hwlcd4
LCD status display system for Hauptwerk virtual pipe organ
* user's guide *

1. Introduction

The **hwlcd4** is compact single-/dual-display module, especially designed for using with Hauptwerk 4 or any other application that supports Hauptwerk's original *System Exclusive* messages format. It can control one or two standard 2x16 LCD panels, each displaying various parameters/information, coming from Hauptwerk. In addition, there is RGB full-color LED with user-assignable function per each of LCD panels.

The user can re-configure at any moment all user-configurable parameters by means of simple programming utility, available for free download. The configuration data is uploaded via specific SysEx message described in *Appendix A*.

The communication between **hwlcd4** and the World goes thru standard MIDI input and output. The unit requires external power supply of 12V AC/DC.

Any information below related to Hauptwerk has been taken from the original Hauptwerk User Guide.

2. Firmware

The firmware of **hwlcd4** includes three separate software modules, running independently and simultaneously, each processing specific stream of MIDI messages in real time. The user can choose which part of which stream is to be displayed by each of LCD lines separately.

These firmware modules are:

- **Hauptwerk Status Monitor module**

Hauptwerk reports its status using specific System Exclusive messages (message code 0x10, 0x1a, 0x1b, described in details in Hauptwerk User Manual), allowing monitoring on 55 various parameters. All these parameters are continuously tracked by the Status Monitor Module and are available for display. User decides which parameter on which available LCD display line will appear. Only one parameter can be displayed per line at a time.

There are up to 4 additional user-defined static strings which can be displayed on user-selected line on displays so that users can define their own labels for displayed parameters.

Since each of the physical LCD modules has RGB LED, user can set the function of each of these LEDs separately. They can be used for indicating certain Hauptwerk parameters (like clipping parameters) by color code. They can be used for displaying the color code carried with text message (read below) or they can be even set to emit static user-selectable color (1 out of 8 Hauptwerk-defined colors).

- **Dual Hauptwerk Text Panel module**

Two virtual Hauptwerk display panels (Primary and Secondary) are continuously tracking and recognizing the Hauptwerk text messages carried by specific System Exclusive messages (message code 0x01). Each of these virtual display panels has user-assignable ID (0-127) so that it registers the proper text messages addressed to respective Hauptwerk LCD panel ID.

The received text messages are internally buffered in 4x 16-character text buffers (two for the Primary and two for the Secondary panel). The content of each of these buffers is available for display on any available physical LCD line.

The RGB LEDs installed on each of the LCD panels can be used for displaying the color code, carried by same MIDI message, for additional visualization.

- **MIDI Monitor module**

In this module, every MIDI message including Channel, System Common, Realtime and SysEx message is monitored and parsed in real time. The results of parsing for most recent 4 messages are internally buffered in 4x 16-character buffers and each of these buffers content can be displayed on any of available physical LCD lines. The information of MIDI Monitor is displayed in alphanumeric format, without time stamps. Following are few examples of typical MIDI messages as displayed by MIDI Monitor:

NOn:c01n032v127	**Note On**, Channel 0, Note 32, Velocity 127
NOf:c01n032v127	**Note Off**, Channel 0, Note 32, Velocity 127
CCg:c02t007v100	**Control Change**, Channel 1, Controller 7, Value 100
CCg:c02t007v102r	**Control Change**, Channel 1, Controller 7, Value 100, **Running Status**
PCg:c03p045	**Control Change**, Channel 1, Controller 7, Value 100
PWl:c01l059m032	**Pitch Wheel**, Channel 1, LS byte 59, MS byte 32
Cat:c05p069	**Channel Aftertouch**, Channel 5, Pressure 69
PAt:c08n036p077	**Poly/Key Aftertouch**, Chanel 8, Note 36, Pressure 37
SysEx[00016b]EOX	**System Exclusive**, body 16 bytes
Active Sensing	**Active Sensing** (realtime)
Tune Request	**Tune Request** (system common)
System Reset	**System Reset** (realtime)

The MIDI Monitor module supports *Running Status* (indicated with "r" at the end of the line, where present). *NoteOn* message with velocity 0 is displayed as *NoteOn* and not as *NoteOff*.

