3

Command Set

3.1 Command and Response

3.1.1 Introduction

The NuDAM command is composed by numbers of characteristics, including the leading code, address ID, the variables, the optional check-sum byte, and a carriage return to indicate the end of a command. The host computer can only command only one NuDAM module except those syncronized commands with wildcard address "**". The NuDAM may or may not give response to the command. The host should check the response to handshake with the modules.

3.1.2 Document Conventions

The following syntax conventions are used to describe the NuDAM commands in this manual.

(Leading Code)	Leading Code is the first characteristic of the NuDAM command. All NuDAM commands need a command leading code, such as %,$,#,@,...etc. 1- character
(Addr)	Module's address ID, the value is in the range of 00 - FF (Hexadecimal) if no specified in the following 2- character
(Command Variable)	Items indicate command codes or value of variables Variable length
[Data]	Some output command need data Variable length
[Checksum]	Checksum in brackets indicate optional parameter, only checksum is enable then this field is required 2- character
< >	Identifies a control code character, such as <CR> for carriage return, its value is 0x0D. **1- character**

3.1.3 Format of NuDAM Commands

(Leading Code)(Addr)(Command)[Data]**[Checksum]**<CR>

When checksum is enable then **[Checksum]** is needed, it is

2-character.

How to calculate checksum value ?

[Checksum] = ((LeadingCode)+(Addr)+(Command)+[Data]**) MOD 0x100**

Example 1: checksum is **disable**

```
User Command:  $012<CR>
     Response:  !01400600<CR>

          $   : LeadingCode
         01   : Address
          2   : Command  (Read Configuration)
       <CR>   : Carriage return 0x0D
```

Example 2: checksum is **enable**

User Command: $012**B7**<CR>
Response: !01400600**AC**<CR>

$: LeadingCode
01 : Address
2 : Command (Read Configuration)
B7 : Checksum value
<CR> : Carriage return 0x0D

'$' = 0x24 '0' = 0x30 '1' = 0x31 '2' = 0x30

B7 = (0x24 + 0x30 + 0x31 + 0x32 **) MOD 0x100**

'!' = 0x24 '0' = 0x30 '1' = 0x31 '4' = 0x34
'6' = 0x36

AC = **(** 0x24 + 0x30 + 0x31 + 0x34 + 0x30 + 0x30 + 0x36 + 0x30 + 0x30 **) MOD 0x100**

Note : 1.There is no spacing between characters.
2. At end of command need a <CR> carriage return 0x0D.
3. Checksum is optional parameter.

3.1.4 Response of NuDAM Commands

The response message depends on NuDAM command. The response is also composed with several characteristics, including leading code, variables, and carriage return for ending. There are two kinds of leading code for response message, "!" or ">" means valid command and "?" means invalid. By checking the response message, user can monitor the command is valid or invalid.

Note : Under the following conditions, there will have **no response** message.

1. The specified address ID is not exist.
2. Syntax error.
3. Communication error
4. Some special commands does not have response.

3.2 Summary of Command Set

There are three categories of NuDAM commands. One is the general commands, including set configuration command, read configuration, reset, read module's name or firmware version, etc. Every NuDAM can response to the general commands.

The second category is the functional commands, which depends on functions of each module, not every module can execute all functions.

The third category is the special commands, including functions about the programmable watchdog timer, safe values, and the programmable leading code.

Command Set of Digital I/O Modules		
Command	**Syntax**	**Module**
General Commands		
Set Configuration	**%(OldAddr)(NewAddr)(TypeCode)(BaudRate)(CheckSumFlag)**	ALL
Read Configuration	**$(Addr)2**	ALL
Read Module Name	**$(Addr)M**	ALL
Read Firmware Version	**$(Addr)F**	ALL
Reset Status	**$(Addr)5**	ALL
Functional Commands		
Synchronized Sampling	**#****	6050, 6052, 6053, 6054, 6058, 6060
Read Synchronized Data	**$(Addr)4**	6050, 6052, 6053, 6054, 6058, 6060
Digital Output	**#(Addr)(ChannelNo)(OutData)**	6050, 6060, 6063
	#(Addr)(Port)(Odata)	6056, 6058
	#(Addr)(Port)(ChannelNo)(BitData)	6056,6058
	#(Addr)T(OdataA)(OdataB)(OdataC)	6058
Digital Input	**$(Addr)6**	ALL
Set Programmable I/O Mode	**$(Addr)S(IOSts)**	6058
Special Commands		
Read Command Leading Code Setting	**~(Addr)0**	ALL
Change Command Leading Code Setting	**~(Addr)10(C1)(C2)(C3)(C4)(C5)(C6)**	ALL
Set Host Watchdog / Safety Value	**~(Addr)2(Flag)(TimeOut)(SafeValue)**	ALL
Read Host WatchDog / Safe Value	**~(Addr)3**	ALL
Change Polarity	**~(Addr)CP(Status)**	ALL
Read Polarity	**~(Addr)CR**	ALL
Host is OK	**~****	ALL

