User Manual

Version 1.4 Jan. 2023

ACS-20B(W)-MRTU

No-touch Infrared Sensor Switch

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Important Information

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning

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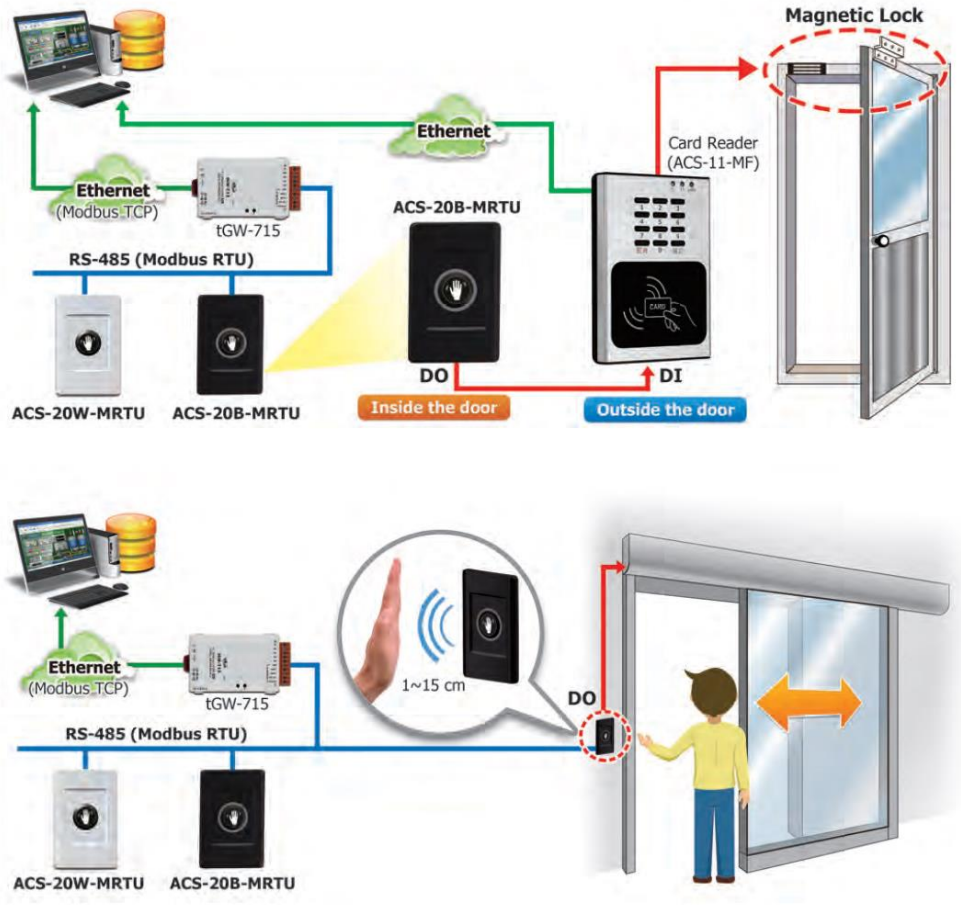
1. Introduction



▲Figure 1-1 ACS-20B(W)-MRTU application architecture

The No-touch Infrared Sensor Switch from ICP DAS can be used to open a door using palm induction, which makes it more convenient when entering or exiting a room or building. The inductive distance and the delay time for door opening are adjustable, and has red and blue indicator lights to show the status of the switch. As people enter and exit the door using the No-touch Infrared Sensor Switches, a time stamp recording the action can be simultaneously logged.

The No-touch Infrared Sensor Switch includes an RS-485 interface and provides Modbus RTU communication, which can remotely enable/disable the switch and get the induction time records by the access control system.

Additionally, the No-touch Infrared Sensor Switch is not only used for the access control system but also helps you control other electronic devices. While it is triggered in toggle mode at the first time, the switch outputs ON signal, and next time outputs OFF signal.

The No-touch Infrared Sensor Switch can be used with electric doors to prevent issues related to the spread of infectious bacteria via touch. The switches can be used in medical institutions, retail stores, the food industry, industrial plants, and offices, etc. to provide an excellent sanitary environment.

1.1 Features

- **[ACS-20B-MRTU / ACS-20W-MRTU]**
  - Special infrared code to against interference
  - Multiple operating modes: Sensing/Standby, Lock, Toggle Switch.
  - Provides 8 locked periods each day
  - Double-color status indicator
  - Induction distance: 1 ~ 12 cm
  - With Relay (N.C. and N.O. output)
  - Relay hold time: 0.5 ~ 20 sec
  - The switches time recording: 1,600 records
  - Communication interface and protocol: RS-485/Modbus RTU

- [**Applications**]
  - Surveillance system
  - Home and building automation
  - Medical institutions
  - Retail stores
  - Food industry

2. Hardware

2.1 Specifications

Table 2-1: Specification Table

Model	ACS-20B-MRTU	ACS-20W-MRTU
IR Interface		
IR Output Ch.	1	
IR Input Ch.	2	
COM Ports		
Ports	RS-485 (DATA+, DATA-)	
Baud Rate (bps)	9600, 19200, 38400, 57600, 115200	
Protocol	Modbus RTU (slave)	
LED Indicator		
LED	Red (Standby); Blue (Sensing) [can be inverted]	
Relay Output		
Channels	1	
Type	Form C	
Contact Rating	2A@30VDC, 0.5A@120VAC, 0.25A@240VAC	
Power		
Power Supply	+10 ~ +30 VDC	
Power Consumption	0.9 W (Max.)	
Mechanical		
Installation	Wall Mounting	
Dimensions	75 mm x 119 mm x 24 mm (W x L x H)	
Cover Color	Black	White
Environment		
Operating Temp.	-25 ℃ ~ +75 ℃	
Storage Temp.	-30 ℃ ~ +80 ℃	
Humidity	10 ~ 90% RH, Non-condensing	

2.2 Appearance

▲ Figure 2-1: ACS-20B-MRTU.

▲ Figure 2-2: ACS-20W-MRTU

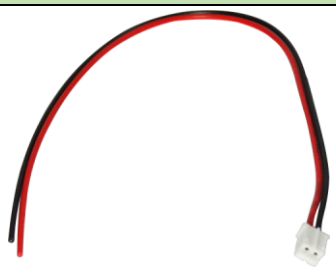
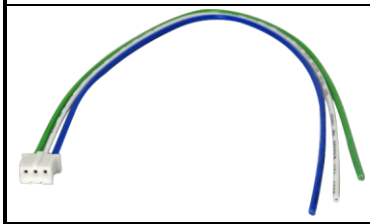
2.3 Pin assignments

■ Terminals

▲ Figure 2-3: ACS-20B(W)-MRTU terminals

■ Cables

Table 2-2: Cables for ACS-20B(W)-MRTU terminal

Cables			
Picture	**Model.**	**Description**	**Interface**
	**CA-014**	+Vs (Red) (+10~+30VDC)	Power
		GND (Black)-	
	**CA-012**	NO (Blue)	Relay
		COM (White)	
		NC (Green)	
	**CA-019**	DATA+ (Green)	RS-485
		DATA- (黃)	

2.4 LED Indicators

There are circular red and blue led indicators on the ACS-20B/W-MRTU to show different operating states. The meanings of these states are described in Table 2-3.

▲ Figure 2-4: Red/Blue LED indicators of ACS-20B(W)-MRTU

▼ Table 2-3: Red/Blue LED indicators corresponding to module status

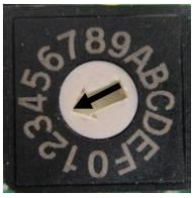
LED	Circular LED Indicator	ACS-20B(W)-MRTU Status
Red Blue	Red LED ON (NC & COM contacted) (*)	Standby; Toggle mode (ON)
	Blue LED ON (NO & COM contacted) (*)	IR sensing; Toggle mode (OFF)
	Red LED blinks once per 2 seconds	Locked mode
	Red & blue LED blink 2 times per second	Firmware update mode

* The module status inverted if red and blue LEDs are inverted.

