

# hwlcd-mini

## LCD panel for Hauptwerk virtual organ

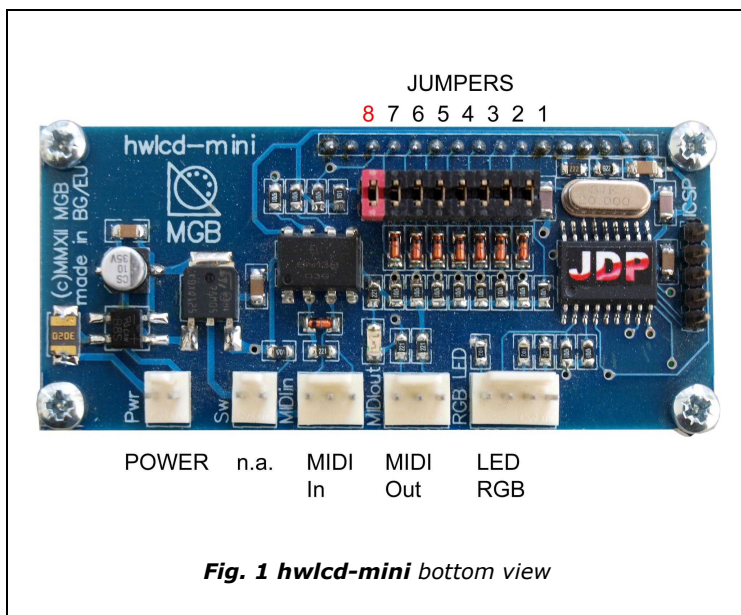
\* user's guide \*

### 1. Introduction

The **hwlcd-mini** is compact display module, designed for use with Hauptwerk VPO as well as with any other application that support Hauptwerk's original *System Exclusive* messages format. It is supposed to play the role of intelligent label for stops and other console controls so that their functionality could be easily assigned/changed from within Hauptwerk. The module has standard opto-insulated MIDI input and repeating MIDI output that allows easy inserting this module in existing MIDI consoles even chaining up to 128 **hwlcd-mini** units in a system.

The standard display is 2x16 characters on blue background (can be black on green as well on request). An optional RGB LED (CC) can be controlled, allowing up to 8 different colors or color combinations based on RGB scheme, which may be used for indicating modes, groups etc. The text on display as well as the LED color are controlled by means of *System Exclusive* message defined in Hauptwerk online documentation:

<http://www.hauptwerk.com/clientuploads/documentation/CurrentUserGuide/HauptwerkInstallationAndUserGuide.pdf>



**Fig. 1** hwlcd-mini bottom view

### 2. Settings

For using multiple LCD character displays, Hauptwerk supports 16-bit address space allowing addressing virtually up to 65536 display units. **hwlcd-mini** itself has 8 jumpers on its back side (**Fig. 1**). The jumpers numbered 1 to 7 (black jumpers) are used for setting unit's ID in range (0-127) according **Table 1**. The address space 0-127 would allow up to 128 **hwlcd-mini** unit to be chained together in single system.

The 8-ht jumper (shown in red color) controls the LCD backlight. For standard white-on-

blue LCDs the backlight must be on all the time, otherwise characters become hard-to-see. For black-on-green LCDs the backlight can be used per user choice. The jumper can be replaced for external switch when/if necessary.

Please note that the black jumpers (i.e. unit's ID) are read once upon unit reset and any change would take place after power cycle. The unit's ID is displayed briefly upon each power-up/reset for user convenience.

