Advantech AE Technical Share Document

Date	2022/01/11	**SR#**	1-3625600501
Category	■FAQ □SOP	**Related OS**	N/A
Abstract	What are the differences between communication WDT, system WDT, FSV WDT Core task WDT of WISE-4000 and WISE-4220 series?		
Keyword	WISE, communication WDT, system WDT, FSV WDT, Core task WDT		
Related Product	WISE-4010/LAN, WISE-4050/LAN, WISE-4060/LAN, WISE-4012, WISE-4012E, WISE-4050, WISE-4051, WISE-4060, WISE-4220-S214, WISE-4220-S231		

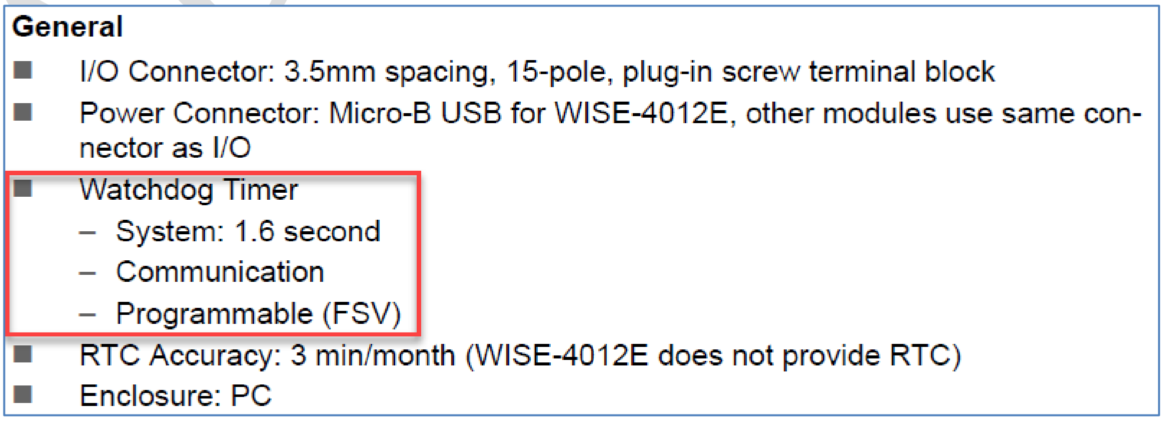
■ **Problem Description:**

There are some watchdog timers in WISE-4000 and WISE-4220 series. What exactly are they? What do they do? When and what will trigger a watchdog?

There are 3 types of watchdog functions, Communication WDT, system WDT, FSV WDT. The firmware version A2.XXBXX, there is the 4th watchdog function, core task WDT. All 4 of them will be explained in detail in this document.

■ **Brief Solution - Step by Step:**

In the user manual "UM-WISE-4000-ED.4-EN.PDF", there is a paragraph about WDT, which is shown as the figure 1. There are 3 types of watchdog functions. The firmware version A2.XXBXX, there is the 4th watchdog function. All 4 of them will be explained in detail in this document.



General

- I/O Connector: 3.5mm spacing, 15-pole, plug-in screw terminal block
- Power Connector: Micro-B USB for WISE-4012E, other modules use same connector as I/O
- Watchdog Timer
  - System: 1.6 second
  - Communication
  - Programmable (FSV)
- RTC Accuracy: 3 min/month (WISE-4012E does not provide RTC)
- Enclosure: PC

Figure 1. Captured from user manual.

Table 1shows the relationship between firmware version and watchdog functions.

Table 1. LAN and WiFi version of WISE-4000 series watchdog relationship.

Model name	System WDT		Communication WDT				FSV WDT		Core task WDT	
Firmware version	vA1.xxBxx	vA2.xxBxx	vA113B06		vA114B03		vA1.xxBxx	vA2.xxBxx	vA1.xxBxx	vA2.xxBxx
			Single TCP socket WDT	All TCP socket WDT	Single TCP socket WDT	All TCP socket WDT				
WISE-4010/LAN	√	√	-	√	√	√	√	√	-	-
WISE-4050/LAN	√	√	-	√	√	√	√	√	-	-
WISE-4060/LAN	√	√	-	√	√	√	√	√	-	-
			vA1.xxBxx		vA2.xxBxx		vA1.xxBxx	vA2.xxBxx	vA1.xxBxx	vA2.xxBxx
WISE-4012	√	√	-	√	√	√	√	√	-	√
WISE-4012E	√	√	-	√	√	√	√	√	-	√
WISE-4050	√	√	-	√	√	√	√	√	-	√
WISE-4051	√	√	-	√	√	√	√	√	-	√
WISE-4060	√	√	-	√	√	√	√	√	-	√
	vA103B00	vA110B00	vA103B00		vA110B00		vA103B00	vA110B00	vA103B00	vA110B00
WISE-4220-SXX	√	√	-	√	-	√	√	√	-	-

