

MTC64 Power Board

Mains Switches Expansion for MTC64 Main Board

Installation and User's Manual

© 2005 by Doepfer Musikelektronik

Important Notes

- **DANGER TO LIFE !**
- **Dangerous mains voltages (115V AC / 230V AC) appear at the pc board, electronic parts and wires during operation.**
- **Because of electrical safety installation, wiring and operation of the MTC power board has to be carried out by qualified personnel only that is familiar with all safety rules valid in the country where the MTC power board is installed.**
- **Not qualified personell is not allowed to install and run the MTC power board !**
- **If you are not sure if your knowledge is sufficient to install and run the MTC power board do not install and operate the device.**
- **The user has to read the installation manual carefully and follow all instructions in the manual meticulously !**
- **The complete construction has to be mounted into an isolating case before the mains voltage is applied. It has to be impossible to touch any part that may lead mains voltage (including cables, electronic parts, fuses, fuse holders, connectors, pcb tracks, wires, cables and so on).**
- **Operation of the MTC power board outside such a housing is strictly forbidden!**
- **In case that a metal housing is used it has to be connected to earth/shield. The cross section for the earth/shield cable has to be more than for the mains cables. In Germany only yellow/green cables are allowed for earth/shield wiring. This color is not allowed to be used for any other connection.**
- **Connecting and wiring the boards has to be carried out without mains voltage applied to the board. Therefore the board has to be disconnected completely from mains during any work at the board (even for fuse replacement !).**
- **For all main connections and wiring (i.e. all connections to mains and to the loads) connectors and cables have to be used that are suitable and licenced for the voltage (115/230V AC) and current in question.**
- **The single fuses (i.e. the fuses located at the MTC power board for each output) are equipped with 1A from the factory and must not be replaced by higher values or bridged (exception: if only 8 or less outputs are used the value may be increased to 2A max.).**
- **For the mains input a fuse (fast blow) has to be installed that is equal to the sum of all loads that are driven (depends even upon the number of outputs that are actually wired). The maximum allowed value for this fuse is 16A !**
- **Because of the heat emission of the sold state relays the complete construction has to be cooled to avoid overheating. Possibly a housing with ventilation slits or an additional fan has to be used.**
- **The complete construction must never be operated outdoors but only in dry, closed rooms. Never use it in a humid or wet environment nor near inflammables.**

- ***No liquids or conducting materials must get into the construction. If this should happen the board must be disconnected from power immediately and be examined, cleaned and eventually be repaired by a qualified person.***
- ***Never subject the construction to temperatures above +50°C or below -10°C. Before operation the device should have a temperature of at least 10°C.***
- ***Do not place the device into direct sun light. Do not install the instrument near heat sources.***
- ***Never use the device in the immediate proximity of other electronic devices (e.g. monitors, computers) since this could create disturbances within both devices.***
- ***The MTC64 Power Board may only be used for the purpose described in this operating manual. Due to safety reasons, the device must never be used for other purposes not described in this manual. If you are not sure about the intended purpose of the instrument please contact an expert.***

The MTC Power Board is an expansion board for the **universal MIDI control electronics MTC64**. It is used to switch mains voltages (230V/115V) to drive mains voltage devices. For example lamps or other mains loads can be controlled by MIDI note on/off messages.

These are the most important features:

- 16 power outputs 115V or 230V
- max. 2A for each output (i.e. 460 Watt/VA @ 230V resp. 230Watt/VA @ 115V)
- max. total load for all outputs 16 A, i.e. 1A for each output in case of equal loads for all outputs (= 115 Watt/VA @ 115V resp. 230Watt/VA @ 230V)
- zero crossing switches to reduce mains interferences
- separate fuse for each output
- mains and load connections via screw terminals
- up to four MTC power boards can be connected to one MTC64 main board
- connection between MTC power boards and MTC64 main board via one 10 pin ribbon cable leading from the main board to all power boards, and a 16 pin ribbon cable between main board and power board (one for each power board). Please specify how many power boards have to be connected to the main board (because of the length and number of female connectors of the 10 pin ribbon cable)
- ribbon cables are included with the power board, cables for mains and loads connection are not included
- If an old MTC64 main board is used the integrated circuits labelled CD4094 have to be replaced by 74HC4094 (valid only for MTC64 main boards manufactured before January 2005, in case of orders of main boards in combination with power boards the main boards are already equipped with 74HC4094)
- Different versions are available:
 - 16 stages (full version)
 - 8 stages only
 - 4 stages only
 - 0 stages (i.e. all electronic parts are assembled except the solid state relays, these may be added by the user)
- For the partial versions (8/4/0 stages) all electronic parts except the (expensive) solid state relays are assembled, even the fuse holders and screw terminals for all outputs are assembled
- The board is tested only for solid state relays manufactured by Sharp (type S202T02). We cannot guarantee that it will work with other solid state relays.

