

Service manual

Ver. 1.0



MASTERTIG
MLS3500

MASTERTIG
MLS2500

MASTERCOOL
10

MASTER
MLS3500

MASTER
MLS2500

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Technical data

Master 2500 MLS™ and Mastertig 2500 MLS™

Supply voltage	380 V -10 % ... 415 V +6 %	
Loadability	MMA	TIG
ED 30%		300A/22V (8,7kVA)
ED 40%	250A/30V (9,4kVA)	
ED 60%	205A/28,2V (7,3kVA)	205A/18,2V (5kVA)
ED 100%	160A/26,4V (5,3kVA)	160A/16,4V (3,6kVA)
Welding current adjustment range	10A/20,5V...250A/30V	5A/10V...300A/22V
OCV	80V*	
Efficiency	80% (250A/30,0V)	
Power factor	0,95 (250A/30,0V)	
Idle power	approx. 10W	
Temperature class	H (180°C)/B (130°C)	
Casing class	IP23C	
Weight	20kg (Master) 22kg (Mastertig)	

Master 3500 MLS™ and Mastertig 3500 MLS™

Supply voltage	380 V -10 % ... 415 V +6 %	
Loadability	MMA	TIG
ED 30%		400A/26V (13,8kVA)
ED 40%	350A/34V (15kVA)	
ED 60%	285A/31,4V (11,3kVA)	285A/21,4V (8,1kVA)
ED 100%	220A/28,8V (8kVA)	220A/18,8V (5,6kVA)
Welding current adjustment range	10A/20,5V...350A/34V	5A/10V...400A/26V
OCV	80V*	
Efficiency	80% (350A/34,0V)	
Power factor	0,95 (350A/34,0V)	
Idle power	approx. 10W	
Temperature class	H (180°C)/B (130°C)	
Casing class	IP23C	
Weight	21kg (Master) 23kg (Mastertig)	

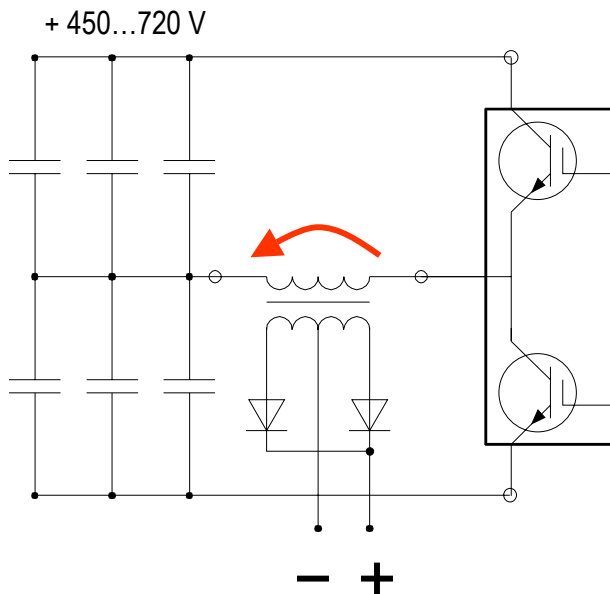
* See jumper functions

Operating principle

Master and Mastertig 2500 and 3500 MLSTM are DC-welding machines for MMA- and TIG-methods, based on inverter technology. Primary inverter is based on IGBT-technology and the operating frequency is always 20 kHz.

Master and Mastertig MLSTM -powersource functions are controlled by a microcontroller, hence all welding operations are made programmatically. Also the panels have their own microcontrollers, except the MEL-panel for MMA welding.

Master and Mastertig 2500 MLSTM- and 3500 MLSTM-power sources operating principle is shown in the picture below:

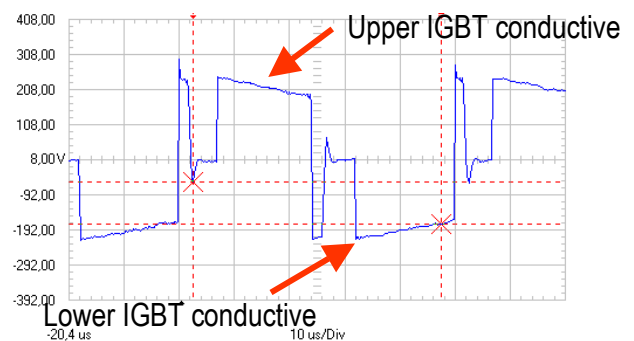
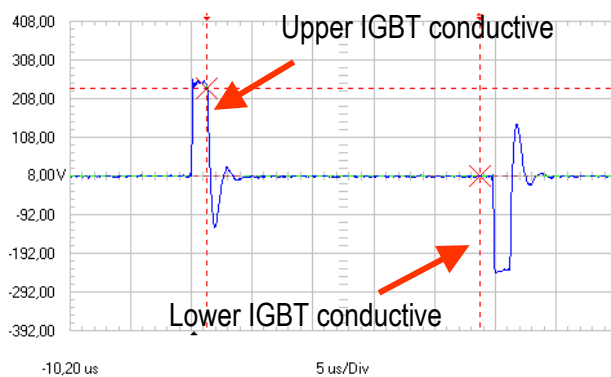


The power stage is a traditional half-bridge, where the intermediate circuit DC voltage is halved by the load capacitors. An IGBT capacitor is used as a power switch.

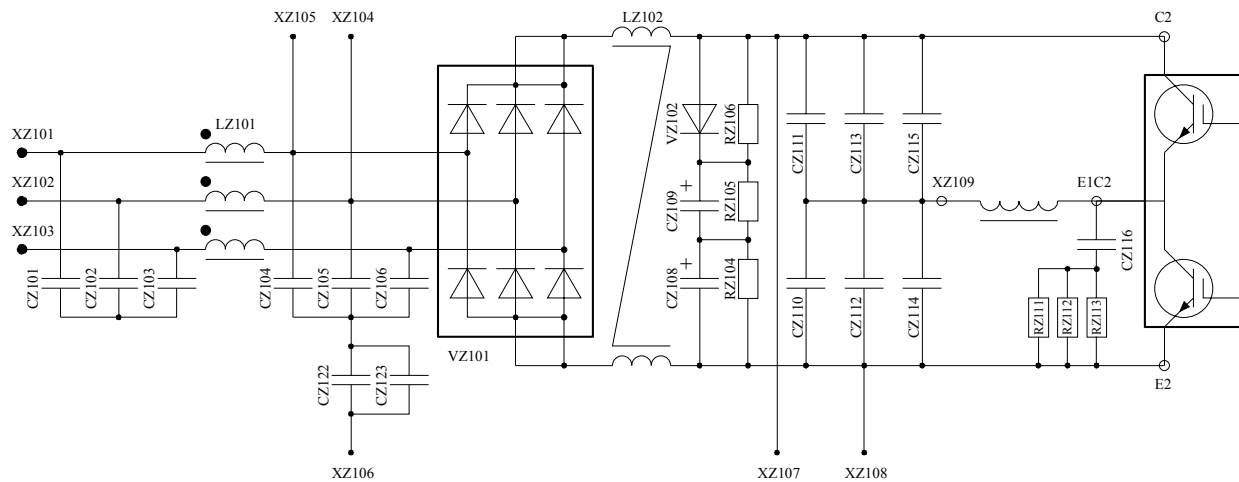
When both IGBTs are non-conductive, no power is transferred.

When the upper IGBT is conductive, the main transformer primary has positive voltage. And when the lower IGBT is conductive, the main transformer primary has negative voltage.

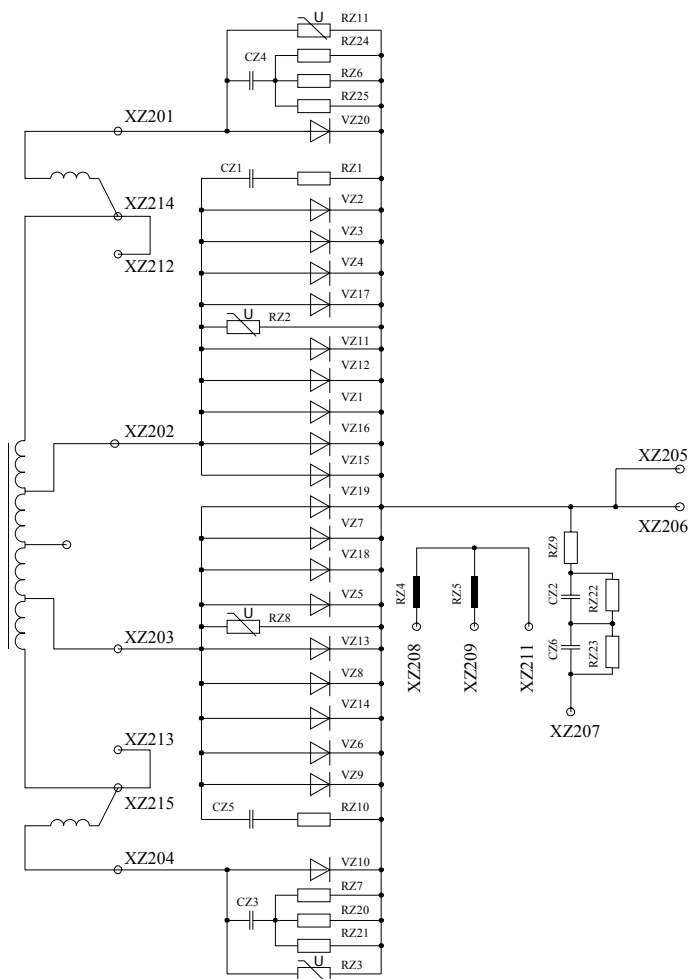
Power is adjusted by changing the IGBT conducting timings (PWM).



Main circuit

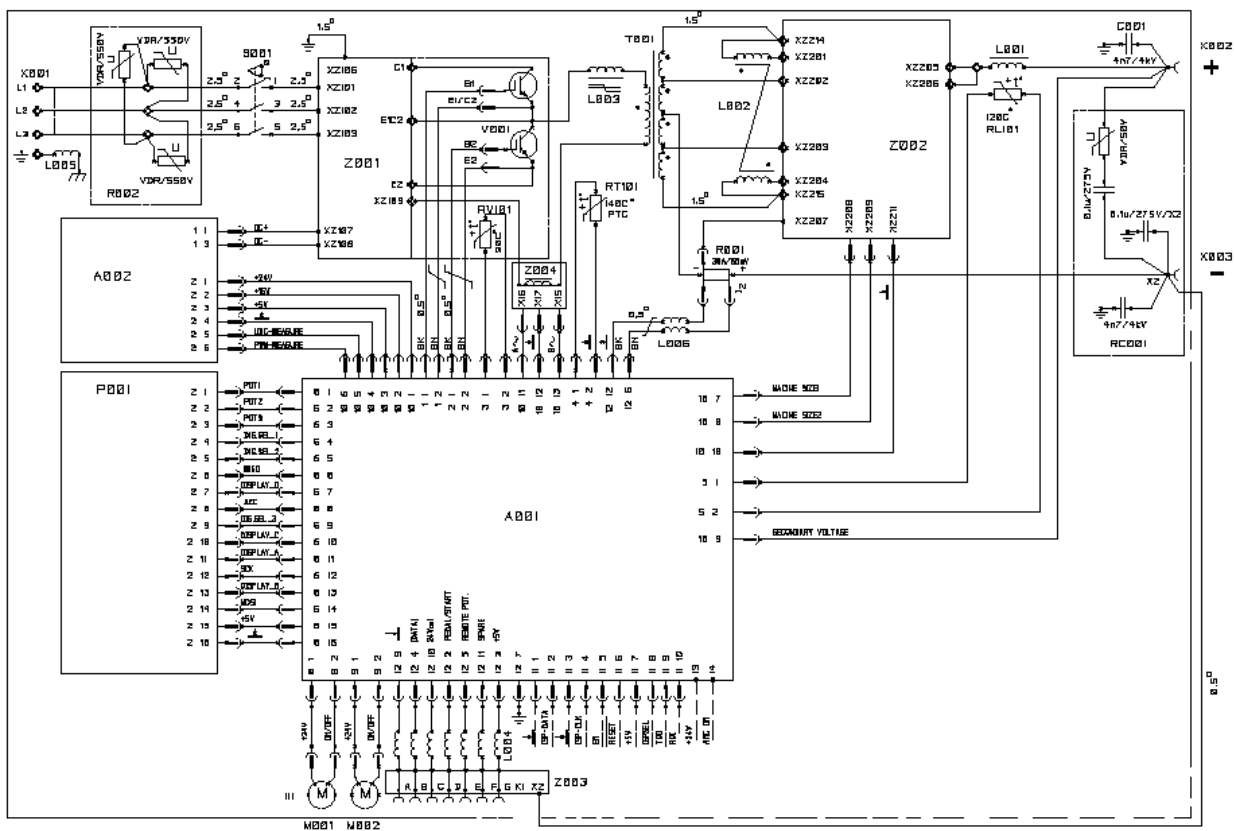


Primary circuit connection.

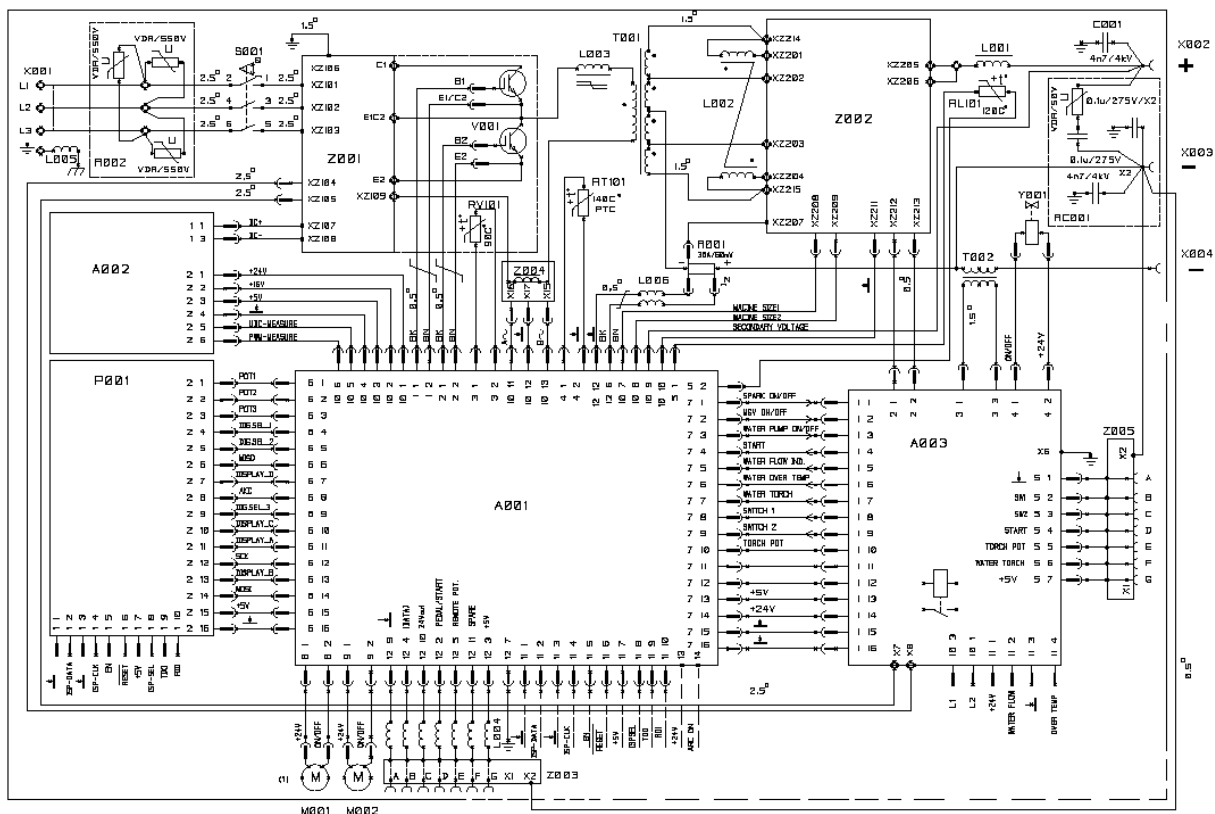


Secondary circuit connection.