System watchdog:

This watchdog is a **hardware watchdog**, which is implemented by **IC ADM706x**. The corresponding function block is pointed out in the figure 2 with red box. As you can see from the specification of the IC shown in figure 3, the triggered timing is 1.6 seconds. WISE firmware sends signal to the dog every 0.64 seconds by a subprogram. If the subprogram is hung-up for 1.6 seconds, then the IC will trigger the WISE module for rebooting. This event will not be recorded in system log due to the program is hanged.

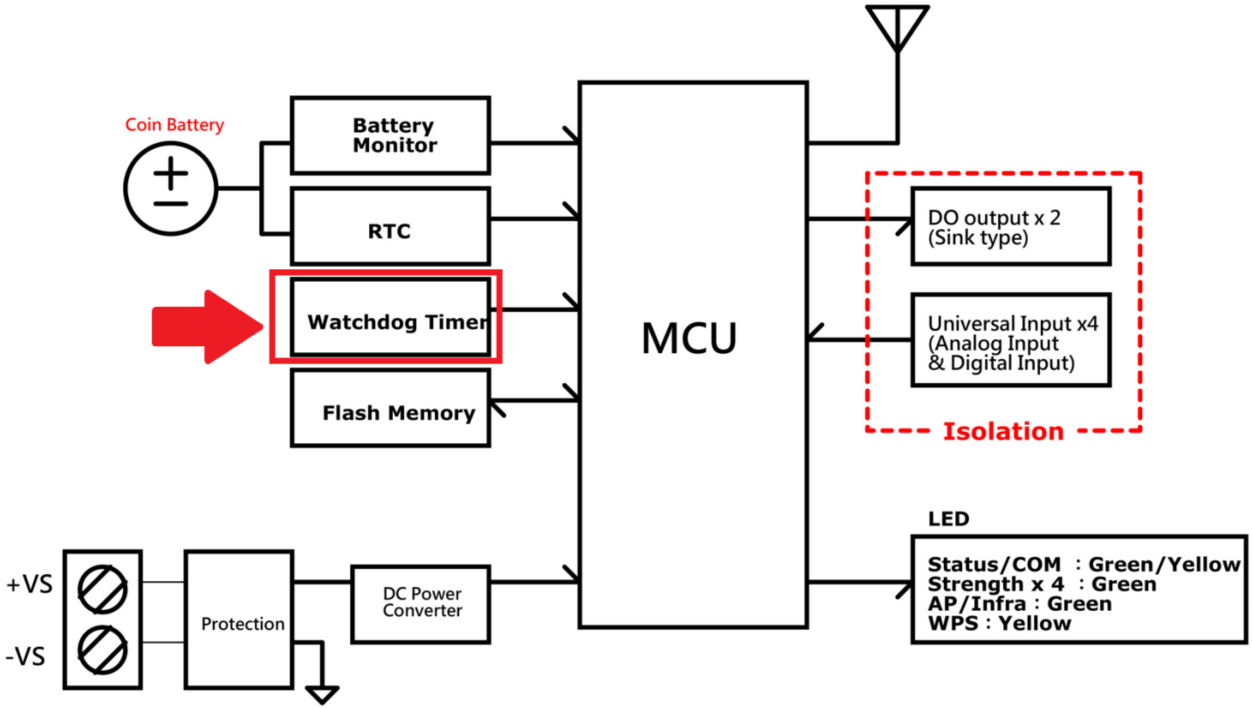
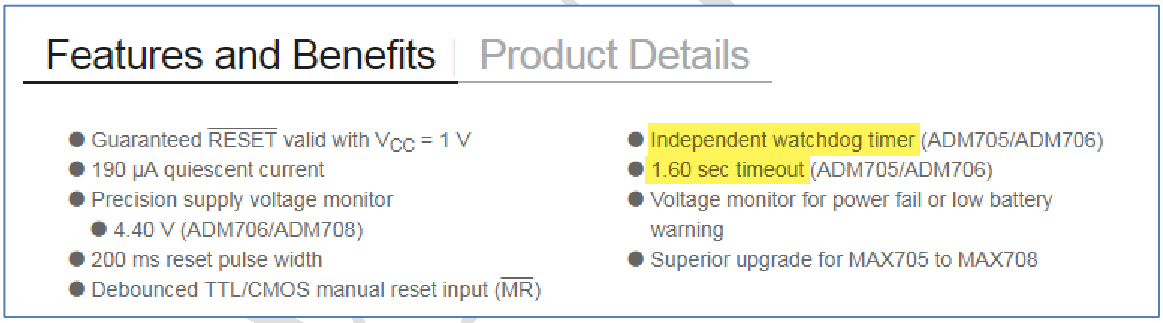


Figure 2. Function block of WISE module captured from user manual.