3.3 Set Configuration

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Configure the basic setting about address ID, baud rate, and checksum.

@Syntax

%(OldAddr)(NewAddr)(TypeCode)(BaudRate)(CheckSumFlag)<CR>

%	Command leading code. (1-character)
(OldAddr)	NuDAM module original address ID. The default address ID of a brand new module is 01. The value range of address ID is 00 to FF in hexadecimal. **(2-character)**
(NewAddr)	New address ID, if you don't want to change address ID, let new address ID equals to the old one. **(2-character)**
(TypeCode)	Type Code is fixed *40H* for Digital I/O modules. **(2-character)**
(BaudRate)	Communication baud rate, refer to Table 3-1 for details. **(2-character)**
(CheckSumFlag)	Define check-sum status, refer to Table 3-2 for details. **(2-character)**

@Response

!(Addr)<CR>

or

?(Addr)<CR>

(Addr)	Address ID.
!	Command is valid.
?	Command is invalid. Invalid parameter values, When you wanted to change the setting without grounding the DEFAULT* pin.

Note : When you want to change the checksum or baud rate then the DEFAULT* pin should be grounded at first.

@Example

User command:	%0130400600<CR>
Response:	!30<CR>

Item	Meaning	Description
%	(Leading Code)	Command leading code.
01	(OldAddr)	Original address ID is 01H.
30	(NewAddr)	New address ID is 30H (Hexadecimal).
40	(TypeCode)	Digital I/O module.
06	(BaudRate)	Baud rate is 9600.
00	(CheckSumFlag)	00 means checksum is disable.
<CR>	Carriage return	0x0D.

Code	Baudrate
03	1200 bps
04	2400 bps
05	4800 bps
06	9600 bps
07	19200 bps
08	38400 bps
09	115200 bps

Table 0-1 Baud rate setting code

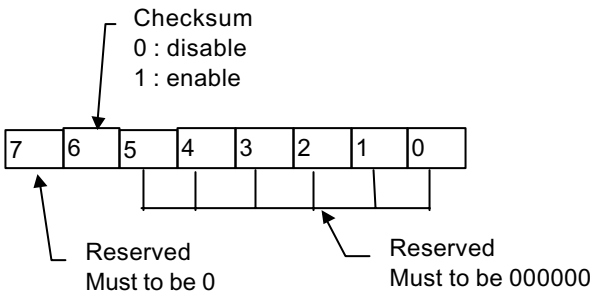

Table 0-2 Check sum flag setting

3.4 Read Configuration

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Read the configuration of module on a specified address ID.

@Syntax

$(Addr)2<CR>

$	Command leading code
(Addr)	Address ID.
2	Command code for reading configuration

@Response

!(Addr)(TypeCode)(BaudRate)(CheckSumFalg)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(TypeCode)	It always be 40 (Hex) for digital I/O modules.
(BaudRate)	Current setting of communication baud rate, refer to Table 3-1 for details.
(CheckSumFlag)	Current setting of check-sum flag, refer to Table 3-3. for details.