**Table 1.** Setting unit ID (Address) on Jumpers 1 - 7

Unit ID	Jumper 7	Jumper 6	Jumper 5	Jumper 4	Jumper 3	Jumper 2	Jumper 1
000	On	On	On	On	On	On	On
001	On	On	On	On	On	On	Off
002	On	On	On	On	On	Off	On
003	On	On	On	On	On	Off	Off
004	On	On	On	On	Off	On	On
005	On	On	On	On	Off	On	Off
006	On	On	On	On	Off	Off	On
007	On	On	On	On	Off	Off	Off
008	On	On	On	Off	On	On	On
009	On	On	On	Off	On	On	Off
010	On	On	On	Off	On	Off	On
011	On	On	On	Off	On	Off	Off
012	On	On	On	Off	Off	On	On
013	On	On	On	Off	Off	On	Off
014	On	On	On	Off	Off	Off	On
015	On	On	On	Off	Off	Off	Off
016	On	On	Off	On	On	On	On
017	On	On	Off	On	On	On	Off
018	On	On	Off	On	On	Off	On
019	On	On	Off	On	On	Off	Off
020	On	On	Off	On	Off	On	On
021	On	On	Off	On	Off	On	Off
022	On	On	Off	On	Off	Off	On
023	On	On	Off	On	Off	Off	Off
024	On	On	Off	Off	On	On	On
025	On	On	Off	Off	On	On	Off
026	On	On	Off	Off	On	Off	On
027	On	On	Off	Off	On	Off	Off
028	On	On	Off	Off	Off	On	On
029	On	On	Off	Off	Off	On	Off
030	On	On	Off	Off	Off	Off	On
031	On	On	Off	Off	Off	Off	Off
032	On	Off	On	On	On	On	On
033	On	Off	On	On	On	On	Off
034	On	Off	On	On	On	Off	On
035	On	Off	On	On	On	Off	Off
036	On	Off	On	On	Off	On	On
037	On	Off	On	On	Off	On	Off
038	On	Off	On	On	Off	Off	On
039	On	Off	On	On	Off	Off	Off
040	On	Off	On	Off	On	On	On
041	On	Off	On	Off	On	On	Off
042	On	Off	On	Off	On	Off	On
043	On	Off	On	Off	On	Off	Off
044	On	Off	On	Off	Off	On	On
045	On	Off	On	Off	Off	On	Off
046	On	Off	On	Off	Off	Off	On
047	On	Off	On	Off	Off	Off	Off
048	On	Off	Off	On	On	On	On
049	On	Off	Off	On	On	On	Off
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051	On	Off	Off	On	On	Off	Off
052	On	Off	Off	On	Off	On	On
053	On	Off	Off	On	Off	On	Off
054	On	Off	Off	On	Off	Off	On
055	On	Off	Off	On	Off	Off	Off
056	On	Off	Off	Off	On	On	On
057	On	Off	Off	Off	On	On	Off
058	On	Off	Off	Off	On	Off	On
059	On	Off	Off	Off	On	Off	Off
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061	On	Off	Off	Off	Off	On	Off
062	On	Off	Off	Off	Off	Off	On
063	On	Off	Off	Off	Off	Off	Off
064	Off	On	On	On	On	On	On
065	Off	On	On	On	On	On	Off
066	Off	On	On	On	On	Off	On