3. User-programming

hwlcd4 is available in two forms: basic and extended. The basic form consists of Main board (controller) and 2x16 character LCD display stacked over it. The extended form features Main board with stacked LCD display plus Extension board with another 2x16 LCD display stacked over it. Extension module is connected to Main module via 16-way ribbon cable. In further description the respective LCD displays will be referred to as Main LCD and Extension LCD, meaning the real physically available LCD displays. Similarly, we will use Main RGB and Extension RGB, meaning respective RGB LEDs.

Each of lines on each of available physical LCD display can be set separately to show user-selected parameter or data from any of available firmware modules described above.

Each of RGB LEDs can be set separately to indicate Hauptwerk parameters (where available) in color, with no respect of what is being displayed on proper LCD display.

This way user can set both LCD displays to function as 4-line MIDI monitor, or function as two separate Hauptwerk text displays with attached RGB LEDs, or function as 4 separate displays, showing variable names and values in text or numbers with two separate RGB LEDs, indicating variable's value in color code, in any combination.

The software configuration tool named ***hwlcd4set*** is available for free download from our site www.midiboutique.com. Following is short description of all user-selectable parameters:

Primary HW text panel ID: the ID of the first available virtual text panel. While Hauptwerk supports 14-bit number, hwlcd4 supports only 7-bit (0..127) ID. Normally is expected that each available panel is set for different ID, but it is still possible to set more than one to be responding to same ID, if necessary;

Secondary HW text panel ID: the ID for the secondary virtual text panel;

User String#1: User-assignable string to be used as statically displayed text (label);

User String#2: User-assignable string to be used as statically displayed text (label);

User String#3: User-assignable string to be used as statically displayed text (label);

User String#4: User-assignable string to be used as statically displayed text (label);

Main LD Top line Program: Defines what will be displayed on top line of Main LCD display;

Main LCD Bottom line Program: Defines what will be displayed on bottom line of Main LCD display;

Extension LCD Top line Program: Defines what will be displayed on top line of Extension LCD display;

Extension LCD Bottom line Program: Defines what will be displayed on bottom line of Extension LCD display;

Main RGB Program: Defines what will be indicated by Main RGB LED;

Extension RGB Program: Defines what will be indicated by Extension RGB LED.

The list of available programs for LCD lines and RGB LEDs is shown in *Appendix B*.

The step-by step instruction for use of **hwlcd4**set utility is shown in *Appendix C*.

4. Connection and use

The connection diagrams for Setup and Use are shown in Appendix D.

When used as part of Hauptwerk system, **hwlcd4** is inserted between MIDI output of the computer running Hauptwerk software and the other equipment listening for Hauptwerk MIDI messages (if any). **Hwlcd4** will retransmit the MIDI messages byte-by byte without any altering.

It requires power from external power supply rated for 12V AC/DC, capable to source 150mA or more (with back light on and RGB LEDs lit in white).

When initially powered, each of available LDC displays will display the product name and firmware version information:

```
MGB hwlcd4-m
   v.1.1
```

```
MGB hwlcd4-x
   v.1.1
```

After 1s timeout it will display the numbers of current programs per each line and LED, giving visual feedback to user of what will be displayed:

```
MainTop:060 LED:
MainBot:061 056
```

```
MainExt:062 LED:
MainExt:063 056
```

After another 2s timeout displays get clear and the unit is ready for use.

There is 2-pin connector (marked BL) on the back of each module, allowing user to switch on/off the back light by jumper, or use external switch for controlling the back light

For indicating the power and MIDI traffic there are green and red SMD LEDs installed on the back side. The green one will be lit while there is power supplied, the red will be flashing per each received/transmitted MIDI byte. The power must be applied on 2-pole screw terminal.

