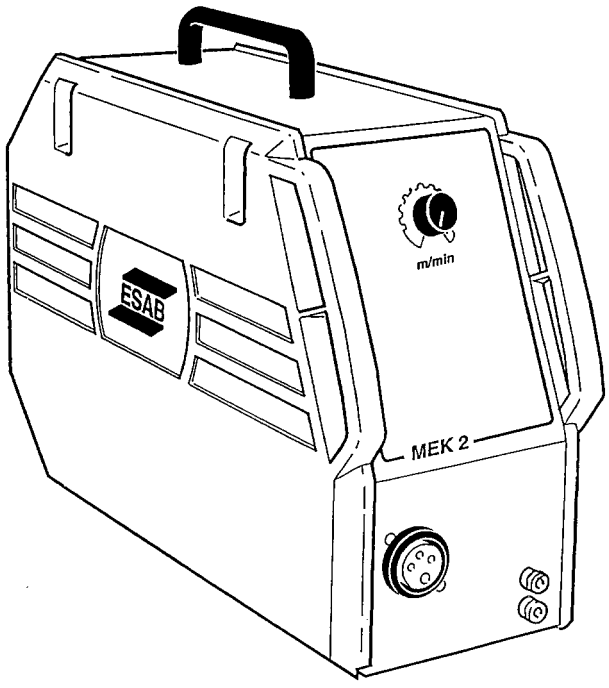
MEK 2



Service manual

0740 800 094 020531

LIST OF CONTENTS Page

READ THIS FIRST

Maintenance and repair work should be performed by an experienced person, and electrical work only by a trained electrician. Use only recommended replacement parts.

This service manual is intended for use by technicians with electrical/electronic training for help in connection with fault-tracing and repair.

Use the connection diagram as a form of index for the description of operation. The circuit board is divided into numbered blocks, which are described individually in more detail in the description of operation. All component names in the connection diagram are listed in the component description.

This manual contains details of all design changes that have been made up to and including May 2002.

The MEK 2 is designed and tested in accordance with international and European standard IEC/EN 60974-1 and 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.

ESD

WARNING !

STATIC ELECTRICITY can damage circuit boards and electronic components.

- **Observe precautions for handling electrostatic sensitive devices.**
- **Use proper static-proof bags and boxes.**

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.

NOISE - Excessive noise can damage hearing
- Protect your ears. Use ear defenders or other hearing protection.
- Warn bystanders of the risk.

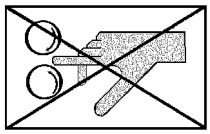
MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

WARNING!

Rotating parts can cause injury, take great care



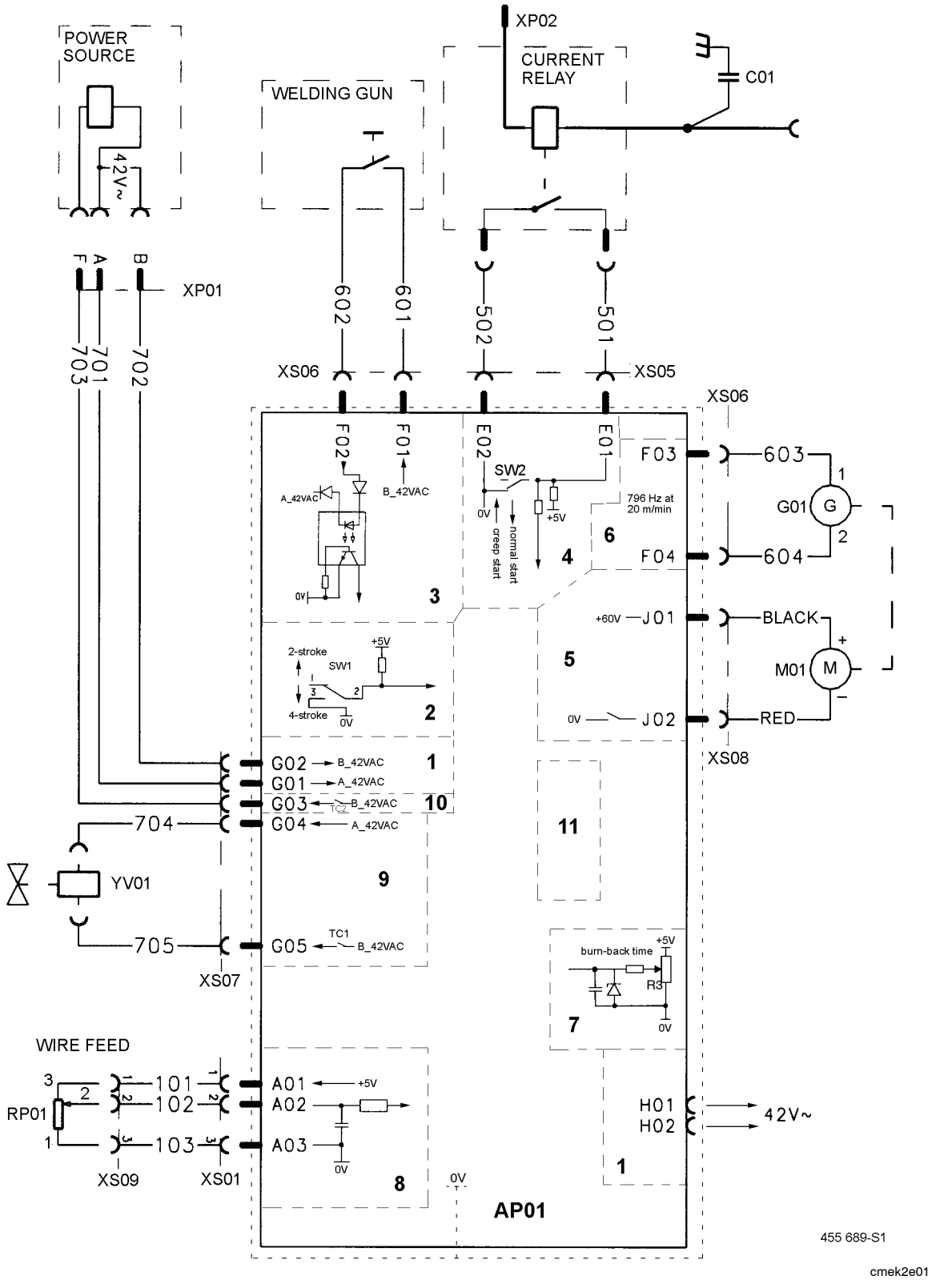
COMPONENT DESCRIPTION

This component description refers to the connection diagram. In the description of operation on page 7 there is a more detailed description of the components and their function.