The sketch on the page 4 shows the wiring of the MTC Power Board(s) with the MTC64 main board, the mains and the loads.

Connections

JP1 (10 pin connector)

This pin header is connected to JP5 on the MTC64 main board and carries GND and +5V (i.e. power supply). For the connection a 10 pin ribbon cable with a female connector on each side is used. If two or more MTC power boards are used in combination with one MTC64 main board this connection has to be carried out parallel (i.e. GND and +5V for all boards). For this a special 10 pin ribbon cable has to be used with the corresponding number of female connectors. A cable with 3 connectors is required for 2 power boards, a cable with 4 connectors is required for 3 power boards and a cable with 5 connectors is required for 4 power boards. If several MTC power boards are ordered together a suitable cable is enclosed. If the power boards are ordered one after another the special cable has to be ordered in addition (please specify the number of female connectors and the distances between the connectors).

Pay attention to the correct polarity of the connection: the wire of the ribbon cable that leads +5V (this side of the connector is labelled "+5V" on the MTC64 main board) has to direct to the mains connector (X17) on the MTC power board in Richtung des Netzanschlusses (X17). If the cable is connected in the wrong way GND and +5V are shortened. This may destroy the power supply !

JP2 (16 pin connector)

This pin header is connected to one of the pin headers JP1 (range 1...16), JP2 (range 17...32), JP3 (range 33...48) or JP4 (range 49...64) on the MTC64 main board. For the connection a 16 pin ribbon cable with a female connector on each side is used. Up to four MTC power boards can be combined with one MTC64 main board. Connecting the cable in the wrong to JP1...JP4 on the MTC64 main board will cause no damage. Only the sequence of the outputs will be mixed up.

X1 ... X16 (2 pin screw terminals)

These are the terminals for the loads (e.g. lamps, motors). Each 2 pin terminal corresponds to one load. It is recommended to use standard mains connectors between the outputs of the MTC power power and the loads. The connectors have to be specified for at least 230V~/2A (resp. 115V~/2A in 115V applications).

X17 (2 pin screw terminal)

This is the mains connector. This terminal is used to establish the connection to the 115/230V mains. For the connection an additional fuse (max. 16A) has to be used. In case of a partial version (e.g. 8 or 4 stages only) a smaller fuse has to be used suitable to the maximum current of all loads. Even for the mains a suitable connector and possibly a mains switch can be used. All components have to be specified for at least 230V~/16A (resp. 115V~/16A in 115V applications).

