MSCU
Technical
Reference Manual

Version 2.0

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M611001

Preface

This document has been compiled with great care and is believed to be correct at the date of print. The information in this document is subject to change without notice and does not represent a commitment on the part of OMICRON Vakuumphysik GmbH.

Please note. Some components described in this manual may be optional. The delivery volume depends on the ordered configuration.

Please note. This documentation is available in English only.

Attention. Please read the safety information on pages 7 to 8 before using the instrument.

Trademarks: Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies.

Copyright

Warranty

OMICRON acknowledges a warranty period of 12 months from the date of delivery (if not otherwise stated) on parts and labour, excluding consumables such as filaments, sensors, etc.

No liability or warranty claims shall be accepted for any damages resulting from non-observance of operational and safety instructions, natural wear of the components or unauthorised repair attempts.

Normal Use

The **Micro Piezo Slide Control Unit** shall always be used in combination with

- OMICRON piezo drives, e.g. MS5.

The **Micro Piezo Slide Control Unit** must always be used

- with original cable sets which are explicitly specified for this purpose
- with all cabling connected and secured, if applicable
- with all electronics equipment switched on
- in an indoor research laboratory environment
- by personnel qualified for operation of delicate scientific equipment
- in accordance with all related manuals.

Warning: Lethal Voltages!!

Adjustments and fault finding measurements as well as installation procedures and repair work may only be carried out by authorised personnel qualified to handle lethal voltages.

Attention: Please read the safety information in the relevant manuals before using the instrument.

Conditions of CE Compliance

OMICRON instruments are designed for use in an indoor laboratory environment. For further specification of environmental requirements and proper use please refer to your quotation and the product related documentation (i.e. **all** manuals, see individual packing list).

The OMICRON **Micro Piezo Slide Control Unit** complies with CE directives as stated in your individual delivery documentation if used unaltered and according to the guidelines in the relevant manuals.

Limits of CE Compliance

This compliance stays valid if repair work is performed according to the guidelines in the relevant manual and using original OMICRON spare parts and replacements.

This compliance also stays valid if original OMICRON upgrades or extensions are installed to original OMICRON systems following the attached installation guidelines.

Exceptions

Omicron **cannot** guarantee compliance with CE directives for **components** in case of

- changes to the instrument **not authorised by OMICRON**, e.g. modifications, add-on's, or the addition of circuit boards or interfaces to computers supplied by OMICRON.

The customer is responsible for CE compliance of entire **experimental setups** according to the relevant CE directives in case of

- installation of OMICRON components to an on-site system or device (e.g. vacuum vessel),
- installation of OMICRON supplied circuit boards to an on-site computer,
- alterations and additions to the experimental setup not explicitly approved by OMICRON

even if performed by an OMICRON service representative.

Spare Parts

Omicron spare parts, accessories and replacements are not individually CE labelled since they can only be used in conjunction with other pieces of equipment.

Please note: CE compliance for a combination of certified products can only be guaranteed with respect to the lowest level of certification. Example: when combining a CE-compliant instrument with a CE 96-compliant set of electronics, the combination can only be guaranteed CE 96 compliance.

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Safety Information

Important:

- Please read this manual and the safety information in all related manuals before installing or using the electronics equipment.
- The safety notes and regulations given in this and related documentation have to be observed at all times.
- Check for correct mains voltage before connecting any equipment.
- Do not cover any ventilation slits/holes so as to avoid overheating.
- The Micro Piezo Slide Control Unit MSCU may only be handled by authorised personnel.

Warning: Lethal Voltages!!

- Adjustments and fault finding measurements may only be carried out by authorised personnel qualified to handle lethal voltages.
- Lethal voltages may present at parts of the Micro Piezo Slide during operation.
- Lethal voltages are present inside the MSCU and at open connectors.

Always

- All connectors which were originally supplied with fixing screws must always be used with their fixing screws attached and tightly secured.
- Always disconnect the mains supplies of all electrically connected units before
  - ⇨ opening the control unit case,
  - ⇨ before touching any cable cores or open connectors,
  - ⇨ before touching any part of the instrument components.
- Leave for a few minutes after switching off for any stored energy to discharge.

Never

- Never have in-vacuum components connected to their electronics in the corona pressure region, i.e. between 10 mbar and 10^{-3} mbar, so as to avoid damage due to corona discharge.

This product is only to be used:

- indoors, in laboratories meeting the following requirements:
  - ⇨ altitude up to 2000 m,
  - ⇨ temperatures between 5°C / 41°F and 40°C / 104°F (specifications guaranteed between 20°C / 68°F and 25°C / 77°F)
  - ⇨ relative humidity less than 80% for temperatures up to 31°C / 88°F (decreasing linearly to 50% relative humidity at 40°C / 104°F)
  - ⇨ pollution degree 1 or better (according to IEC 664),
  - ⇨ overvoltage category II or better (according to IEC 664)
  - ⇨ mains supply voltage fluctuations not to exceed ±10% of the nominal voltage

1. Introduction

The Micro Piezo Slide Control Unit MSCU is a power supply and control unit particularly designed and optimised for OMICRON linear stepper drives (inertia drives) such as the Micro Piezo Slide (MS 5).

The MSCU can also be used for autonomically driving OMICRON SPM heads, i.e. without the use of the SCALA electronics and software package. The supplied features include:

- 8 independent channels, i.e. 8 axes can be connected and driven
- single step and continuous operation modes
- menu assisted handling via a remote box
- controllable step speed (repetition rate) and step width (voltage)
- external control via TTL input supported
- software control via RS232 and dll-commands supported

Example: Sample Positioning

A sample can be positioned with a 2-axes linear stepper drive, for example using two MS 5. These use slip/stick effects related to inertia forces when a piezo is driven in a fast/slow sequence. In most OMICRON SPM heads the sample slider is magnetically coupled to three shear piezos which are driven with a sawtooth voltage input. The sample slider is transported during the slow movement of the piezo and slips during the fast piezo motion due to its inert mass. The following sketch shows the shape of the voltage ramp applied to the piezos during a single step.

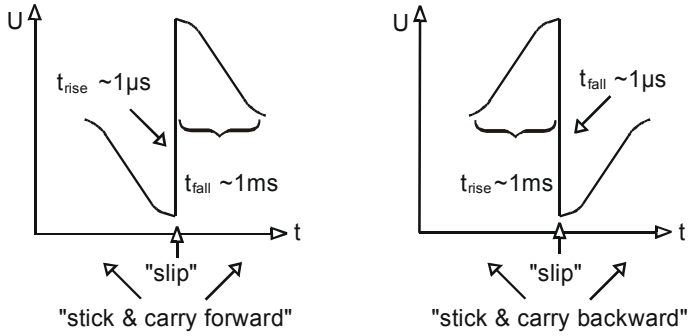


Figure 1. Typical voltage applied to piezos during a (single step) slip/stick motion.

2. Front- and Back Panel

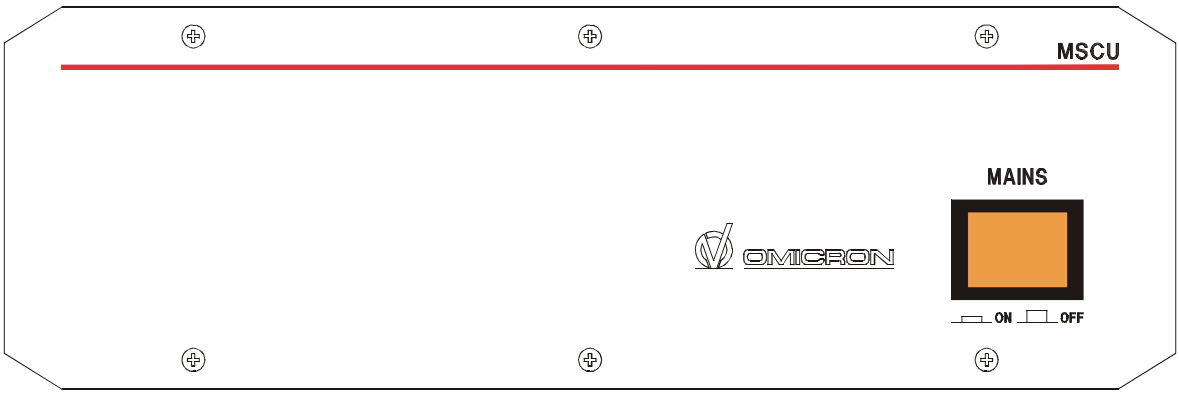


Figure 2. Front panel MSCU, schematic diagram.

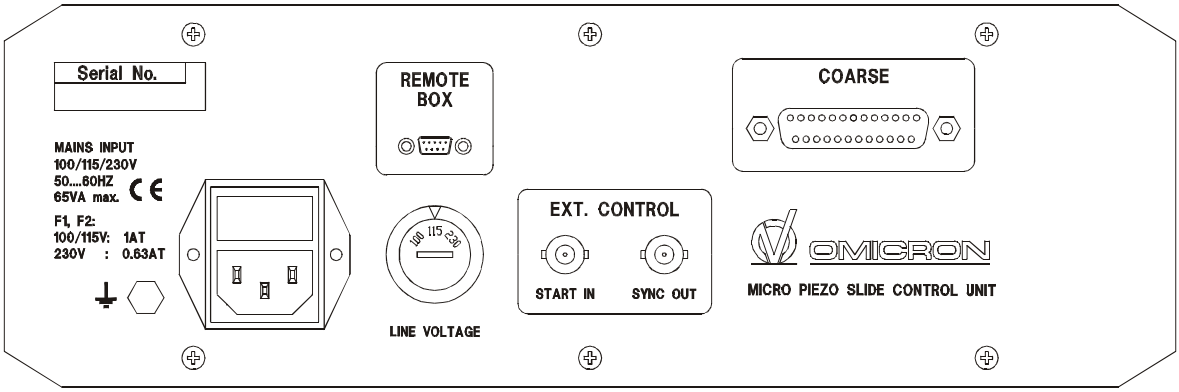
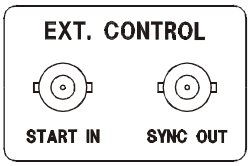
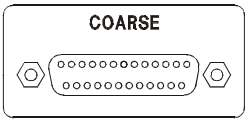
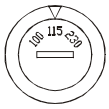
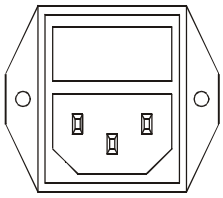


Figure 3. Back panel MSCU, schematic diagram.

