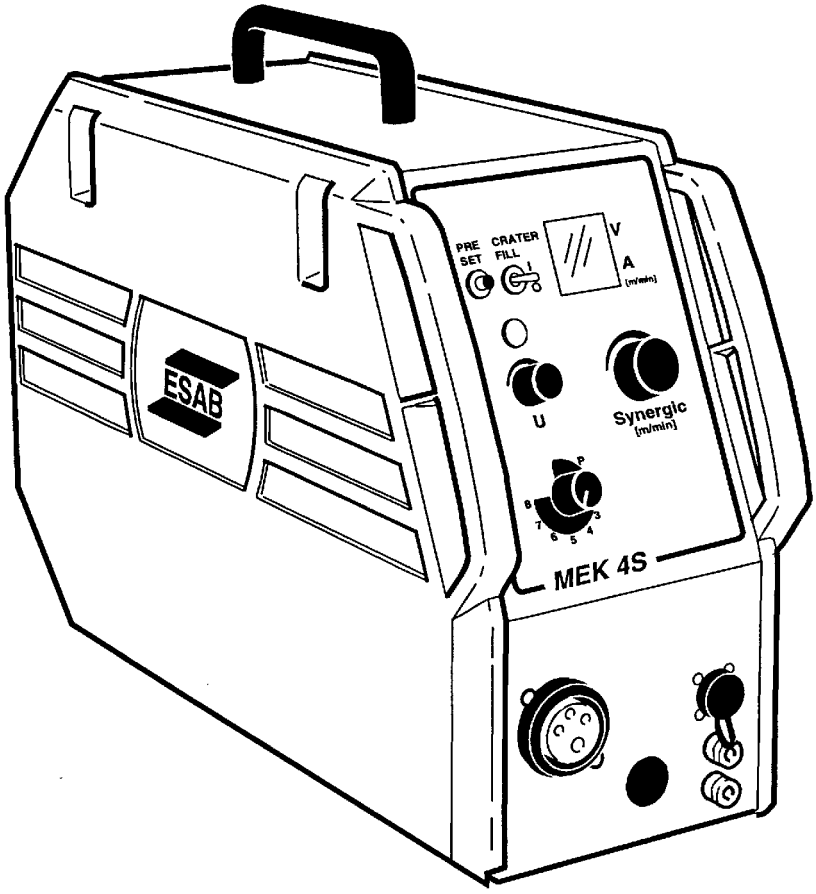
MEK 4S
MEK 4SP



Service manual

0740 800 091 020924

Valid for serial no. 514-xxx-xxxx to 912-xxx-xxxx

LIST OF CONTENTS

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 wiring 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 wiring diagram are listed in the component description.

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

The MEK 4S and MEK 4SP are 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.

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.

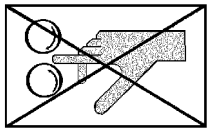
MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

WARNING!

Rotating parts can cause injury, take great care



WARNING !

STATIC ELECTRICITY can damage circuit boards and electronic components.

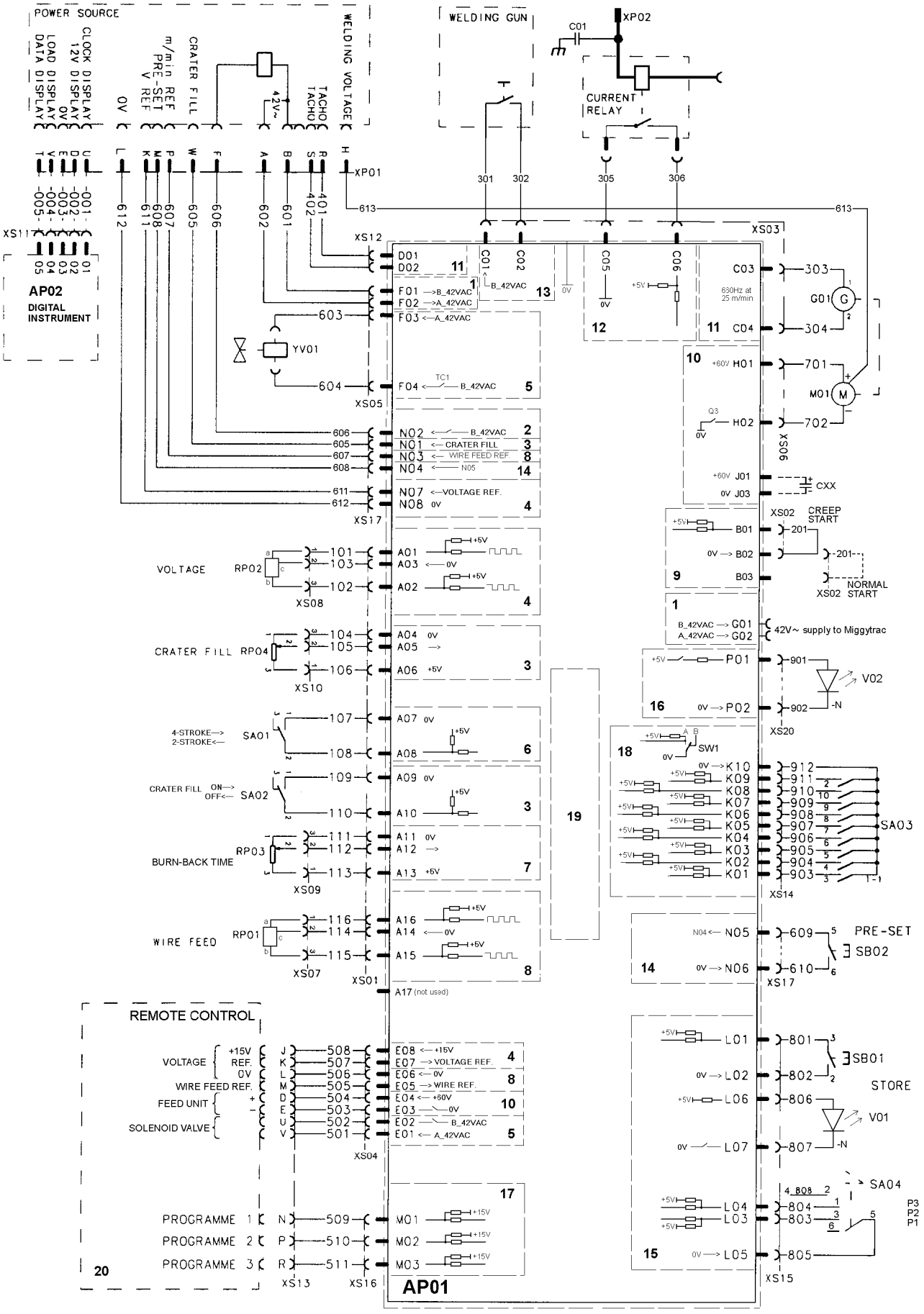
- **Observe precautions for handling electrostatic sensitive devices.**
- **Use proper static-proof bags and boxes.**

COMPONENT DESCRIPTION MEK 4S

AP01	Main circuit board with control electronics: see the description on page 12.
AP02	Circuit board with display: see the description on page 30.
C01	Capacitor 0.1 µF 125 VAC, decoupling.
CXX	Capacitor 4700µF. Must be fitted when an intermediate wire feed unit is in use in extreme applications (low mains voltage and long cables).
G01	Tachogenerator, incorporated in motor M01.
M01	Motor, rated voltage 42 V.
RP01	Pulse unit, for setting the wire feed speed.
RP02	Pulse unit, for setting the welding voltage.
RP03	Potentiometer, 10 kΩ, for setting the burn-back time.
RP04	Potentiometer, 10 kΩ, for setting the crater fill time.
SA01	Switch, 2/4-stroke changeover.
SA02	Switch, Crater fill function On/Off.
SA03	10-pole function selector switch.
SA04	3-pole welding program selector switch.
SB01	Pushbutton switch, for the Store function.
SB02	Pushbutton switch, for presetting.
SW1	Selector switch, for selection of Synergy A or B.
V01	Light-emitting diode, indicating storing of working point or synergy lines.
V02	Light-emitting diode, indicating working point.
XP01	23-pole connector, for connection to the welding power unit.
XP02	Terminal for welding current connection from the power unit.
XS01-XS21	Sleeve connectors.
XS12	From serial number 514-615-xxxx cables 401, 402 and connector XS12 are not mounted.
YV01	Gas valve.

WIRING DIAGRAM MEK 4S

The numerals 1-20 refer to the description of operation on page 12.

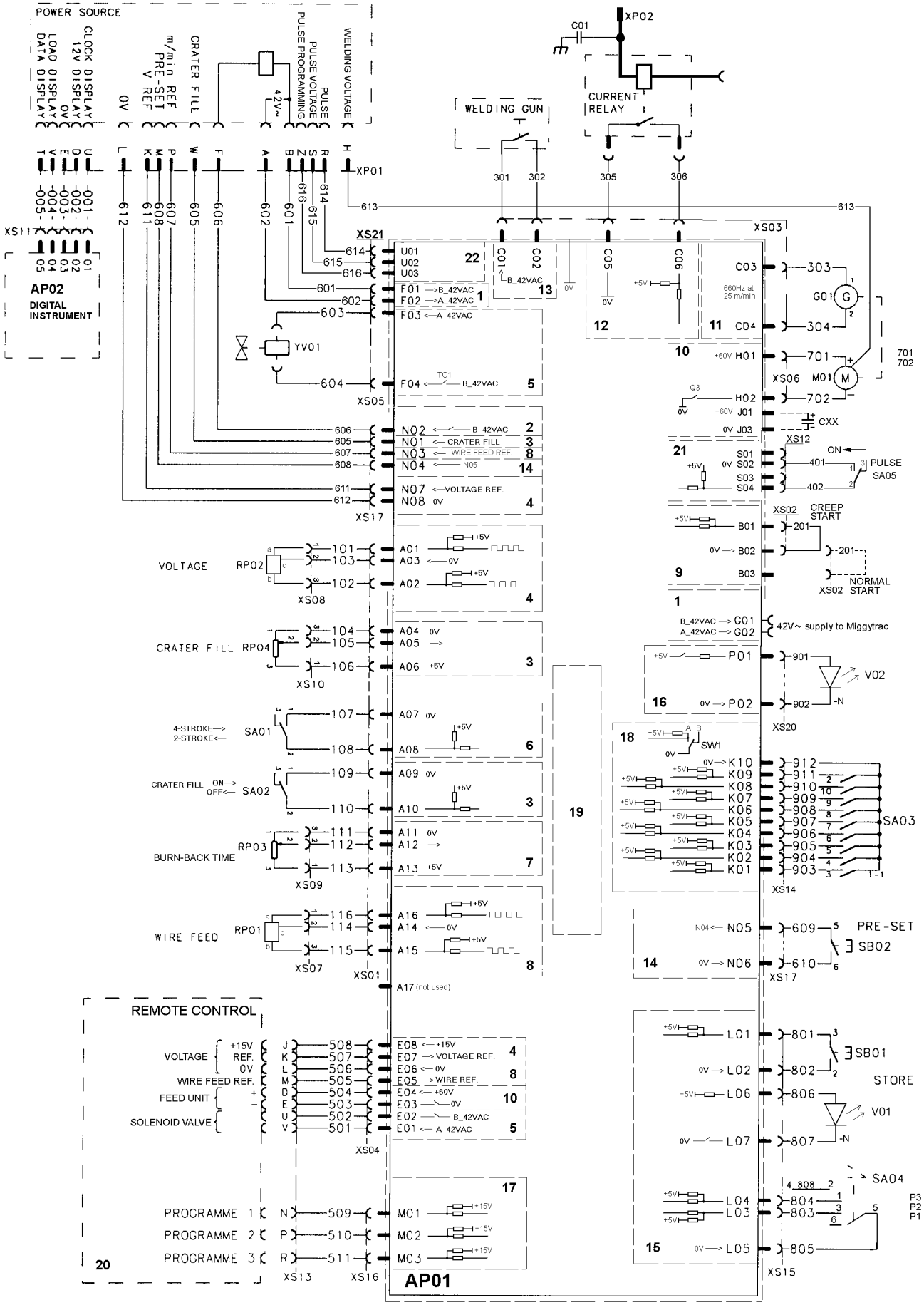


COMPONENT DESCRIPTION MEK 4SP

AP01	Main circuit board with control electronics: see the description on page 12.
AP02	Circuit board with display: see the description on page 30.
C01	Capacitor 0.1 µF 125 VAC, decoupling.
CXX	Capacitor 4700µF. Must be fitted when an intermediate wire feed unit is in use in extreme applications (low mains voltage and long cables).
G01	Tachogenerator, incorporated in motor M01.
M01	Motor, rated voltage 42 V.
RP01	Pulse unit, for setting the wire feed speed.
RP02	Pulse unit, for setting the welding voltage.
RP03	Potentiometer, 10 kΩ, for setting the burn-back time.
RP04	Potentiometer, 10 kΩ, for setting the crater fill time.
SA01	Switch, 2/4-stroke changeover.
SA02	Switch, Crater fill function On/Off.
SA03	10-pole function selector switch.
SA04	3-pole welding program selector switch.
SA05	Switch, Pulse function On/Off.
SB01	Pushbutton switch, for the Store function.
SB02	Pushbutton switch, for presetting.
SW1	Selector switch, for selection of Synergy A or B.
V01	Light-emitting diode, indicating storing of working point or synergy lines.
V02	Light-emitting diode, indicating working point.
XP01	23-pole connector, for connection to the welding power unit.
XP02	Terminal for welding current connection from the power unit.
XS01-XS21	Sleeve connectors.
YV01	Gas valve.

WIRING DIAGRAM MEK 4SP

The numerals 1-22 refer to the description of operation on page 12.



DESCRIPTION OF OPERATION

Design changes

There have been some changes of softwares and circuit boards over the time. If the change affects the operational features, it is mentioned where the feature is described. The software version is indicated by a label on the processor (IC12).

The latest version of circuit board AP01 (0486 485 880) may be used as spare part to all MEK 4S and 4SP wire feeders.

MEK 4S

MEK 4S units supplied up to and including the third quarter of 1997 will be fitted with circuit board 0486 271 880, on which components are through-mounted. Units supplied later will be fitted with circuit board 0486 485 880, on which components are surface-mounted. The operational features of both boards are the same. However, the names of components may differ in a few cases, this is indicated in the description on the following pages.

From serial no. 818-xxx-xxxx

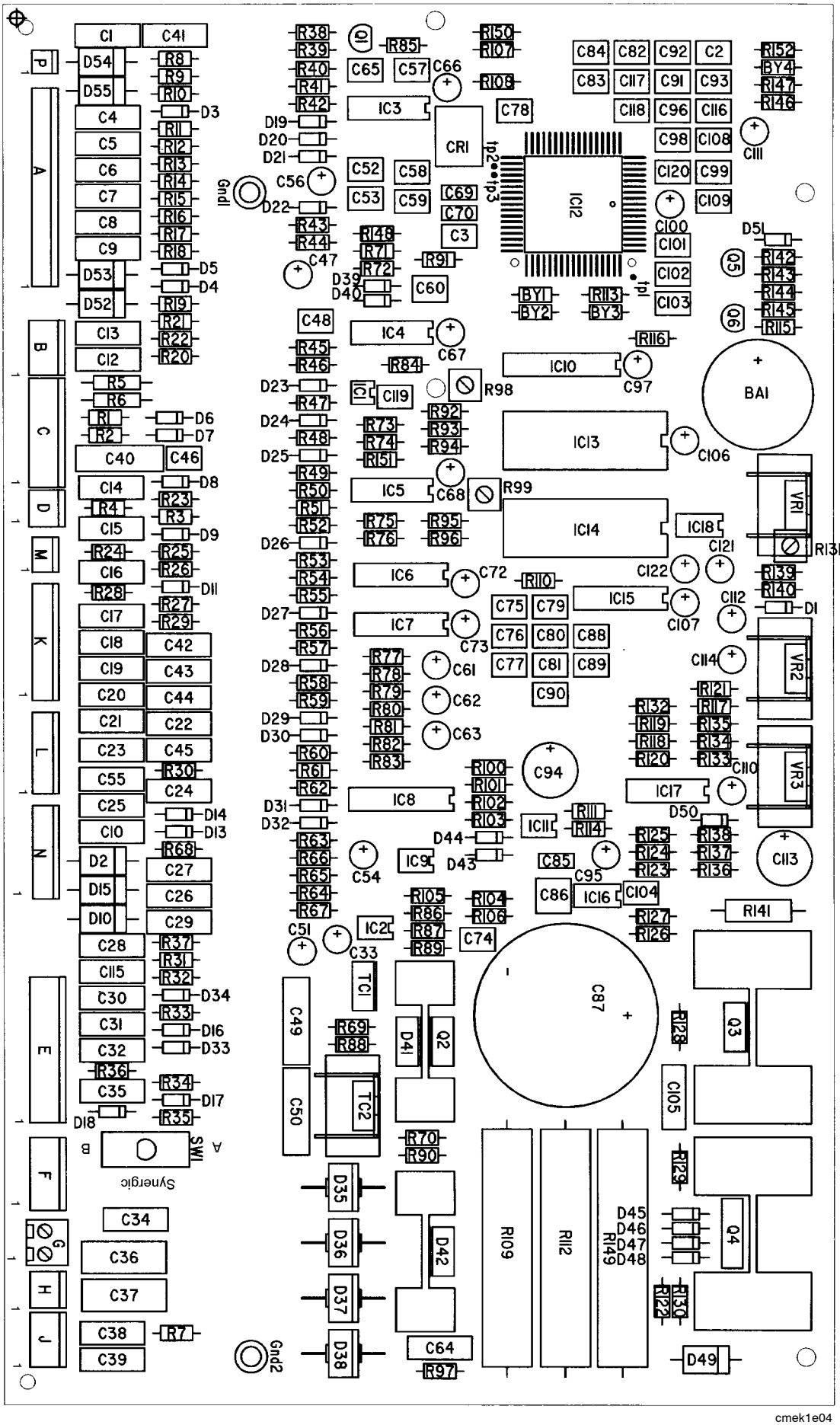
New software (ver. 2.02), with 14 pre-programmed synergy lines: see table on page 38.