The MIDI connection is done by 3-pin and 2-pin connectors (marked MIDI out/MIDI in).

DIN5 sockets are not included and can be ordered separately where/if needed.

5. Technical parameters

Table 1. **hwlcd4** technical parameters

Parameter	Value	Unit	Comment
Power supply voltage	9-12 AC/DC	V	Adapter or transformer
Power supply current	Without back light: 50 With back light: 150	mA	
Recognized MIDI messages	All standard and all Hauptwerk specific System Exclusive messages for status/text display	-	
Retransmitted MIDI messages	Any received	-	The unit is MIDI-transparent
User-programmable	Yes, by MGB-specific SysEx message	-	Software setup utility (Windows) available for free download
Back light	Yes	-	User-selectable
Size	8.0x3.5x3.3 Main 8.0x3.5x3.3 Extension	cm	3.1”x1.4”x1.3” approx. 3.1”x1.4”x1.3” approx.
Weight	67 Main 61 Extension	g	2.4 oz. 2.2 oz

Appendix A. Recognized System Exclusive messages

Note: All MIDI data numbers are shown in hexadecimal notation!

hwlcd4 programming message format:

```
Byte 1: 0xF0 – SyEx (system exclusive message start)
Byte 2: 0x00    - mandatory
Byte 3: 0x21    - manufacturer ID LSB (MGB)
Byte 4: 0x7F    - manufacturer ID MSB (MGB)
Byte 5: 0x11    - device ID (hwlcd4)
Byte 6: 0x00    - device sub-ID (message type: Settings upload)
Byte 7: 0x00..0x7F - Main LCD top line Program
Byte 8: 0x00..0x7F - Main LCD bottom line Program
Byte 9: 0x00..0x7F - Extension LCD top line Program
Byte 10: 0x00..0x7F - Extension LCD bottom line Program
Byte 11: 0x00..0x7F - Main RGB LED Program
Byte 12: 0x00..0x7F - Extension RGB LED Program
Byte 13: 0x00..0x7F - Primary HW text panel ID
Byte 14: 0x00..0x7F - Secondary HW text panel ID
Bytes 15-30: User String #1 – 16 ASCII (7-bit) character codes
Bytes 31-46: User String #2 – 16 ASCII (7-bit) character codes
Bytes 47-62: User String #3 – 16 ASCII (7-bit) character codes
Bytes 63-77: User String #4 – 16 ASCII (7-bit) character codes
Byte 79: 0x00 – spare/not used
Byte 80: 0xF7 – EOX (end of system exclusive message)
```

Hauptwerk LCD panel 2x18 text message format:

```
Byte 1: 0xF0 – SyEx (system exclusive message start)
Byte 2: 0x7D - manufacturer ID (Milan Digital Audio)
Byte 3: 0x01 - message type code for Hauptwerk LCD output message
Byte 4: 0x00..0x7F - destination panel unique ID LSB (7-bit)
Byte 5: 0x00..0x7F - destination panel unique ID MSB (7-bit)-ignored by hwlcd4
Byte 6: color code 0-127 (0=off/black, 1=white, 2=red, 3=green,
4=yellow, 5=blue, 6=magenta, 7=cyan, others-ignored by hwlcd4)
Bytes 7-38: the 32 ASCII (7-bit) bytes for the text to display
Byte 39: 0xF7 – EOX (end of system exclusive message)
```

Hauptwerk 7-bit unsigned integer/Boolean variable status message format :

```
Byte 1: 0xF0 – SyEx (system exclusive message start)
Byte 2: 0x7D - manufacturer ID (Milan Digital Audio)
Byte 3: 0x1B - message type code for Hauptwerk 7-bit
               unsigned integer variable status message
Byte 4: variable ID (see list below)
Byte 5: 0x00..0x7F - variable value (0-127 for integer value or
                     1/0 for representing Boolean True/False values)
Byte 6: 0xF7 – EOX (end of system exclusive message)
```