3. Configured by Hardware

3.1 Relay Hold Time

Relay hold time (off-delay time) after IR sensing can be set by the scale position “0~C” of the rotary switch (figure 3-1) as shown in table 3-1.



▲ Figure 3-1: Scale 0~C of rotary switch for relay hold time

▼ Table 3-1: relay hold time to the scale of the rotary switch

scale	Relay hold time (sec)
0	0.5
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	15
C	20

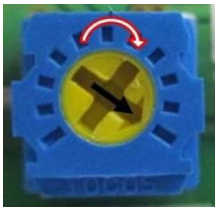
3.2 Toggle Switch Mode

Rotate the rotary switch to the scale ‘D’ to be in the hardware Toggle Switch Mode. In this mode, sense the ACS-20B(W)-MRTU by hand once, the circular red LED is changed to blue (Relay: NO & COM contact). Then, sense the ACS-20B(W)-MRTU by hand once again, the blue LED will be changed back to red. (Relay: NC & COM contact)

▲Figure 3-2: Scale 0~C of rotary switch for relay hold time

3.3 Sensing Range

Sensing range (sensed by palm of the hand) of ACS-20B(M)-MRTU can be adjusted by the rotary knob in figure 3-3. Rotate the knob clockwise to extend the sensing range (maximum 12 cm). Rotate the knob counterclockwise to reduce the sensing range (minimum 1 cm around). The scale is not linear between minimum and maximum limit. The default scale is rotated clockwise to the maximum limit.



▲Figure 3-3: Rotary knob for sensing range (sensed by palm)

3.4 Restore Default Communication Settings

Rotate the rotary switch to the scale ‘E’. **Power cycle** the module to restore the default serial communication (Table).

▲Figure 3-4: Rotate the rotary switch to ‘E’ scale for default communication.

▼Table 3-2: relay hold time to the scale of the rotary s

Item	Default value
Baud Rate	9600 bps
Paritys	None
Data Bits	8
Stop Bits	1
Modbus Response Delay	1 ms
Modbus Net ID	1

4. Configured by Software

4.1 ACS-20 Utility

ACS-20 Utility is the configuration tool for ACS-20B(W)-MRTU. It runs in .NET Framework 4.5 based on Microsoft Windows OS. Users can download the ACS-20 Utility from:

ACS-20 Utility (ACS20_Util_Setup_v#i#i#i#.zip)

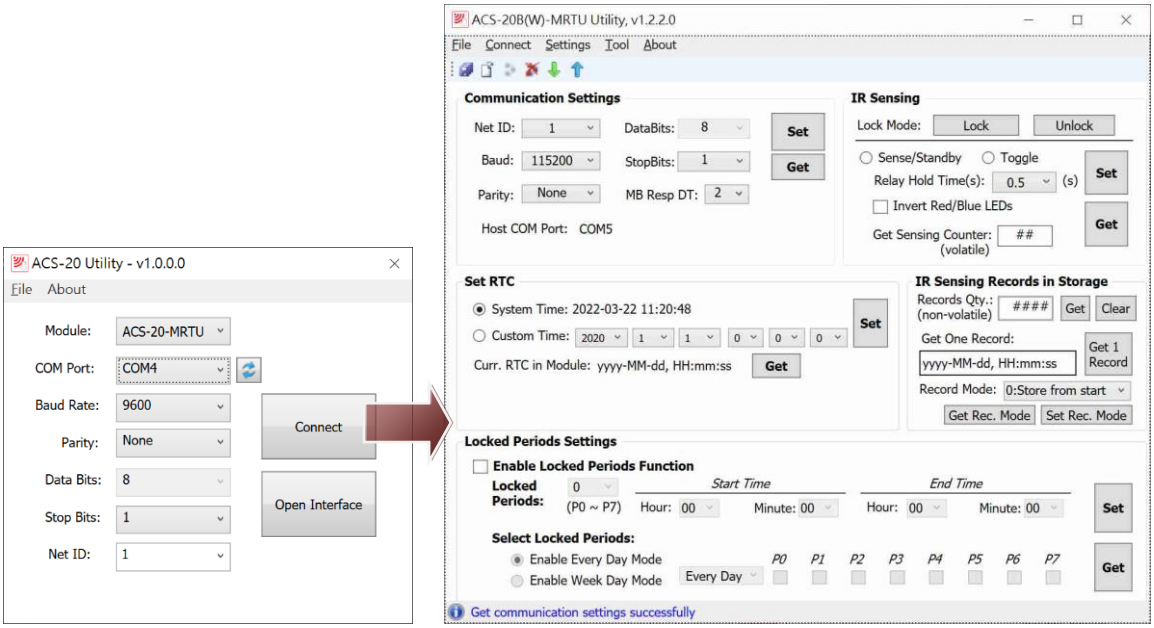
https://www.icpdas.com/en/download/show.php?num=3154&model=ACS-20B-MRTU

If the .NET Framework 4.5 is not available on the Microsoft OS, the setup package will download and install the redistribution automatically. The redistribution package can also be downloaded from the following link:

https://www.microsoft.com/en-US/download/details.aspx?id=30653

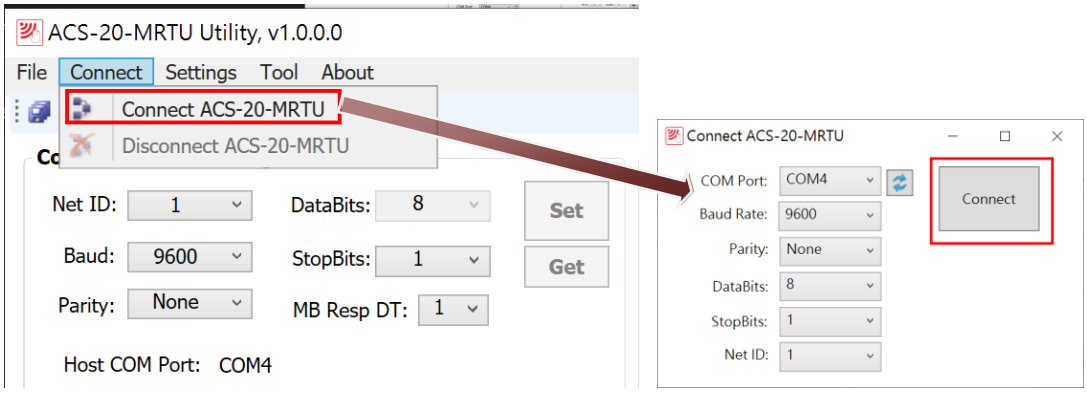
4.2 Serial Communication

The initial window of the ACS-20 utility is shown in the left of figure 4-1. Select the COM port of the host PC and the communication parameters of ACS-20B(W)-MRTU. Go to the main configuration window by clicking the “Connect” button.



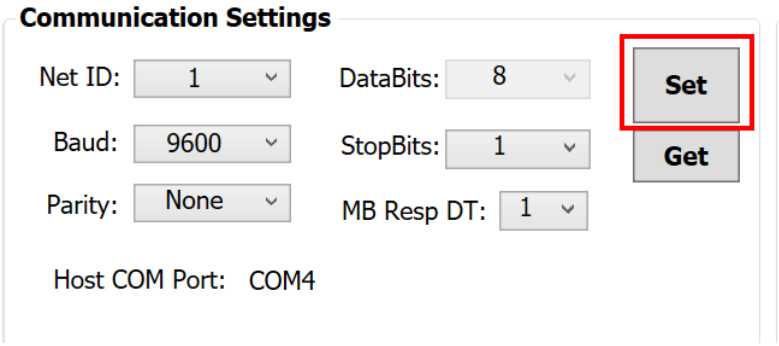
▲ Figure 4-1: Configuration window for ACS-20B(W)-MRTU.