Main circuit diagram

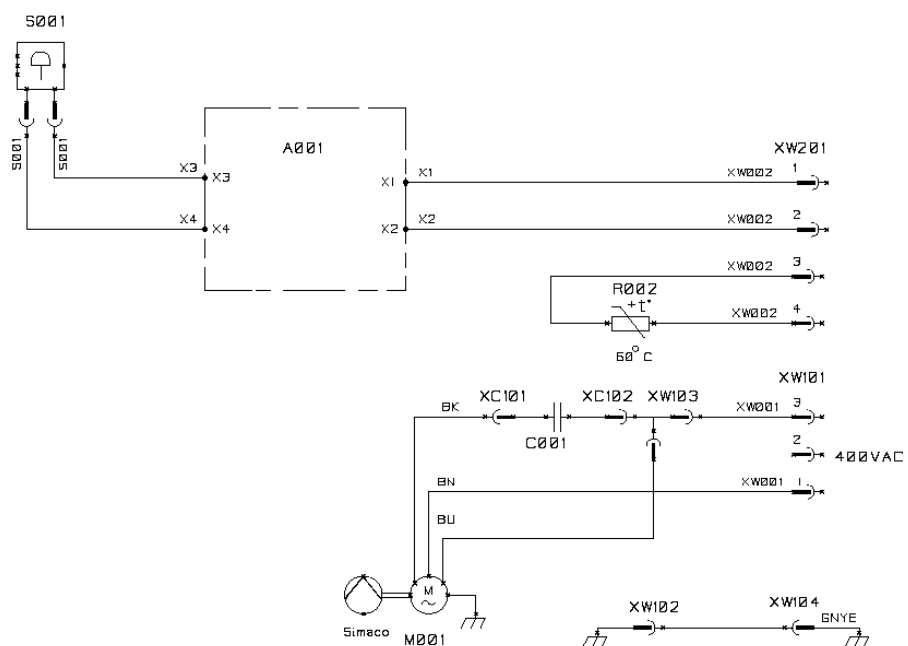


Master 2500/3500 MLS™



Mastertig 2500/3500 MLS™

Main circuit diagram



Mastercool 10

General

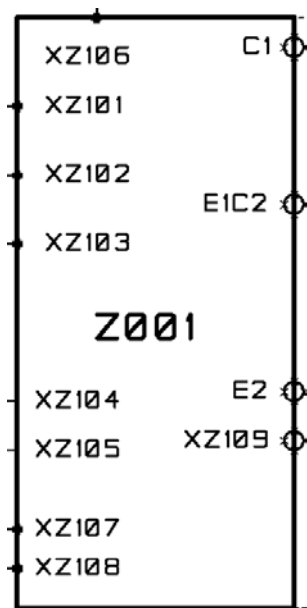
The device may be repaired only by a person legally authorized perform electric work!

Always check the device visually first, to find possible damages like loose wires, breaks or signs of overheating.

Troubleshooting

DISTURBANCE	POSSIBLE CAUSE	REMEDY
The power source will not start; panel displays are off.	Net fuses or supply cable.	Check the net fuses and the condition of the supply cable.
	Faulty power supply card A002.	Measure the intermediate circuit's DC voltage between the power supply card A002 connectors X1 and X3 (approx. 570 Vdc). Check that the LEDs H1, H2 and H3 are lit. See the power supply card A002 layout.
The net fuses burn during startup.	A faulty power semi-conductor on the primary circuit side.	Check the condition of the power semi-conductors on the primary side and the capacitors on the main circuit card Z001.
Power source doesn't deliver full power.	Main transformer T001, current transformer card Z004 and secondary diode card Z002.	Check if the main transformer T001 ferrites are loose or current transformer Z004 coding resistors or the secondary diode card diodes.
Power source starts and the OCV rises to approx. 50 V. The set value can't be adjusted on MMA.	Main transformer T001 auxiliary coils or the secondary diode card Z002.	Check the main transformer T001 auxiliary coils connectors and the diodes on the secondary diode card Z002.
TIG- or MEX-panel doesn't show the power source's program version.	A faulty panel flat cable or a faulty control card A001.	Check the panel's flat cable. Update the power source's program by Datamaster.
TIG- or MEX-panel's displays remain flashing after startup.	A faulty panel.	Empty the panel's EEPROM-memory by the Datamaster (ERASE MLS EEPROM).

Main circuit card Z001 functions



Main circuit card Z001 includes the following operational blocks:

- EMI-filter
- Primary rectifier (VZ101)
- Power stage
- Damping circuits

Connectors:

XZ106 Protective earth

XZ101, XZ102 and XZ103 Net connection 3~ 400 VAC

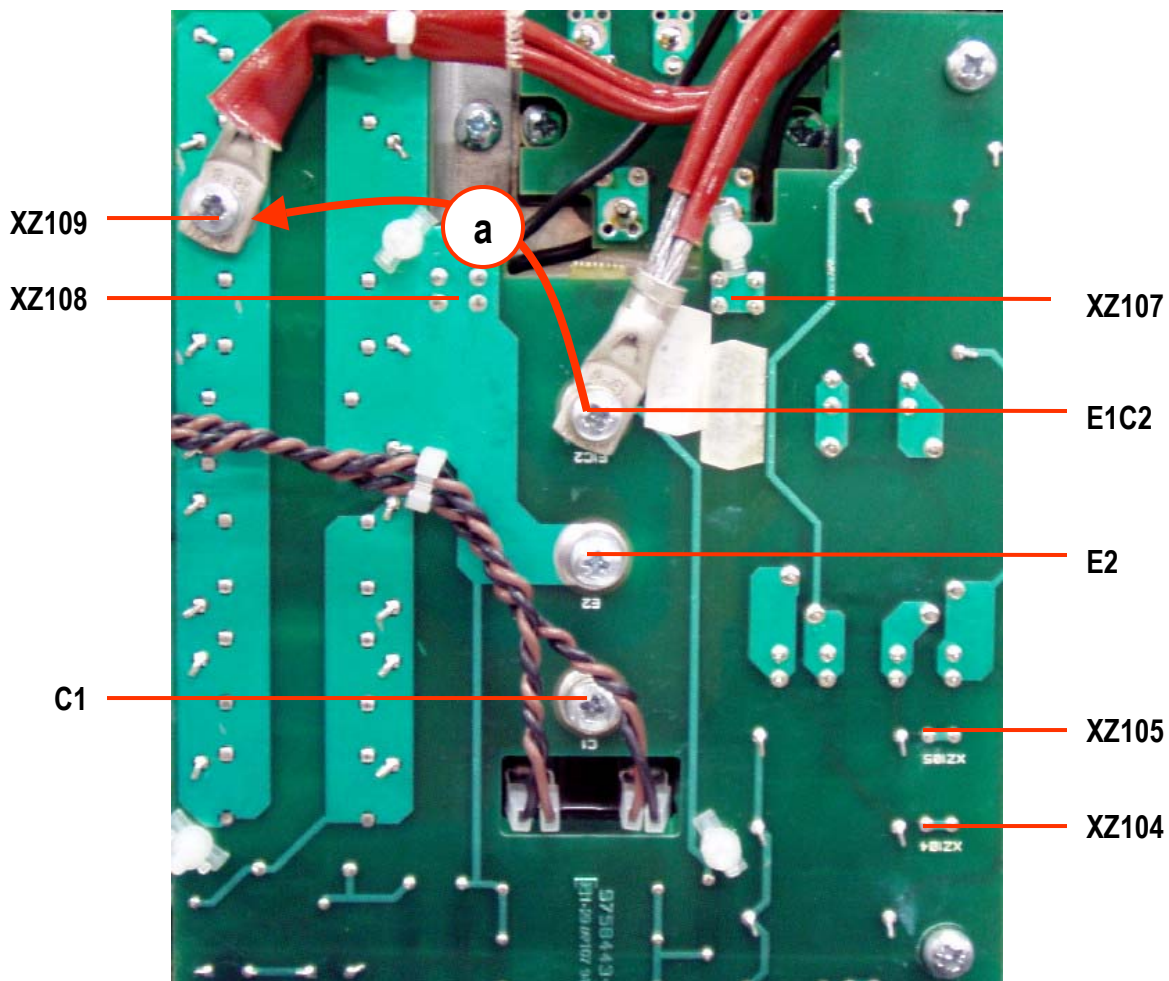
XZ104 and XZ105 Pump motor power supply 400 VAC

XZ107 and XZ108 Power source card (A002) power supply 450...720 VDC

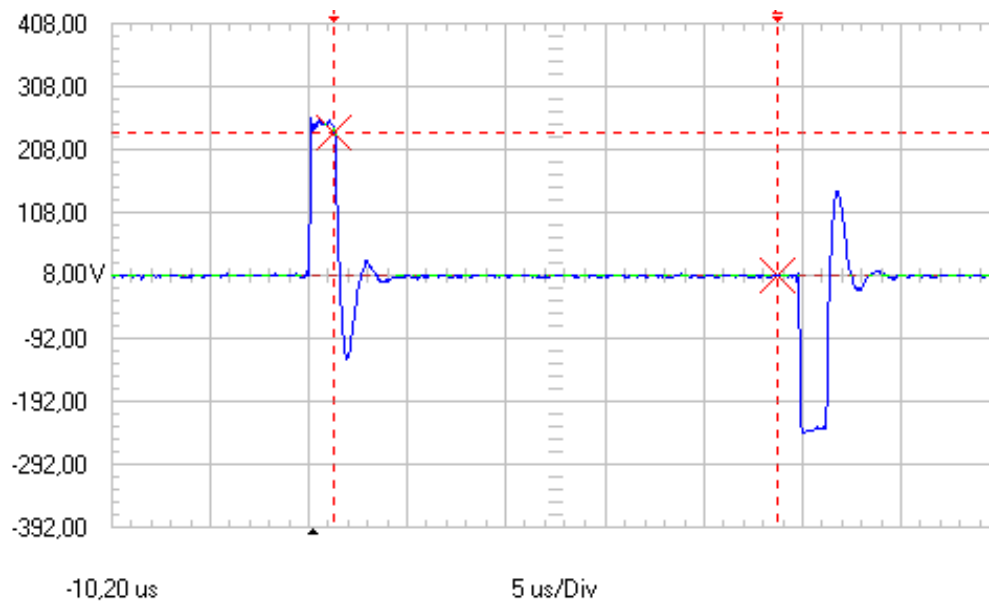
XZ109 Main transformer T001 primary

C1, E1C2 and E2 IGBT

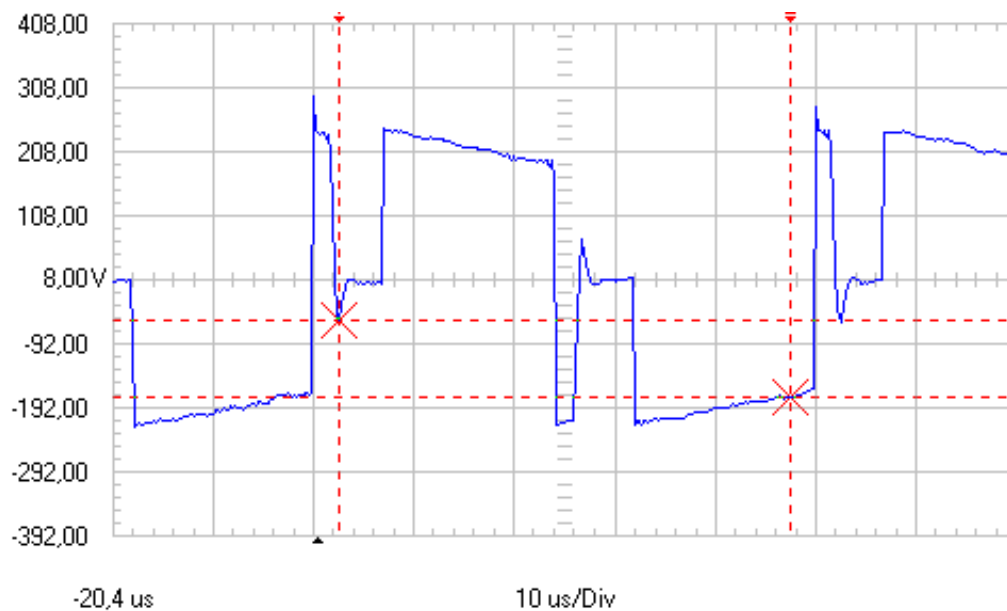
Main circuit card Z001 layout



Main transformer T001 primary voltage

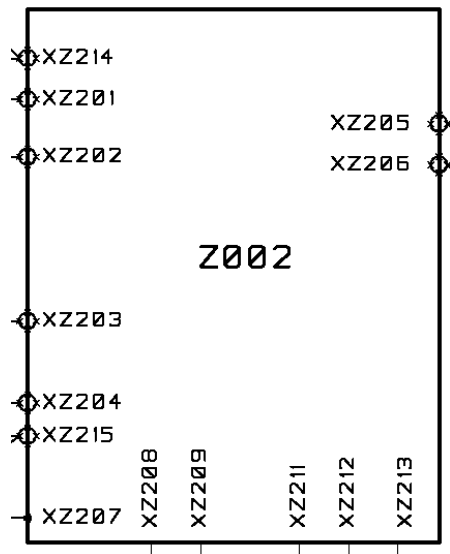


Main transformer T001 primary voltage with minimum current, test point a



Main transformer T001 primary voltage with maximum current, test point a

Secondary diode card Z002 functions



Sec. diode card Z002 includes the following operational blocks:

- Secondary rectifying
- Voltage reserve circuits
- Machine size coding
- OCV circuit
- Damping circuits

