2CH wlan Digital Storage Oscilloscope
Velleman® nv has been an important wholesaler and developer of electronics for over 36 years. Our warehouses contain more than 18,000 different products of 50 brands. The distribution network includes more than 1700 distributors in well over 85 countries. Velleman® nv has built up an excellent service reputation towards retailers. To meet the ever increasing growth, Velleman® nv expanded with new offices and showrooms as well as a new warehouse of 35,000m³ equipped with the latest in order picking technology. This represents an investment of over €5,500,000.
Contents

Send ‘wifi settings request’ from display device (Tablet or USB host) to WiFi Scope ......................... 4
Send ‘wifi settings’ from display device (Tablet or USB host) to WiFi Scope .................................. 4
Send ‘start calibration’ from display device (Tablet or USB host) to WiFi Scope .............................. 5
Send ‘status request’ from display device (Tablet or USB host) to WiFi Scope ............................... 5
Send ‘settings’ from display device (Tablet or USB host) to WiFi Scope ........................................ 6
Send ‘sample data request’ from display device (Tablet or USB host) to WiFi Scope ...................... 7
Receive scope settings from WiFi Scope to display device (Tablet or USB host) ........................... 8
Receive scope sample data from WiFi Scope to display device (Tablet or USB host) ....................... 9
Receive WiFi settings from WiFi Scope to display device (Tablet or USB host) ......................... 11
Send ‘wifi settings request’ from display device (Tablet or USB host) to WiFi Scope

\[
\text{Start of transmission: } \text{STX} = 0x02 \\
\text{Data length: } 8 \\
\text{Wifi settings request command: } 0xA \\
\text{Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes} \\
\text{End of transmission: } \text{ETX} = 0xA
\]

Send ‘wifi settings’ from display device (Tablet or USB host) to WiFi Scope

\[
\text{Start of transmission: } \text{STX} = 0x02 \\
\text{Data length: } 74 \\
\text{Wifi settings command: } 0xB \\
\text{Wifi channel: } 1...13 \\
\text{SSID: Up to 32 characters (not used characters = 0)} \\
\text{Remark: At least one character must be used. Only the following characters are allowed: 0...9, a...z, A...Z, _ and -} \\
\text{Password: Up to 32 characters (not used characters = 0)} \\
\text{Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes} \\
\text{End of transmission: } \text{ETX} = 0xA\]
Send ‘start calibration’ from display device (Tablet or USB host) to WiFi Scope

<STX>
<Start-calibration-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 8
Start calibration command: 0xCA
Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes
End of transmission: ETX = 0x0A

Send ‘status request’ from display device (Tablet or USB host) to WiFi Scope

<STX>
>Status-request-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 8
Status request command: 0x10
Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes
End of transmission: ETX = 0x0A
Send ‘settings’ from display device (Tablet or USB host) to WiFi Scope

\texttt{<STX>}
\texttt{<Settings-cmd> <Data-length-low-byte> <Data-length-high-byte>}
\texttt{<0> <0>}
\texttt{<CH1-input-coupling> <CH1-V/div> <CH1-Yposition>}
\texttt{<CH2-input-coupling> <CH2-V/div> <CH2-Yposition>}
\texttt{<Timebase> <Trigger-level> <Trigger-setting> <reserved>}
\texttt{<CHKSUM>}
\texttt{<ETX>}

\textbf{Start of transmission:} STX = 0x02
\textbf{Data length:} 18
\textbf{Settings command:} 0x11

\textbf{CHx input coupling:}

\begin{center}
\begin{tabular}{ccc}
AC & 0 & DC & 1 & GND & 2 \\
\end{tabular}
\end{center}