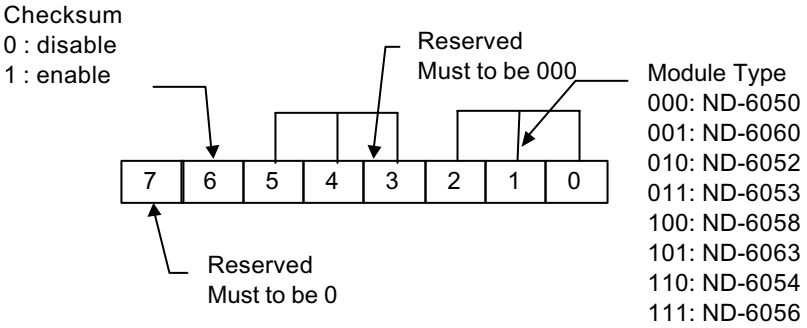

Table 0-3 Response of check sum flag

@Example

User command:	$302<CR>
Response:	!30400600<CR>

!	Command is valid.
30	Address ID.
40	Digital I/O module.
06	Baud rate is 9600 bps.
00	checksum is disable.

3.5 Read Module Name

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Read NuDAM module's name.

@Syntax

$(Addr)M<CR>

$	Command leading code.
(Addr)	Address ID.
M	Read module name.

@Response

!(Addr)(ModuleName) <CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(ModuleName)	NuDAM module's name.

@Example

User command:	$30M<CR>
Response:	!306050<CR>

!	Command is valid
30	Address.
6050	ND-6050 (Digital I/O module).

3.6 Read Firmware Version

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Read NuDAM module‘s firmware version.

@Syntax

$(Addr)F<CR>

$	Command leading code.
(Addr)	Address ID
F	Read module firmware version.

@Response

!(Addr)(FirmRev) <CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(FirmRev)	NuDAM module‘s firmware version.

@Example

User command:	$30F<CR>
Response:	!30A1.50<CR>

!	Command is valid.
30	Address
A1.50	Firmware Version

3.7 Reset Status

(6050, 6052, 6053, 6054,

6056, 6058, 6060, 6063)

@Description

Checks the reset status of module at specified address to see whether it has been reset since the last reset status command was issued to the module.

@Syntax

$(Addr)5<CR>

$	Command leading code.
(Addr)	Address ID.
5	Reset Status Command.

@Response

!(Addr)(Status)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(Status)	0 : It has not been reset since the last reset status command was issued. 1 : It has been reset since the last reset status command was issued.

@Example

User command:	$305<CR>
Response:	!300<CR>

Status is 0 means this digital I/O module has not been reset,

since the last reset status command was issued.

3.8 Digital Output

(6050, 6060, 6063)

@Description

Set digital output channel value at specified address. This command is only available to modules involving the digital output function.

@Syntax

#(Addr)(ChannelNo)(OutData)<CR> (6050,6060,6063 Only)

#	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
(ChannelNo)	00 : Set value to all channels 1X : Set value to single channel First character is 1, Second character is channel number. **(2-character)**
(OutData)	Set value to all channels : Each bit is mapping to each channel number Set value to single channel : First character is 0, second character is set to value 0 or 1. **(2-character)**

@Response

<CR>

or

?(Addr)<CR>

>	Command is valid
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	#300003<CR>
Response:	><CR>

30	Address ID
00	Set output to all channels
03	03 (00000011), Channel 0 and 1 are set ON other channels are set to OFF

User command:	#2F1201<CR>
Response:	><CR>

2F	Address ID
12	**1** : Set output to single channel **2** : Output single channel is channel 2
01	Set single channel to ON

3.9 Digital Output (Continued)

(6056, 6058)

@Description

Set digital output channel value at specified address. This command is only available to modules involving the multiport digital output function.

@Syntax

#(Addr)T(OutDataH)(OutDataL)<CR> (6056 only)

#(Addr)T(OutDataA)(OutDataB)(OutDataC) (6058 only)

#	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
T	Set value to all channels
(OutDataH)	Each bit is mapping to each channel number from 14 to 8. (2-character)
(OutDataL)	Each bit is mapping to each channel number from 7 to 0. (2-character)
(OutDataA)	Output data for port A. Each bit is mapping to each channel number from 7 to 0. (2-character)
(OutDataB)	Output data for port B. Each bit is mapping to each channel number from 7 to 0. (2-character)
(OutDataC)	Output data for port C. Each bit is mapping to each channel number from 7 to 0. (2-character)

*** if the port of ND-6058 is in input mode, output data to this port will be ignore.**

@Response

<CR>

or

?(Addr)<CR>

>	Command is valid
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	#30T0303<CR> (for ND-6056)
Response:	><CR>

30	Address ID
T	Set output to all port
0303	0303 (0000001100000011), Channel 0, 1, 8 and 9 are set ON other channels are set to OFF

User command:	#2FT010203<CR> (for ND-6058)
Response:	><CR>

2F	Address ID
T	Set output to all port
01	Set channel 0 of port A ON
02	Set channel 1 of port B ON
03	Set channel 0 and 1 of port C ON

3.10 Digital Output (Continued)

(6056, 6058)

@Description

Set digital output port channel value at specified address. This command is only available to modules involving the multiport digital output function.

