

Service manual

v. 1.0

FastMig



KM 300
KM 400
KM 500



KMS 300
KMS 400
KMS 500



MF 29
MF 33
MSF 53
MSF 55
MSF 57

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Technical data

FastMig KM / MF

	FastMig™ KM 300	FastMig™ KM 400	FastMig™ KM 500
Mains voltage 3~50/60 Hz			
	400 V -15 %...+20 %	400 V -15 %...+20 %	400 V -15 %...+20 %
Rated power			
60 % ED	-	-	25,9 kVA
80 % ED	-	18,5 kVA	-
100 % ED	12,9 kVA	16,9 kVA	20,1 kVA
Connection cable/fuse delayed			
	4 x 6 S - 5 m / 25 A	4 x 6 S - 5 m / 35 A	4 x 6 S - 5 m / 35 A
Max. welding voltage 40 °C			
60 % ED	-	-	500 A
80 % ED	-	400 A	-
100 % ED	300 A	380 A	430 A
Welding current range			
MIG	10 V ... 37 V	10 V ... 39 V	10 V ... 42 V
Max. welding voltage			
	46 V	46 V	46 V
Open circuit voltage			
	65 V	65 V	65 V
Open circuit power			
	25 W	25 W	25 W
Efficiency			
	87 %	87 %	87 %
Power factor			
	0,9	0,9	0,9
Storage temperature range			
	-40 ... +60 °C	-40 ... +60 °C	-40 ... +60 °C
Operating temperature range			
	-20 ... +40 °C	-20 ... +40 °C	-20 ... +40 °C
Degree of protection			
	IP 23 C	IP 23 C	IP 23 C
External dimensions			
length	590 mm	590 mm	590 mm
width	230 mm	230 mm	230 mm
height	430 mm	430 mm	430 mm
Weight	34 kg	35 kg	38 kg
Voltage supply for auxiliary devices			
	24 V DC	24 V DC	24 V DC
Voltage supply for cooling unit			
	1~, 400 V / 250 VA	1~, 400 V / 250 VA	1~, 400 V / 250 VA

		MF 33
Working voltage (safety voltage)		24 V DC
Rated power		100 W
Max. load (nominal values)		
	60 % ED	520 A
	100 % ED	440 A
Operation principle		4-roll feed
Diameter of feed roll		32 mm
Wire feed speed *)		0...25 m/min
Filler wires		
	ø Fe, Ss	0,6...1,6
	ø Cored wire	0,6...2,0
	ø Al	1,0...2,4
Wire reel		
	max. weight	20 kg
	max. size	ø 300 mm
Gun connector		Euro
Operation temperature range		-20...+40 °C
Storage temperature range		-40...+60 °C
Degree of protection		IP 23 C
Dimensions		
	length	590 mm
	width	240 mm
	height	445 mm
Weight		13,6 kg

Technical data

FastMig KMS / MSF

	FastMig™ KMS 300	FastMig™ KMS 400	FastMig™ KMS 500
Mains voltage 3~50/60 Hz			
	400 V -15 %...+20 %	400 V -15 %...+20 %	400 V -15 %...+20 %
Rated power			
60 % ED	-	-	26,1 kVA
80 % ED	-	19,5 kVA	-
100 % ED	13,9 kVA	18,5 kVA	20,3 kVA
Connection cable/fuse delayed			
	4 x 6 S - 5 m / 25 A	4 x 6 S - 5 m / 35 A	4 x 6 S - 5 m / 35 A
Loadability 40 °C			
60 % ED	-	-	500 A
80 % ED	-	400 A	-
100 % ED	300 A	380 A	430 A
Welding current and voltage range			
MMA	10 A ... 300 A	10 A ... 400 A	10 A ... 500 A
MIG	10 V ... 37 V	10 V ... 39 V	10 V ... 42 V
Max. welding voltage	46 V	46 V	46 V
Open circuit voltage	50 V	50 V	50 V
Open circuit power	25 W	25 W	25 W
Efficiency	87 %	87 %	87 %
Power factor	0,9	0,9	0,9
Storage temperature range			
	-40 ... +60 °C	-40 ... +60 °C	-40 ... +60 °C
Operating temperature range			
	-20 ... +40 °C	-20 ... +40 °C	-20 ... +40 °C
Degree of protection	IP 23 C	IP 23 C	IP 23 C
External dimensions			
length	590 mm	590 mm	590 mm
width	230 mm	230 mm	230 mm
height	430 mm	430 mm	430 mm
Weight	34 kg	35 kg	36 kg
Voltage supply for auxiliary devices			
	50 V DC	50 V DC	50 V DC
X14, X15	fuse 6,3 A delayed	fuse 6,3 A delayed	fuse 6,3 A delayed
Voltage supply for cooling unit			
	1~, 400 V / 250 VA	1~, 400 V / 250 VA	1~, 400 V / 250 VA

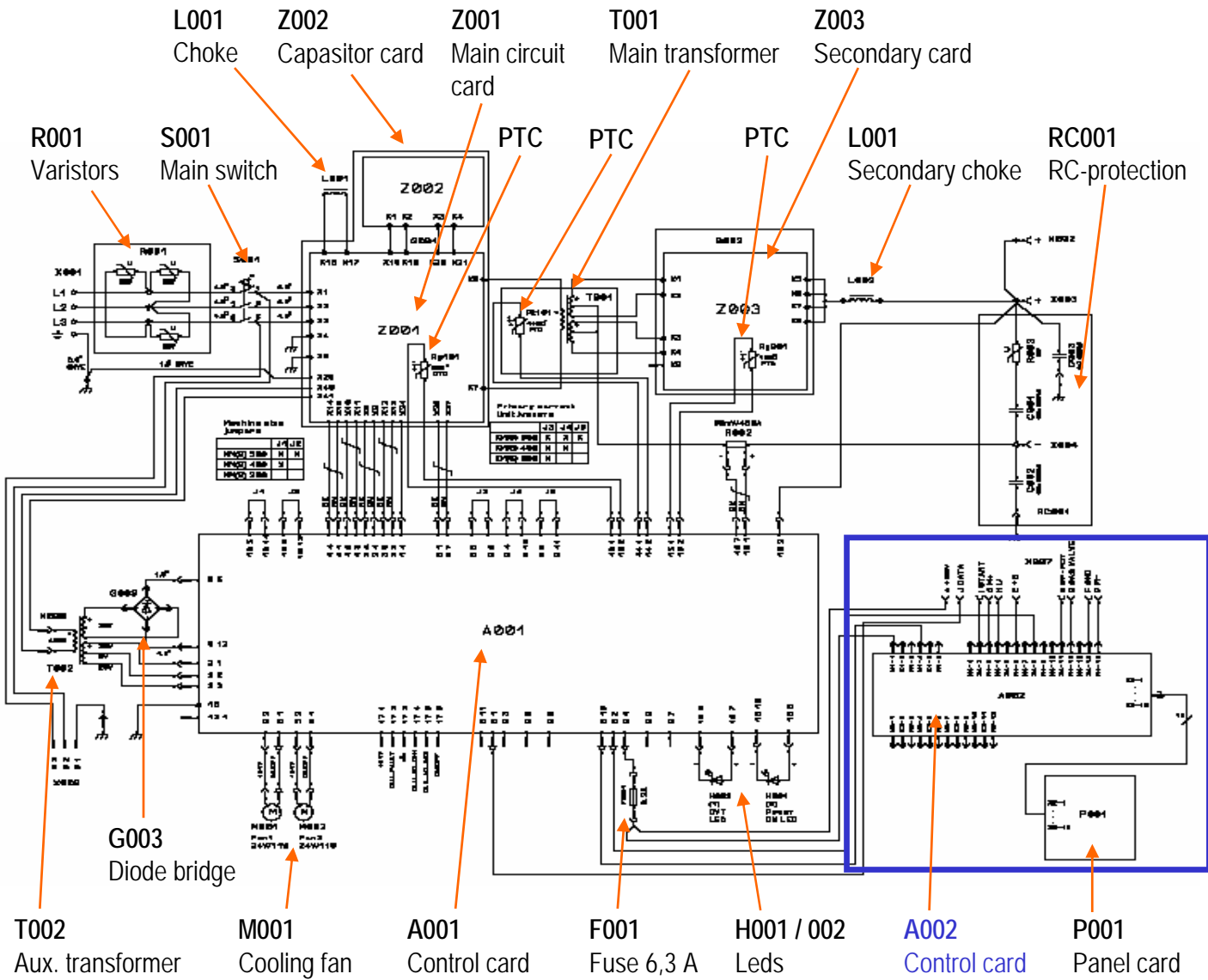
	<i>MSF 53</i>	<i>MSF 55</i>	<i>MSF 57</i>	
Operating voltage (safety voltage)	50 VDC	50 VDC	50 VDC	
Rated power	100 W	100 W	100 W	
Load capacity (nominal values)				
	60 % ED	520 A	520 A	520 A
	100 % ED	440 A	440 A	440 A
Feeding mechanism		4-roll feed	4-roll feed	4-roll feed
Diameter of feed roll		32 mm	32 mm	32 mm
Wire feed speed		0...25 m/min	0...25 m/min	0...25 m/min
Filler wires				
	ø Fe, Ss	0,6...1,6	0,6...2,4	0,6...1,6 mm
	ø Cored wire	0,8...1,6	0,8...2,4	0,8...2,0 mm
	ø Al	1,0...1,6	1,0...2,4	1,0...2,4 mm
Spool				
	max. weight	5 kg	20 kg	20 kg
	max. size	ø 200 mm	ø 300 mm	ø 300 mm
Gun connector		Euro	Euro	Euro
Operation temperature range		-20...+40 °C	-20...+40 °C	-20...+40 °C
Storage temperature range		-40...+60 °C	-40...+60 °C	-40...+60 °C
Degree of protection		IP 23	IP 23	IP 23
External dimensions				
	length	510 mm	620 mm	625 mm
	width	200 mm	210 mm	243 mm
	height	310 mm	445 mm	247 mm
Weight		9,4 kg	11,1 kg	12,5 kg