MEK 4SP

From serial no. 818-xxx-xxxx

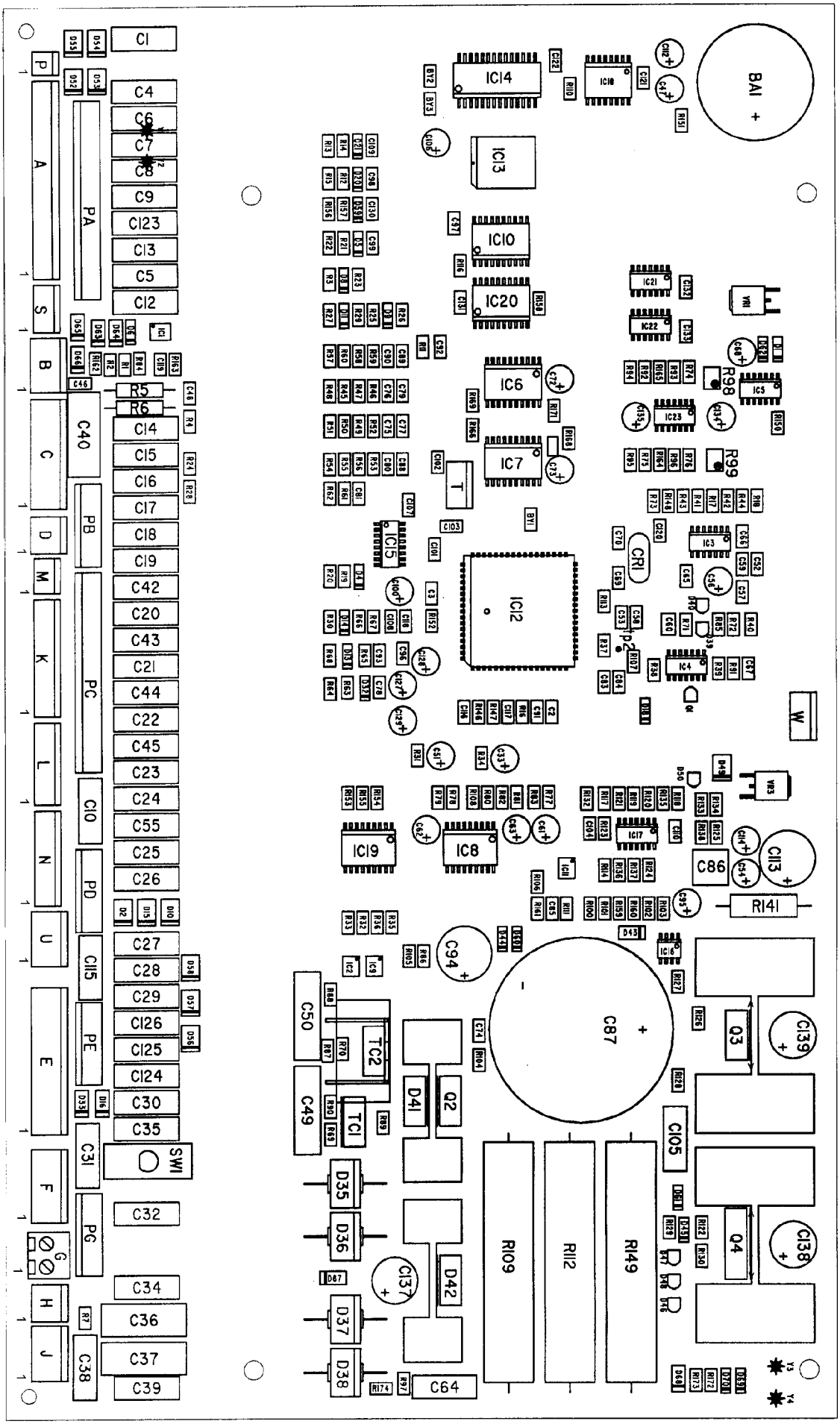
New software (ver. 2.02), with 14 pre-programmed synergy lines without pulsing and 10 pre-programmed lines with pulsing: see tables on pages 38 and 41.

To determine wether the unit has the old or new software:
Select synergy line 4A. Depress the preset pushbutton and keep it depressed, alternate between pulsed an not pulsed mode, compare the display readings. If the readings are the same you have the old software (ver. 2.01), without pulsing at line 4A. If the readings are unequal, you have the new software, with pulsing at line 4A.



cmek1e04

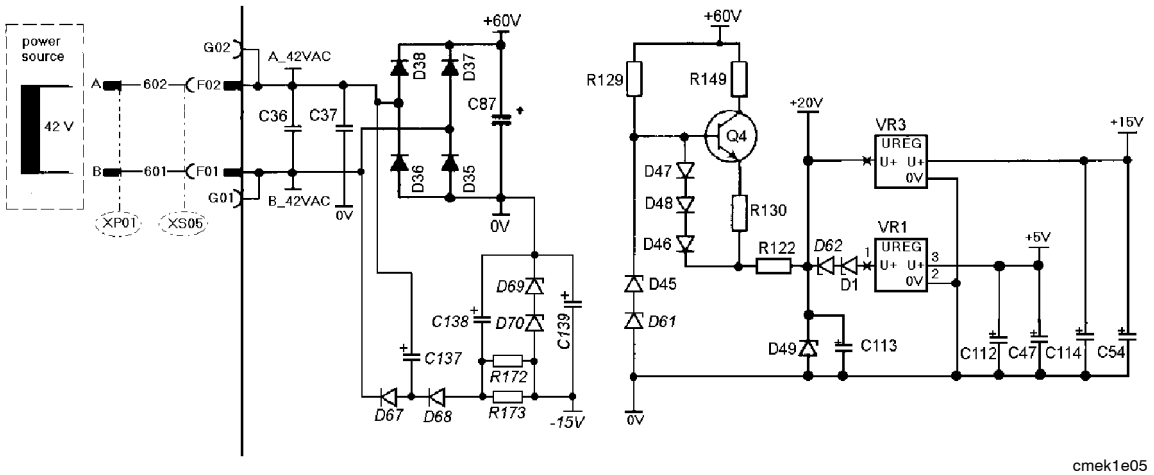
Component positions circuit board AP01 with part no.. 0486 271 880, for MEK 4S



Component positions circuit board AP01 with part no.. 0486 485 880, for MEK 4S and 4SP

Sections 1-22 below refer to the cabling/wiring diagrams on page 7 and 5.
The circuit board AP01 is screened by a metal casing, connected to 0 V in the wire feed unit.

1 Power supply



Components marked in *italics* are fitted only to the 0486 485 880 circuit board.

The wire feed unit receives 42 V from the control power supply transformer in the welding power unit via connector XP01. The LAW welding power units can supply a maximum of 6 A to the wire feed unit. The wire feed unit's own power requirement at maximum load is 5 A.

42 V AC is supplied to the welding gun trigger switch, the gas valve and the contactor. In addition, terminals G01 and G02 supply 42 V to a Miggytrac unit if this is used together with the wire feed unit.

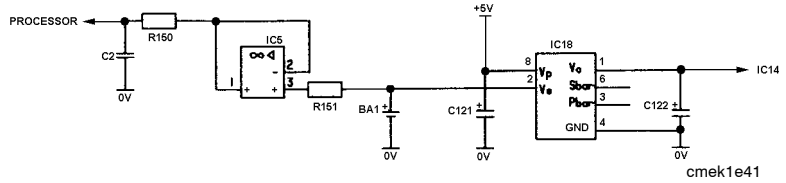
DC power supplies

Diodes D35 - D38 rectify the 42 V supply to 60 V. Capacitor C87 smooths the supply, which is then used to power the wire feeder motor.
Transistor Q4 is a pre-regulator that drops the voltage from 60 V to 20 V. Q4 is current-limited to about 200 mA.
VR1 and VR3 are voltage regulators, producing 5 V ±0,2 V and 15 V ±1 V respectively. The circuit board's microprocessor monitors the voltages. If the 20 V supply falls below 13 V, the wire feed unit is stopped.

Circuit board 0486 485 880 also has a -15 V ±1 V supply, which feeds IC23, as described in items 4 and 8 below.

Battery backup of RAM memory

When the power supply to the unit is turned off, battery BA1 supplies IC14, the circuit board's RAM memory, with power. This prevents loss of data stored in IC14: welding parameters from programs 1–3 and four manually programmed synergy characteristics, together with the settings from pulse generators RP01 and RP02.

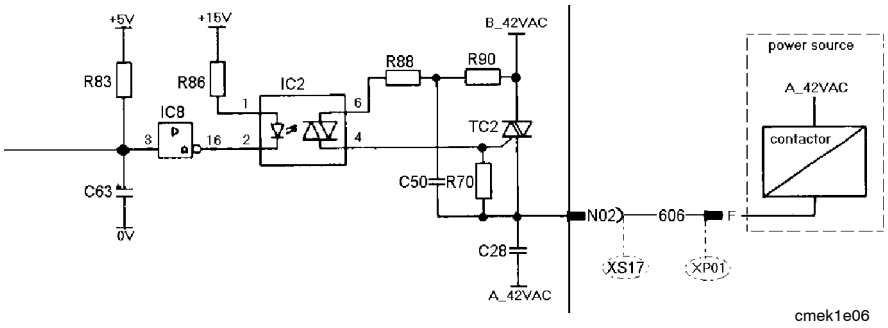


The Automatic battery back up switch IC18 supplies power to IC14 either from the 5 V power supply rail or from the battery. IC14 is supplied from the 5 V rail when this exceeds the battery voltage (nominally 3 V): if not, the supply to IC14 is from the battery.

An A/D input on the processor senses the battery voltage via IC5. If the battery voltage falls below 2.4 V, the storage indication lamp V01 flashes at 0.5 second intervals. In order to avoid loss of data, the battery should be replaced as soon as possible after V01 starts to flash. Under normal operating conditions, the battery should have a life of about 8 years.

The ordering number for the battery is 0193 069 201.

2 Activation, power source

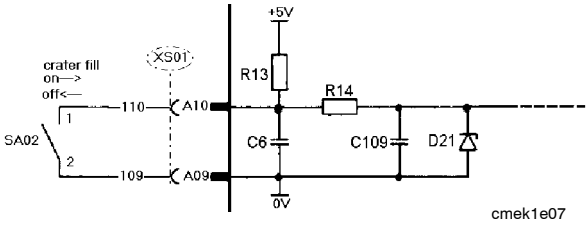


The start signal is connected to the power unit via pin F in contact XP01. LAW power units do not have a contactor: instead, the start signal from triac TC1 is fed to a 1 kΩ resistor.

3 Crater filling

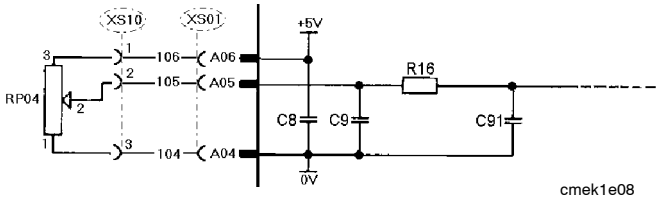
The crater fill function comprises the following modules :

- An input for selecting crater fill function On/Off.



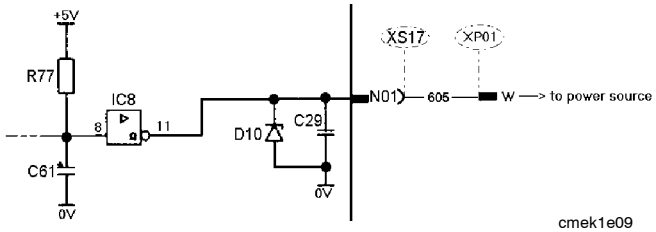
Closing switch SA02 activates the function.

- Potentiometer RP04 sets the crater fill time.



Times between 0 and 5.1 seconds can be set.

- An output, XP01;W, which supplies a signal to the power unit when the voltage is to be reduced for crater filling.



The crater fill function operates as follows :

Phase 1

When in 2-stroke control mode, releasing the welding gun trigger switch reduces the wire feed speed to 84% of its original value. In 4-stroke control mode, crater filling starts when the trigger switch is pressed for the second time. Optocoupler IC10 is activated, supplying a signal to the power unit that crater filling has started, causing the power unit to reduce its output voltage.
Phase 1 continues for a time as determined by the setting of potentiometer RP04, up to a maximum of 1.27 seconds.

Phase 2

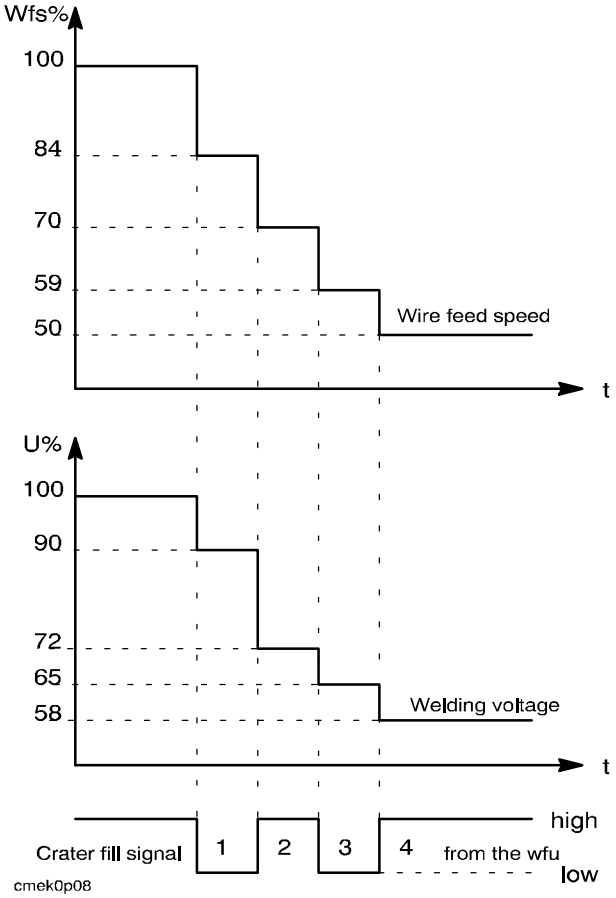
Phase 2 starts when phase 1 finishes. The wire feed unit further reduces the wire speed to 84% of the value during phase 1. Optocoupler IC10 turns off, giving the power unit a signal further to reduce the voltage. Phase 2 continues also for a maximum of 1.27 seconds.

Phases 3 and 4

Phases 3 and 4 are repeats of phases 1 and 2. After phase 4, during which wire feed speed is 50 % of the original value, welding concludes with the preset back-burn time.

If, whether in two-stroke or four-stroke control mode, the welding gun trigger switch is released while crater filling is in progress, then crater filling will be immediately interrupted.

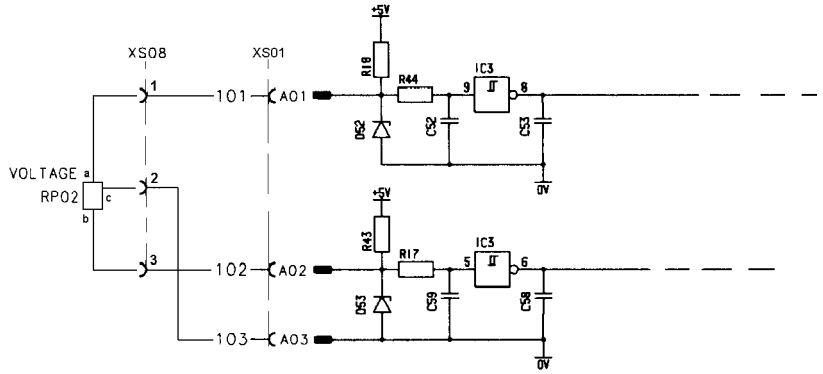
In the MEK 4S, fitted with circuit board 0486 271 880, crater filling will be interrupted by releasing the trigger switch only in four-stroke mode.



