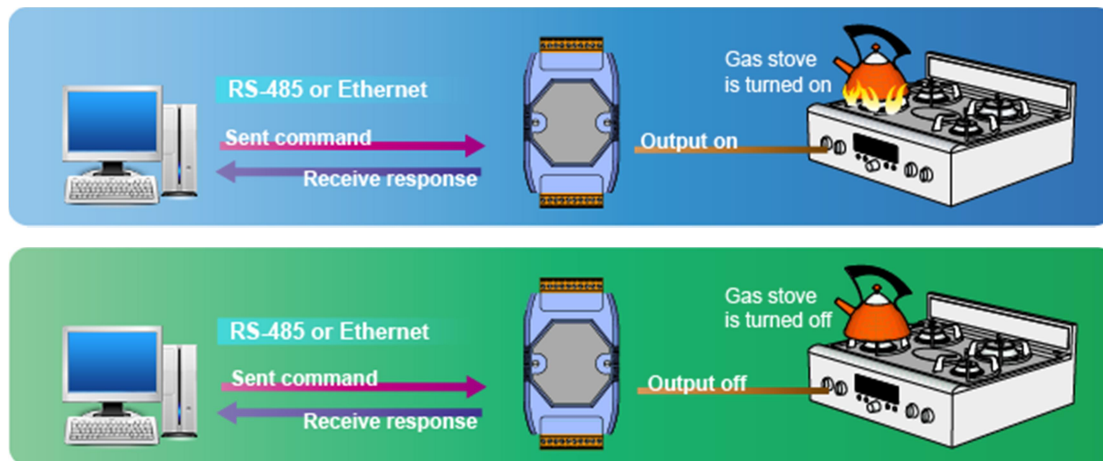


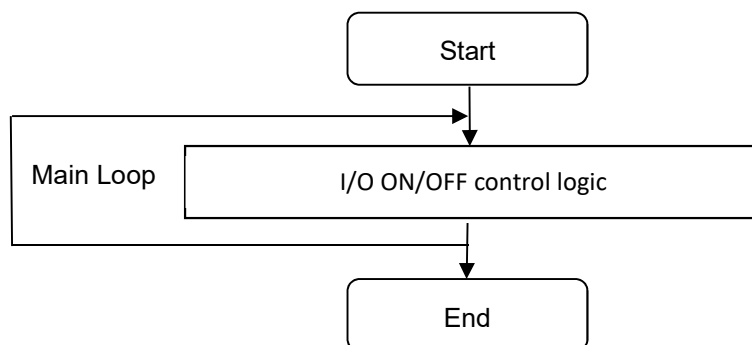
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How to establish a reliable and safety system by using Safe Value and Host Watchdog?

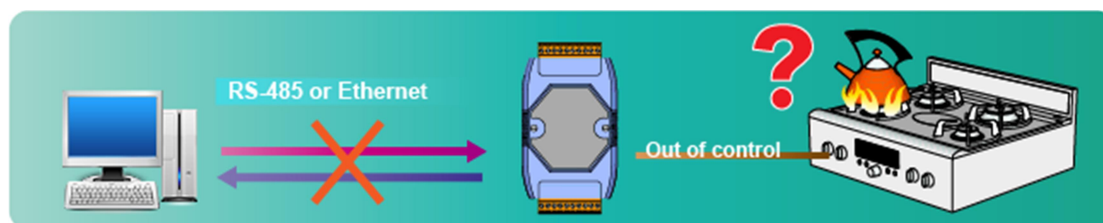
Below diagram shows how to use PC to handle a remote gas stove On/Off control by using an output I/O module via RS-485 or Ethernet network.



Such a simple control system will be like below flow chart



If communication is lost during heating process, the output module can not receive any commands from host PC to turn off the heater, it is very dangerous under this condition. In other words, it is unreliable in practice, and there are safety concerns.



In the figure above, the master program has changed the output status of the DO. When a communication exception occurs during the process, the master can no longer send the command to the remote module. How can the output module change the output status? We will introduce the “Safe Value” in next section.