If the main configuration window is opened by the “Open Interface” button, click menu [Connect]=>[Connect ACS-20-MRTU] to open the connection window as shown in figure 4-2.



▲ Figure 4-2: Connection window for the main configuration window.

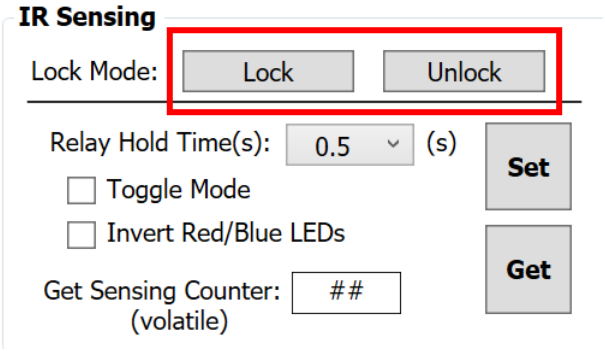
Set the communication parameters by clicking the “Set” button in the Communication Settings section in figure 4-3. Refer to chapter 5 for related Modbus command.



▲Figure 4-3: Set communication settings.

4.3 Test Locked Mode

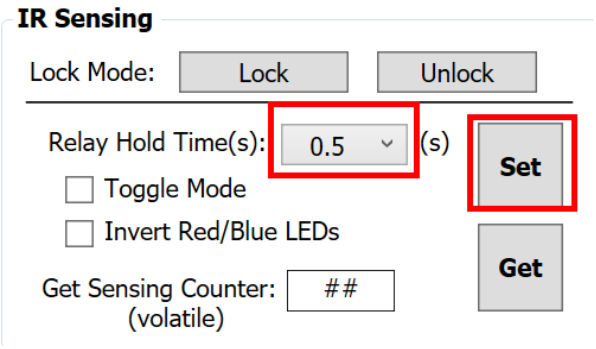
In the “IR Sensing” section of the utility, click “Lock” and “Unlock” button (figure 4-4) to test the locked mode. IR sensing function is disabled in this mode. Refer to chapter 5 for related Modbus command.



▲Figure 4-4: Test locked mode.

4.4 Set Relay Hold Time

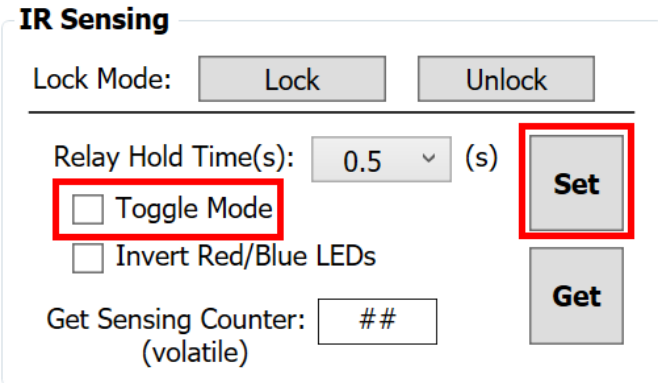
In the “IR Sensing” section of the utility, there are “0.5 ~ 20 sec” items in the “Relay Hold Time” combobox (figure 4-5) for selection. Click the “Set” button to set the paramter. Refer to chapter 5 for related Modbus register and command.



▲Figure 4-5: Set relay hold time.

4.5 Set Toggle Mode

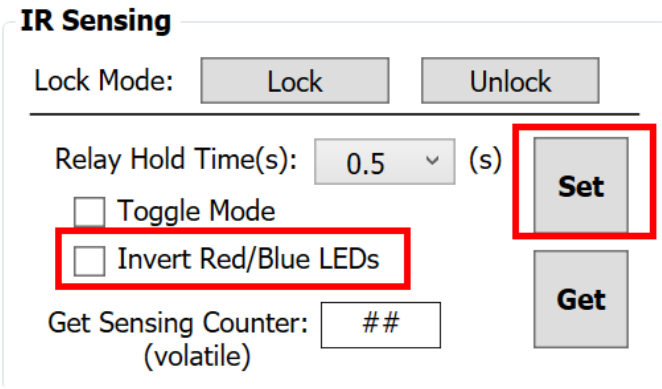
In the “IR Sensing” section of the utility, click the “Set” button after checking or unchecking the “Toggle Mode” checkbox as shown in figure 4-6. Refer to chapter 5 for related Modbus register and command.



▲Figure 4-6: Set toggle mode.

4.6 Invert Red/Blue LED

In the “IR Sensing” section of the utility, click the “Set” button after checking or unchecking the “ Invert Red/Blue LED” checkbox as shown in figure 4-7. Refer to chapter 5 for related Modbus register and command.

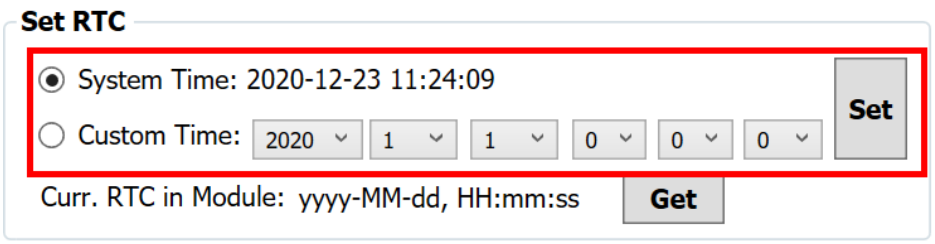


▲Figure 4-7: Set inversion of Red/Blue LED.

4.7 Set RTC

There is built-in RTC (Real Time Clock) in ACS-20B(W)-MRTU. One RTC Time (Year/Month/Day, Hour:Minute:Second) is recorded when IR sensing by palm of hand.

In the “Set RTC” section (figure 4-8) of the utility, the time following the “System Time” radio button is the host system time. Customize the time by clicking the “Custom Time” radio button. Click the “Set” button to set RTC with the tiime folowing the selected radio button. Refer to chapter 5 for the related Modbus command to access RTC.

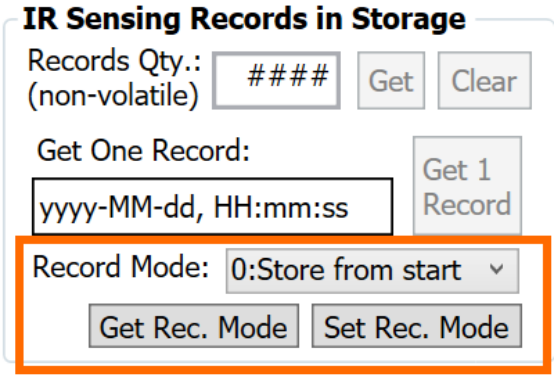


▲Figure 4-8: Set RTC

4.8 Set IR Sensing Record Mode

The “Record Mode” in the “IR Sensing Records in Storage” section (figure 4-9) is for setting the storage mode when the storage is full. There are two modes:

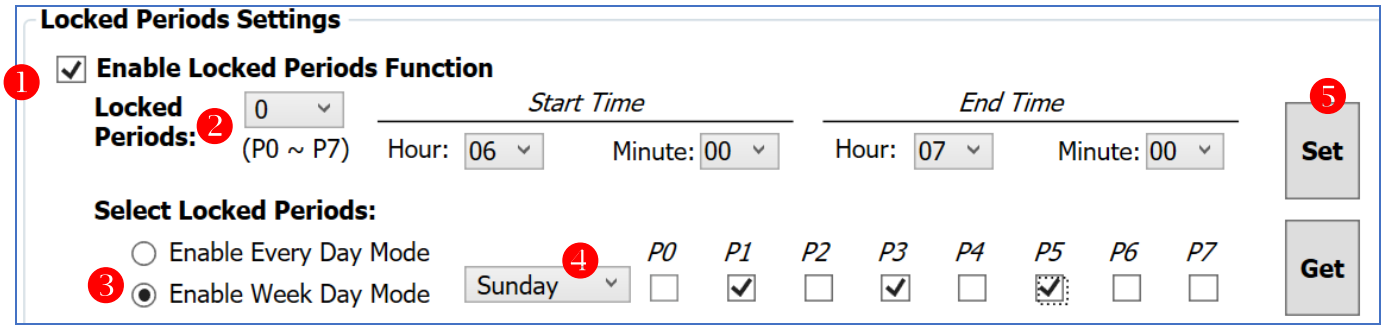
Mode 0 (Store from start): (default) Clear all records and store from start.
Mode 1 (Discard the latest): Discard new data and keep 1600 records of old data.