Connectors:

XZ207 Shunt resistor negative (R001)

XZ201 and **XZ204** Voltage reserve circuits chokes (L002)

XZ214 and **XZ215** Voltage reserve circuits auxiliary coils (T001) and chokes (L002)

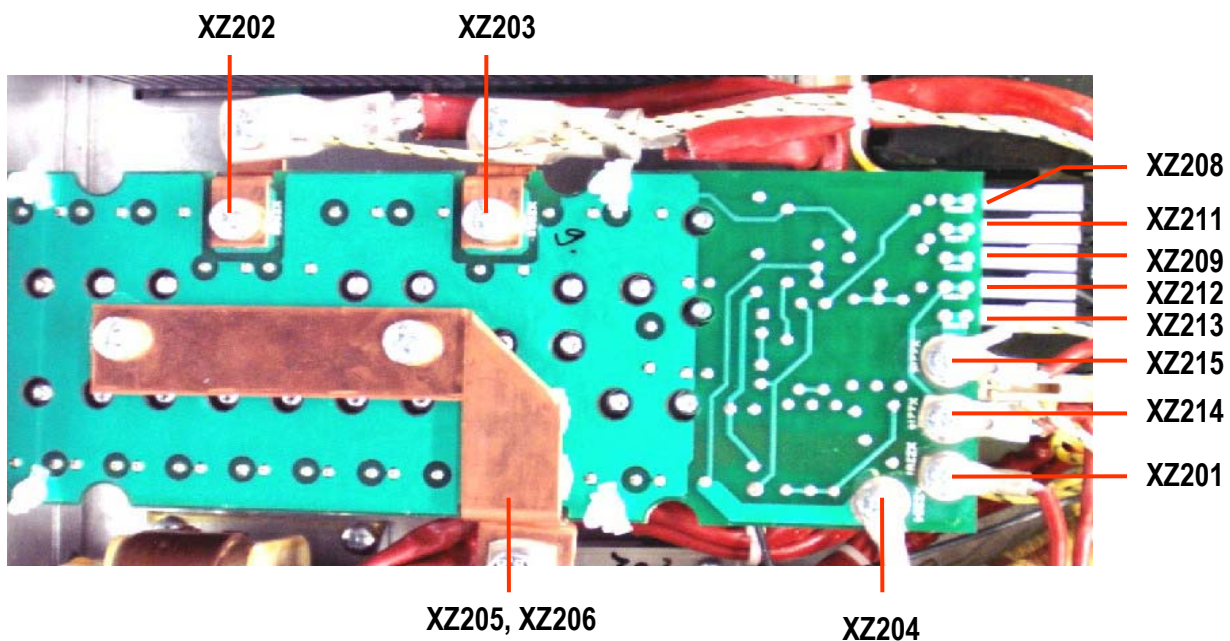
XZ212 and **XZ213** Spark generator (A003) power supply

XZ202 and **XZ203** Main transformer (T001) sec. coils

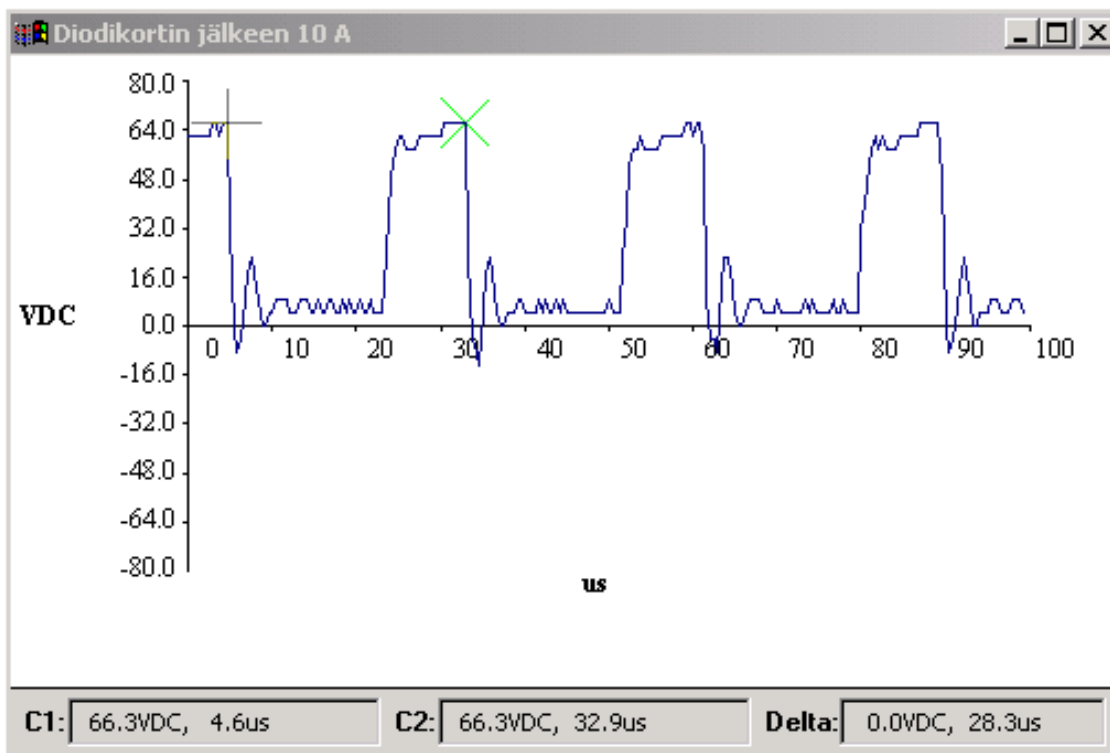
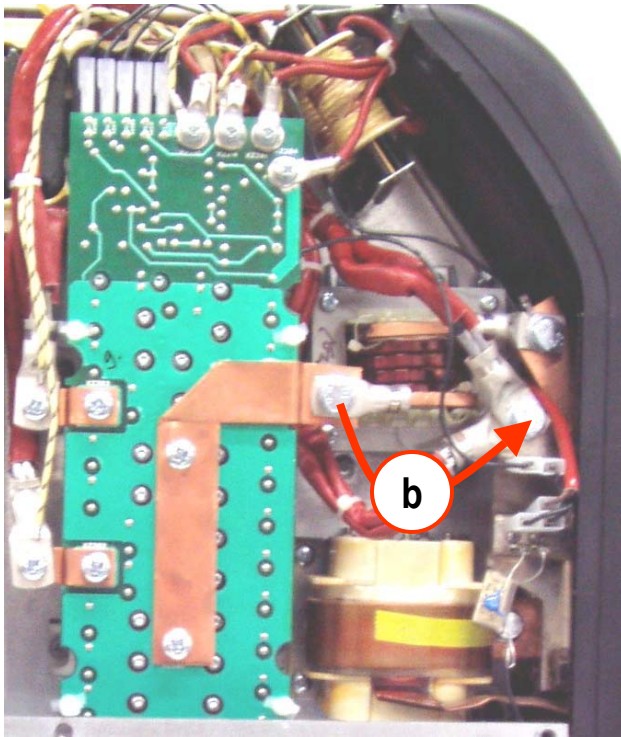
XZ205 and **XZ206** Secondary choke (L001)

XZ208, **XZ209** and **XZ211** Machine size coding

Secondary diode card Z002 layout

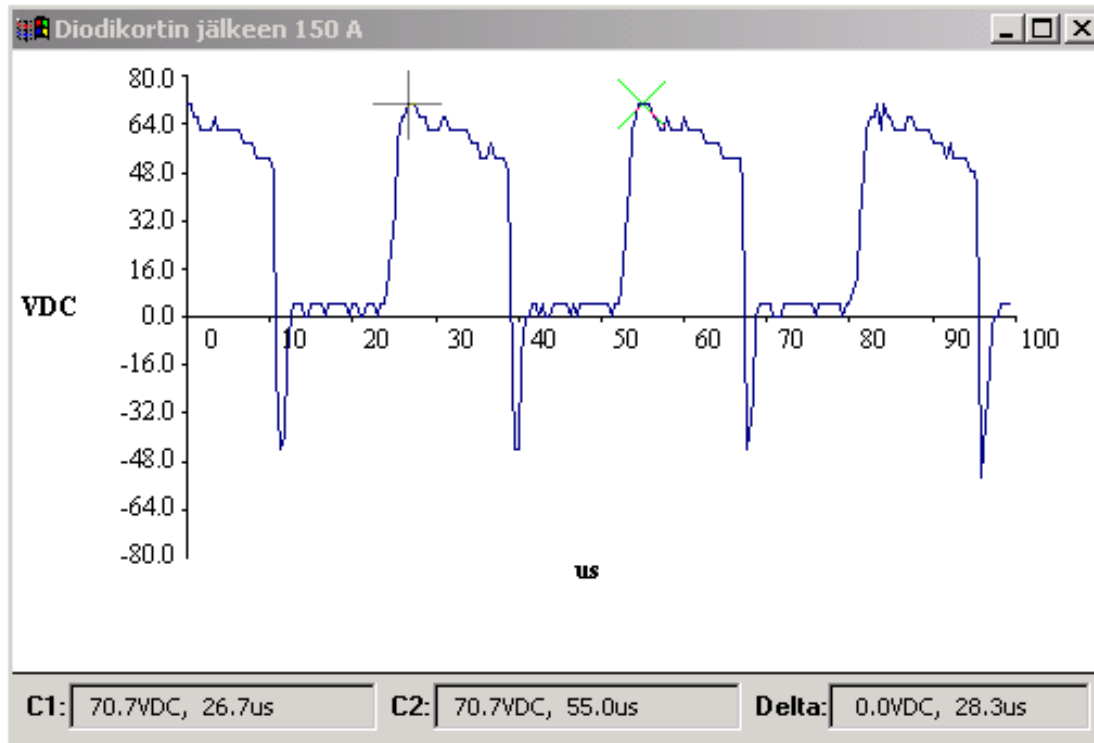


Voltage after the secondary diode card Z002

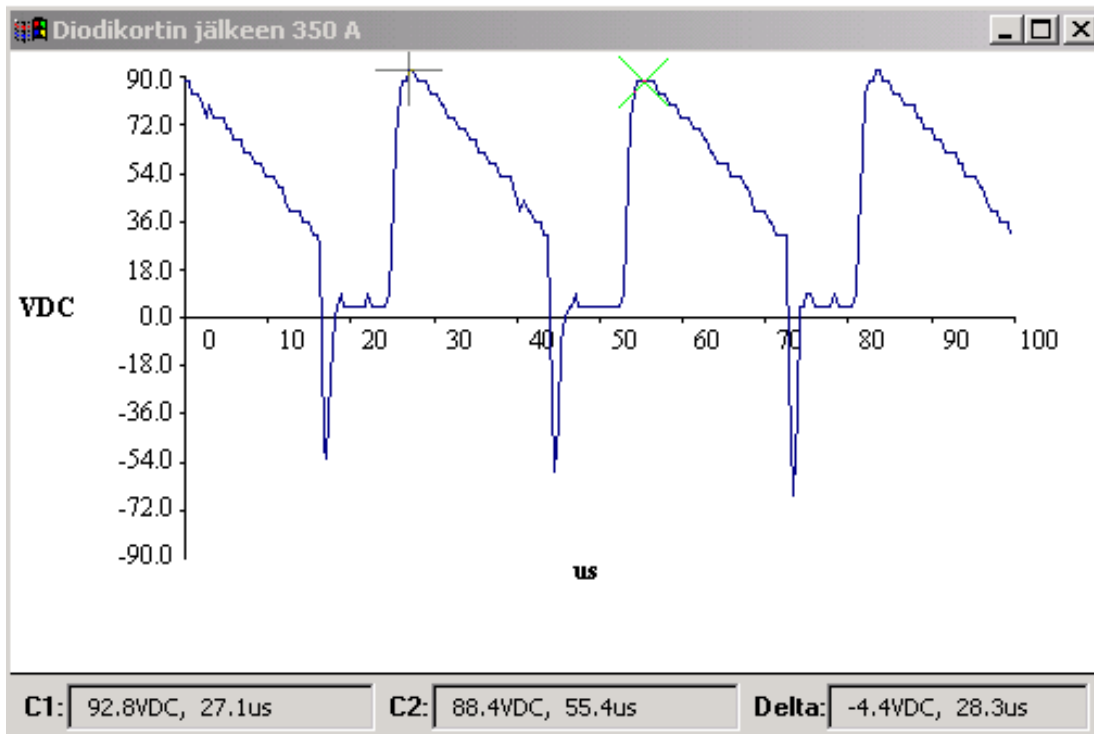


Voltage after the secondary diode card Z002 with 10 A current, test point b

Voltage after the secondary diode card Z002

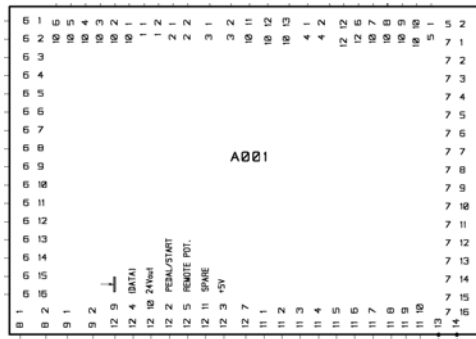


Voltage after the secondary diode card Z002 with 150 A current, test point **b**



Voltage after the secondary diode card Z002 with 350 A, test point **b**

Control card A001 functions



Control card A001 includes the following operational blocks:

- **Microcontroller ST72334N4**
- **PWM-development (PWMOD UC3846)**
- Current and voltage adjustment loop
- IGBT gate control
- Shunt amplifier
- Secondary voltage watch
- Primary side overcurrent indication circuit
- PWM-measurement (A002)
- Auxiliary voltage watch
- Reset-generator
- Temperature watch
- Microcontroller I/O extension
- Remote controller line (X1) protection
- Buses (SPI, ISP and SCI)
- MEL-MMA panel control

Connectors:

- X10/1** + 24 V (A002)
- X10/2** + 16 V (A002)
- X10/3** + 5 V (A002)
- X10/4** GND (A002)
- X10/5** Intermediate circuit DC-voltage measurements (A002)
- X10/6** Power supply card PWM-measurement (A002)
- X10/7** Machine size detection 1 (Z002)
- X10/8** Machine size detection 2 (Z002)
- X10/9** Secondary voltage
- X10/10** GND (Z002)
- X10/11** Primary current measurement (Z004)
- X10/12** GND (Z004)
- X10/13** Primary current measurement (Z004)