Please note: If not being used the MSCU switches to a STAND BY mode, i.e. the high voltage is switched off. The remote box show a respective notice.

Pressing any button on the remote box deactivates the STAND BY mode. The high voltage is available as soon as the remote box display shows the operating menu.

	9-pin micro sub-D socket for connecting the remote box or RS232 interface cable for software control.
	BNC sockets for TTL control.
	25-pin high voltage sub-D socket for connecting the coarse cable. For a connector pinout please refer to page 26. **Signal specifications:** Output voltage adjustable between ±80 V and ±400 V (±3%) Frequency adjustable between ca. 50 Hz and 4 kHz Slew rate minimum 600 V/µs Output load maximum 5 nF
	Mains voltage selection.
	**This unit is supplied with a 3-pin standard European mains socket** for AC input of 100/110/120/220/240 volts ±10% and 50 or 60 Hz, set to customer specification. Maximum power consumption 65 VA. The wire insulations of the standard 3-lead mains cable are coloured in accordance with the following code: Brown: Live Green/Yellow: Earth Blue: Neutral Mains fuse(s): 5mm ∅, 20mm long use 2 x 0.63 A (slow) for 230 V AC 2 x 1 A (slow) for 100-115 V AC To change the fuse • disconnect mains • lift the flap using a screw driver for leverage • replace the fuse as indicated above • re-fit the fuse holder.

Please note: Upon short-circuiting an active output, this will be automatically deactivated and the remote box shows a warning and gives an acoustic signal (5 seconds).

The short circuit recognition in single step mode depends on the step size and frequency and is only available when the output current is above the threshold.

3. Remote Box

The Coarse Position Remote Box has a 4-line liquid crystal display (LCD) and a 12-button membrane keypad which gives access to several configuration- and operating menus. A "SPEED" dial allows manual regulation of the coarse motor speed: this dial can be assigned with the step size (default) or with repetition frequency in the settings menu. For information on the MSCU settings please refer to pages 12ff.

Before you start we recommend that you study the flowchart, see pages 12 ff. This gives you a short pictorial overview of the functions and scope of the Coarse Position Remote Box.

Upon switching on the MSCU the remote box display shows an initialisation array for 10 seconds (can be skipped by pressing the DOWN button). This consists of the OMICRON Logo together with the name of the MSCU. The remote box then switches to the OUTPUT CONTROL menu, see below.

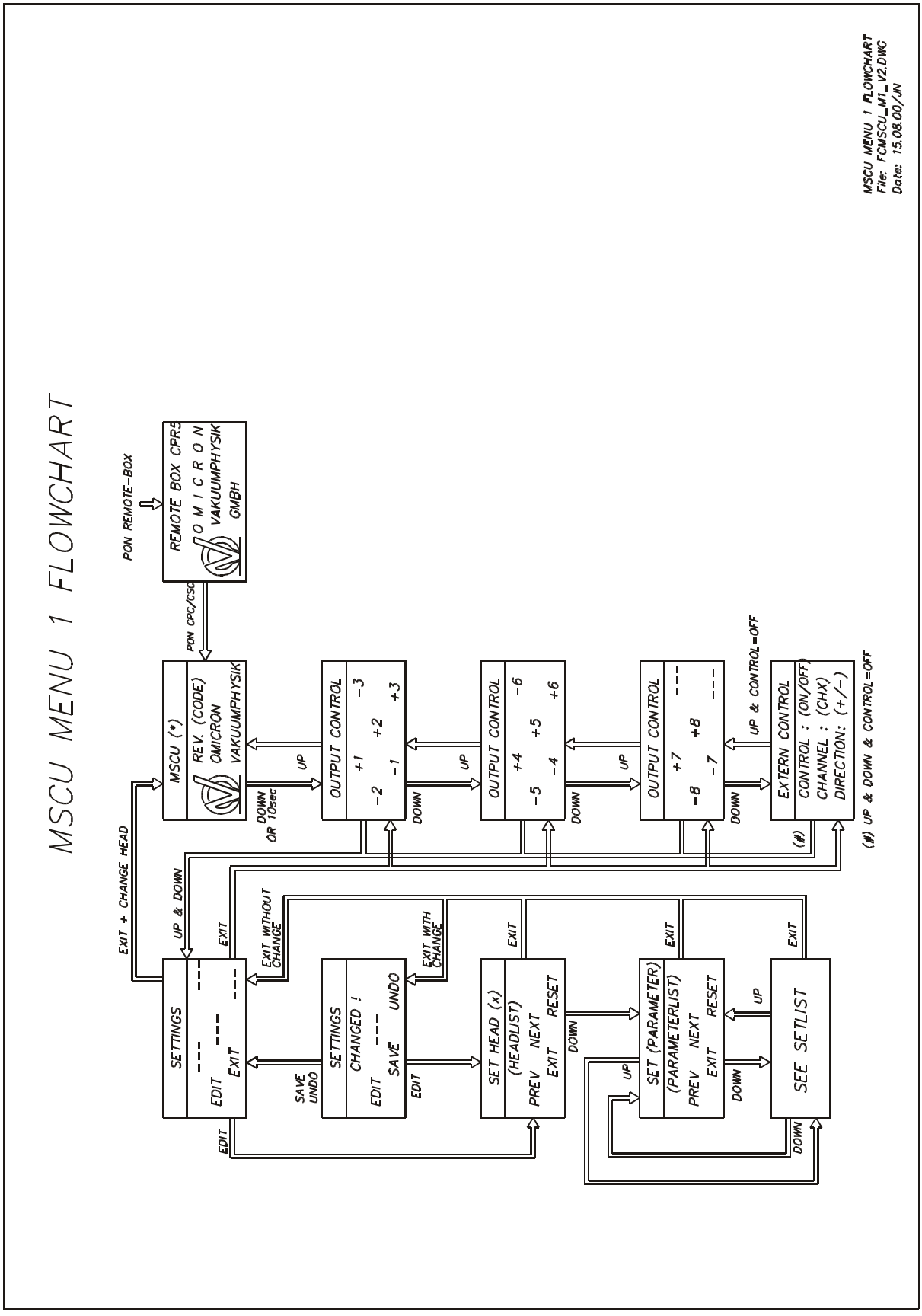
Table and Flowchart

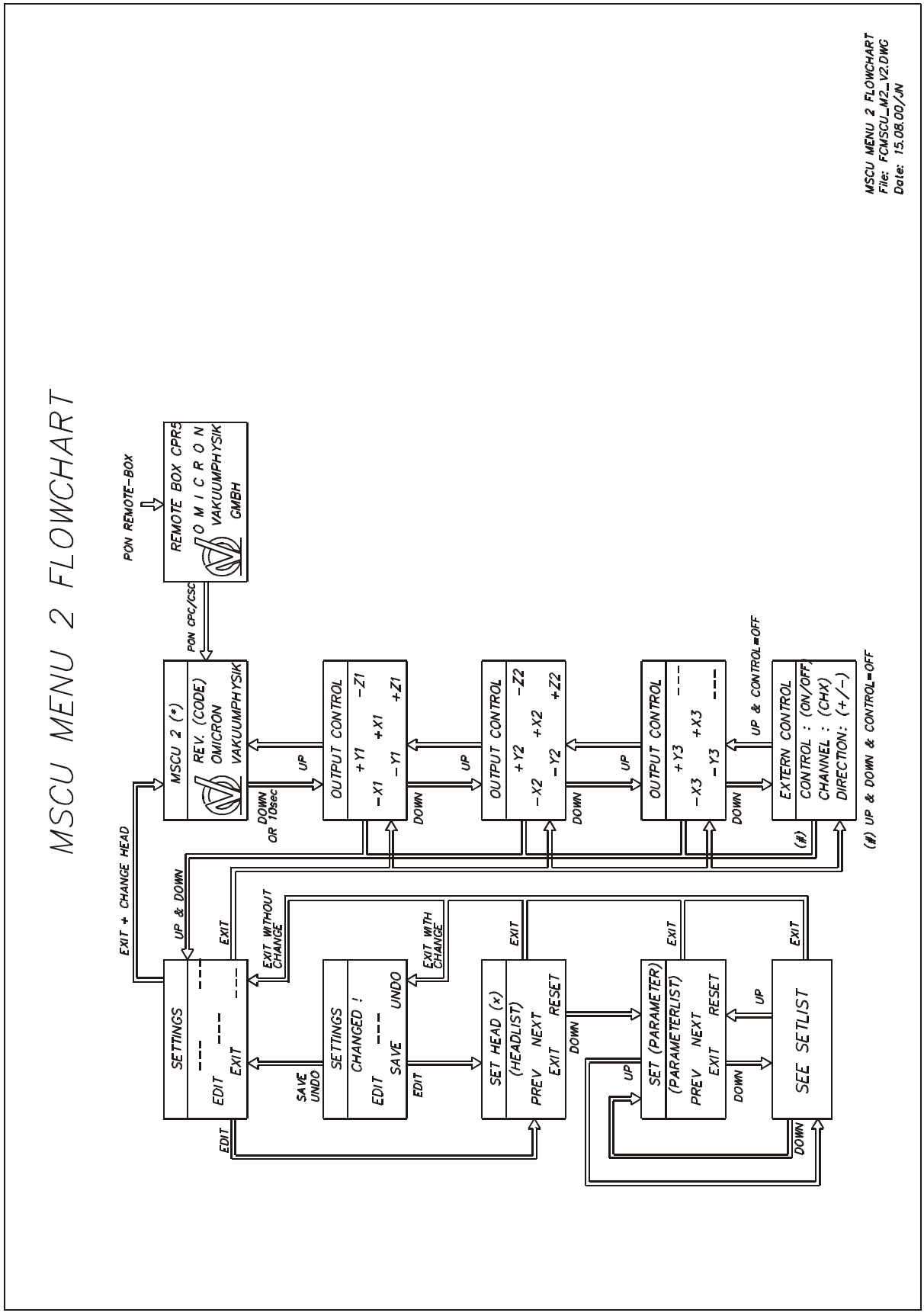
For the MSCU two parameter files have been predefined: MSCU1 and MSCU2. Settings MSCU1 are very general and need to be adapted to the system in use. If you employ the MSCU together with a standard X,Y,Z-table, the settings MSCU2 may be used for simplicity.