Technical data

FastMig KMS / MVU

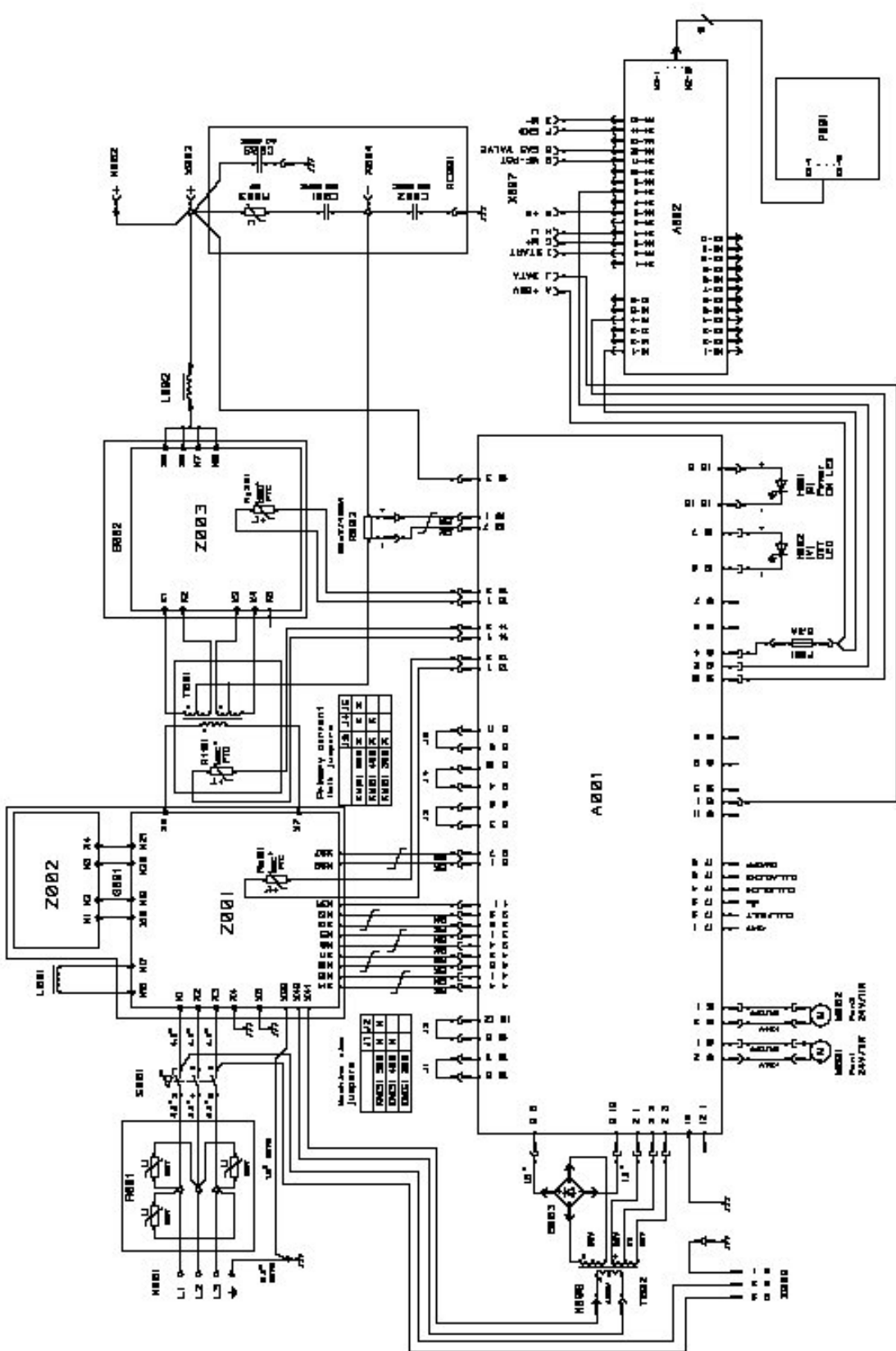
FastMig™ KMS 400 MVU		
	400 V	230 V
Mains voltage 3~50/60 Hz	400 V -15 %...+20 %	230 V -10 %...+10 %
Rated power	19 kVA	20 kVA
Primary current		
MIG 80%ED I _{1max}	27A	48A
MIG 100%ED I ₁	26A	45A
MMA 80%ED I _{1max}	29A	50A
MMA 100%ED I ₁	27A	47A
Connection cable	H07RN-F 4G10 (10 mm ²)	H07RN-F 4G10 (10 mm ²)
Fuse delayed	35 A	50 A
Load capacity 40 °C		
	80 % ED	400 A/36 V
	100 % ED	380 A/35 V
Welding range	MIG	10 ... 39 V
Max. welding voltage		46 V
Open circuit voltage	MIG	55 ... 69 V
	MMA	50 V
Open circuit power		30 W
Efficiency MMA/MIG 100% ED		87 %
Power factor at max current		0,8
Storage temperature range		-40 ... +60 °C
Operating temperature range		-20 ... +40 °C
Degree of protection		IP 23 S
External dimensions		
	length	590 mm
	width	230 mm
	height	580 mm
Weight		49 kg
Voltage supply for auxiliary devices		24 V DC

Main circuit diagram



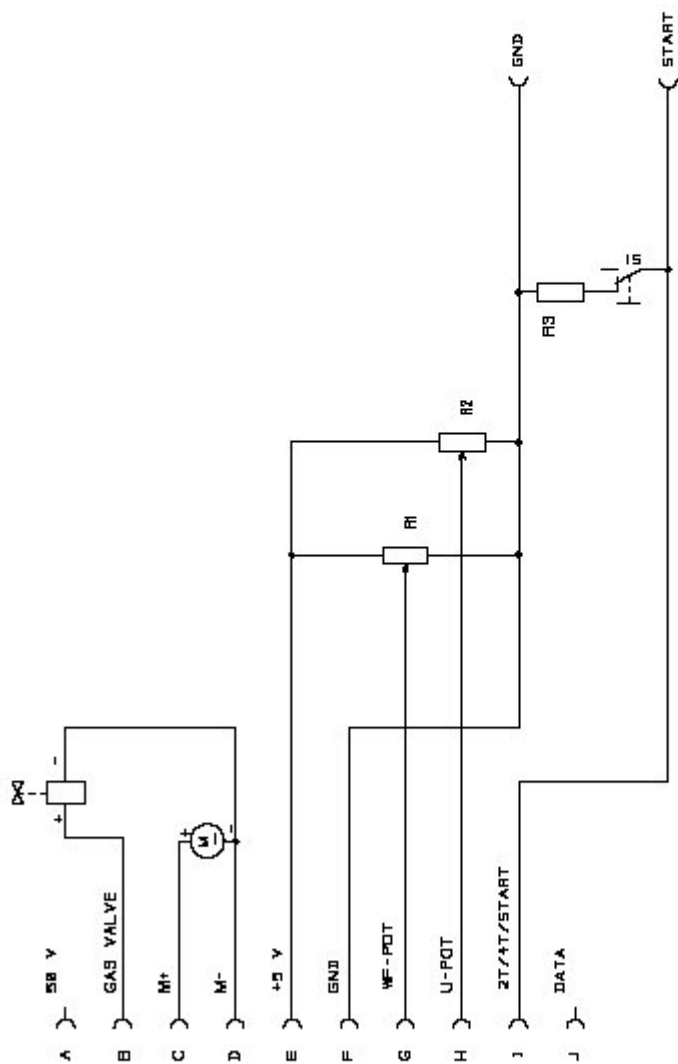
KM-power sources (A002) also contain circuitry that is needed for wire feeding motor driving and reading of the potentiometer of the simple wire feeder (MF or other).

Main circuit diagram KM



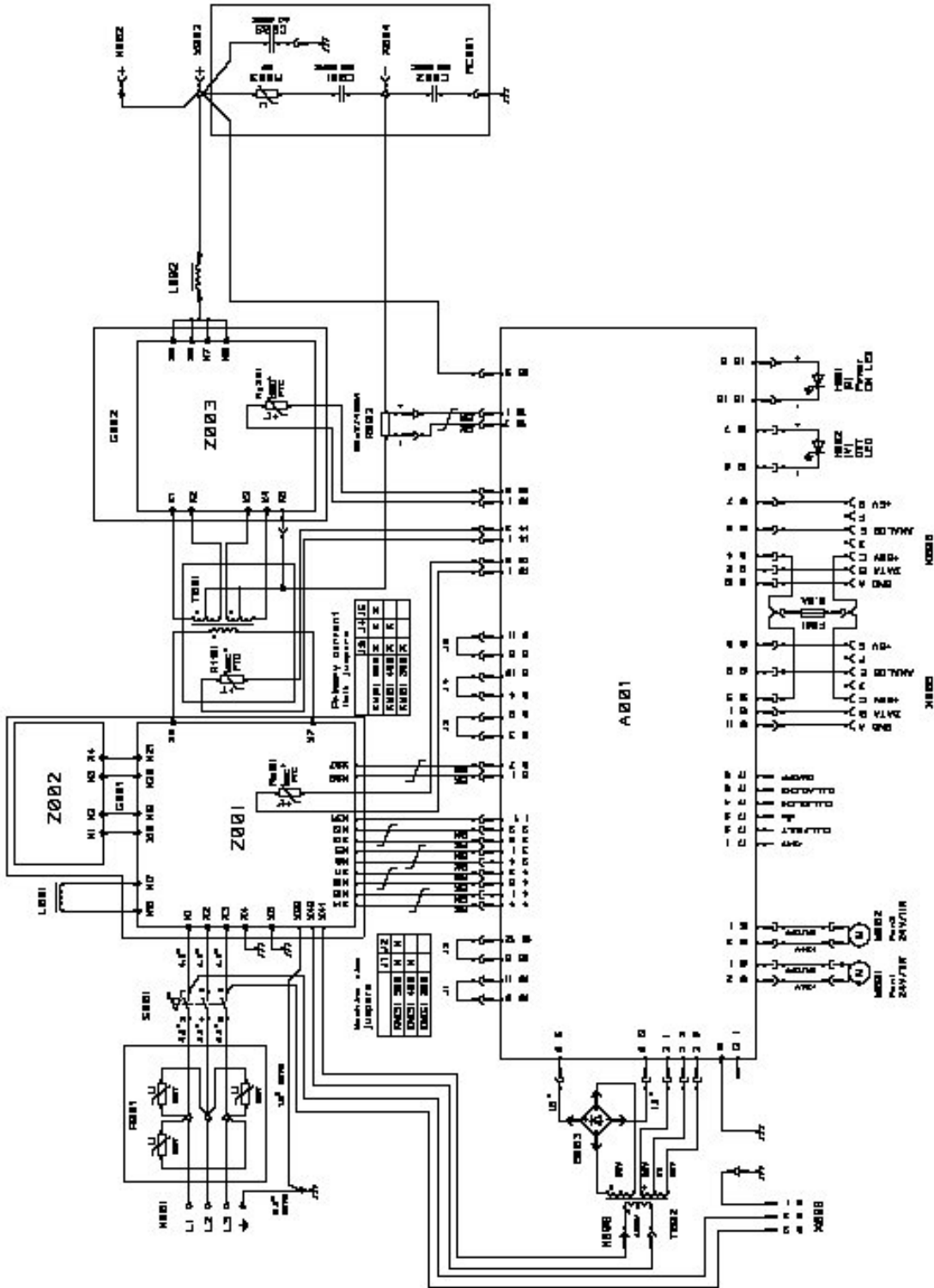
Fase 4 Mig KM 300, 400, 500		TARPO	PORTO: MK
KEMPPI		MRO	VALOR: 100-4-000
			W001190