▲ Figure 4-9: Set IR sensing record mode.

4.9 Set Locked Periods

Locked periods can be set in the “Locked Periods Settings” section of the utility as shown in figure 4-10. The module goes into locked mode (no IR sensing) in the locked period.



▲ Figure 4-10: Set locked periods.

(1) Check/Uncheck “Enabled Locked Periods Function” checkbox to enable/disable this

function.

(2) Click the “Locked Periods” combobox to select 8 periods (0 ~ 7) for setting. The “End Time” should be more than the “Start Time”.

(3) Click “Enable Every Day Mode” or “Enable Week Day Mode” radio button for “Every Day Mode” or “Week Day Mode”.

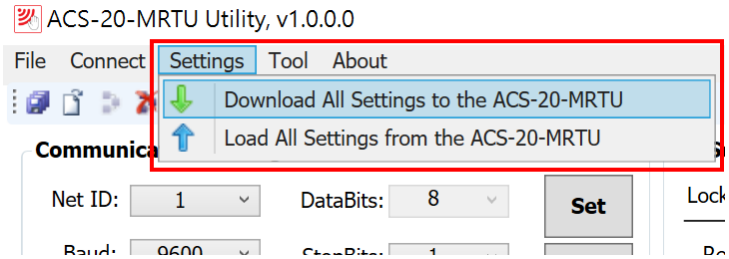
(4) This combobox can set the locked periods for every day and weekdays (Sunday to Saturday) by checking or unchecking the P0 ~ P7 checkboxes to enable or disable them.

(5) Click the right “Set” button to finish the setting.

4.10 Access All Settings

Separate settings can be set as previous sections. Or click Menu [Settings]=>[Download All Settings to the ACS-20-MRTU] to set all settings to the module at once after all parameters are selected in the utility.

Click Menu [Settings]=>[Load All Settings from the ACS-20-MRTU] to read back all settings to utility from the module at once.

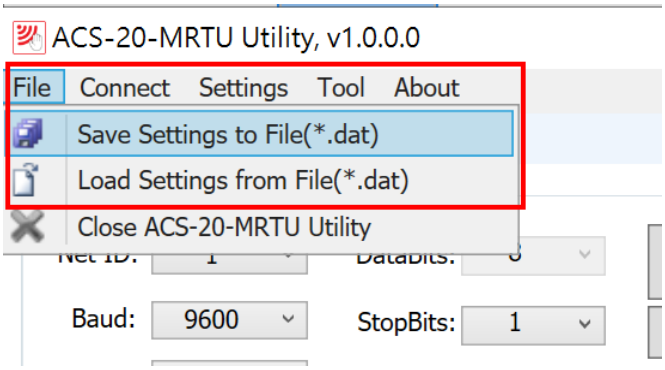


▲ Figure 4-11: Access all setting of the module.

4.11 Configuration File

All settings in the utility can be saved to a configuration file by clicking Menu [File]=>[Save Settings to File(*.dat)] where the file extension is dat.

Load all setting from a configuration file by clicking Menu [File]=>[Load Settings from File(*.dat)]



▲ Figure 4-12: Access configuration file.

5. Modbus Command

The following Function Code commands are provided for a Modbus master to configure ACS-20B(W)-MRTU. Function Code 100 are manufacturer assigned commands for parameter settings to the module.

Table 5-1: Modbus Function Code for ACS-20B(W)-MRTU

Function Code	Description	Section
4 (0x04)	Read multiple input registers (3xxxx)	5.1.1
3 (0x03)	Read holding registers (4xxxx)	5.1.2
6 (0x06)	Write single register (4xxxx)	5.1.2
16 (0x10)	Write multiple registers (4xxxx)	5.1.2
1 (0x01)	Read multiple coils status (0xxxx)	5.1.3
5 (0x05)	Write single coil (0xxxx)	5.1.3
15 (0x0F)	Force multiple coils (0xxxx)	5.1.3
2 (0x02)	Read Discrete Inputs (1xxxx)	5.1.4
100 (0x64)	Manufacturer defined function call.	5.2

5.1 Modbus Register Table

This section provides Modbus registers for configuration. FC4 can be used to read status in section 5.1.1. FC1, FC5, FC15, FC3, FC6 and FC16 can be used to access the settings (provided for firmware version v1.6.0 and later). The same setting function can be done by the FC100 commands in section 5.2, too.

5.1.1 Modbus Input Registers

The Modbus Input Registers are listed in Table 5-2. They are read-only registers.

Table 5-2: Modbus Input Registers (3xxxx)

Address (1-based)	Address (0-based)	Description	R/W
30261	260 (0x0104)	Sensing Year (2000~2200) (The last IR sensing RTC time after power-on)	R
30262	261 (0x0105)	Sensing Month (1~12) (The last IR sensing RTC time after power-on)	R
30263	262 (0x0106)	Sensing Day (1~31) (The last IR sensing RTC time after power-on)	R
30264	263 (0x0107)	Sensing Hour (0~23) (The last IR sensing RTC time after power-on)	R
30265	264 (0x0108)	Sensing Minute (0~59) (The last IR sensing RTC time after power-on)	R
30266	265 (0x0109)	Sensing Second (0~59) (The last IR sensing RTC time after power-on)	R
30267	266 (0x010A)	Sensing Day of Week (0~6: Sun.~Sat.) (The last IR sensing RTC time after power-on)	R
30268	267 (0x010B)	Quantity of stored IR sensing records (0~1600)	R
30269	268 (0x010C)	IR Sensing status (0: not sensing, 1: sensing / toggle mode(always 1))	R
30270	269 (0x010D)	Value of rotary switch (0x00~0x0F)	R
30271	270 (0x010E)	Current RTC Year (2000~2200)	R
30272	271 (0x010F)	Current RTC Month (1~12)	R
30273	272 (0x0110)	Current RTC Day (1~31)	R
30274	273 (0x0111)	Current RTC Hour (0~23)	R
30275	274 (0x0112)	Current RTC Minute (0~59)	R
30276	275 (0x0113)	Current RTC Second (0~59)	R
30277	276 (0x0114)	Current RTC Day of Week (0~6: Sunday~Saturday)	R

5.1.2 Modbus Holding Registers

The Modbus Holding Registers are listed in Table 5-3. The access is read and write. Write values to the holding registers can change settings immediately, and some of them can be stored (non-volatile) in the module and some are not (volatile) after power cycling the module.

