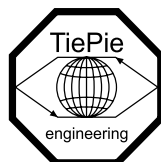


Wireless Multi Instrument Synchronization Module

User manual



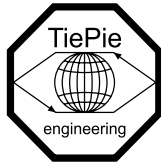
TiePie engineering

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Revision 1.2, August, 2023

Despite the care taken for the compilation of this user manual, TiePie engineering can not be held responsible for any damage resulting from errors that may appear in this manual.

Declaration of conformity



TiePie engineering
Koperslagersstraat 37
8601 WL Sneek
The Netherlands

EC Declaration of conformity

We declare, on our own responsibility, that the product

Wireless Multi Instrument Synchronization Module WCMI-(8/9)

for which this declaration is valid, is in compliance with

EC directive 2011/65/EU (the RoHS directive)
including up to amendment 2021/1980,

EC regulation 1907/2006 (REACH)
including up to amendment 2021/2045,

EC regulation 2014/53/EU (Radio Equipment Directive)

and with

EN 55011:2016/A1:2017 IEC 61000-6-1:2019 EN
EN 55022:2011/C1:2011 IEC 61000-6-3:2007/A1:2011/C11:2012 EN

according the conditions of the EMC standard 2004/108/EC

This declaration loses its validity in the event of a change to the device
not agreed with us.

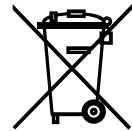
Sneek, 01-05-2023
ir. A.P.W.M. Poelsma

Environmental considerations

This section provides information about the environmental impact of the Wireless Multi Instrument Synchronization Module.

End-of-life handling

Production of the Wireless Multi Instrument Synchronization Module required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the Wireless Multi Instrument Synchronization Module's end of life.



In order to avoid release of such substances into the environment and to reduce the use of natural resources, recycle the Wireless Multi Instrument Synchronization Module in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

The shown symbol indicates that the Wireless Multi Instrument Synchronization Module complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

WCMI



The Wireless Multi Instrument Synchronization Module (WCMI) is a module that allows to synchronize and combine two or more Handyscopes / WiFiScopes via an RF connection. The scopes can be up to 400 m apart from each other.

The WCMI is compatible with:

WiFiScope WS6 DIFF	Handyscope HS6 DIFF
WiFiScope WS6	Handyscope HS6
WiFiScope WS5	Handyscope HS5

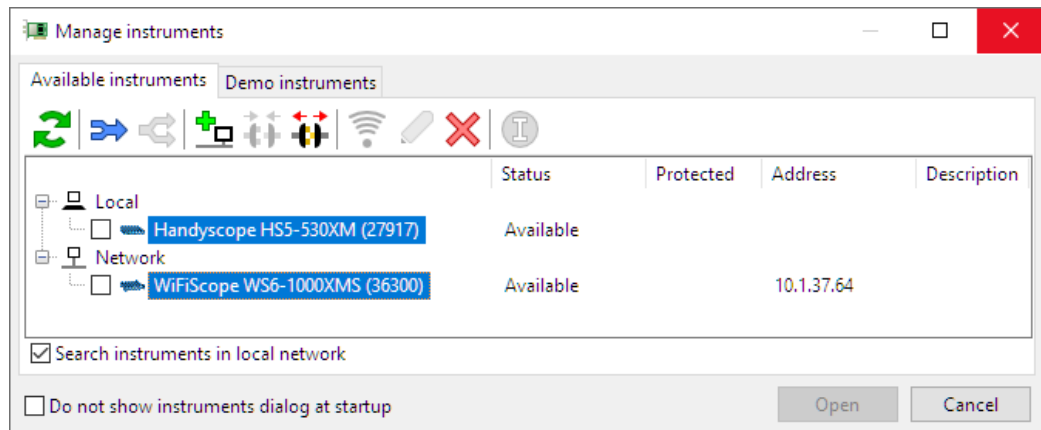
When WCMI's are placed on the extension connectors of the instruments, the instruments are synchronized via an RF connection between the modules. In the Multi Channel oscilloscope software the instruments can be combined to a large combined instrument. The accurate wireless RF connection between the modules will share the trigger signals, in order to start the combined scopes at exactly the same moment. The WCMI module has an internal automatic time synchronization system that takes care that all sample clocks of the oscilloscopes are synchronized.

This allows to measure many signals simultaneously, using scopes that can be up to 400 m apart from each other. No long cabling is required between the scopes and the computer, which makes the setup very easy and hassle free.

Per scope in the combined instrument, a WCMI is required.

Combining oscilloscopes

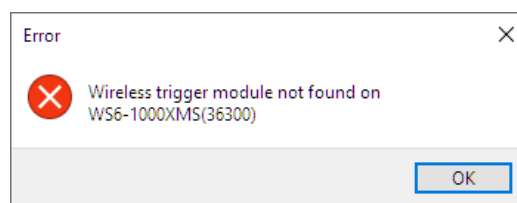
Place the WCMI modules on the extension connectors of the WiFi-Scopes or Handyscopes. Then in the Multi Channel software, open the **Manage instruments** dialog and select the scopes to combine, by using Ctrl-click on each instrument.