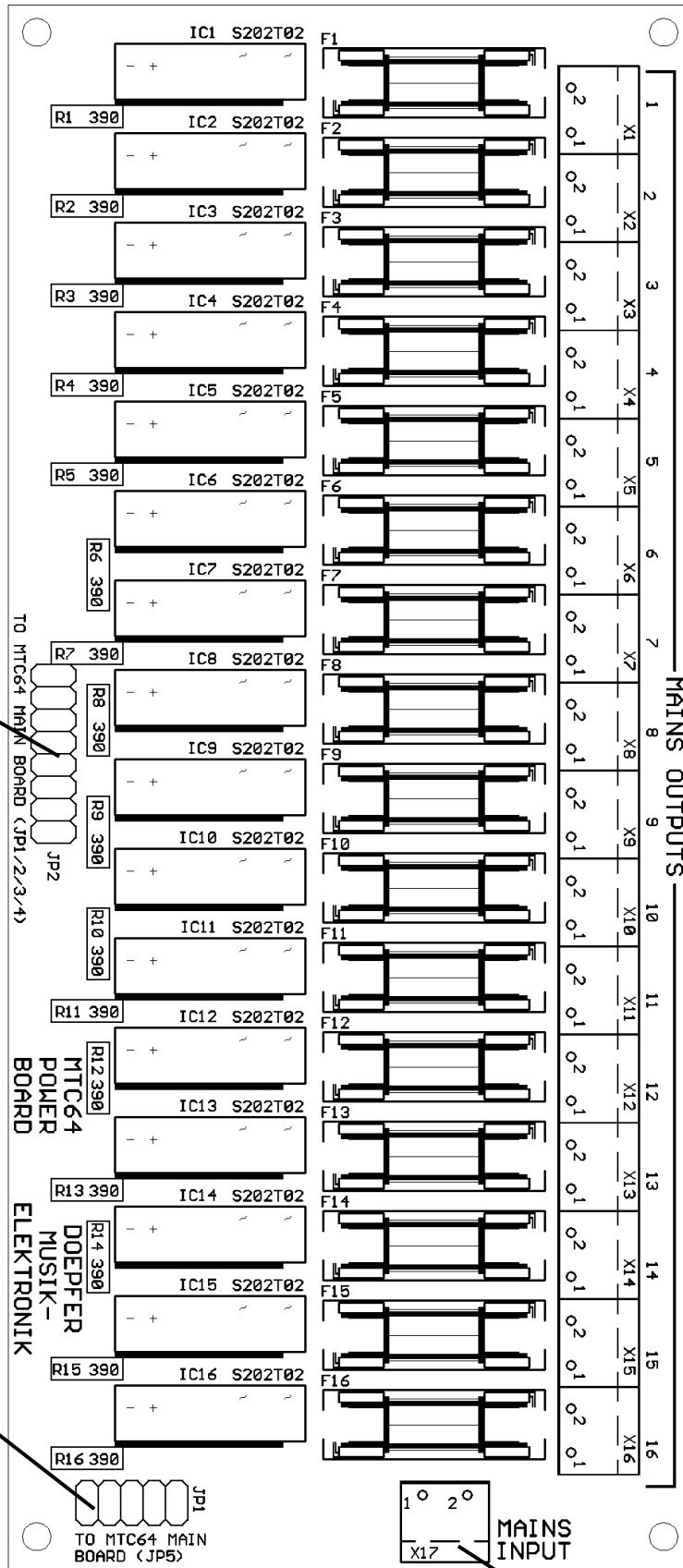
Construction Notes

- ***Pay attention to all safety rules and laws that are valid in your country.***
- ***The complete construction has to be mounted into an isolating case before the mains voltage is applied. It has to be impossible for the user to touch any part that may lead mains voltage (including cables, electronic parts, fuses, fuse holders, connectors, pcb tracks, wires, cables and so on).***
- ***It is not allowed to operate the MTC power boards without the case described above.***
- ***If a metallic case is used it has to be connected to the mains shield. The cross section for this connection has to be more than for the other mains cables.***
- ***For all wiring and connections parts have to be used (e.g. cables, wires, switches, connectors) that are specified for 230V~ (resp. 115V in 115V applications) and the corresponding current.***
- ***In Germany only yellow/green cables are allowed for shield connections. This color is not allowed for any other function !***
- ***For the mains power supply cable a fuse has to be used that corresponds to the sum of all loads (max. 16A). This depends upon the number of outputs in use (e.g. partial version with 2/4/8 outputs only) and the power consumption of the actual loads (max. 2A for each load).***
- ***The terminal screws have to be tightened very fast to avoid slipping out of the cables.***
- ***The pc boards have 3 mm mounting holes that can be used to mount the board to the bottom of the case with screws, washers, nuts and spacers. If a plastic case is used even plastic screws/washers/nuts/spacers have to be used. In case of metallic screws/washers/nuts dangerous voltages may appear at these parts outside the plastic case. If a (grounded) metallic case is used even metallic screws/washers/nuts/spacers are allowed.***
- ***The minimum distance between the case and all parts that may lead mains voltage (including the pc board) is 10 mm. Consequently spacers with at least 10 mm length have to be used to mount the MTC power board on the bottom of the case.***
- ***The MTC64 main board has to be adjusted to the desired Midi channel, note number range (resp. program change number range), mode (note or program change) and polarity before the case that contains both MTC power board(s) and the corresponding main board is closed. Please refer to the user's manual of MTC64 main board for details.***
- ***If the outputs of the MTC power board behave the other way round the polarity of the MTC64 outputs have to be changed.***
- ***The MTC64 main board requires a separate power supply +7...12V, e.g. a wall outlet version power supply. The power supply for the MTC64 main board may be put into the case of the MTC power board to have only one mains connection.***