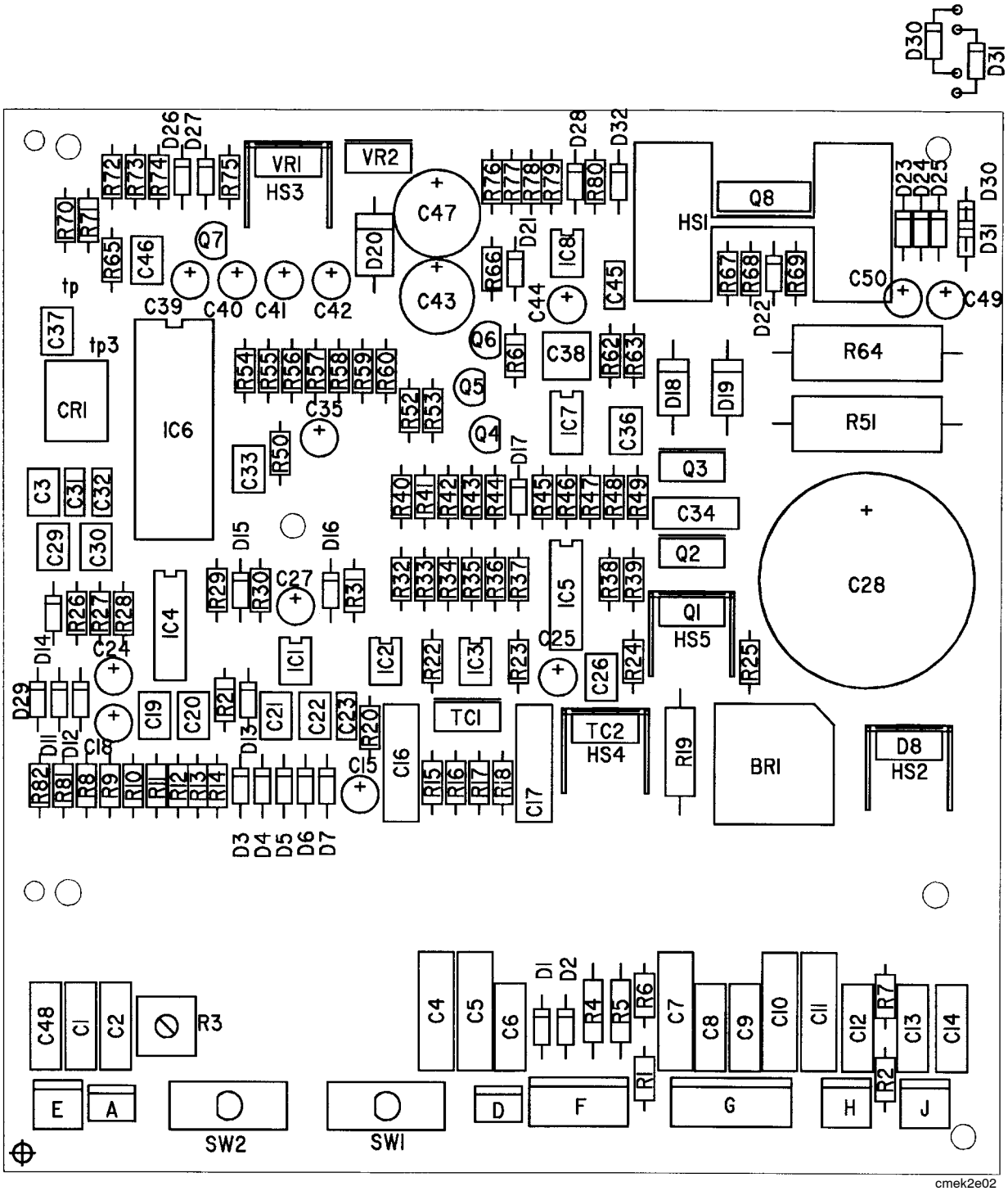
AP01	Main circuit board with control electronics.
C01	Capacitor 0.1 µF 125 VAC, decoupling.
G01	Tachogenerator, incorporated in motor M01.
M01	Motor, rated voltage 24 V.
R3	Potentiometer, for setting the burn-back time.
RP01	Potentiometer, 10 kΩ, for setting the wire feed speed.
SW1	Switch, 2/4-stroke changeover.
SW2	Switch, creep start ON/OFF
XP01	23-pole connector, for connection to the welding power unit.
XP02	Terminal for welding current connection from the power unit.
XS01 - XS09	Sleeve connectors.
YV01	Solenoid valve

CONNECTION DIAGRAM MEK 2

The numerals 1 – 11 refer to the description of operation.



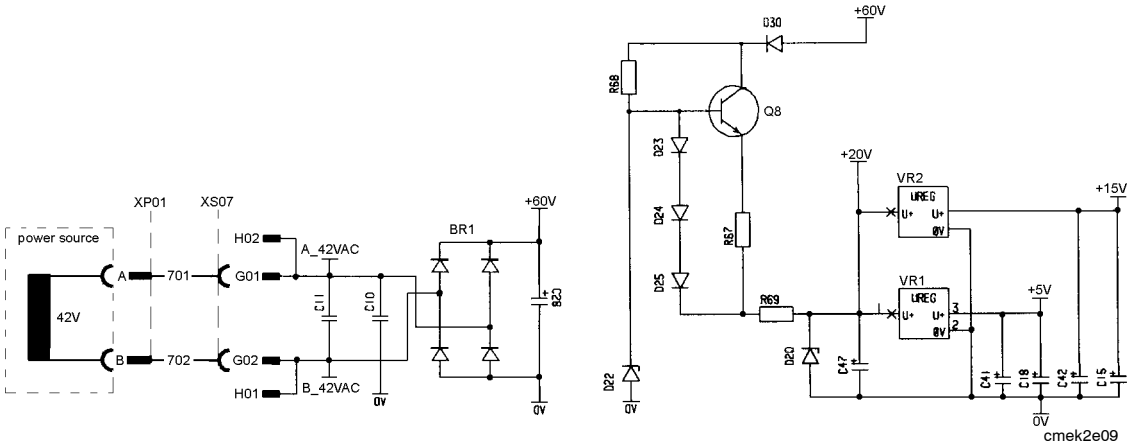
DESCRIPTION OF OPERATION



Component positions, circuit board AP01

Sections 1 to 11 below refer to the diagram on page 5.
The circuit board is screened by a metal casing, connected to 0 V in the wire feed unit.

1 Power supply



The feeder obtains a 42 V supply from the control power supply transformer in the power unit via contact XP01. Its power demand at maximum load is 3.5 A.

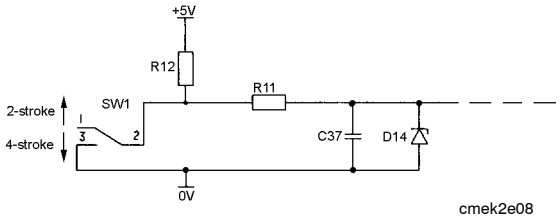
42 V AC is used for the welding torch trigger switch and as the power supply to the gas solenoid valve and the main contactor. In addition, 42 V is also available on contacts H01 and H02.

Rectifier BR1 rectifies the 42 V supply to 60 V. Capacitor C28 smooths the voltage, which then supplies the wire feeder motor.

Transistor Q8 is a pre-regulator which reduces the voltage from 60 V to 20 V. Q8 is current-limited to about 200 mA. If the 20 V supply drops below 13 V, the wire feed unit stops.

VR1 and VR2 are 5 V and 15 V voltage regulators respectively.

2 2-stroke / 4-stroke



cmek2e08

2-STROKE

When SW1 is open, the unit operates in 2-stroke mode. Operating the trigger on the welding torch starts the motor, opens the gas valve and energises the power unit contactor.