Main circuit diagram MF



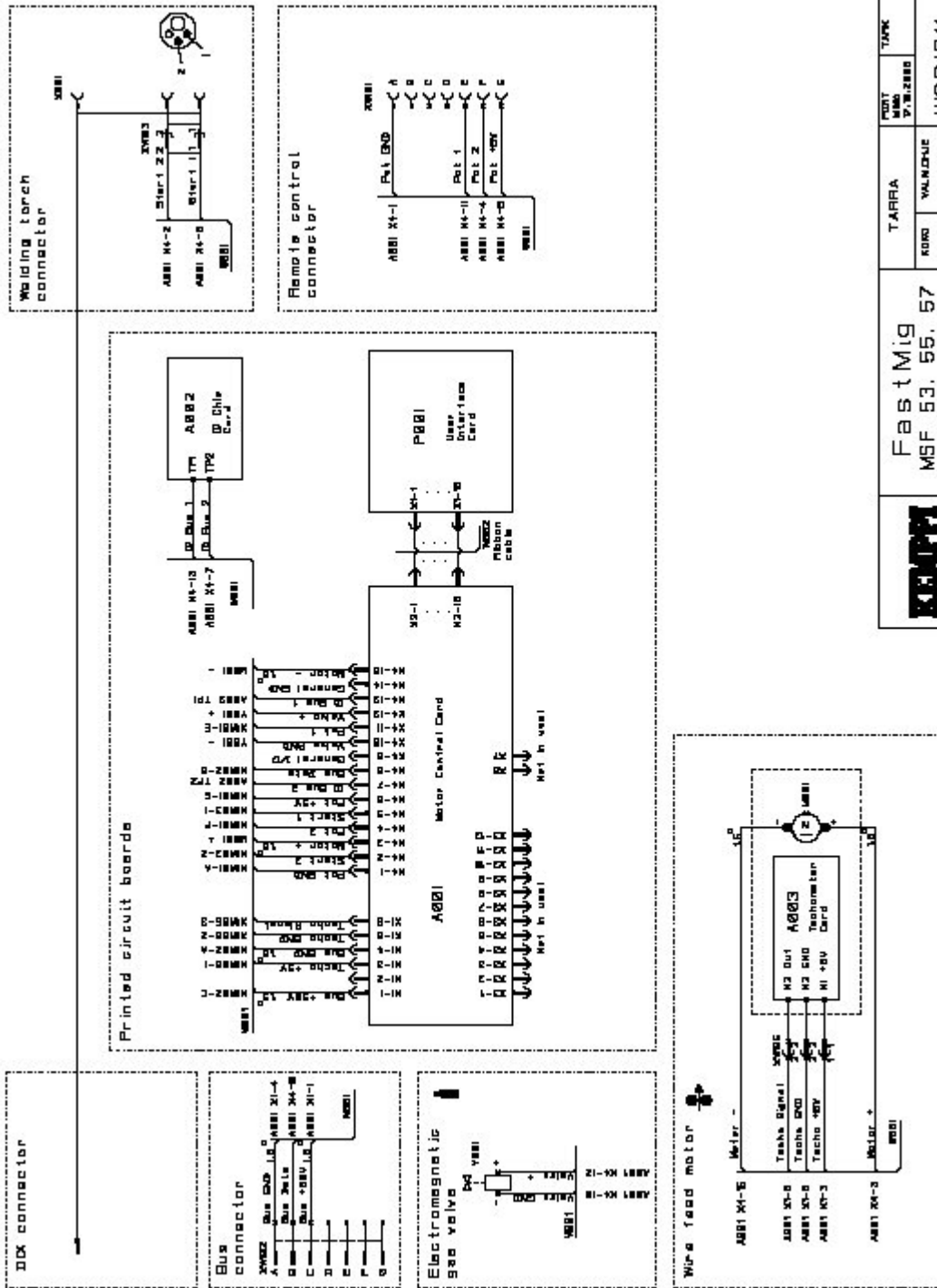
KEMPPI	MF33 MF29	TARRA		PIIRT RALL	TARK
		KOKO A4	VAL.MOHJE KES-54-002	26.5.2006	
		W01212A			

Main circuit diagram KMS



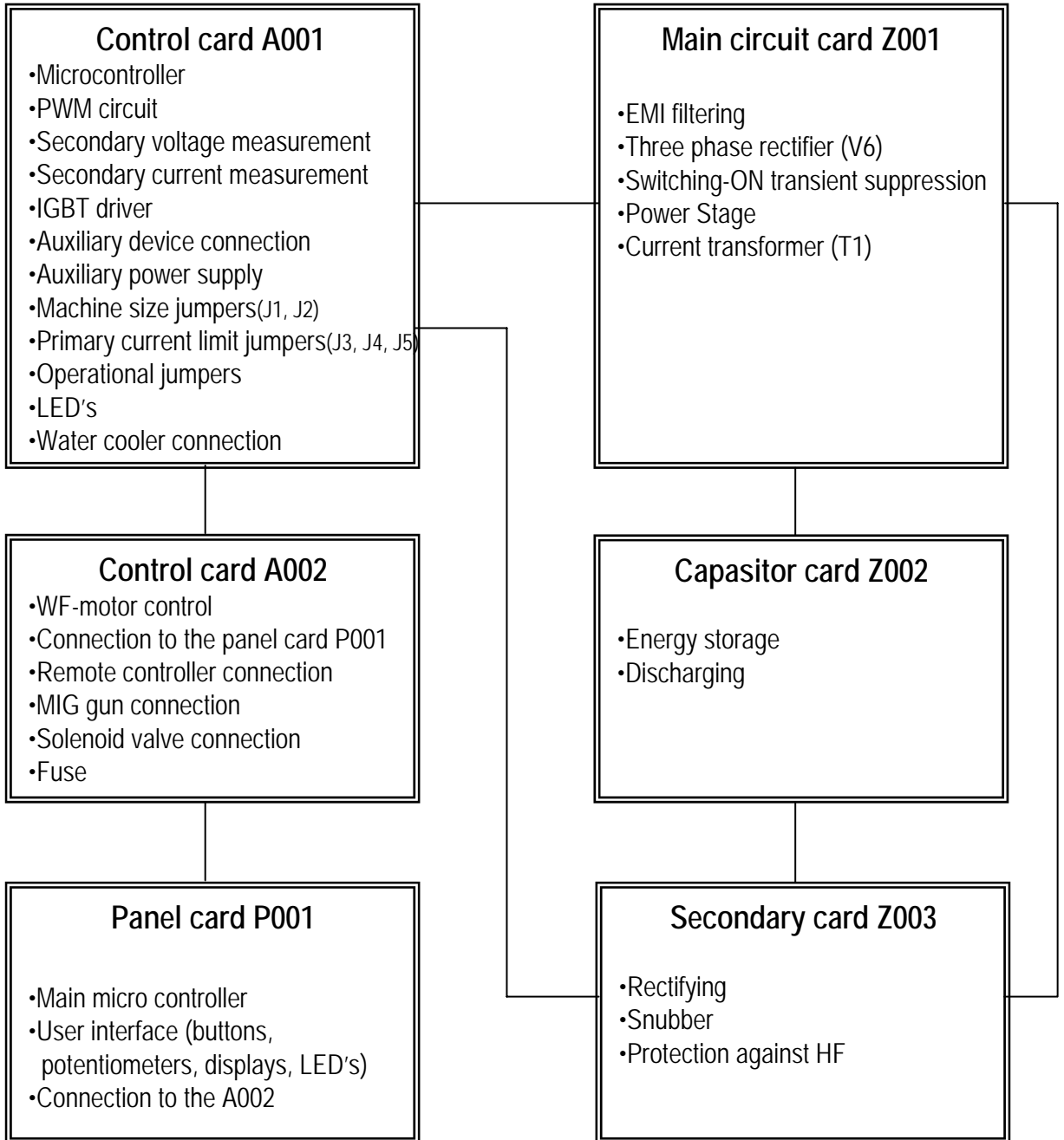
	Fusil Mig		TARPO	PORTOIT	VWK
	KMS 300, 400, 500	W001	W002	W003	W004
			W005	W006	W007
			W008	W009	W010
			W011	W012	W013
			W014	W015	W016
			W017	W018	W019
			W020	W021	W022
			W023	W024	W025
			W026	W027	W028
			W029	W030	W031
			W032	W033	W034
			W035	W036	W037
			W038	W039	W040
			W041	W042	W043
			W044	W045	W046
			W047	W048	W049
			W050	W051	W052
			W053	W054	W055
			W056	W057	W058
			W059	W060	W061
			W062	W063	W064
			W065	W066	W067
			W068	W069	W070
			W071	W072	W073
			W074	W075	W076
			W077	W078	W079
			W080	W081	W082
			W083	W084	W085
			W086	W087	W088
			W089	W090	W091
			W092	W093	W094
			W095	W096	W097
			W098	W099	W100

Main circuit diagram MSF

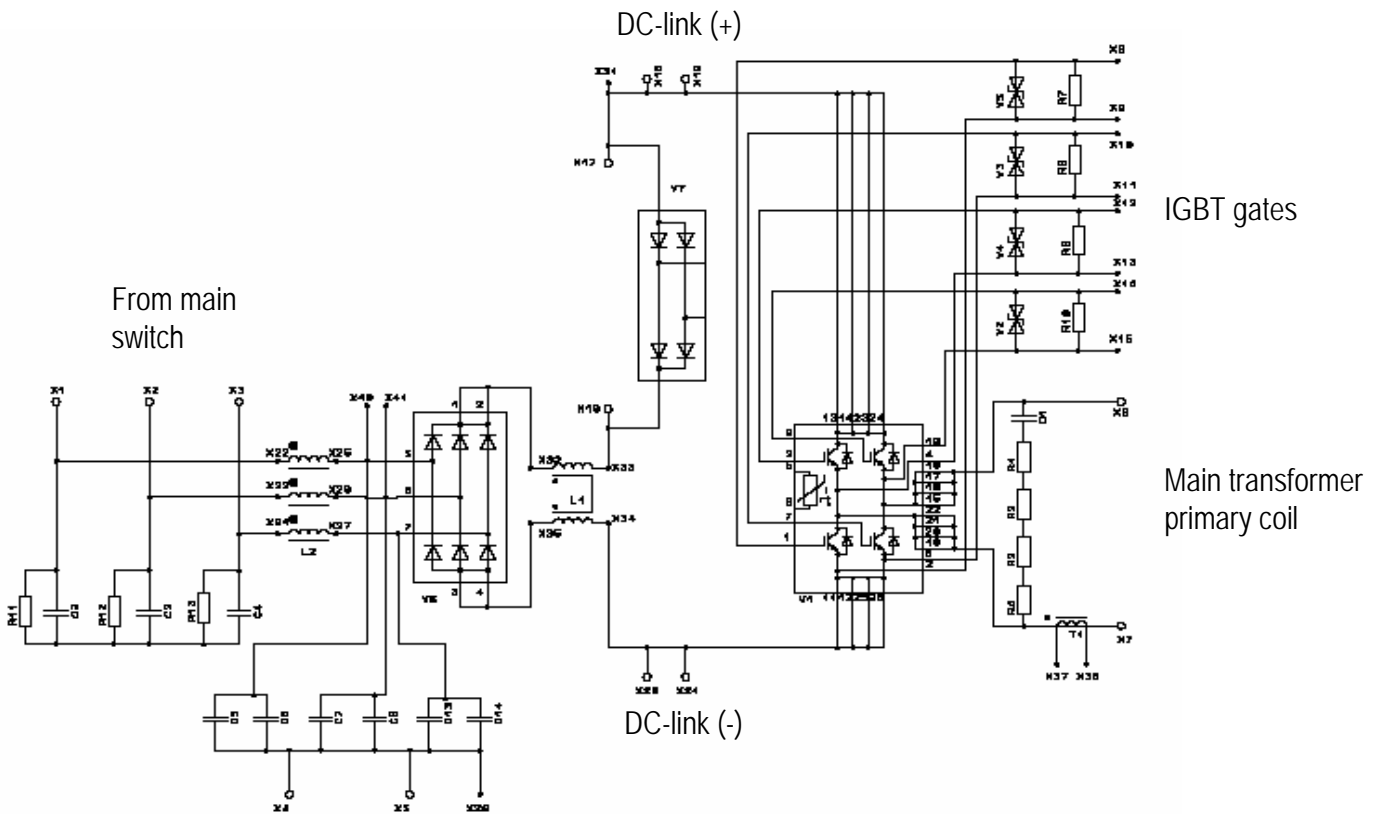


KEMPPI		Fast Mig		ABB2	
MSF 53, 55, 57		MSF 53, 55, 57		MSF 53, 55, 57	
Main Circuit Diagram		Main Circuit Diagram		Main Circuit Diagram	
KOD	TARRA	VALMUSUE	W001211	ABB2	ABB2
A4	ABB2	ABB2	ABB2	ABB2	ABB2