Features and Benefits | Product Details

- Guaranteed $\overline{\text{RESET}}$ valid with V_{CC} = 1 V
- 190 µA quiescent current
- Precision supply voltage monitor
  - 4.40 V (ADM706/ADM708)
- 200 ms reset pulse width
- Debounced TTL/CMOS manual reset input ($\overline{\text{MR}}$)
- Independent watchdog timer (ADM705/ADM706)
- 1.60 sec timeout (ADM705/ADM706)
- Voltage monitor for power fail or low battery warning
- Superior upgrade for MAX705 to MAX708

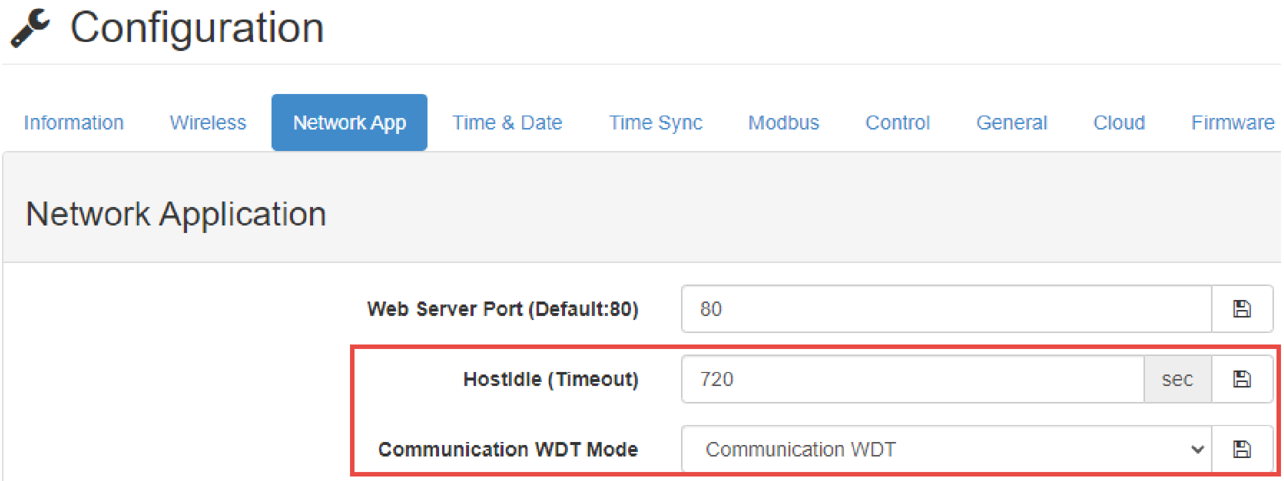
Figure 3. Specification of watchdog timer IC captured from Website.

Communication WDT

This watchdog is a **firmware watchdog**, which is implemented by a **subprogram**. The HostIdle time is set as default number 720 seconds which can be modified by users.

There are 2 kinds of communication WDT:

1. For all of TCP sockets connection.
2. There will be a system event “PE:3, Record:0x00－Communication WDT: FSV” in the system log.
3. For single TCP socket connection.
   - ✧ Only version A2.XXBXX firmware supports this function. Please refer to the table 1.
   - ✧ There will be a system event **“**PE:3, Record: 0x01 – communication WDT: Modbus” or **“**PE:3, Record: 0x02 – communication WDT: WEB” in the system log.