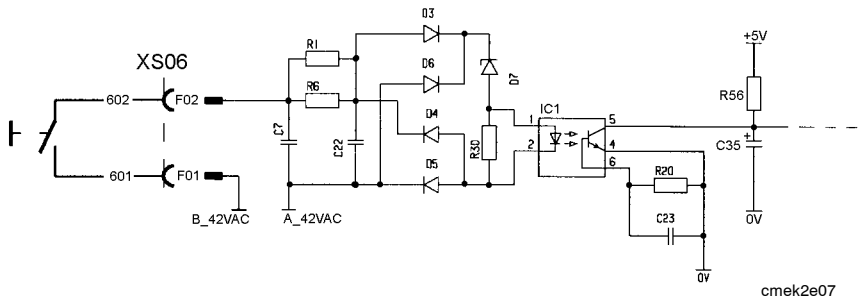
Releasing the trigger stops the motor, de-energises the contactor and closes the gas valve. If burn-back is in operation, welding ceases when the burn-back time has elapsed.

4-STROKE

When SW1 is closed, the unit operates in 4-stroke mode. Operating the trigger on the welding torch opens the gas valve: releasing the trigger then starts the motor and energises the power unit contactor.

Operating the trigger switch for a second time stops the motor and de-energises the contactor in the power unit: releasing the switch then closes the gas solenoid valve. If burn-back is in operation, welding ceases when the burn-back time has elapsed..

3 Start / Stop



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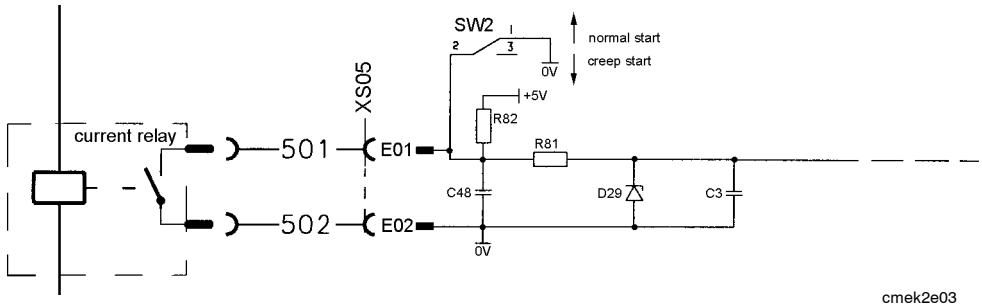
The welding torch switch is supplied with 42 V AC. Closing the switch activates optocoupler IC1, causing the voltage across C35 to go low.

4 Current relay, Creep start / Normal start

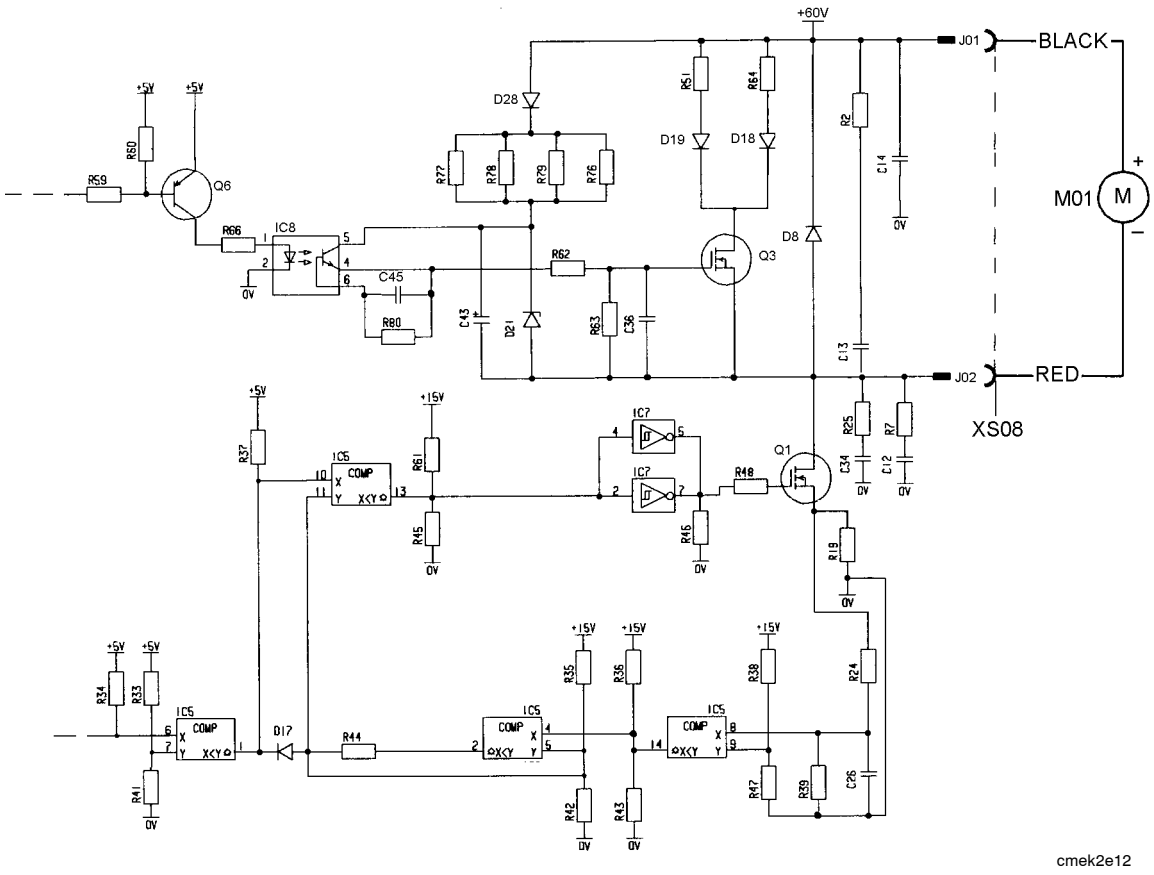


The current relay is activated when the welding current exceeds 20 A.

Creep start means that the motor runs at 1.9 m/minute until the current relay operates, after which the speed increases to the set speed. If the current relay does not operate within one second after starting, the motor speed increases to the set speed in any case.

Selector switch SW2 on the circuit board selects Creep Start On/Off. Closing the switch on to the 0 V rail disengages creep start.

5 Motor driving / braking



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DRIVING

The motor is powered from the smoothed +60 V supply. Motor speed is controlled by pulse width modulation of transistor Q1. The pulse frequency is 12 kHz, and the maximum on-time is 97% of the pulse cycle time. During the pulse spaces, the motor current freewheels through diode D8.

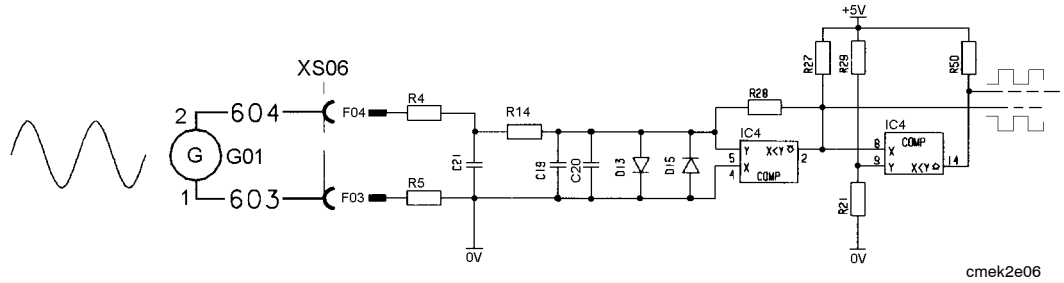
At 24 V motor supply voltage, the wire feed rollers' speed is 160 r/min. A wire feed speed of 20 m/min. requires a roller speed of 212 r/min.