- X6/1** Ignition pulse potentiometer (MEL)/
Panel detection (+ 5 V)
- X6/2** Dynamics potentiometer (MEL)
- X6/3** Current set value (MEL)
- X6/4** Switches and displays (hundreds) selection (MEL)
- X6/5** Switches and displays (tens) selection (MEL)
- X6/6** Master In Slave Out, MISO (TIG-panels) *SPI*
- X6/7** Display control, bit 3 (MEL)
- X6/8** SPI-check/ Local-/remote control selection (MEL) *SPI*
- X6/9** Switches and displays (ones) selection (MEL)
- X6/10** Display control, bit 2 (MEL)
- X6/11** Display control, bit 0 (MEL)
- X6/12** Clock-signal from panel (TIG-panels) *SPI*
- X6/13** Display control, bit 1 (MEL)
- X6/14** Master Out Slave In, MOSI (TIG-panels) *SPI*/
A/V-switch and MMA/TIG-switch (MEL)
- X6/15** + 5 V
- X6/16** GND

- X11/1** GND
- X11/2** Data-signal (ISP)
- X11/3** GND
- X11/4** Clock-signal (ISP)
- X11/5** Enabled-signal (ISP)
- X11/6** Reset-signal (ISP)
- X11/7** + 5 V
- X11/8** Select-signal (ISP)
- X11/9** Transmitted data (SCI)
- X11/10** Received data (SCI)

- X1/1-2** IGBT gate control
- X2/1-2** IGBT gate control
- X3/1-2** IGBT heatsink's PTC (RV101)
- X4/1-2** Main transformer's PTC (RT101)
- X5/1-2** Secondary choke's PTC (RL101)

- X8/1-2** Fan (M001)
- X9/1-2** Fan (M002)
- X13** + 24 V
- X14** Arc on/off-signal
- X7/1** TIG-spark control on/off
- X7/2** Solenoid valve control on/off
- X7/3** Waterpump control on/off
- X7/4** TIG-torch start switch
- X7/5** Flow watch/pressure watch
- X7/6** Coolant temperature
- X7/7** Liquid cooled torch detection
- X7/8** TIG-torch aux. switch
- X7/9** TIG-torch aux. switch
- X7/10** TIG-torch potentiometer
- X7/11** -
- X7/12** -
- X7/13** + 5 V
- X7/14** + 24 V
- X7/15** GND
- X7/16** GND

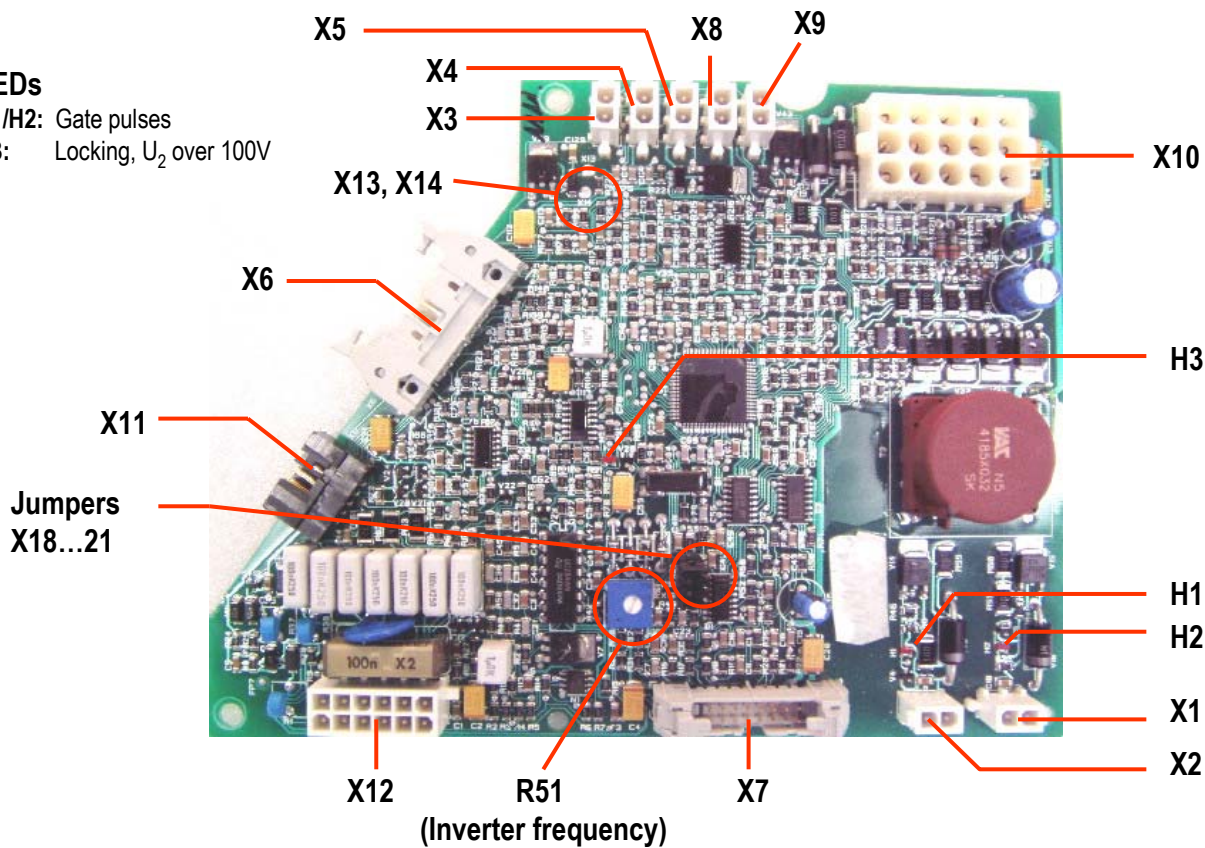
- X12/1** -
- X12/2** Foot switch detection / start
- X12/3** + 5 V
- X12/4** Data (Not used)
- X12/5** Remote control/ footswitch potentiometer
- X12/6** Current info from the shunt resistor (R001)
- X12/7** Protective earth
- X12/8** -
- X12/9** GND
- X12/10** + 24 V
- X12/11** -
- X12/12** GND

Control card A001 layout

LEDs

H1/H2: Gate pulses

H3: Locking, U_2 over 100V



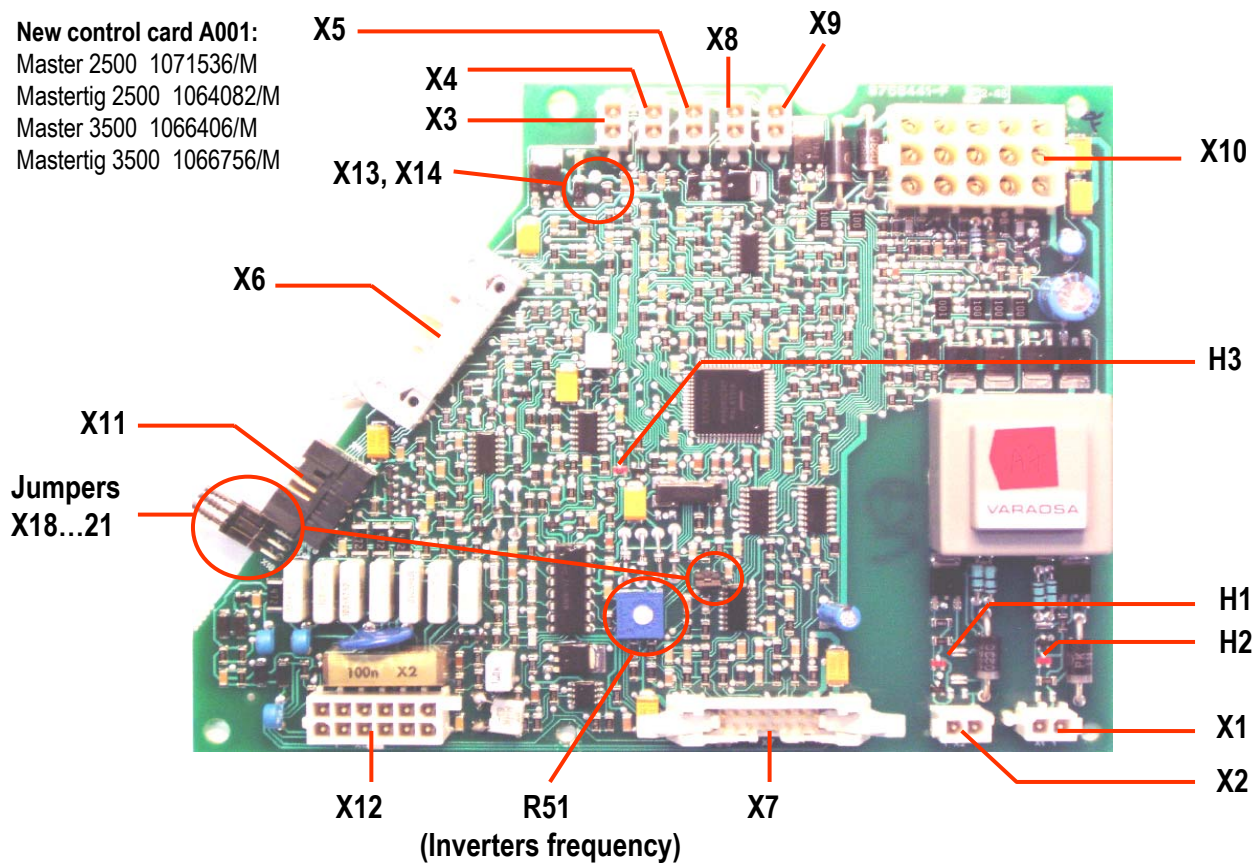
New control card A001:

Master 2500 1071536/M

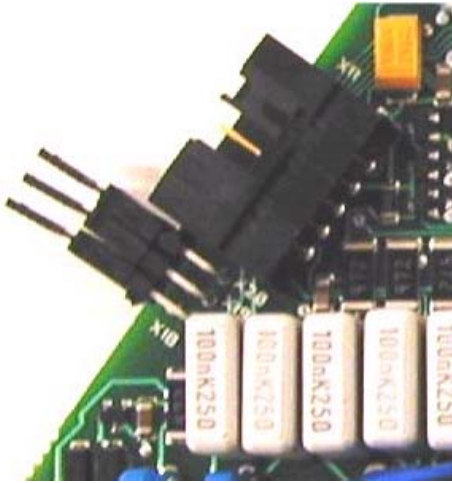
Mastertig 2500 1064082/M

Master 3500 1066406/M

Mastertig 3500 1066756/M



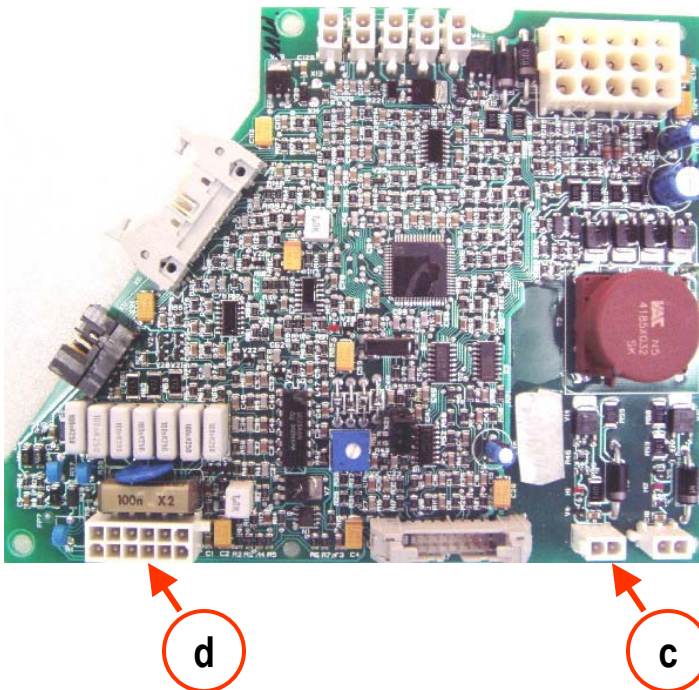
Control card A001 jumper functions



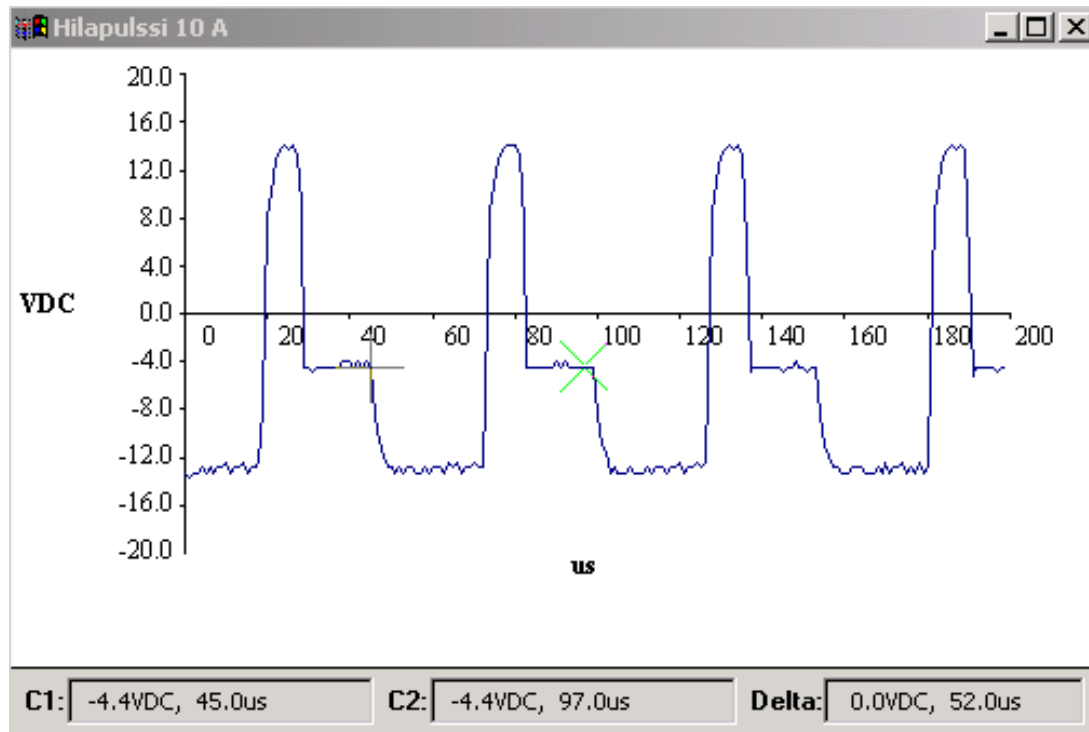
Jumper	Closed	Open
X18	Normal OCV	VRD option (10 V)*
X19	Normal electric net use	Generator use
X20	OCV 80 V (MEL)	OCV 40 V (MEL)
X21	-	-