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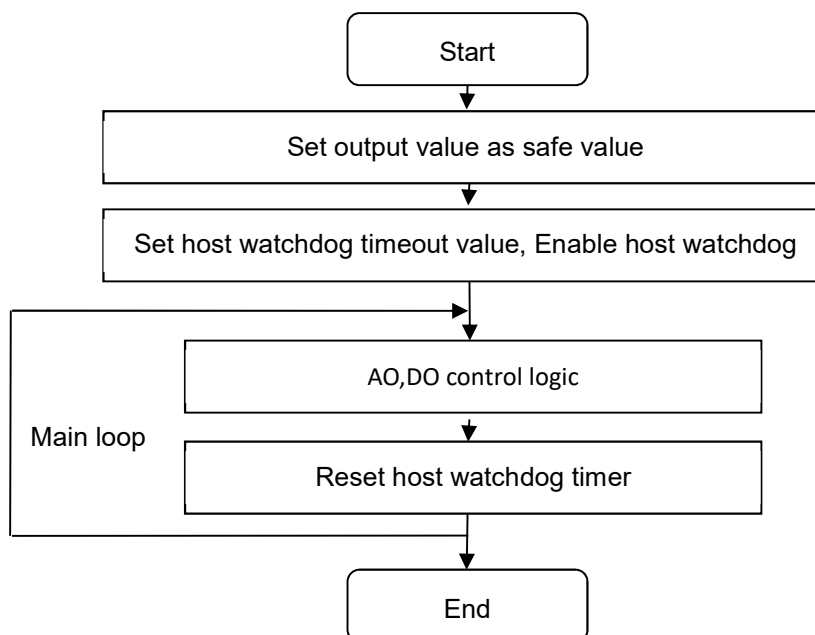
Set Safe Value

The so-called Safe Value means that the DO or AO module can automatically switch to a safe output state (Safe Value) when it cannot receive a command from the console (Host watchdog timeout). To ensure a safe output state, the preset Safe Value is no output 0.

In practice, the setting of Safe Value is set according to the needs of the scene, such as turning off the heater, and at the same time sounding the on-site alarm or warning light.



Coupled with Safe Value and Host Watchdog mechanism, the original programming structure is adjusted as shown below.

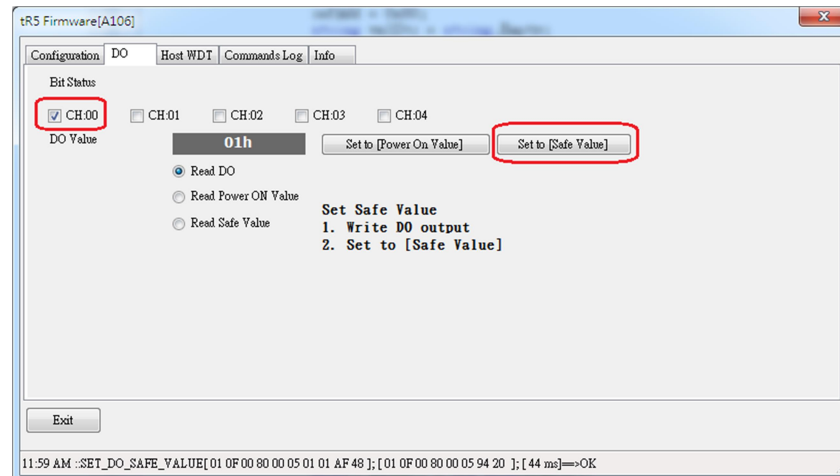


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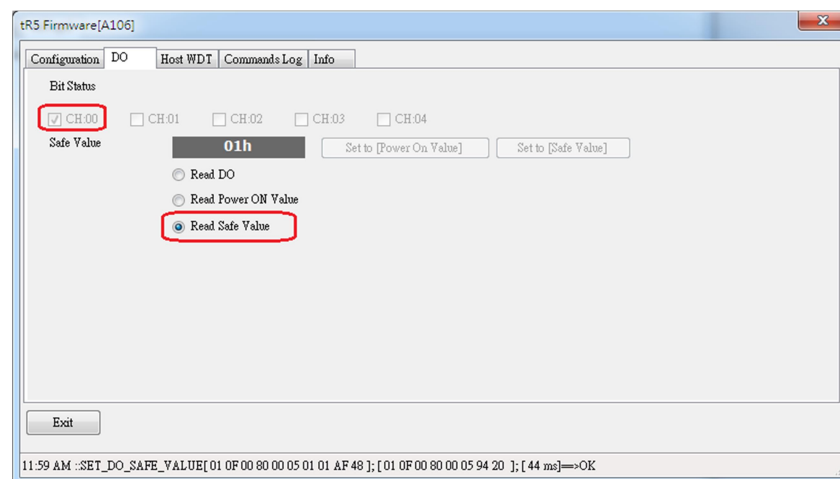
Setting steps:

Step 1: Given DO or AO output value

Step 2: Press "Set to [Safe Value]"



Read back the Safe Value to confirm that it is the same as the setting



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Set Host Watchdog Timer

The Host Watchdog is a timeout processing mechanism for communication between the master and the remote controlled module.