Setting	**Values**	**Comment**
HEAD	**MSCU1**	
FREQUENCY	DIAL, 0.5 kHz, 1 kHz, 2 kHz, 3 kHz, 4 kHz.	"DIAL-Range" 500 Hz - 4 kHz
VOLTAGE	DIAL, 20%, 40%, 80%, 100%	"DIAL-Range" 20% - 100%
EXT. CHANNEL	CH1; CH2; …, CH8	Out1, Out2, …, Out8
EXT. DIRECTION	-, +	
DELAYTIME	0.6 sec to 2 sec in steps of 0.2 sec	
Menu	**Button(s)**	**Active Output(s)**
OUTPUT CONTROL MSCU1	-CH1 / +CH1	OUT1
	-CH2 / +CH2	OUT2
	-CH3 / +CH3	OUT3
	-CH4 / +CH4	OUT4
	-CH5 / +CH5	OUT5
	-CH6 / +CH6	OUT6
	-CH7 / +CH7	OUT7
	-CH8 / +CH8	OUT8

Setting	**Values**	**Comment**
HEAD	**MSCU2**	
FREQUENCY	DIAL, 0.5 kHz, 1 kHz, 2 kHz, 3 kHz, 4 kHz.	"DIAL-Range" 500 Hz - 4 kHz
VOLTAGE	DIAL, 20%, 40%, 80%, 100%	"DIAL-Range" 20% - 100%
EXT. CHANNEL	CH1; CH2; …, CH8	Out1, Out2, …, Out8
EXT. DIRECTION	-, +	
DELAYTIME	0.6 sec to 2 sec in steps of 0.2 sec	
Menu	**Button(s)**	**Active Output(s)**
OUTPUT CONTROL MSCU2	-X1/+X1	OUT2
	-Y1/+Y1	OUT1
	-Z1/+Z1	OUT3
	-X2/+X2	OUT5
	-Y2/+Y2	OUT4
	-Z2/+Z2	OUT6
	-X3/+X3	OUT8
	-Y3/+Y3	OUT7

Table 1. Remote box settings MSCU, default values underlined.


MSCU MENU 1 FLOWCHART
MSCU MENU 1 FLOWCHART
File: FCMSCU_M1_V2.DWG
Date: 15.08.00/JN
PON REMOTE-BOX
REMOTE BOX CPR5
OMICRON VAKUUMPHYSIK GMBH
PON CPC/CSC
MSCU (*)
REV. (CODE)
OMICRON VAKUUMPHYSIK
UP
DOWN 10sec OR
OUTPUT CONTROL
+1 -3
-2 +2 +3
-1
DOWN
OUTPUT CONTROL
+4 -6
-5 +5 +6
-4
DOWN
OUTPUT CONTROL
+7 ---
-8 +8 ---
-7
DOWN
UP & CONTROL=OFF
EXTERN CONTROL
CONTROL : (ON/OFF)
CHANNEL : (CHX)
DIRECTION: (+/-)
(#)
(#) UP & DOWN & CONTROL=OFF
EXIT + CHANGE HEAD
UP & DOWN
EXIT
EXIT WITHOUT CHANGE
EXIT WITH CHANGE
SETTINGS
--- ---
EDIT --- ---
EXIT
SAVE UNDO
SETTINGS
CHANGED !
EDIT --- ---
SAVE UNDO
EDIT
SET HEAD (x)
(HEADLIST)
PREV NEXT
EXIT RESET
DOWN
SET (PARAMETER)
(PARAMETERLIST)
PREV NEXT
EXIT RESET
DOWN
UP
SEE SETLIST
EDIT
UP
DOWN


MSCU MENU 2 FLOWCHART
MSCU MENU 2 FLOWCHART
File: FCMSCU_M2_V2.DWG
Date: 15.08.00/JN
PON REMOTE-BOX
REMOTE BOX CPR5
OMICRON VAKUUMPHYSIK GMBH
PON CPC/CSC
MSCU 2 (*)
REV. (CODE)
OMICRON
VAKUUMPHYSIK
UP
DOWN OR 10sec
OUTPUT CONTROL
+Y1 -Z1
-X1 +X1
-Y1 +Z1
DOWN
OUTPUT CONTROL
+Y2 -Z2
-X2 +X2
-Y2 +Z2
OUTPUT CONTROL
+Y3 ---
-X3 +X3
-Y3 ---
UP & CONTROL=OFF
EXTERN CONTROL
CONTROL : (ON/OFF)
CHANNEL : (CHX)
DIRECTION: (+/-)
(#)
(#) UP & DOWN & CONTROL=OFF
EXIT + CHANGE HEAD
UP & DOWN
EXIT
EXIT WITHOUT CHANGE
EXIT WITH CHANGE
SETTINGS
--- ---
EDIT EXIT ---
SETTINGS
CHANGED !
EDIT --- ---
SAVE UNDO
SAVE UNDO
EDIT
SET HEAD (x)
(HEADLIST)
PREV NEXT
EXIT RESET
SET (PARAMETER)
(PARAMETERLIST)
PREV NEXT
EXIT RESET
SEE SETLIST

4. Remote Control via RS232 Interface

The MSCU can be software controlled from a computer using a RS232 interface cable connected to the Remote Box port on the backpanel. The following sections give some hints on setting up your own control dll and list the available dll commands and their syntax.

MSCU Control DLL Programmers Guide

Version: 2 Revision: 0

The MSCU is controlled by a DLL named MSCU.DLL. This DLL must reside in the same directory, where the control software is located. For a complete command reference see chapter "Definition of MSCU DLL Control Sequences" hereafter.

A program frame should look like the following example.

```
//two MSCU at COM1 and COM2
//include this for Windows Console Application
#include <windows.h>
//Definitions for DLL use
#define DLL_API __declspec(dllimport)
#include "mscu.h"
void main(void)
{
        if(!configcom(1)) exit(0);      //init COM1 for communication
        if(!configcom(2)) exit(0);      //init COM2 for communication
        ...
        ...//enter control code here
        ...
        exitcom(1);    //terminate communication via COM1
        exitcom(2);    //terminate communication via COM2
}//main
```

The command set is separated into two parts:

- the MSCU control commands, e.g. for frequency or voltage setting
- and the communication control commands.

The communication control is done via *geterror()* and *readbuffer()*. To allow sending commands to multiple MSCUs, the command *readbuffer()* is used to control execution of commands sent before. The command *geterror()* is used to check out for transmission errors. It is called any time a control command returns negative results.

An Example:

```
//set frequency to 300Hz at Com 1
if(!setfrequency(1,300))
        if(geterror(1))
                cout << "ERROR COM1\n"
//set voltage to 100V at Com 2

if(!setvoltage(2,100))
        if(geterror(2))
                cout << "ERROR COM2\n"
...
//at a later program position, one may check if a command has been executed

if(readbuffer(1)==C_SETFREQUENCY)
setvoltage(1,123);//wait for setting of frequency before setting voltage to 123V
```

Also, command execution may be checked out by deleting the result of *readbuffer()* from a list of previously transmitted commands.

Please note. Execution of different commands may take different times. In addition, serial transmission may cause some delay between calling a control sequence and execution by the MSCU, so the order of transmitted commands and *readbuffer()* results is only guaranteed for one MSCU. Sending the same command to three different MSCUs may result in slower or faster execution by these units.

To execute commands step by step, one must wait for the *readbuffer()* result before transmitting the next command:

```
//set frequency to 300Hz at Com 1
if(!setfrequency(1,300))
        if(geterror(1))
                cout << "ERROR COM1\n"
while(1)
{
if(readbuffer(1)==C_SETFREQUENCY) break;
if(readbuffer(1)==~C_SETFREQUENCY){cout << "execution error\n"; break;}
}
//set voltage to 100V at Com 2
if(!setvoltage(2,100))
        if(geterror(2))
                cout << "ERROR COM2\n";
while(1)
{
if(readbuffer(2)==C_SETVOLTAGE) break;
if(readbuffer(2)==~C_SETVOLTAGE){cout << "execution error\n"; break;}
}
```

Definition of MSCU DLL Control Sequences

Version: 2 Revision: 0

Communications Control Commands

int configcom(int Comport)

Description: Configures PC's serial interface for operation with MSCU.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
Return values:	1	initialization successful
	-1	error while opening comport

int exitcom(int Comport)

Description: Releases PC's serial interface (Comport).