* Requires an auxiliary card

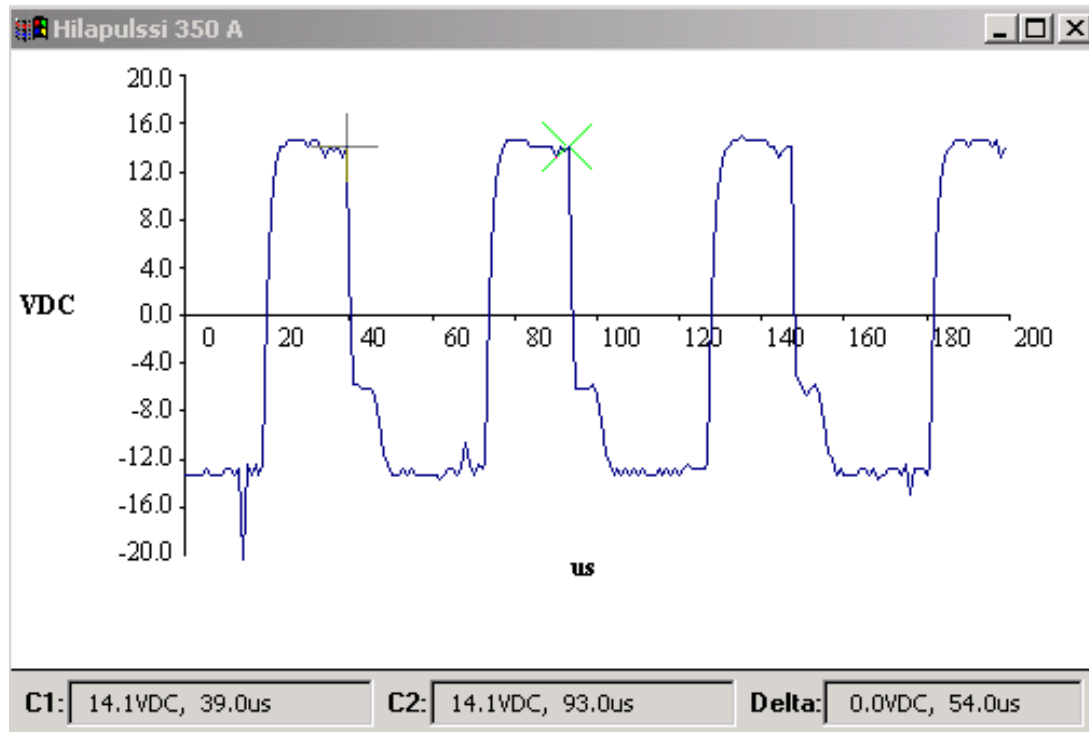
Test points on control card A001



IGBT gate pulse

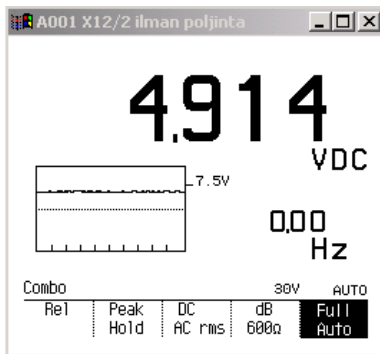


IGBT gate pulse with 10 Amps, test point c

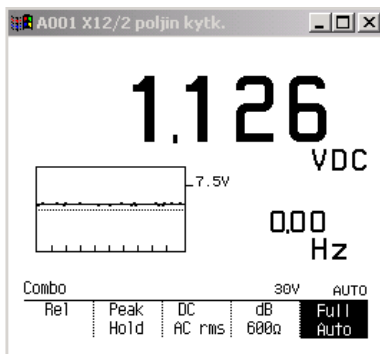


IGBT gate pulse with 350 Amps, test point c

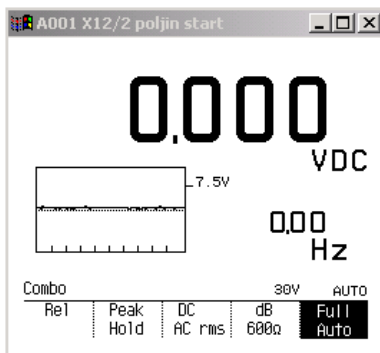
Footswitch detection



Voltage on connector X12/2; without footswitch, test point **d**

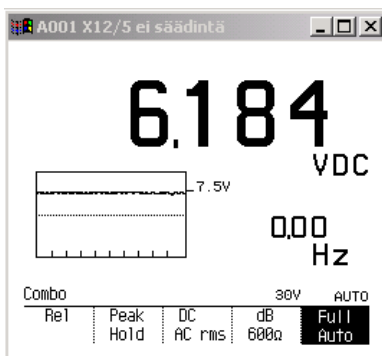


Voltage on connector X12/2; footswitch connected, test point **d**

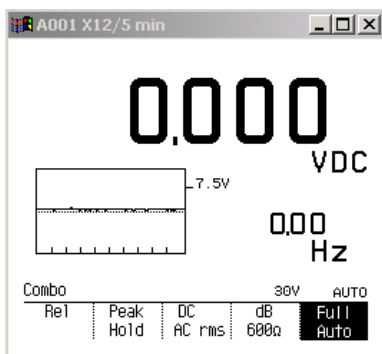


Voltage on connector X12/2; footswitch connected / Start, test point **d**

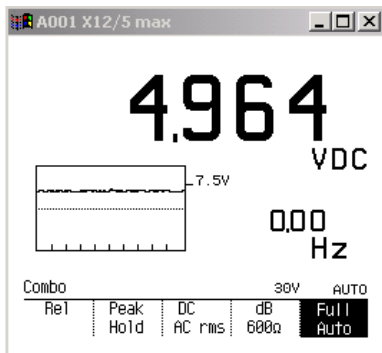
Remote controller detection



Voltage on connector X12/5; without remote controller, test point **d**

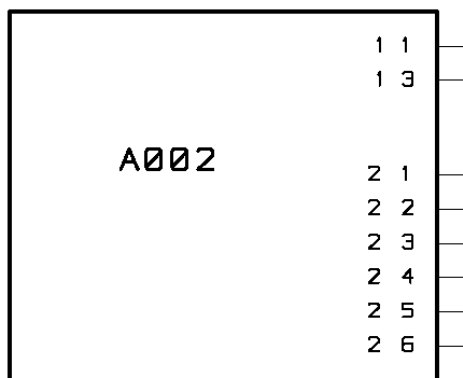


Voltage on connector X12/5; remote controller minimum, test point **d**



Voltage on connector X12/5; remote controller maximum, test point **d**

Auxiliary power supply card A002 functions



Auxiliary power supply card A002 includes these operational blocks:

- Aux. power source (+ 24 V, + 16 V ja + 5 V)
- **PWMOD UC2844**
- Overvoltage watch
- Intermediate circuit voltage measuring

Connectors:

X1 Intermediate circuit dc voltage (+)

X3 Intermediate circuit dc voltage (-)

X2/1 + 24 V

X2/2 + 16 V

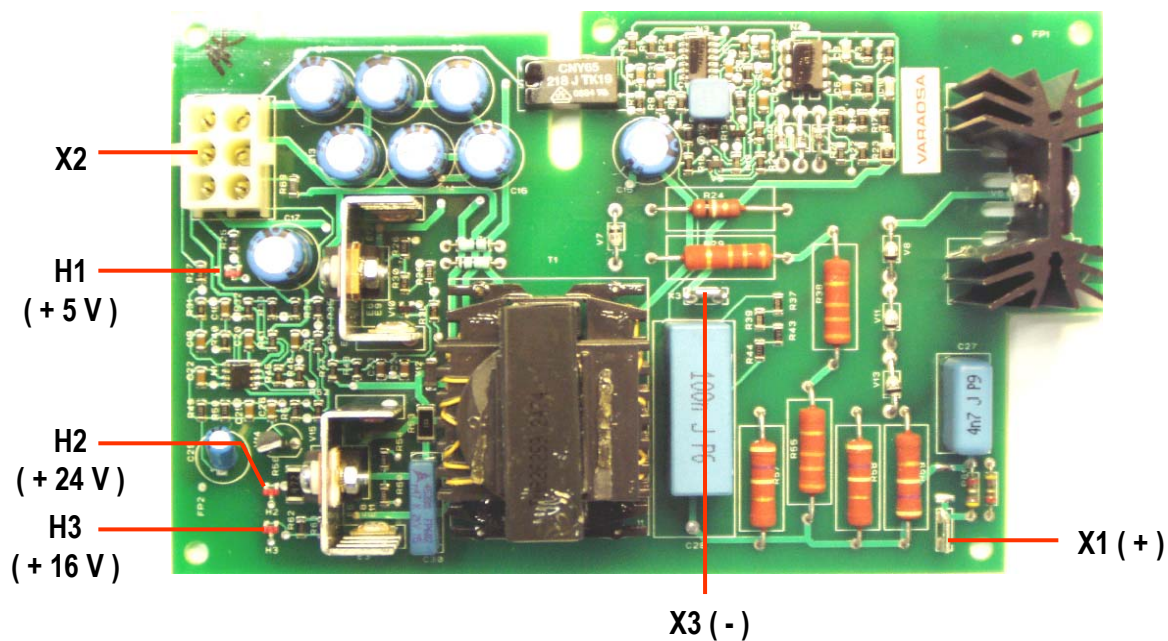
X2/3 + 5 V

X2/4 GND

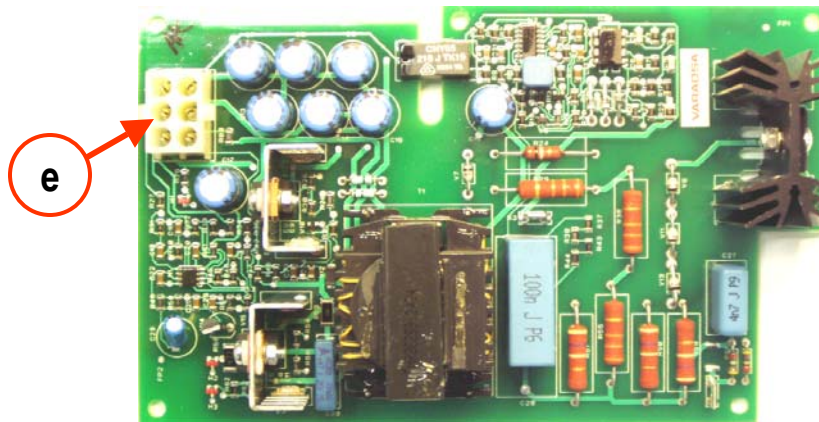
X2/5 Intermediate circuit dc voltage measuring

X2/6 PWM-signal

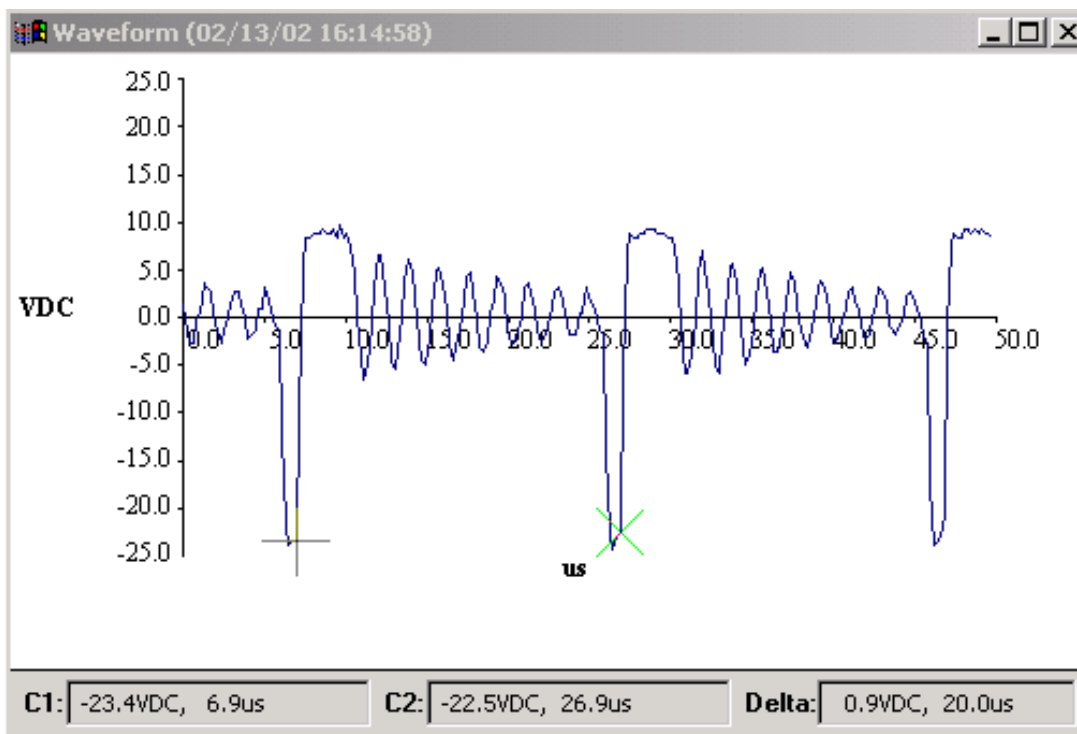
Auxiliary power supply card A002 layout



Auxiliary power supply card A002 test points

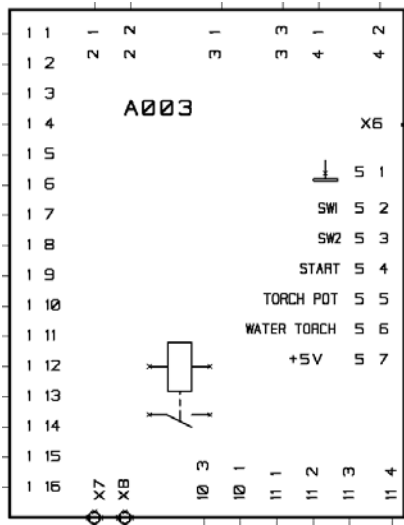


PWM Measure-signal



Voltage on connector X2/6, test point e

Spark card A003 functions



Spark card A003 includes these operational blocks:

- Spark generator
- Torch connector protection
- Water pump control
- Solenoid valve control
- Coolant pressure and temperature watch

Connectors:

X1/1 TIG ignition spark control on/off
X1/2 Solenoid valve control on/off
X1/3 Water pump control on/off
X1/4 TIG-torch start switch
X1/5 Flow control /pressure switch
X1/6 Coolant temperature
X1/7 Liquid cooled torch detection
X1/8 TIG-torch aux. switch
X1/9 TIG-torch aux. switch
X1/10 TIG-torch potentiometer
X1/11 -
X1/12 -
X1/13 + 5 V
X1/14 + 24 V
X1/15 GND
X1/16 GND