We will show how to set up a 25-second Host Watchdog operation.

Step 1: Enable the WDT function and set the watchdog timer time to 25 seconds



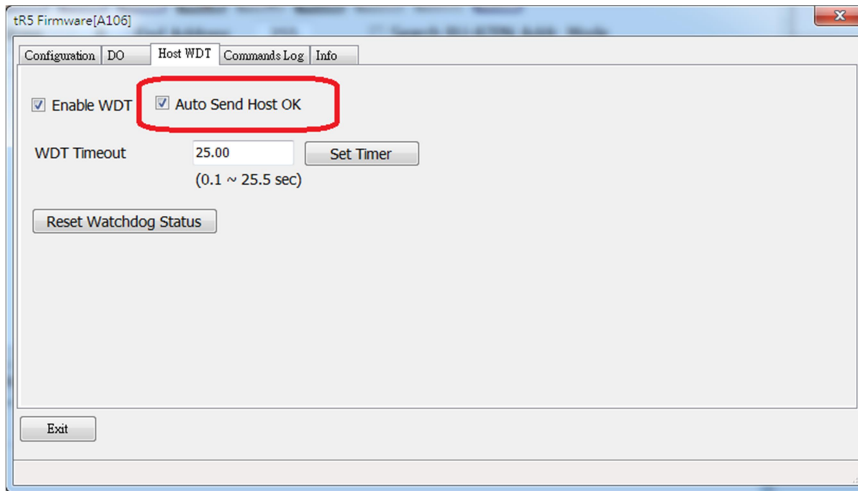
Step 2: When the setting of step 1 is completed, the watchdog timer of the module starts to count. If no notification from the host is received within 25 seconds, the watchdog timeout will be happened and the output value will change to the Safe Value. If a notification is received, the watchdog Timer restarts.



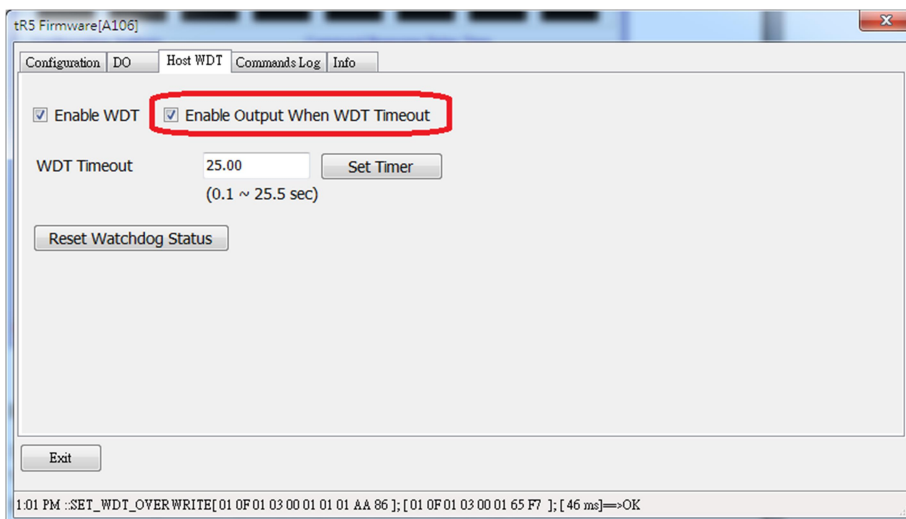
Note 1: There are two differences between the operation of the DCON module and the Modbus module in Host Watchdog, please refer to the table below.

	DCON module	Modbus module
Reset watchdog timer	Send ~** broadcast command	Detect if there is a command on the network
Output operation when watchdog timer timeout	It is not allowed to change output until the watchdog timeout flag is clear.	Can set to allow changing the output or not allow changing output until watchdog timeout flag is clear.

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DCON must send ~** broadcast command to reset WDT Timer, Modbus module resets WDT Timer when it detects a command from the network



Modbus module can set whether to allow output after host watchdog timer timeout.