\textbf{CHx V/div:}

\begin{center}
\begin{tabular}{cc}
Off & 0 \\
20 V/div & 1 \\
10 V/div & 2 \\
4 V/div & 3 \\
2 V/div & 4 \\
1 V/div & 5 \\
0.5 V/div & 6 \\
\end{tabular}
\begin{tabular}{l}
0.2 V/div 7 \\
0.1 V/div 8 \\
50 mV/div 9 \\
25 mV/div 10 \\
10 mV/div 11 \\
5 mV/div 12 \\
0.2 V/div 7 \\
0.1 V/div 8 \\
0.5 V/div 10 \\
0.2 V/div 11 \\
0.1 V/div 12 \\
0.5 V/div 13 \\
0.2 V/div 14 \\
0.1 V/div 15 \\
0.2 V/div 16 \\
0.5 V/div 17 \\
1 s/div 18 \\
1 ms/div 9 \\
\end{tabular}
\end{center}

\textbf{CHx Yposition:} 3...252 \hspace{1cm} (3 = top / 128 = center / 252 = bottom of screen)

\textbf{Timebase:}

\begin{center}
\begin{tabular}{ccc}
1 µs/div & 0 & 2 ms/div & 10 \\
2 µs/div & 1 & 5 ms/div & 11 \\
5 µs/div & 2 & 10 ms/div & 12 \\
10 µs/div & 3 & 20 ms/div & 13 \\
20 µs/div & 4 & 50 ms/div & 14 \\
50 µs/div & 5 & 0.1 s/div & 15 \\
0.1 ms/div & 6 & 0.2 s/div & 16 \\
0.2 ms/div & 7 & 0.5 s/div & 17 \\
0.5 ms/div & 8 & 1 s/div & 18 \\
1 ms/div & 9 & 2 ms/div & 10 \\
\end{tabular}
\end{center}

\textbf{Trigger level:} 3...252 \hspace{1cm} (3 = top / 128 = center / 252 = bottom of screen)
**Trigger settings:**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 0</td>
<td>Trigger mode (00 = Normal / 01 = Auto / 10 = Once)</td>
</tr>
<tr>
<td>2</td>
<td>Trigger slope (0 = rising edge / 1 = falling edge)</td>
</tr>
<tr>
<td>3</td>
<td>Trigger channel (0 = ch1 / 1 = ch2)</td>
</tr>
<tr>
<td>4</td>
<td>Run/Hold (0 = run / 1 = Hold)</td>
</tr>
<tr>
<td>5</td>
<td>Reserved</td>
</tr>
<tr>
<td>6</td>
<td>Reserved</td>
</tr>
<tr>
<td>7</td>
<td>Autorange (0 = autorange off / 1 = autorange on)</td>
</tr>
<tr>
<td>8...15</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

**Checksum:** CHKSUM = 8-bit two’s complement of sum of all previous bytes

**End of transmission:** ETX = 0x0A

**Remark:**

Setting the autorange:
- The Y-position and trigger level is forced to the center position.
- Triggermode is set to auto mode.
- The timebase and V/div will be automatically set to fit the waveform on screen.
- The V/div will be automatically set for the channels to fit the waveform on screen.

Into autorange:
Changing the Y-position, trigger level, trigger mode, V/div or Timebase must switch the autorange off

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**Send ‘sample data request’ from display device (Tablet or USB host) to WiFi Scope**

```
<STX>
<Sample-data-request-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CHKSUM>
<ETX>
```

**Start of transmission:** STX = 0x02
**Data length:** 8
**Sample data request command:** 0x12
**Checksum:** CHKSUM = 8-bit two’s complement of sum of all previous bytes

**End of transmission:** ETX = 0x0A
Receive scope settings from WiFi Scope to display device (Tablet or USB host)

<STX>
<Status-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CH1-input-coupling> <CH1-V/div> <CH1-Yposition>
<CH2-input-coupling> <CH2-V/div> <CH2-Yposition>
<Timebase> <Trigger-level> <Trigger-settings> <Module-status>
<CHKSUM>
<ETX>