Resistor R19 produces a voltage drop proportional to the motor current. If the current exceeds 7 A, IC5:2 turns off the gate pulses to Q1. When the current falls, Q1 conducts again at the next gate pulse.

BRAKING

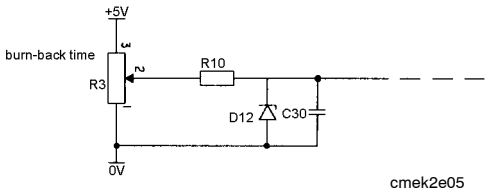
When the motor starts, capacitor C43 charges up via diode D28: the voltage is limited to 15 V by zener diode D21. When the motor is to brake, the LED in optocoupler IC8 lights, causing the transistor in IC8 to conduct and discharge capacitor C43 (15 V) to the gate of transistor Q3. The transistor conducts and short-circuits the motor voltage through resistors R51 and R64, which limit the current to about 20 A.

6 Tachometer input



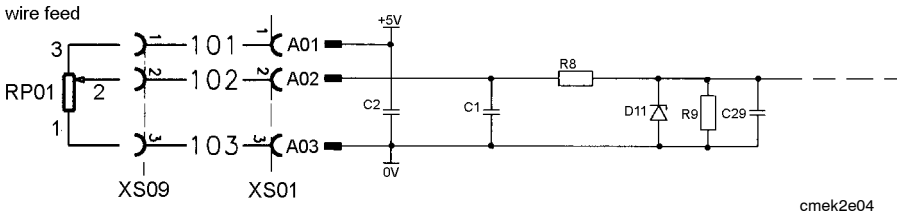
Tachometer G01 is fitted in the motor casing. Tachometer output frequency is 796 Hz for a wire feed speed of 20 meters per minute.
Comparator IC4:2 converts the sine wave signal from the tachometer to a square wave at the same frequency.

7 Burn-back time



The burn-back time is the time from when motor braking starts until the main contactor in the power unit opens. It can be adjusted between 0 and 0.5 seconds by potentiometer R3, which is mounted on the circuit board.

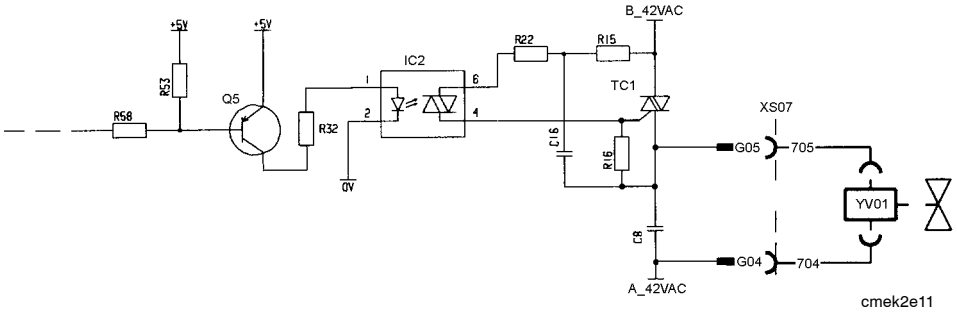
8 Wire feed speed



The wire feed speed range is from 1.9 to 20 meters per minute.

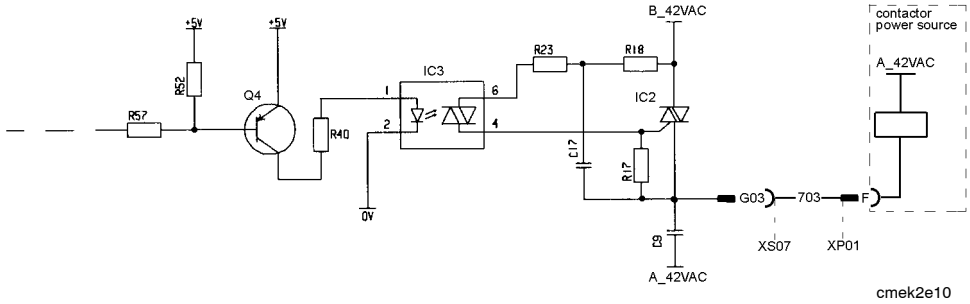
A 5 V reference voltage signal at connection A02 represents a speed of 20 m/minute.

9 Gas valve



The gas valve is connected to board contacts G04 and G05. The valve is energised via triac TC1.

10 Activation, contactor



The start signal to the power unit is connected to board contact G03. The contactor is energised via triac TC2.

11 Processor

The processor incorporates EPROM memory in which the machine's program is stored.

The processor monitors the wire feed speed. If the speed deviates from the set speed by more than 1.5 m/minute for more than five seconds, wire feed will be stopped..

TECHNICAL DATA

Power supply	42 V 50 – 60 Hz
Power requirement	150 VA
Feed speed	1.9 – 20 m/min
Pistol connection	EURO
Max. diameter of wire bobbin	300 mm
Weight	15 kg
Dimensions (l x w x h)	645 x 240 x 480 mm

⚠ WARNING

There is a risk of tipping if the MEK 4 is fitted with a counterbalance arm. Secure the equipment, especially if used on an uneven or sloping surface.

Limit the angle of rotation of the wire feed cabinet using the straps supplied.

When moving the equipment, do **NOT** pull on the torch.

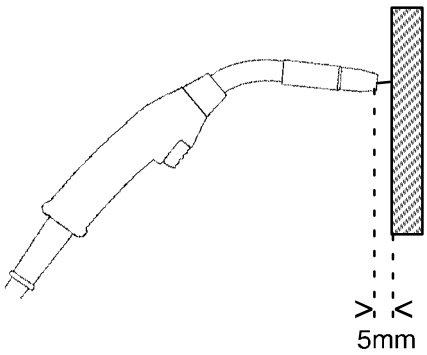
MAINTENANCE

Regular maintenance is important in ensuring safe and reliable operation.

- **The feed unit**
  Clean and replace the wearing parts in the feed mechanism at regular intervals.
  Do not set too high a pressure on the pressure rollers, as this can cause abnormal wear of the pressure rollers,. the feed rollers and wire guide. Instructions for setting the wire feed pressure are on page 14.
- **The pistol**
  Blow the wire guide clean with compressed air at regular intervals and clean the gas nozzle.

SETTING THE WIRE FEED PRESSURE

Start by checking that the wire can run freely through the wire liner, and then adjust the pressure of the wire feed rollers. It is important that the pressure is not too high.