X2 Spark generator power supply
X4 Solenoid valve

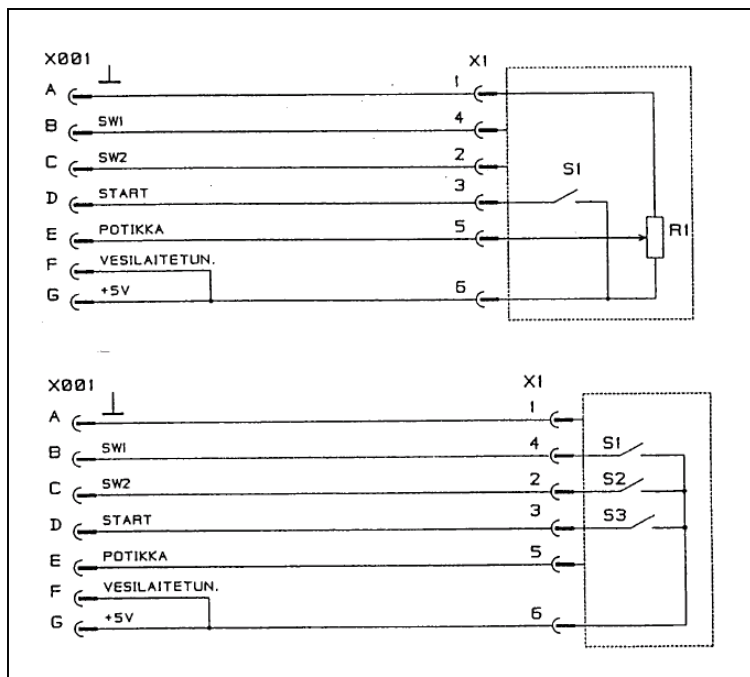
X5/1 (A) GND
X5/2 (B) SW1
X5/3 (C) SW2
X5/4 (D) Start
X5/5 (E) Torch potentiometer
X5/6 (F) Liquid cooled torch detection
X5/7 (G) + 5 V

X7 L1
X8 L2

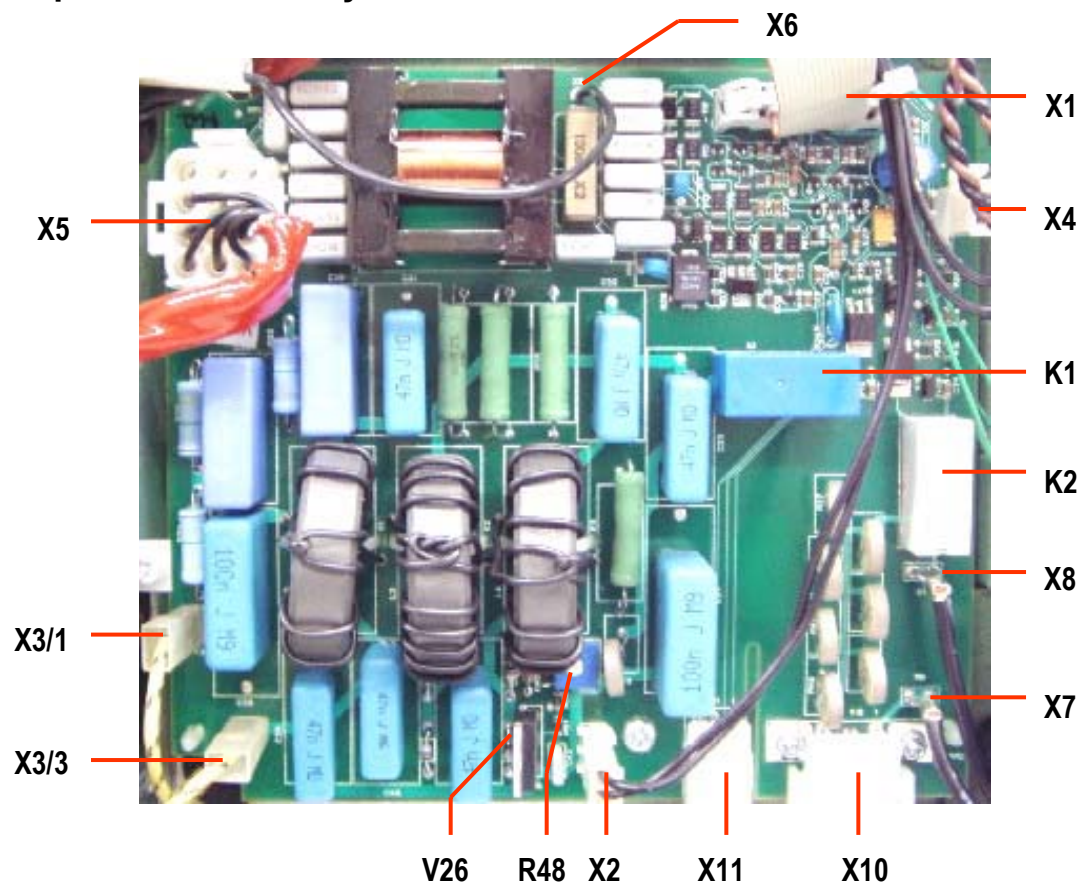
X10/1 L1
X10/2 L2

X11/1 + 24 V
X11/2 Flow control/pressure switch
X11/3 GND
X11/4 Temperature watch

TTC-torch connection

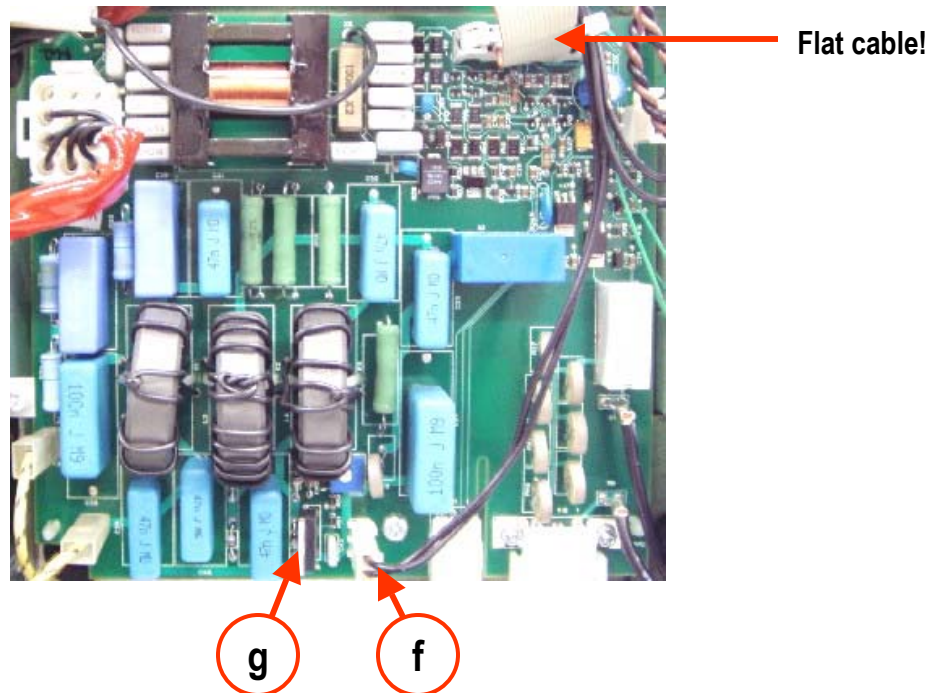


Spark card A003 layout

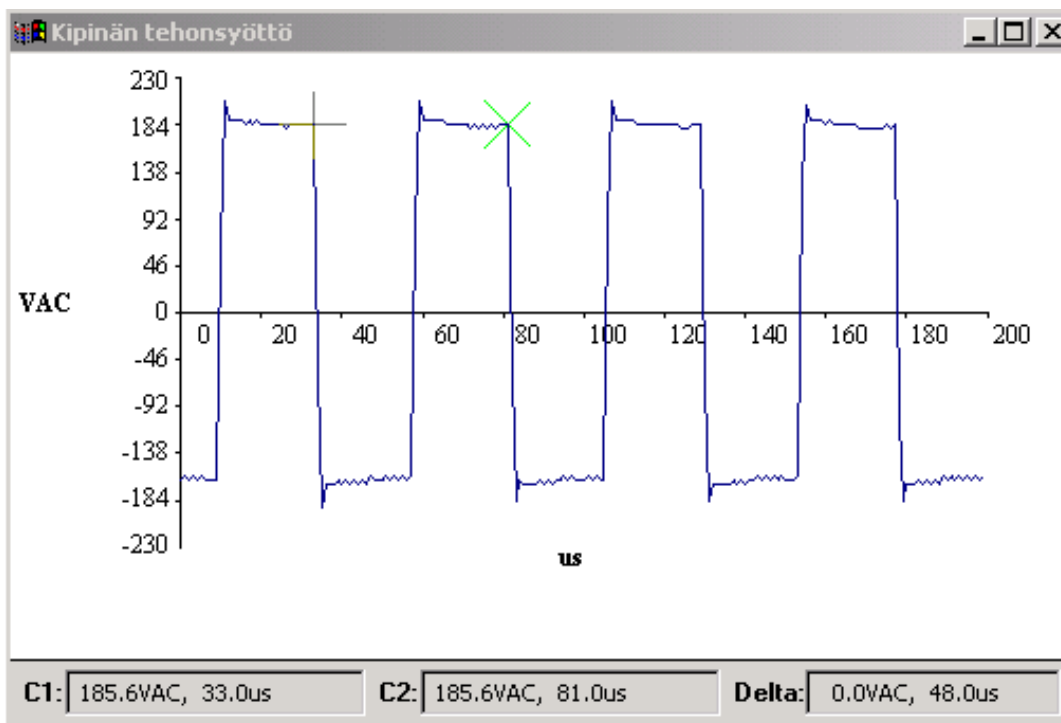


R48 Spark voltage adjustment 7,5...11,5 kV

Test points on control card A003

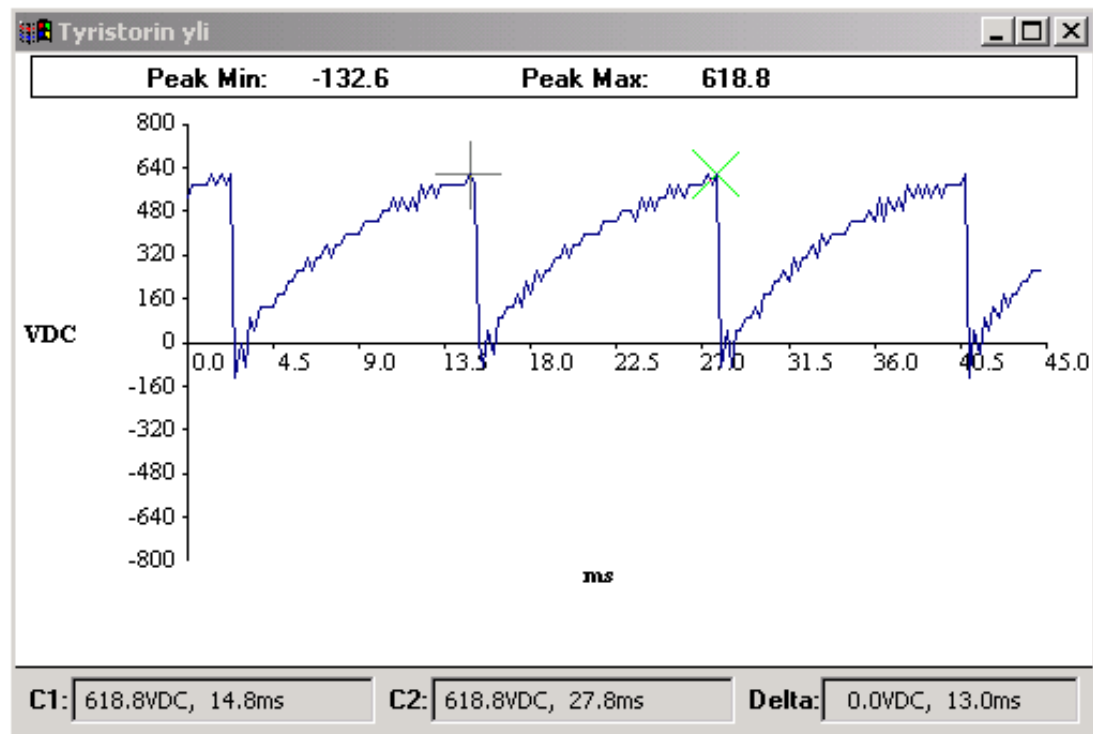


Spark generator power supply



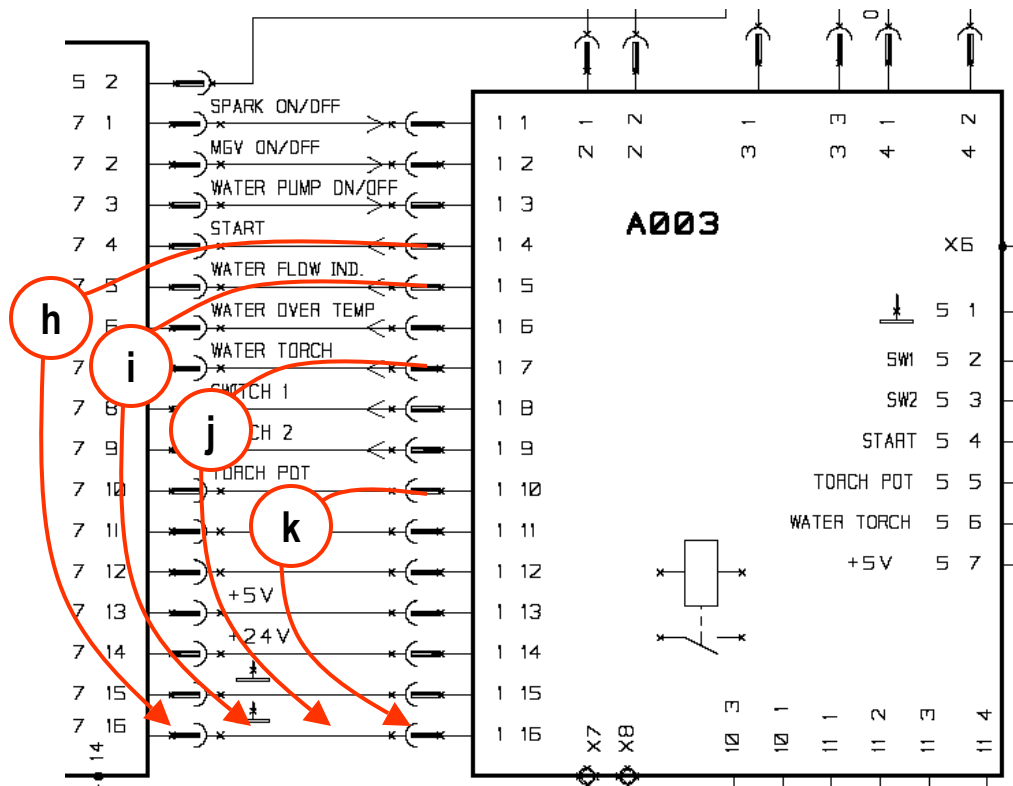
Voltage on connector X2/1-2, test point f