**Start of transmission:** STX = 0x02

**Settings command:** 0x20

**Data length:** 18

**CHx V/div:**
- Off 0 0.2 V/div 7
- 20 V/div 1 0.1 V/div 8
- 10 V/div 2 50 mV/div 9
- 4 V/div 3 25 mV/div 10
- 2 V/div 4 10 mV/div 11
- 1 V/div 5 5 mV/div 12
- 0.5 V/div 6

**CHx Yposition:** 3...252 (3 = top / 128 = center / 252 = bottom of screen)

**Timebase:**
- 1 µs/div 0 2 ms/div 10
- 2 µs/div 1 5 ms/div 11
- 5 µs/div 2 10 ms/div 12
- 10 µs/div 3 20 ms/div 13
- 20 µs/div 4 50 ms/div 14
- 50 µs/div 5 0.1 s/div 15
- 0.1 ms/div 6 0.2 s/div 16
- 0.2 ms/div 7 0.5 s/div 17
- 0.5 ms/div 8 1 s/div 18
- 1 ms/div 9

**Trigger level:** 3...252 (3 = bottom / 128 = center / 252 = bottom of screen)

**Trigger settings:**
- Bit 1 & 0 Trigger mode (00 = Normal / 01 = Auto / 10 = Once)
- Bit 2 Trigger slope (0 = rising edge / 1 = falling edge)
- Bit 3 Trigger channel (0 = ch1 / 1 = ch2)
- Bit 4 Run/Hold (0 = run / 1 = Hold)
- Bit 5 Reserved
- Bit 6 Reserved
- Bit 7 Autorange (0 = autorange off / 1 = autorange on)
Module status:

Bit 0  Charger Power-Good status
Bit 1  Charge Status 2
Bit 2  Charge Status 1

<table>
<thead>
<tr>
<th>Status</th>
<th>Bit 2 (Stat 1)</th>
<th>Bit 1 (Stat 2)</th>
<th>Bit 0 (PG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No USB power present</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>No battery present</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low battery</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Temperature fault</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Charging complete</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Charging</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Bit 3 0
Bit 4  Calibrating (0 = off / 1 = busy)
Bit 5  Low battery (1 = low battery)

Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes

End of transmission: ETX = 0x0A

Receive scope sample data from WiFi Scope to display device (Tablet or USB host)

<STX>
Sample-data-cmd <Data-length-low-byte> <Data-length-high-byte>
Offset-low-byte <Offset-high-byte>
CH1-input-coupling <CH1-V/div> <CH1-Yposition>
CH2-input-coupling <CH2-V/div> <CH2-Yposition>
Timebase <Trigger-level> <Trigger-settings> <Module-status>
Sample-1-ch1 <Sample-1-ch2> <Sample-2-ch1> <Sample-2-ch2> ... <Sample-n-ch1> <Sample-n-ch2>
CHKSUM
<ETX>

Start of transmission: STX = 0x02
Settings command: 0x21
Data length: 18 + (2 x number of samples/channels)
Offset: X- position of sample buffer

CHx V/div:

<table>
<thead>
<tr>
<th>CHx V/div</th>
<th>Offset</th>
<th>0.2 V/div</th>
<th>0.1 V/div</th>
<th>50 mV/div</th>
<th>25 mV/div</th>
<th>10 mV/div</th>
<th>5 mV/div</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off 0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>20 V/div</td>
<td>1</td>
<td>0.2 V/div</td>
<td>0.1 V/div</td>
<td>50 mV/div</td>
<td>25 mV/div</td>
<td>10 mV/div</td>
<td>5 mV/div</td>
</tr>
<tr>
<td>10 V/div</td>
<td>2</td>
<td>20 V/div</td>
<td>10 V/div</td>
<td>4 V/div</td>
<td>2 V/div</td>
<td>1 V/div</td>
<td></td>
</tr>
<tr>
<td>4 V/div</td>
<td>3</td>
<td>4 V/div</td>
<td>2 V/div</td>
<td>10 mV/div</td>
<td>1 V/div</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 V/div</td>
<td>4</td>
<td>8 V/div</td>
<td>10 mV/div</td>
<td>5 mV/div</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 V/div</td>
<td>5</td>
<td>10 mV/div</td>
<td>5 mV/div</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5 V/div</td>
<td>6</td>
<td>10 mV/div</td>
<td>5 mV/div</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**CHx Yposition:** 3...252  
(3 = top / 128 = center / 252 = bottom of screen)