The **Combine instruments** button gets then enabled, which can be clicked to combine and synchronize the instruments. Then place a check in front of the combined instrument and open it. You can now use the combined and synchronized instruments as if it was one large instrument.

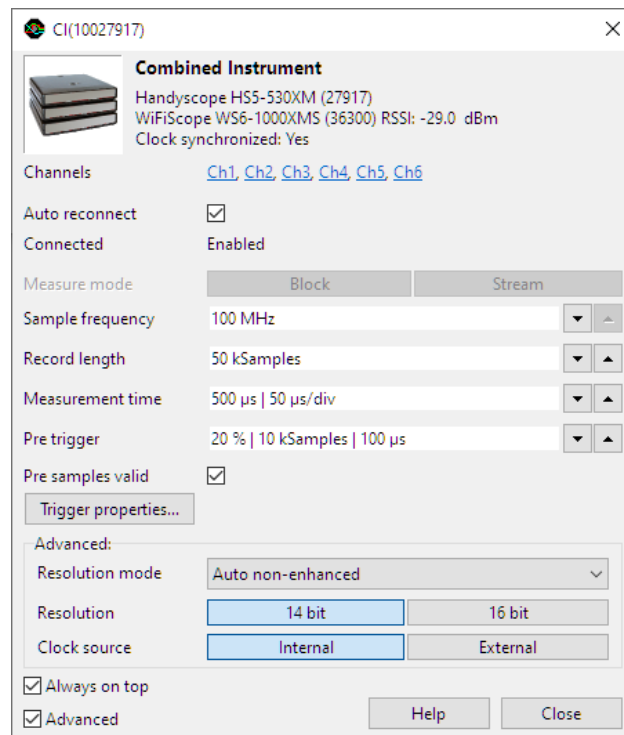
Each of the channels of the combined instrument can be selected as trigger source. Triggering on a combination of sources is only possible when all sources are located on one instrument in the combined instrument. It is not possible to trigger on a combination of sources from different instruments.

When an instrument without WCMI module connected is selected, or the module is not properly connected, combining will fail and an error is shown:



Clock synchronization and signal strengths

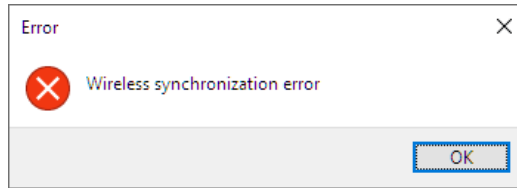
The WCMI module has an internal automatic time synchronization system that takes care that all sample clocks of the oscilloscopes are synchronized. After starting the Multi Channel software and starting continuous measurements, the modules will be synchronized in approximately 10 seconds. When the modules are synchronized, this is indicated in the  **Instrument settings window** as **Clocks synchronized: Yes**, see image below.



The WCMI module on the instrument that contains the trigger source will be transmitting trigger pulses. The module(s) on the other instrument(s) will be receiving the trigger pulses.

A Receiving Signal Strength Indication (RSSI) can be found in the Instrument settings window, showing the signal strength in dB_m. In the image above, the Handyscope HS5 functions as trigger source, the WiFiScope WS6 receives the trigger signal, with a signal strength of -29 dB_m.

When the signal strength falls below -90 dB_m, the connection can get lost, resulting in a notification message in the software and measurements to stop.



Reposition the instruments and/or remove blocking objects between the modules to improve the signal strength. It is also possible to disconnect the antenna from the module and connect an (external) antenna via a cable to optimize the antenna position and improve signal strength.

