SuperLogics

8080, 8080D
User Manual

8000 SERIES New Features
1. Self Tuner Inside
2. Multiple Baud Rate
3. Multiple Data Format
4. Dual WatchDog Inside
5. True Distributed Control
6. High Speed & High Density I/O

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1. Introduction

8000 SERIES is a family of network data acquisition and control modules. They provide A/D, D/A, DI/O, Timer/Counter and other functions. These modules can be remote controlled by a set of commands. The common features of 8080 and 8080D are given as following:

- 2 independent 32-bit counter, counter 0 & counter 1
- input signal can be isolated or non-isolated
- programmable digital filter for isolated and non-isolated input
- external gate control for isolated and non-isolated input
- programmable threshold value for non-isolated input.
- programmable alarm output
- input frequency measurement up to 100K Hz

The 8080D is the 8080 with a 5-digit LED display. The counter value and input signal frequency can be shown in LED directly without PC control.

More Information

Refer to "8000 SERIES Bus Converter User Manual" chapter 1 for more information as following:

1.1 8080/8080D

Comparison between 8080 & 8080D

	8080	8080D
5-digit LED	No	Yes
Response to LED command	No	Yes
Module name	programmable	programmable
Counter preset value	Yes(programmable)	Yes(programmable)
Alarm on counter 0 only	Yes(programmable)	Yes(programmable)
Alarm on counter 0&1	Yes(programmable)	Yes(programmable)
Channel 0 & channel 1 are both non-isolated (input mode 0, $AAB0)	Yes	Yes
Channel 0 & channel 1 are both isolated (input mode 1, $AAB1)	Yes	Yes
Channel 0 is non-isolated & channel 1 is isolated (input mode 2, $AAB2)	Yes	Yes
Channel 0 is isolated & channel 1 is non-isolated (input mode 3, $AAB3)	Yes	Yes
Input frequency	100K max.	100K max.

default setting of 8080:

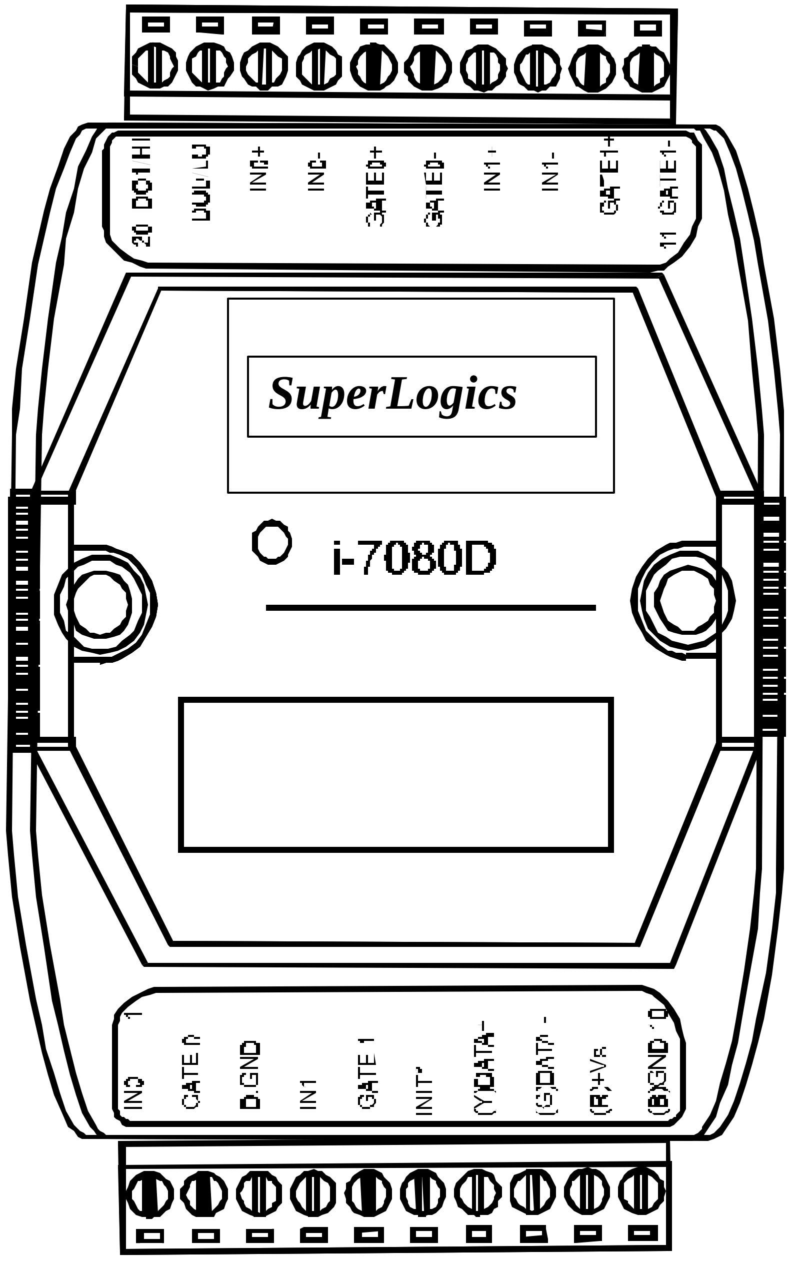
- High alarm on counter 0 & 1
- Counter preset value: 0
- Module name: 8080

default setting of 8080D:

- High/High-High alarm on counter 0
- Counter preset value: 0
- Module name: 8080D

1.2Pin Assignment

Isolated Input



Non-isolated Input

1.3 Specifications

8080: Counter/Frequency Module
8080D: 8080 with LED Display

Counter Input

- Channels: Two independents 32 bit counters, counter 0&1
- Input signal: Isolated or non-isolated programmable
- Isolation input levels:
  Logic level 0: +1V max.
  Logic level 1: +3.5V to +30V
- Isolation voltage: 3750 Vrms
- non-isolation input threshold level: programmable
  Logic level 0: 0 to +5V (default = 0.8V)
  Logic level 1: 0 to +5V (default = 2.4V)
- Maximum count: 32 bit (4,294,967,295)
- Programmable digital noise filter: 2 us to 65 ms
- Alarming: alarm on counter 0 or counter 0&1, programmable
- Counter preset value: programmable

Display

- LED Indicator: 5-digit readout, channel 0 or channel 1

Frequency Measurement

- Input frequency: 1Hz to 100K Hz max.
- Programmable built-in gate time: 1.0/0.1sec