Hauptwerk 28-bit signed integer variable status message format:

```
Byte 1: 0xF0 – SyEx (system exclusive message start)
Byte 2: 0x7D - manufacturer ID (Milan Digital Audio)
Byte 3: 0x1A - message type code for Hauptwerk 28-bit
               signed integer variable status message
Byte 4: variable ID (see list below)
Byte 5: variable value byte 1 (most significant 7 bits)
Byte 6: variable value byte 2
Byte 7: variable value byte 3
Byte 8: variable value byte 4 (least significant 7 bits)
Byte 9: 0xF7 – EOX (end of system exclusive message)
```

Hauptwerk 16-character string variable status message format:

```
Byte 1: 0xF0 – SyEx (system exclusive message start)
Byte 2: 0x7D - manufacturer ID (Milan Digital Audio)
Byte 3: 0x10 - message type code for Hauptwerk
                string variable status message
Byte 4: variable ID (see list below).
Bytes 6-20: 16 ASCII (7-bit) character codes
Byte 21: 0xF7 – EOX (end of system exclusive message)
```

Table 2. Hauptwerk Status variables IDs:

Var #	Var Name	Type	Range/Display
0	CurrOrganShortName	String	16 chars
1	CuedFavOrganNum	7-bit unsigned integer	1..32
2	CuedFavOrganShortName	String	16 chars
3	LastOrganShortName	String	16 chars
4	CurrCombSetShortName	String	16 chars
5	CuedFavCombSetNum	7-bit unsigned integer	1..32
6	CuedFavCombSetShortName	String	16 chars
7	CurrTemperShortName	String	16 chars
8	CuedFavTemperNum	7-bit unsigned integer	1..32
9	CuedFavTemperShortName	String	16 chars
10	FloatingDiv1RouteNum	7-bit unsigned integer	1..4
11	FloatingDiv1KbdShortNameList	String	16 chars
12	FloatingDiv2RouteNum	7-bit unsigned integer	1..4
13	FloatingDiv2KbdShortNameList	String	16 chars
14	FloatingDiv3RouteNum	7-bit unsigned integer	1..4
15	FloatingDiv3KbdShortNameList	String	16 chars
16	FloatingDiv4RouteNum	7-bit unsigned integer	1..4
17	FloatingDiv4KbdShortNameList	String	16 chars
18	FloatingDiv5RouteNum	7-bit unsigned integer	1..4
19	FloatingDiv5KbdShortNameList	String	16 chars
20	CurrCombStepperFrameNum	28-bit signed integer	0..999
21	CuedCombStepperFrameBankNum	28-bit signed integer	0..990
22	CurrMasterGeneralNum	7-bit unsigned integer	1..20
23	LastTriggeredMasterRegObjType	7-bit unsigned integer	1..4
24	CurrMasterCrescNum	7-bit unsigned integer	1..4
25	CuedMasterCrescStage	7-bit unsigned integer	0..31
26	TransposerIncSemitones	28-bit signed integer	-12..+12
27	OrganBasePitchHz	Floating-point	0.0..13421772.7
28	MasterTuningIncCents	28-bit signed integer	-200..+200
29	OrganAudioLevelTrimDecibels	Floating-point	-24.0..+24.0
30	PolyphonyLimitSetting	28-bit signed integer	256..32768
31	SampleRateHz	28-bit signed integer	0..134217727
32	LatencyMs	Floating-point	0.0 to 13421772.7
33	IsSetterModeOn	Boolean	0/1(F/T)
34	IsScopeModeOn	Boolean	0/1(F/T)
35	IsRecordingAudio	Boolean	0/1(F/T)
36	IsRecordingMIDI	Boolean	0/1(F/T)