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
Return values:	1	no error
	-1	error

int getversion(int Comport)

Description: Returns the version of the MSCU software.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
Return values:	0 to 32767	combined version & revision number
	-1	no communication with MSCU

To get the software version number divide the combined version & revision number by 256. To get the software revision number use the modulus operation.

Example:

```
//at Com 1
combined_version = getversion(1)
if(version > 0)
{
version_number = combined_version / 256;
revision_number = combined_version % 256;
}
else    //error
{
        switch (geterror(1))
        {...
        }
        ...
}
```

int readbuffer(int Comport)

Description: Reads execution message buffer. This buffer holds the MSCU control command numbers of executed or not executed commands.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
Return values:	0	buffer empty
	-1	error while transmission, for error code execute geterror()
	positve	command with this number has been executed by MSCU
	negative	command with this number was not executed by MSCU

int geterror(int Comport)

Description: Returns last error message if any of the above functions deliver an error code.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
Return values:	0	no error
	1	parity error
	2	handshake error
	3	unknown command
	4	transmission timeout

int getstatus(int Comport)

Description: Returns last status report of MSCU.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
Return values:	0	no error
	1	MSCU is in power down mode
	2	Output stage short circuit
	3	MSCU had a power on reset
	4	MSCU had a reset (i.e. watchdog reset)
	5	MSCU perform steps continuously
	-1	no communication with MSCU

MSCU Control Commands

int singlestep(int Comport, int Channel, int Direction)

Description: Perfoms one step. Command number is 0x10.

Parameters:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...)
		valid values: 1 to 16
	Channel	axis number (i.e. 1 = ch1, 2 = ch2 , 3 = ch3)
		valid values: 1 to 8
	Direction	1= forward, -1= backward
Return values:	1	command transmitted

	-1	error while transmission

Please note. If the state of the MSCU is power down (1), this command sets the MSCU into the state no error (0) before starting an execution.

int dosteps(int Comport, int Channel, int Direction, int Steps)

Description: Perfoms series of steps. Command number is 0x11.

Parameters:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...) valid values: 1 to 16
	Channel	axis number (i.e. 1 = ch1, 2 = ch2, 3 = ch3) valid values: 1 to 8
	Direction	1= forward, -1= backward
	Steps	number of steps to be moved valid values: 1 to 32767 (steps) -1 to perform steps continuously 0 to stop moving
Return values:	1	command transmitted
	-1	error while transmission

Please note. If the state of the MSCU is power down (1), this command sets the MSCU into the state no error (0) before starting an execution.

int setvoltage(int Comport, int Voltage)

Description: Sets output voltage. Command number is 0x12.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...) valid values: 1 to 16
	Voltage	amplitude of the output signal in volts valid values: 80 to 400
Return values:	1	command transmitted
	-1	error while transmission

Please note. During initialization the voltage is set to a default value of 400 volts.

int setfrequency(int Comport, int Frequency)

Description: Sets output signal's frequency. Command number is 0x13.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...) valid values: 1 to 16
	Frequency	frequency of the output signal in Hertz valid values: 50 to 4000
Return values:	1	command transmitted
	-1	error while transmission

Please note. During initialization the frequency is set to a default value of 1000 Hertz.

int standby(int Comport, int Mode)

Description: Activates standby mode. Command number is 0x14.

Parameter:	Comport	number of serial interface (i.e. 1 for COM1, 2 for COM2,...) valid values: 1 to 16
	Mode	1= enter standby 0= exit standby
Return values:	1	command transmitted
	-1	error while transmission

General Tips

Please note. Since the transmission of a command is done via a serial interface, some delay time may occur between sending the command, receiving the acknowledge code or error messages, detecting timeouts, execution on MSCU side, and receiving the code for executed or non-executed commands.

To avoid long waiting sequences in the main program, the transmission and the detection of execution or errors were divided into two parts.

The commands for the MSCU are called and then the sending and checking for reception is done there. These commands return after receiving an acknowledge or timeout signal. If an error code is returned, the user may check this with *geterror()*.

At a later main program position, the user may check for execution of the command. This is done with the *readbuffer()* command.

A command sequence is typically done as follows:

```
//at Com 1
if(setfrequency(1,300))
{
}
else    //error
{
        switch (geterror(1))
        {...
        }...
}
//do something
...
exe_msg=readbuffer(1);
switch (exe_msg)
{...
}
....
```

5. Remote Control via TTL Input

Signal Specifications for TTL Control

To enable TTL control select menu item "EXTERN CONTROL ON/OFF". This switches the remote box control off and the TTL input socket active. Simultaneous operation is not possible.

Switching back to manual control is only possible if no external signal is applied. The remote box can then be reactivated by pressing EXTERN CONTROL ON/OFF.

BNC Sockets

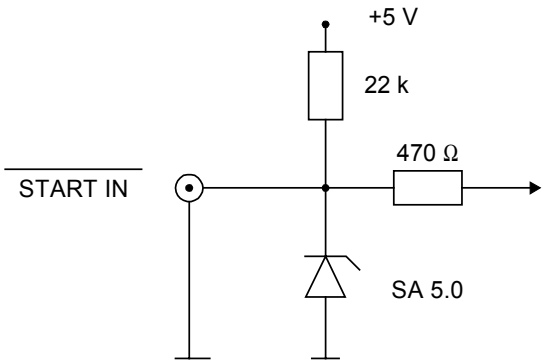


Figure 4. Input START IN (BNC socket), TTL signal active = low.

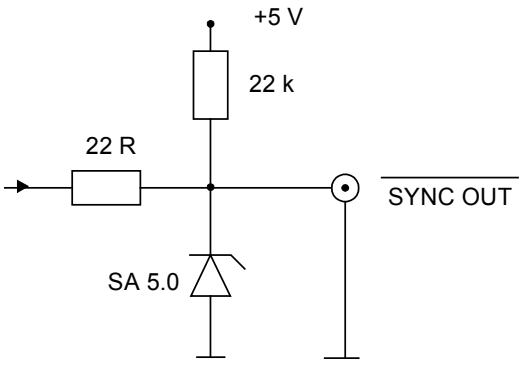


Figure 5. Output SYNC OUT (BNC socket), TTL signal active = low.

Timing Diagram

Abbreviation	Comment	Values
ti	start in signal low time	
ts	startup time	100 ms
tp	step period	1/f
tcp	pulse width of step counter	50 µs ± 5 µs
twc	time wait between end of cont. mode and START IN low	twc > ts
tws	time wait between two single steps	tws > 3ts
single step	ts < ti < 2ts	checked all 200 ms
continuous mode	ti > 2ts	

Table 2. Timing Requirements

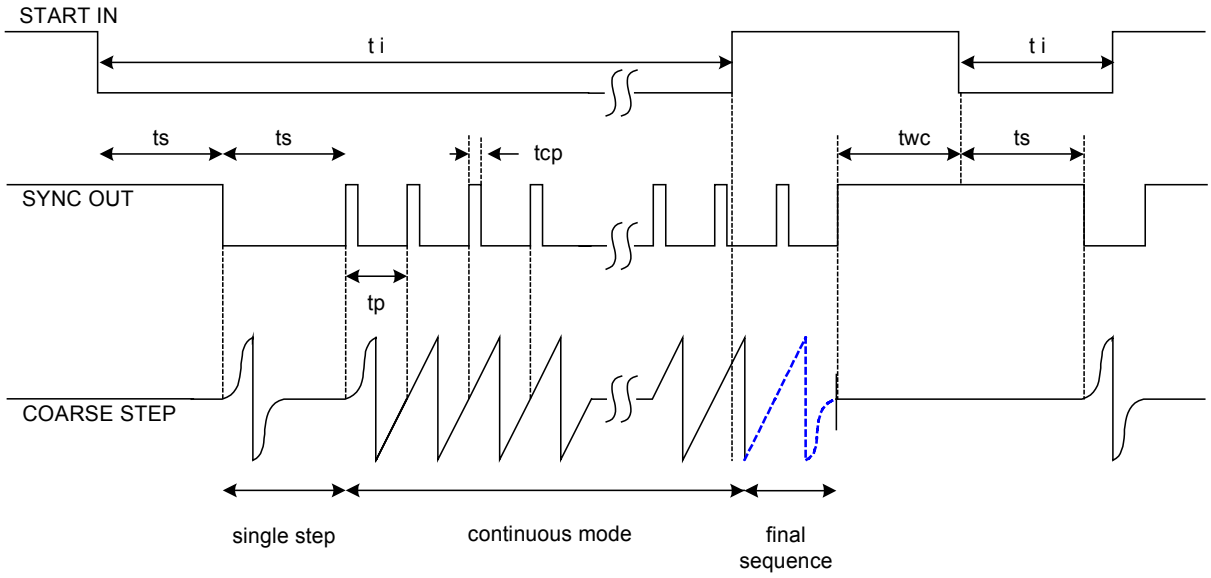


Figure 6. Timing diagram continuous mode. Note that the last step is always fully finished.

Please note: The final sequence is always added in full at the end of a continuous mode, i.e. after finishing the current continuous step.

