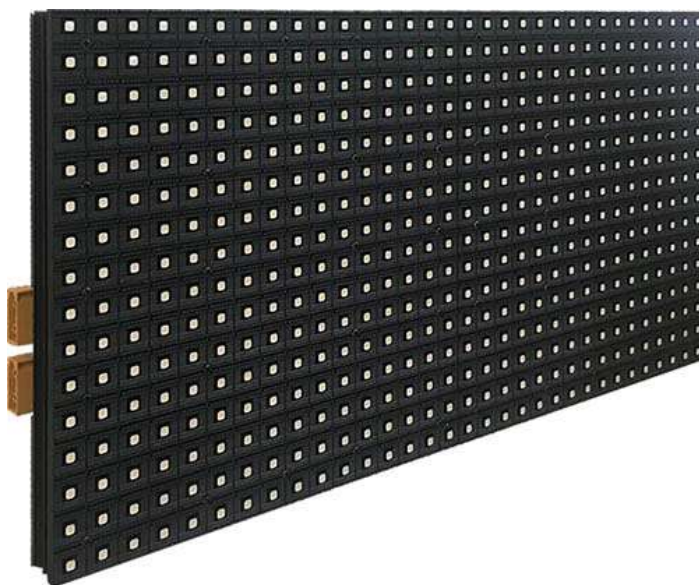# MLED (Modular LED Display)

1. Appearance

The MLED full color panel introduces a new, flexible way to build and use your timing screens. With its lightweight and modular design you can use as many panels as you need to build your desired display size for your event.

Each MLED has a definition of 32x16 dots and can be assembled in series up to a total of 8 panels.

Multi lines can also be achieved by mounting multiple MLED panels vertically.

MLED-3S
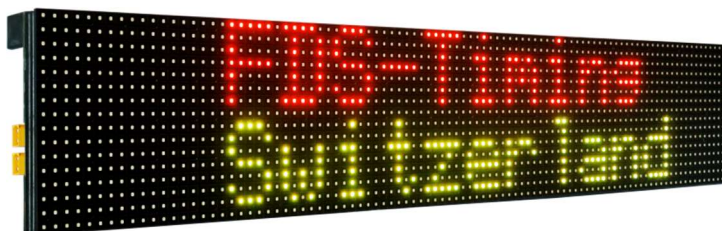
2. MLED with embedded radio receiver

The MLED model 20 is equipped with an embedded radio receiver. In a display assembly of several MLED, the model 20 has to be located on the lower right side and will act as the master. The TBox model 41 is able to send wireless data to this module either in 'Auto Timing' mode or under the control of the SmartChrono App. Data can also be send from any computer using our WINP as transmitter with a dedicated special firmware.

MLED-3R (front face)

| MLED 10-xxxxx	MLED 10-xxxxx	MLED 20-xxxxx

Ideally the radio model (MLED-20) should be located within 100m of the transmitter.
Our new model (MLED-21) has an external antenna which will allow better reception and longer distance. Few hundred meters to km could be achieved in good environmental conditions.
Radio band has to match the one used on the TBox-41 transmitter (country based).
Only Groups A-D can be used with the MLED radio.
⚠ TBox , MLED and WIRC have to be on the same group.
⚠ For better reception, make sure the display is in a clear space and not against a wall.

2.1. Settings

The MLED radio accepts data only from a predefined list of transmitter serial number (White list). This list must be set using the PC application "Display Setup Manager".
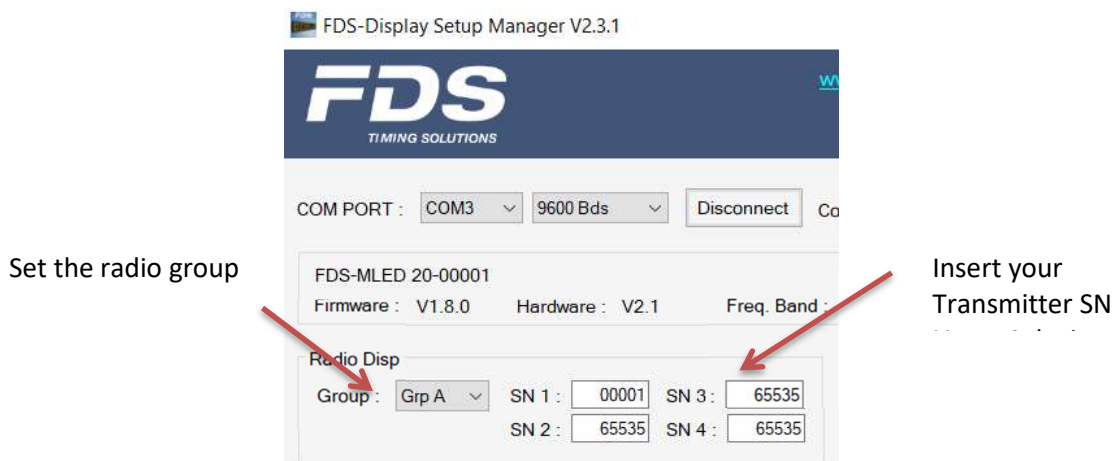
3. Connection

Each panel is equipped with 2 power connectors and 2 RS232 data connectors.