@Syntax

#(Addr)(Port)(OutData)<CR> (6056, 6058 only)

#	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
(Port)	Set value to indivisual port **0H:** for 6056 channel 14 to 8 **0L:** for 6056 channel 7 to 0 **0A:** for 6058 port A **0B:** for 6058 port B **0C:** for 6058 port C (2-character)
(OutData)	Each bit is mapping to each channel number (2-character)

*** if the port of ND-6058 is in input mode, output data to this port will be ignore.**

@Response

<CR>

or

?(Addr)<CR>

>	Command is valid.
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	#30H03<CR> (for ND-6056)
Response:	<CR>

30	Address ID
0H	Set output to high byte

03	03 (00000011), Channel 8 and 9 are set ON other channels are set to OFF

User command:	#2F0A10<CR>
Response:	<CR>

2F	Address ID
0A	Set output to port A
10	Set channel 4 of port A ON

3.11 Digital Output (Continued)

(6056, 6058)

@Description

Set direct digital output channel value at specified address. This command is only available to modules involving the multiport digital output function.

@Syntax

#(Addr)(Port)(ChNo)(OutData)<CR> (6056,6058 only)

#	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
(Port)	Set direct channel value to indivisual port **H:** for 6056 channel 14 to 8 **L:** for 6056 channel 7 to 0 **A:** for 6058 port A **B:** for 6058 port B **C:** for 6058 port C (1-character)
(ChNo)	Channel value 7 ~ 0
(OutData)	1: ON 0: OFF (1-character)

*** if the port of ND-6058 is in input mode, output data to this port will be ignore.**

@Response

<CR>

or

?(Addr)<CR>

>	Command is valid
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	#30H31<CR> (for ND-6056)
Response:	<CR>

30	Address ID
H	Set output to high byte
3	Channel number is 3, that is channel 11
1	Set corresponding channel to ON

User command:	#2FA20<CR>
Response:	<CR>

2F	Address ID
A	Set output to port A
2	Channel number is 2
0	Set corresponding channel to OFF

3.12 Synchronized Sampling

(6050, 6052, 6053, 6054,6058, 6060,)

@Description

Synchronized all modules to sample input values and stored the values in the module's register at the same time and use "Read Synchronized Data" command to read the data and process it one by one.

For digital I/O module, this command is only available to modules involving the digital input function, such as NuDAM-6050, NuDAM-6052, NuDAM-6053, NuDAM-6054, NuDAM-6058 and NuDAM-6060.

@Syntax

#**<CR>

#	Command leading code.
**	Synchronized sampling command

@Response

Note : Synchronized sampling command **has NO response**.

@Example

User command:	#**<CR>

Synchronized sampling command **has no response**.

3.13 Read Synchronized Data

(6050, 6052, 6053,6054, 6058, 6060)

@Description

After a synchronized sampling command**#**** was issued, you can read the input value that was stored in the addressed module's register and use same method to process other module's data one by one.

@Syntax

$(Addr)4<CR>

$	Command leading code.
(Addr)	Address ID.
4	Read synchronized data.

@Response

ND-6050 module response :

!(Status)(DataOut)(DataIn)00<CR>

ND-6052 module response :

!(Status)(DataIn)0000<CR>

ND-6053 module response :

!(Status)(DataInH)(DataInL)00<CR>

ND-6054 module response :

!(Status)(DataInH)(DataInL)00<CR>

ND-6058 module response :

!(Status)(IOFlag)(DIn)(DataInA)(DataInB)(DataInC)<CR>

ND-6060 module response :

!(Status)(DataOut)(DataIn)00<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.