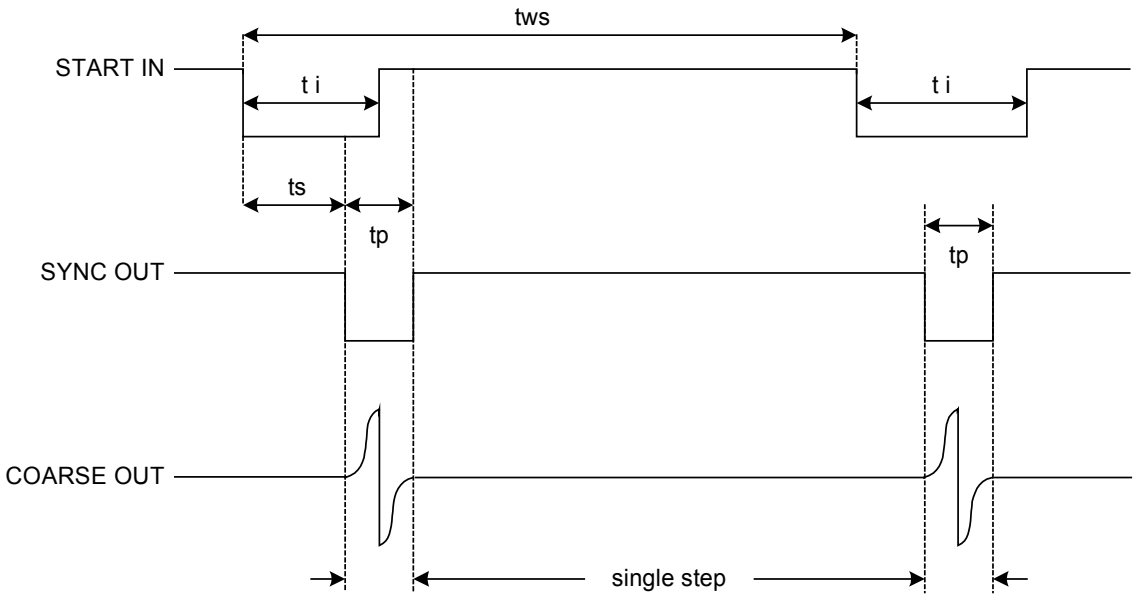


Figure 7. Timing diagram, single steps.

6. Technical Data

Coarse Pinout

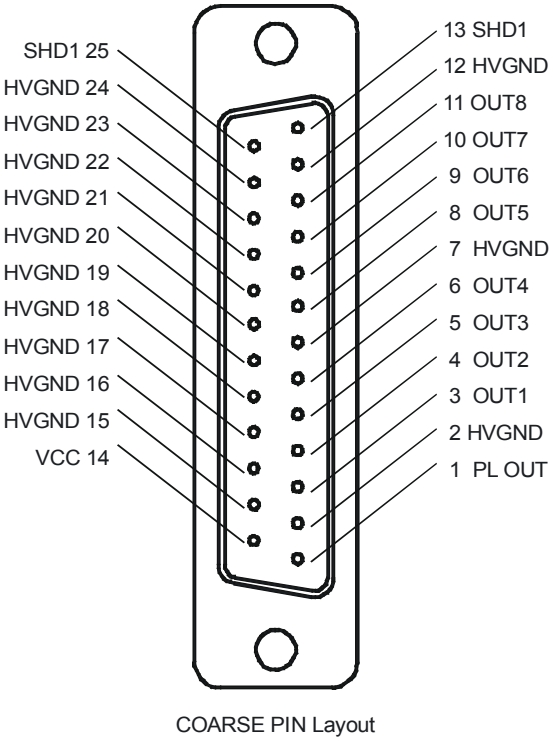


Figure 8. Coarse positioning connector pinout.

Attention. This is a high voltage socket, maximum voltage ±400 V!

Block Diagram

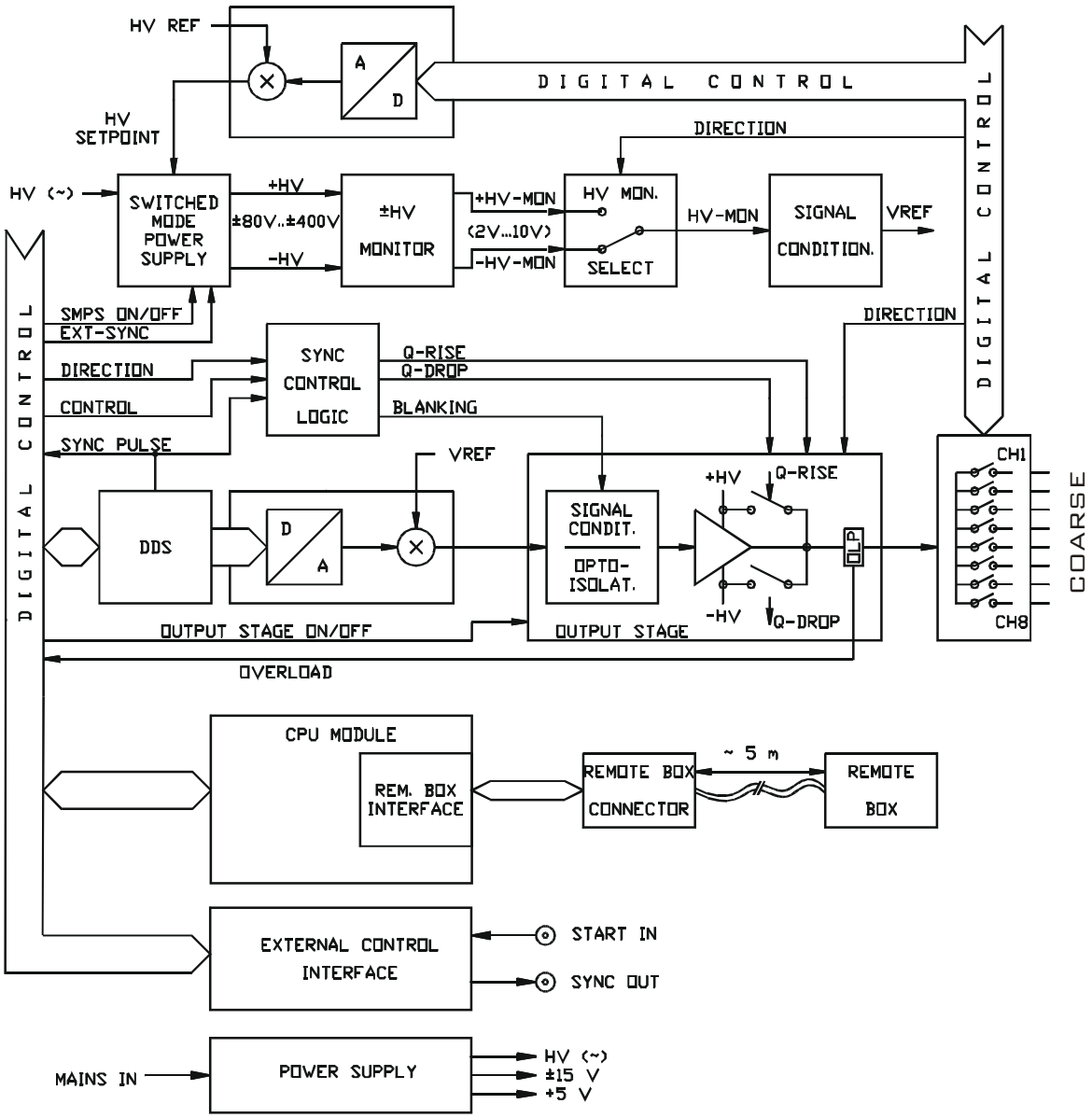


Figure 9. MSCU schematic circuit diagram.