Table 5-3: Modbus Holding Registers (4xxxx)

Address (1-based)	Address (0-based)	Description	R/W
40253	252 (0x00FC)	(reboot effected) Modbus Unit ID of Module : 1 ~ 247，default = 1	R,W
40254	253 (0x00FD)	(reboot effected) Baud rate index : 6 ~ 10, default = 6 (6~10 => 9600, 19200, 38400, 57600, 115200 bps)	R,W
40255	254 (0x00FE)	(reboot effected) Parity : 0=>None[default], 1=>Odd, 2=>Even	R,W
40256	255 (0x00FF)	Databits: 8 (reserved, always 8)	R
40257	256 (0x0100)	(reboot effected) Stopbits : 1[default], 2	R,W
40258	257 (0x0101)	(reboot effected) Modbus response delay (ms) : 0 ~ 30 ms (default = 3 ms)	R,W
40260	259 (0x0103)	(volatile) Lock/unlock switch (0=>unlock, 1=>lock) (volatile)	R,W
40261	260 (0x0104)	(volatile) Toggle mode (0=>disable, 1=>enable) (volatile)	R,W
40266	265 (0x0109)	(volatile) (High word) Total number of IR sensing from power on.	R,W
40267	266 (0x010A)	(volatile) (Low word) Total number of IR sensing from power on.	R,W
40268	267 (0x010B)	Relay hold time (off-delay) (ms). value=500~20000	R,W
40269	268 (0x010C)	(volatile) Low byte : 1=> Clear all IR sensing records; 0=>Register value is 0 right after cleared all. (volatile) High byte : IR sensing recording. 0=>enable; 1=> disable	R, W
40270	269 (0x010D)	Invert the Red/Blue LED for IR sensing. 0=>[default] Red (standby, NC contacts COM) / Blue (IR sensing, NO contacts COM) 1=>Red (IR sensing, NC contacts COM) / Blue (standby, NO contacts COM).	R,W
40271	270 (0x010D)	Record mode of IR sensing RTC data when the storage is full. 0=>[default] overwrite the first record, 1=>neglect the new records, 2=>keep the latest records	R,W
40274	273 (0x0111)	Set RTC Year : 2000 ~ 2200. Back to zero after setting.	W
40275	274 (0x0112)	Set RTC Month : 1 ~ 12. Back to zero after setting.	W

40276	275 (0x0113)	Set RTC Day : 1 ~ 31. Back to zero after setting.	W
40277	276 (0x0114)	Set RTC Hour : 0 ~ 23. Back to zero after setting.	W
40278	277 (0x0115)	Set RTC Minute : 0 ~ 59. Back to zero after setting.	W
40279	278 (0x0116)	Set RTC Second : 0 ~ 59. Back to zero after setting.	W
40282	281 (0x0119)	Lock Period 0 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40283	282 (0x011A)	Lock Period 0 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40284	283 (0x011B)	Lock Period 1 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40285	284 (0x011C)	Lock Period 1 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40286	285 (0x011D)	Lock Period 2 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40287	286 (0x011E)	Lock Period 2 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40288	287 (0x011F)	Lock Period 3 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40289	288 (0x0120)	Lock Period 3 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40290	289 (0x0121)	Lock Period 4 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40291	290 (0x0122)	Lock Period 4 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40292	291 (0x0123)	Lock Period 5 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40293	292 (0x0124)	Lock Period 5 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40294	293 (0x0125)	Lock Period 6 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40295	294 (0x0126)	Lock Period 6 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40296	295 (0x0127)	Lock Period 7 Start : Hour(0~23), Minute(0~59) [Start < End]	R,W
40297	296 (0x0128)	Lock Period 7 End : Hour(0~23), Minute(0~59) [Start < End]	R,W
40309	308 (0x0134)	0x0080 => reboot module after 3 seconds	R

5.1.3 Modbus Coils

The Modbus Coils are listed in Table 5-4. The access is read and write. Write values to the coils can change settings immediately and kept after power cycling the module.

Table 5-4: Modbus Coils (0xxxx)

Address (1-based)	Address (0-based)	描述	R/W
00017	16 (0x0010)	Enable/Disable locked period function。 0=>disable; 1=>enable	R,W
00019	18 (0x0012)	Day mode of locked period function 0=>everyday(default)；1=>weekday	R,W
00028 ~ 00035	27 ~ 34 (0x001B~0x0022)	Enable/Disable locked period 0 ~ 7 (everyday mode) 0=>disable; 1=>enable	R,W
00044 ~ 00051	43 ~ 50 (0x002B~0x0032)	Enable/Disable locked period 0 ~ 7 (Sunday) 0=>disable; 1=>enable	R,W
00060 ~ 00067	59 ~ 66 (0x003B~0x0042)	Enable/Disable locked period 0 ~ 7 (Monday) 0=>disable; 1=>enable	R,W
00076 ~ 00083	75 ~ 82 (0x004B~0x0052)	Enable/Disable locked period 0 ~ 7 (Tuesday) 0=>disable; 1=>enable	R,W
00092 ~ 00099	91 ~ 98 (0x005B~0x0062)	Enable/Disable locked period 0 ~ 7 (Wednesday) 0=>disable; 1=>enable	R,W
00108 ~ 00115	107 ~ 114 (0x006B~0x0072)	Enable/Disable locked period 0 ~ 7 (Thursday) 0=>disable; 1=>enable	R,W
00124 ~ 00131	123 ~ 130 (0x007B~0x0082)	Enable/Disable locked period 0 ~ 7 (Friday) 0=>disable; 1=>enable	R,W
00140 ~ 00147	139 ~ 146 (0x008B~0x0092)	Enable/Disable locked period 0 ~ 7 (Saturday) 0=>disable; 1=>enable	R,W

5.1.4 Modbus Discrete Inputs

The Modbus Discrete Inputs are listed in Table 5-5. The R/W access is read-only. The Modbus Discrete Inputs are provided in the firmware version **1.6.5** and later.

Table 5-5: Modbus Coils (0xxxx)

Address (1-based)	Address (0-based)	描述	R/W
10001	0 (0x0000)	Contact status of the relay. 0 => NC and COM are connected; 1 => NO and COM are connected.	R

5.2 Modbus FC100 Commands

This section describes all sub function calls (sub-FC) of FC100 (0x64) for the settings on ACS-20B(W)-MRTU. All sub-FCs are listed in table 5-5. All setting values are non-volatile (effective after power-cycling the module). In the following sections, Modbus requests and responses are listed without CRC16 bytes.

Table 5-6: Sub-FCs of FC100

Sub-FC	Command Description	Section
00 (0x00)	Get the module name.	5.2.1
04 (0x04)	Set the Modbus unit ID (Net ID) of the module.	5.2.2
05 (0x05)	Read communication settings.	5.2.3
06 (0x06)	Set communication settings.	5.2.4
07 (0x07)	Read current communication settings.	5.2.5
08 (0x08)	Read Modbus response delay.	5.2.6
09 (0x09)	Set Modbus response delay.	5.2.7
32 (0x20)	Read firmware version.	5.2.8
33 (0x21)	Read firmware date.	5.2.9
34 (0x22)	Get stored quantity of IR sensing records.	5.2.10
35 (0x23)	Clear all stored IR sensing records.	5.2.11
39 (0x27)	Get RTC time.	5.2.12
40 (0x28)	Set RTC time.	5.2.13
41 (0x29)	Get IR sensing records data	5.2.14
42 (0x2A)	Get IR sensing record mode.	5.2.15
43 (0x2B)	Set IR sensing record mode.	5.2.16
44 (0x2C)	Get inverted red/blue LED status.	5.2.17
45 (0x2D)	Set inverted red/blue LED status.	5.2.18
46 (0x2E)	Get relay hold time.	5.2.19
47 (0x2F)	Set relay hold time.	5.2.20
64 (0x40)	Get locked mode.	5.2.21
65 (0x41)	Set locked mode.	5.2.22
66 (0x42)	Get day mode of locked periods.	5.2.23
67 (0x43)	Set day mode of locked periods.	5.2.24
68 (0x44)	Get enabled state of locked periods.	5.2.25
69 (0x45)	Set enabled state of locked periods.	5.2.26
70 (0x46)	Get 8 locked periods.	5.2.27
71 (0x47)	Set 8 locked periods.	5.2.28
72 (0x48)	Get enabled state of locked period function.	5.2.29
73 (0x49)	Set enabled state of locked period function.	5.2.30
76 (0x4C)	Get scale value of rotary switch.	5.2.31
77 (0x4D)	Get toggle mode	5.2.32
78 (0x4E)	Set toggle mode	5.2.33
165 (0xA5)	Reboot module	5.2.34

5.2.1 Sub-FC00 (0x00): Get the Module Name

The request/response for getting the module name is listed in table 5-6 and table 5-7.