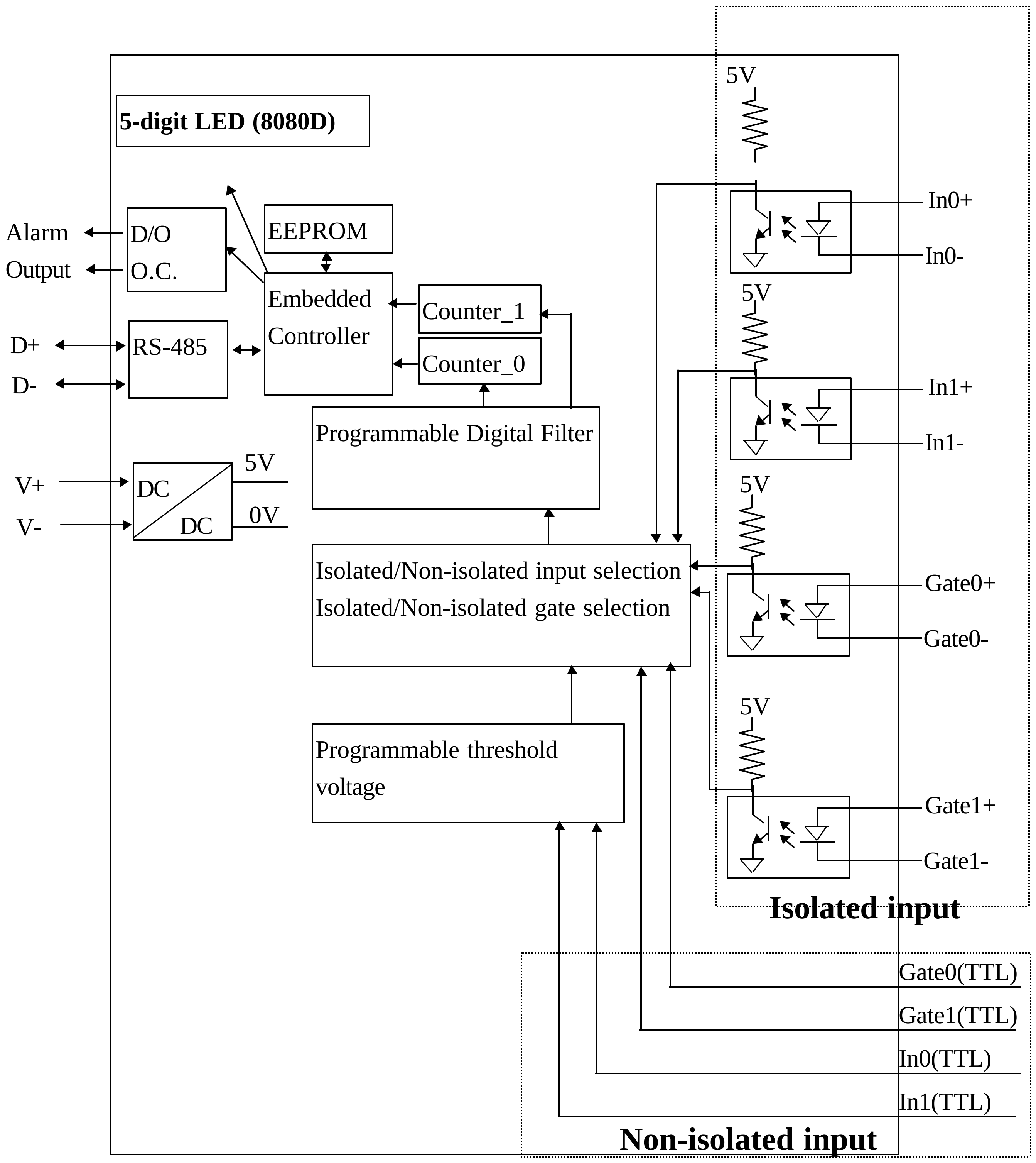
Digital Output

- 2 channels, open-collector to 30V, 30mA max. load
- Power dissipation: 300mW

Power

- Power requirements: +10V to 30V(non-regulated)
- Power consumption : 2W for 8080, 2.2W for 8080D

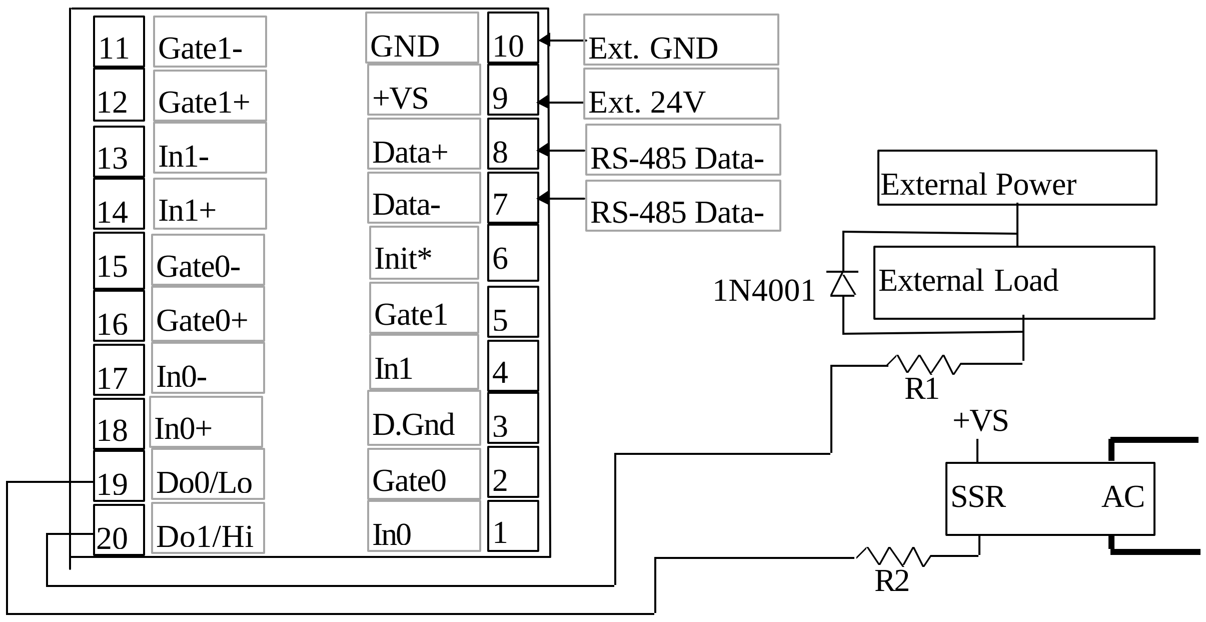
1.4 Block Diagram



1.5 Application Wiring

1.5.1 Output Drive SSR or Other Load

8018 & 8018D

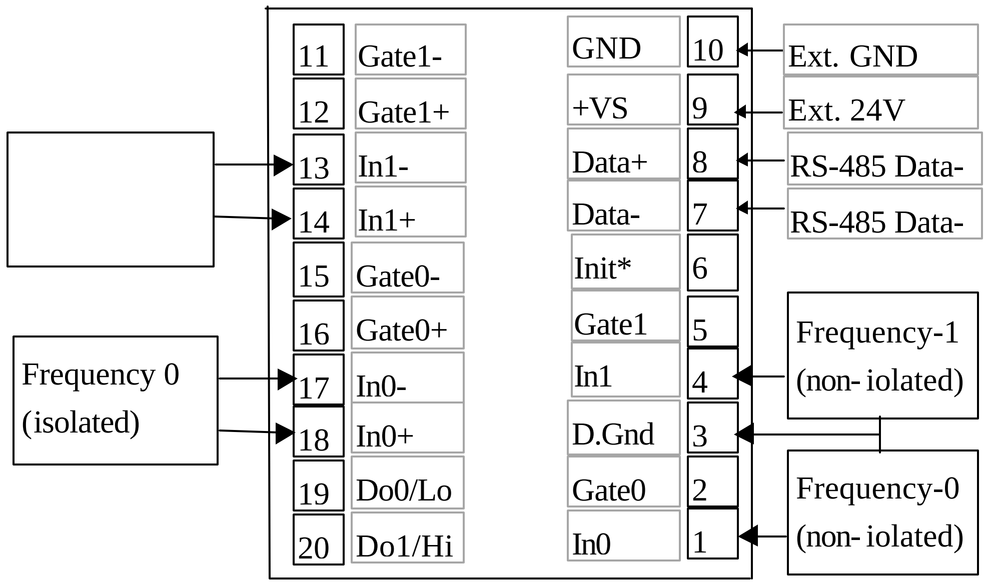


Note:

- If the external load is resistive load, the 1N4001 can be omitted. (transistor, lamp, resistor, …)
- If the external load is inductive load, the 1N4001 can't be omitted. (relay, coil, …)