(Status)	0 : Data has been sent at least once before. 1 : Data has been sent for the first time since a synchronized sampling command was issued.(1-character)
(IOFlag)	Status of programmable I/O 0x00: A(O/P) B(O/P) CH(O/P) CL(O/P) 0x01: A(O/P) B(O/P) CH(O/P) CL(I/P) 0x02: A(O/P) B(O/P) CH(I/P) CL(O/P) 0x03: A(O/P) B(O/P) CH(I/P) CL(I/P) 0x04: A(O/P) B(I/P) CH(O/P) CL(O/P) 0x05: A(O/P) B(I/P) CH(O/P) CL(I/P) 0x06: A(O/P) B(I/P) CH(I/P) CL(O/P) 0x07: A(O/P) B(I/P) CH(I/P) CL(I/P) 0x08: A(I/P) B(O/P) CH(O/P) CL(O/P) 0x09: A(I/P) B(O/P) CH(O/P) CL(I/P) 0x0A: A(I/P) B(O/P) CH(I/P) CL(O/P) 0x0B: A(I/P) B(O/P) CH(I/P) CL(I/P) 0x0C: A(I/P) B(I/P) CH(O/P) CL(O/P) 0x0D: A(I/P) B(I/P) CH(O/P) CL(I/P) 0x0E: A(I/P) B(I/P) CH(I/P) CL(O/P) 0x0F: A(I/P) B(I/P) CH(I/P) CL(I/P) *I/P input mode, O/P output mode.
(DataOut)	Value of digital output channel. **(2-character)**
(DataIn)	Value of digital input channel. **(2-character)**
(DIn)	Value of dedicated digital input channel 3-0 for ND-6058. The first character is 0 **(2-character)**
(DataInH)	Value of digital input channel 15-8 **(2-character)**
(DataInL)	Value of digital input channel 7-0 **(2-character)**
(DataInA)	Value of port A channel 7-0 **(2-character)**
(DataInB)	Value of port B channel 7-0 **(2-character)**
(DataInC)	Value of port C channel 7-0 **(2-character)**

@Examples

Example for NuDAM-6050 :

User command:	$304<CR>
Response:	!1065200<CR>

!	Command is valid.
1	Data has not been sent before.
06	06 (00000110) means digital output channel 1,2 are ON, channel 0,3,4,5,6,7 are OFF.
52	52(01010010) means digital input channel 1,4, 6 are HIGH, channel 0,2,3,5,7 are LOW..

Example for NuDAM-6058 :

User command:	$304<CR>
Response:	!10C0F010203<CR>

!	Command is valid.
1	Data has not been sent before.
0C	Port A and B are input mode, high and low half byte of port C are output mode.
0F	Channel 0,1,2,3 of digital input is HIGH.
01	01 (00000001) means port A digital input channel 0 is HIGH, others are LOW.
02	02 (00000010) means port B digital input channel 1 is HIGH, others are LOW.
03	03 (00000011) mean port C digital output channel 0,1 are ON, others are OFF.

3.14 Digital Input

(6050, 6052, 6053, 6054, 6058, 6060)

@Description

Read the digital input channel value and readback the digital output channel value.

@Syntax

$(Addr)6<CR>

$	Command leading code.
(Addr)	Address ID
6	Digital data input command.

@Response

ND-6050 module response :

!(DataOut)(DataIn)00<CR>

ND-6052 module response :

!(DataIn)0000<CR>

ND-6053 module response :

!(DataInH)(DataInL)00<CR>

ND-6054 module response :

!(DataInH)(DataInL)00<CR>

ND-6056 module response :

!(DataOutH)(DataOutL)00<CR>

ND-6058 module response :

!(IoFlag)(DataIn)(DataA)(DataB)(DataC)<CR>

ND-6060 module response :

!(DataOut)(DataIn)00<CR>

ND-6063 module response :