cmek0p10

Figure 1

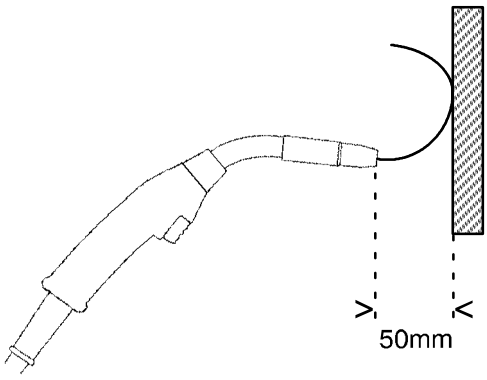


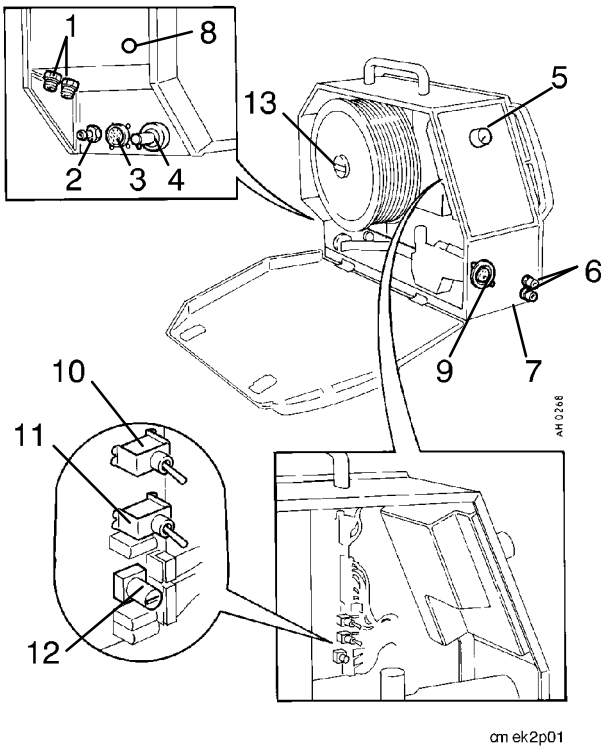
Figure 2

To check for correct feed pressure, feed the wire out against a piece of insulating material, such as a piece of wood.

With the pistol held about 5 mm from the wood (Figure 1), the drive rollers should slip.

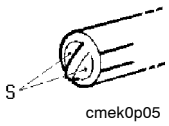
With the pistol held further away from the wood (about 50 mm, as shown in Figure 2), the wire should continue to feed out, bending as it does so.

CONTROL PANEL AND CONNECTIONS



1. Cooling water connections (only -883 model).
2. Gas connection.
3. Connector for control cable from the power unit.
4. Connector for welding current cable from the power unit.
5. Potentiometer, wire feed speed 1.9 - 20 meter per minute.
6. Cooling water connections to/from the welding gun (only -883 model).
7. Strap securing points. The strap must be used to secure the wire feed unit to the power unit during transport.
8. Hole for fitting wire liner from the ESAB Marathon Pac.
9. Welding gun connector.
10. Selector switch, 2/4-stroke mode.
11. Selector switch, creep start On/Off.
12. Potentiometer, burn-back time, 0 - 0.5 seconds.
13. Brake hub.
    The hub is adjusted when delivered, if readjustment is required, follow the instructions below.

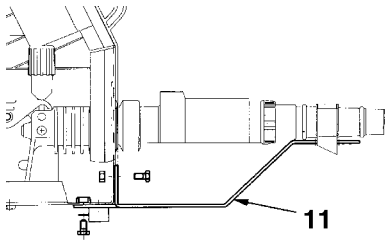
    Adjust the braking power by means of the two screws (springs) inside the hub.
    Turn the adjustment screws clockwise to reduce the braking power.
    Adjust the brake hub so that wire is slightly slack when wire feed stops.