Wire feed speed and welding voltage during crater filling

4 Voltage adjustment

Adjustment from the front panel

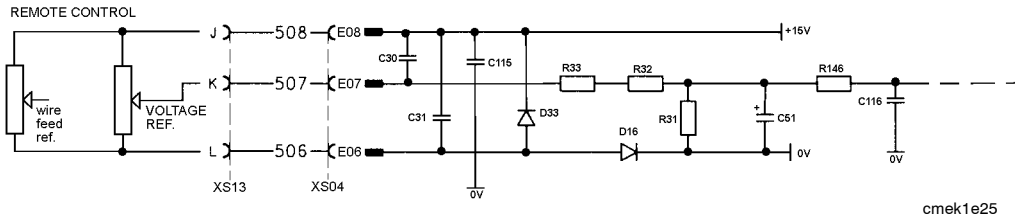


RP02 is a mechanical pulse generator. When it is turned, contact A3 (0 V) is briefly connected to contacts A1 and A2 at each 'click'. A1 and A2 are connected to A3 with a slight time difference. Schmitt triggers IC3;6 and IC3;8 generate positive pulses that are displaced by about 90° relative to each other.

The processor senses which contact was first connected to 0 V and therefore whether the arc voltage reference signal should be increased or decreased. Each pulse increases or decreases the reference signal as appropriate by 0.25 V.

When RP02 is at rest, the voltage at contacts A1 and A2 is +5 V.

Arc voltage adjustment from the remote control unit

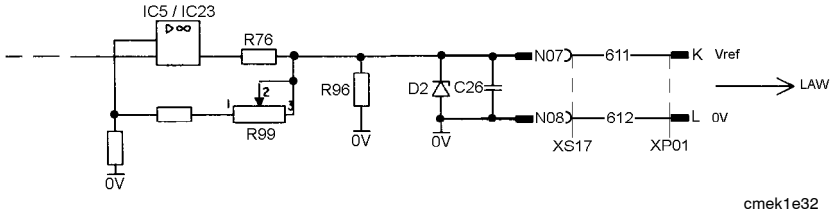


cmek1e25

The arc voltage remote control unit is supplied with power in parallel with the remote control unit for the wire feed speed reference signal.

When a remote control unit is connected to socket XS13, the front panel control is disengaged. The microprocessor senses that the remote control unit is connected by the voltage drop across diode D16. With the unit connected, the voltage at circuit board contact E07 cannot be less than about 0.6 V.

Arc voltage reference signal to the power unit

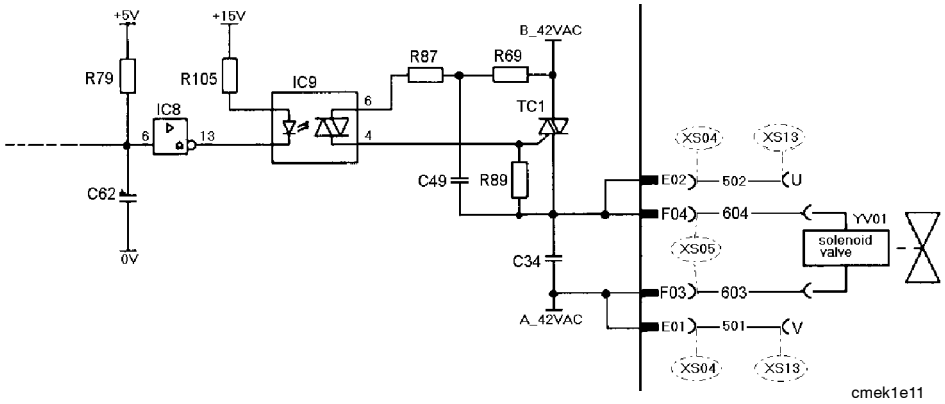


cmek1e32

The circuit board's microprocessor supplies the voltage reference signal to the power unit through a D/A converter. The signal from this converter is amplified in operational amplifier IC5/IC23 (IC5 on circuit board 0486 271 880 and IC23 on circuit board 0486 485 880).

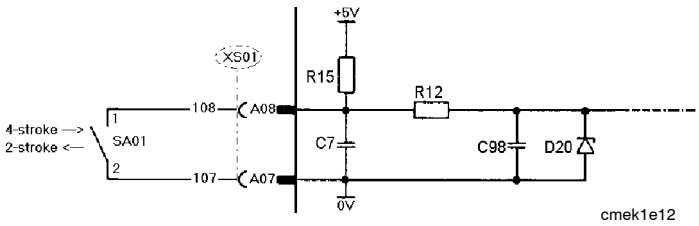
Potentiometer R99 adjusts the level of the output signal so that the voltage at board contact N07 is 12.65 V ±5 mV at the maximum reference signal value.

5 Gas valve



The gas valve is connected to connectors F03 and F04. If an intermediate wire feed unit is being used, its gas valve is connected via pins V and U in the remote control connector (XS13).

6 2-stroke / 4-stroke



2-stroke

When switch SA01 is open, 2-stroke control mode is selected. This means that closing the welding gun trigger switch starts the wire feed motor, opens the gas valve and closes the power unit contactor.

Releasing the switch stops the motor, releases the contactor and closes the gas valve. If crater filling and/or back-burn time are operative, they will be activated before welding ceases.

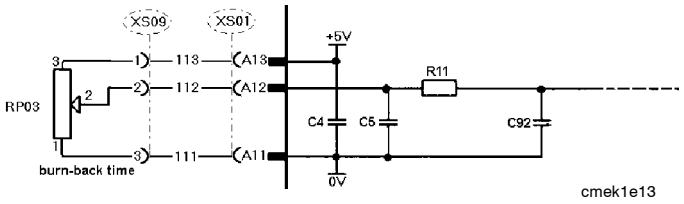
4-stroke

When switch SA01 is closed, 4-stroke control mode is selected. This means that first closure of the trigger switch operates the gas valve, with the wire feed motor starting, and the power unit contactor operating, when the trigger switch is released.

Closing the trigger switch for the second time stops the motor and de-energises the contactor in the power unit. Releasing the switch closes the gas valve.

If crater filling and/or back-burn time are operative, they will be activated before welding ceases.

7 Burn-back time

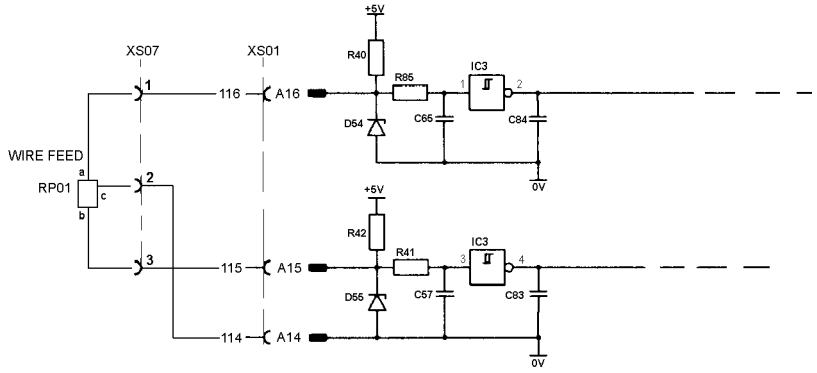


The burn-back time is the time from when motor braking starts until the machine contactor opens. It can be adjusted by potentiometer RP03 between 0 and 0.5 seconds.

8 Wire feed speed

The wire feed speed range is from 1.9 m/min to 25 m/min.

Adjustment from the front panel

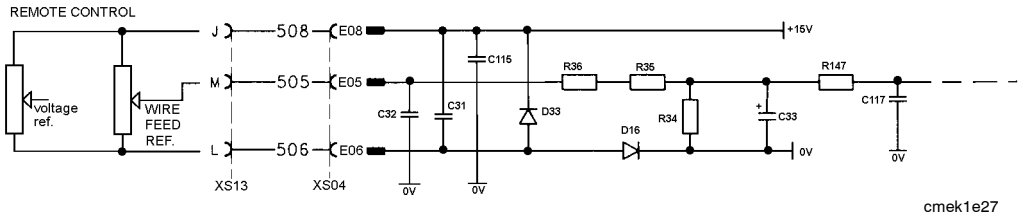


RP01 is a mechanical pulse generator. When it is turned, contact A14 (0 V) is briefly connected to contacts A15 and A16 at each 'click'. A15 and A16 are connected to A14 with a slight time difference. Schmitt triggers IC3;2 and IC3;4 generate positive pulses that are displaced by about 90° relative to each other.

The processor senses which contact was first connected to 0 V and therefore whether the wire feed speed reference signal should be increased or decreased. Each pulse increases or decreases the reference signal as appropriate by 0.1 m/min.

When RP01 is at rest, the voltage at contacts A15 and A16 is +5 V.

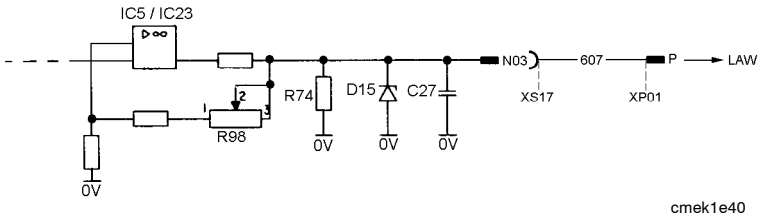
Adjustment from the remote control unit



The wire feed speed remote control unit is supplied with power in parallel with the arc voltage reference signal remote control unit.

When a remote control unit is connected to socket XS13, the front panel control is disengaged. The microprocessor senses that the remote control unit is connected by the voltage drop across diode D16. With the unit connected, the voltage at circuit board contact E5 cannot be less than about 0.6 V.

Wire feed speed reference signal to the power unit



The circuit board's microprocessor passes the wire feed speed reference signal to the power unit via a D/A converter. The signal from this converter is amplified in operational amplifier IC5/IC23 (IC5 on circuit board 0486 271 880 and IC23 on circuit board 0486 485 880).
Potentiometer R98 adjusts the level of the output signals so that the voltage at board contact N03 is 12.40 V ±5 mV at the maximum reference signal value.

This signal is used only for displaying the wire feed speed setting on the digital display instrument and for telling the LAW power unit that an MEK 4S/SP wire feed unit is connected.

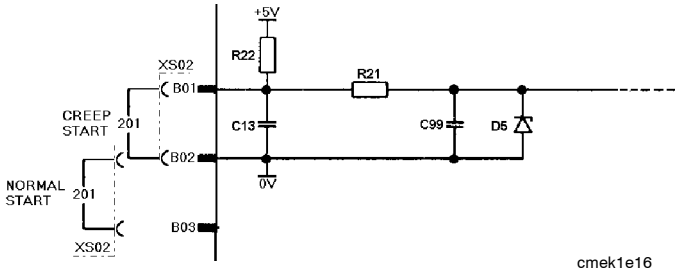
9 Creep start / Normal start

Creep start means that the motor runs at a speed of 1.9 m/minute until the current relay is activated. When the relay operates, the speed increases to the set speed. If the current relay has not operated within one second after starting, the motor increases to the set speed.

Rapid start

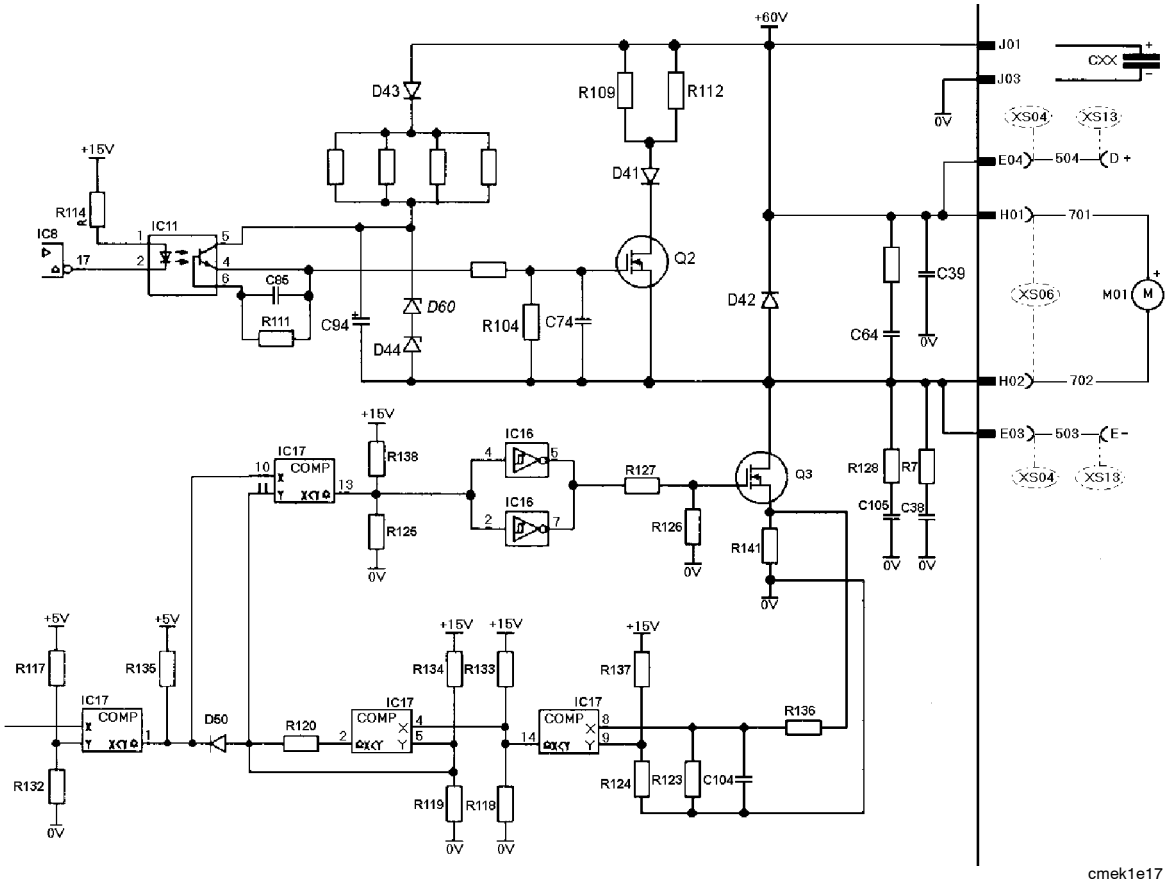
With the creep start function activated, and when in two-stroke control mode, a rapid start can be obtained if welding is restarted within one second of having stopped. This rapid start will occur at the set speed.

This rapid start function is provided on all wire feed units having the 0486 485 880 circuit board.



The wire feed unit is delivered with creep start activated. If it is to be disengaged, so that the unit starts immediately at the set speed, connector XS02 must be changed over so that terminals B02 and B03 are connected.

10 Motor driving / braking



The motor is powered by the smoothed +60 V supply. Pulse width modulation, controlled by transistor Q3, is used to vary the motor voltage. The pulse frequency is 12 kHz, and the maximum conducting time of the pulses is 97% of the pulse cycle time.
Freewheel diode D42 maintains motor current during the pulse breaks.
At a supply voltage of 42 V, the wire feed drive roller has a speed of 258 r/min. At a drive roller speed of 266 r/min, the wire feed speed is 25 m/min.

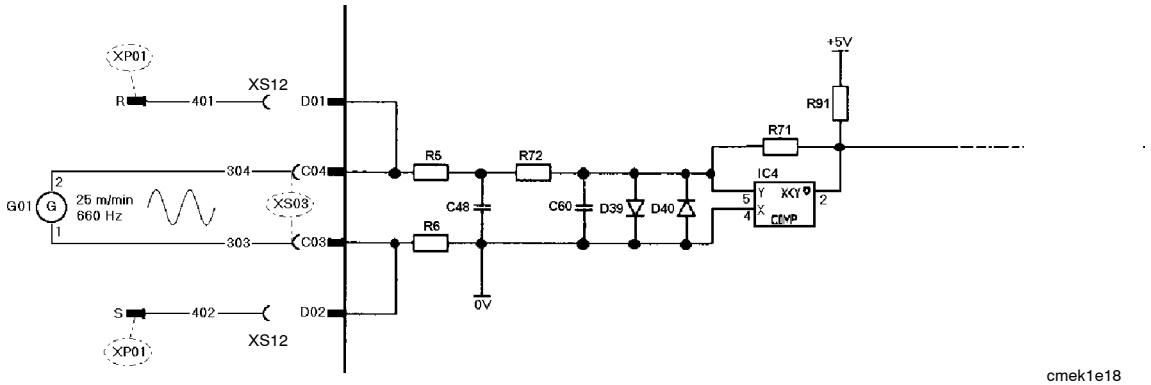
Pins D and E in the remote control unit connector XS13 provide power for the motor in an intermediate wire feed unit or for a PKE (push/pull) welding gun. If an intermediate wire feed unit is being used in extreme applications (low mains voltage and long cables), an additional 4700µF smoothing capacitor CXX must be connected.