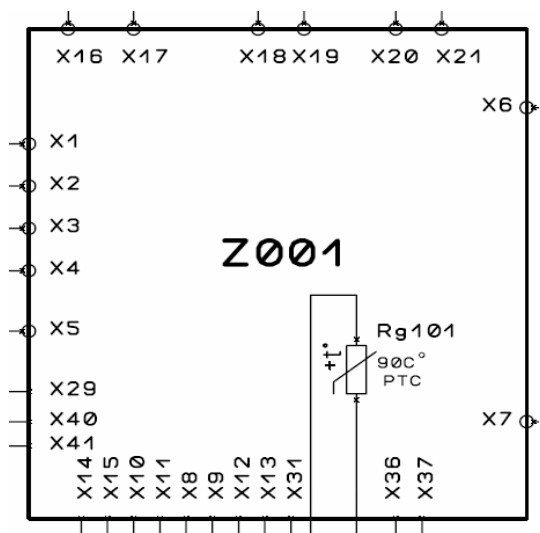
Block diagram



Main circuit card Z001 KM / KMS



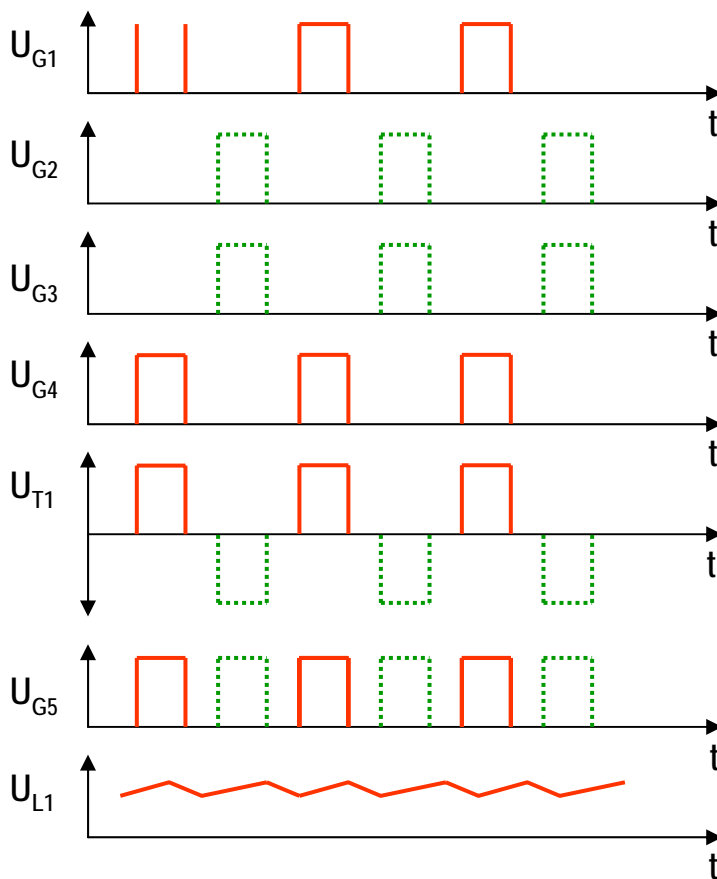
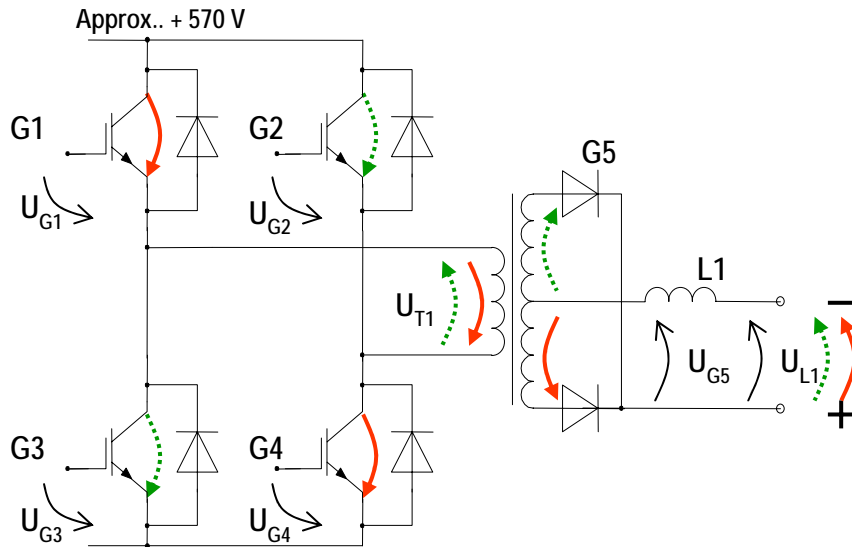
Operating diagram



- EMI filtering
- Three phase rectifier (V6)
- Switching-ON transient suppression
- Power Stage
- Current transformer (T1)

Main circuit card Z001

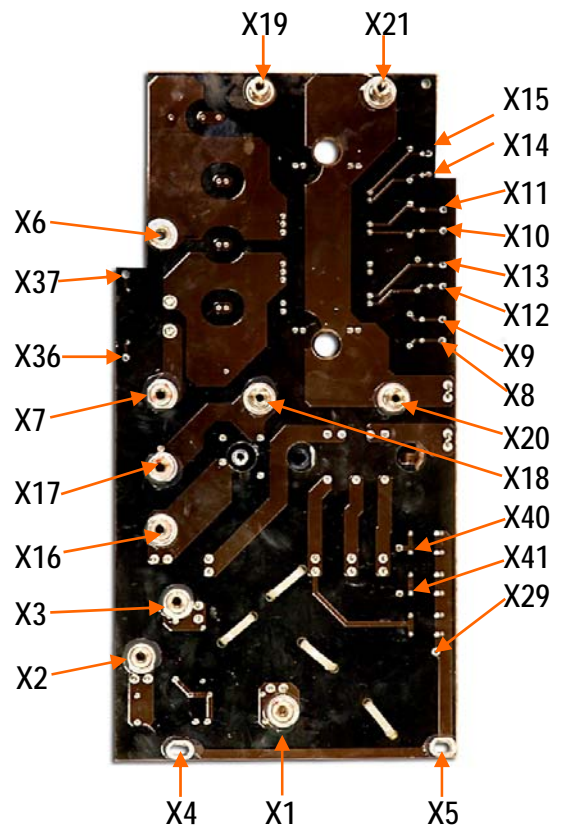
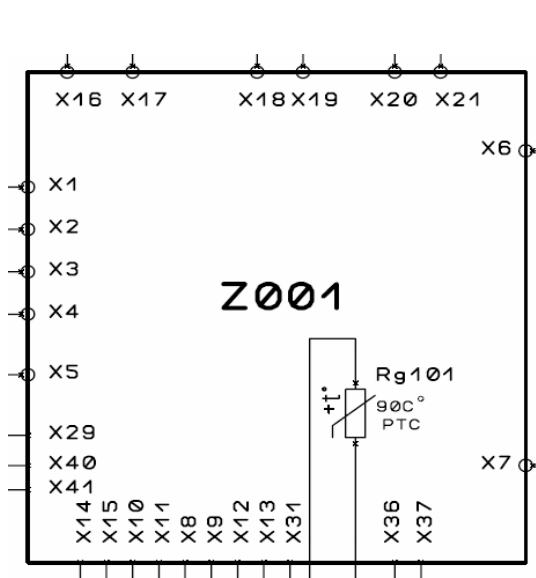
Operation principle



When IGBT-transistors **G1** and **G4** conduct, there is a positive voltage U_{T1} in main transformer **T1** primary and when IGBT-transistors **G2** and **G3** conduct there is a negative voltage U_{T1} in main transformer primary. Power is adjusted by changing the IGBT timings (PWM)

Main circuit card Z001

Connectors

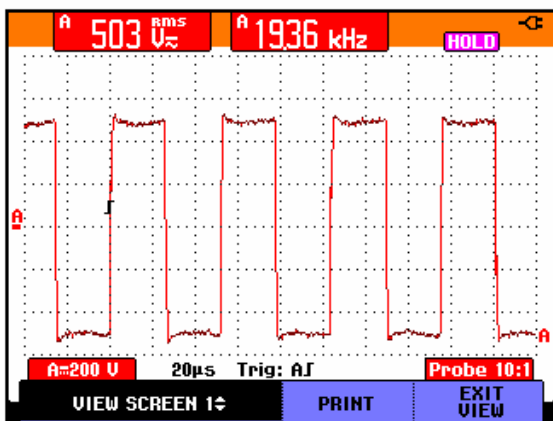
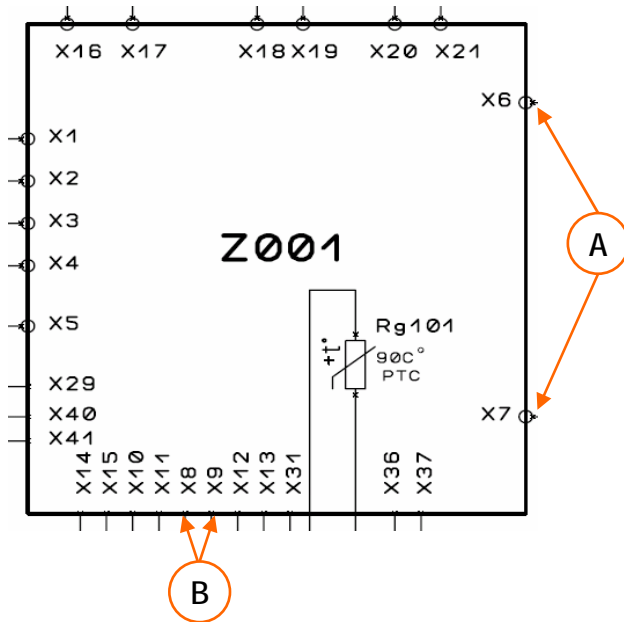


Z001 connectors / signals	
X1	Main switch
X2	Main switch
X3	Main switch
X4	Chassis ground
X5	Chassis ground
X6	Main transformer
X7	Main transformer
X8	IGBT gates and emitters
X9	IGBT gates and emitters
X10	IGBT gates and emitters
X11	IGBT gates and emitters
X12	IGBT gates and emitters
X13	IGBT gates and emitters
X14	IGBT gates and emitters
X15	IGBT gates and emitters

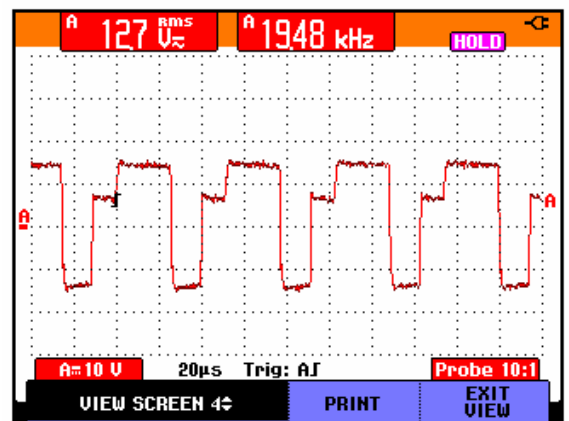
Z001 connectors / signals	
X16	Primary choke
X17	Primary choke
X18	DC-link voltage (+)
X19	DC-link voltage (+)
X20	DC-link voltage (-)
X21	DC-link voltage (-)
X29	Chassis ground
X36	Current transformer secondary
X37	Current transformer secondary
X40	Auxiliary transformer
X41	Auxiliary transformer