RS Cable Diagram

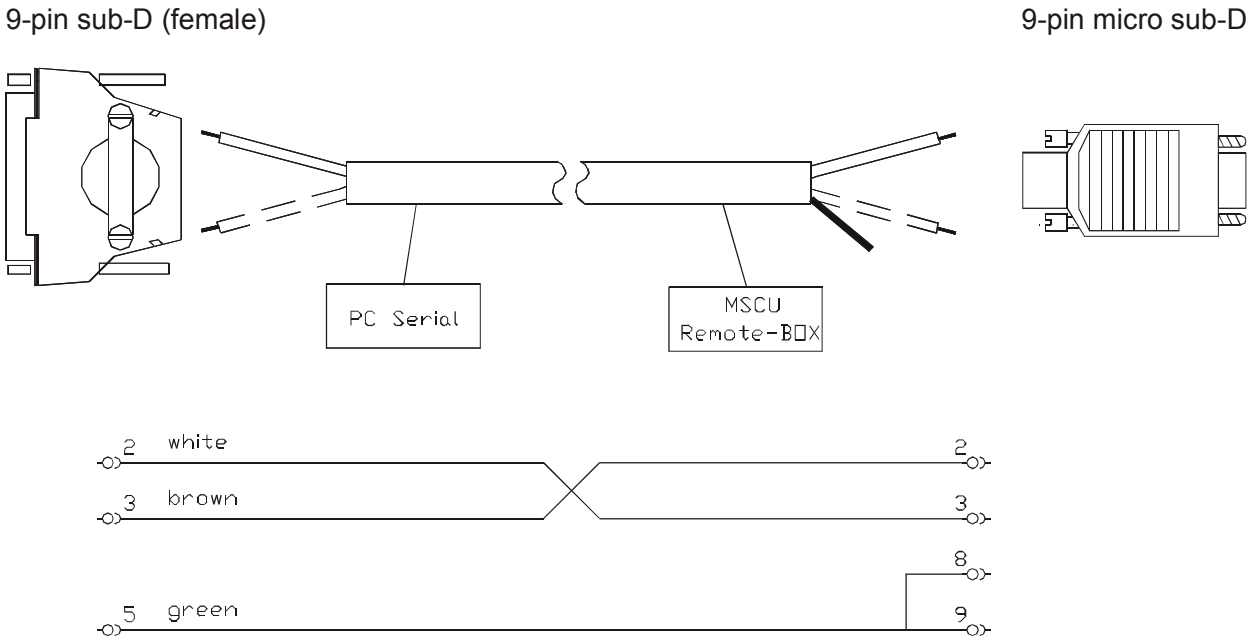
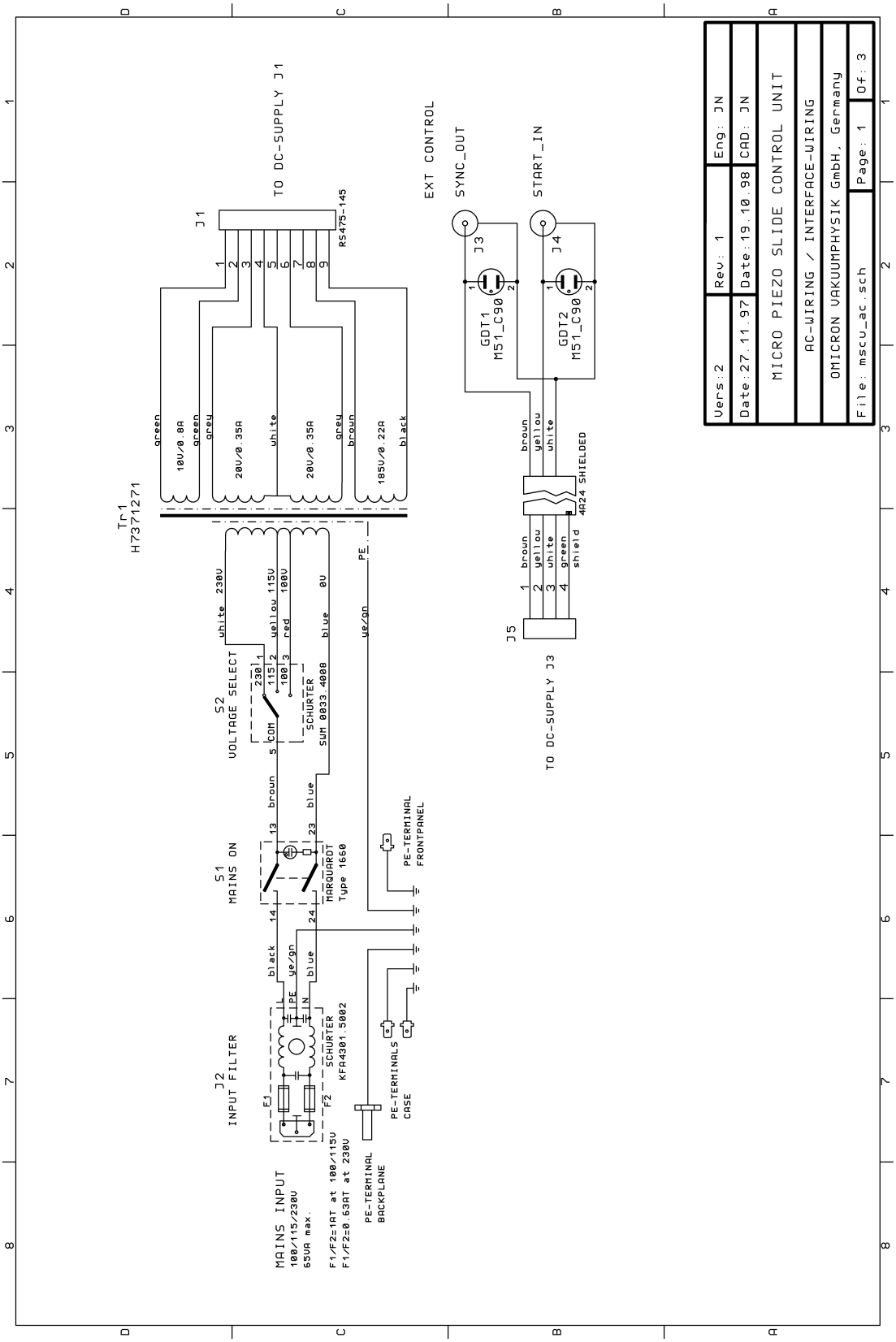
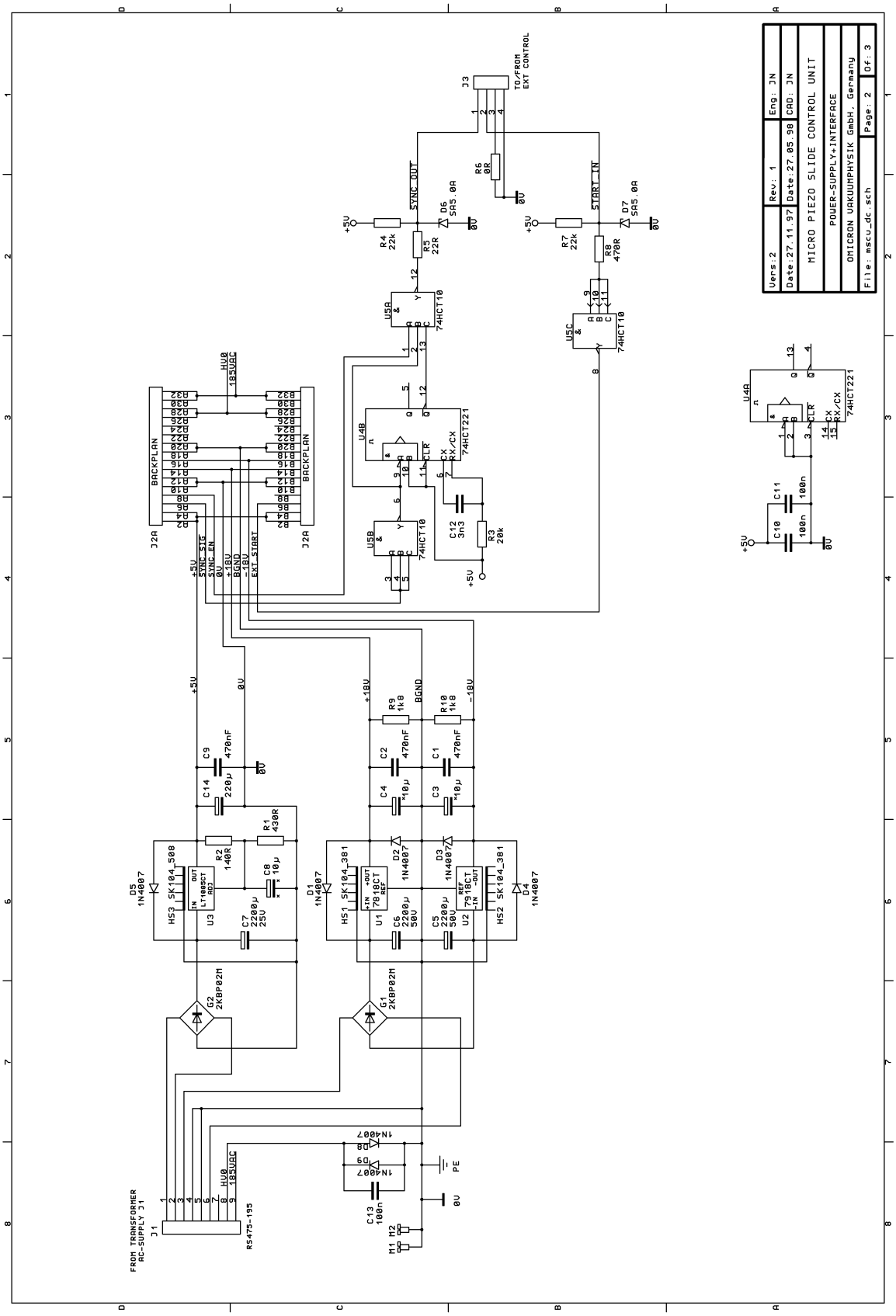


Figure 10. RS cable, schematic diagram.