The voltage drop across resistor R141 provides a signal that is proportional to the motor current. When the current exceeds 15.4 A, IC17:2 turns off the gate pulse to Q3. When the current drops, Q3 conducts again at the next gate pulse.

Braking

When the motor starts, capacitor C94 charges up to 15 V, with zener diode D44 limiting the voltage across it. On circuit board 0486 485 880 there are two zener diodes, D44 and D60 with a total zener voltage of 15 V.
Braking is activated by the optocoupler IC11. When the transistor in IC11 is turned on by the LED, 15 V from capacitor C94 is connected to the gate of transistor Q2. Transistor Q2 turns on and short circuits the motor through the resistors R109 and R112. The resistors limit the braking current to about 20 A.

11 Tachometer input



The tachometer G01 is fitted inside the motor casing. At a wire feed speed of 25 m/min, it produces a signal frequency of 660 Hz. Comparator IC4;2 converts the sine wave signal from the tachogenerator to a square wave at the same frequency.

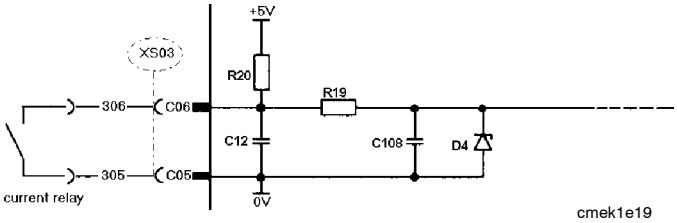
MEK 4S

The connections XP01;R and XP01;S are not used. Connector XS12 must **not** be connected.
The cables 401, 402 and connector XS12 are not mounted from serial number 514-615-xxxx

MEK 4SP

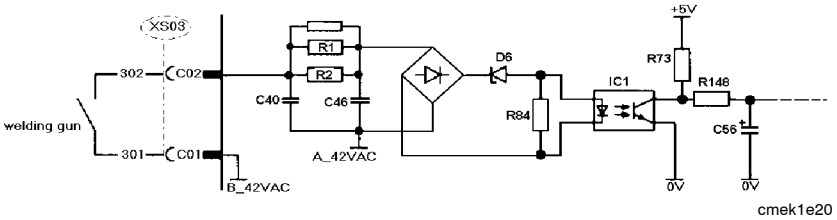
The connections XP01;R and XP01;S and connector XS12 are used for other functions. See item 21 and 22 below.

12 Current relay



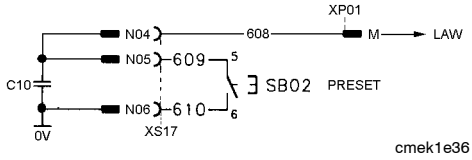
The current relay operates when the welding current exceeds 20 A. If the creep start function has been selected, this is disengaged when the current relay operates. If the crater filling function has been selected, it will work only when the current relay has operated.

13 Start / Stop



The trigger switch in the welding gun is supplied at 42 V AC. Closing the switch energises optocoupler IC1, pulling down the voltage across C56.

14 Preset

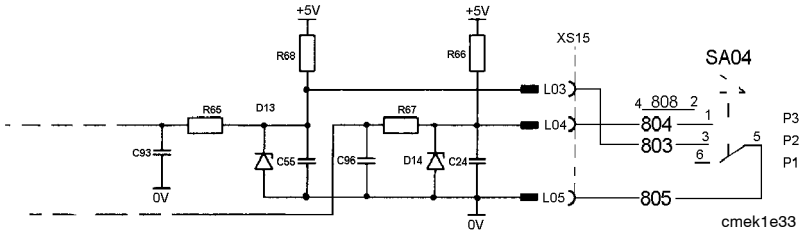


SB02 is a pushbutton switch. Pressing it causes the display to show the arc voltage and wire feed speed settings.

15 Storing welding parameter data

Two switches, SA04 and SB01, together with an LED (V01), are mounted on a panel beneath the side cover. They are used when storing data on arc voltage and wire feed parameters.

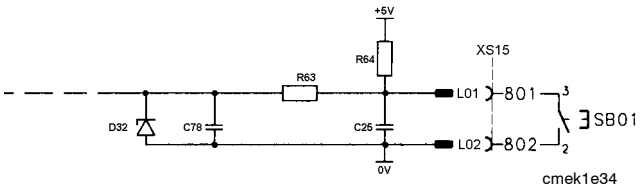
a. Program selection



Use switch SA04 to select in which program the data is to be stored. This switch also determines which of the stored programs are to be activated: see 'Method of Use' on Page 36.

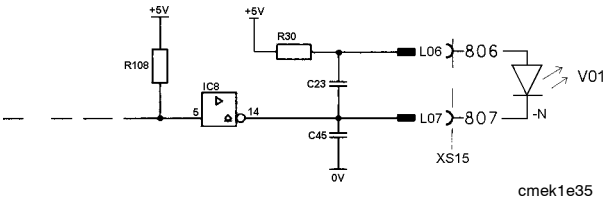
Program	L03	L04
1	+5V	+5V
2	0V	+5V
3	+5V	0V

b. Storage



Pushbutton SB01 causes the welding data and programmed synergy lines to be stored. See also 'Method of Use' on Page 36.

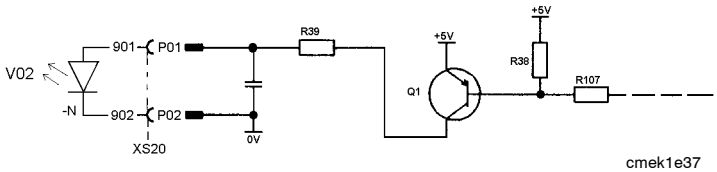
c. Indication of storage



LED V01 is fitted inside the side panel of the wire feed unit. Current through it is limited to about 20 mA by resistor R30. The diode has the following functions:

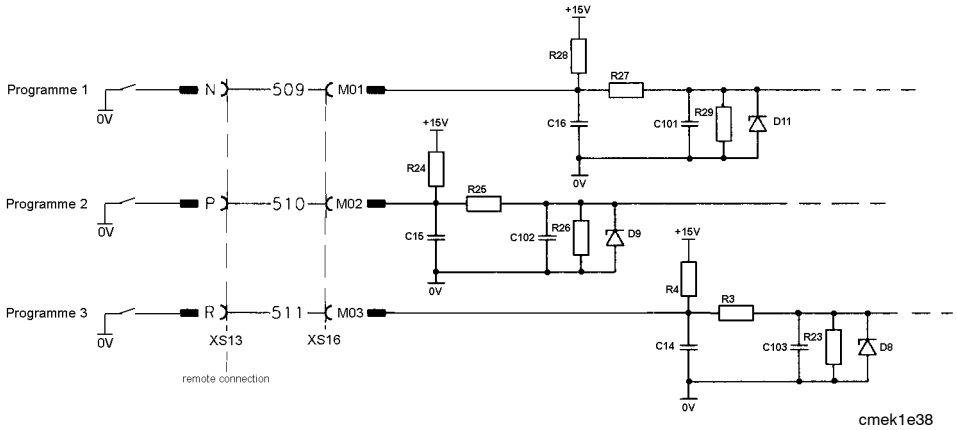
- It lights to show that a program or working point on a synergy line has been stored. There is a delay of 2.5 seconds between pressing the pushbutton and when storage is carried out.
- The diode flashes at about 2 Hz to indicate low battery voltage. The battery supplies the RAM memory that stores welding data to maintain its contents when the power supply to the wire feed unit is interrupted.
  When low battery voltage is indicated, the battery should be replaced as soon as possible, in order to prevent any loss of data from programs 1-3 or from the four programmed synergy lines.
- The diode lights, and remains continuously lit, if any fault has occurred in the EPROM. If such a fault has occurred, it will not be possible to start the wire feed unit, and the entire circuit board will have to be replaced.

16 Indication of synergy deviation



LED V02 is fitted to the front panel of the wire feed unit, and lights to indicate zero deviation of the welding parameters from the synergy characteristic. Current through it is limited to about 20 mA.

17 Program selection from the welding torch / Synergy programming



A welding torch or a remote control unit incorporating program selection facilities can be connected to pins N, P and R of remote control unit connector XS13. Alternatively, a PAH 1 programming unit can be connected for programming of individual synergy lines. See also 'Method of Use' on Page 36.

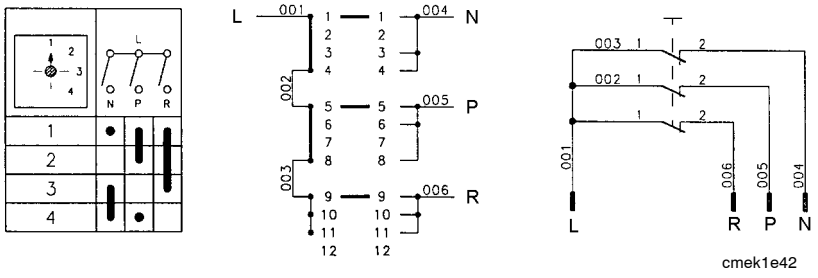
Resistors connected to the circuit board inputs form potential dividers to drop the +15 V supply to +10 V on open inputs.

- Program selection from a welding torch / remote control unit

Program	XS13;N (M01)	XS13;P (M02)	XS13;R (M03)
1	0 V	+10 V	+10 V
2	+10 V	0 V	+10 V
3	+10 V	+10 V	0 V

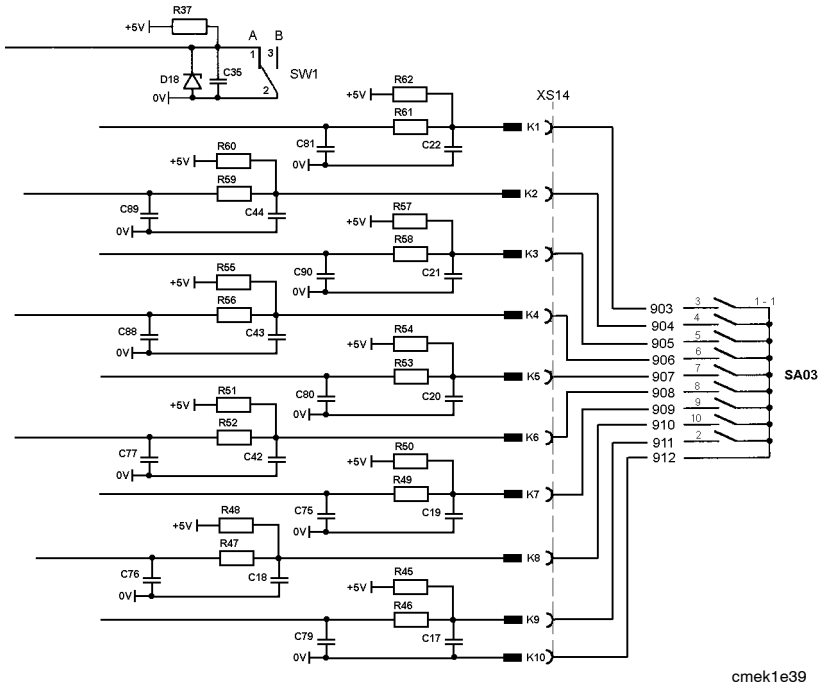
- Setting the operating point using a PAH 1 programming unit

Operating point	XS13;N (M01)	XS13;P (M02)	XS13;R (M03)
1	0 V	0 V	0 V
2	+10 V	0 V	0 V
3	0 V	+10 V	0 V
4	0 V	0 V	+10 V



Circuit diagram PAH1

18 Mode selector switch



Mode selector switch SA03 is used for selection of:

- Manual operation
- Programmed operation
- Synergy-controlled operation.
  Operation in this mode provides a choice of 16 different synergy characteristics, in two groups of eight (1A - 8A and 1B - 8B), depending on the setting of selector switch SW1, which is located on the circuit board. See 'Method of Use' on Page 36.

Switch SA03 is connected to board contacts K01 - K10. Contact K10 is connected to the board neutral (0 V). In the Manual mode position, contacts K01 - K9 are at +5 V: in the other positions, one of the inputs is at 0 V and the remainder are at +5 V.

Checking operation of the mode selector switch

Pressing the welding torch control trigger when the wire feed unit is energised starts a test routine in which operation of mode selector switch SA03 can be tested. Note that the welding torch control switch must be held in throughout the test: releasing the switch changes this test mode to the normal welding program.

The test also provides a means of indirectly checking that the wire feed speed and arc voltage reference signal outputs are correctly adjusted. See Sections 4 and 8 of these operating instructions for details of adjusting the output signals.

The various settings of SA03 cause different voltages to be supplied from the wire feed speed reference signal output (board contact N03) and the arc voltage reference signal output (board contact N07). If the wire feed unit is connected to an LAW power unit, the digital instrument will show the test result in the m/min display, if you press the preset pushbutton (SB02).

The table on the next page shows the voltage levels and wire feed speeds for the various positions of switch SA03.

Switch SA03	Board contact N03 Wire feed ref. (V)	Board contact N07 Arc voltage ref. (V)	Wfs in the display (m/min)
Manual	0.99	0.99	2.0
Program selection	1.98	1.98	4.0
1 A,B	2.98	2.98	6.0
2 A,B	4.02	4.02	8.1
3 A,B	5.01	5.01	10.1
4 A,B	6.00	6.00	12.1
5 A,B	6.99	6.99	14.1
6 A,B	7.99	7.99	16.1
7 A,B	8.98	8.98	18.1
8 A,B	10.02	10.02	20.2

Voltage levels and wire feed speeds for the various positions of switch SA03

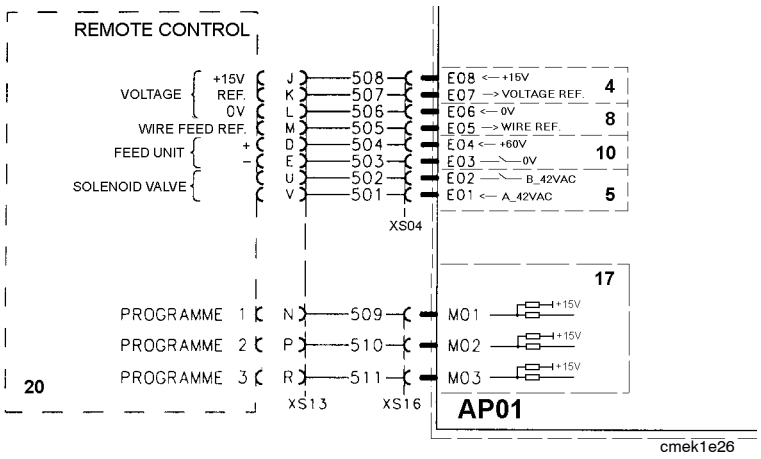
This test function is **not** available for wire feeders with software version 2.01.
The software version is indicated by a label on the processor (IC12).

19 Processor

The processor stores the machine program. It monitors the power supply voltages: if the voltages drop to too low a level, wire feed is stopped, as described in section 1 on page 12.
The processor also monitors speed. If the wire speed deviates from the set value by more than 1.5 m/min for more than five seconds, wire feed will be stopped.

When power is applied to the circuit board, the program starts with an initiation phase which includes a number of self-test routines, including a check sum test of all the bytes in the circuit board EPROM. If any byte in the EPROM has changed, this will be indicated by lighting of LED V01, and it will not be possible to use the wire feed unit.

20 Remote control input



The following items can be connected to the remote control input :

Wire feed speed remote control unit: pins M, J and L in XS13.

Welding voltage remote control unit: pins J, K and L in XS13.

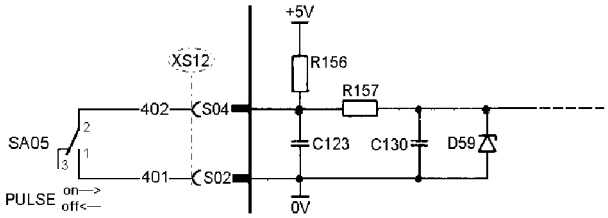
Suitable remote controls are:
”Aristo Control Synergic Torch” ordering number 0466 515 880.
”Aristo Control Synergic Box” ordering number 0466 801 880.

A program selection remote control unit.

An MEK 25 intermediate wire feeder unit.

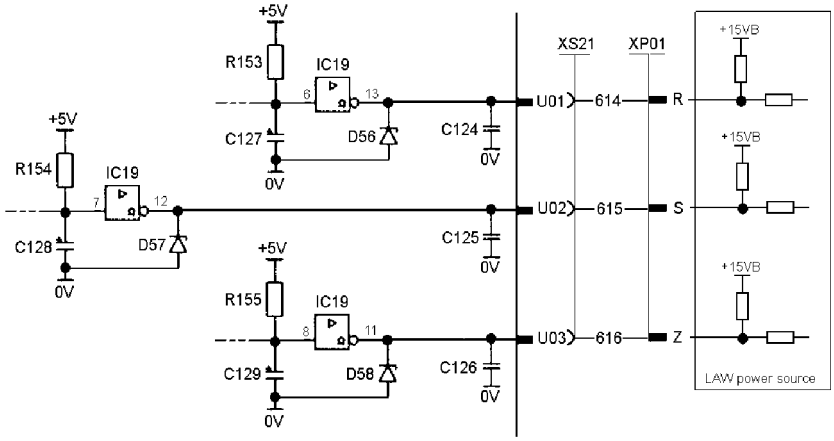
A programming unit for programming synergy characteristics: see ’Method of Use’ on Page 39 och 42.