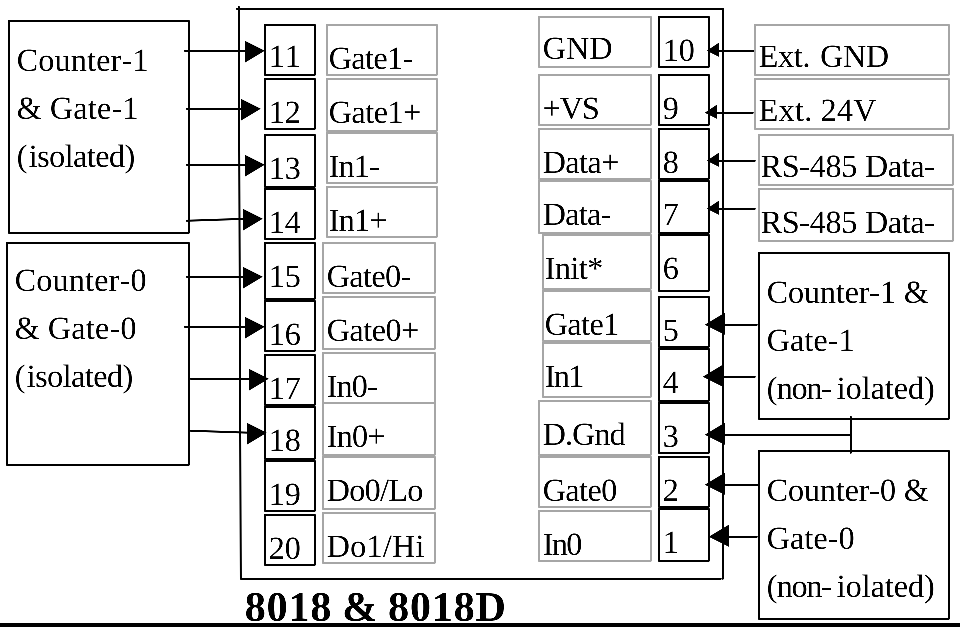
1.5.2 Frequency Input

Use $AABS command to select isolated/non-isolated input.



8018 & 8018D

1.5.3 Counter Input



8018 & 8018D

1.6 Quick Start

Refer to “8000 SERIES Bus Converter User Manual” chapter-5 for the following functions:

- **module status unknown**(Sec. 5.1), **change address**(Sec. 5.2)
- **change baud rate**(Sec. 5.3), **checksum enable/disable**(Sec. 5.4)
- Wire connection(Sec 2.4)
- Test program **TEST.EXE**

1.6.1 Frequency Input Measurememt

1. Refer to Sec. 1.5.2 for wire connection. Power on and run **test.exe**
2. press **2**
3. press **$012[Enter]** → Receive=!01500600
4. press **2**
5. press **%0101510600[Enter]**→ Receive=>!01
6. press **2**
7. press **$01B0[Enter]** → Receive=!01
8. press **2**
9. press **#010[Enter]** → Receive=>????????
10. press **2**
11. press **#011[Enter]** → Receive=>????????

- step 3: the status of 8080 is COUNTER mode
- step 5: change to frequency mode
- step 7: select non-isolated input
- step 9: frequency measurement of channel-0
- step 11: frequency measurement of channel-1

Note: the command **$01B1**(step 7) can be used to select the isolated input.**(**the command **$01B2** and **$01B3** are used for the other selections)

1.6.2 Counter input Measurement

1. Refer to Sec. 1.5.2 for wire connection. Power on and run **test.exe**
2. press **2**
3. press **$012[Enter]** → Receive=!01500600
4. press **2**
5. press **$01B0[Enter]** → Receive=!01
6. press **2**
7. press **#010[Enter]** → Receive=>????????
8. press **2**
9. press **#011[Enter]** → Receive=>????????

- step 3: the status of 8080 is COUNTER mode
- step 5: select non-isolated input
- step 7: counter measurement of channel-0
- step 9: counter measurement of channel-1

Note: the command **$01B1**(step 7) can be used to select the isolated input.**(**the command **$01B2** and **$01B3** are used for the other selections)

1.7 Default Setting

The default setting is given as following:

- address=01
- baud rate=9600
- checksum disable
- data=1 start+8 data+1 stop(no parity)
- type=50 → counter input
- alarm=hi alarm on counter 0 & counter 1 (8080)
  hi/hhi alarm on counter 0 (8080D)

1.8 Application Notes

1.8.1 Counter/Frequency Input Mode Selection

The counter/frequency input can be selected from isolated or non-isolated signal. The channel 0 & channel 1 can be selected separately. There are 4 different input mode given as following: These four input modes can be used in both of 8080 & 8080D.

Input Mode	Command	Channel 0	Channel 1
Input mode 0	$AAB0	Non-isolated	Non-isolated
Input mode 1	$AAB1	Isolated	Isolated
Input mode 2	$AAB2	Non-isolated	Isolated
Input mode 3	$AAB3	Isolated	Non-isolated

1.8.2 Counter Alarm Mode Selection

There are no alarm function in frequency mode(51). There are two counter alarm mode, alarm mode 0 & alarm mode 1. These two alarm modes can be used in both of 8080 & 8080D.

The **alarm mode 0** is designed for two-channel application as following:

- select alarm mode 0: ~AAA0 (for both channels)
- enable channel 0: @AAEA0
- disable channel 0: @AADA0
- set high alarm limit of channel 0: @AAPA(data)
- if (counter 0 >= alarm limit 0) $\rightarrow$ D/O 0 turn ON
- if (counter 0 < alarm limit 0) $\rightarrow$ D/O 0 turn OFF

- enable channel 1: @AAEA1
- disable channel 1: @AADA1
- set high alarm limit of channel 1: @AASA(data)
- if (counter 1 >= alarm limit 1) $\rightarrow$ D/O 1 turn ON
- if (counter 1 < alarm limit 1) $\rightarrow$ D/O 1 turn OFF

The **alarm mode 1** is designed for single-channel application as following:

- select alarm mode 1: ~AAA1 (for channel 0 only)
- enable channel 0: @AAEAT
- disable channel 0: @AADA
- clear latch alarm: @AACA
- set high alarm limit: @AAPA(data)
- set high-high alarm limit: @AASA(data)

	D/O 0	D/O 1
Counter 0 < high alarm	OFF	OFF
high alarm <= counter 0 & counter 0 < high-high alarm	ON	OFF
High-high alarm <= counter 0	ON	ON

Note: high-high alarm must greater than high-alarm

1.8.3 Digital Output Application Notes

The D/O0 & D/O1 can be used as D/O or alarm output as following:

- can be used as D/O in the frequency mode.
- can be used as D/O in the counter mode & alarm disable (by @AADA or @AADAN command)
- can be used as alarm output in the counter mode & alarm enable(by @AAEAT or @AAEAN command)

	D/O 0	D/O 1
Frequency mode	D/O 0	D/O 1
Counter mode & alarm disable	D/O 0	D/O 1
Counter mode & alarm enable (alarm mode 1, ~AAA1)	High-alarm on counter 0	High-high alarm on counter 0
Counter mode & alarm enable (alarm mode 0, ~AAA0 & @AAEA0)	Alarm on counter 0	D/O 1 or alarm on counter 1
Counter mode & alarm enable (alrm mode 0, ~AAA0 & @AAEA1)	D/O 0 or alarm on counter 0	alarm on counter 1

1.8.4 Programmable Threshold Voltage Setting

The programmable threshold voltage is valid for non-isolated input of **counter mode (50) & frequency mode(51)**. The default setting are given as following:

- TTL compatible
- low trigger level = 0.8 volt
- high trigger level = 2.4 volt

The high trigger level can be changed by $AA1H(data) command, the low trigger can be changed by $AA1L(data) comand. The high trigger level must be greater than the low trigger level.