Main circuit card Z001

Operational measurements



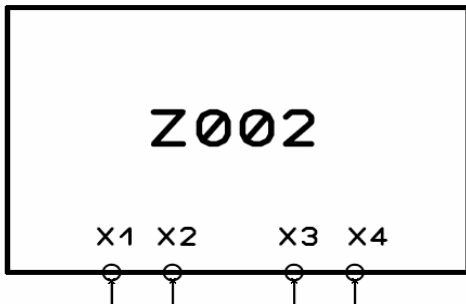
A.
Main transformer T001 primary voltage,
set values 50 A/16,5 V



B.
IGBT-gate pulses, set values 50 A/16,5 V

Capacitor card Z002

Operating diagram



- Energy storage
- Discharging

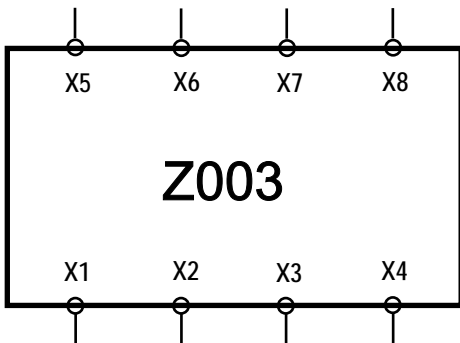


Connectors

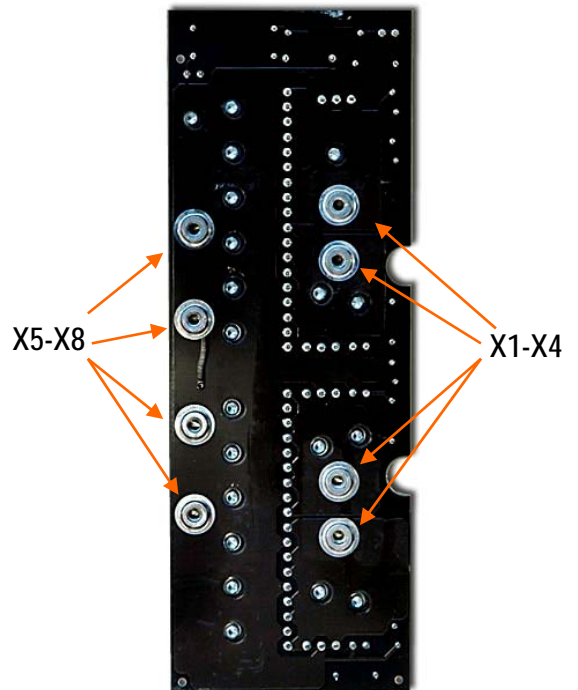
Z002 connectors / signals	
X1	DC +
X2	DC +
X3	DC -
X4	DC -

Secondary rectifier card Z003

Operating diagram



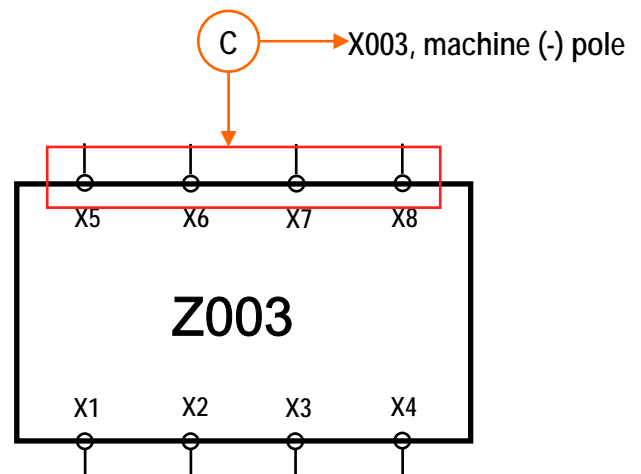
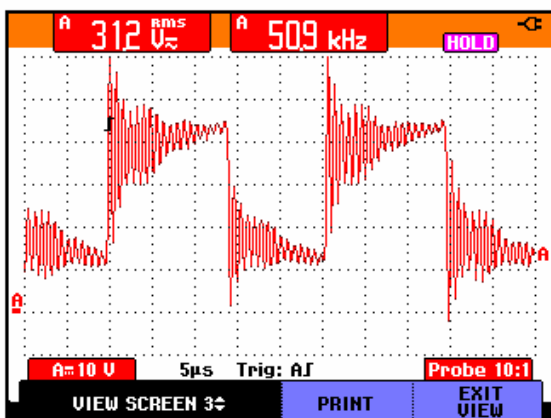
- Rectifying
- Snubber
- Protection against HF



Connectors

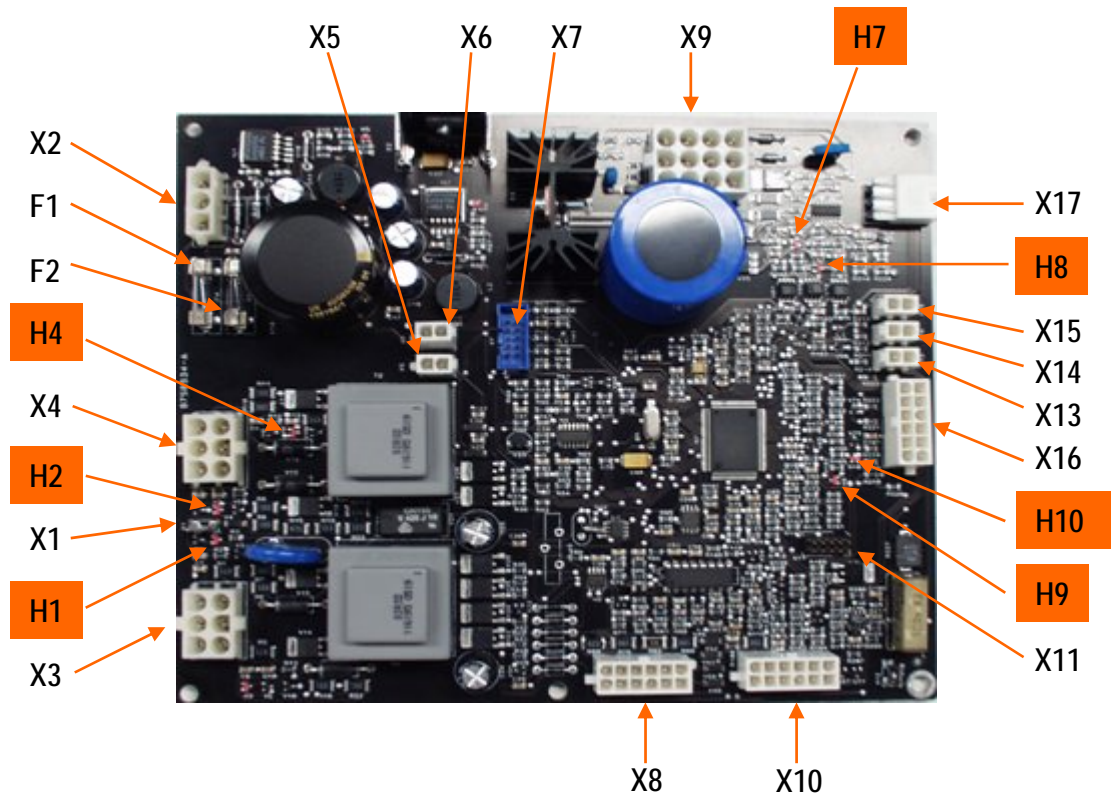
Z003 connectors / signals	
X1	Main transformer
X2	Main transformer
X3	Main transformer
X4	Main transformer
X5	Secondary choke
X6	Secondary choke
X7	Secondary choke
X8	Secondary choke

Operational mesurings

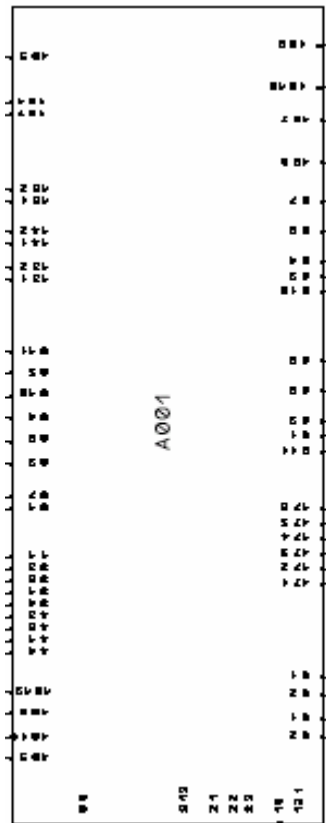


C.
Voltage after secondary rectifier card Z003,
set values 50 A/16,5 V

Control card A001



Operating diagram



- Microcontroller
- PWM circuit
- Secondary voltage measurement
- Secondary current measurement
- IGBT driver
- Auxiliary device connection
- Auxiliary power supply
- Machine size jumpers (J1, J2)
- Primary current limit jumpers (J3, J4, J5)
- Operational jumpers
- LED's
- Water cooler connection

Control card A001

Connectors

A001 / X1	
X1	DC-link voltage (+)

A001 / X2	
X2/1	20V auxiliary voltage~
X2/2	20V auxiliary voltage ground
X2/3	20V auxiliary voltage~

A001 / X3	
X3/1	IGBT emitter
X3/3	IGBT emitter
X3/4	IGBT gate
X3/6	IGBT gate

A001 / X4	
X4/1	IGBT emitter
X4/3	IGBT emitter
X4/4	IGBT gate
X4/6	IGBT gate

A001 / X5	
X5/1	Fan (-) (M002)
X5/2	Fan (+) (M002)

A001 / X6	
X6/1	Fan (-) (M001)
X6/2	Fan (+) (M001)

A001 / X7	
X7	Production programming bus

A001 / X8	
X8/1	Current transformer ~
X8/3	Primary current limit jumper (J3)
X8/4	Primary current limit jumper (J4)
X8/5	Primary current limit jumper (J5)
X8/6	GND
X8/7	Current transformer ~
X8/9	GND (Primary current limit jumper J3)
X8/10	GND (Primary current limit jumper J4)
X8/11	GND (Primary current limit jumper J5)
X8/12	GND

A001 / X9 / KM	
X9/1	System bus DATA
X9/2	System bus DATA B
X9/3	GND
X9/4	+ 50 V
X9/6	-
X9/7	-
X9/8	-
X9/9	-
X9/10	Connection A002 X1/4
X9/11	-

A001 / X9 / KMS		
X9/1	System bus DATA B	(X005)
X9/2	System bus DATA B	(X006)
X9/3	+50V	(X005)
X9/4	+50V	(X006)
X9/6	+5V	(X005)
X9/7	+5V	(X006)
X9/8	Analog DATA	(X005)
X9/9	Analog DATA	(X006)
X9/10	GND	(X006)
X9/11	GND	(X005)

A001 / X10	
X10/1	Shunt (+)
X10/2	-
X10/3	Secondary voltage (+)
X10/4	-
X10/5	Machine size jumper J1
X10/6	Machine size jumper J2
X10/7	Shunt (-)
X10/8	TxD0 (possible future use)
X10/9	RxD0 (possible future use)
X10/10	GND
X10/11	GND(Machine size jumper J1)
X10/12	GND(Machine size jumper J2)

A001 / X11	
-	Not connected
J6	Forced programming mode
J7	For future purposes
J8	For future purposes
J9	For future purposes

Control card A001

Connectors

A001 / X13	
X13/1	PTC, Rg 101 (Z001)
X13/2	PTC, Rg 101 (Z001)

A001 / X14	
X14/1	PTC, Rt 101 (T001)
X14/2	PTC, Rt 101 (T001)