Voltage over the thyristor V26

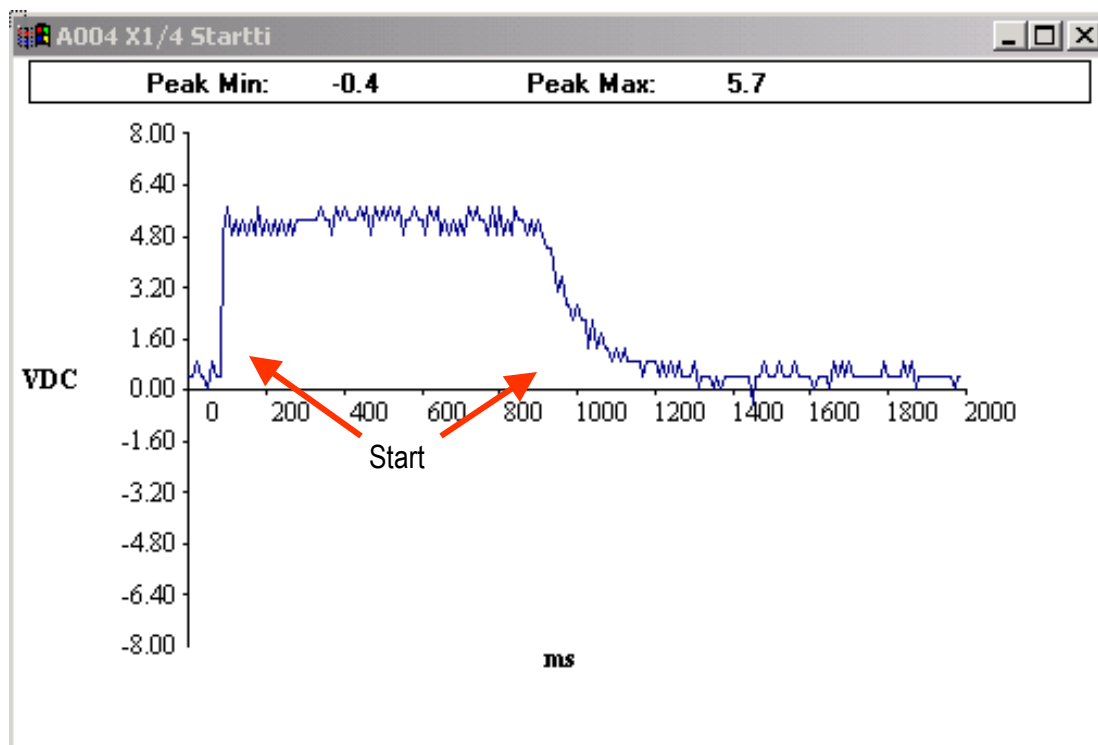


Voltage over the thyristor V26, test point g

Test points on the flat cable

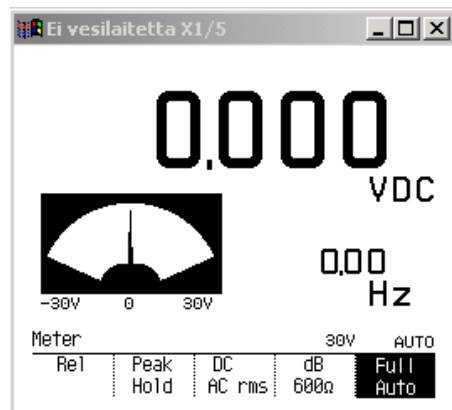


Start detection

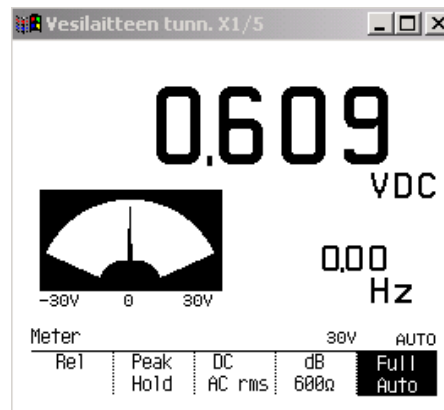


Voltage on connector X1/4, test point h

Cooling unit detection



a)

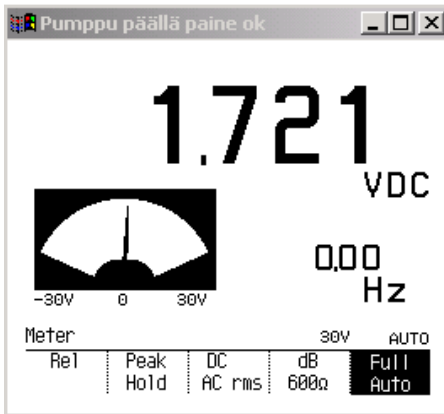


b)

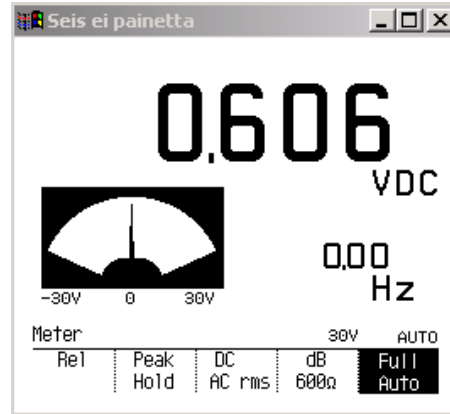
a) Voltage on connector X1/5; without cooling unit, test point i

b) Voltage on connector X1/5; cooling unit connected, test point i

Cooling unit monitoring



a)

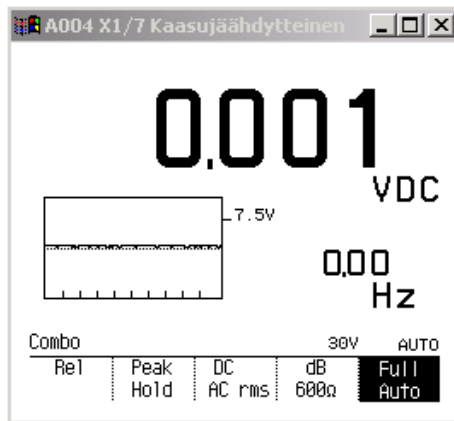


b)

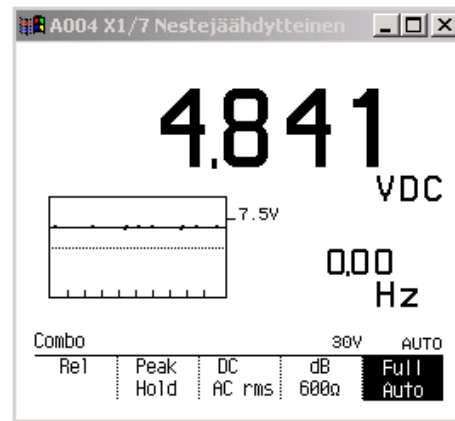
a) Voltage on connector X1/5; pump is on and pressure OK, test point i

b) Voltage on connector X1/5; stop, pressure < 1 bar., test point i

Liquid cooled TIG-torch detection



a)

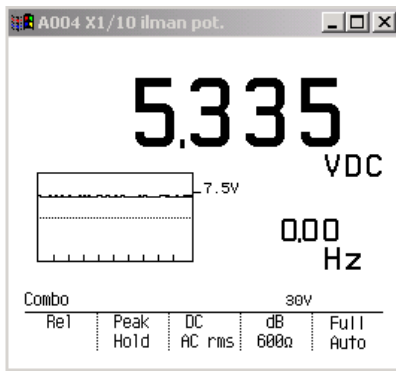


b)

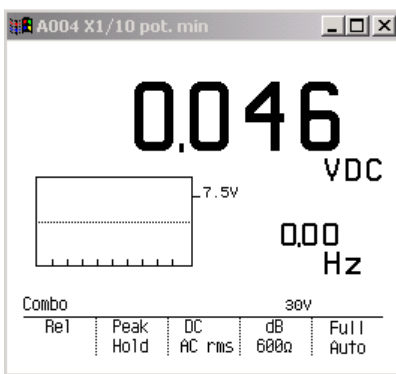
a) Voltage on connector X1/7; gas cooled TIG torch, test point j

b) Voltage on connector X1/7; liquid cooled TIG torch, test point j

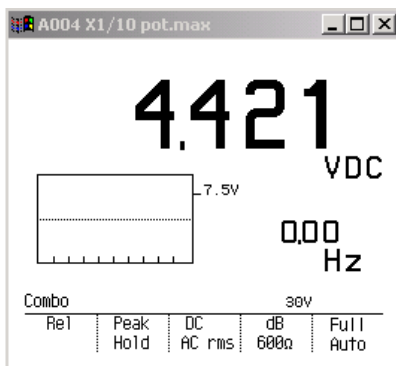
TIG-torch potentiometer



Voltage on connector X1/10; without TIG-torch potentiometer, test point k

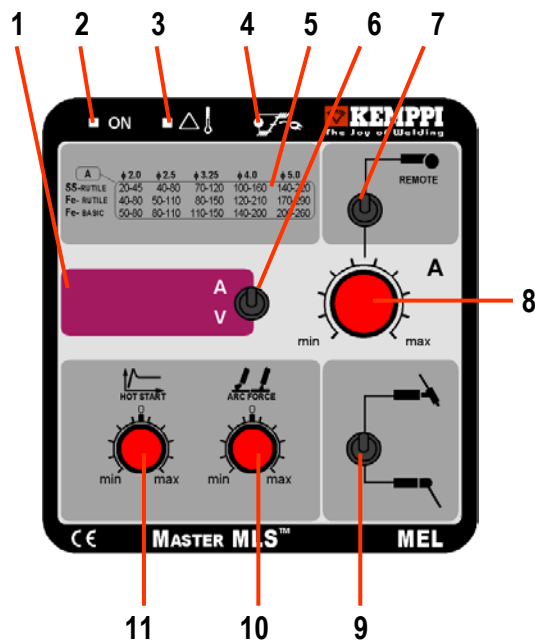


Voltage on connector X1/10; TIG-torch potentiometer minimum, test point k



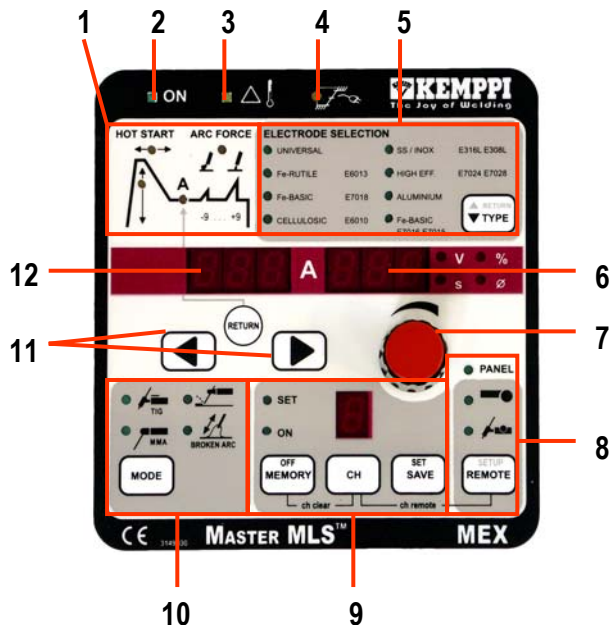
Voltage on connector X1/10; TIG-torch potentiometer maximum, test point k

MMA-panels



- 1 Current- / voltage display
- 2 Main switch signal lamp
- 3 Overheat signal lamp
- 4 Net over-/undervoltage signal lamp
- 5 Welding current selection instruction
- 6 Current- / voltage display selection
- 7 Remote/local control
- 8 Welding current adjustment
- 9 Welding process selection
- 10 Welding dynamics adj.
- 11 Ignition current adj.

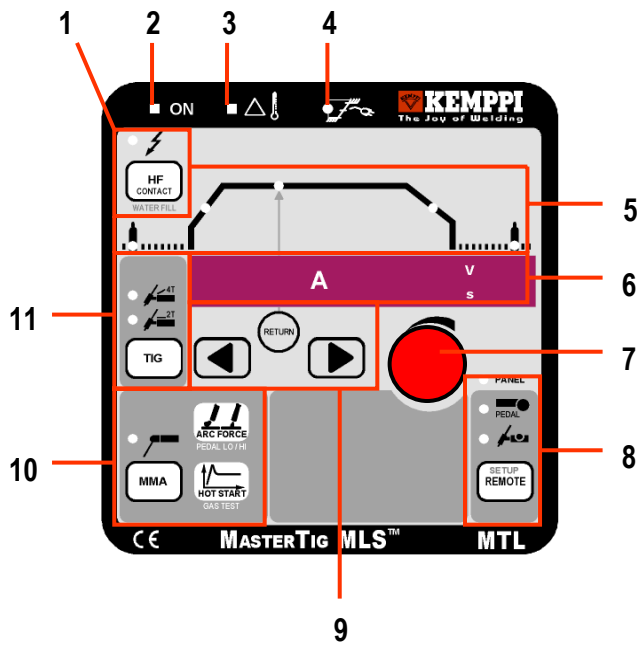
MEL- panel (MMA)



- 1, 11 Adjustable parameter selection
- 2 Main switch signal lamp
- 3 Overheat signal lamp
- 4 Net over-/under voltage signal lamp
- 5 Electrode type selection
- 6, 12 Displays
- 7 Parameters adjustments
- 8 Remote/local control selection, SETUP
- 9 Memory (10 memory channel)
- 10 Welding process selection

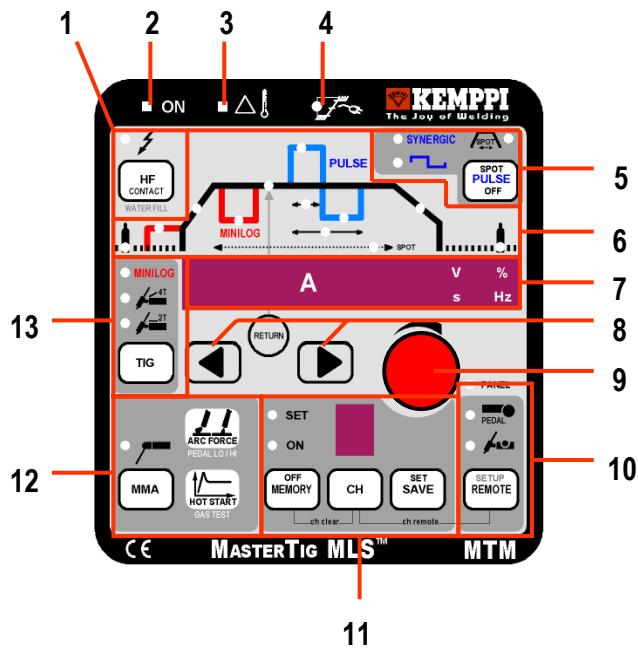
MEX-panel (MMA)

TIG-panels



- 1 Ignition method selection
- 2 Main switch signal lamp
- 3 Overheat signal lamp
- 4 Net over-/undervoltage signal lamp
- 5, 9 Adjustable parameter selection
- 6 Displays
- 7 Parameter adjustment
- 8 Local/remote control, SETUP
- 10 MMA process selection
- 11 TIG process selection