21 MEK 4SP: Activation of pulsing



When contact SA05 is closed, the pulse function in the MEK 4SP is activated. Pulsing operates only in combination with pulsed synergy lines or with a pulsed operating point that has been stored in one of the three program memories.

22 MEK 4SP: Pulse outputs



U01 pulsing signal

The pulsing signal, U01, tells the power unit that pulsing has been selected. U01 goes low when pulsing has been selected.

U02 pulse voltage signal

There is only one voltage reference from the wire feed unit to the power source. However, two different voltage reference signals are needed for pulsing: one for the peak voltage (Utop) and one for the background voltage (Ub). As Utop is always the same within the same synergy line, the wire feed unit sends the peak voltage reference signal to the power unit immediately when a pulsed synergy line has been selected, and it is then stored in memory in the power unit.. The wire feed unit then transmits Ub continuously to the power unit as long as welding continues on the same synergy line.

U02 goes low (0 V) for about 300 ms when the Utop voltage reference signal is transmitted.

U02 goes high (+15 V) when Ub is being transmitted.

U03 pulse programming signal

U03 goes low (0 V) when custom synergy lines are being constructed in the pulse mode. See the programming description on page 42.

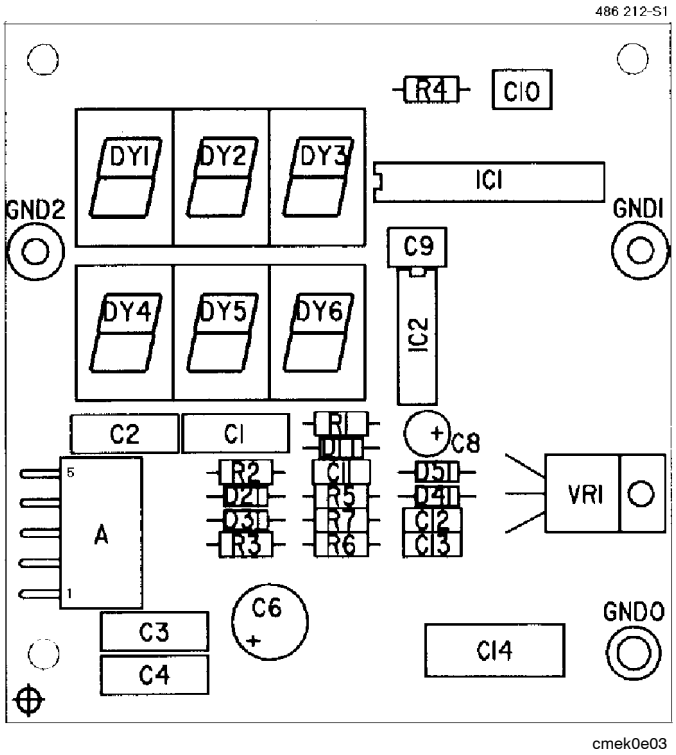
AP02 DIGITAL DISPLAY INSTRUMENT

If the display in the wire feed unit is to operate, the corresponding display in the power unit must not be connected.

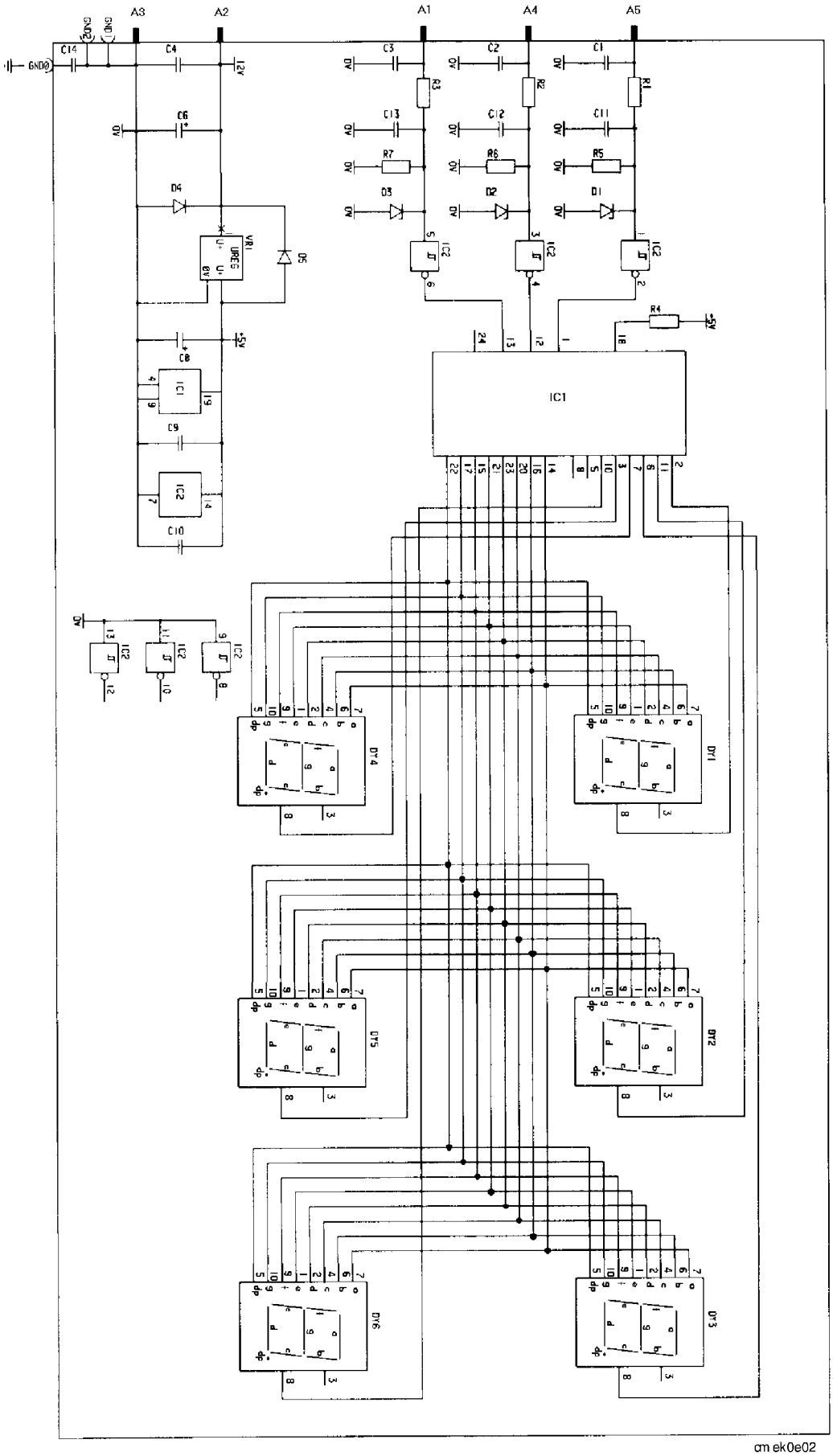
The display board has two rows of 7-segment displays, with three displays in each row. The upper row displays arc voltage and the lower displays the welding current.

Data is transmitted serially to the display board from the LAW power unit, via inputs A1, A4 and A5.

A smoothed 12 V DC power supply is supplied to the board via inputs A2 and A3 from the welding power unit. Voltage regulator VR1 produces a 5 V output.



Component positions, display board



Circuit diagram, display board

TECHNICAL DATA

The MEK 4S and MEK 4SP wire feed units are of enclosed construction with four-wheel drive to the wire.
The MEK 4S is intended for use with the LAW 400/410 and 500/510 power units.
The MEK 4SP is intended for use with the LAW 400/410 with serial number 701-xxx-xxxx and above.

The letter S in the type designation indicates that synergy welding characteristic lines can be used. The letter P in the type designation of the MEK 4SP indicates that it can perform pulsed welding. Pulsing is available in both the synergy control mode and in programmed mode.

	MEK 4S / MEK 4SP
Power supply	42 V 50 - 60 Hz
Power requirement	300 VA
Feed speed	1.9 - 25 m/min
Welding gun connection	EURO
Max. diameter of wire bobbin	300 mm
Weight	16 kg
Dimensions (l x w x h)	645 x 240 x 480 mm

⚠ WARNING

There is a risk of tipping if the MEK 4S or MEK 4SP are 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.

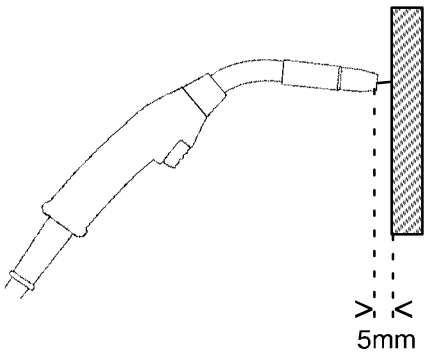
MAINTENANCE

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 of the wire feed pressure are on page 33.
- **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

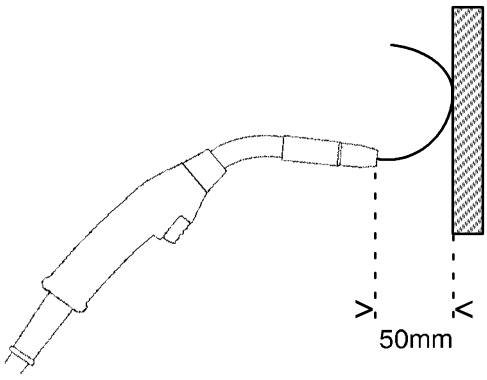


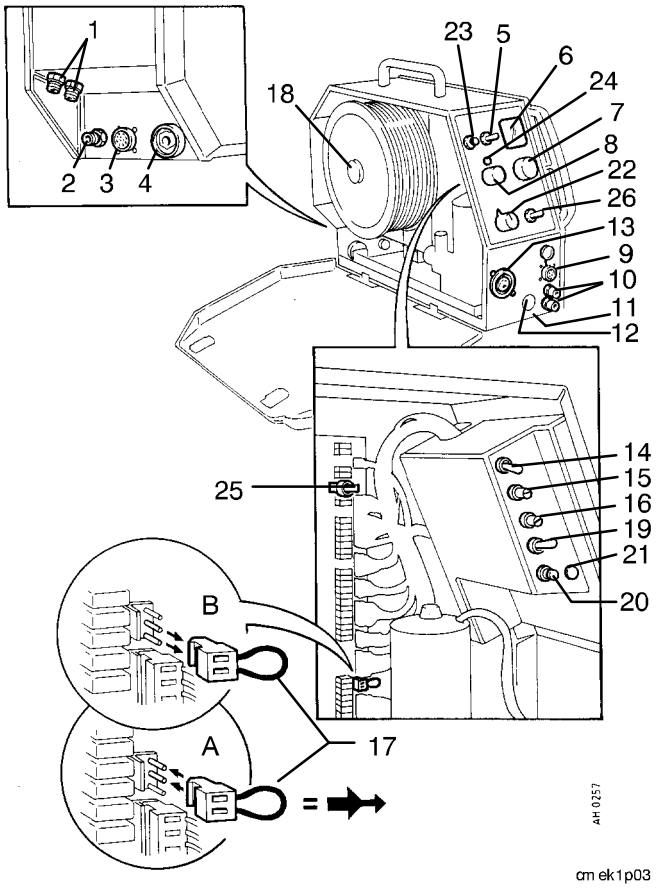
Figure 2

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.

THE CONTROL PANEL AND CONNECTIONS



1. Cooling water connections.
2. Gas connection.
3. Connector for control cable from the power unit.
4. Connector for welding current cable from the power unit.
5. Switch, crater filling On/Off.
6. Digital instrument, shows arc voltage and welding current. If switch 23 is depressed it shows the settings for wire feed speed and arc voltage.
7. Pulse generator, wire feed speed 1.9 - 25 metre per minute.
8. Pulse generator, welding voltage control.
9. Connector, remote control unit. Control is passed to the remote control unit automatically when it is connected.
10. Cooling water connections to/from the welding gun.
11. Strap securing points. The strap must be used to secure the wire feed unit to the power unit during transport.
12. Hole for fitting connector for PKE (welding gun with integral wire feed drive motor).
13. Welding gun connector.
14. Selector switch, 2/4-stroke mode.
15. Potentiometer, back-burn time, 0 - 0.5 seconds.
16. Potentiometer, crater fill time, 0 - 5.1 seconds.

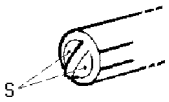
17. Link, creep start On/Off. The connector with the link is fitted on circuit board contact B.

    A: Creep start active. Wire feed starts at 1.9 m/min and then increases to the set speed.

    With the creep start function activated, and when in two-stroke control mode, a rapid start can be obtained if welding is restarted within one second of having stopped. This rapid start will occur at the set speed.
    This feature is available on all MEK 4SP feed units and on the MEK 4S having the 0486 485 882 circuit board.

    B: Normal start. Wire feed starts at the set speed.
    See also CREEP START / NORMAL START on page 19.

18. 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.



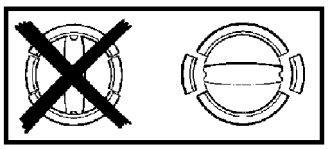
S = Adjustment screws

19. Program selector switch.
20. Pushbutton for welding parameter data storage.
21. Indication lamp for storage.
22. Mode selector switch.
23. Pushbutton for preset of wire feed speed and arc voltage reference.
24. Indication lamp for working point.
25. Selector switch for synergy characteristic groups 1A - 8A or 1B - 8B.
26. Switch, pulse function On/Off.

Functions 19 - 26 above are described in more detail on the following pages.

IMPORTANT

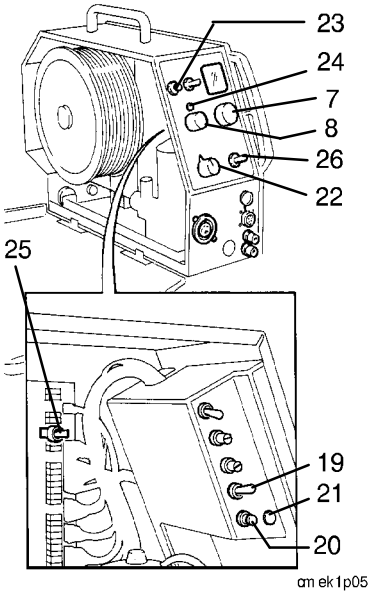
To prevent the reel sliding off the hub: Lock the reel in place by turning the red knob as shown on the warning label attached next to the hub.



METHOD OF USE

Mode selector switch **22** provides ten different operating modes for the unit:
MANUAL, PROGRAM and SYNERGY 1 - 8.

Manual operation



Set selector switch **22** to manual. Hold the preset button **23** depressed while you set the desired voltage and wire feed speed, the display shows the set values.
When the preset button is released, the instrument displays the most recent measured value of actual arc voltage and welding current.

The MEK 4SP pulse function is **not** active in manual operation.

Storing the working point

A working point consists of a wire feed speed and arc voltage. Set the program selector switch **19** to one of the three settings 1, 2 or 3. Set the desired voltage and wire feed speed.

Perform actual storage of these parameters by pressing pushbutton **20**. After a delay of 2.5 seconds the green LED **21** lights to indicate that it has been stored, and remains lit until pushbutton **20** is released.

Program mode

To use one of the three stored working points, switch mode selector switch **22** to mode "P" and selector switch **19** to one of the three settings. If a welding torch incorporating a program selector switch is connected to the remote control socket, the settings can be selected from this. The settings may be changed from one to another during welding.

Note: If a remote control unit or a welding torch incorporating a program selector switch is connected to the remote control socket, selector switch **19** cannot be used to select the working points.

Do **not** press program storage switch **20** when mode selector switch **22** is in the Program mode position.

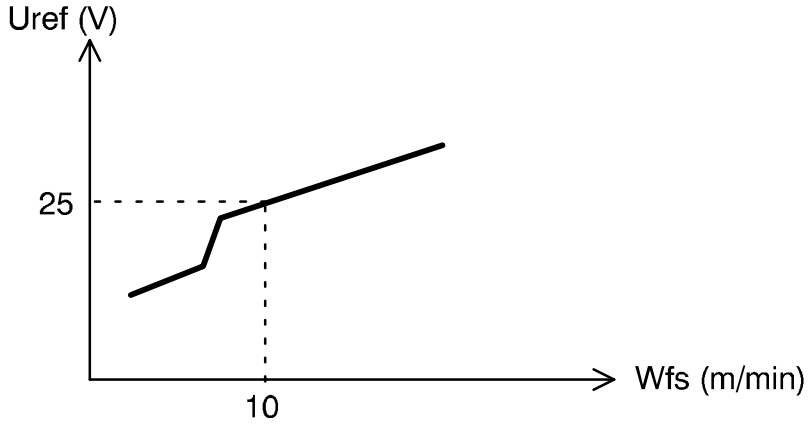
When in the Program mode position, wire feed speeds and arc voltage values can be **only** those stored in the working points. All other wire feed speed and arc voltage setting controls are inactive.