Configuration

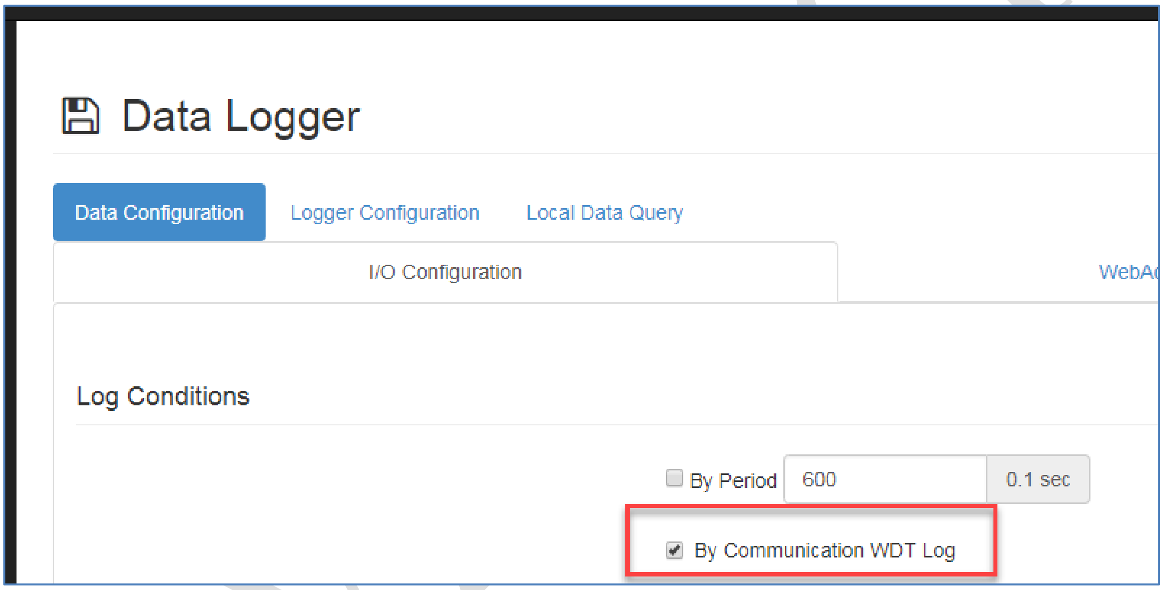
Network Application

Web Server Port (Default:80): 80

HostIdle (Timeout): 720 sec

Communication WDT Mode: Communication WDT

Figure 4. HostIdle time and Communication WDT mode setting page.


Data Logger

Log Conditions

☐ By Period 600 0.1 sec

☑ By Communication WDT Log

Figure 5. Log I/O data while communication WDT is triggered setting page.

For all of TCP sockets connection.

This watchdog timer **check the all of the TCP sockets connection**, including RESTful command, Modbus/TCP.

If all of the connections have no data/command transferring in/out within HostIdle(Timeout):

(1) The watchdog will be triggered.

(2) If FSV function is enabled, the corresponding action can be referred to the FSV WDT section below.

(3) If the log condition “by Communication WDT Log” is enabled, then the module will start to log I/O data according to the “period” interval until any of the socket connections start to have input/output.

(4) For both RESTful and Modbs/TCP socket connection over HostIdle(Timeout), there will be a system event “PE:3, Record:0x00－**Communication WDT: FSV**” in the system log.

For single TCP socket connection.

This watchdog timer is for user connection. The timer checks **each TCP socket connection,** such as Modbus/TCP, RESTful command **with WISE server** did not receive any request to the socket within HostIdle(Timeout):

(1) The watchdog will be triggered.

(2) The TCP socket will be closed by the firmware.

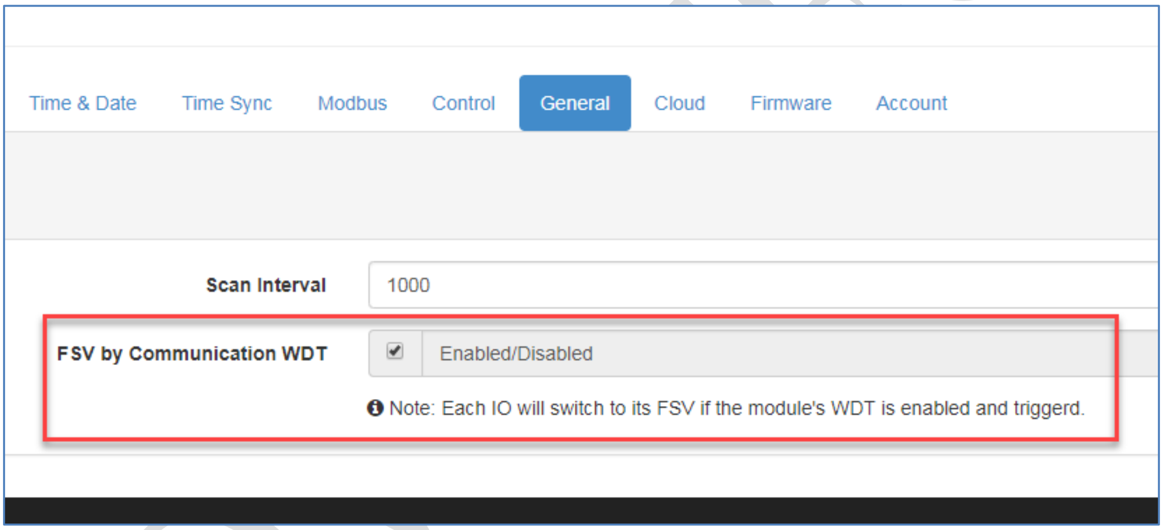
(3) For Modbus/TCP socket connection over HostIdle(Timeout) only, there will be a system event "**PE:3, Record: 0x01 – communication WDT: Modbus**" in system log.