POWER connectors:

There is one power connector on each side. Power input is via the XT60 male on the right side of each panel with the left hand side female XT60 being the voltage output to supply the adjoining MLED panel. Input voltage range goes from 12V to 24V +/- 10%

RS232 data connectors:

Similar to the power, there are two XT60 (MLED-x0) / MR30 (MLED-x1) connectors on each panel, the data connector on the right side of the panel being the RS232 data input from a PC and the left side connector supplying the RS232 data output to the adjoining MLED panel.

4. Mode of operation

The most common configuration comprises of 3 or 4 MLED panels adjoined to form a display fully configurable to either a single full height line of characters or multiple lines as below. Another configuration proposed is 2 rows of 6 modules which form a 192x32cm display area. The total display area is divided into 9 zones (A – I) as the schematic below. Be aware that some zones share the same display area and should not be used together. A line number as well as a color can be assigned to each zone via the IOS or PC setup application.
It is recommended to assign the value "0" to any unused zone.

A

B
C

D	E
F	G

H	I
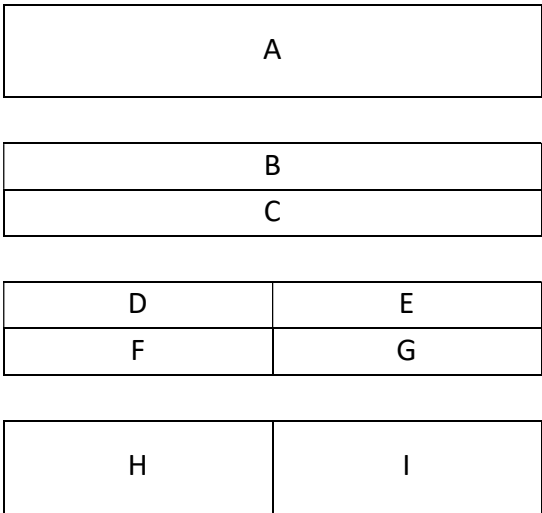
Display with 3 x MLED panels (MLED-3S):

Zone A:　　　　8-9 characters, height 14-16cm depending on the font type selected
Zone B - C:　　16 characters per zone, height 7cm
Zone D - G:　　8 characters per zone, height 7cm
Zone H - I:　　4 characters per zone, height 14-16cm

Display with 2x6 MLED panels (MLED-26S):

Zone A: 8-9 characters, height 28-32cm depending on the font type selected
Zone B - C: 16 characters, height 14-16cm per zone
Zone D - G: 8 characters, height 14-16cm per zone
Zone H - I: 4 characters, height 28-32cm per zone

4.1. Zones Settings

 - For each zone a Line number and color have to be defined.
   Line Nr = 0 means the zone is not used.
 - A range can be set for zones A – C. A range allows displaying only part of a frame.
   For example if a range is set from 5 to 15 and the received frame is "this is a range demo",
   MLED will display the text "is a range".
 - The proportion of the adjacent Zones D-E, F-G, H-I can be modified.

If the parameter 'auto scroll speed' defined for a zone is greater than zero, then any text longer than the zone will be automatically scrolled.

5. RS232 Control

If used without any extension module as our MLED-CTRL, the only way to set and control an MLED display is via its right side RS232 port. When an assembly of several MLED modules is used to form a display, the lower right hand side MLED module is acting as the master and therefore the RS232 cable has to be connected to this module. Lines color and number can be defined using our PC Display setup application.

Important:
All settings are stored in the master MLED module. If this module is swapped with another one, you will have to configure the new master module according to your need.