<b>067</b>	Off	On	On	On	On	Off	Off
<b>068</b>	Off	On	On	On	Off	On	On
<b>069</b>	Off	On	On	On	Off	On	Off
<b>070</b>	Off	On	On	On	Off	Off	On
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<b>077</b>	Off	On	On	Off	Off	On	Off
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<b>079</b>	Off	On	On	Off	Off	Off	Off
<b>080</b>	Off	On	Off	On	On	On	On
<b>081</b>	Off	On	Off	On	On	On	Off
<b>082</b>	Off	On	Off	On	On	Off	On
<b>083</b>	Off	On	Off	On	On	Off	Off
<b>084</b>	Off	On	Off	On	Off	On	On
<b>085</b>	Off	On	Off	On	Off	On	Off
<b>086</b>	Off	On	Off	On	Off	Off	On
<b>087</b>	Off	On	Off	On	Off	Off	Off
<b>088</b>	Off	On	Off	Off	On	On	On
<b>089</b>	Off	On	Off	Off	On	On	Off
<b>090</b>	Off	On	Off	Off	On	Off	On
<b>091</b>	Off	On	Off	Off	On	Off	Off
<b>092</b>	Off	On	Off	Off	Off	On	On
<b>093</b>	Off	On	Off	Off	Off	On	Off
<b>094</b>	Off	On	Off	Off	Off	Off	On
<b>095</b>	Off	On	Off	Off	Off	Off	Off
<b>096</b>	Off	Off	On	On	On	On	On
<b>097</b>	Off	Off	On	On	On	On	Off
<b>098</b>	Off	Off	On	On	On	Off	On
<b>099</b>	Off	Off	On	On	On	Off	Off
<b>100</b>	Off	Off	On	On	Off	On	On
<b>101</b>	Off	Off	On	On	Off	On	Off
<b>102</b>	Off	Off	On	On	Off	Off	On
<b>103</b>	Off	Off	On	On	Off	Off	Off
<b>104</b>	Off	Off	On	Off	On	On	On
<b>105</b>	Off	Off	On	Off	On	On	Off
<b>106</b>	Off	Off	On	Off	On	Off	On
<b>107</b>	Off	Off	On	Off	On	Off	Off
<b>108</b>	Off	Off	On	Off	Off	On	On
<b>109</b>	Off	Off	On	Off	Off	On	Off
<b>110</b>	Off	Off	On	Off	Off	Off	On
<b>111</b>	Off	Off	On	Off	Off	Off	Off
<b>112</b>	Off	Off	Off	On	On	On	On
<b>113</b>	Off	Off	Off	On	On	On	Off
<b>114</b>	Off	Off	Off	On	On	Off	On
<b>115</b>	Off	Off	Off	On	On	Off	Off
<b>116</b>	Off	Off	Off	On	Off	On	On
<b>117</b>	Off	Off	Off	On	Off	On	Off
<b>118</b>	Off	Off	Off	On	Off	Off	On
<b>119</b>	Off	Off	Off	On	Off	Off	Off
<b>120</b>	Off	Off	Off	Off	On	On	On
<b>121</b>	Off	Off	Off	Off	On	On	Off
<b>122</b>	Off	Off	Off	Off	On	Off	On
<b>123</b>	Off	Off	Off	Off	On	Off	Off
<b>124</b>	Off	Off	Off	Off	Off	On	On
<b>125</b>	Off	Off	Off	Off	Off	On	Off
<b>126</b>	Off	Off	Off	Off	Off	Off	On
<b>127</b>	Off	Off	Off	Off	Off	Off	Off

### 3. Wiring

**Appendix.A shows the wiring diagram for single hwlcd-mini using locally obtained wiring/connecting materials.** Alternatively the unit is available in a form of bundles, including all necessary wires and connectors plus RGB LED per display. **Appendices B,C,D** show the wiring diagrams for bundle#1, #2 and #3 accordingly. Bigger number of chained units is also possible, following same logic.

### 4. MIDI Implementation

The **hwlcd-mini** standard firmware would only 'understand' *System Exclusive* messages as defined in Hauptwerk specification. Each MIDI byte received on MIDI input will be immediately retransmitted on MIDI output with no processing and/or delay. Any MIDI message that is different than Hauptwerk's System Exclusive will be simply ignored and won't affect the status of display/LEDs. The unit won't alter the MIDI messages passing thru so that they can be used by another units cascaded down the same MIDI line.

Following is the description of how **hwlcd-mini** would interpret Hauptwerk *System Exclusive* message format (all bytes shown in hexadecimal format). Note that the format is compatible to Hauptwerk's original SysEx format, but has extended color set so that any combination of the three basic LED colors (Red, Green, Blue) can be used.

The *System Exclusive* message is exactly 39 bytes in length:

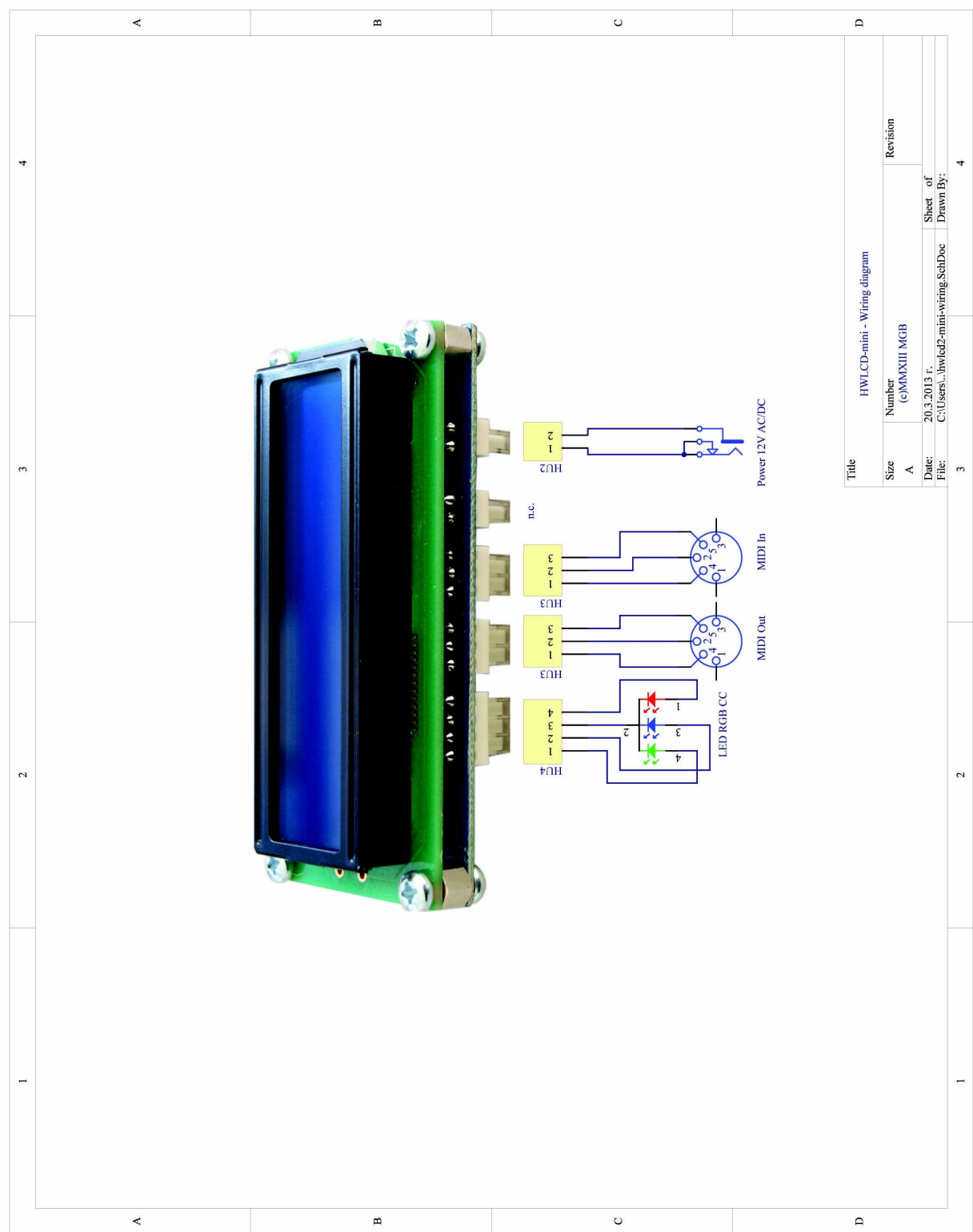
- Byte 1:** *System Exclusive* start, always **0xf0**  
**Byte 2:** Fixed manufacturer ID, always **0x7d**  
**Byte 3:** Message type code for Hauptwerk LCD output message, always **0x01**  
**Byte 4:** LCD panel ID most significant byte, ignored by **hwlcd-mini**, can be **0x00-0x7f**  
**Byte 5:** LCD panel ID least significant byte, interpreted by **hwlcd-mini** as unique ID, can be **0x00-0x7f**  
**Byte 6:** Color code for controlling LEDs, can be **0x00-0x7f**:
- 0x00** = none (LED off)
  - 0x01** = white (R+G+B)
  - 0x02** = red (R)
  - 0x03** = green (G)
  - 0x04** = yellow (R+G)
  - 0x05** = blue (B)
  - 0x06** = magenta (R+B)
  - 0x07** = cyan (G+B)
  - 0x08-0x7f** = none (LED off)
- Bytes 7-38:** The 32 ASCII (Z-bit) bytes for the text to display, each byte can be **0x00-0x7f**  
**Byte 39:** *EOX/End of System Exclusive*, always **0xf7**.