37	IsPlayingMIDI	Boolean	0/1(F/T)
38	IsOrganReady	Boolean	0/1(F/T)
39	IsInErrorState	Boolean	0/1(F/T)
40	ProgressIndicatorPct	7-bit unsigned integer	0..100
41	MasterOutputLevelCCPct	7-bit unsigned integer	0..100
42	FloatingDiv1ExprPedCCPct	7-bit unsigned integer	0..100
43	FloatingDiv2ExprPedCCPct	7-bit unsigned integer	0..100
44	FloatingDiv3ExprPedCCPct	7-bit unsigned integer	0..100
45	FloatingDiv4ExprPedCCPct	7-bit unsigned integer	0..100
46	FloatingDiv5ExprPedCCPct	7-bit unsigned integer	0..100
47	MasterCrescPedCC	7-bit unsigned integer	0..31
48	AudioLevelClipping	7-bit unsigned integer	0..2
49	PolyphonyClipping	7-bit unsigned integer	0..2
50	CPUClipping	7-bit unsigned integer	0..2
51	RAMClipping	7-bit unsigned integer	0..2
52	CurrObjShortNameAllTypes	String	16 chars
53	CuedFavNumAllTypes	7-bit unsigned integer	1..32
54	CuedFavShortNameAllTypes	String	16 chars
55	AllTypesObjType	7-bit unsigned integer	1..3

Note: For more detailed information about Hauptwerk SysEx messages and Status variables please refer the Hauptwerk User Manual. The most up-to date version ofthis document is always available for download on their site www.hauptwerk.com.

Appendix B. List of supported programs for LCD lines and RGB LEDs

Table 3. **hwlcd4** LCD line programs

Prog#	The line displays:	Data format/range
0	HW variable #0: CurrOrganShortName	string
1	HW variable #1: CuedFavOrganNum	unsigned int
2	HW variable #2: CuedFavOrganShortName	string
3	HW variable #3: LastOrganShortName	string
4	HW variable #4: CurrCombSetShortName	string
5	HW variable #5: CuedFavCombSetNum	unsigned int
6	HW variable #6: CuedFavCombSetShortName	string
7	HW variable #7: CurrTemperShortName	string
8	HW variable #8: CuedFavTemperNum	unsigned int
9	HW variable #9: CuedFavTemperShortName	string
10	HW variable #10: FloatingDiv1RouteNum	unsigned int
11	HW variable #11: FloatingDiv1KbdShortNameList	string
12	HW variable #12: FloatingDiv2RouteNum	unsigned int
13	HW variable #13: FloatingDiv2KbdShortNameList	string
14	HW variable #14: FloatingDiv3RouteNum	unsigned int
15	HW variable #15: FloatingDiv3KbdShortNameList	string
16	HW variable #16: FloatingDiv4RouteNum	unsigned int
17	HW variable #17: FloatingDiv4KbdShortNameList	string
18	HW variable #18: FloatingDiv5RouteNum	unsigned int
19	HW variable #19: FloatingDiv5KbdShortNameList	string
20	HW variable #20: CurrCombStepperFrameNum	signed int
21	HW variable #21: CuedCombStepperFrameBankNum	signed int
22	HW variable #22: CurrMasterGeneralNum	unsigned int
23	HW variable #23: LastTriggeredMasterRegObjType	unsigned int(to string)
24	HW variable #24: CurrMasterCrescNum	unsigned int(to char)
25	HW variable #25: CuedMasterCrescStage	unsigned int
26	HW variable #26: TransposerIncSemitones	signed int
27	HW variable #27: OrganBasePitchHz	float
28	HW variable #28: MasterTuningIncCents	signed int
29	HW variable #29: OrganAudioLevelTrimDecibels	float
30	HW variable #30: PolyphonyLimitSetting	signed int
31	HW variable #31: SampleRateHz	signed int
32	HW variable #32: LatencyMs	float
33	HW variable #33: IsSetterModeOn	Boolean(to string)
34	HW variable #34: IsScopeModeOn	Boolean(to string)
35	HW variable #35: IsRecordingAudio	Boolean(to string)
36	HW variable #36: IsRecordingMIDI	Boolean(to string)
37	HW variable #37: IsPlayingMIDI	Boolean(to string)
38	HW variable #38: IsOrganReady	Boolean(to string)
39	HW variable #39: IsInErrorState	Boolean(to string)
40	HW variable #40: ProgressIndicatorPct	unsigned int
41	HW variable #41: MasterOutputLevelCCPct	unsigned int
42	HW variable #42: FloatingDiv1ExprPedCCPct	unsigned int
43	HW variable #43: FloatingDiv2ExprPedCCPct	unsigned int