A001 / X15	
X15/1	PTC, Rg 201 (Z003)
X15/2	PTC, Rg 201 (Z003)

A001 / X16	
X16/7	H002 + (yellow led)
X16/8	H002 -
X16/9	H001 + (green led)
X16/10	H001 -

A001 / X17	
X17/1	+24V
X17/2	CLU fault
X17/3	GND
X17/4	CLU AD CH1
X17/5	CLU AD CH2
X17/6	ON/OFF

Operation of the LEDs on control card

A001 / LEDS	
H1	IGBT gate pulses
H2	IGBT gate pulses
H3	IGBT gate pulses
H4	IGBT gate pulses
H5	+15V
H6	+5V
H7	Remote control unit connected
H8	Data communication
H9	Micro controller operation
H10	Micro controller operation

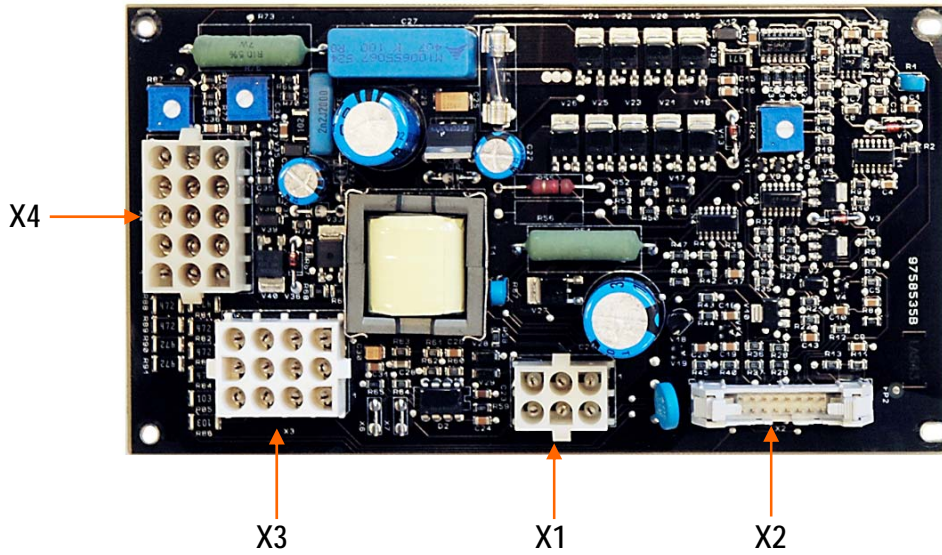
H1-H4: Indicate the existence of the gate pulses.

H5, H6: Indicate that auxiliary voltages exist (+5V and +15V). If these Leds are not lit when the power source is switched on, first thing to do is check if control card fuses are OK.

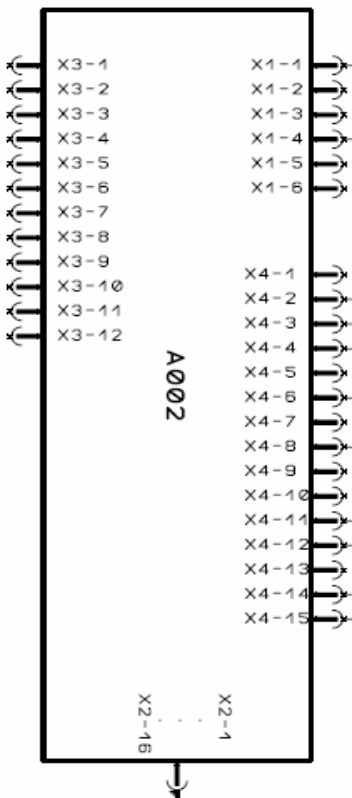
H7, H8: Indicate operation of the auxiliary device connection. LED H8 indicates that there is data communication taking place through the system bus when it is lit. LED H7 indicates that remote control unit is connected when it is lit.

H9, H10: Indicate state of the microcontroller. In normal situation both leds should be lit.

Motor control card A002



Operating diagram



- WF-motor control
- Connection to the panel card P001
- Remote controller connection
- MIG gun connection
- Solenoid valve connection
- Fuse
- ID-Chip connection (MSF)

Motor control card A002 (A001 = MSF)

Connectors

A002 / X1 / KM	
X1/1	Connection to A001, X9/4
X1/4	Connection to A001, X9/10

A001 / X1 / MSF	
X1/1	Bus +50V
X1/3	Tacho +5V
X1/4	Bus GND
X1/5	Tacho GND
X1/6	Tacho Signal

A002/A001 / X2	
X2	Connection to panel card

A002 / X4 / MF	
X4/2	Start
X4/3	Motor+
X4/4	U-measurement
X4/6	Pot +5V
X4/8	Connection A001 X9/2
X4/11	WF-pot
X4/12	Valve
X4/14	GND
X4/15	Motor -

A001 / X4 / MSF	
X4/1	Pot GND
X4/2	Start 2
X4/3	Motor +
X4/4	Pot 2
X4/5	Start 1
X4/6	Pot +5V
X4/7	ID Bus 2
X4/8	Bus Data
X4/9	General I/O
X4/10	Valve -
X4/11	Pot 1
X4/12	Valve +
X4/13	ID Bus 1
X4/14	GND
X4/15	Motor -

ID chip card A002 (MSF)



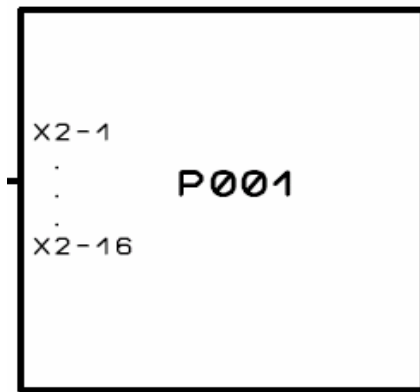
A002
ID-chip card

Connectors

A002	
TP1	ID Bus 1 (connection to A001)
TP2	ID Bus 2 (connection to A001)

Panel card P001 / KM

Operating diagram



- Main micro controller
- User interface (buttons, potentiometers, displays, LED's)
- Connection to the A002

Connectors

P001 / X2	
X2	Connection to A002

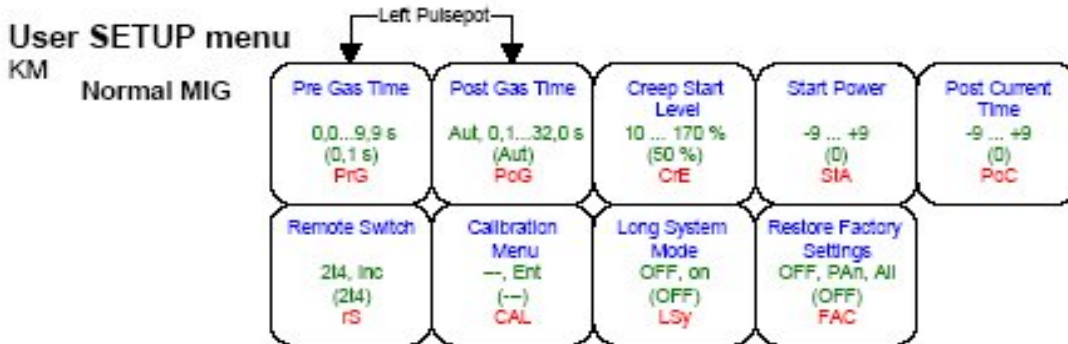
Error codes

Power source	1 50
MIG Logic	51 100
Curve Access	101 130
Robot Interface	131 150
MIG / TIG Unit	151 200
User interface	201 250
Others	0 999

Err 2:	Power source undervoltage (new start up)
Err 3:	Power source overvoltage (new start up)
Err 4:	Power source is overheated
Err 5:	Water unit alarm
Err 11:	Two units have the same address in the system bus
Err 12:	Data error on communication (2)
Err 13:	Member of a wrong FastMIG family connected
Err 14:	Data communication problem between power source and auxiliary unit
Err 15:	Power source program / updating method problem
Err 21:	Power source´s control card +5 V aux. Voltage too low
Err 22:	Power source´s control card +15 V aux. Voltage too low
Err 23:	Temporarily power source overvoltage
Err 31:	Power source calibration error. Welding only possible with default values.
Err 54:	No data communication from power source. Perhaps faulty cable/connector.
Err 55:	Welding forbidden (congiguration / system bus reserved)
Err 61:	The water unit is not found. Cooling unit may be OFF.
Err 153:	Overheating of liquid-cooled gun
Err 154:	Wire feed motor overcurrent. Perhaps the wire liner is blocked or gun cable too curvy.
Err 155:	Wire feed motor overload. Motor´s current is too close to the limit.
Err 161:	Warning of the wire feed unit overheating
Err 162:	Overloading of the wire feed motor
Err 171:	Configuration of the equipment can not be found. Gun start wires cross-connected.
Err 172:	Wrong configuration code has been supplied
Err 173:	Operation is not activated with right configuration code
Err 184:	Control cable not connected or faulty.
Err 185:	Machine program update error. Wrong program or updating method.
Err 201:	Usage of PMT-gun prevented
Err 221:	Data error of the panel (1)
Err 222:	Data error of the panel (2)
Err 223:	Data error of the panel (3)
Err 224:	Data error of the panel (4)
Err 225:	Program updating problem.
Err 241:	EEPROM is faulty
Err 251:	DLI data communication error(another unit in the bus is using same code=conflict)
Err 252:	DLI data error (2)
Err 254:	DLI data communication error(connection to other units has been interrupted(maybe bad connectors or cable damages)
Err 255:	DLI data communication error(program update problem, maybe a wrong program version etc)
Err 999:	Unidentified error (systembus has sent an error message not identified by the panel)