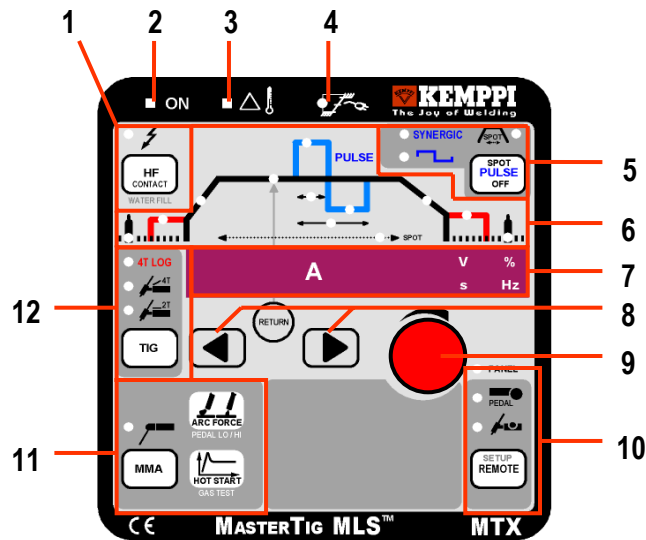
MTL-panel



- 1 Ignition method selection
- 2 Main switch signal lamp
- 3 Overheat signal lamp
- 4 Electric net over-/under voltage signal lamp
- 5 Pulse-TIG- and spotwelding selection
- 6, 8 Adjustable parameter selection
- 7 Displays
- 9 Parameter adjustment
- 10 Local/remote control, SETUP
- 11 Memory (10 memory channels)
- 12 MMA process selection
- 13 TIG process selection

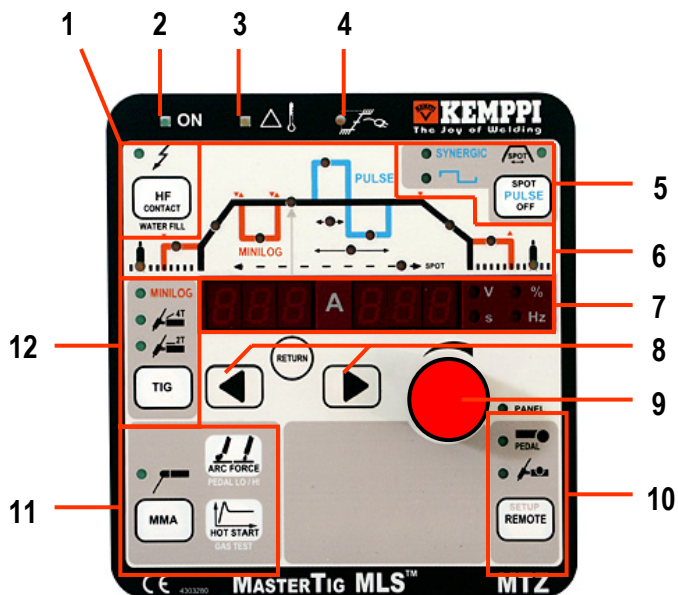
MTM-panel

TIG-panels



- 1 Ignition method selection
- 2 Main switch signal lamp
- 3 Overheat signal lamp
- 4 Net over-/undervoltage signal lamp
- 5 Pulse-TIG- and spotwelding selection
- 6, 8 Adjustable parameter selection
- 7 Displays
- 9 Parameter adjustment
- 10 Local/remote control selection, SETUP
- 11 MMA process selection
- 12 TIG process selection

MTX-panel



- 1 Ignition method selection
- 2 Main switch signal lamp
- 3 Overheat signal lamp
- 4 Net over- / undervoltage signal lamp
- 5 Pulse-TIG- and spotwelding selection
- 6, 8 Adjustable parameter selection
- 7 Displays
- 9 Parameter adjustment
- 10 Local/remote control selection, SETUP
- 11 MMA process selection
- 12 TIG process selection

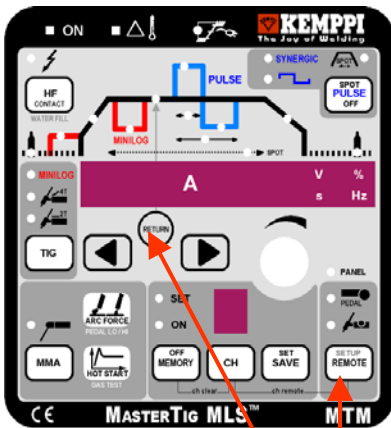
MTZ-panel

Setup-functions in TIG panels and MEX (MMA) panels

Panel(&power source) functions can be altered by the functions in setup. The setup can be accessed by pressing and holding down the REMOTE (SETUP) and RETURN buttons for approx. 3 seconds.

Setup is divided into four layers:

1. The first layer includes jumper functions.
2. The second layer includes some jumper functions and adjustable values.
3. The third layer includes the adjustments for the minimum panel parameter settings.
4. The fourth layer includes the adjustments for the maximum panel parameter settings.



Approx. 3 s.

Setup-functions

A1	Upslope (<i>TIG-panels</i>)
0	The current upslope is constant
1	The current upslope depends on the set value
A1	MMA ignition pulse adjustment method (<i>MEX-panels</i>)
0	2-knob adj.
1	1-knob adj.
A2	Downslope (<i>TIG-panels</i>)
0	The current downslope is constant
1	The current downslope depends on set value
A3	TIG antifreeze (<i>TIG- and MEX-panels</i>)
0	TIG antifreeze is off
1	TIG antifreeze is on
A4	MMA antifreeze (<i>TIG- and MEX-panels</i>)
0	MMA antifreeze is off
1	MMA antifreeze is on
A5	MMA ignition pulse (<i>TIG- and MEX-panels</i>)
0	MMA ignition pulse is not time dependant
1	MMA ignition pulse is time dependant (no function)
A6	Downslope cut-off level (<i>TIG-panels</i>)
0	The dpwnslope is cut-off at a certain %-level of the welding current
1	The downslope goes to the level of the minimum current
A7	OCV (<i>TIG- and MEX-panels</i>)
0	OCV is 80 VDC
1	OCV is 40 VDC
A8	Downslope interruption (<i>TIG-panels</i>)
0	The current can be adjusted up and down by the torch switch
1	On 2T the downslope is cut-off by a short press on the torch switch (< 0,4 s.)
A9	Tack welding automatics (<i>TIG-panels</i>)
0	The tack welding automatics is off
1	The tack welding automatics is on (3 s.)

Setup-functions

A10	Current rise speed (<i>TIG-panels</i>)
0	Maximum current rise speed in the start
1	The current rise speed is 0,2 s with currents above 100 A from the half-ponit of the current, if the rise speed is set at 0,0 s.
A11	Downslope linearity (<i>TIG-panels</i>)
0	Linear downslope
1	Non-linear downslope (a quick %-drop from the set value and then a linear downslope)
A12	Remote controller function (<i>TIG- and MEX-panels</i>)
0	Current control by the remote as normal
1	MMA/TIG-selection by remote controller (remote controller potentiometer value; less than half = TIG, more than half = puikko)
A13	"Search-arc" (<i>TIG-panel</i>)
0	"Search-arc" is OFF
1	"Search-arc" is ON
A14	Current "freezing" (<i>TIG-panels</i>)
0	Current "freezing" not possible
1	Current "freezing" is possible during downslope (on 4T also during upslope)
A15	Torch auxiliary switches (<i>TIG-panels</i>)
0	Torch up/down-switch controls the current
1	Torch up/down-switch changes the memory channels
A16	Torch auxiliary switches (<i>TIG-panels</i>)
0	Torch up/down-switches can control the current simultaneously with the panel
1	Torch up/down-switches can control the current only if the torch control es enabled
A17	Flow control/pressure watch (<i>TIG-panels</i>)
0	The cooling unit flow control/pressure watch is not active
1	The cooling unit flow control/pressure watch is active
A18	Welding stopping with Minilog and 4 T with the MTM-panel (from software version 0A2 onwards)
0	Welding is stopped normally
1	The downslope starts with a long press of the torch switch and welding is stopped by releasing the torch switch

Setup-functions

A19	Cooling unit control (<i>TIG-panels</i>)
0	Run control
1	Constant run

The user can go from A-level to B-level with a short press of the REMOTE (SETUP)-button.

B1	Contact ignition current adjustment (<i>TIG- and MEX-panels</i>)
20 A	Factory setting
10 – 40 A	Adjustment range
B2	Spark ignition duration (<i>TIG-panels</i>)
1,0 s.	Factory setting
0,2 – 2,0 s.	Adjustment range
B2	Tack welding (Broken Arc) cut-off level (<i>MEX-panels</i>)
50 V	Factory setting
30 – 50 V	Adjustment range
B3	Downslope cut-off level (%) (<i>TIG-panels</i>)
10 %	Factory setting
5 – 40 %	Adjustment range
B3	OCV adjustment (if A7=0) (<i>MEX-panels</i>)
80 V	Factory setting
10 – 80 V	Adjustment range
B4	Upslope start current level (%) (<i>TIG-panels</i>)
20 %	Factory setting
5 – 40 %	Adjustment range
B5	Factory settings recall (<i>TIG- and MEX-panels</i>)
0	
1	Factory settings recalled. The setting is activated by exiting the SETUP and turning the power source off. NOTE! If one wants to store the memory channels contents, the one must not exit the setup, just simply turn the power source off, after changing the jumper value.

Setup-functions

B6	Downslope interruption – upslope angle (<i>TIG-panels</i>)
1	Maximum upslope speed
2	According to upslope
3	According to downslope
B6	Contact - TIG maximum voltage (cut-off level) (<i>MEX-panels</i>)
50 V	Factory setting
20 – 50 V	Adjustment range
B7	Non-linear downslope (%) (<i>TIG-panels</i>)
35 %	Factory setting
15 – 60 %	Adjustment range

The user can go from B-level to C-level with a short press on the REMOTE (SETUP)-button.

C1	Pregas time (<i>TIG-panels</i>)
0,0 s.	Factory setting
0,0 – 2,0 s.	Adjustment range
C2	Upslope (<i>TIG-panels</i>)
0,0 s.	Factory setting
0,0 – 4,0 s.	Adjustment range
C3	TIG minimum current (<i>TIG- and MEX-panels</i>)
5 A	Factory setting
2 A – 14 A	Adjustment range
C4	MMA minimum current (<i>TIG- and MEX-panels</i>)
10 A	Factory setting
5 – 30 A	Adjustment range
C5	Remote controller minimum (<i>TIG- and MEX-panels</i>)
5 A	Factory setting
5 – 30 A	Adjustment range
C6	Downslope (<i>TIG-panels</i>)
0,0 s.	Factory setting
0,0 – 5,0 s.	Adjustment range

Setup-functions

C7	Post gas time (<i>TIG-panels</i>)
1 s.	Factory setting
0,0 – 10,0 s.	Adjustment range
C8	Spot time (<i>TIG-panels</i>)
0,0 s.	Factory setting
0,0 – 5,0 s.	Adjustment range
C9	Pulse frequency (<i>TIG-panels</i>)
0,2 Hz	Factory setting
0,1 – 9,9 Hz	Adjustment range
C10	Pulse base current (<i>TIG-panels</i>)
10 %	Factory setting
0 – 50 %	Adjustment range
C11	Pulse ratio (<i>TIG-panels</i>)
10 %	Factory setting
5 – 50 %	Adjustment range
C12	Pulse current (<i>TIG-panels</i>)
10 A	Factory setting
2 – 200 A	Adjustment range
C13	"Search-arc" (<i>TIG-panels</i>)
5 %	Factory setting
2 – 30 %	Adjustment range
C14	"Tail-arc" (<i>TIG-panels</i>)
5 %	Factory setting
2 – 30 %	Adjustment range
C15	Minilog-current (<i>TIG-panels</i>)
10 %	Factory setting
10 – 50 %	Adjustment range

The user can go from C-level to D-level with a short press of the REMOTE (SETUP)-button.

Setup-functions

D1	Pregas time (TIG-panels)
10,0 s.	Factory setting
5,0 – 20,0 s.	Adjustment range
D2	Upslope (TIG-panels)
10,0 s.	Factory setting
5,0 – 20,0 s.	Adjustment range
D3	TIG maximum current (TIG- and MEX-panels)
200/300/400A	Factory setting
100 – 200/300/400 A	Adjustment range
D4	MMA maximum current (TIG- and MEX-panels)
160/250/350 A	Factory setting
100 – 160/250/350 A	Adjustment range
D5	Remote controller maximum (TIG- and MEX-panels)
200/300/400 A	Factory setting
100 – 200/300/400 A	Adjustment range
D6	Downslope (TIG-panels)
15,0 s.	Factory setting
10,0 – 25,0 s.	Adjustment range
D7	Post gas time (TIG-panel)
30,0 s.	Factory setting
15,0 – 150,0 s.	Adjustment range
D8	Spot time (TIG-panels)
10,0 s.	Factory setting
6,0 – 15,0 s.	Adjustment range
D9	Pulse frequency (TIG-panels)
300 Hz	Factory setting
10 – 500 Hz	Adjustment range
D10	Pulse base current (TIG-panels)
70 %	Factory setting
60 – 90 %	Adjustment range

Setup-functions

D11	Pulse ratio (<i>TIG-panels</i>)
70 %	Factory setting
60 – 90 %	Adjustment range
D12	Pulse current (<i>TIG-panels</i>)
D3	TIG maximum current
D3 - 300/400 A	Adjustment range
D13	"Search-arc" (<i>TIG-panels</i>)
90 %	Factory setting
30 – 95 %	Adjustment range
D14	"Tail-arc" (<i>TIG-panels</i>)
90%	Factory setting
30 – 95 %	Adjustment range
D15	Minilog-current (<i>TIG-panels</i>)
90 %	Factory setting
60 – 150 %	Adjustment range

Panel flat cable

X2	Flat cable
1	Ignition pulse potentiometer (MEL) / Panel detection (+5 V)
2	Dynamics potentiometer (MEL)
3	Set value potentiometer (MEL)
4	Switches and displays selection (MEL)
5	Switches and displays selection (MEL)
6	MISO (SPI)
7	Display control (MEL)
8	AKC (SPI-check) / Local-/remote control selection (MEL)
9	Switches and displays selection (MEL)
10	Display control (MEL)
11	Display control (MEL)
12	SCK (SPI)
13	Display control (MEL)
14	MOSI (SPI) / Display A/V-selection and MMA/TIG-selection (MEL)
15	+ 5 V
16	GND

ISP-programming connector

X1	Connector for ISP- and SCI-buses
1	GND
2	Data-signal (ISP)
3	GND
4	Clock-signal (ISP)
5	Enabled-signal (ISP)
6	Reset-signal (ISP)
7	+ 5 V
8	Select-signal (ISP)
9	Transmitted data (SCI)
10	Received data (SCI)