Table 5-7: FC100-Sub-FC00 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x00

Table 5-8: FC100-Sub-FC00 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x00
03~14	Module name	12 Bytes	Hex ASCII code of characters. 0x00 is none. “ACS20MRTU”=> 0x41,0x43,0x53,0x32,0x30,0x4D,0x52,0x54,0x55, 0x00,0x00,0x00

5.2.2 Sub-FC04 (0x04): Set the Modbus Unit ID (Net ID)

Table 5-9: FC100-Sub-FC04 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x04
03	New Address	1 Byte	1 ~ 247 (Net ID)
04	[reserved]	1 Byte	0x00

Table 5-10: FC100-Sub-FC04 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x04
03	Result	1 Byte	0x00 => OK, Others => Error
04	[reserved]	1 Byte	0x00

Note: This parameter setting is effective after power cycling the module,

5.2.3 Sub-FC05 (0x05): Get Communication Settings

Table 5-11: FC100-Sub-FC05 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x05
03	reserved	1 Byte	0x00

Table 5-12: FC100-Sub-FC05 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x05
03	Net ID	1 Byte	1 ~ 247 (Net ID) of the module
04	Baud rate	1 Byte	6 ~ 10 (baud rate index) => {9600, 19200, 38400, 57600, 115200} bps
05	Parity	1 Byte	0, 1, 2=>{None, Odd, Even} (default: None)
06	Data bits	1 Byte	8 (fixed)
07	Stop bits	1 Byte	1, 2 (default: 1)
08	Modbus response delay	1 Byte	0 ~ 30 ms (default: 1 ms)
09	Reserved	1 Byte	0x00

5.2.4 Sub-FC06 (0x06): Set Communication Settings

Table 5-13: FC100-Sub-FC06 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x05
03	New NetID	1 Byte	1 ~ 247 (Net ID) of the module
04	Baud rate	1 Byte	6 ~ 10 (baud rate index) => {9600, 19200, 38400, 57600, 115200} bps
05	Parity	1 Byte	0, 1, 2=>{None, Odd, Even} (default: None)
06	Reserved	1 Byte	0x00
07	Stop bits	1 Byte	1, 2 (default: 1)
08	Modbus response delay	1 Byte	0 ~ 30 ms (default: 1 ms)
09	Change Setting	1 Byte	0=>The settings are effective after power cycling. 1=>Change settings immediately

Table 5-14: FC100-Sub-FC06 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x05
03	Result	1 Byte	0=>OK 0xFF=>Error

5.2.5 Sub-FC07 (0x07): Read Current Communication Settings

The settings read from Sub-FC05 is the settings by Sub-FC06 if the Byte 09 [Change Setting] of Sub-FC06 is 0 (The settings are effective after power-cycling). Sun-FC07 reads the settings before power-cycling the module.

Table 5-15: FC100-Sub-FC07 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x07
03	reserved	1 Byte	0x00

Table 5-16: FC100-Sub-FC07 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x07
03	Net ID	1 Byte	1 ~ 247 (Net ID) of the module
04	Baud rate	1 Byte	6 ~ 10 (baud rate index) => {9600, 19200, 38400, 57600, 115200} bps
05	Parity	1 Byte	0, 1, 2=>{None, Odd, Even} (default: None)
06	Data bits	1 Byte	8 (fixed)
07	Stop bits	1 Byte	1, 2 (default: 1)
08	Modbus response delay	1 Byte	0 ~ 30 ms (default: 1 ms)
09	Reserved	1 Byte	0x00

5.2.6 Sub-FC08 (0x08): Get Modbus Response Delay

Table 5-17: FC100-Sub-FC08 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x08

Table 5-18: FC100-Sub-FC08 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x08
03	Modbus Response Delay	1 Byte	0 ~ 30 ms (default: 1ms)

5.2.7 Sub-FC09 (0x09): Set Modbus Response Delay

Table 5-19: FC100-Sub-FC09 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x09
03	Modbus Response Delay	1 Byte	0 ~ 30 ms (default: 1ms)

Table 5-20: FC100-Sub-FC09 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x09
03	Result	1 Byte	0=>OK 0xFF=>Error

5.2.8 Sub-FC32 (0x20): Get Firmware Version

Table 5-21: FC100-Sub-FC32 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x20

Table 5-22: FC100-Sub-FC32 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x20
03	Major	1 Byte	Major number of firmware version
04	Minor	1 Byte	Minor number of firmware version
05	Build	1 Bhyte	Build number of firmware version

5.2.9 Sub-FC33 (0x21): Get Firmware Date

Table 5-23: FC100-Sub-FC33 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x21

Table 5-24: FC100-Sub-FC33 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x21
03	Year_MSB	1 Byte	High byte of AD year, e.g. 0x07 of 0x07E5 (2021)
04	Year_LSB	1 Byte	Low byte of AD year, e.g. 0xE5 of 0x07E5 (2021)
05	Month	1 Bhyte	1 ~ 12
06	Day	1 Byte	1 ~ 31

5.2.10 Sub-FC34 (0x22): Get Stored Quantity of IR Sensing Records

Table 5-25: FC100-Sub-FC34 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x22

Table 5-26: FC100-Sub-FC34 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x22
03	Quantity_MSB	1 Byte	High byte of record quantity
04	Quantity_LSB	1 Byte	Low byte of record quantity

5.2.11 Sub-FC35 (0x23): Clear All Stored IR Sensing Records

Table 5-27: FC100-Sub-FC35 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x23
03	Reserved	1 Byte	0x00

Table 5-28: FC100-Sub-FC35 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x23
03	Result	1 Byte	0=>OK, 1=>Error

5.2.12 Sub-FC39 (0x27): Get RTC Time

Table 5-29: FC100-Sub-FC39 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x27

Table 5-30: FC100-Sub-FC39 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x27
03	Year_MSB	1 Byte	High byte of AD Year, e.g. 07h of 07E5h (2021)
04	Year_LSB	1 Byte	Low byte of AD Year, e.g. 0xE5 of 0x07E5 (2021)
05	Month	1 Byte	1 ~ 12
06	Day	1 Byte	1 ~ 31
07	Hour	1 Byte	0 ~ 23
08	Minute	1 Byte	0 ~ 59
09	Second	1 Byte	0 ~ 59
10	Reserved	1 Byte	0x00

5.2.13 Sub-FC40(0x28): Set RTC Time

Table 5-31: FC100-Sub-FC40 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x28
03	Year_MSB	1 Byte	High byte of AD Year, e.g. 07h of 07E5h (2021)
04	Year_LSB	1 Byte	Low byte of AD Year, e.g. 0xE5 of 0x07E5 (2021)
05	Month	1 Byte	1 ~ 12
06	Day	1 Byte	1 ~ 31
07	Hour	1 Byte	0 ~ 23
08	Minute	1 Byte	0 ~ 59
09	Second	1 Byte	0 ~ 59
10	Reserved	1 Byte	0x00

Table 5-32: FC100-Sub-FC40 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x28
03	Result	1 Byte	0=>OK, Others=>Error

5.2.14 Sub-FC41(0x29): Get IR Sensing Record Data

Table 5-33: FC100-Sub-FC41 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x29
03	Number of records	1 Byte	1 ~ 31, read number of records. The size of 1 record is 8 bytes.