1.8.5 Digital Filter Setting

The digital filter is disable in frequency mode(51). The digital filter is designed as a pulse-width filter in both high/low pulse. The digital filter is valid for both nono-isolated & isolated input. The digital filter can be enable or disable. The key points of using digital filter are given as following:

1. Use $AABS to select input signal.
2. Use $AA0H(data) to set min. width of high level.
3. Use $AA0L(data) to set min. width of low level.
4. Use $AA4S to enable/disbale digital filter (both channels).

If the high width of input signal is small than the min. high width of digital filter, this input signal will be filtered out. Also the low width of input signal must be greater than the min. low width of digital filter.

For example, the width of input signal is greater than 1000 us, the user can set the digital filter at 900 us. Therefore all noise below 900 us will be filtered out by the digital filter. These steps are given as following:

1. $AAB0
2. $AA0H00900
3. $AA0L00900
4. $AA41

1.8.6 Gate Control Setting

The gate control will be ignored in frequency mode(51). The gate control is defaultly disable in counter mode(50). The user can use command to enable/disable the gate control as following:

- $AAA0 → gate input must be low to enable counter
- $AAA1 → gate input must be high to enable counter
- $AAA2 → gate input is ignored. The counter will be always enable.

1.8.7 Preset Value Setting

The preset value will be ignored in frequency mode(51). The counters will go to their preset value in the first power-on state. The reset counter command, $AA6N, also force the counters go to their preset value. The factory default setting of preset value is 0. The user can use the $AAPN(data) command to change the preset value. The key points are given as following:

	8080 & 8080D
Factory default setting	Counter preset value is 0
Power on state	Counter 0/1 go to preset value
$AA6N	Counter N go to preset value
$AAPN(data)	Set preset value of counter N

1.8.8 Frequency Input Applications

Type=51

	Frequency 0	Frequency 1
$AAB0 → input mode 0 $AA1H(data) & $AA1L(data)	Non-isolated channel 0 & threshold value active	Non-isolated channel 1 & threshold value active
$AAB1 → input mode 1 $AA1H(data) & $AA1L(data)	Isolated channel 0	Isolated channel 1
$AAB2 → input mode 2 $AA1H(data) & $AA1L(data)	Non-isolated channel 0 & threshold value active	Isolated channel 1
$AAB3 → input mode 3 $AA1H(data) & $AA1L(data)	Isolated channel 0	Non-isolated channel 1 & threshold value active

The steps to measure frequency are given as following:

1. Use $AA1H(data) & $AA1L(data) to set the threshld value if the frequency is non-isolated input.
2. Use $AAB? to select the mode (this command will clear the current frequency first)
3. Use #AA? to perform frequency measurement

Note: Only four commands are important in frequency measurement mode. These commands are given as following:

- **$AAB? → select mode**
- **$AA1H(data) → set high-level threshold value**
- **$AA1L(data) → set low_level threshold value**
- **#AA? → perform frequency measurement**

The status-read-back commands are given as following:

- **$AAB → mode read back**
- **$AA1H → high_level threshold value read back**
- **$AA1L(data) → low_level threshold value read back**

1.8.9 Counter Input Applications

Tyepe=50

	Counter 0	Counter 1
$AAB0 → input mode 0 $AA1H(data) & $AA1L(data)	Non-isolated channel 0 & threshold value active	Non-isolated channel 1 & threshold value active
$AAB1 → input mode 1 $AA1H(data) & $AA1L(data)	Isolated channel 0	Isolated channel 1
$AAB2 → input mode 2 $AA1H(data) & $AA1L(data)	Non-isolated channel 0 & threshold value active	Isolated channel 1
$AAB3 → input mode 3 $AA1H(data) & $AA1L(data)	Isolated channel 0	Non-isolated channel 1 & threshold value active

Note: the threshold value command, $AA1H(data) & $AA1L(data) are effective to Non-isolated input only.

1.9 Tables

Configuration Code Table : CC

CC	Baud Rate
03	1200 BPS
04	2400 BPS
05	4800 BPS
06	9600 BPS
07	19200 BPS
08	38400 BPS
09	57600 BPS
0A	115200 BPS

Configuration Code : FF, 2-char (for all)

7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	checksum 0=disable 1=enable	0			frequency gate time 0: 0.1 second 1: 1.0 second	0	

Configuration Code Table: TT

TT	Input Range
50	Counter
51	Frequency

2. Command Set

General Command Set

Command	Response	Description	Reference
%AANNTTCCFF	!AA	Set module configuration	Sec. 2.1
#AAN	>(data)	Read counter or frequency	Sec. 2.2
~**	No Response	Host OK	Sec. 2.3
~AA0	!AASS	Read Module Status	Sec. 2.4
~AA1	!AA	Reset Module Status	Sec. 2.5
~AA2	!AATT	Read Host Watchdog Timer	Sec. 2.6
~AA3ETT	!AA	Enable Host Watchdog Timer	Sec. 2.7
~AAO(name)	!AA	Set module name	Sec. 2.9
$AA2	!AATTCCFF	Read configuration	Sec. 2.18
$AAF	!AA(data)	Read firmware number	Sec. 2.34
$AAI	!AAS	Read the value of INIT* pin	Sec. 2.35
$AAM	!AA(data)	Read the module name	Sec. 2.36

Frequency Command Set

Command	Response	Description	Reference
$AAB	!AAS	Read input mode	Sec. 2.32
$AABS	!AA	Set input mode	Sec. 2.33
$AA1H	!AA(data)	Read high trigger level	Sec. 2.14
$AA1H(data)	!AA	Set high trigger level	Sec. 2.15
$AA1L	!AA(data)	Read low trigger level	Sec. 2.16
$AA1L(data)	!AA	Set low trigger level	Sec. 2.17

General Counter Command Set

~AAAS	!AA	Set counter alarm mode	Sec. 2.8
$AA0H	!AA(data)	Read min. width of High	Sec. 2.10
$AA0H(data)	!AA	Set min. width of High	Sec. 2.11
$AA0L	!AA(data)	Read min. width of High	Sec. 2.12
$AA0L(data)	!AA	Set min. width of High	Sec. 2.13
$AA1H	!AA(data)	Read high trigger level	Sec. 2.14
$AA1H(data)	!AA	Set high trigger level	Sec. 2.15
$AA1L	!AA(data)	Read low trigger level	Sec. 2.16
$AA1L(data)	!AA	Set low trigger level	Sec. 2.17
$AA3N	!AA(data)	Read max. counter value	Sec. 2.19
$AA3N(data)	!AA	Set max. counter value	Sec. 2.20
$AA4	!AAS	Read filter status	Sec. 2.21
$AA4S	!AA	Set filter status	Sec. 2.22
$AA5N	!AAS	Read the counter status	Sec. 2.23
$AA5NS	!AA	Set the counter status	Sec. 2.24
$AA6N	!AA	Reset counter	Sec. 2.25
$AA7N	!AAS	Read overflow status	Sec. 2.26
$AAA	!AAG	Read gate mode	Sec. 2.30
$AAAG	!AA	Set gate mode	Sec. 2.31
$AAB	!AAS	Read input mode	Sec. 2.32
$AABS	!AA	Set input mode	Sec. 2.33
@AADI	!AAS0D00	Read D/O & alarm state	Sec. 2.37
@AADO0D	!AA	Set D/O value	Sec. 2.38
@AAGN	!AA(data)	Read preset value	Sec. 2.44
@AAPN(data)	!AA	Set preset value	Sec. 2.45