!(DataOutH)0000<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(DataOut)	Value of digital output channel. **(2-character)**
(DataIn)	Value of digital input. **(2-character)**
(DataInH)	Value of digital input channel 15-8. (2-character)
(DataInL)	Value of digital input channel 7-0.**(2-character)**
(DataOutH)	Value of digital output channel 15-8. (2-character)
(DataOutL)	Value of digital output channel 7-0.**(2-character)**
(DataA)	Value of digital channel 7-0.**(2-character)**
(DataB)	Value of digital channel 7-0.**(2-character)**
(DataB)	Value of digital channel 7-0.**(2-character)**
(IOFlag)	Status of programmable I/O 0x00: A(O/P) B(O/P) CH(O/P) CL(O/P) 0x01: A(O/P) B(O/P) CH(O/P) CL(I/P) 0x02: A(O/P) B(O/P) CH(I/P) CL(O/P) 0x03: A(O/P) B(O/P) CH(I/P) CL(I/P) 0x04: A(O/P) B(I/P) CH(O/P) CL(O/P) 0x05: A(O/P) B(I/P) CH(O/P) CL(I/P) 0x06: A(O/P) B(I/P) CH(I/P) CL(O/P) 0x07: A(O/P) B(I/P) CH(I/P) CL(I/P) 0x08: A(I/P) B(O/P) CH(O/P) CL(O/P) 0x09: A(I/P) B(O/P) CH(O/P) CL(I/P) 0x0A: A(I/P) B(O/P) CH(I/P) CL(O/P) 0x0B: A(I/P) B(O/P) CH(I/P) CL(I/P) 0x0C: A(I/P) B(I/P) CH(O/P) CL(O/P) 0x0D: A(I/P) B(I/P) CH(O/P) CL(I/P) 0x0E: A(I/P) B(I/P) CH(I/P) CL(O/P) 0x0F: A(I/P) B(I/P) CH(I/P) CL(I/P) *I/P input mode, O/P output mode.

@Example

Example for NuDAM-6050 :

User command:	$306<CR>
Response:	!321100<CR>

!	Command is valid.
32	32 (00110010) means digital output channel 1, 4, 5 are ON, channel 0, 2, 3, 6, 7 are OFF.
11	11 (00000011) means digital input channel 0, 1 are HIGH and channel 2, 3, 4, 5, 6, 7 are LOW.
00	No used

Example for NuDAM-6058 :

User command:	$304<CR>
Response:	!0C0F010203<CR>

!	Command is valid.
0C	Port A and B are input mode, high and low half byte of port C are output mode.
0F	Channel 0,1,2,3 of digital input is HIGH.
01	01 (00000001) means port A digital input channel 0 is HIGH, others are LOW.
02	02 (00000010) means port B digital input channel 1 is HIGH, others are LOW.
03	03 (00000011) mean port C digital output channel 0,1 are ON, others are OFF.

3.14 Programmable I/O Mode Setting

(6058)

@Description

Set the programmable input or output mode for ND-6058.

@Syntax

$(Addr)S(IOFlag)<CR> (6058 only)

$	Command leading code.
(Addr)	Address ID
S	Set programmable I/O mode
(IOFlag)	Status of programmable I/O 0x00: A(O/P) B(O/P) CH(O/P) CL(O/P) 0x01: A(O/P) B(O/P) CH(O/P) CL(I/P) 0x02: A(O/P) B(O/P) CH(I/P) CL(O/P) 0x03: A(O/P) B(O/P) CH(I/P) CL(I/P) 0x04: A(O/P) B(I/P) CH(O/P) CL(O/P) 0x05: A(O/P) B(I/P) CH(O/P) CL(I/P) 0x06: A(O/P) B(I/P) CH(I/P) CL(O/P) 0x07: A(O/P) B(I/P) CH(I/P) CL(I/P) 0x08: A(I/P) B(O/P) CH(O/P) CL(O/P) 0x09: A(I/P) B(O/P) CH(O/P) CL(I/P) 0x0A: A(I/P) B(O/P) CH(I/P) CL(O/P) 0x0B: A(I/P) B(O/P) CH(I/P) CL(I/P) 0x0C: A(I/P) B(I/P) CH(O/P) CL(O/P) 0x0D: A(I/P) B(I/P) CH(O/P) CL(I/P) 0x0E: A(I/P) B(I/P) CH(I/P) CL(O/P) 0x0F: A(I/P) B(I/P) CH(I/P) CL(I/P) *I/P input mode, O/P output mode.

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID

@Example

User command:	$060C<CR>
Response:	!06<CR>

!	Command is valid.
0C	Port A and B are input mode, high and low half byte of port C are output mode.

3.15 Read Leading Code Setting

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Read command leading code setting and host watchdog status.

@Syntax

~(Addr)0<CR>

~	Command leading code.
(Addr)	Address ID
0	Read command leading code setting.