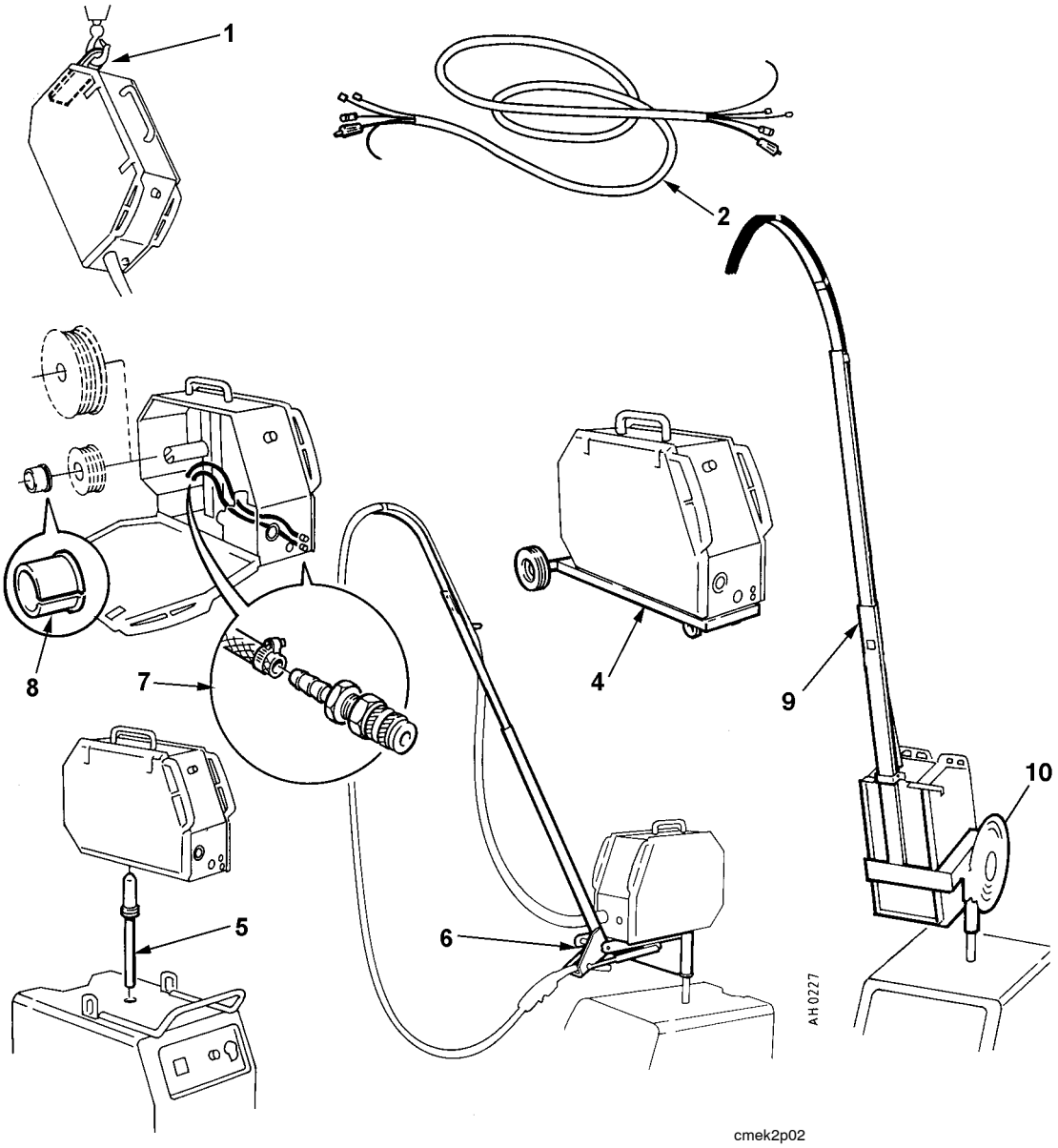


S = Adjustment screws

ACCESSORIES

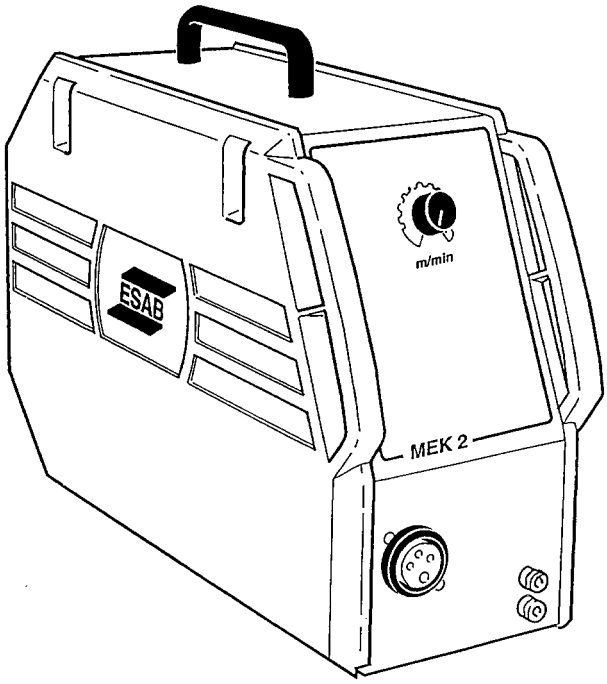
Item no.	Ordering no.	Denomination
1	469 789-880	Lifting eye
2	469 836-880	Connection set, 1.7 meter. When connected to LAX 320/380
2	469 836-885	Connection set, 1.7 meter. When connected to LAX 380W
	469 836-881	Connection set, 8 meter. When connected to LAX 320/380
	469 836-886	Connection set, 8 meter. When connected to LAX 380W
4	469 786-880	Trolley
5	156 654-883	Guide pin (included in LAX)
6	469 792-881	Counter balance device and mast
7	469 967-880	Water connection set
8	455 410-001	Adapter for 5 kg bobbin
9	0156 746 880	Mast
10	0456 693 880	Counter balance device, sprung coil
11	0457 341 880	Hose reinforcement bracket





cmek2p02

Spare parts list



Valid for serial no. 510 -xxx-xxxx to serial no. 826-xxx-xxxx

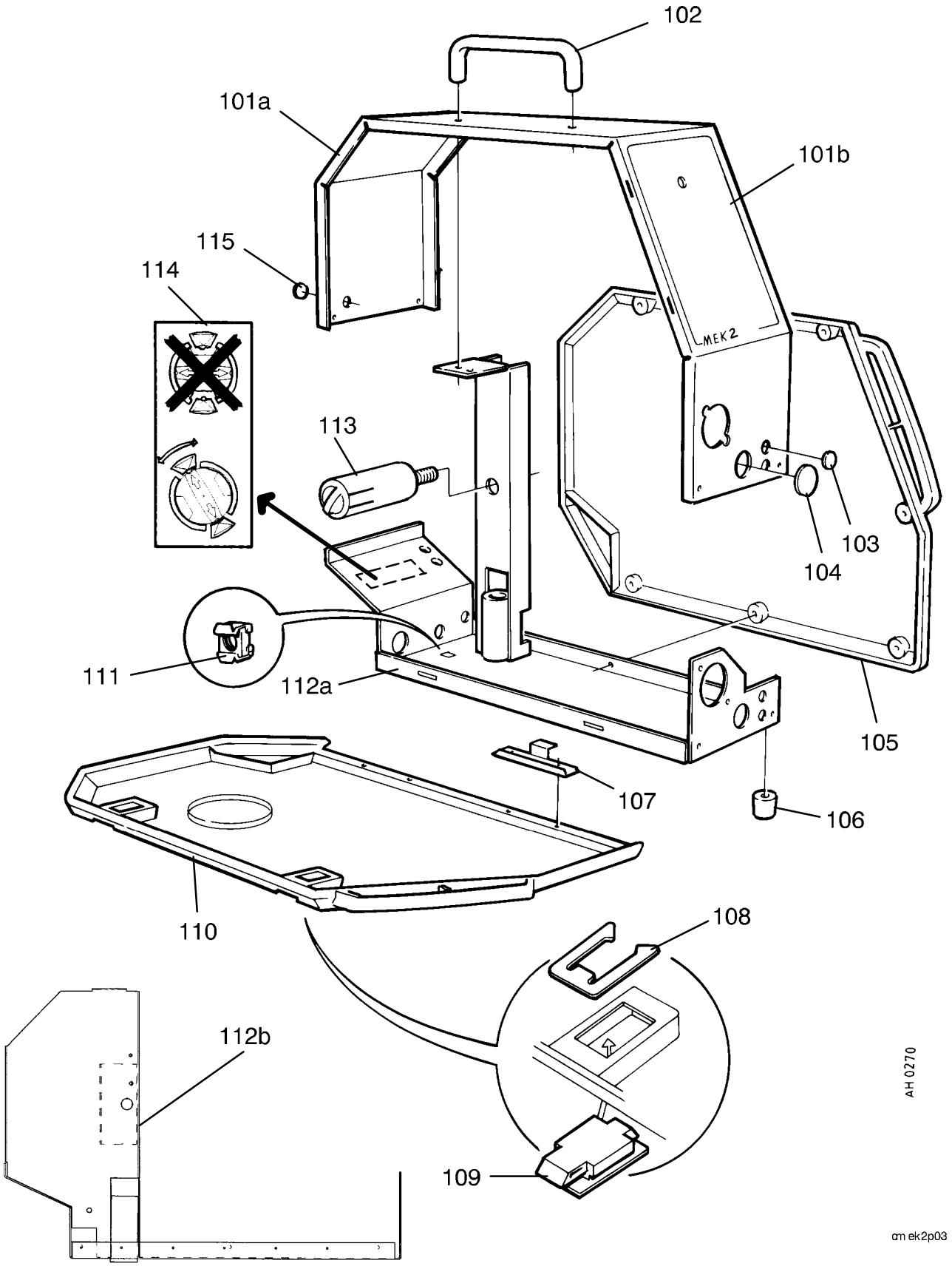
Ordering numbers for MEK 2

0455 590 881	MEK 2	Without water connection
0455 590 883	MEK 2	With water connection

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.