Table 5-34: FC100-Sub-FC41 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x29
03	Result	1 Byte	0=>OK, Others=>Error
04	Data byte count	1 Byte	8 ~ 248, i.e., 8 * N (bytes) where N = 1 ~ 31
05 ~ [5 + (8*N-1)]	Record data	8*N bytes	[Year_MSB_1][Year_LSB_1][Month_1][Day_1] [Hour_1][Min_1][Sec_1][Reserved_1] … [Year_MSB_N][Year_LSB_N][Month_N][Day_N] [Hour_N][Min_N][Sec_N] [Reserved_N] where N=1~31 and data length=8*N bytes

Note: Data length of 1 record is 8 bytes
([Year_MSB][Year_LSB][Month][Day][Hour][Minute][Second])

5.2.15 Sub-FC42(0x2A): Get IR Sensing Record Mode

Table 5-35: FC100-Sub-FC42 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2A

Table 5-36: FC100-Sub-FC42 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2A
03	Record mode	1 Byte	The way of storing records when storage full: 0=> (default) Clear all records and store from start. 1=> Discard new data and keep 1600 records of old data.

5.2.16 Sub-FC43(0x2B): Set IR Sensing Record Mode

Table 5-37: FC100-Sub-FC43 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2B
03	Record mode	1 Byte	The way of storing records when storage full: 0=> (default) Clear all records and store from start. 1=> Discard new data and keep 1600 records of old data.

Table 5-38: FC100-Sub-FC43 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2B
03	Result	1 Byte	0x00=>OK, 0xFF=>Error

5.2.17 Sub-FC44(0x2C): Get Inverted Red/Blue LED Status

Table 5-39: FC100-Sub-FC44 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2C

Table 5-40: FC100-Sub-FC44 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2C
03	Inverted Red/Blue LED State	1 Byte	0 => default Red(Standby) / Blue(Sensing); 1 => Red(Sensing) / Blue(Standby)

5.2.18 Sub-FC45(0x2D): Set Inverted Red/Blue LED Status

Table 5-41: FC100-Sub-FC45 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2D
03	Inverted Red/Blue LED State	1 Byte	0 => default Red(Standby) / Blue(Sensing); 1 => Red(Sensing) / Blue(Standby)

Table 5-42: FC100-Sub-FC45 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2D
03	Result	1 Byte	0x00 => OK 0xFF => Error

5.2.19 Sub-FC46(0x2E): Get Relay Hold Time

Table 5-43: FC100-Sub-FC46 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2E

Table 5-44: FC100-Sub-FC46 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2E
03	Relay hold time MSB	1 Byte	High byte of relay hold time (500~20,000ms) e.g. 0x03 0f 0x03E8 (1,000 ms)
04	Relay hold time LSB	1 Byte	Low byte of relay hold time (500~20000ms) e.g. 0xE8 of 0x03E8 (1,000 ms)

5.2.20 Sub-FC47(0x2F): Set Relay Hold Time

Table 5-45: FC100-Sub-FC47 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2F
03	Relay hold time MSB	1 Byte	High byte of relay hold time (500~20,000ms) e.g. 0x03 of 0x03E8 (1,000 ms)
04	Relay hold time LSB	1 Byte	Low byte of relay hold time (500~20000ms) e.g. 0xE8 of 0x03E8 (1,000 ms)

Table 5-46: FC100-Sub-FC47 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x2F
03	Result	1 Byte	0x00 => OK 0xFF => Error

5.2.21 Sub-FC64(0x40): Get Locked Mode

Table 5-47: FC100-Sub-FC64 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x40

Table 5-48: FC100-Sub-FC64 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x40
03	Locked mode	1 Byte	0x00 => disabled (unlocked) 0x01 => enabled (locked)

5.2.22 Sub-FC65(0x41): Set Locked Mode

Table 5-49: FC100-Sub-FC65 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x41
03	Locked mode	1 Byte	0x00 => disabled (unlocked) 0x01 => enabled (locked)

Table 5-50: FC100-Sub-FC65 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x41
03	Result	1 Byte	0x00 => OK Others => Error

5.2.23 Sub-FC66(0x42): Get Day Mode of Locked Periods

Table 5-51: FC100-Sub-FC66 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x42

Table 5-52: FC100-Sub-FC66 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x42
03	Reserved	1 Byte	0x00
04	Day mode	1 Byte	0x00 => Every day mode (default) 0x01 => Weekday mode

5.2.24 Sub-FC67(0x43): Set Day Mode of Locked Periods

Table 5-53: FC100-Sub-FC67 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x43
03	Day mode	1 Byte	0x00 => Every day mode (default) 0x01 => Weekday mode

Table 5-54: FC100-Sub-FC67 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x43
03	Result	1 Byte	0x00 => OK 0xFF => Error

5.2.25 Sub-FC68(0x44): Get Enabled State of Locked Periods

This command gets the enable/disable status of the 8 locked periods in a day by one byte with 8 bits (b7~b0=>P8~P1) where bit value = 1 means enabled and bit value = 0 disabled. E.g. 0x73 (hex) = 0111 0011 (binary) means 5 locked periods are enabled.

▼ Table 5-55: FC100-Sub-FC68 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x44

▼ Table 5-56: FC100-Sub-FC68 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x44
03	Reserved	1 Byte	0x00
04	Every day enabled state	1 Byte	0x00 => Every day mode (default) 0x01 => Weekday mode
05	Reserved	1 Byte	0x00
06	Sunday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
07	Reserved	1 Byte	0x00
08	Monday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
09	Reserved	1 Byte	0x00
10	Tuesday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
11	Reserved	1 Byte	0x00
12	Wednesday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
13	Reserved	1 Byte	0x00
14	Thursday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
15	Reserved	1 Byte	0x00
16	Friday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
17	Reserved	1 Byte	0x00
18	Saturday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods

5.2.26 Sub-FC69(0x45): Set Enabled State of Locked Periods

This command gets the enable/disable status of the 8 locked periods in a day by one byte with 8 bits (b7~b0=>P8~P1) where bit value = 1 means enabled and bit value = 0 disabled. E.g. 0x73 (hex) = 0111 0011 (binary) means 5 locked periods are enabled.

Table 5-57: FC100-Sub-FC69 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x45
03	Reserved	1 Byte	0x00
04	Every day enabled state	1 Byte	0x00 => Every day mode (default) 0x01 => Weekday mode
05	Reserved	1 Byte	0x00
06	Sunday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
07	Reserved	1 Byte	0x00
08	Monday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
09	Reserved	1 Byte	0x00
10	Tuesday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
11	Reserved	1 Byte	0x00
12	Wednesday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
13	Reserved	1 Byte	0x00
14	Thursday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
15	Reserved	1 Byte	0x00
16	Friday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
17	Reserved	1 Byte	0x00
18	Saturday enabled state	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods

Table 5-58: FC100-Sub-FC69 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x45
03	Result	1 Byte	0x00 => OK 0xFF => Error

5.2.27 Sub-FC70(0x46): Get 8 Locked Periods

This command gets 8 locked periods in a day from module. One locked period composed of Start Time and End Time. The End Time should be late after the Start Time.

