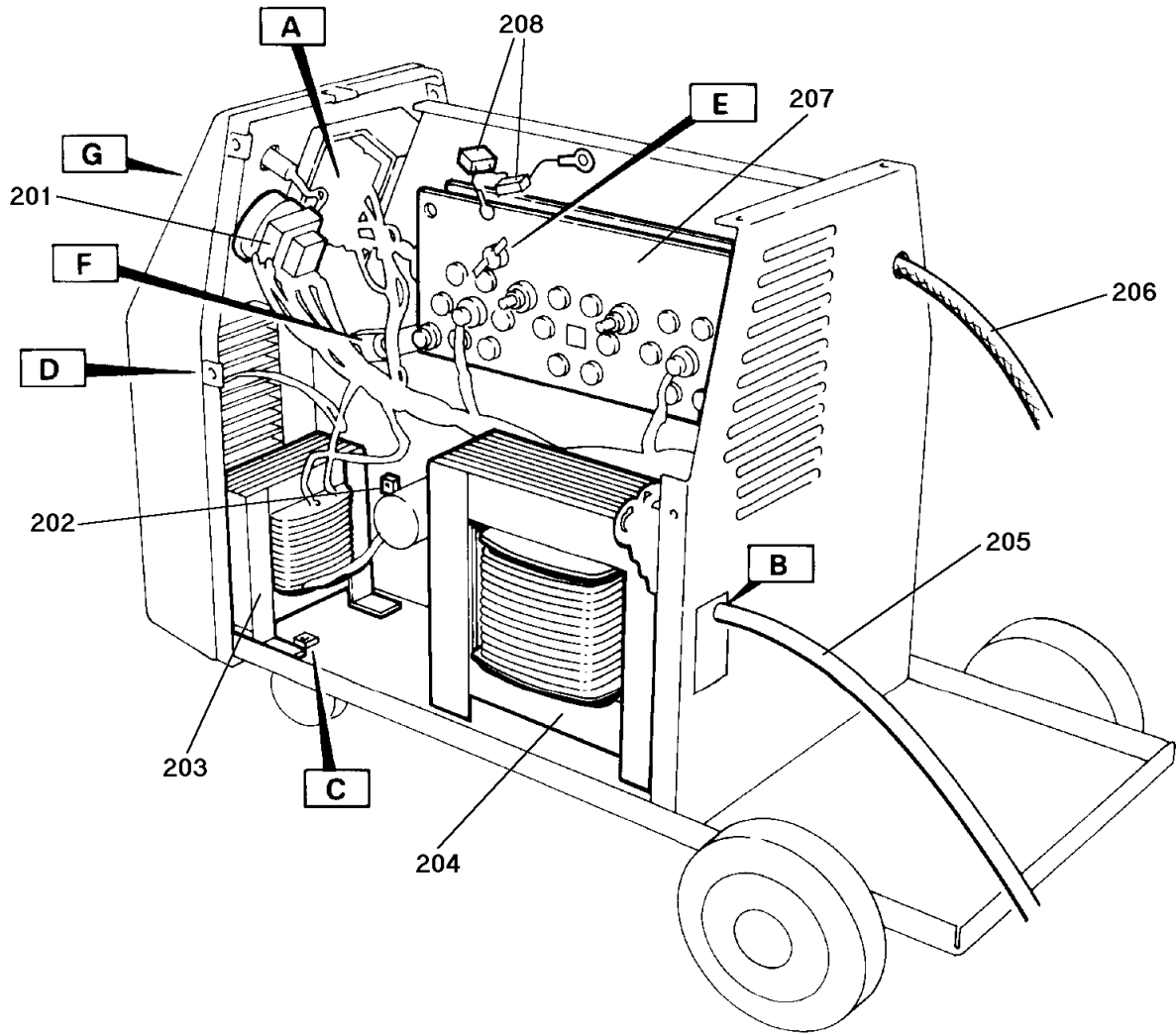
Item	Ordering no.	Denomination	Notes
150	469 517-880	Spare parts set	Contains items 114, 115, 117 feed roller 0.6/0.8 and a tool for the feed roller
151	469 517 880 469 517-881	Feed roller	0.6/0.8 1.0/1.2
152	155 716-880	Gas flow gauge	For protection gas



Spare parts list – Reservdelsförteckning – Ersatzteilverzeichnis – Liste de détachées

C = component designation in the circuit diagram

Item no	Qty	Ordering no.	Denomination	Notes	C
201	1	469 471-001	Switch		QF1
	1	469 668-001	Switch	Only for the Australian market	QF1
202	4	192 562-801	Cage nut	M4	
203	1	469 300-880	Inductor		L1
204	1	469 280-880	Transformer	Complete with thermal cutout ST1	TM1
205	1	369 724-002	Mains cable	3 x 1.5 mm ² with mains plug	
	1	369 724-003	Mains cable	3 x 1.5 mm ² with mains plug Only for the Danish market	
	1	369 724-004	Mains cable	3 x 1.5 mm ² with mains plug Only for the Australian market	
	1	369 724-005	Mains cable	3 x 1.5 mm ² with mains plug Only for the British market	
206	1	190 315-102	Gas hose	To be ordered per meter 1.3 meter as delivered	
207	1	469 662-880	Diode bridge		VC1
208	1	469 380-880	Capacitor	Set of 2 capacitors, PME 0.1 µF 400 V, with cable lugs	C1 + C2
210	1	193 260-001	Connector	2-pole	XS1
211	1	193 260-153	Connector	5-pole	XS2
212	1	193 260-150	Connector	2-pole	XS3
213	1	469 477-001	Cable inlet		
214	4	192 562-105	Cage nut	M6	
215	3	469 381-001	Speednut		
216	1	321 229-003	Thermal cutout	Opens at 110 °C	ST2
217	1	469 377-001	Connection block		XT2
218	1	469 378-001	Insulation		
219	1	469 379-001	Bus bar		
220	1	486 155-880	Circuit board		AP1
221	1	193 759-002	Light-emitting diode	Yellow	V1
222	1	366 296-003	Knob		
223	1	191 510-104	Knob		
224	1	469 364-001	Panel	With text	



AH 0216

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