44	HW variable #44: FloatingDiv3ExprPedCCPct	unsigned int
45	HW variable #45: FloatingDiv4ExprPedCCPct	unsigned int
46	HW variable #46: FloatingDiv5ExprPedCCPct	unsigned int
47	HW variable #47: MasterCrescPedCC	unsigned int
48	HW variable #48: AudioLevelClipping	unsigned int
49	HW variable #49: PolyphonyClipping	unsigned int
50	HW variable #50: CPUClipping	unsigned int
51	HW variable #51: RAMClipping	unsigned int
52	HW variable #52: CurrObjShortNameAllTypes	string
53	HW variable #53: CuedFavNumAllTypes	unsigned int
54	HW variable #54: CuedFavShortNameAllTypes	string
55	HW variable #55: AllTypesObjType	unsigned int
56	User string#1	string
57	User string#2	string
58	User string#3	string
59	User string#4	string
60	MIDI Monitor line#0 (most up to date)	string
61	MIDI Monitor line#1	string
62	MIDI Monitor line#2	string
63	MIDI Monitor line#3 (least up to date)	string
64	Primary HW text panel, Top Line	string
65	Primary HW text panel, Bottom Line	string
66	Secondary HW text panel, Top Line	string
67	Secondary HW text panel, Bottom Line	string
68-127	empty line	n.a.

Table 4 . **hwlcd4** RGB-LED programs

Prog#	Displays	Data format/range
0-32	off	n.a.
33	HW variable #33: IsSetterModeOn	False:Red, True:Green
34	HW variable #34: IsScopeModeOn	False:Red, True:Green
35	HW variable #35: IsRecordingAudio	False:Red, True:Green
36	HW variable #36: IsRecordingMIDI	False:Red, True:Green
37	HW variable #37: IsPlayingMIDI	False:Red, True:Green
38	HW variable #38: IsOrganReady	False:Red, True:Green
39	HW variable #39: IsInErrorState	False:Red, True:Green
40-47	off	n.a.
48	HW variable #48: AudioLevelClipping	0:Green,1:Yellow,2:Red
49	HW variable #49: PolyphonyClipping	0:Green,1:Yellow,2:Red
50	HW variable #50: CPUClipping	0:Green,1:Yellow,2:Red
51	HW variable #51: RAMClipping	0:Green,1:Yellow,2:Red
52-55	off	n.a.
56	Color#0	Black (off)
57	Color#1	White
58	Color#2	Red
59	Color#3	Green
60	Color#4	Yellow
61	Color#5	Blue

62	Color#6	Magenta
63	Color#7	Cyan
64	Primary HW text panel, Color Code	unsigned int (to color)
65	off	
66	Secondary HW text panel, Color Code	unsigned int (to color)
67-127	off	n.a.