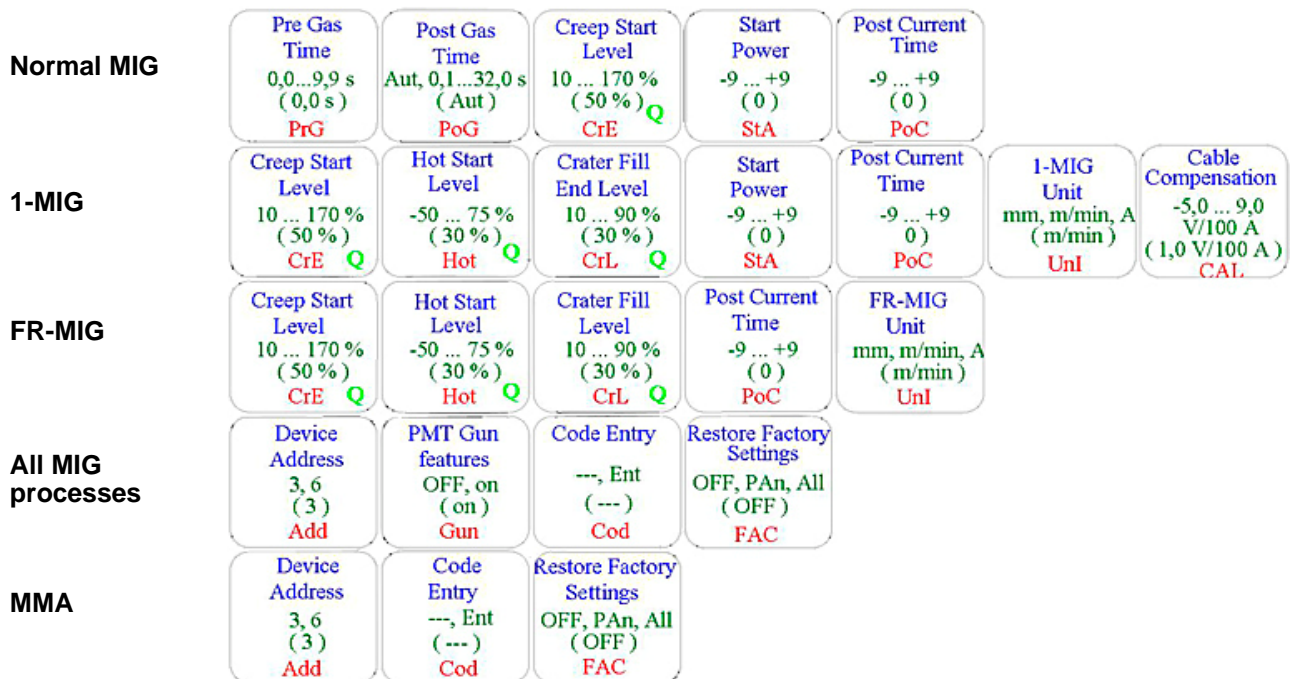
Setup menu

MF 29 / 33



FastMig Basic (MF) SETUP menu

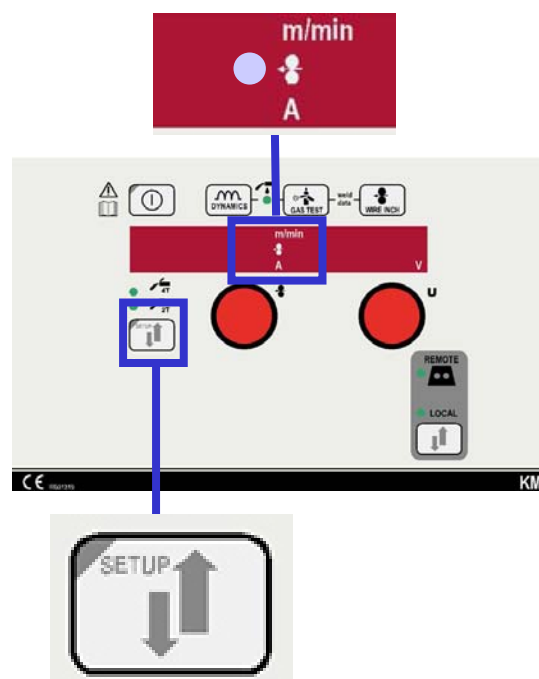
SF 51, 52, 53, 54



FastMig Synergic (MSF) setup menu

Wire feed speed calibration / KM

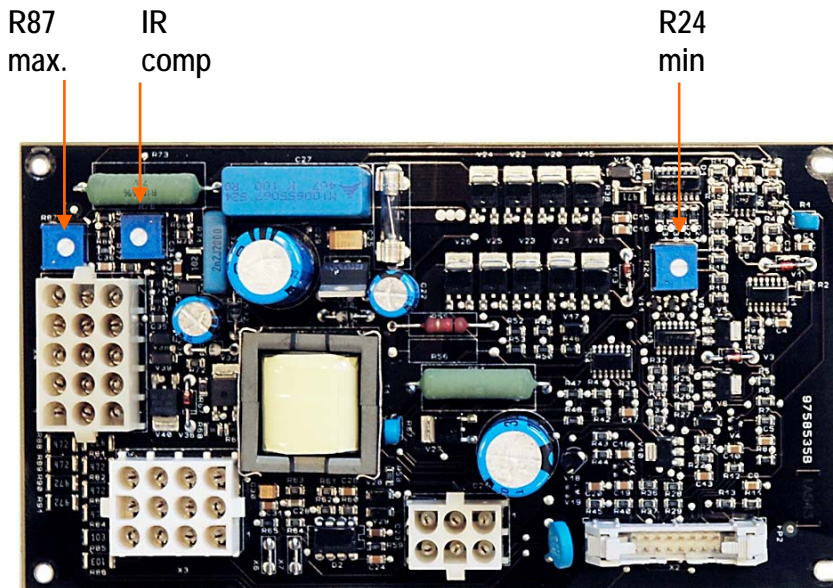
- In factory set Wfs is adjusted in the range of 4...100 without any unit
 - LED light and feed roll symbol tells that the parameter to be set is Wfs
 - After Wfs Calibration **m/min** unit is displayed
-
- Drive filler wire through the MIG gun and contact tip
 - Enter to User Setup Menu by pressing **SETUP** button (appr 5 s)
 - Select the Calibration menu (**CAL**) with left side potentiometer
 - Select "Enter" (**Ent**) with right side potentiometer
 - Approve your selection by pressing briefly **REMOTE / LOCAL** key
 - Select '**m/min**' as calibration value of the quantity with right side potentiometer
 - Approve selection by pressing briefly **REMOTE / LOCAL** key
 - Set first Calibration point (e.g. 2.0 m/min) with left side potentiometer
 1. Press MIG gun trigger and let the wire run until it stops automatically
 2. Measure the length of feeded wire with the accuracy of 1 cm
 3. Enter wire length to the panel display (**cm**) with right side potentiometer
 4. Approve your selection by pressing briefly **REMOTE / LOCAL** button
 - Set second Calibration point (e.g. 18.0 m/min)
 - Repeat steps 1 - 4 with left side potentiometer
 - Message "**Suc cES**" in the display inform that calibration has ended successfully
 - After Calibration panel returns to the operation mode



Wire feed speed calibration

If wire feeding speed is not correct (too slow or too fast), motor control card A002 must be calibrated by following instruction:

- Set 'MIN' and 'MAX' -trimmers to middle position.
- Set 'IR-comp' -trimmer to clock vice maximum.
- Set wire feeding speed to maximum from the panel (Basic: 100, Synergic: 25,0 m/min). Adjust 'MAX' –trimmer until wire feeding speed is same than value adjusted from the panel.
- Set wire feeding speed to minimum from the panel (Basic: 4, Synergic: 1,0 m/min). Adjust 'MIN' –trimmer until wire feeding speed is same than value adjusted from the panel.
- Check/adjust minimum and maximum again until both are OK.
- If adjustment range is too small, decrease IR -compensation and adjust minimum and maximum again.