Explanation of synergic lines

Each combination of wire type, wire diameter and gas mixture requires its own unique relationship between the wire feed speed and voltage (arc length) in order to maintain a stable and effective arc. The wire feeders have pre-programmed "**synergic lines**".

Once you have chosen the pre-programmed synergic line that matches your wire type, wire diameter and gas mixture all you need to do is set the appropriate wire feed speed for your welding task. The voltage (arc length) is automatically adjusted in accordance with the pre-programmed synergic line you have chosen, i.e. you have one-knob control.

Because different welding tasks and joint preparations require slightly different voltages (arc lengths) the voltage can naturally be fine-tuned either side of the pre-programmed value. When this is done the green light on the front panel goes out. This indicates that the voltage is above or below the pre-programmed value. If you want to return to the original setting you simply adjust the voltage until the green light comes on again.



Example of synergy characteristic without pulsing

Synergy mode without pulsing

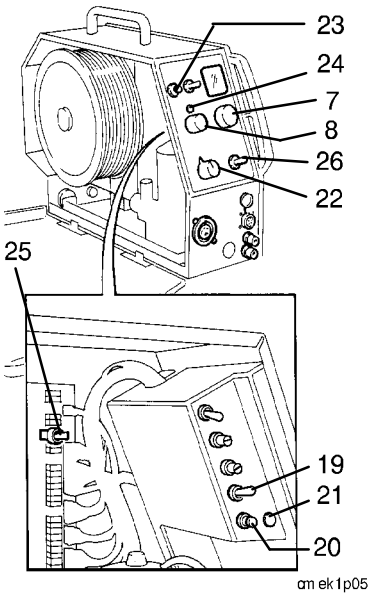
Switch **26** on MEK 4SP must **not** be in the pulse position.

A total of 16 different synergy characteristics can be selected, of which two (four) can be programmed by the user, see the tables on page 38.

Set selector switch **22** and switch **25** to the synergy line that matches the wire type you intend to use. Switch **25** is mounted on the circuit board, it has two positions A and B.

Set a wire feed speed (Wfs) by means of wire feed speed pulse generator **7**, after which the program calculates a suitable arc voltage reference signal characteristic (U_{ref}), as shown above.

A synergy deviation characteristic from the calculated arc voltage reference can be set by a voltage control potentiometer on the remote control unit or by the voltage control **8** on the front panel of the unit. If the synergy deviation is zero, green LED **24** lights to indicate that the unit is operating on the synergy characteristic line. Positive or negative deviation will result in the LED being extinguished.



The synergy deviation will be zeroed when a new synergy characteristic is selected. When using the MEK 4SP, welding can be changed between non-pulsed and pulsed welding without zeroing the synergy deviation.

If a remote control unit is connected, the synergy deviation cannot be zeroed by the software. Turning the remote control potentiometer to its centre position gives zero synergy deviation.

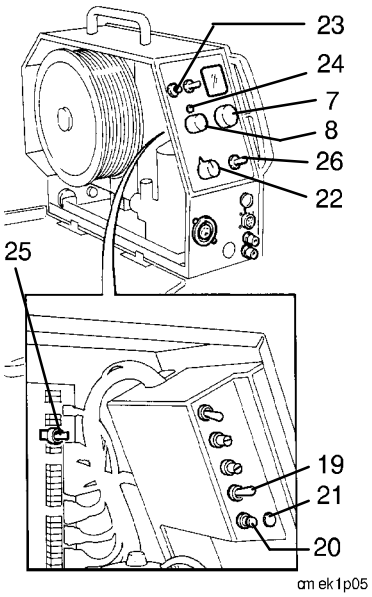
Presetting

Press pushbutton **23** to display the values of wire feed speed and arc voltage that make up the respective synergy characteristics. The digital display responds by showing the wire feed speed setting, together with the arc voltage as modified by any synergy deviation.

Storing the working point

Any arbitrary point on a synergy characteristic line can be selected and stored as a working point in the same way as storing manual working points:

- Select a synergy characteristic.
- Set the required wire feed speed and synergy deviation.
- Check the set values by pressing pushbutton **23**.
- Use switch **19** to select the program (1, 2 or 3) in which the parameters are to be stored.
- Press and hold pushbutton **20**. The welding parameters data will be stored after 2.5 seconds.
- Green LED **21** lights to indicate completion of storage.
- Release pushbutton **20**.



	Synergy A		Synergy B
1	Fe 1.0 80%Ar 20%CO_2	1	RFCW 1.2 80%Ar 20%CO_2
2	Fe 1.2 80%Ar 20%CO_2	2	RFCW 1.6 80%Ar 20%CO_2
3	Ss 1.0 98%Ar 2%CO_2	3	BFCW 1.2 80%Ar 20%CO_2
4	SSFCW 1.2 80%Ar 20%CO_2	4	BFCW 1.6 80%Ar 20%CO_2
5	Al Mg 1.2 100%Ar	5	Programmable
6	Al Mg 1.6 100%Ar	6	Programmable
7	MCW 1.2 80%Ar 20%CO_2	7	Programmable
8	MCW 1.6 80%Ar 20%CO_2	8	Programmable

12 pre-programmed synergy lines (valid up to software ver. 2.01, see page 9.)

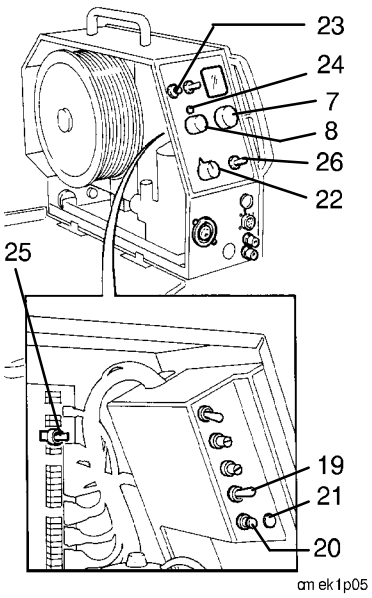
SSFCW = Stainless Steel Flux Cored Wire
MCW = Metal Cored Wire
RFCW = Rutile Flux Cored Wire
BFCW = Basic Flux Cored Wire

	Synergy A		Synergy B
1	Fe 1.0 80%Ar 20%CO_2	1	MCW 1.2 80%Ar 20%CO_2
2	Fe 1.2 80%Ar 20%CO_2	2	MCW 1.6 80%Ar 20%CO_2
3	Ss 1.0 98%Ar 2%CO_2	3	RFCW 1.2 80%Ar 20%CO_2
4	Ss 1.2 80%Ar 2%CO_2	4	RFCW 1.6 80%Ar 20%CO_2
5	Al Mg 1.2 100%Ar	5	BFCW 1.2 80%Ar 20%CO_2
6	Al Mg 1.6 100%Ar	6	BFCW 1.6 80%Ar 20%CO_2
7	Al Si 1.2 100%Ar	7	Programmable
8	Al Si 1.6 100%Ar	8	Programmable

14 pre-programmed synergy lines (software ver. 2.02, see page 9.)

Programming of synergy lines without pulsing

Switch **26** on the MEK 4SP must **not** be in the Pulse position.



You can program your own synergy lines if one of the programmable lines has been selected and the PAH 1 programming unit is connected to the remote control socket.

PAH 1 consists of a four-position rotary switch, enabling four working points to be stored. Each synergy line consists of four working points defining the arc voltage and wire feed speed, from which the synergy characteristic is calculated by the microprocessor.

Program your custom synergy line as follows:

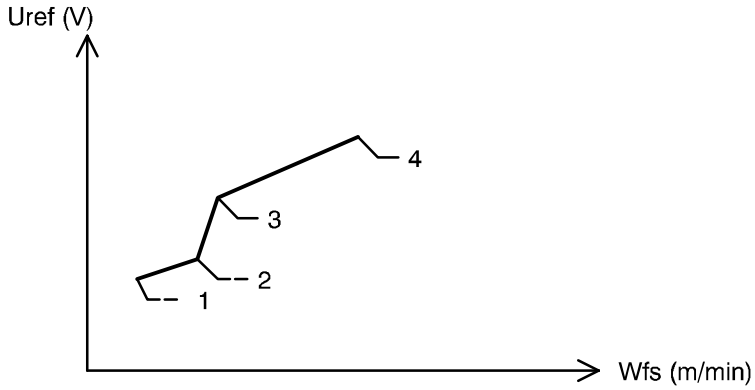
- Use function selector switch **22** and switch **25** to select one of the programmable synergy lines. Connect the PAH 1 unit. The wire feed unit now operates as in manual control mode.
- Turn the PAH 1 switch to position 1. Set the required wire feed speed and arc voltage for the first working point (working point 1). Wire feed speed and arc voltage can be adjusted and set anywhere between their minimum and maximum values (1.9 - 25 m/min and 12 - 45 V respectively).
- Make a test weld, and adjust the settings until good results are obtained. Store the values by pressing pushbutton **20**.
- Turn the PAH 1 to positions 2 - 4, and set welding data for the corresponding working points (2 - 4) in the same way as for working point 1.

When you have finished programming, and the programming unit has been disconnected, you will be returned to synergy line operation.

When programming a synergy line, you must program and store four points in the following order:
Point 1 < point 2 < point 3 < point 4 (Wfs1 < Wfs2 < Wfs3 < Wfs4, Uref1 < Uref2 < Uref3 < Uref4)

The wire feed sped cannot be set lower than Wfs1 or higher than Wfs4, as opposed to the fixed lines, where wire feed speed can be set between 1.9 and 25 m/min.

The figure below shows an example of a programmed line.



Example of programmed synergy characteristic without pulsing

MEK 4SP: Synergy mode with pulsing

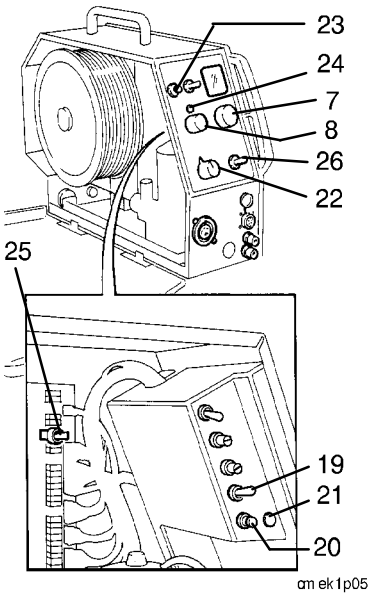
Set switch **26** to the Pulse position.

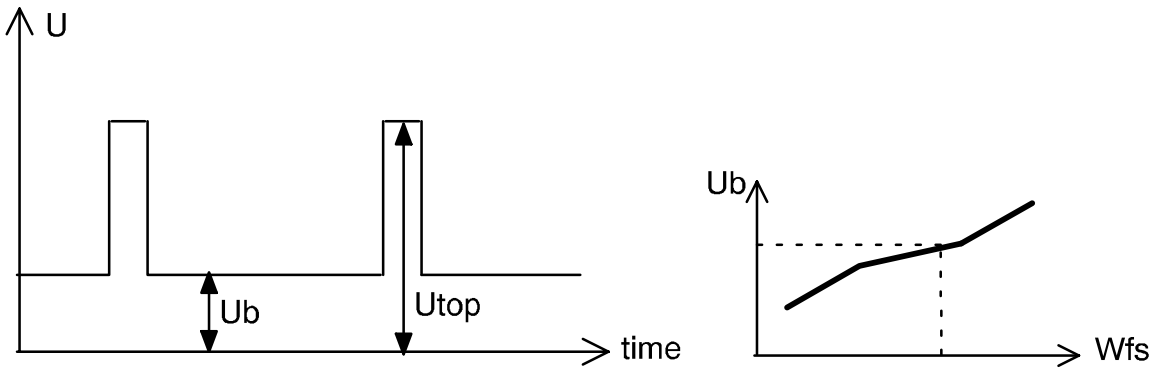
In addition to the 16 synergy lines available for normal welding,

Twelve (eleven) lines are available for pulsed welding. Two (four) of them can be programmed by the user, see the tables on page 41.

Set selector switch **22** and switch **25** to the programmable synergy line that matches the wire type you intend to use.

When in synergy operation control mode, set the required wire feed speed (Wfs) using pulse generator **7**. From this speed, the program will then calculate a background arc voltage (Ub), as shown in the example in the figure below. The peak voltage (Utop) is constant for a given synergy line.





Background arc voltage, peak voltage and synergy line for pulsing

When welding, the digital display shows the arc voltage as a mean value of Ub and Utop.

A synergy deviation from the calculated arc voltage reference value can be set using the potentiometer in the remote control unit or by pulse generator **8** on the front of the wire feed unit.
If no deviation is set, i.e. if the deviation is zero, green LED **24** will light to indicate that the unit is operating on the synergy line characteristic. Any deviation, whether positive or negative, will result in the LED being extinguished.

The synergy deviation will be zeroed when a new synergy line characteristic is selected. It is possible to change between pulsed and non-pulsed welding without zeroing the synergy deviation.

If a remote control unit is connected, the synergy deviation cannot be zeroed by the software. Set the remote control potentiometer to its centre position for zero synergy deviation.

Presetting

Press switch **23** to read off the values of wire feed speed and arc voltage set in/by the respective synergy lines. The display show the set value of wire feed speed and the arc voltage as a calculated mean value of the background voltage and the pulse voltage, including any synergy deviation that may be applied.

Storing the working point

Any point on a synergy line can be stored in the same way as storing a working point in manual operation. See the description on page 38.

Synergy A		Wfs
1	Fe 1.0 92%Ar 8%CO_2	4.5 - 25 m/min
2	Fe 1.2 92%Ar 8%CO_2	4.0 - 25 m/min
3	Ss 1.0 98%Ar 2%CO_2	4.0 - 25 m/min
4	**NO PULSE FUNCTION**	
5	Al Mg 1.2 100%Ar	4.5 - 25 m/min
6	Al Mg 1.6 100%Ar	3.5 - 25 m/min
7	MCW 1.2 80%Ar 20%CO_2	3.5 - 25 m/min
8	MCW 1.6 80%Ar 20%CO_2	2.5 - 25 m/min

7 pre-programmed pulsed synergy lines (valid up to software ver. 2.01, see page 9.)

SSFCW = Stainless Steel Flux Cored Wire
MCW = Metal Cored Wire
RFCW = Rutile Flux Cored Wire
BFCW = Basic Flux Cored Wire

Synergy A		Wfs	Synergy B		Wfs
1	Fe 1.0 92%Ar 8%CO_2	4.5 - 25 m/min	1	MCW 1.2 80%Ar 20%CO_2	3.5 - 25 m/min
2	Fe 1.2 92%Ar 8%CO_2	4.0 - 25 m/min	2	MCW 1.6 80%Ar 20%CO_2	2.5 - 25 m/min
3	Ss 1.0 98%Ar 2%CO_2	4.0 - 25 m/min	3	**NO PULSE FUNCTION**	
4	Ss 1.2 98%Ar 2%CO_2	3.3 - 25 m/min	4	**NO PULSE FUNCTION**	
5	Al Mg 1.2 100%Ar	4.5 - 25 m/min	5	**NO PULSE FUNCTION**	
6	Al Mg 1.6 100%Ar	3.5 - 25 m/min	6	**NO PULSE FUNCTION**	
7	Al Si 1.2 100%Ar	4.4 - 25 m/min	7	Programmable	
8	Al Si 1.6 100%Ar	2.8 - 25 m/min	8	Programmable	

10 pre-programmed pulsed synergy lines (software ver. 2.02, see page 9.)

On the MEK 4SP, switch **26** changes operation between pulsed and non-pulsed welding when operating on one of the pulsed synergy lines.

It is also possible to change between pulsed and non-pulsed welding when operating on a user-programmed synergy line, provided that the line has been programmed in both pulsed and non-pulsed modes.

MEK 4SP: Programming of synergy lines with pulsing

Set switch **26** to the Pulse position.

You can create your own synergy lines if any of the programmable synergy lines have been selected, and the PAH 1 programming unit is connected to the remote control socket. The MEK 4SP unit allows you to create four (eight) custom synergy lines: two (four) in pulsed mode, and two (four) in non-pulsed mode.

Programming in the pulse mode requires you to enter three working points and a pulse voltage.

It is a good idea, when programming your own synergy lines, to have some proven base values to start from: see the table below.