solid state relays single fuses screw terminals
for the loads
1...16

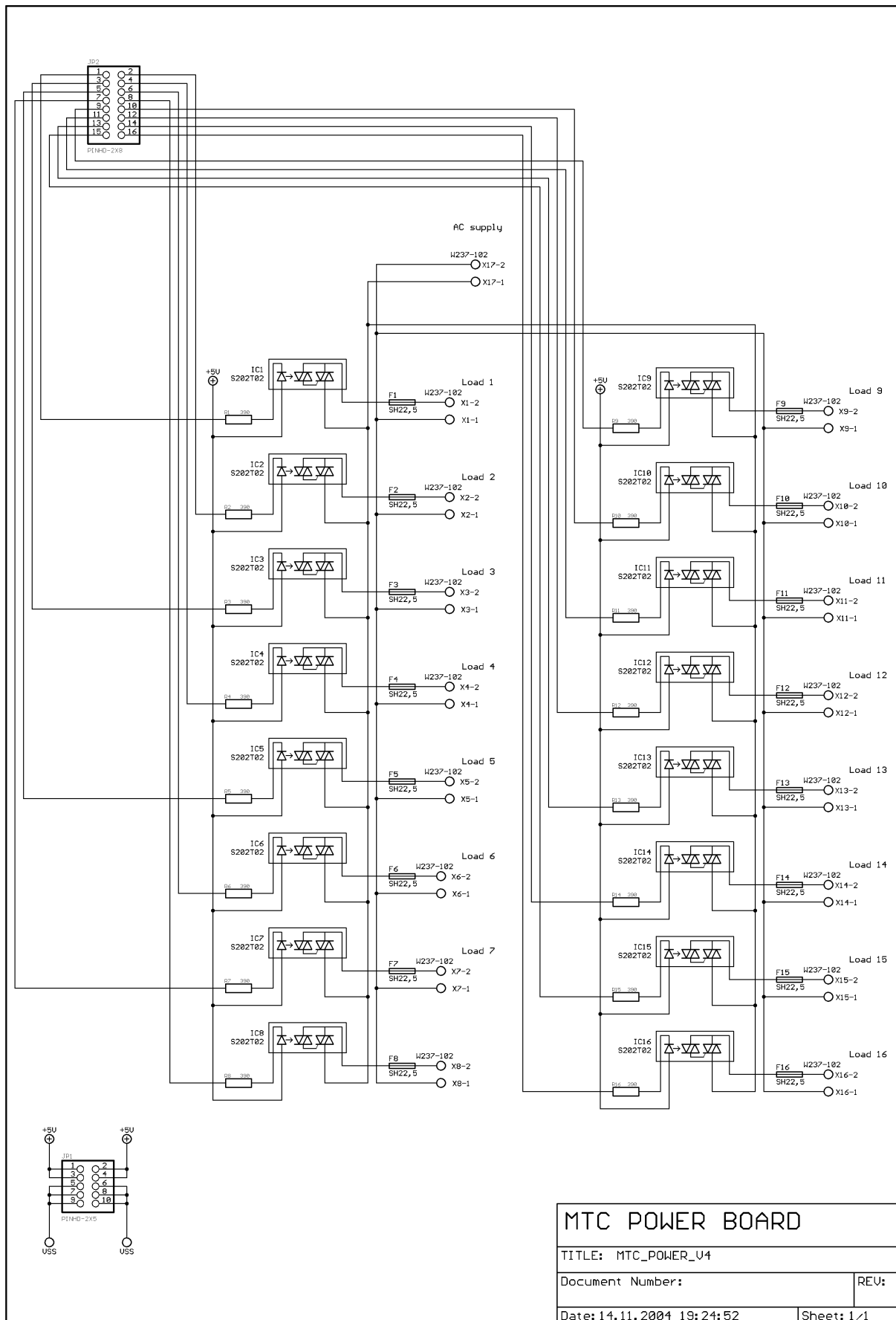
16 pin connector
JP2
→ to JP1 or JP2
or JP3 or JP4
MTC64 main
board

10 pin connector
JP1
→ to JP5 MTC64
main board



(corresponding labels to those of JP5 at the main board)

mains input
(230V resp. 115V AC)



Schematics MTC Power Board
 © 2005 by Doepfer Musikelektronik

Check list

If the MTC power board does not work at the first go please check these items
(separate the complete construction from mains before any check):

- Does the MTC64 main board alone work correctly ? Check especially the correct Midi channel, note/program change range, mode and polarity. Please refer to the user's manual of the MTC64 main board for details and do the basic tests with a LED described on page 13.
- Is the MTC64 main board equipped with 74HC4094 (instead of CD4094) ? This could happen only if an old MTC64 main board is used. For orders of MTC power boards together with MTC64 main boards this cannot happen.
- If the outputs of the MTC power board behave the other way round the polarity of the MTC64 outputs has to be changed (Jumper 5 / JP7 on main board).
- Are all ribbon cable connections between main board and power board carried out in the right way and is the polarity of the 10 pin ribbon cable correct ?
- Are the fuses on the MTC power board inserted and OK (i.e. not blown) ?
- Are the mains terminal (X17) and the load terminals (X1...X16) connected in the right way ?
- Is the solid state relay of the output in question assembled (only for partial versions) ?

DOEPFER
MUSIKELEKTRONIK
www.doepfer.com