(4) For RESTful TCP socket connection over HostIdle(Timeout) only, there will be a system event "**PE:3, Record: 0x02 – communication WDT: WEB**" in system log.

So, if users want to send again request command next time, no matter with "RESTful command" or "Modbus/TCP", need to re-build a TCP socket connection with the module.

FSV WDT

This watchdog is a firmware watchdog, which is implemented by a subprogram.

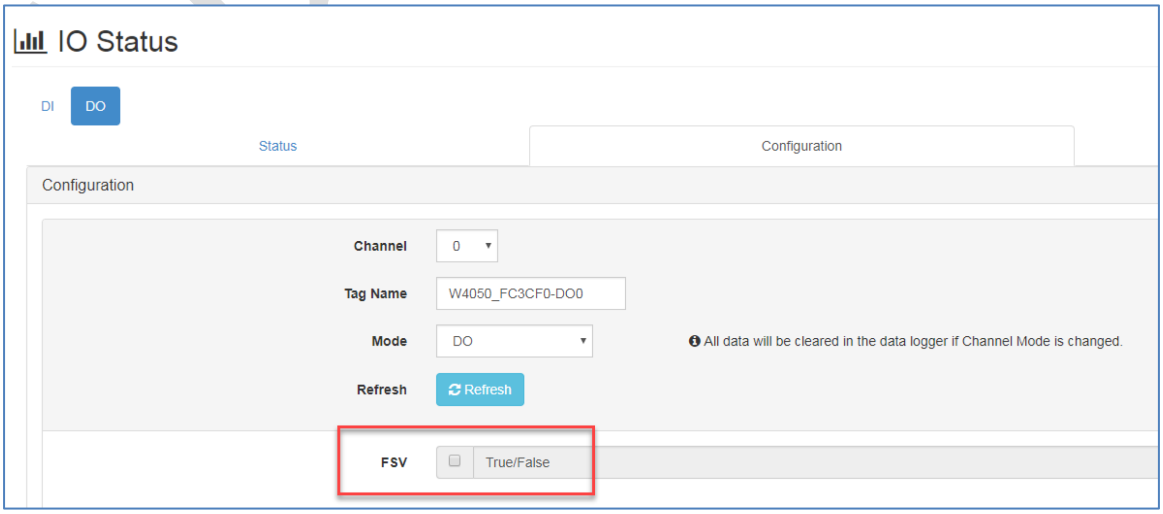


Scan Interval: 1000

FSV by Communication WDT: ☑ Enabled/Disabled

Note: Each IO will switch to its FSV if the module's WDT is enabled and triggerd.

Figure 5. FSV by Communication WDT mode setting page.



Configuration

Channel: 0

Tag Name: W4050_FC3CF0-DO0

Mode: DO

All data will be cleared in the data logger if Channel Mode is changed.

FSV: □ True/False

Figure 5. FSV of DO channel setting page.

Situation1.

If a user enabled:

✓ “communication WDT mode”

✓ “FSV by communication WDT”

✓ DO “FSV Ture/False”

The firmware will check if all of the TCP sockets of a WISE module did not send-in/send-out any kind of data or command, then:

(1) Output channel will be set as logic high.

(2) There will be an event “3 – communication WDT” in your system log.

Situation2.

If a user enabled:

✓ “communication WDT mode”

✓ “FSV by communication WDT”

✗ DO “FSV Ture/False”

The firmware will check if all of the TCP sockets of a WISE module did not send-in/send-out any kind of data or command, then:

(1) Output channel will be set as logic low.

(2) There will be an event “PE:3 – communication WDT” in your system log.

Core task WDT

This watchdog function is supported by WISE-4000 Wi-Fi series with versionA2.XXBXX. Please refer to the table 1. There is an interrupt subprogram monitoring the main program every 10 seconds. If the main program is not responding the subprogram:

(1) The watchdog will be triggered.

(2) There will be a system log event “PE:7 – record 4: CoreTask WDT”

(3) The module will be rebooted.