Alarm-mode 0 Command Set

@AAEAN	!AA	Enable alarm	Sec. 2.39
@AADAN	!AA	Disabel alarm	Sec. 2.43
@AAPA(data)	!AA	Set counter 0 alarm value	Sec. 2.46
@AASA(data)	!AA	Set counter 1 alarm value	Sec. 2.48
@AARP	!AA	Read counter 0 alarm value	Sec. 2.50
@AARA	!AA	Read counter 0 alarm value	Sec. 2.52

Alarm-mode 1 Command Set

@AAEAT	!AA	Enable alarm	Sec. 2.40
@AACA	!AA	Clear larch alarm	Sec. 2.41
@AADA	!AA	Disabel alarm	Sec. 2.42
@AAPA(data)	!AA	Set Halarm value	Sec. 2.47
@AASA(data)	!AA	Set HHalarm value	Sec. 2.49
@AARP	!AA	Read Halarm value	Sec. 2.51
@AARA	!AA	Read HHalarm value	Sec. 2.53

LED Command Set

$AA8	!AAS	Read LED configuration	Sec. 2.27
$AA8V	!AA	Set LED configuration	Sec. 2.28
$AA9(data)	!AA	Send data to LED	Sec. 2.29

2.1 %AANNTTCCFF

8080/8080D

- **Description**: Set the configuration of module.

- **Syntax**: %AANNTTCCFF[chk](cr)
  % is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  NN=new AA
  TT=input type code, refer to Sec. 1.9
  CC=baud rate code, refer to Sec. 1.9
  FF=status code, refer to Sec. 1.9
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:
  command: %0102500600(cr)
  response : !02(cr)

  address 01 is configured to a new address 02, counter

  command: %0202510600(cr)
  response : !02(cr)

  Change to frequency mode.

Refer to "8000 SERIES Bus Converter User Manual" chapter-5 for the following functions:

- **module status unknown**(Sec. 5.1), **change address**(Sec. 5.2)
- **change baud rate**(Sec. 5.3), **checksum enable/disable**(Sec. 5.4)

2.2 #AAN

- **Description**: Read counter or frequency value.

- **Syntax**: #AAN[chk](cr)
  # is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → channel-0 of counter or frequency
  1 → channel-1 of counter or frequency
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → >[chk](data)(cr)
  invalid command → No Response
  no response → syntax error or communication error or address error
  > is a delimiter character indicating a valid command
  (data) = 8-character data(in HEX format)
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $012(cr)
response :  !01500600(cr)
command:  #010(cr)
response :  >0000001E(cr)
```

Counter-0=0x1E=30 (in decimal)

```
command:  $022(cr)
response :  !02510600(cr)
command:  #021(cr)
response :  >0000001E(cr)
```

Frequency-1=0x1E Hz = 30 Hz (in decimal)

2.3 ~**

- **Description**: Host send this command to tell all modules “Host is OK”.

- **Syntax**: ~**[chk](cr)
  ~ is a delimiter character
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: no response

- **Example**:
  command: ~**(cr)
  response : No Response

2.4 ~AA0

8080/8080D

- **Description**: Read the module status. The module status will be latched until ~AA1 command is sent. **If the host watchdog is enable and the host is down, the module status will be set to 4. If the module status=4, all output command will be ignored.**

- **Syntax**: ~AA0[chk](cr)
  ~ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AASS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  SS=2-character HEX status value as following:
  Bit_0, Bit_1 = reserved
  Bit_2 = 0 → OK,
  1 → host watchdog failure
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: ~010(cr)
response : !0100(cr)

Status of module 01 is OK

command: ~020(cr)
response : !0204(cr)

Module status=04 → host watchdog failure → HOST is down now

2.5 ~AA1

8080/8080D

- **Description**: Reset the module status. The module status will be latched until ~AA1 command is sent. **If the module status=4, all output command will be ignored.** Therefore the user should read the module status first to make sure that the module status is 0. If the module status is not 0, only ~AA1 command can clear the module status.

- **Syntax**: ~AA1[chk](cr)
  ~ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command:	~010(cr)	module status=0x04 → host is down
response :	!0104(cr)	
command:	**@01DO00(cr)**	Output command is ignored
response :	**!(cr)**	
command:	~011(cr)	clear module status
response :	!01(cr)	
command:	~010(cr)	module status=0x00
response :	!0100(cr)	
command:	@01DO00(cr)	Output command is OK
response :	>(cr)	

2.6 ~AA2

8080/8080D

- **Description**: Read the status and timer value of host watchdog. The host watchdog timer is designed for host watchdog. When the host watchdog is enable, the host must send ~** command to all modules before the timer is up. When the ~** command is received, the host watchdog timer is reset and restart. Use ~AA3ETT to enable/disable/setting the host watchdog timer.

- **Syntax**: ~AA2[chk](cr)
  ~ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AASTT[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0: host watchdog is disable
  S=1: host watchdog is enable
  TT=2-character HEX value, from 00 to FF, unit=0.1 second
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  ~012(cr)
response :  !01000(cr)
```

Host watchdog timer of module 01 is disable

```
command:  ~022(cr)
response :  !0210A(cr)
```

host watchdog timer of module 02 is enable and = 0.1*10 = 1 second.

2.7 ~AA3ETT

8080/8080D

- **Description**: Enable/disable the timer value of host watchdog. The host watchdog timer is designed for software host watchdog. When the software host watchdog is enable, the host must send ~** command to all modules before the timer is up. When the ~** command is received, the host watchdog timer is reset and restart. Use ~AA2 to read the host watchdog status & value.

- **Syntax**: ~AA3ETT[chk](cr)
  ~ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  E=0 is disable and 1 is enable
  TT=2-character HEX value, from 00 to FF, unit=0.1 second
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:
  command: ~013000(cr)
  response : !01(cr)

  disable host watchdog timer of module 01

  command: ~02310A(cr)
  response : !02(cr)

  host watchdog timer of module 02 is enable and = 0.1*10 = 1 second.

2.8 ~AAAS

8080/8080D

- **Description**: Set counter alarm mode. Refer to Sec. 1.8.2 for more information.
- **Syntax**: ~AAAS[chk](cr)
  ~ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  S=0 → alarm mode 0.
     1 → alarm mode 1.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  ~01A0(cr)
response :  !01(cr)
```

Set alarm mode=0.

```
command:  ~02A1(cr)
response :  !02(cr)
```

Set alarm mode=1.

2.9 ~AAO(name)

8080/8080D

- **Description**: Set module name.

- **Syntax**: ~AAO(name)[chk](cr)
  ~ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (name)=4-character/5-character module name
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01M(cr)
response :  !018080(cr)
command:  ~01O8080(cr)
response :  !01(cr)
```

Change module name from 8080 to 8080

```
command:  $01M(cr)
response :  !018080D(cr)
command:  ~01O8080D(cr)
response :  !01(cr)
```

Change module name from 8080D to 8080D

Note: This command is designed for OEM/ODM user. The user can use it to change the module name for other purpose.