@Response

!(Addr)(Status)(C1)(C2)(C3)(C4)(C5)(C6)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID (2-character)
(Status)	Bit 0 : Reserved Bit 1 : Power failure or watchdog failure Bit 2 : Host watchdog is enable Bit 3 : Host failure
(C1)	Leading code 1, for read configuration status, firmware version, etc. default is **$.** (1-character)
(C2)	Leading code 2, for read synchronize sampling, digital output ,default is **#. (1-character)**
(C3)	Leading code 3, for change configuration. default is %. (1-character)
(C4)	Leading code 4, for read alarm status, enable alarm, etc. default is **@. (1-character)**
(C5)	Leading code 5, for read command leading code, change command leading code, etc. default is **~. (1-character)**
(C6)	Leading code 6, this leading code is reserved.

Default is *. **(1-character)**

@Example

User command:	~060<CR>
Response:	!0600$#%@~*<CR>

Command leading code setting is $#%@~* for module address ID is 06, current status is factory default setting.

3.16 Change Leading Code Setting

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

User can use this command to change command leading code setting as he desired.

@Syntax

~(Addr)10(C1)(C2)(C3)(C4)(C5)(C6)<CR>

~	Command leading code.
(Addr)	Address ID, range (00 - FF).
10	Change command leading code setting.
(C1)	Leading code 1, for read configuration status, firmware version, etc. default is **$.** (1-character)
(C2)	Leading code 2, for read synchronize sampling, digital output ,default is **#. (1-character)**
(C3)	Leading code 3, for change configuration. default is %. (1-character)
(C4)	Leading code 4, for read alarm status, enable alarm, etc. default is **@. (1-character)**
(C5)	Leading code 5, for read command leading code, change leading code, etc. default is **~.** (1-character)
(C6)	Leading code 6, this leading code is reserved. default is ***. (1-character)**

@Response

!(Addr)< CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.

@Examples

User command:	~060<CR>
Response:	!0600**$**#%@~*<CR>
User command:	~0610**A**#%@~*<CR>
Response:	!06<CR>
User command:	**A**06F
Response:	!06A1.8<CR>

Read leading code setting is $#%@~* for module address 06 and change leading code **$** to **A**, then use A06F to read firmware version of module on address 06.

***** WARNING *****

We do not recommend users to change the default setting of leading code, because it will make you confuse

The leading code change only use the command conflicts other devices on the network.

3.17 Set Host Watchdog Timer & Safety Value

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Set host watchdog timer, module will change to safety state when host is failure. Define the output value in this command.

@Syntax

~(Addr)2(Flag)(TimeOut)(SafeValue)<CR>

~(Addr)2(Flag)(TimeOut)(SafeH)(SafeL)<CR> (6056 only)

~(Addr)2(Flag)(TimeOut)(SafeA)(SafeB)(SafeC)<CR> (6058only)

~	Command leading code.
(Addr)	Address ID, range (00 - FF).
2	Set host watchdog timer and safe state value.
(Flag)	0 : Disable host watchdog timer 1 : Enable host watchdog timer **(1-character)**
(TimeOut)	Host timeout value, between this time period host must send (Host is OK) command to module, otherwise module will change to safety state. Range 01 - FF. **(2-character)** One unit is 100 ms 01 = 1 * 100 = 100 ms FF = 255 * 100 = 25.5 sec
(SafeValue)	8 channels safety value of digital output channels when host is failure. **(2-character)**
(SafeH)	Safety value of digital output channels 14 ~ 8 when host is failure. **(2-character)**
(SafeL)	Safety value of digital output channels 7 ~ 0 when host is failure. **(2-character)**
(SafeA)	Safety value of port A channels 7 ~ 0 when host is failure while A in output mode. **(2-character)**
(SafeB)	Safety value of port B channels 7 ~ 0 when host is failure while B in output mode. **(2-character)**
(SafeC)	Safety value of port C channels 7 ~ 0 when host is failure while C in output mode. **(2-character)**

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID

@Example

Example for NuDAM-6050 :

User command:	~0621121C<CR>
Response:	!06<CR>

06	Address ID
2	Set host watchdog timer and safe state value.
1	Enable host watchdog timer.
12	Timeout value. 0x12 = 18 18 * 100 = 1800 ms
1C	1C (00011100) Digital output channel DO2, DO3 and DO4 are high, the others are low.