**Timebase:**

<table>
<thead>
<tr>
<th>Timebase</th>
<th>1 µs/div</th>
<th>2 µs/div</th>
<th>5 µs/div</th>
<th>10 µs/div</th>
<th>20 µs/div</th>
<th>50 µs/div</th>
<th>0.1 ms/div</th>
<th>0.2 ms/div</th>
<th>0.5 ms/div</th>
<th>1 ms/div</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

**Trigger level:** 3...252  
(3 = top / 128 = center / 252 = bottom of screen)

**Trigger settings:**

- **Bit 1 & 0** Trigger mode (00 = Normal / 01 = Auto / 10 = Once / 11 = Roll)
- **Bit 2** Trigger slope (0 = rising edge / 1 = falling edge)
- **Bit 3** Trigger channel (0 = ch1 / 1 = ch2)
- **Bit 4** Run/Hold (0 = run / 1 = Hold)
- **Bit 5** Reserved
- **Bit 6** Reserved
- **Bit 7** Autorange (0 = autorange off / 1 = autorange on)

**Module status:**

- **Bit 0** Charger Power-Good status
- **Bit 1** Charge Status 2
- **Bit 2** Charge Status 1

<table>
<thead>
<tr>
<th>Status</th>
<th>Bit 2 (Stat 1)</th>
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<tr>
<td>No USB power present</td>
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<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low battery</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Temperature fault</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Charging complete</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Charging</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

- **Bit 3** 0
- **Bit 4** Calibrating (0 = off / 1 = busy)
- **Bit 5** Low battery (1 = low battery)

**Sample buffer:** Channel 1 & channel 2 samples (3 = top / 128 = center / 252 = bottom of screen)

For all timebase settings: 50 samples/div except for 1µs/div: 10 samples/div and for 2µs/div: 20 samples/div

**Checksum:** CHKSUM = 8-bit two’s complement of sum of all previous bytes

**End of transmission:** ETX = 0x0A
Receive WiFi settings from WiFi Scope to display device (Tablet or USB host)

<STX>
<Status-wifi-settings-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<Wifi-channel-low-byte> <Wifi-channel-high-byte>
<SSID-char1> <SSID-char2> <SSID-char3> ... <SSID-char32>
<Password-char1> <Password-char2> <Password-char3> ... <Password-char32>
<Build-digit1> <Build-digit2> <Build-digit3> <Build-digit4>
<Wifi-Firmware-version-char1> <Wifi-Firmware-version-char2> ... <Wifi-Firmware-version-char16>
<CHKSUM>
<ETX>

Start of transmission: TX = 0x02
Data length: 94
Status WiFi settings command: 0x22
Wifi channel: 1...13
SSID: Up to 32 characters (not used characters = 0)
Password: Up to 32 characters (not used characters = 0)
Build: 4 characters for scope firmware build
Version: Up to 16 characters for wifi module scope firmware version
Checksum: CHKSUM = 8-bit two's complement of sum of all previous bytes
End of transmission: ETX = 0x0A
The Velleman WFS210 is the world’s first wlan dual channel digital storage oscilloscope geared towards tablet computers. The WFS210 is a compact, portable battery powered fully featured two channel oscilloscope. Instead of a built-in screen it uses your tablet (iOS, Android™ or PC(Windows)) to display the measurements. Data exchange between the tablet and the oscilloscope is via wlan.