2.10 $AA0H

8080/8080D

- **Description**: Read the min. input signal width at high level. Refer to Sec. 1.8.5 for more information.
- **Syntax**: $AA0H[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=5-character decimal value for min. width at high level. The unit is uS and the range can be from 2 uS to 65535 uS.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $010H(cr)
response : !0100010(cr)

Min. width = **10** uS

command: $020H(cr)
response : !0201000(cr)

Min. width = **1000** uS = 1 mS

2.11 $AA0H(data)

8080/8080D

- **Description**: Set the min. input signal width at high level. Refer to Sec. 1.8.5 for more information.
- **Syntax**: $AA0H(data)[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=5-character decimal value for min. width at high level. The unit is uS and the range can be from 2 uS to 65535 uS.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

  command: $010H00010(cr)
  response : !01(cr)

  Min. width = **10** uS

  command: $020H01000(cr)
  response : !02(cr)

  Min. width = **1000** uS = 1 mS

2.12 $AA0L

- **Description**: Read the min. input signal width at low level. Refer to Sec. 1.8.5 for more information.
- **Syntax**: $AA0L[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=5-character decimal value for min. width at low level. The unit is uS and the range can be from 2 uS to 65535 uS.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $010H(cr)
response : !0100020(cr)

Min. width=20 uS

command: $020H(cr)
response : !0202000(cr)

Min. width=2000 uS=2 mS

2.13 $AA0L(data)

8080/8080D

- **Description**: Set the min. input signal width at low level. Refer to Sec. 1.8.5 for more information.
- **Syntax**: $AA0H(data)[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=5-character decimal value for min. width at low level. The unit is uS and the range can be from 2 uS to 65535 uS.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

  command: $010H00020(cr)
  response : !01(cr)

  Min. width = **20** uS

  command: $020H02000(cr)
  response : !02(cr)

  Min. width = **2000** uS = 2 mS

2.14 $AA1H

8080/8080D

- **Description**: Read the high trigger level of non-isolated input. Refer to Sec. 1.8.4 for more information.
- **Syntax**: $AA1H[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=2-character decimal value for high trigger level. The unit is 0.1 volt and the range can be from 0.0 to 5.0 volt.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

  command: $011H(cr)
  response : !0124(cr)

  High trigger level=2.4 volt

  command: $021H(cr)
  response : !0230(cr)

  High trigger level=3.0 volt

2.15 $AA1H(data)

8080/8080D

- **Description**: Set the high trigger level of non-isolated input. Refer to Sec. 1.8.4 for more information.
- **Syntax**: $AA1H(data)[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=2-character decimal value for high trigger level. The unit is 0.1 volt and the range can be from 0.0 to 5.0 volt.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $011H24(cr)
response :  !01(cr)
```

High trigger level=2.4 volt

```
command:  $021H30(cr)
response :  !02(cr)
```

High trigger level=3.0 volt

- **Note**: default is 2.4V

2.16 $AA1L

8080/8080D

- **Description**: Read the Low trigger level of non-isolated input. Refer to Sec. 1.8.4 for more information.
- **Syntax**: $AA1L[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=2-character decimal value for low trigger level. The unit is 0.1 volt and the range can be from 0.0 to 5.0 volt.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $011L(cr)
response :  !0108(cr)
```

Low trigger level=0.8 volt

```
command:  $021L(cr)
response :  !0210(cr)
```

Low trigger level=1.0 volt

2.17 $AA1L(data)

8080/8080D

- **Description**: Set the low trigger level of non-isolated input. Refer to Sec. 1.8.4 for more information.
- **Syntax**: $AA1L(data)[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=2-character decimal value for low trigger level. The unit is 0.1 volt and the range can be from 0.0 to 5.0 volt.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $011L08(cr)
response :  !01(cr)
```

Low trigger level=0.8 volt

```
command:  $021L10(cr)
response :  !02(cr)
```

Low trigger level=1.0 volt

- **Note**: default is 0.8V

2.18 $AA2

8080/8080D

- **Description**: Read the configuration of module.
- **Syntax**: $AA2[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AATTCCFF[chk](cr),
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  TT, CC, FF: refer to Sec. 1.9
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  $012(cr)
response :  !01500600(cr)
```

Address=01, counter, 9600 BPS, checksum disable

```
command:  $022(cr)
response :  !02510800(cr)
```

Address=02, frequency, 19200 BPS, checksum disable

NOTE: If the user use %AANNTTCCFF command to change module configuration, the new configuration code will be stored into EEPROM immediately. The configuration code includes module address, module type, baud rate code, checksum enable/disable code, calibration code, power-on value and safe value. **The EEPROM data of 8000 SERIES can be read infinite times and can be written about 100,000 times max.** Therefore the user should not change configuration code often for testing.
The $AA2 command is used to read EEPROM data only, therefore the user can send this command to 8000 SERIES module infinitely.

2.19 $AA3N

8080/8080D

- **Description**: Read the max. counter value.
- **Syntax**: $AA3N[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → channel-0 of counter or frequency
  1 → channel-1 of counter or frequency
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $0130(cr)
response :  !010000FFFF(cr)
```

Counter-0 from preset value to FFFF

```
command:  $0131(cr)
response :  !01FFFFFFFF(cr)
```

Counter-1 from preset value to FFFFFFFF

2.20 $AA3N(data)

- **Description**: Set the max. counter value.
- **Syntax**: $AA3N(data)[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → channel-0 of counter or frequency
  1 → channel-1 of counter or frequency
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01300000FFFF(cr)
response :  !01(cr)
```

Counter-0 from preset value to FFFF

```
command:  $0131FFFFFFFF(cr)
response :  !01(cr)
```

Counter-1 from preset value to FFFFFFFF

2.21 $AA4

8080/8080D

- **Description**: Read the status of digital filter. Refer to Sec. 1.8.5 for more information.
- **Syntax**: $AA4[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0 → digital filter is disable
  1 → digital filter is enable
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $014(cr)
response : !010(cr)

Digital filter is disable.

command: $024(cr)
response : !021(cr)

Digital filter is enable.

2.22 $AA4S

8080/8080D

- **Description**: Set the filter status. Refer to Sec. 1.8.5 for more information.
- **Syntax**: $AA4S[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  S=0 → digital filter is disable
  1 → digital filter is enable
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $0140(cr)
response :  !01(cr)
```

Digital filter is disable.

```
command:  $0241(cr)
response :  !02(cr)
```

Digital filter is enable.

2.23 $AA5N

8080/8080D

- **Description**: Read the counter status
- **Syntax**: $AA5N[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → counter 0
  1 → counter 1
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0 → counter is stop (disable)
  1 → counter is start (enable)
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $0150(cr)
response : !010(cr)

Counter 0 is stop now.

command: $0151(cr)
response : !011(cr)

Counter 1 is start now.

2.24 $AA5NS

8080/8080D

- **Description**: Set the counter status
- **Syntax**: $AA5NS[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → counter 0
  1 → counter 1
  S=0 → stop counter
  1 → start counter
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01500(cr)
response :  !01(cr)
```

Stop the counter 0.

```
command:  $01511(cr)
response :  !01(cr)
```

Start the counter 1.

2.25 $AA6N

8080/8080D

- **Description**: Reset counter 0 or counter 1 to the preset value & clear the overflow flag. Refer to Sec. 1.8.7 for more information.
- **Syntax**: $AA6N[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → counter 0
     1 → counter 1
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  @01G0(cr)
response :  !0100000000(cr)
command:  $0160(cr)
response :  !01(cr)
```

Preset value=0
Reset counter 0 to preset value 0

```
command:  @01G1(cr)
response :  !010000ABCD(cr)
command:  $0161(cr)
response :  !01(cr)
```

Preset value=0xABCD
Reset counter 1 to preset value 0xABCD

2.26 $AA7N

8080/8080D

- **Description**: Read the overflow flag of counter. The user can use $AA6S comand to reset counter & clear overflow flag.
- **Syntax**: $AA7N[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → counter 0
  1 → counter 1
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0 → no overflow
  1 → is overflow
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $0180(cr)
response :  !011(cr)
command:  $0160(cr)
response :  !01(cr)
```

Counter 0 is overflow.

Clear the overflow flag.

```
command:  $0171(cr)
response :  !010(cr)
```

Counter 1 is OK.