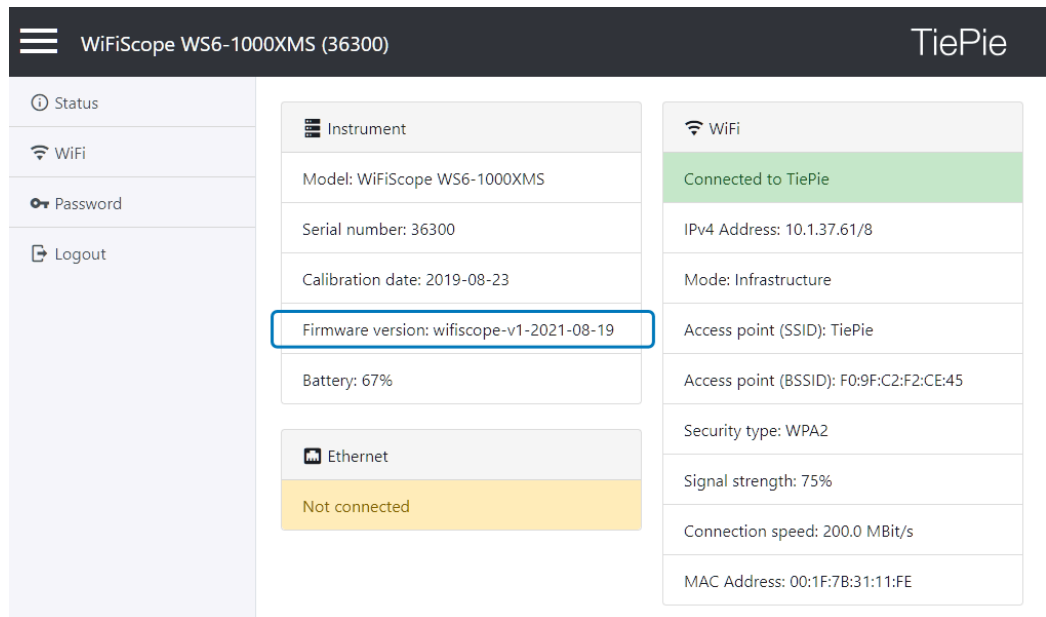
Models

The WCMi module is available in two models, with different frequencies, for different regions.

Model	Frequency	Region
WCMi-8	868 MHz	to be used in Europe
WCMi-9	920 MHz	to be used in the USA

WiFiScope firmware update

WiFiScopes that were produced and sold before the Wireless Multi Instrument Synchronization Module was introduced will require a firmware update, in order to support the WCMI modules. A firmware dated 2023-06-01 or later is required. The firmware version of the WiFiScope can be obtained on its status page in the web interface. Refer to the latest WiFiScope instrument manual to enter the web interface.



The screenshot shows the web interface for a WiFiScope WS6-1000XMS (36300). The interface is divided into three main sections: a left sidebar with navigation options (Status, WiFi, Password, Logout), a central 'Instrument' section, and a right 'WiFi' section. The 'Instrument' section displays the following information: Model: WiFiScope WS6-1000XMS, Serial number: 36300, Calibration date: 2019-08-23, Firmware version: wifiscope-v1-2021-08-19 (highlighted with a blue box), and Battery: 67%. The 'WiFi' section shows the device is 'Connected to TiePie' (highlighted in green) with an IPv4 Address of 10.1.37.61/8, Mode: Infrastructure, Access point (SSID): TiePie, Access point (BSSID): F0:9F:C2:F2:CE:45, Security type: WPA2, Signal strength: 75%, Connection speed: 200.0 MBit/s, and MAC Address: 00:1F:7B:31:11:FE. Below the 'Instrument' section, an 'Ethernet' section shows 'Not connected' (highlighted in yellow).

The required firmware image file can be downloaded from www.tiepie.com/download

The firmware update instructions are included in the instrument manual of the WiFiScope, which can be downloaded from the same page.

Handyscopes do not require a firmware update.

Hardware specifications

Model	WCMI-8	WCMI-9
Frequency	868 MHz	920 MHz
Region	Europe	USA
Transmission power	14 dBm	
Range	400 m	
Connections	Instrument	Antenna
	9 pin male D-sub	SMA female
Dimensions	Module	Antenna
Length	73 mm	37 mm
Width	34 mm	12 mm
Height	20 mm	175 mm
Weight	33 g	21 g
Power consumption	30 mA, from instrument extension connector	
Compatible instruments	WiFiScope WS6 DIFF WiFiScope WS6 WiFiScope WS5	Handyscope HS6 DIFF Handyscope HS6 Handyscope HS5
Clock synchronicity	≤ 1 ppm typical ≤ 0.2 ppm	
Maximum sampling rate combined instrument	100 MSa/s at 14 bit	6.25 MSa/s at 16 bit
Trigger jitter *	Sample rate ≤ 1 MSa/s	Sample rate > 1 MSa/s
2 x "5"	$\leq \pm 2$ samples	$\leq \pm 2 \mu\text{s}$
"5" and "6"		
Trigger source = "5"	$\leq \pm 2$ samples	$\leq \pm 2 \mu\text{s}$
Trigger source = "6"	$\leq \pm 8$ samples	$\leq \pm 8 \mu\text{s}$
2 x "6"	$\leq \pm 8$ samples	$\leq \pm 8 \mu\text{s}$
Environmental conditions	Operating	Storage
Ambient temperature	-10 °C to 40 °C	-25 °C to 70 °C
Relative humidity	0 % to 95 %, non condensing	5 % to 95 %, non condensing
Compliances	RoHS	CE
	Yes	Yes

The WCMI is a RED Directive assessed radio module that is CE marked and that has been manufactured and tested with the intention of being integrated into a final product.

* "5" = WiFiScope WS5 or Handyscope HS5

"6" = WiFiScope WS6 (DIFF) or Handyscope HS6 (DIFF)



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