6. How to update the firmware

Updating the firmware is relatively simple. It can be performed on one panel or simultaneously on several panels assembled together.
For this operation you will need to use the software "FdsFirmwareUpdate".

a) Disconnect power from the display
b) Install the program "FdsFirmwareUpdate" on your computer
c) Connect the RS232 cable to the RS232 XT60 connector on the right side of the panel.
d) Run the program "FdsFirmwareUpdate"
e) Select the COM Port
f) Select the update file (.bin)
g) Press Start on the program
h) Connect the power cable to the MLED panel
i) Once the update completes, "OK" will be displayed on each panel

7. RS232 Protocol

The FDS display protocol is compatible with standard frames from the TagHeuer DISP08 protocol.

In order to use all the potential of our display lines, some FDS proprietary commands have been implemented and added as an extension of this protocol.

7.1. Frame format

```
<STX>NLXXXXXXXX<LF>
```

STX = 0x02
N   = Line number <1..9, A..Z>
L   = Brightness <1..3>
X   = Characters (up to 64, cmd included)
LF   = 0x0A

Format: 8bits / no parity / 1 stop bit
Baud Rate: 9600bds

7.2. Characters Set

All standard ASCII characters <32 .. 126> excepted for the char ^ which is used as delimiter

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
[\]_'`abcdefghijklmnopqrstuvwxyz{|}~
```

Extended Latin ASCII characters (ISO-8859-1) <224 .. 255>
àáâãäåæçèéêëìíîïðñòóôõö÷øùúûüýþÿ

7.3. FDS extended commands

The following specification is valid for firmware version V2.3.0 an above.

Inline commands can be add in a display frame between the ^^ delimiters.

Command	Description
^cs **c^**	**Color overlay**
^cp **s e c^**	**Color overlay between two characters position**
^tf **p c^**	**Display a Traffic Light at position (Filled)**
^tb **p c^**	**Display a Traffic Light at position (Border only)**
^ic **n c p ^**	**Display an icon (among proposed icons)**
^fi **c^**	**Fill all display**
^fs **n s c^** ^fe^	**Flash part of a text**
^fd **n s c^**	**Flash full line**
^rt **f hh:mm:ss^** ^rt **f hh:mm:ss.d^** ^rt **f mm:ss^** ^rt **f mm:ss.d^** ^rt **f sss^** ^rt **f sss.d^**	**Display a running time**

Color Overlay:

Command	Description
^cs c^	**Color overlay** **cs** = start color overlay cmd **c** = color code (1 or 2 digits : <0 … 10>) *Example A:* <STX>13Welcome ^cs 2^FDS^cs 0^Timing<LF> "Welcome" and "Timing" are in the default line color "FDS" is in Green *Example B:* <STX>23^cs 3^Colour^cs 4^ Display<LF> "Color" is in Blue "Display" is in Yellow Color overlay is only applied in the current received frame.

Text Color at position:

Command	Description
^cp s e c^	**Set color overlay between two characters position (permanent)** **cp** = cmd **s** = first character position (1 or 2 digits : <1 .. 32>) **e** = last character position (1 or 2 digits : <1 .. 32>) **c** = color code (1 or 2 digits : <0 … 10>) *Example:* <STX>13^cp 1 10 2^^cp 11 16 3^ <LF> Characters position 1 to 10 are defined in Green Characters position 11 to 16 are defined in Blue This setting is saved in non-volatile memory, and is applied to all following received frame.

Display a Traffic lights at position (Filled):

Command	Description
^tf p c^	**Display a filled traffic light at a defined position** **tf** = cmd **p** = position starting from the left (1 .. 9). 1 inc = 1 traffic light width **c** = color code (1 or 2 digits : <0 … 10>) *Example:* <STX>13^tf 1 2^^tf 2 1^ <LF> Display a green and a red traffic Light on the left of the display. This will overlay any other data. The rest of the display is not modified. Do not add text in the same frame

Display a Traffic lights at position (Border only):

Command	Description
^tb **p c**^	**Display a traffic light (border only) at a defined position** **tb** = cmd **p** = position starting from the left (1 .. 9). 1 inc = 1 traffic light width **c** = color code (1 or 2 digits : <0 … 10>) *Example:* <STX>13^tb 1 2^^tb 2 1^ <LF> Display a green and a red traffic Light on the left of the display. This will overlay any other data. The rest of the display is not modified Do not add text in the same frame

Display an Icon:

Command	Description