### 5. Technical parameters

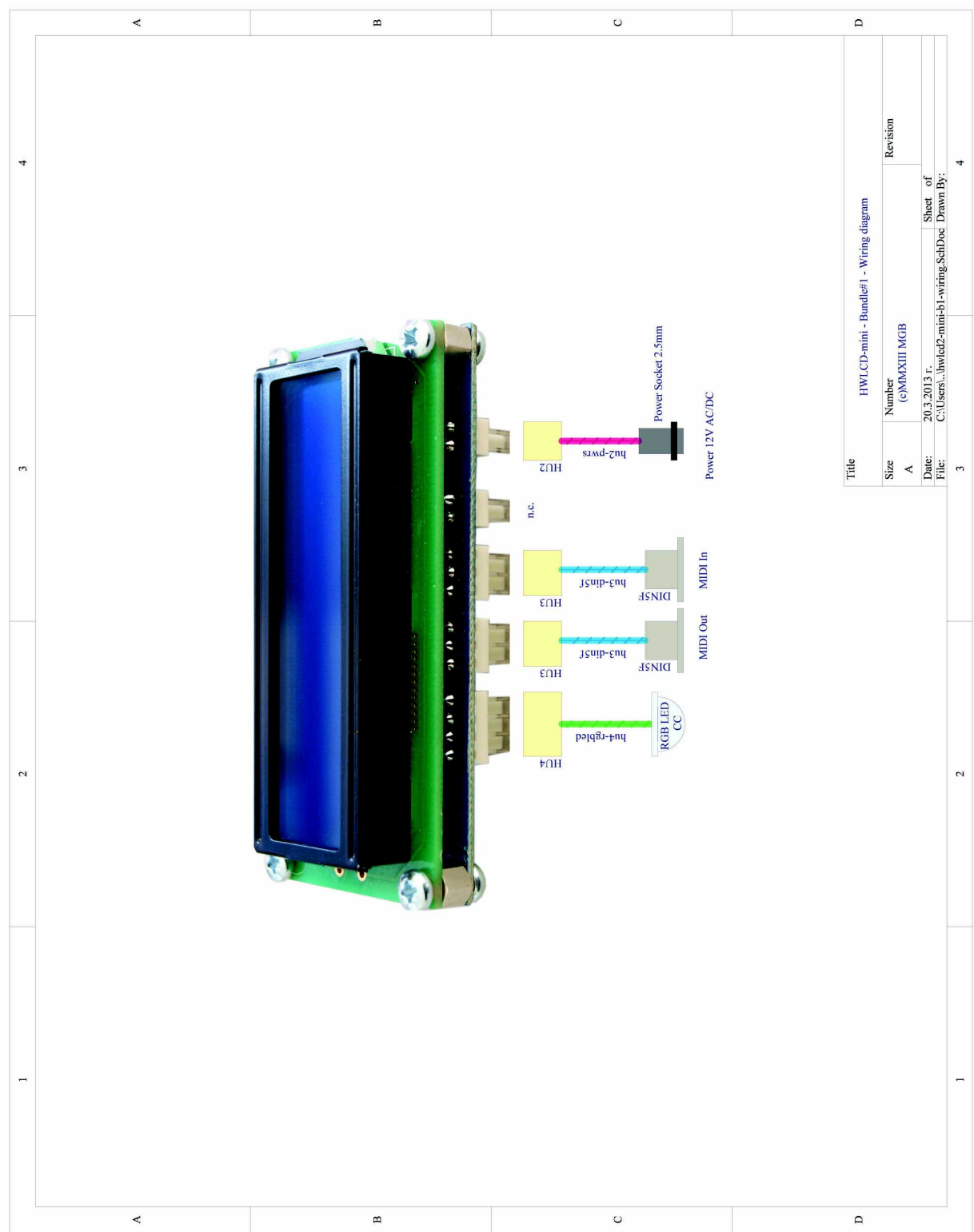
**Table 2. hwlcd-mini technical parameters**

Parameter	Value	Unit	Comment
Power supply voltage	9-12 AC/DC	V	Adapter or transformer
Power supply current	White-on-blue with backlight: 30 Black-on-green with backlight: 160	mA	
Recognized MIDI messages	Hauptwerk specific System Exclusive message for controlling Displays	-	May be other on request
Retransmitted MIDI messages	Any received	-	The unit is actually transparent for all MIDI messages.
Unit ID	0..127	-	User-selectable
Backlight	Yes	-	User-selectable
Size	8.0x3.5x2.7	cm	3.1"x1.4"x1.1" approx. (with no cables attached)
Weight	57	g	2.0 oz (with no cables attached)