7. Circuit Diagrams

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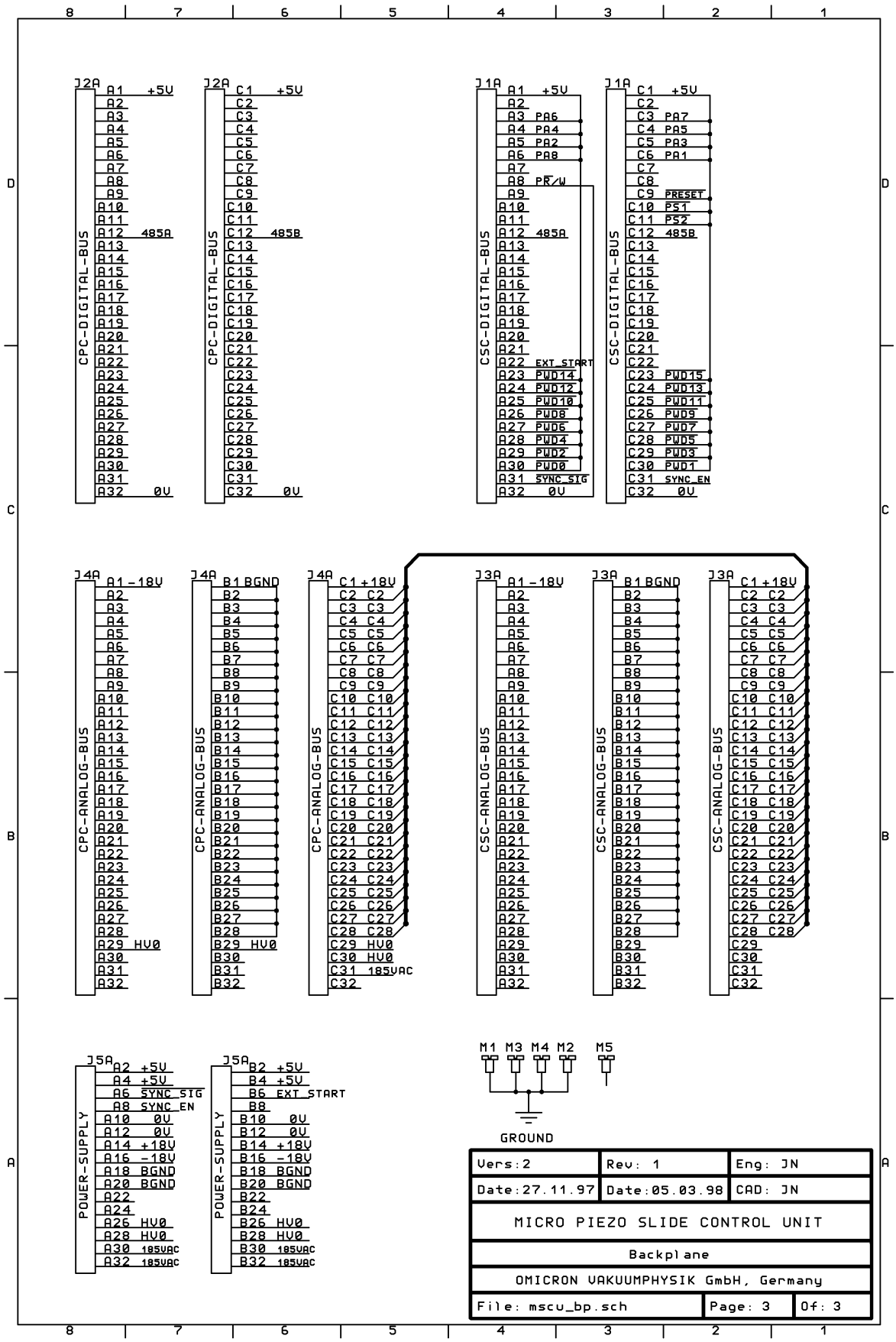
POWER-SUPPLY+INTERFACE
OMICRON VAKUUMPHYSIK GmbH, Germany
Vers:2
Date:27.11.97
Rev: 1
Date:27.05.98
Eng: JN
CAD: JN
Page: 2
Of: 3
File: mscu_dc.sch
J3
TO/FROM EXT CONTROL
SYNC OUT
START IN
SYNC_STG
SYNC_EN
EXT_START
+5U
0U
+18U
BGND
-18U
BACKPLAN
FROM TRANSFORMER AC-SUPPLY J1
74HCT10
74HCT221
LT1085CT
7918CT
7818CT
SK104_508
SK104_381
2KBP02M
1N4007
SA5.0A