Structure

KM / KMS

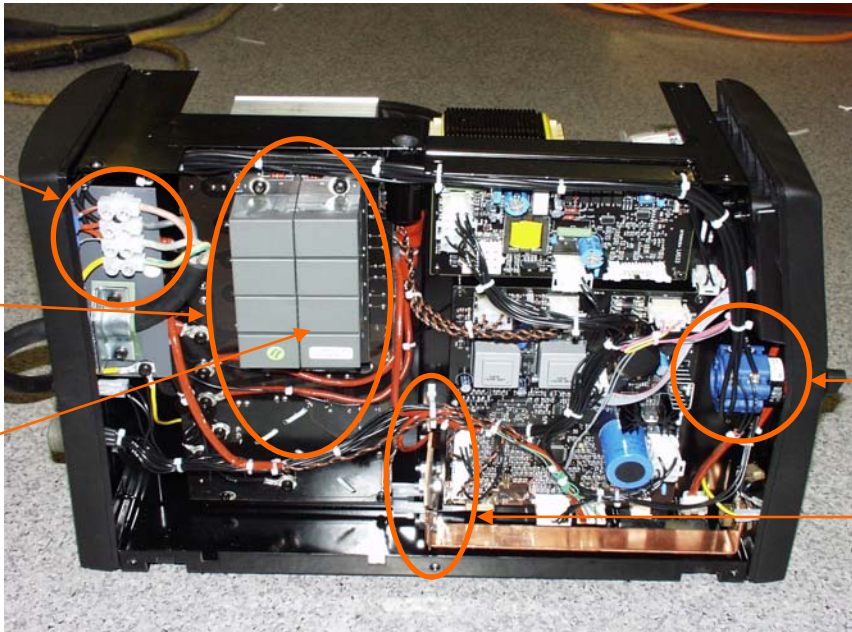
Mains connector and varistors

Z001
Main circuit board

Z002
DC-link
Capacitor board

S001
Main
switch

R001
Shunt
resistor

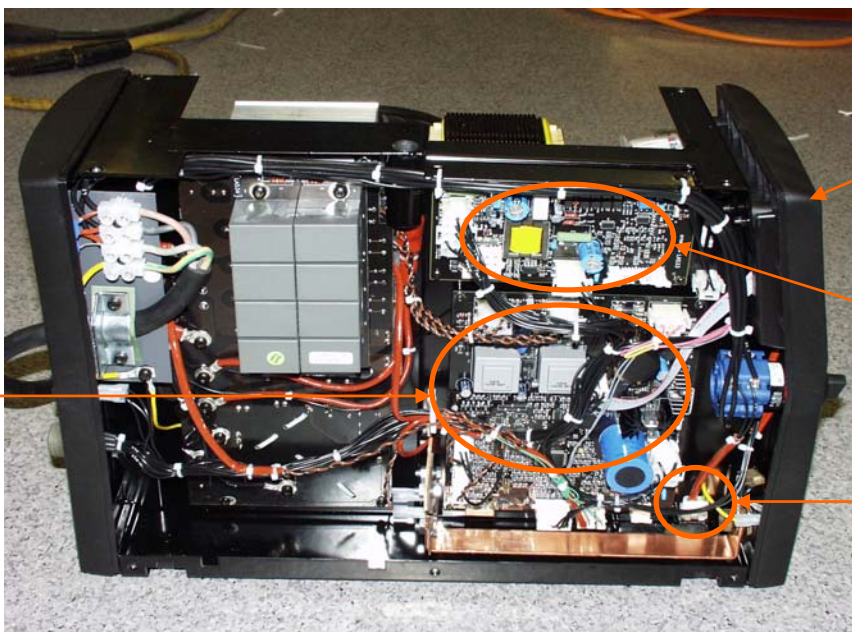


A001
Control card

P001
Panel card

A002 (KM)
Wire feed
control card

Water cooler
Power
connector



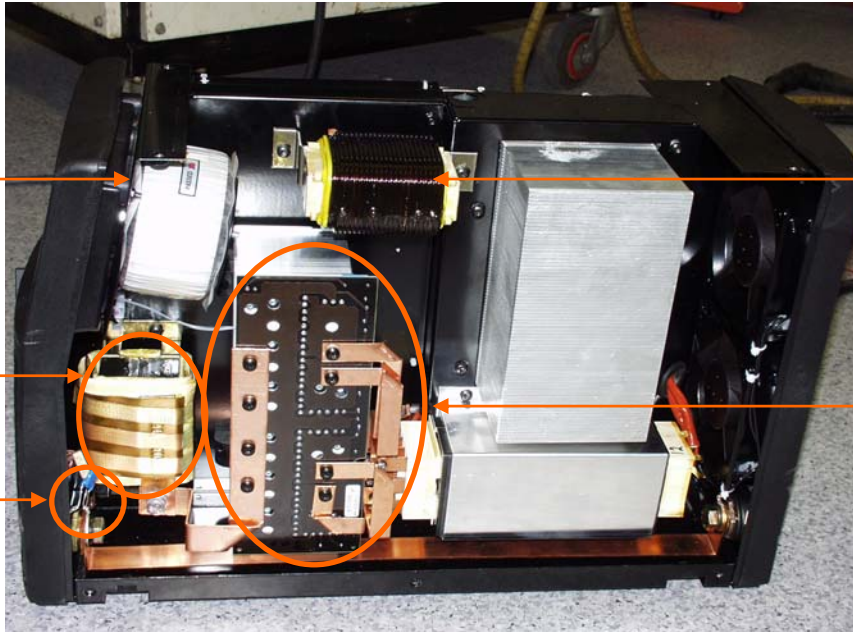
Structure

KM / KMS

T002
Auxiliary
transformer

L002
Secondary
choke

Capacitors and
varistors

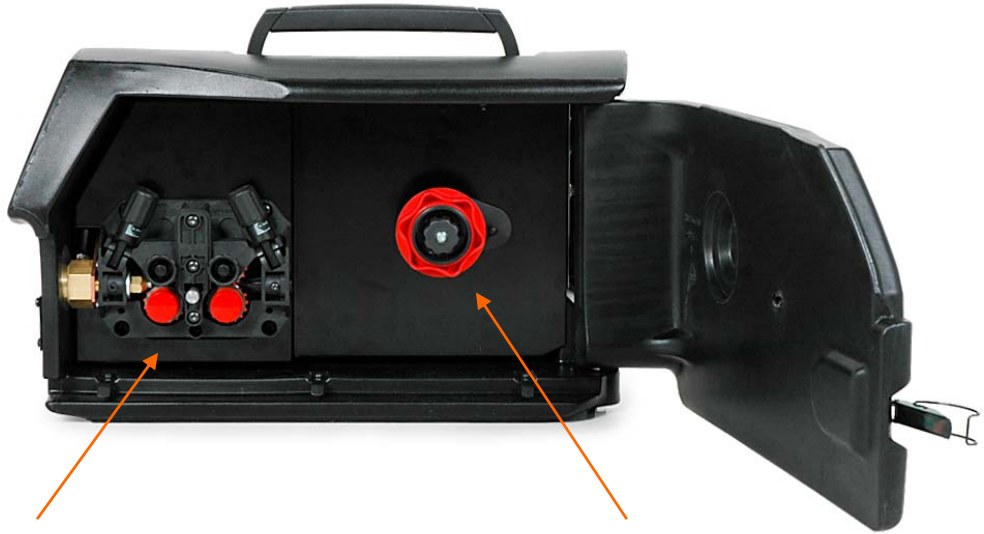


L001
Choke

Z003
Secondary
rectifier diodes

Structure

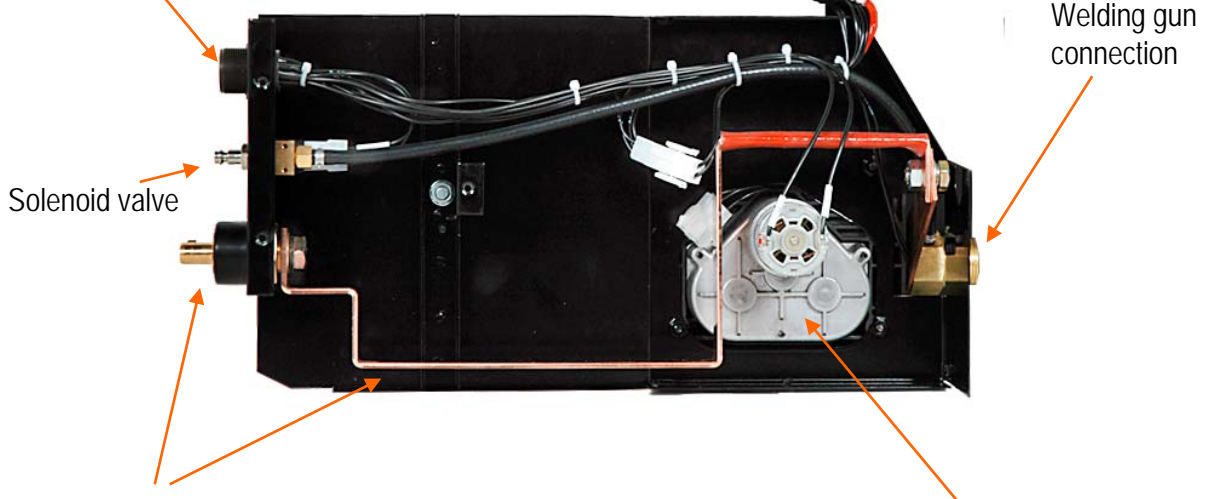
MF 29 / 33



Dura Torque wire feeding mechanism

Axle for wire reel coop

Control cable connector
& wiring



Solenoid valve

Welding gun
connection

Welding current connector
& copper bar

Dura Torque wire feeding mechanism

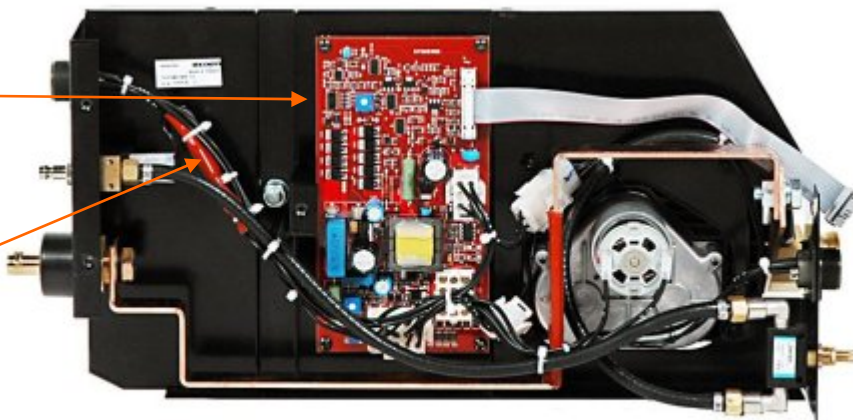
Structure

MSF 53 / 55 / 57

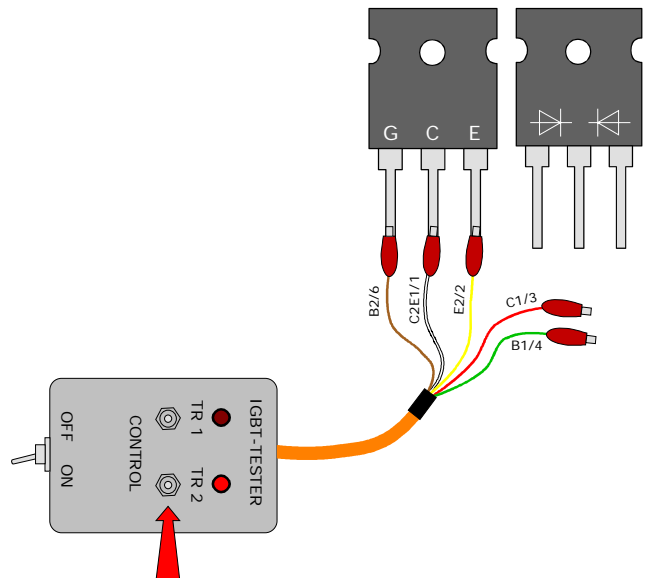
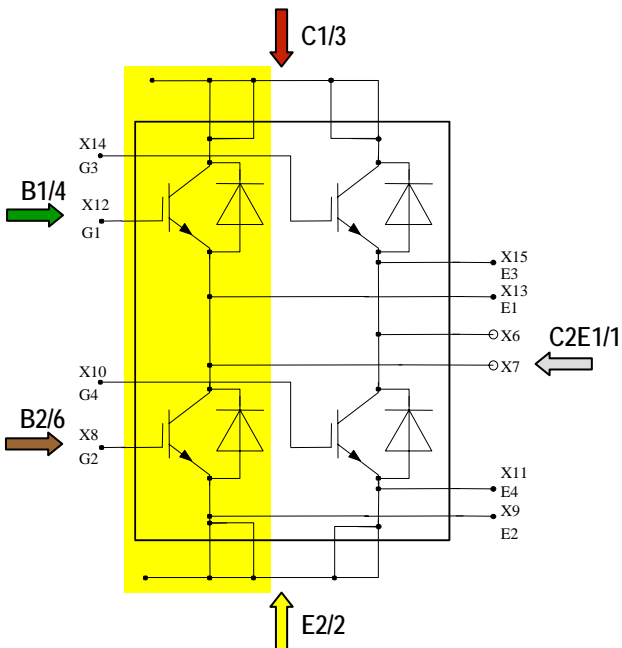
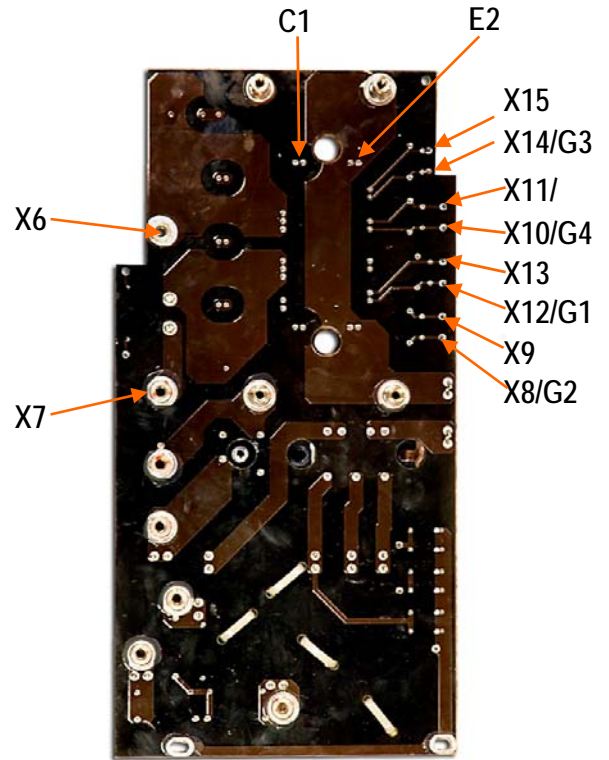
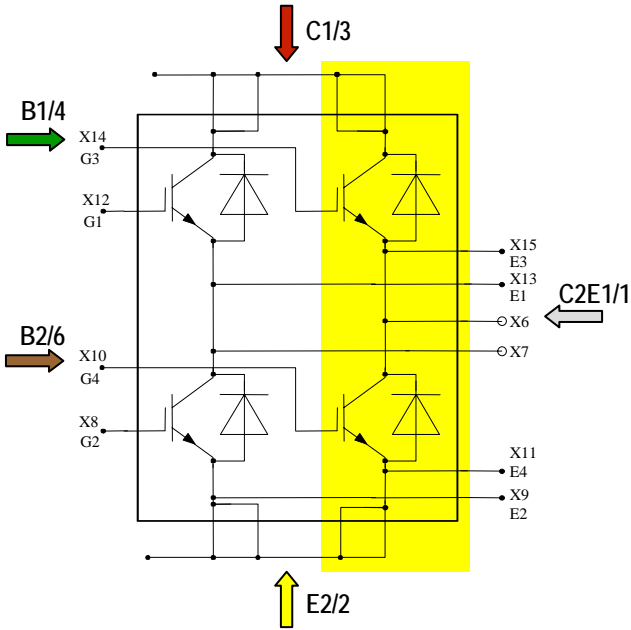


A001
Motor control
card

A002
ID-chip
card



IGBT testing



IGBT replacing

Mounting the IGBT to the heat sink

The tools and premises used in this work must be clean and free of dirt and dust. Even very small particles (0,050mm) between the surfaces may increase the gap between heatsink and module, causing overheating and possible damage.

Heat transfer compound is to be spread in even layer of approximately 0,1 mm onto the module base. Then the module should be immediately mounted on the heatsink, in order to minimize the possibility of dirt getting between the components.

First, all the M5 type screws are tightened 0,5...2 NM. After a few minutes the module can be tightened into the torque of 3 NM.