Table 5-59: FC100-Sub-FC70 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x46

Table 5-60: FC100-Sub-FC70 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x46
03	P1 Start Hour	1 Byte	0 ~ 23, period 1 start Hour
04	P1 Start Minute	1 Byte	0 ~ 59, period 1 start Minute
05	P1 Start Second	1 Byte	0 ~ 59, period 1 start second
06	P1 End Hour	1 Byte	0 ~ 23, period 1 end Hour
07	P1 End Minute	1 Byte	0 ~ 59, period 1 end Minute
08	P1 End Second	1 Byte	0 ~ 59, period 1 end second
09~44	P2 to P7 …	36 Bytes	period 2 ~ 7 start time and end time
45	P8 Start Hour	1 Byte	0x00
46	P8 Start Minute	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
47	P8 Start Second	1 Byte	0x00
48	P8 End Hour	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
49	P8 End Minute	1 Byte	0x00
50	P8 End Second	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods

5.2.28 Sub-FC71(0x47): Set 8 Locked Periods

This command sets 8 locked periods in a day to module. One locked period composed of Start Time and End Time. **The End Time should be late after the Start Time.**

Table 5-61: FC100-Sub-FC71 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x47
03	P1 Start Hour	1 Byte	0 ~ 23, period 1 start Hour
04	P1 Start Minute	1 Byte	0 ~ 59, period 1 start Minute
05	P1 Start Second	1 Byte	0 ~ 59, period 1 start second
06	P1 End Hour	1 Byte	0 ~ 23, period 1 end Hour
07	P1 End Minute	1 Byte	0 ~ 59, period 1 end Minute
08	P1 End Second	1 Byte	0 ~ 59, period 1 end second
09~44	P2 to P7 …	36 Bytes	period 2 ~ 7 start time and end time
45	P8 Start Hour	1 Byte	0x00
46	P8 Start Minute	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
47	P8 Start Second	1 Byte	0x00
48	P8 End Hour	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods
49	P8 End Minute	1 Byte	0x00
50	P8 End Second	1 Byte	0x00 ~ 0xFF, enabled state of 8 periods

Table 5-62: FC100-Sub-FC71 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x47
03	Result	1 Byte	0x00 => OK Others => Error, bit0~bit7 correspond to period1~period8. Bit value=1 means invalid settings.

5.2.29 Sub-FC72(0x48): Get Enabled State of Locked Period Function

Table 5-63: FC100-Sub-FC72 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x48

Table 5-64: FC100-Sub-FC72 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x48
03	Enabled state	1 Byte	0x00 => disabled 0x01 => enabled

5.2.30 Sub-FC73(0x49): Set Enabled State of Locked Period Function

Note: Settings of Sub-FC66~ 71 are effective when this function is enabled.

Table 5-65: FC100-Sub-FC73 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x49
03	Enabled state	1 Byte	0x00 => disabled (default) 0x01 => enabled

Table 5-66: FC100-Sub-FC73 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x49
03	Result	1 Byte	0x00 => OK 0xFF => Error

5.2.31 Sub-FC76(0x4C): Get Scale Value of Rotary Switch

Note: Settings of Sub-FC66~ 71 are effective when this function is enabled.

Table 5-67: FC100-Sub-FC76 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x4C

Table 5-68: FC100-Sub-FC76 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x4C
03	Scale value	1 Byte	0x00 ~ 0x0F

5.2.32 Sub-FC77(0x4D): Get Toggle Mode

Table 5-69: FC100-Sub-FC77 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x4D

Table 5-70: FC100-Sub-FC77 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x4D
03	Toggle mode	1 Byte	0x00 => disabled (default) 0x01 => enabled

5.2.33 Sub-FC78(0x4E): Set Toggle Mode

Table 5-71: FC100-Sub-FC78 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x4E
03	Toggle mode	1 Byte	0x00 => disabled (default) 0x01 => enabled

Table 5-72: FC100-Sub-FC78 Response

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0x49
03	Result	1 Byte	0x00 => OK 0xFF => Error

5.2.34 Sub-FC165(0xA5): Reboot Module

Table 5-73: FC100-Sub-FC165 Request

Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0xA5

Table 5-74: FC100-Sub-FC165 Response

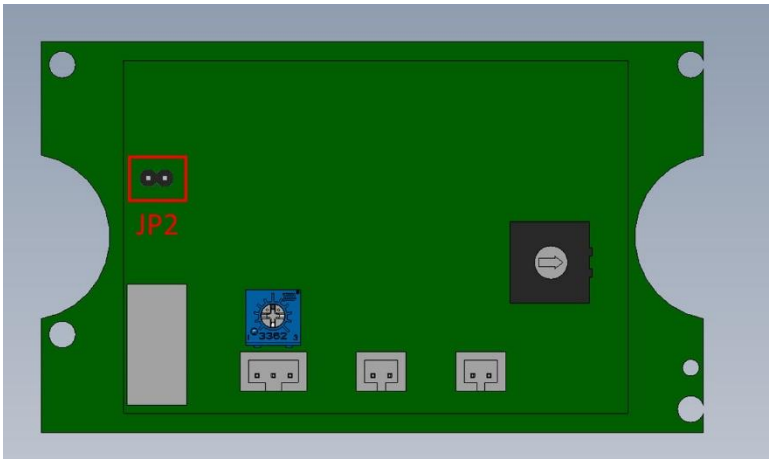
Byte order	Description	Size	Value
00	Address	1 Byte	1 ~ 247 (Net ID)
01	FC	1 Byte	0x64
02	Sub-FC	1 Byte	0xA5
03	Result	1 Byte	0x00 => OK Others => Error

Appendix A. Update Firmware

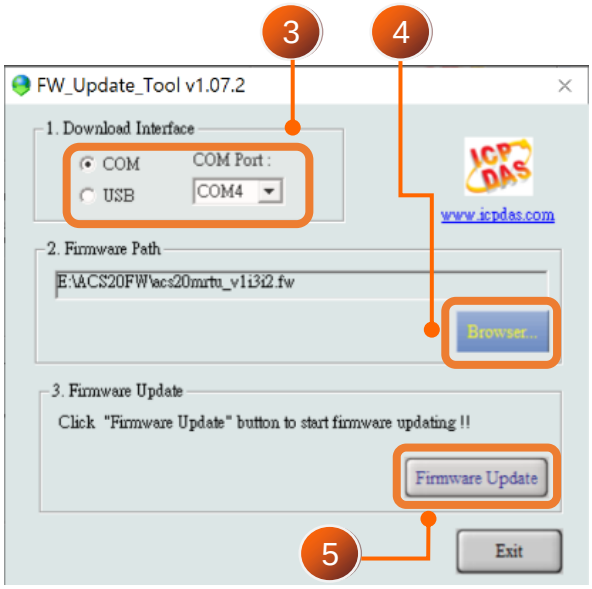
To update the firmware, users can click the menu [Tool] -> [Firmware Update Tool] from the ACS-20-MRTU Utility to launch the firmware update tool (must be **v1.07.2**). Please follow the below steps to finish the update firmware procedure, which is also depicted in Figure A-1.

(1) Power off the module. Release the back case.
(2) Short the two pins of JP2 and then power on the module. Red & blue LED blink 2 times per second which means it is in firmware update mode.
(3) Click “COM” radio button and select “COM Port” connected to ACS-20B(W)-MRTU..
(4) Click “Browser” to find the firmware file, e.g., acs20mrtu_v#i#i#.fw.
(5) Click “Firmware Update” button to start the update procedure.
(6) After firmware update finished, power cycle the module. Click Utility Menu [About] to check the firmware version.

Note: The all configuration settings would not be changed except RTC time after firmware update.



▲ Figure A-1: JP2 position.



▲ Figure A-2: Firmware update procedure.

The firmware of ACS-20B(W)-MRTU can be downloaded from:
https://www.icpdas.com/en/download/index.php?model=ACS-20B-MRTU

Appendix B. Revision History

This chapter provides revision history information to this document.

Table B-1: Revision History

Version	Date	Description of changes
1.0	2021-1-24	The First Release Revision
1.1	2021-2-3	1. Add section 4.8. 2. Update section 5.2.15 & 5.2.16. 3. Update appendix A.
1.2	2022-3-08	1. Correct errors. 2. Add Modbus holding register table and Coil table in chapter 5..
1.3	2022-3-22	1. Modify the figure of utility.
1.4	2023-1-11	1. Add section 5.1.4 for Modbus Discrete Inputs.