2.27 $AA8

8080D

- **Description**: Read the LED configuration.
- **Syntax**: $AA8[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0 → show counter/frequency channel 0
  1 → show counter/frequency channel 1
  2 → HOST control
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $018(cr)
response : !010(cr)

LED show the value of channel 0.

command: $028(cr)
response : !021(cr)

LED show the value of channel 1.

command: $038(cr)
response : !032 (cr)

HOST control the LED display.

2.28 $AA8V

8080D

- **Description**: Select LED Configuration.

- **Syntax**: $AA8V[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  V=0 → LED shows counter/frequency channel 0
  1 → LED show counter/frequency channel 1
  ….2 → HOST control LED
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $0181(cr)
response :  !01(cr)
```

LED shows channel 1.

```
command:  $0282(cr)
response :  !02(cr)
command:  $029040.00(cr)
response :  !02(cr)
```

HOST will control LED.

2.29 $AA9(data)

8080D

- **Description**: Send data to LED display.

- **Syntax**: $AA9(data)[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)→ **5 decimal digit + 1 decimal point**
  max.= 99999.
  min. = 0.0000
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01999999.(cr)      Show max. = 99999.
response :  !01(cr)

command:  $0290.0000(cr)      Show min. = 0.0000.
response :  !02(cr)

command:  $03912.345(cr)      Show display = 12.345
response :  !03(cr)
```

2.30 $AAA

8080/8080D

- **Description**: Read gate control mode. Refer to Sec. 1.8.6 for more information.
- **Syntax**: $AAA[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAG[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  G=0 → gate is low active
  1 → gate is high active
  2 → gate is disable
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $01A(cr)
response : !010(cr)

Gate is low active.

command: $02A(cr)
response : !021(cr)

Gate is high active.

command: $03A(cr)
response : !032 (cr)

Gate is disable (always active).

2.31 $AAAG

8080/8080D

- **Description**: Set gate control mode. Refer to Sec. 1.8.6 for more information.
- **Syntax**: $AAAG[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  G=0 → gate is low active
  1 → gate is high active
  2 → gate is disable
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01A0(cr)
response :  !01(cr)
```

Gate is low active.

```
command:  $02A1(cr)
response :  !02(cr)
```

Gate is high active.

```
command:  $03A2(cr)
response :  !03(cr)
```

Gate is disable (always active).

2.32 $AAB

8080/8080D

- **Description**: Read input mode. Refer to Sec. 1.8.1 for more information.
- **Syntax**: $AAB[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0 → channel 0 is non-isolated, channel 1 is non-isolated.
  1 → channel 0 is isolated, channel 1 is isolated.
  2 → channel 0 is non-isolated, channel 1 is isolated.
  3 → channel 0 is isolated, channel 1 is non-isolated.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $01B(cr)
response : !010(cr)

Counter/frequency channel 0 is non-isolated, channel 1 is non-isolated.

command: $02B(cr)
response : !021(cr)

Counter/frequency channel 0 is isolated, channel 1 is isolated.

command: $03B(cr)
response : !032(cr)

Counter/frequency channel 0 is non-isolated, channel 1 is isolated.

2.33 $AABS

8080/8080D

- **Description**: Set input mode. Refer to Sec. 1.8.1 for more information.
- **Syntax**: $AABS[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  S=0 → channel 0 is non-isolated, channel 1 is non-isolated.
  1 → channel 0 is isolated, channel 1 is isolated.
  2 → channel 0 is non-isolated, channel 1 is isolated.
  3 → channel 0 is isolated, channel 1 is non-isolated.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01B0(cr)
response :  !01(cr)
```

Counter/frequency channel 0 is non-isolated, channel 1 is non-isolated.

```
command:  $02B1(cr)
response :  !02(cr)
```

Counter/frequency channel 0 is isolated, channel 1 is isolated.

```
command:  $03B2(cr)
response :  !03(cr)
```

Counter/frequency channel 0 is non-isolated, channel 1 is isolated.

2.34 $AAF

8080/8080D

- **Description**: Read the version number of firmware.
- **Syntax**: $AAF[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  data=5-character for version number
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  $01F(cr)
response :  !01A2.0(cr)
```

Ver. A2.0

```
command:  $02F(cr)
response :  !02A3.0(cr)
```

Ver. A3.0

2.35 $AAI

8080/8080D

- **Description**: Read the value of *INIT pin.
- **Syntax**: $AAI[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AAS[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  S=0 → INIT* pin is connected to GND pin
  1 → INIT* pin is open
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

command: $01I(cr)
response : !010(cr)

INIT* pin is connected to GND pin.

command: $02I(cr)
response : !021(cr)

INIT* pin is open.

2.36 $AAM

8080/8080D

- **Description**: Read the module name.

- **Syntax**: $AAM[chk](cr)
  $ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  data=4-character for module name
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  $01M(cr)
response :  !018080(cr)
```

Module name of 01 is 8080

```
command:  $02M(cr)
response :  !028080D(cr)
```

Module name of 02 is 8080D

2.37 @AADI

8080/8080D

- **Description**: Read the status of D/O & alarm. Refer to Sec. 2.8 for more information.
- **Syntax**: @AADI[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AAS0D00[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error

  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  D=0 → D/O0=D/O1=OFF
  =1 → D/O0=ON, D/O1=OFF
  =2 → D/O0=OFF, D/O1=ON
  =3 → D/O0=D/O1=ON

  Alarm mode 0
  S=0 → counter 0 alarm=disable, counter 1 alarm=disable
  =1 → counter 0 alarm=enable, counter 1 alarm=disable
  =2 → counter 0 alarm=disable, counter 1 alarm=enable
  =3 → counter 0 alarm=enable, counter 1 alarm=enable

  Alarm mode 1
  S=0 → counter 0 alarm=disable
  =1 → counter 0 alarm=enable & MOMENTARY mode
  =2 → counter 0 alarm=enable & LATCH mode

  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

command: @01DI(cr)
response : !0100000(cr)

Alarm disable. D/O0=D/O1=OFF

command: @02DI(cr)
response : !0230100(cr)

Alarm enable. D/O0=ON. D/O1=OFF

2.38 @AADO0D

8080/8080D

- **Description**: Set digital output.
- **Syntax**: @AADO0D[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  D=0 → D/O0=D/O1=OFF
    =1 → D/O0=ON, D/O1=OFF
    =2 → D/O0=OFF, D/O1=ON
    =3 → D/O0=D/O1=ON
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  alarm is enable → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01DO00(cr)
response :  !01(cr)
```

Turn all D/O OFF.

```
command:  @02DO01(cr)
response :  !02(cr)
```

Turn D/O 0 ON.
Turn D/O 1 OFF.

NOTE: if the alarm is enable, the D/O 0 & D/O 1 will be always controlled by module. Therefore the following D/O commands will be ignored.

- **power-on value is changed to hi/lo condition immediately**
- **the @AADO0D command is ignored.**

2.39 @AAEAN

8080/8080D

- **Description**: Enable counter alarm(for alarm-mode 0). Refer to Sec. 1.8.2 for more information.
- **Syntax**: @AAEAN[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → enable counter 0
  1 → enable counter 1
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D

- **Example**:

```
command:  @01EA0(cr)
response :  !01(cr)
```

Enable counter 0.

```
command:  @01EA1(cr)
response :  !02(cr)
```

Enable counter 1.

2.40 @AAEAT

8080/8080D

- **Description**: Enable counter alarm(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AAEAT[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  T=M → momentary alarm, T=L → latch alarm
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01EAL(cr)      Latch alarm.
response :  !01(cr)

command:  @02EAM(cr)      Momentary alarm.
response :  !02(cr)
```

NOTE: if the alarm is enable, the D/O 0 & D/O 1 will be always controlled by module. Therefore the following D/O commands will be ignored.