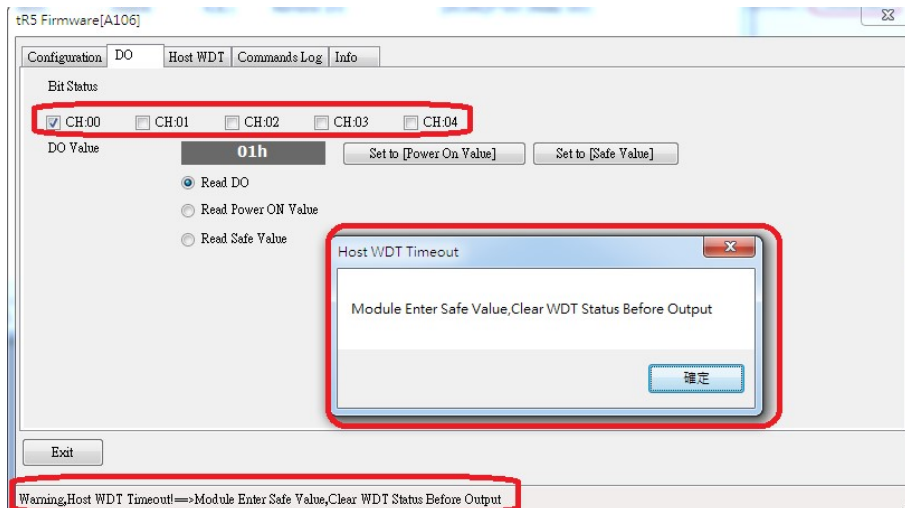
Remark:

1. After the host watchdog timer timeout occurs, the DCON module must first remove the watchdog timer timeout flag and then reset the watchdog timer function.
2. The Modbus module can change the output state if the host watchdog timeout is not set, and the watchdog timer timeout flag must be removed before restarting the watchdog timer function.

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How to know Host Watchdog Timer is timeout?

1. After the Host Watchdog Timeout occurs, it will get error response when trying to change the output value, for Safe Value is a state of lock protection. **However, it can still communicate normally.**



Owing to not know how to use the Host Watchdog and Safe Value, or accidentally start the Host Watchdog Timer, which causes the field personnel can't understand why the system cannot output correctly.

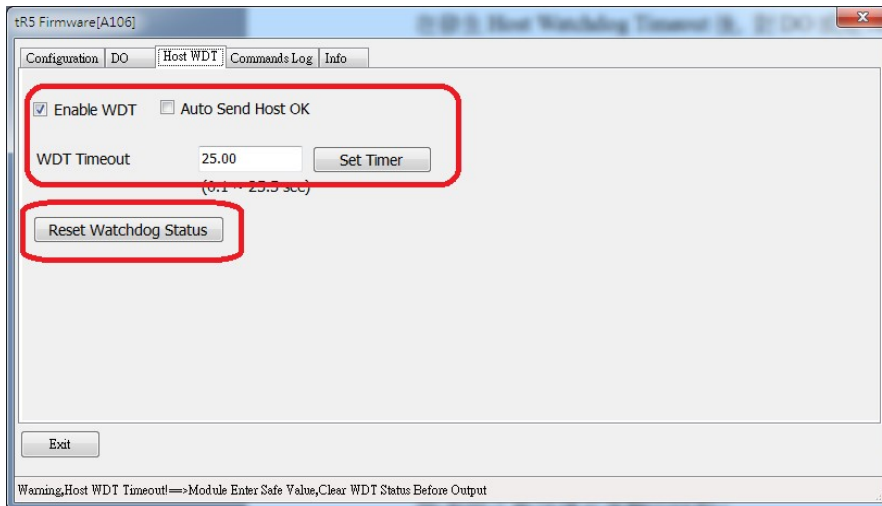
2. When the WDT Timer Timeout occurs, it can be found that the red power indicator on the module blinks every 1 second. Normally, the red power indicator is constantly on.



If the main program is still communicating with the module, the red power indicator will be flashing at high speed, which is easy to be mistaken for constant on. At this time, you can disconnect the communication line or close the control program to see that the power indicator will flash once every 1 second.