J2A
CPC-DIGITAL-BUS
A1 +5V
A12 485A
A32 0V
C1 +5V
C12 485B
C32 0V
J1A
CSC-DIGITAL-BUS
A1 +5V
A3 PA6
A4 PA4
A5 PA2
A6 PA8
A8 PR/W
A12 485A
A22 EXT_START
A23 PWD14
A24 PWD12
A25 PWD10
A26 PWD8
A27 PWD6
A28 PWD4
A29 PWD2
A30 PWD0
A31 SYNC_SIG
A32 0V
C1 +5V
C3 PA7
C4 PA5
C5 PA3
C6 PA1
C8
C9 PRESET
C10 PS1
C11 PS2
C12 485B
C23 PWD15
C24 PWD13
C25 PWD11
C26 PWD9
C27 PWD7
C28 PWD5
C29 PWD3
C30 PWD1
C31 SYNC_EN
C32 0V
J4A
CPC-ANALOG-BUS
A1 -18V
A29 HV0
B1 BGND
B29 HV0
C1 +18V
C29 HV0
C30 HV0
C31 185VAC
J3A
CSC-ANALOG-BUS
A1 -18V
B1 BGND
C1 +18V
J5A
POWER-SUPPLY
A2 +5V
A4 +5V
A6 SYNC_SIG
A8 SYNC_EN
A10 0V
A12 0V
A14 +18V
A16 -18V
A18 BGND
A20 BGND
A26 HV0
A28 HV0
A30 185VAC
A32 185VAC
B2 +5V
B4 +5V
B6 EXT_START
B10 0V
B12 0V
B14 +18V
B16 -18V
B18 BGND
B20 BGND
B26 HV0
B28 HV0
B30 185VAC
B32 185VAC
M1 M3 M4 M2 M5
GROUND
Vers:2
Rev: 1
Eng: JN
Date:27.11.97
Date:05.03.98
CAD: JN
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Backplane
OMICRON VAKUUMPHYSIK GmbH, Germany
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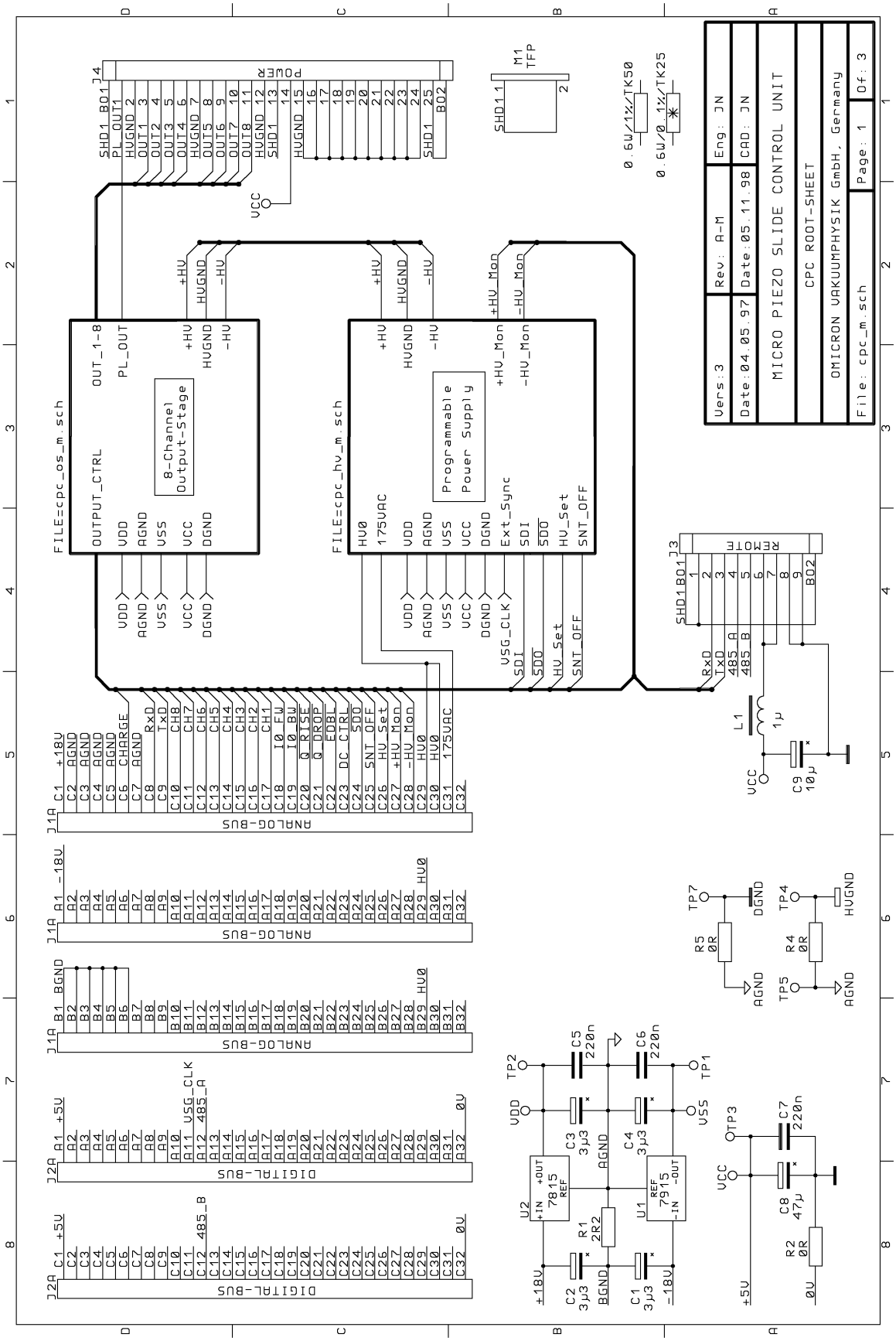
Page: 3
Of: 3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Rev: A-M
Date:05.11.98
Eng: JN
CAD: JN
Page: 1
Of: 3
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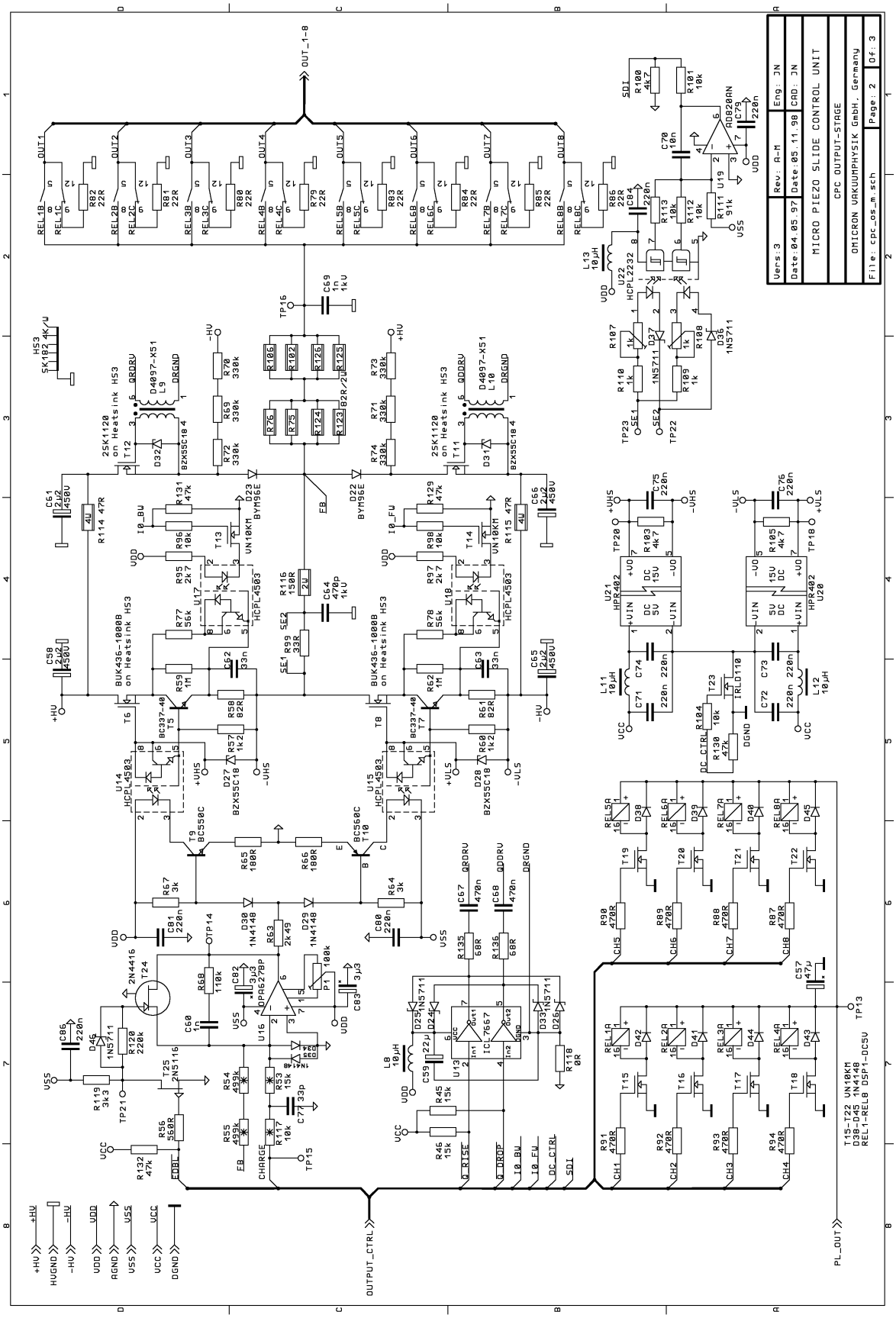
8-Channel Output-Stage
FILE=cpc_hv_m.sch
Programmable Power Supply
ANALOG-BUS
DIGITAL-BUS
REMOTE
+18V
-18V
+5V
VCC
VDD
VSS
AGND
DGND
HVGND
+HV
-HV
+HV_Mon
-HV_Mon
RxD
TxD
485_A
485_B
SDI
SDO
HV_Set
SNT_OFF
VSG_CLK
U1 7915
U2 7815
L1 1µ
C9 10µ
C8 47µ
C1 3µ3
C2 3µ3
C3 3µ3
C4 3µ3
C5 220n
C6 220n
C7 220n
R1 2R2
R2 0R
R4 0R
R5 0R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Rev: A-M
Eng: JN
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Date:05.11.98
CAD: JN
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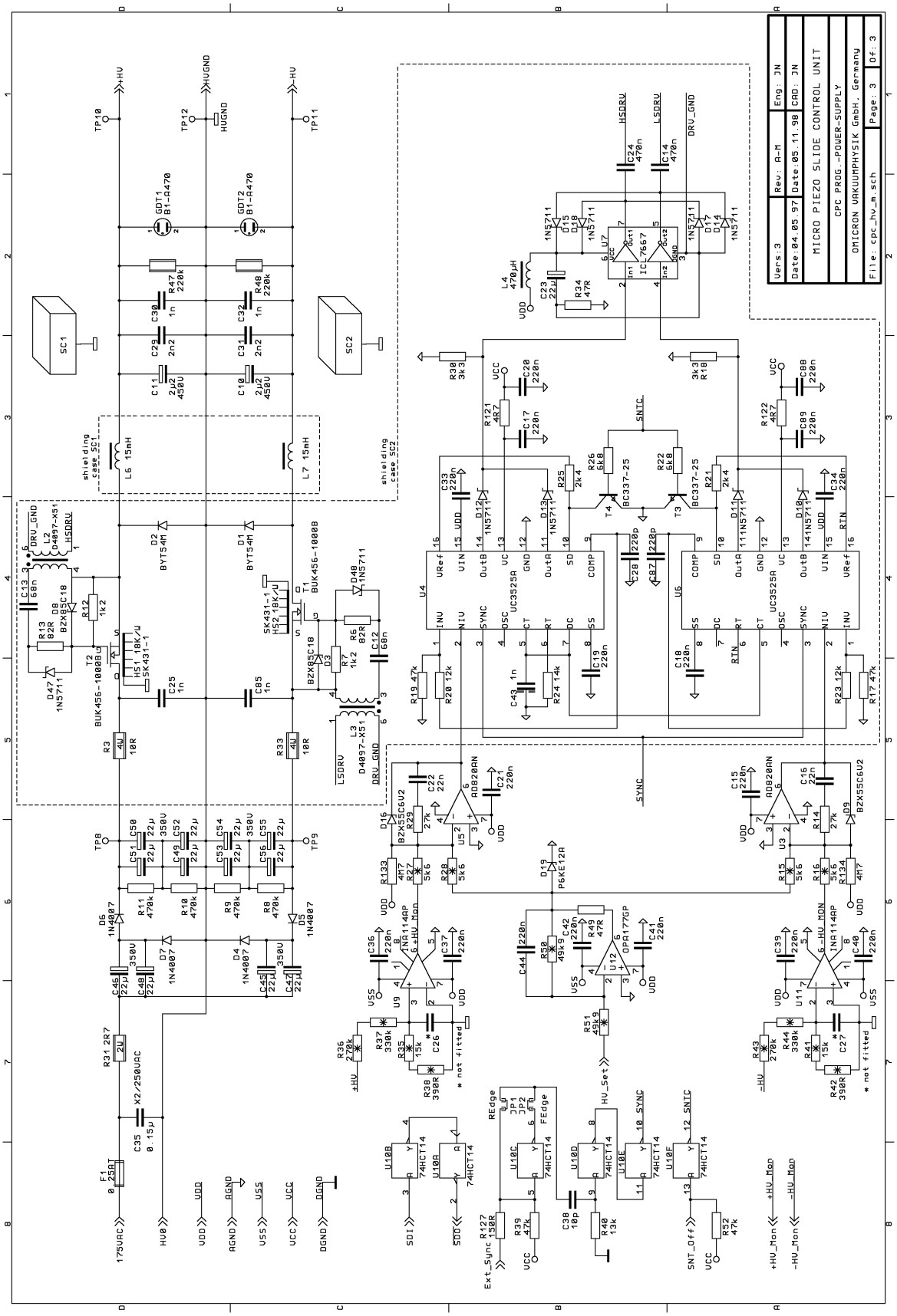
Page: 2
Of: 3
OUT_1-8
OUTPUT_CTRL
PL_OUT
+HV
-HV
VDD
VSS
VCC
DGND
T15-T22 UN10KM
D38-D45 1N4148
REL1-REL8 DSP1-DC5V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OMICRON VAKUUMPHYSIK GmbH, Germany
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Rev: A-M
Eng: JN
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Date: 05.11.98
CAD: JN
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Of: 3
+HV
-HV
HVGND
TP10
TP11
TP12
GDT1 B1-A470
GDT2 B1-A470
SC1
SC2
shielding case SC1
shielding case SC2
L6 15mH
L7 15mH
L2 D4097-X51
L3 D4097-X51
DRV_GND
HSDRV
LSDRV
BUK456-1000B
BYT54M
SK431-1
HS1.18K/W
BZX85C18
1N5711
1N4007
IC_7667
UC3525A
OPA177GP
INA114AP
74HCT14
AD820AN
BZX55C6V2
P6KE12A
BC337-25
TP8
TP9
F1 0.25AT
X2/250VAC
175VAC
HV0
VDD
AGND
VSS
VCC
DGND
SDI
SDO
Ext_Sync
HV_Set
SNT_Off
+HV_Mon
-HV_Mon
SYNC
SNTC
* not fitted

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- Place the instrument in a polythene bag.
- **Reuse the original packaging and transport locks.**
- Take out a **transport insurance policy.**

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No repair of vacuum equipment without a legally binding signed decontamination declaration !

- Wear suitable cotton or polythene gloves when handling the equipment.
- **Re-insert all transport locks (**if applicable**).**
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- **Fix the instrument to its plastic cylinder (**if applicable**).**

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Tel: .....
FAX: .....

Type of Instrument .....

Serial Number .....

Purchasing Date .....

(Last Service Date .....**)**

Problem:

Date: **Signature:**

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Fax (011) 3965 2766
e-mail: edwards@snet.com.br

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