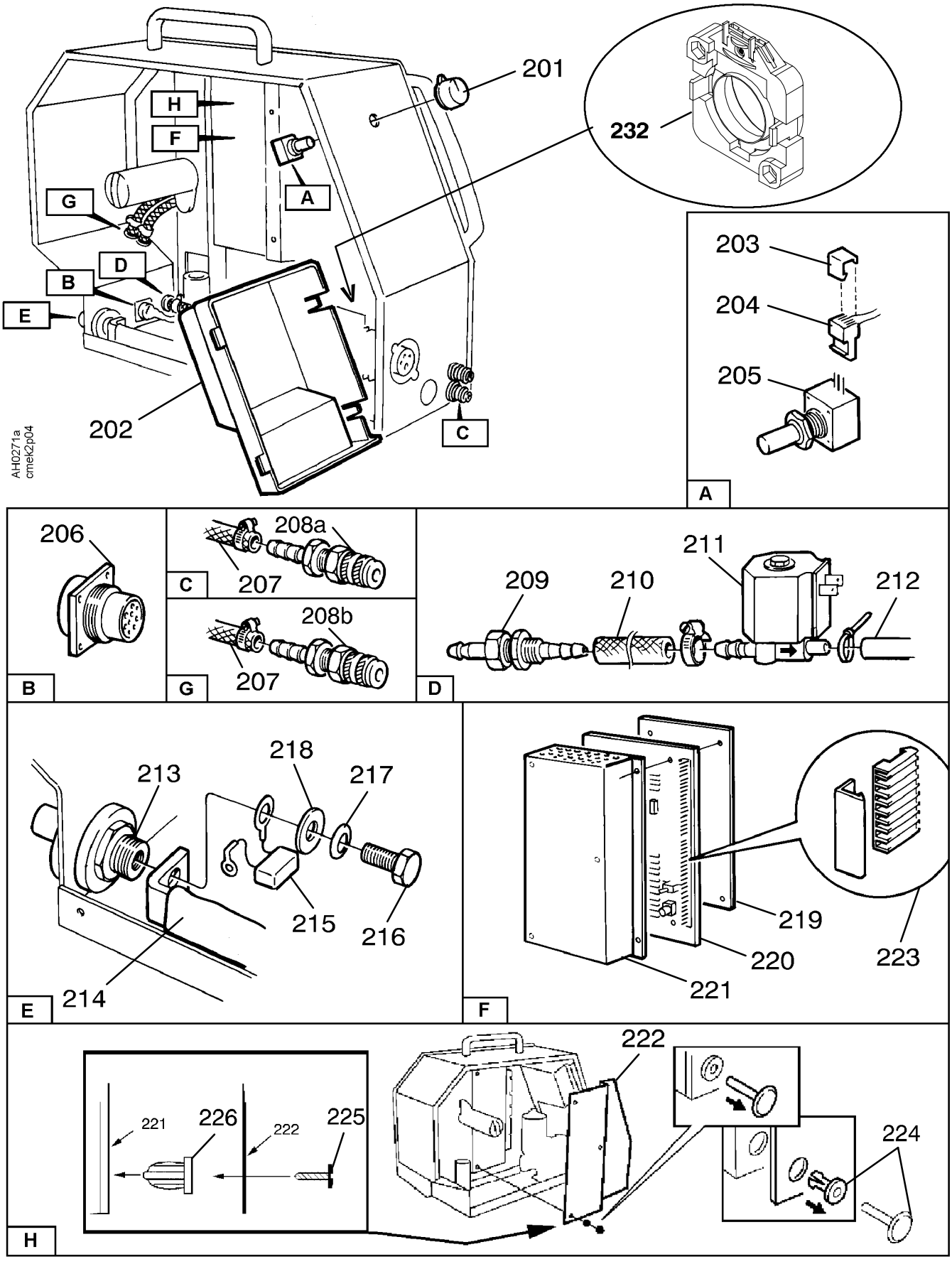
Maintenance and repair work should be performed by an experienced person, and electrical work only by a trained electrician. Use only recommended spare parts.

Item	Qty	Ordering no.	Denomination	Notes
101a	1	0455 693 001	Cover	
101b	1	0456 352 001	Plate	With text
102	1	0467 176 001	Handle	
103	4	0192 230 105	Cover	
104	1	0192 230 112	Cover	
105	1	0469 959 001	Side cover	
106	4	0467 695 001	Rubber foot	
107	2	0469 823 001	Hook	
108	2	0369 561 002	Clamp	
109	2	0369 561 001	Lock	
110	1	0469 960 001	Side cover	
111	1	0192 562 104	Cage nut	M5
112a	-		Chassis	Replaced by item 112b
112b	1	0469 779 880	Chassis	New design, fits all versions of MEK 4
113	1	0146 967 881	Brake hub	
114	1	0416 236 001	Plate	
115	1	0192 230 104	Cover	


102
101a
101b
115
114
113
MEK2
103
104
111
112a
105
107
106
110
108
112b
109
AH 0270
am ek2p03

C = component designation in the circuit diagram

Item	Qty	Ordering no.	Denomination	Notes	C
201	1	0321 475 882	Knob		
202	1	0469 776 001	Cover		
203	1	0193 260 092	Cover	For 3-pole connector	
204	1	0193 260 062	Connector	3-pole	XS07, XS08, XS09, XS10
205	1	0191 870 616	Potentiometer	10 kΩ	RP01, RP02, RP03, RP04
206	1	0368 543 005	Pin socket	23-pole	XP01
	14	0323 945 004	Pin		
207	1	0190 315 106	Hose	L=2x0.65metre, D=16/9.5mm reinforced PVC. To be ordered per metre.	
208a	1	0365 803 008	Quick connector	Female, red	
	1	0365 803 009	Quick connector	Female, blue	
-	-	0365 803 001	Quick connector	Male	
208b	1	0365 803 008	Quick connector	Female, red **Before ser. no. . . . 649 . . . .**	
	1	0365 803 009	Quick connector	Female, blue **Before ser. no. . . . 649 . . . .**	
208b	1	0365 803 011	Quick connector	Female, red **From ser. no. . . . 649 . . . .**	
	1	0365 803 012	Quick connector	Female, blue **From ser. no. . . . 649 . . . .**	
-	-	0365 803 013	Quick connector	Male **From ser. no. . . . 649 . . . .**	
209	1	0367 149 001	Quick connector	Male, the nut is not included	
	1		Nut	M10	
	-	0365 803 002	Quick connector	Female	
210	1	0456 496 001	Hose	L=0.33metre, D=9/5mm, reinforced PVC. To be ordered per metre.	
211	1	0193 054 002	Solenoid valve		YV01
212	1	0456 496 001	Hose	L=0.22metre, D=9/5mm, reinforced PVC To be ordered per metre.	
213	1	0160 609 881	Welding current connector		XP02
214	1	0455 599 880	Busbar	With insulation. The picture on the opposite page does not show the real shape of the busbar.	
215	1	0192 915 013	Capacitor	PME 271 0.1 µF 250 V, without cable lugs	C01
216	1		Screw	M10x20	
217	1		Spring washer	⊘ 20/10.2x1.1	
218	1		Washer	⊘ 24/13x2	
219	1	0455 517 001	Cover (bottom box)	**From ser. no. 826 . . . . . .** Length = 317mm When a cover with another length is replaced also item 221 must be replaced.	
220	1	0486 283 880	Circuit board		AP01
221	1	0455 518 001	Box (top box)	**From ser. no. 826 . . . . . .** Length = 317mm When a box with another length is replaced also item 219 must be replaced. With this box items 228, 225 and 226 must be used.	
222	1	0455 519 001	Cover	**From ser. no. 514 . . . . . .**	
223	1	0193 260 062	Connector	3-pole	XS01
	1	0193 260 091	Cover	For 3-pole connector	
	2	0193 260 150	Connector	2-pole	XS05, XS08
	2	0193 260 180	Cover	For 2-pole connector	
	1	0193 260 152	Connector	4-pole	XS06
	1	0193 260 182	Cover	For 4-pole connector	
	1	0193 260 153	Connector	5-pole	XS07
	1	0193 260 183	Cover	For 5-pole connector	
224	3	0455 661 019	Plastic rivet	**From ser. no. 514 . . . . . to 514 718 . . . .**	
225	3	0193 517 342	Screw	Plastic **From ser. no. 514 718 . . . .**	
226	3	0194 019 001	Spacer	Plastic **From ser. no. 514 718 . . . .**	
232	1	0458 918 880	Front flange with PC board	Current relay	