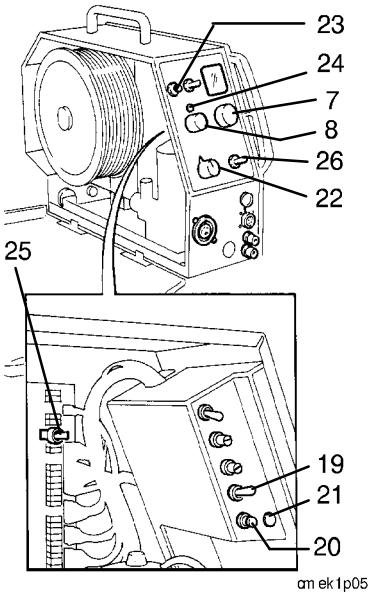
Wire & Gas + line no.	Utop V	Ub V	Wfs m/min	Wire & Gas +line no.	Utop V	Ub V	Wfs m/min
Fe 1.0 92%Ar 8%CO_2 **A1**	40	18 21 24	6 9 12	Al Mg 1.6 100%Ar **A6**	36	16 19 22	6 9 12
Fe 1.2 92%Ar 8%CO_2 **A2**	48	20 23 26	6 9 12	Al Si 1.2 100%Ar **A7**	27	17.7 19 24.5	5 7 11
Ss 1.0 98%Ar 2%CO_2 **A3**	36	17 20 24	6 9 12	Al Si 1.6 100%Ar **A8**	28	18.5 23.5 25	4.2 6 9
Ss 1.2 98%Ar 2%CO_2 **A4**	37	16.5 22 28	5 10 15	MCW 1.2 80%Ar 20%CO_2 **B1**	42	20 24 27	6 9 12
Al Mg 1.2 100%Ar **A5**	32	15 18 21	6 9 12	MCW 1.6 80%Ar 20%CO_2 **B2**	42	25 29 34	6 9 12

Voltage and wire feed speed values applicable to the pre-programmed synergy lines from software version 2.02 (page 41)

Program your own lines as follows:

1. Set function selector switch **22** to one of the positions 5 - 8 and switch **25** to position B. Connect the PAH 1 programming unit. The feed unit now operates as in manual mode.

2. Set the PAH 1 to position 4.
   - Select a base value from the table above and set the peak voltage (Utop).
   - Press programming button **20** to store the set value.
   - You cannot change the wire feed speed.



3. Set the PAH 1 to position 1.
   - Set the background voltage (Ub) and the wire feed speed (Wfs).
   - Make a test weld. If the results are satisfactory, store the set data. If the weld is not satisfactory, adjust Ub and/or Utop. Note that if you change Utop (with PAH 1 in position 4), you must store its value again.
   - Store the settings data when you are satisfied with the results of test welding.

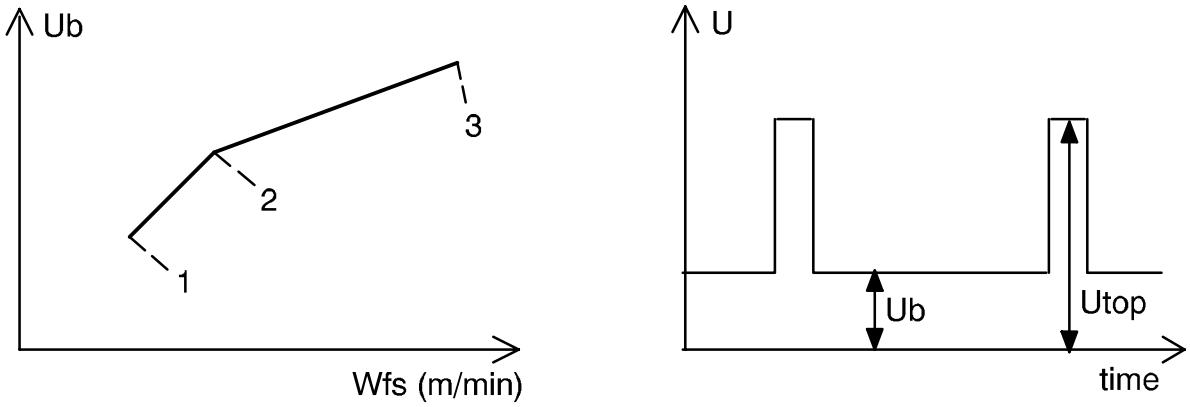
4. Set the PAH 1 to position 2.
   - Set Ub and Wfs for working point 2 and make a test weld.
   - Store the settings data when you are satisfied with the results of test welding.

5. Set the PAH 1 to position 3.
   - Repeat the above procedure.

When you have finished programming, and the programming unit has been disconnected, you will be returned to synergy line operation.

When programming a synergy line, you must program and store three points in the following order:
Point 1 < point 2 < point 3 (Wfs1 < Wfs2 < Wfs3, Ub1 < Ub2 < Ub3)

You cannot set the wire feed speed lower than Wfs1 or higher than Wfs3.

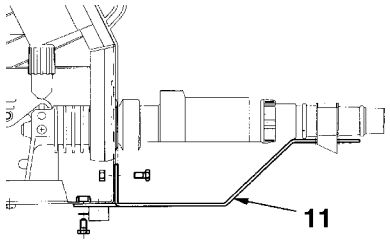


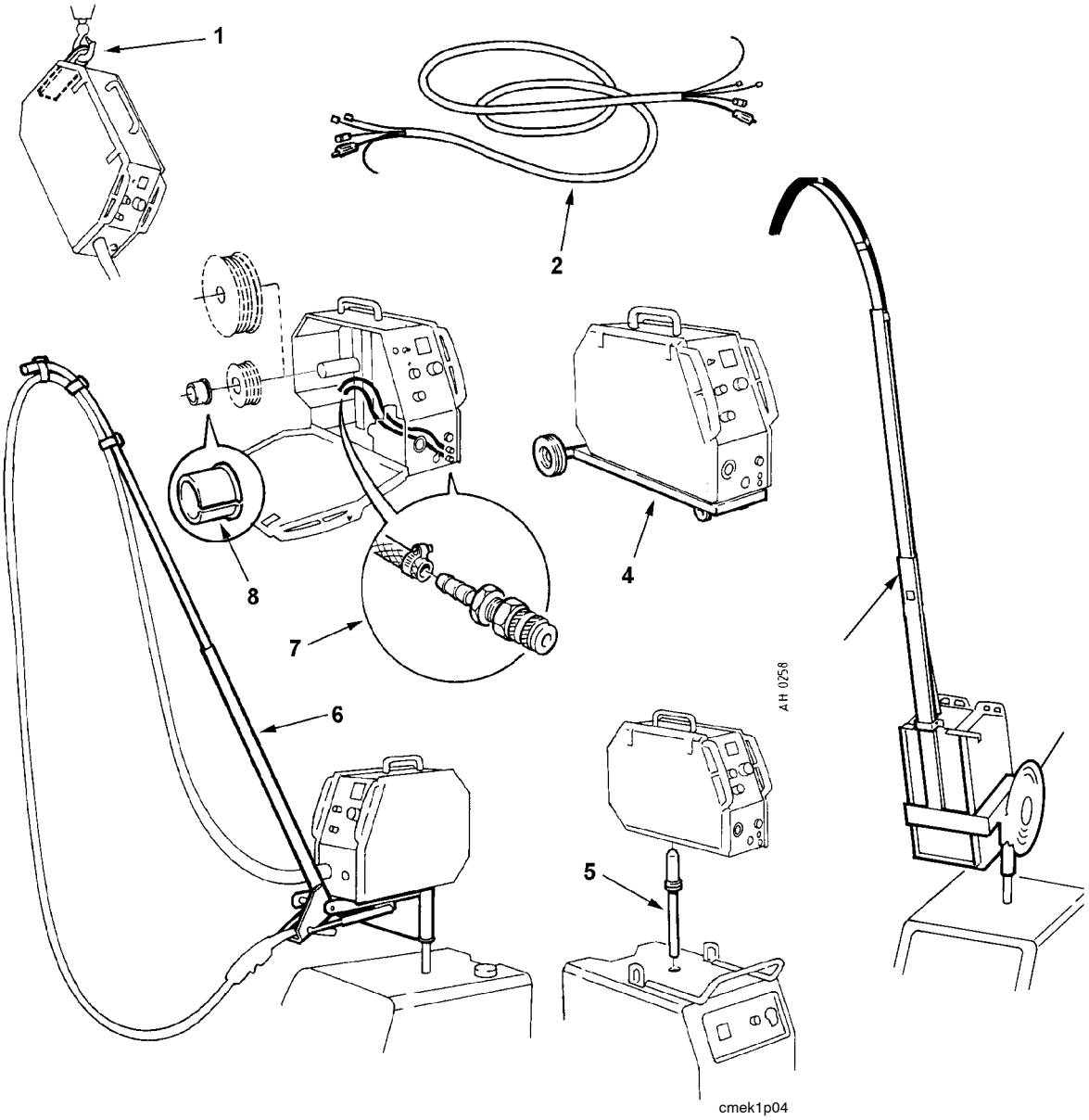
Example of a programmed synergy line for pulsing and background and peak voltage

ACCESSORIES

Item no	Ordering no. when used with LAW 400/410	Ordering no. when used with LAW 400/410 W	Ordering no. when used with LAW 500/510	Ordering no. when used with LAW 500/510 W	Designation
2	0469 836 880	0469 836 885	0469 836 890	0469 836 895	Connection set 1.7 metre
	0469 836 881	0469 836 886	0469 836 891	0469 836 896	Connection set 8 metre
	0469 836 882	0469 836 887	0469 836 892	0469 836 897	Connection set 16 metre
	0469 836 883	0469 836 888	0469 836 893	0469 836 898	Connection set 25 metre
	0469 836 884	0469 836 889	0469 836 894	0469 836 899	Connection set 35 metre

Item	Ordering no.	Designation
1	0469 789 880	Lifting eye
4	0469 786 880	Trolley
5	0156 654 883	Guide pin (included in LAW)
6	0469 792 881	Counter balance device and mast
7	0469 967 880	Water connection set
8	0455 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
-	0455 525 880	PAH 1
-	0349 090 888	Connection kit for foot pedal
-	0466 515 880	Remote control unit: Aristo Control Synergic Torch
-	0466 801 880	Remote control unit: Aristo Control Synergic Box





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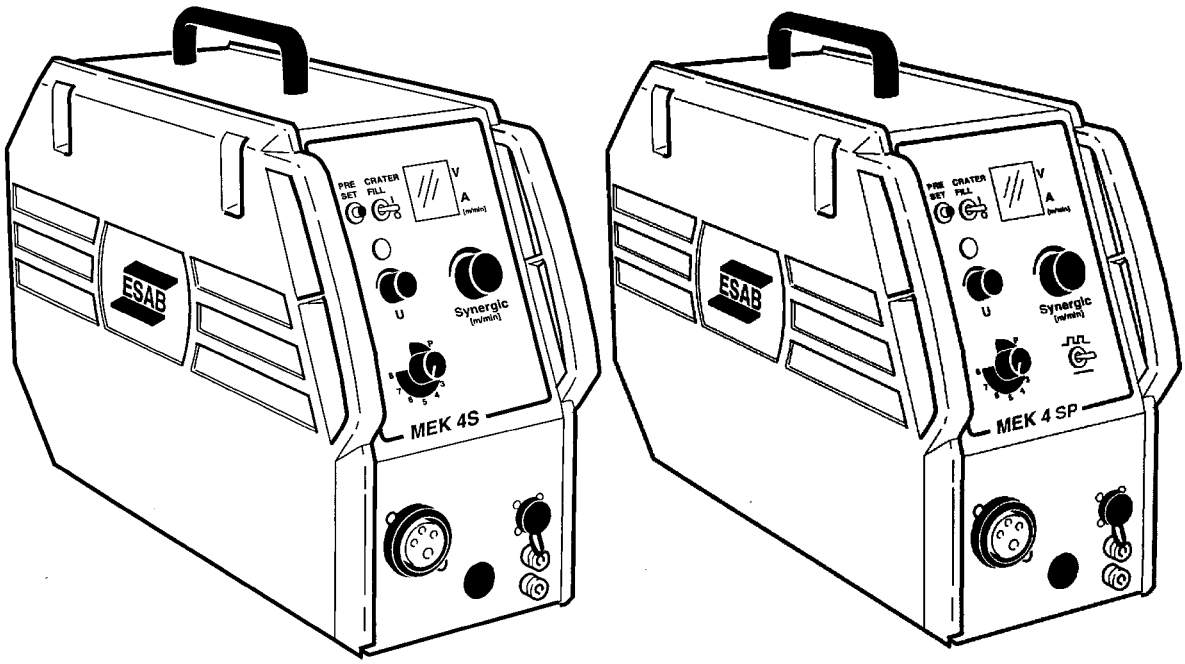
Spare parts list



Valid for serial no. 514-xxxx to serial no. 912-xxx-xxxx

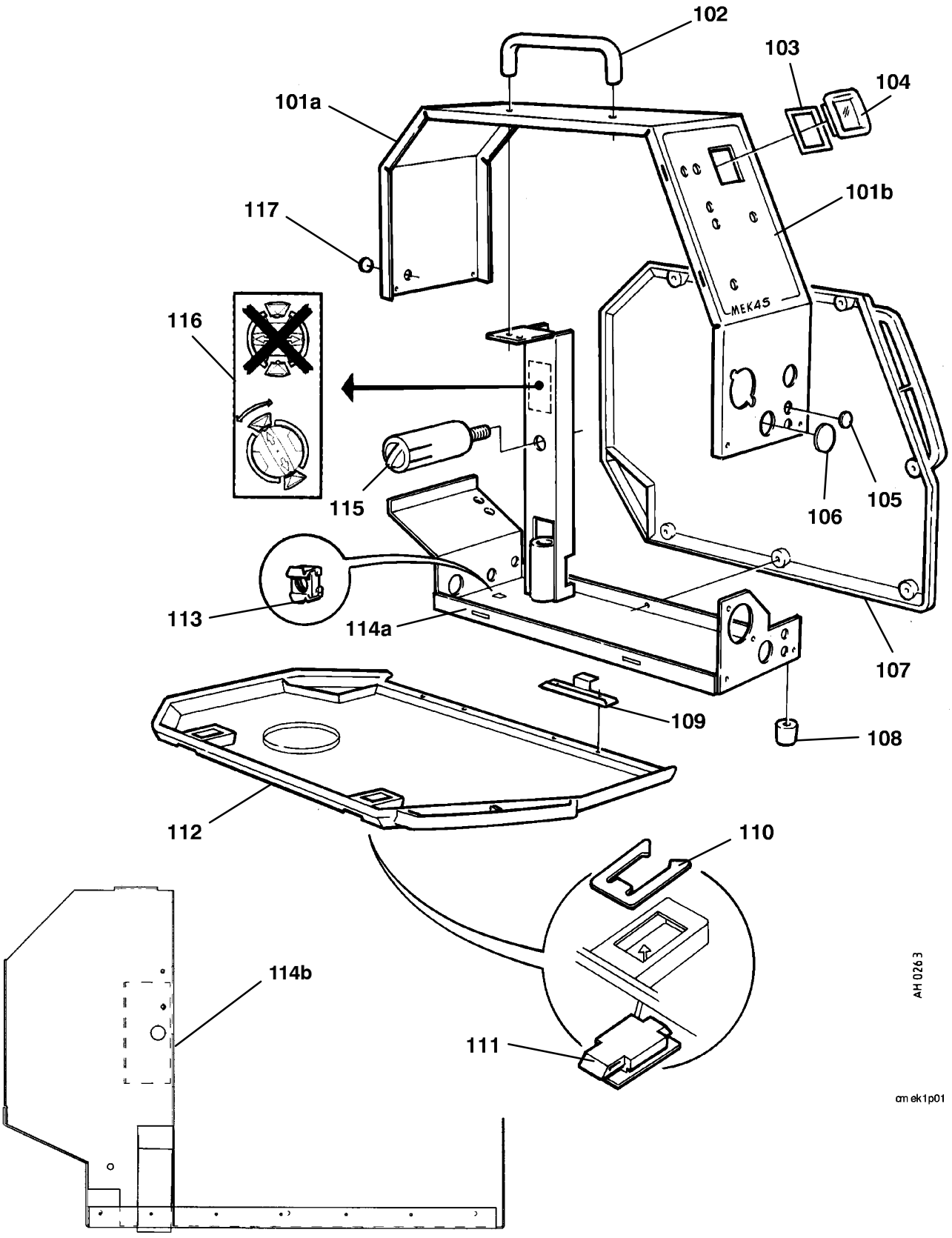
Ordering numbers for *MEK 4S MEK 4SP*

0455 175 880	MEK 4S	Without water connection
0455 175 881	MEK 4S	With water connection
0456 815 881	MEK 4SP	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.