Example for NuDAM-6056 :

User command:	~0621121C1C<CR>
Response:	!06<CR>

06	Address ID
2	Set host watchdog timer and safe state value.
1	Enable host watchdog timer.
12	Timeout value. 0x12 = 18 18 * 53.3 = 959 ms 18 * 100 = 1800 ms
1C1C	1C1C (0001110000011100) Digital output channel DO2, DO3, DO4, DO10, DO11, DO12 are high, the others are low.

Example for NuDAM-6058 :

User command:	~0621121C1C1C<CR>
Response:	!06<CR>

06	Address ID
2	Set host watchdog timer and safe state value.
1	Enable host watchdog timer.
12	Timeout value. 0x12 = 18 18 * 100 = 1800 ms
1C1C1C	1C (00011100) port A, B and C channel 2, 3 and 4 are high, the other are low.

3.18 Read Host Watchdog Timer & Safety Value

(6050, 6052, 6053, 6054,
6056, 6058, 6060, 6063)

@Description

Read host watchdog timer setting and the safety value.

@Syntax

~(Addr)3<CR>

~	Command leading code.
(Addr)	Address ID
3	Read host watchdog setting and module safety state value.

@Response

!(Addr)(Flag)(TimeOut)(SafeValue)<CR>

!(Addr)(Flag)(TimeOut)(SafeH)(SafeL)<CR> (6056 only)

!(Addr)(Flag)(TimeOut)(SafeA)(SafeB)(SafeC)<CR> (6058only)

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID, range (00 - FF).
(Flag)	0 : Host watchdog timer is disable 1 : Host watchdog timer is enable**(1-character)**
(TimeOut)	Host timeout value. Range 01 - FF. **(2-character)** One unit is 100 ms 01 = 1 * 100 = 100 ms FF = 255 * 100 = 25.5 sec
(SafeValue)	8 channels safety state digital output value when host is failure. **(2-character)**

@Example

User command:	~063<CR>
Response:	!061121C<CR>

06	Address ID
1	Host watchdog timer is enable.
12	Timeout value. 0x12 = 18 18 * 100 = 1800 ms
1C	1C (00011100) Digital output channel DO3, DO4 and DO5 are high, the others are low.

Between 1800 ms time period, if host does not send (Host is OK) then digital output will change to safety state 1C (00011100) means digital output DO3 , DO4 and DO5 is high, others are low.

3.19 Change Polarity

@Description

To change the polarity state of digital inputs and outputs of the module.

@Syntax

~(Addr)CP(State)<CR>

~	Command leading code **(1 character)**
(Addr)	Address ID **(2 characters)**
CP	Change Polarity **(2 characters)**
(State)	Polarity state of digital inputs and outputs **(2characters)** 00 : Do not change polarity 01 : Change the polarity of digital inputs 02 : Change the polarity of digital outputs 03 : Change the polarity both the digital inputs and outputs

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	~06CP01<CR>
Response:	!06<CR>

To change the polarity of digital inputs of the DI/O module which ID is 06H.

Note : For this command ,you could define the logic level which you want, For example, if the input connect to high level signal ,and you want to read back the input as a “0”,then you could change the polarity to fit your requirement .

3.20 Read Polarity

@Description

To read the polarity state of digital inputs and outputs of the module.

@Syntax

~(Addr)CR<CR>

~	Command leading code **(1 character)**
(Addr)	Address ID **(2 character)**
CR	Read Polarity **(2 character)**

@Response

!(Addr)(State)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(State)	Polarity state of digital inputs and outputs 00 : Polarity were not changed 01 : Change the polarity of digital inputs 02 : Change the polarity of digital outputs 03 : Change the polarity both the digital inputs and outputs

@Example

User command:	~03CR<CR>
Response:	!0602<CR>

Read the polarity of the DI/O module which ID is 03H.

3.21 Host is OK

@Description

When host watchdog timer is enable, host computer must send this command to every module before timeout otherwise **"host watchdog timer enable"** module's output value will go to safety state output value.

Timeout value and safety state output value is defined in 3.14. "Set Host Watchdog Timer & Safety Value".

@Syntax

~**<CR>

~	Command leading code.
**	Host is OK.

@Response

Note : Host is OK command **has NO response.**

@Example

User command:	~**<CR>