201
232
H
F
A
G
D
B
E
202
C
AH0271a
cmek2p04
203
204
205
A
206
B
208a
207
C
208b
207
G
211
209
210
212
D
213
218
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216
214
E
219
220
221
223
F
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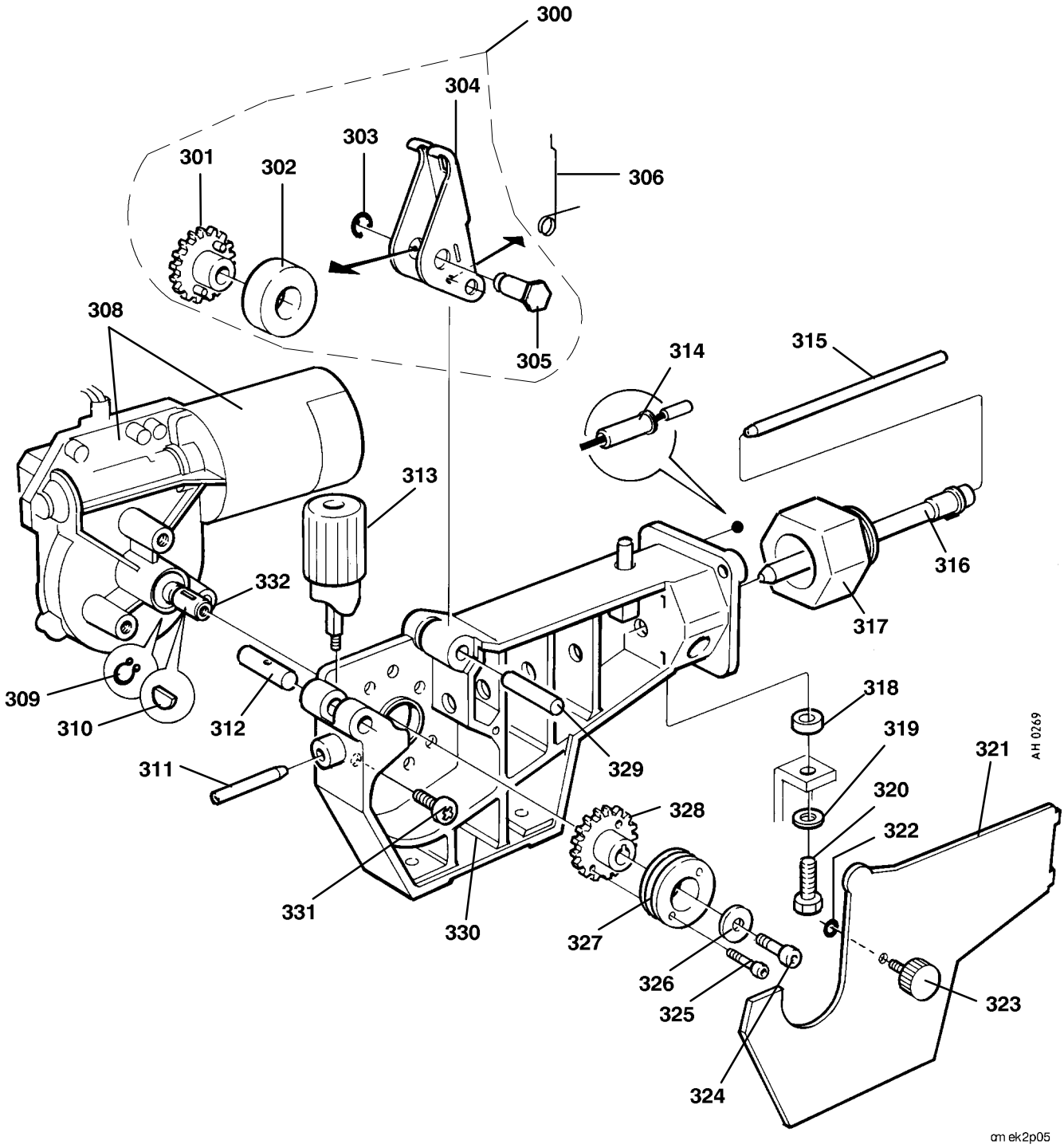
221
226
222
225
224
H

C = component designation in the circuit diagram

Item	Qty	Ordering no.	Denomination	Notes	C
-	-	0455 890 881	Feed unit	Complete, contains items 301 - 332	
300	1	0469 833 880	Pressure arm **(W)**	Complete, contains items 301 - 305	
301	1	0455 053 880	Geared adapter **(W)**		
302	1	0369 728 001	Pressure roller **(W)**		
		0466 262 001	Pressure roller **(W) (A)**	Knurled	
303	1		Locking washer	SGA D8	
304	1		Holder		
305	1		Shaft		
306	1	0455 896 001	Spring		
308	1	0455 597 001	Drive unit	With tachometer	M01, G01
309	1	0215 701 007	Locking washer	Included in item 308	
310	1	0191 496 114	Key	Included in item 308	
311	1	0466 074 001	Inlet nozzle **(W)**		
312	1	0367 528 001	Pin bolt		
313	1	0368 749 880	Pressure transducer		
314	2	0368 750 001	Insulating sleeve		
315a	1	0455 894 001	Insert tube **(W) (A)**	For Al wire, must be used together with item 316a	
315b	1	0455 889 001	Insert tube **(W)**	Steel, must be used together with item 316b Delivered from machine no. XXX 647 XXX	
316a	1	0455 885 001	Outlet nozzle **(W) (A)**	Must be used together with item 315a	
316b	1	0455 886 001	Outlet nozzle **(W)**	Must be used together with item 315b Delivered from machine no. XXX 647 XXX	
317	1	0455 882 001	Current sleeve		
318	1	0455 883 001	Spacer sleeve	⊘ 16/8.2x0.9	
319	1		Washer	⊘ 16/8.4x1.5	
320	1		Screw	M8x20	
321	1	0455 881 001	Protection plate		
322	1	0215 201 202	O-ring		
323	1	0455 898 001	Screw	(M5x12)	
324	1		Screw	M4x12	
325	2		Screw	M3x16	
326	1	0193 104 002	Washer		
327	1	0369 557 001	Feed roller **(W) (A)**	**(V)**For ⊘ 0.6 - 0.8 mm Fe, Ss and cored wire	
	1	0369 557 002	Feed roller **(W) (A)**	**(V)**For ⊘ 0.8 - 1.0 mm Fe, Ss and cored wire	
	1	0369 557 003	Feed roller **(W)**	**(V)**For ⊘ 1.0 - 1.2 mm Fe, Ss and cored wire	
	1	0369 557 007	Feed roller **(W) (A)**	**(V)**For ⊘ 1.2 - 1.6 mm Fe, Ss and cored wire	
	1	0369 557 010	Feed roller **(W) (A)**	**(V)**For ⊘ 1.2 mm x 2 Fe, Ss and cored wire	
	1	0369 557 013	Feed roller **(W) (A)**	**(V)**For ⊘ 1.4 -1.6 mm Fe, Ss and cored wire	
	1	0369 557 004	Feed roller **(W) (A)**	**(K)(V)** For ⊘1.0 - 1.2 / 1.4 - 1.6 mm cored wire	
	1	0369 557 005	Feed roller **(W) (A)**	**(K)(V)** For ⊘1.4-1.6 / (2.0-2.4) mm cored wire	
	1	0369 557 006	Feed roller **(W) (A)**	**(U)** For ⊘ 1.0 - 1.2 mm Al wire	
	1	0369 557 008	Feed roller **(W) (A)**	**(U)** For ⊘ 1.6 mm Al wire	
	1	0369 557 011	Feed roller **(W) (A)**	**(U)** For ⊘ 0,8 - 0,9 mm Al wire	
328	1	0369 716 001	Geared adapter **(W)**		
329	1	0455 893 001	Shaft		
330	1	0455 884 001	Gear housing		
331	3		Screw	M6x16	
332	1	0332 351 013	Drive shaft with pinion	Included in item 308	

(W) = wear part (A) = accessory (K) = knurled rollers (V) = V-groove (U) = U-groove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