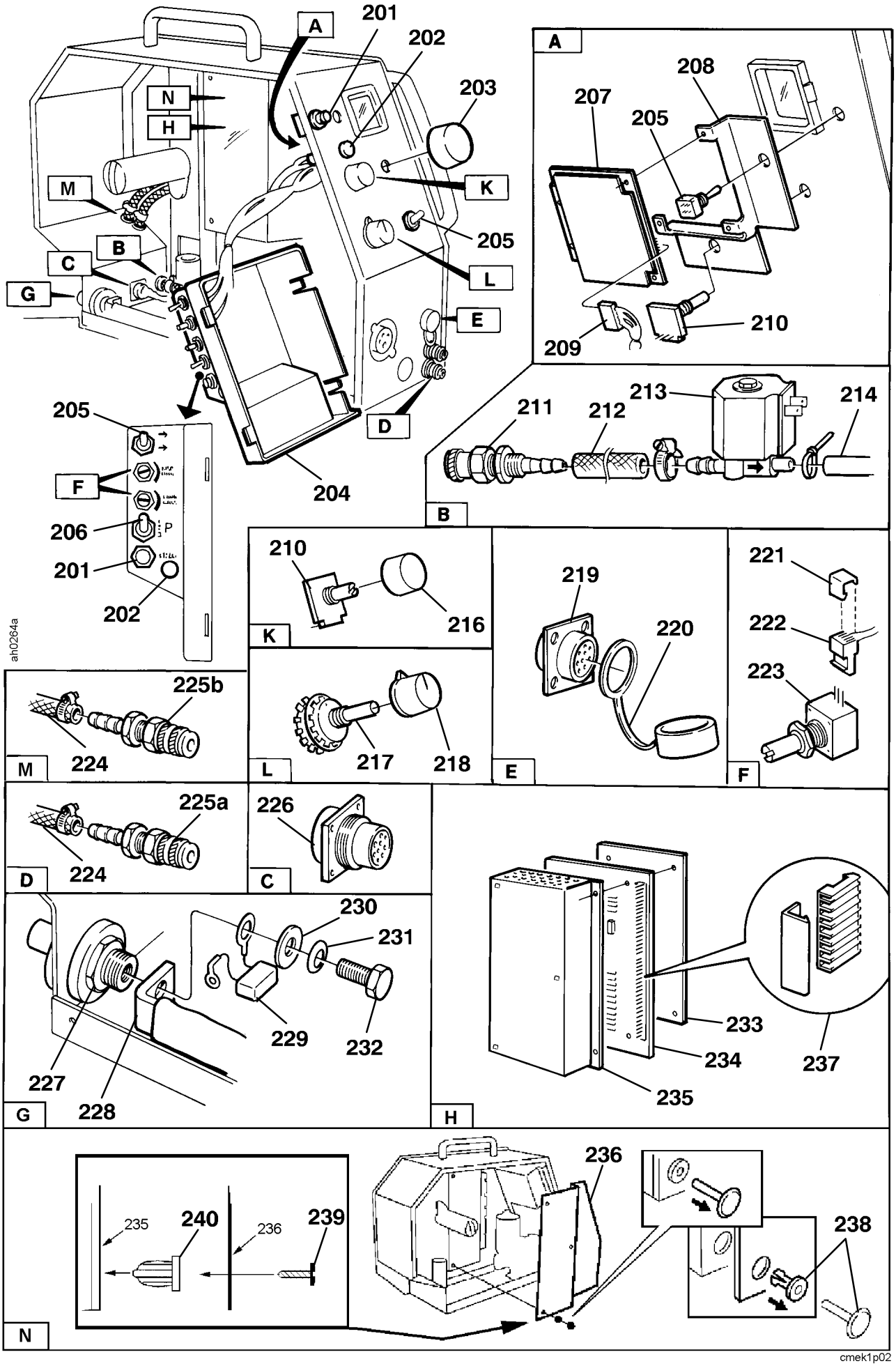
Maintenance and repair work should be performed by an experienced person, and electrical work only by a trained electrician. Use only recommended spare parts.

Item no.	Qty	Ordering no.	Designation	Notes
101a	1	0455 501 001	Cover	With text
101b	1	0456 353 001	Plate with text	**MEK 4S**
101b	1	0456 819 001	Plate with text	**MEK 4SP**
102	1	0467 176 001	Handle	
103	1	0455 174 001	Seal	
104	1	0455 172 001	Protection glass	
105	4	0192 230 105	Cover	
106	1	0192 230 112	Cover	
107	1	0469 959 001	Side cover	
108	4	0467 695 001	Rubber foot	
109	2	0469 823 001	Hook	
110	2	0369 561 002	Clamp	
111	2	0369 561 001	Lock	
112	1	0469 960 001	Side cover	
	1	0455 521 001	Sticker	With the synergic lines **MEK 4S**
	1	0456 824 001	Sticker	With the synergic lines **MEK 4SP**
113	1	0192 562 104	Cage nut	M5
114a	1		Chassis	Replaced by item 114b
114b		0469 779 880	Chassis	
115	1	0146 967 881	Brake hub	
116	1	0416 236 001	Plate	
117	1	0192 230 104	Cover	


102
103
104
101a
101b
117
116
MEK45
115
105
106
113
114a
107
109
108
112
110
114b
111
AH 0263
cmek1p01

C = component designation in the circuit diagram

Item	Qty	Ordering no.	Designation	Notes	C
201	2	0193 483 002	Push-button switch		SB01, SB02
202	2	0455 201 003	Light-emitting diode		V01, V02
203	1	0321 475 893	Knob		
204	1	0469 776 002	Cover		
205	2	0147 866 001	Switch	**MEK 4S**	SA01, SA02
205	3	0147 866 001	Switch	**MEK 4SP** SA01, SA02, SA05	<-----
206	1	0147 866 002	Switch		SA04
207	1	0486 212 880	Circuit board	For display	AP02
208	1	0455 078 001	Attachment		
209	1	0193 669 005	Connector	5-pole	XS11
210	2	0193 912 001	Pulse generator		RP01, RP02
211	1	0367 149 001	Quick connector	Male, the M10 nut is not included	
	-	0365 803 002	Quick connector	Female	
212	1	0456 496 001	Hose	L=0.33m, D=9/5mm, to be ordered per metre	
213	1	0193 054 002	Solenoid valve		YV01
214	1	0456 496 001	Hose	L=0.22m, D=9/5mm, to be ordered per metre.	
216	1	0321 475 892	Knob		
217	1	0192 722 009	Switch		SA03
218	1	0321 475 885	Knob		
219	1	0368 544 005	Sleeve socket	23-pole	XS13
	23	0323 945 003	Sleeve		
220	1	0455 516 001	Protection cap		
221	4	0193 260 092	Cover	For 3-pole connector	
222	4	0193 260 062	Connector	3-pole XS07, XS08, XS09, XS10	<-----
223	4	0191 870 616	Potentiometer	10 kΩ RP01, RP02, RP03, RP04	<-----
224	1	0190 315 106	Hose	L=2x0.65 metre, D=16/9.5mm , reinforced PVC. To be ordered per metre	
225a	1	0365 803 008	Quick connector	Female, red	
	1	0365 803 009	Quick connector	Female, blue	
-	-	0365 803 001	Quick connector	Male	
225b	1	0365 803 008	Quick connector	Female, red **Before ser. no. . . . 649 . . . .**	
	1	0365 803 009	Quick connector	Female, blue **Before ser. no. . . . 649 . . . .**	
225b	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 . . . .**	
226	1	0368 543 005	Pin socket	23-pole	XP01
	14	0323 945 004	Pin		
227	1	0160 609 881	Welding current connector		XP02
228	1	0469 832 880	Busbar	With insulation	
229	1	0192 915 013	Capacitor	PME 271 0.1 μF 250 V, without cable lugs	C01
230	1		Washer	⊘ 24/13x2	
231	1		Spring washer	⊘ 20/10.2x1.1	
232	1		Screw	M10x20	
233	1	0455 517 001	Cover plate (bottom box)		
234	1	0486 485 880	Circuit board		AP01
-	1	0193 069 201	Battery	For the circuit board	
235	1	0455 518 001	Box (top box)		
236	1	0455 519 001	Cover		
237	1	0193 260 076	Connector	17-pole	XS01
	2	0193 260 150	Connector	2-pole	XS02, XS06
	1	0193 260 154	Connector	6-pole	XS03
	1	0193 260 156	Connector	8-pole	XS04
	1	0193 260 152	Connector	4-pole	XS05
	5	0193 260 062	Connector	3-pole XS07, XS08, XS09, XS10, XS16	<-----
	1	0193 260 063	Connector	4-pole **MEK 4SP**	XS12
	1	0193 260 069	Connector	10-pole	XS14
	1	0193 260 064	Connector	5-pole	XS15
	2	0193 260 061	Connector	2-pole	XS15, XS20
	1	0193 260 067	Connector	8-pole	XS17
	1	0193 260 151	Connector	3-pole **MEK 4SP**	XS21
238	3	0455 661 019	Plastic rivet	**Before ser. no. 514 718 . . . .**	
239	3	0193 517 342	Screw	Plastic **From ser. no. 514 718 . . . .**	
240	3	0194 019 001	Spacer	Plastic **From ser. no. 514 718 . . . .**	


A
201
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H
M
K
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C
205
L
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E
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P
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ah0264a
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M
225b
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218
D
225a
224
C
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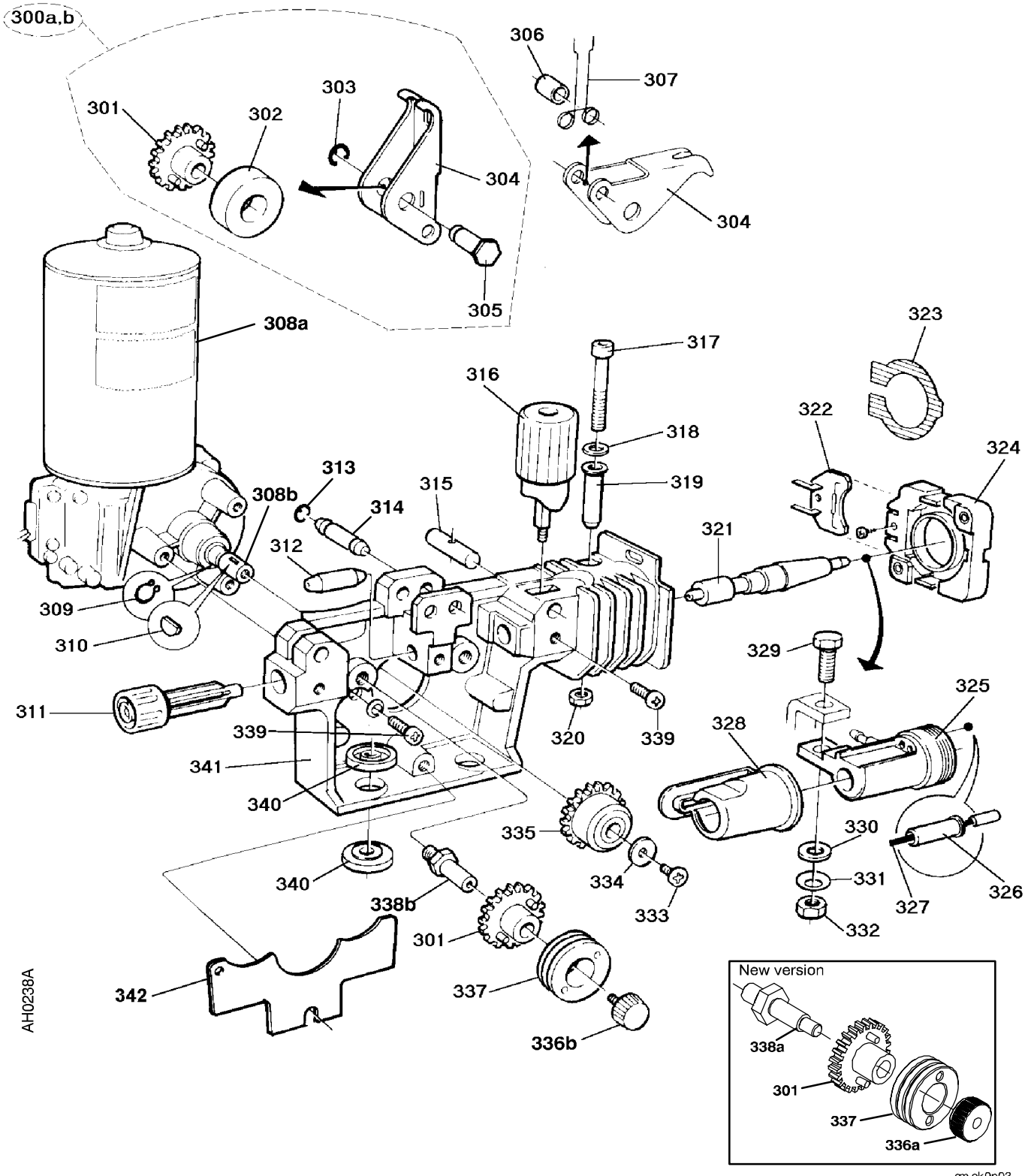
cmek1p02

C = component designation in the circuit diagram

Item	Qty	Ordering no.	Designation	Notes	C
300a	1	0469 833 880	Pressure arm, left	Contains items 301, 302, 303, 304 and 305, one of each.	
300b	1	0469 833 881	Pressure arm, right	Contains items 301, 302, 303, 304 and 305, one of each. The same items as 300a, they are only fitted differently.	
301	4	0455 053 880	Geared adapter **(W)**		
302	2	0369 728 001	Pressure roller **(W)**		
	2	0466 262 001	Pressure roller **(W) (A)**	Knurled	
303	2		Locking washer	Included in item 300a and 300b	
304	2		Holder	Included in item 300a and 300b	
305	2		Shaft	Included in item 300a and 300b	
306	2	0455 070 001	Sleeve		
307	1	0455 050 001	Spring		
308a	1	0455 077 001	Drive unit	With tachometer	M01, G01
308b	1	0332 351 012	Drive shaft	Included in item 308a	
309	1	0215 701 007	Locking washer	Included in item 308a	
310	1	0191 496 114	Key	Included in item 308a	
311	1	0455 049 001	Inlet nozzle **(W)**		
312	1	0455 072 001	Adapter nozzle **(W)**		
	1	0456 615 001	Adapter nozzle **(W) (A)**	For aluminium	
313	4	0215 702 706	Locking washer		
314	2	0455 071 001	Shaft		
315	2	0367 528 001	Pin bolt		
316	2	0368 749 880	Pressure transducer		
317	1		Screw	M6x40	
318	1		Washer	⊘ 12/6.4x1.5	
319	1	0455 048 001	Insulating tube		
320	1		Nut	M6	
321	1	0469 837 880	Outlet nozzle **(W)**		
	1	0469 837 881	Outlet nozzle **(W) (A)**	For aluminium	
322	1	0481 004 880	Printed circuit board	Current relay	
323	1	0455 079 001	Plate		
324	1	0455 047 001	Front flange		
325	1	0455 044 001	Current junction		
326	2	0368 750 001	Insulating sleeve		
327	1	0469 964 882	Cable set		
328	1	0455 045 001	Insulating sleeve		
329	1		Screw	M8x25	
330	1		Washer	⊘ 16/8.4x1.5	
331	1		Spring washer	⊘ 16/8.2x0.9	
332	1		Nut	M8	
333	1		Screw	M4x12	
334	1		Washer	⊘ 16/5x1	
335	1	0455 052 001	Drive gear **(W)**		
336a	2	0458 721 001	Nut	Valid from ser.no.912-114-xxxx	
336b	2	0455 075 001	Screw	Valid before ser.no.912-114-xxxx When ordering: Items 336a and 338a are delivered.	
337	2	0369 557 001	Feed roller **(W) (A)**	**(V)**For ⊘ 0.6 - 0.8 mm Fe, Ss and cored wire	
	2	0369 557 002	Feed roller **(W) (A)**	**(V)**For ⊘ 0.8 - 1.0 mm Fe, Ss and cored wire	
	2	0369 557 003	Feed roller **(W)**	**(V)**For ⊘ 1.0 - 1.2 mm Fe, Ss and cored wire	
	2	0369 557 007	Feed roller **(W) (A)**	**(V)**For ⊘ 1.2 - 1.6 mm Fe, Ss and cored wire	
	2	0369 557 010	Feed roller **(W) (A)**	**(V)**For ⊘ 1.2 mm x 2 Fe, Ss and cored wire	
	2	0369 557 013	Feed roller **(W) (A)**	**(V)**For ⊘ 1.4 -1.6 mm Fe, Ss and cored wire	
	2	0369 557 004	Feed roller **(W) (A)**	**(K)(V)** For ⊘1.0 - 1.2 / 1.4 - 1.6 mm cored wire	
	2	0369 557 006	Feed roller **(W) (A)**	**(U)** For ⊘ 1.0 - 1.2 mm Al wire	
	2	0369 557 008	Feed roller **(W) (A)**	**(U)** For ⊘ 1.6 mm Al wire	
	2	0369 557 011	Feed roller **(W) (A)**	**(U)** For ⊘ 0,8 - 0,9 mm Al wire	
338a	2	0458 722 001	Shaft	Valid from ser.no.912-114-xxxx	

Item	Qty	Ordering no.	Designation	Notes	C
338b	2	0455 068 001	Shaft	Valid before ser.no.912-114-xxxx When ordering: Items 336a and 338a are delivered.	
339	6		Screw	M6x16	
340	4	0153 043 002	Insulating washer		
341	1	0455 046 001	Gear housing		
342	1	0469 838 001	Protection plate		

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



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