- **power-on value is changed to hi/lo condition immediately**
- **the @AADO0D command is ignored.**

2.41 @AACA

8080/8080D

- **Description**: Clear latch alarm(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AACA[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01CA(cr)
response :  !01(cr)
```

Clear latch alarm.

```
command:  @02CA(cr)
response :  !02(cr)
```

Clear latch alarm.

2.42 @AADA

8080/8080D

- **Description**: Disable alarm(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AADA[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:
  command: @01DA(cr)
  response : !01(cr)

  Disable alarm.

  command: @02DA(cr)
  response : !02(cr)

  Disable alarm.

2.43 @AADAN

8080/8080D

- **Description**: Disable alarm(for alarm-mode 0). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AADAN[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → disable counter 0
  1 → disable counter 1
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:
  command: @01DA0(cr)
  response : !01(cr)

  Disable counter 0 alarm.

  command: @02DA1(cr)
  response : !02(cr)

  Disable counter 1 alarm.

2.44 @AAGN

8080/8080D

- **Description**: Read the preset value of counter. The $AA6 command can reset counter to the preset value. Refer to Sec. 1.8.7 for more information.

- **Syntax**: @AAGN[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  N=0 → read counter 0
  1 → read counter 1
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01G0(cr)
response :  !010000FFFF(cr)
```

The preset value of counter 0 is 0000FFFF.

```
command:  @02G1(cr)
response :  !0200000000(cr)
```

The preset value of counter 1 is 00000000.

2.45 @AAPN(data)

8080/8080D

- **Description**: Set the preset value of counter. The $AA6 command can reset counter to preset value. Refer to Sec. 1.8.7 for more information.

- **Syntax**: @AAPN(data)[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:
  command: @01P0FFFF0000(cr)
  response : !01(cr)

  The preset value of counter 0 is FFFF0000.

  command: @02P10000FFFF(cr)
  response : !02(cr)

  The preset value of counter 1 is 0000FFFF.

2.46 @AAPA(data)

8080/8080D

- **Description**: Set alarm limit of counter 0(for alarm-mode 0). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AAPA(data)[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01PAFFFF0000(cr)
response :  !01(cr)
```

The alarm limit of counter-0 is FFFF0000.

```
command:  @02PA0000FFFF(cr)
response :  !02(cr)
```

The alarm limit of counter 0 is 0000FFFF.

2.47 @AAPA(data)

8080/8080D

- **Description**: Set Halarm limit of counter 0(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AAPA(data)[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01PAFFFF0000(cr)
response :  !01(cr)
```

The Halarm limit of counter 0 is FFFF0000.

```
command:  @02PA0000FFFF(cr)
response :  !02(cr)
```

The Halarm limit of counter 0 is 0000FFFF.

2.48 @AASA(data)

8080/8080D

- **Description**: Set alarm limit of counter-1(for alarm-mode 0). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AASA(data)[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:
  command: @01SAFFFF0000(cr)
  response : !01(cr)

  The alarm limit of counter 1 is FFFF0000.

  command: @02SA0000FFFF(cr)
  response : !02(cr)

  The alarm limit of counter 1 is 0000FFFF.

2.49 @AASA(data)

8080/8080D

- **Description**: Set HHalarm limit of counter 0(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AASA(data)[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01SAFFFF0000(cr)
response :  !01(cr)
```

The HHalarm limit of counter 0 is FFFF0000.

```
command:  @02SA0000FFFF(cr)
response :  !02(cr)
```

The HHalarm limit of counter 0 is 0000FFFF.

2.50 @AARP

8080/8080D

- **Description**: Read alarm limit of counter 0(for alarm-mode 0). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AARP[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01RP(cr)
response :  !01FFFF0000(cr)
```

The alarm limit of counter 0 is FFFF0000.

```
command:  @02RP(cr)
response :  !020000FFFF(cr)
```

The alarm limit of counter 0 is 0000FFFF.

2.51 @AARP

8080/8080D

- **Description**: Read Halarm limit of counter 0(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AARP[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01RP(cr)
response :  !01FFFF0000(cr)
```

The Halarm limit of counter 0 is FFFF0000.

```
command:  @02RP(cr)
response :  !020000FFFF(cr)
```

The Halarm limit of counter 0 is 0000FFFF.

2.52 @AARA

8080/8080D

- **Description**: Read alarm limit of counter-1(for alarm-mode 0). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AARA[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:
  command: @01RA(cr)
  response : !01FFFF0000(cr)

  The alarm limit of counter 1 is FFFF0000.

  command: @02RA(cr)
  response : !020000FFFF(cr)

  The alarm limit of counter 1 is 0000FFFF.

2.53 @AARP

8080/8080D

- **Description**: Read HHalarm limit of counter 0(for alarm-mode 1). Refer to Sec. 1.8.2 for more information.

- **Syntax**: @AARP[chk](cr)
  @ is a delimiter character
  AA=2-character HEX module address, from 00 to FF
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Response**: valid command → !AA(data)[chk](cr)
  invalid command → ?AA[chk](cr)
  no response → syntax error or communication error or address error
  ! is a delimiter character indicating a valid command
  ? is a delimiter character indicating a invalid command
  AA=2-character HEX module address
  (data)=8-character HEX value.
  [chk]=2-character checksum, if checksum disable → no [chk]
  (cr)=0x0D
- **Example**:

```
command:  @01RP(cr)
response :  !01FFFF0000(cr)
```

The HHalarm limit of counter 0 is FFFF0000.

```
command:  @02RP(cr)
response :  !020000FFFF(cr)
```

The HHalarm limit of counter 0 is 0000FFFF.

3. Operations Principle & Application Notes

3.1 INIT*_pin Operation Principle

All 8000 SERIES modules contain an EEPROM to store configuration information. Therefore the user is difficult to find out the status of the 8000 SERIES modules. The user can connect the INIT*_pin to GND_pin and power on the module. The 8000 SERIES modules will **go to the factory default setting without changing the EEPROM data.** The factory default setting is given as following:

address	= 00
baud rate	= 9600
checksum	= DISABLE
data format	= 1 start + 8 data bits + 1 stop bit

If the user disconnect the INIT*_pin and GND_pin, the I_8000 module will be auto configured according to the EEPROM data. The user is easy to find the EEPROM configuration data in the default setting. The steps are shown as following:

Step 1: power off and connect INIT*_pin to GND_pin
Step 2: power on
Step 3: send command string **$002[0x0D]** to the module, the module will return back the EEPROM data.
Step 4: record the EEPROM data of this 8000 SERIES module
Step 5: power off and disconnect INIT*_pin and GND_pin
Step 6: power on

Refer to “8000 SERIES Bus Converter User Manual” Sec. 5.1 for more information.

3.2 D/O Operation Principle

(1) Refer to Sec. 1.8.3 for more information.

(2) The D/O output of 8080 & 8080D modules will be turn OFF after first power on.

(3) The D/O output will be changed to the desired state if the "@AADO" command is received. Then all these D/O will keep in the same states until next "@AADO" command.

(4) If the host watchdog is active, all the D/O will not change and the module status is set to 04. If the host computer send out "@AADO" to those modules now, those modules will ignore this command and return "!" as warning information. The host can use "~AA1" command to clear the module status to 0, then the 8080 & 8080D module will accept the "@AADO" again.

(5) If the D/O output is configured as alarm output, the module will control the ON/OFF state automatically. Therefore the "@AADO" command will be ignored in this condition.