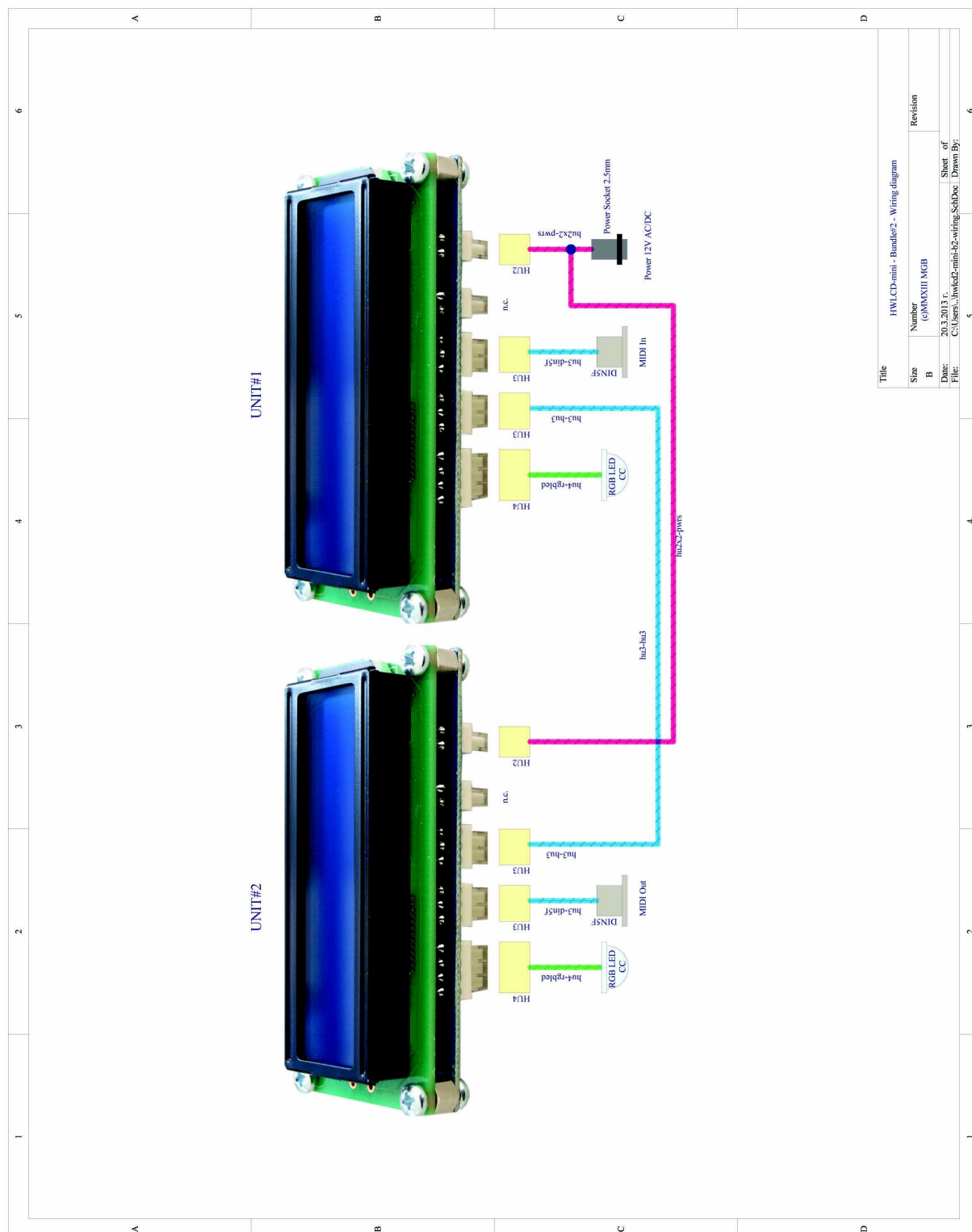
Appendix A. hwlcd-mini wiring diagram



Appendix B. hwlcd-mini-bundle#1 wiring diagram



## Appendix C. hwlcd-mini-bundle#2 wiring diagram



## Appendix D. hwlcd-mini-bundle#3 wiring diagram