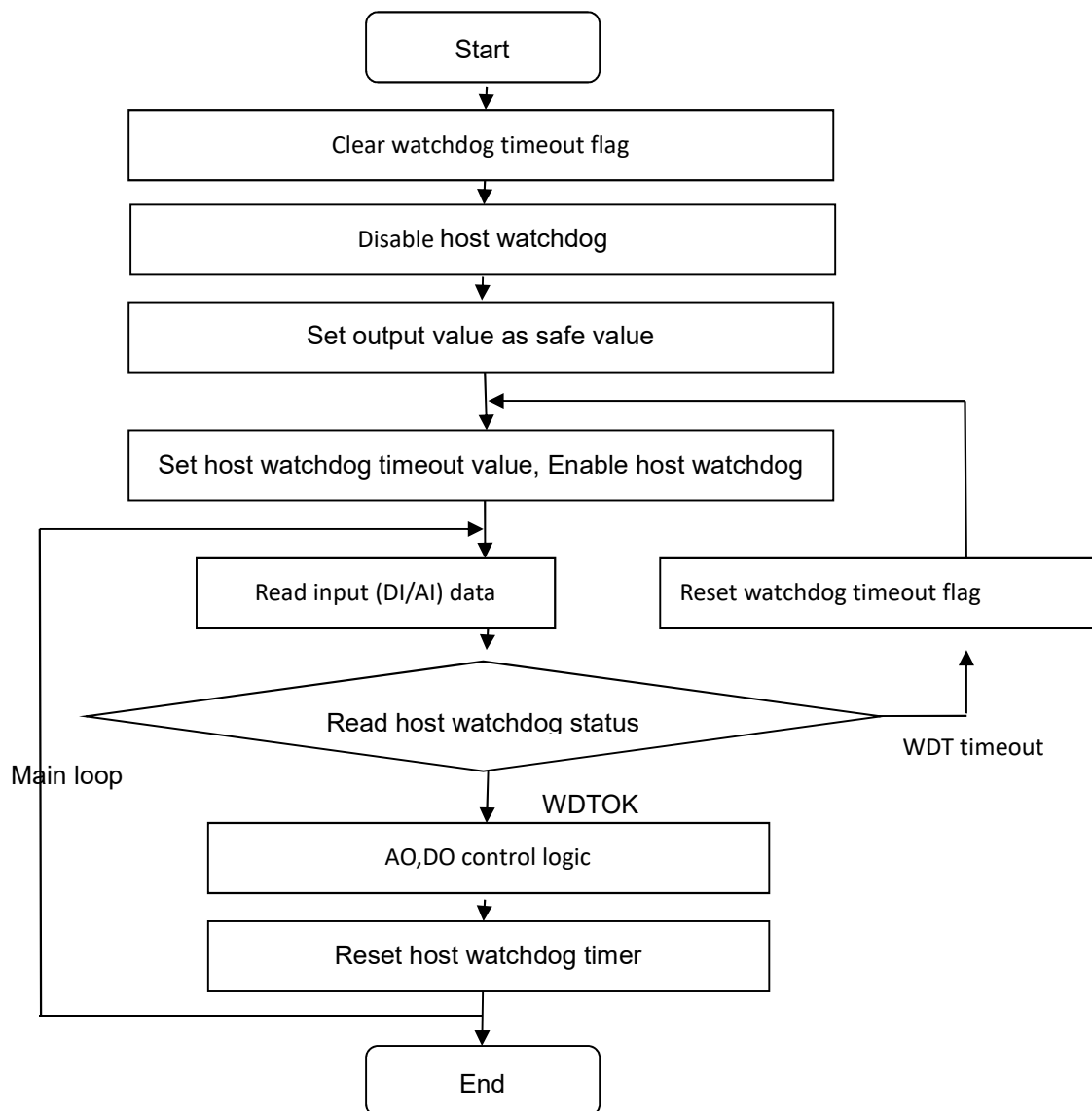
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3. On-site personnel has to find out the reason why watchdog timer timeout and eliminate communication problems.
4. The program must clear the watchdog flag, and then enable the watchdog timer to allow the system to change the output value.



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5. The program needs to monitor the status of the module's Host Watchdog. If the status read back shows that the status of the Host Watchdog is normal, it is allowed to enter the output control logic. If it is judged that the timeout has expired, the Watchdog Timeout flag must be cleared and reset. Start the Host Watchdog Timer. The following is the final revised program structure.



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The following is the host watchdog related function command list

	DCON Command	Modbus Address(base 0)	PACSDK
Set WDT Enable Status	~AA3ett	260 function code 5	pac_SetModuleWDTConfig
Get WDT Enable Status	~AA2	260 function code 1	pac_GetModuleWDTConfig
Set WDT Overwrite	-	259 function code 5	-
Get WDT Overwrite		259 function code 1	-
Clear WDT Status	~AA1	269 function code 5	pac_ResetModuleWDT
Read WDT Status	~AA0	269 function code 1	pac_GetModuleWDTStatus
Set WDT Timer	~AA3ett	488 function code 6	pac_SetModuleWDTConfig
Get WDT Timer	~AA2	488 function code 3	pac_GetModuleWDTConfig
Host OK	~**	-	pac_RefreshModuleWDT

Remark: PACSDK uses DCON command