^ic **n c p**^	**Display an icon inline a text or at a defined position** **ic** = cmd **c** = color code (1 or 2 digits : <0 … 10>) **p** = position starting from the left (*optional) <1…32> 1 inc = ½ icon width *Example 1:* <STX>13^ic 1 2 2^<LF> Display a small green traffic light at position 2 *Example 2:* <STX>13^ic 5 7^Finish<LF> Display a white checker flag on the left followed by the text 'Finish' * If this parameter is omitted, the icon is displayed before, after or between a text. Text can be added in the same frame. If this parameter > 0 then the icon will be displayed at the defined position overlaying any other data. Do not add text in the same frame. **Icon list:** 0 = reserved 1 = small traffic light filled 2 = small traffic light empty 3 = traffic light filled 4 = traffic light empty 5 = Checker flag

Fill all display:

Command	Description
^fi **c**^	**Fill with a defined color the full display area.** **Only 50% of the LEDs are turned on to reduce current and heating** **fi** = cmd **c** = color code (1 or 2 digits : <0 … 10>) *Example:* <STX>13^fi 1^ <LF> Fill the display line with the red color.

Flash a full line:

Command	Description
^fd **n s c**^	**Flash a full line** **fd** = cmd **s** = Speed <0 … 3> **n** = Number of flash <0 … 9> (0 = permanent flashing) **c** = color code *optional (0 - 2 digits : <0 … 10>) *Example:* <STX>13^fd 3 1^<LF> Flash the line 3 times at speed 1

Flash a text:

Command	Description
^fs **n s c**^ ^fe^	**Flash a text** **fs** = Start of text to flash cmd **fe** = End of text to flash cmd **s** = Speed <0 … 3> **n** = Number of flash <0 … 9> (0 = permanent flashing) **c** = color code *optional (0 - 2 digits : <0 … 10>) *Example:* <STX>13^fs 3 1^FDS^fe^ Timing<LF> Display the text "FDS Timing". The word 'FDS' is flashing 3 times. Color is not present so Black by default.

Display a running time:

Command	Description
^rt **f hh:mm:ss^** ^rt **f hh:mm:ss.d^** ^rt **f mm:ss^** ^rt **f mm:ss.d^** ^rt **f sss^** ^rt **f sss.d^**	**Display a running time** **rt** = cmd **f** = Flags <0 … 7> (bit0 = remove leading 0; bit1 =countdown) **hh** = hours <0 … 99> **mm** = minutes <0 … 59> **sss** = seconds <0 … 999> **ss** = seconds <0 … 59> **d** = decimal *Example 1:* <STX>13^rt 0 10:00:00^<LF> <STX>13^rt 0 10:00:00.5^<LF> Display a clock starring at 10h. A decimal can be added for a better synchronization, however if the display is 8 digits wide, the decimal is not showed. *Example 2:* <STX>13^rt 1 00:00.0^<LF> Display a running time in mm:ss.d from 0, hiding the leading zero.

Color code:

code	Color
0	Black
1	Red
2	Green
3	Blue
4	Yellow
5	Magenta
6	Cyan
7	White
8	Orange
9	Deep pink
10	Light Blue

8. Technical specifications

MLED (1 module):

Resolution	32 x 16 (RGB Leds)
Power supply	12V-24V (+/- 10%)
Average current under 12V	0.8A for red text 2.0A for white text
Max power	47W
Operating temperature	-20°C to +60°C
Environment	Indoor & Outdoor (IP63)
Size	320x160x27 mm
Weight	800gr

MLED-3S (3 modules):

Resolution	96 x 16 (RGB Leds)
Power supply	12V-24V (+/- 10%)
Average current under 12V	2.4A for red text 6.0A for white text
Max power	140W
Operating temperature	-20°C to +60°C
Environment	Indoor & Outdoor (IP63)
Size	960x160x27 mm
Weight	2.4kg (without frame)

MLED-26S (12 modules):

Resolution	192 x 32 (RGB Leds)
Power supply	12V-24V (+/- 10%)
Average current under 12V	9.6A for red text 24A for white text (2x300w power supply is advised)
Max power	560W
Operating temperature	-20°C to +60°C
Environment	Indoor & Outdoor (IP63)
Size	1920x320x27 mm
Weight	9.6kg (without frame)

FDS
TIMING SOLUTIONS

9. Copyright and Declaration

This manual has been compiled with great care and the information it contains has been thoroughly verified. The text was correct at the time of printing, however the content can change without notice. FDS accepts no liability for damage resulting directly or indirectly from faults, incompleteness or discrepancies between this manual and the product described.

The sale of products, services of goods governed under this publication are covered by FDS's standard Terms and Conditions of Sales and this product publication is provided solely for informational purposes. This publication is to be used for the standard model of the product of the type given above.

Trademarks: All hardware and software product names used in this document are likely to be registered trademarks and must be treated accordingly.

FDS-TIMING Sàrl

Rue du Nord 123

2300 La Chaux-De-Fonds

Switzerland

www.fdstiming.com