Factory preset:

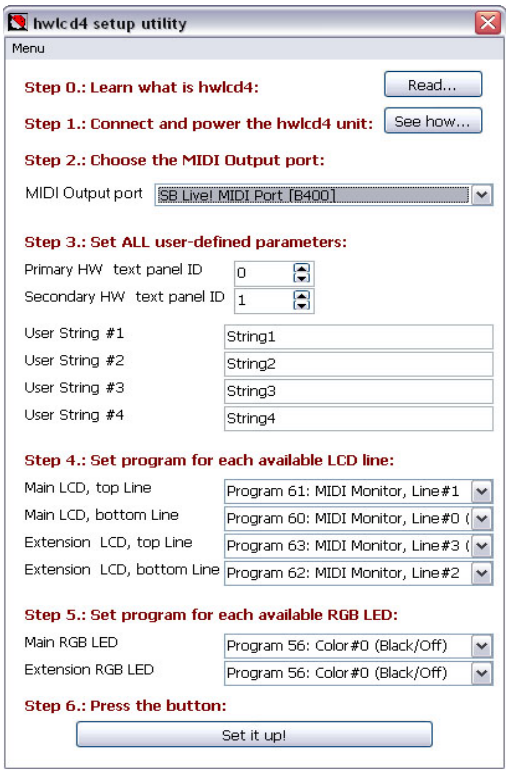
Unless other requested upon order, the unit ships factory configured as follows:

- Main LCD, Bottom Line: Program #60 (MIDI Monitor line#0);
- Main LCD, Top Line: Program #61 (MIDI Monitor line#1);
- Extension LCD, Bottom Line: Program #62 (MIDI Monitor line#2);
- Extension LCD, Top Line: Program #63 (MIDI Monitor line#3);
- Main RGB: Program#57 (Color#1 - White);
- Extension RGB: Program#57 (Color#1 - White);
- Primary HW text panel ID:0;
- Secondary HW text panel ID:1.

NOTE: *Factory settings may differ from above preset in certain cases*.

Appendix B. Step-by step instruction for use of **hwlcd4set** utility

The ***hwlcd4set*** (Windows only) software utility is easy-to-use free-downloadable application that does not need any installation and registration. Just download, unpack in separate folder and run it. Its user interface is straightforward, clearly depicting the steps that must be followed during **hwlcd4** setup procedure.



Step 0: Learn what is **hwlcd4**. Read the available documentation, including this User Manual. For additional information press "Read..." button which will display brief information about **hwlcd4**.

Step 1. Connect and power the **hwlcd4** unit. Press "See how..." button to see the wiring diagrams for setup and use. For setup procedure the MIDI input of **hwlcd4** must be connected to the MIDI output of PC, running the ***hwlcd4set*** software. The MIDI output of hwlcd4 should not be connected to anything, to avoid possible MIDI loops. The power should be applied to power screw terminal. Allow 3 seconds for **hwlcd4** to initialize.

Step 2. Choose the MIDI output port. The Drop-down list will show all available virtual and hardware MIDI out ports. Choose the hardware port to which the **hwlcd4** is attached.

Step 3. Set all user-defined parameters. All of parameters will be updated at once and you cannot modify only certain parameters. Be sure to have correct values in all fields. *Primary HW text panel ID* is the ID that will be used for the first virtual Hauptwerk display panel (LCD line programs 64 and 65, RGB program 64). *Secondary HW text panel ID* is the ID that will be used for the secondary virtual Hauptwerk display panel (LCD line programs 66 and 67, RGB program 66). *User String#1..#4* are the strings that will be used for LCD line programs 56..59.

Step 4. Set program for each available LCD line, following Table 3. The program defines what will be displayed on this line. This could be static label (user string) or dynamic string (Hauptwerk text) or variable value in numeric format etc. Extension lines can be programmed even if no extension is present at the moment and is going to be connected later.

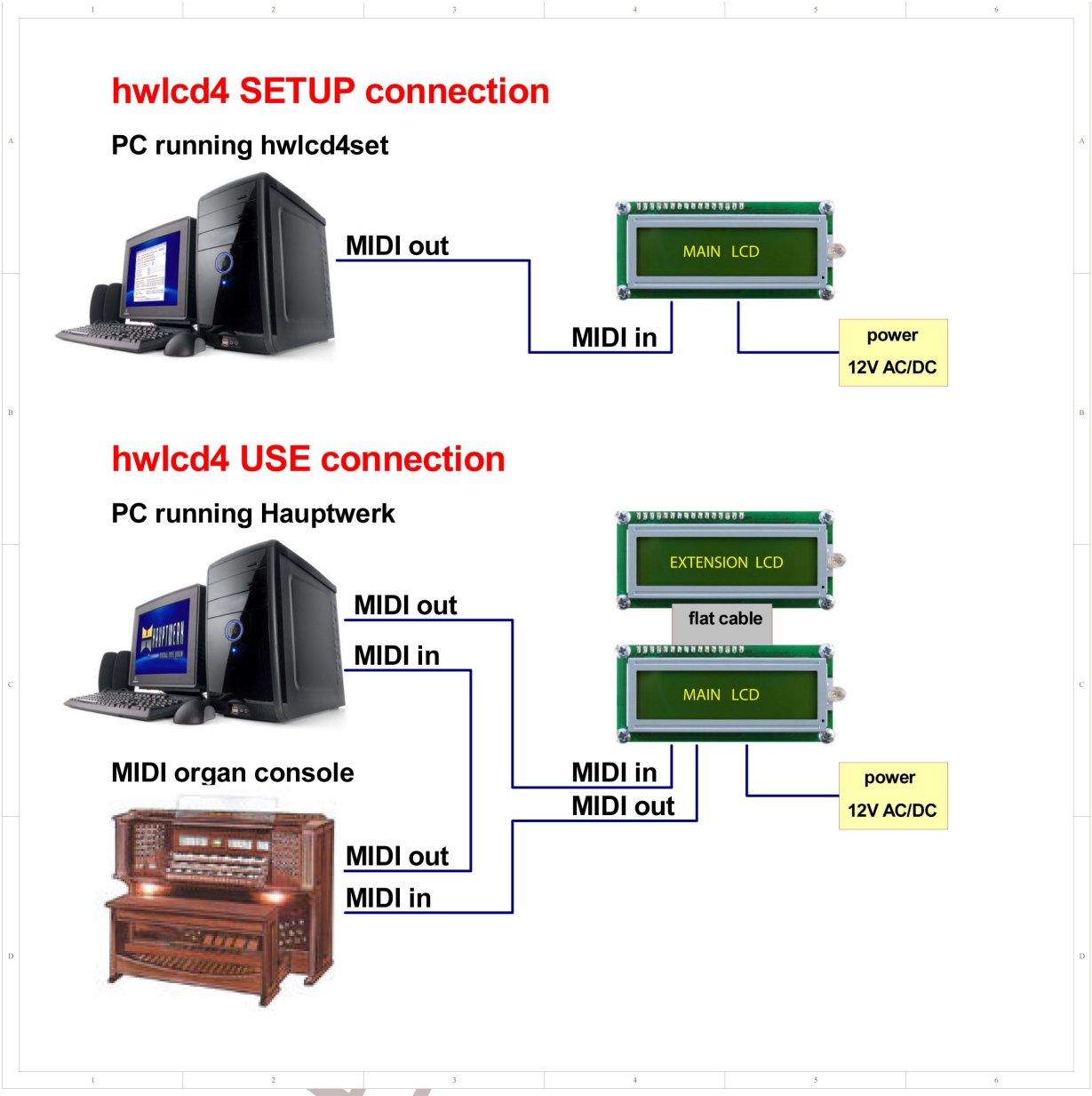
Step 5. Set program for each available RGB LED following Table 4. Only those of Hauptwerk that allow color coding as well as few Boolean variables are supported.

Step 6. Press "Set it up!" button. All above parameters will be uploaded into hwlcd4 and will be memorized permanently in non-volatile memory. Each of available LCD display will show the following message:

```
Config. changed!
Resetting...
```

After 2 seconds the **hwlcd4** will reset per description shown in chapter **4.Connection and Use** .

Appendix C. Wiring diagrams for **hwlcd4**



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