V1.1 2009.02.11

RemoDAQ-8024B

User's Manual

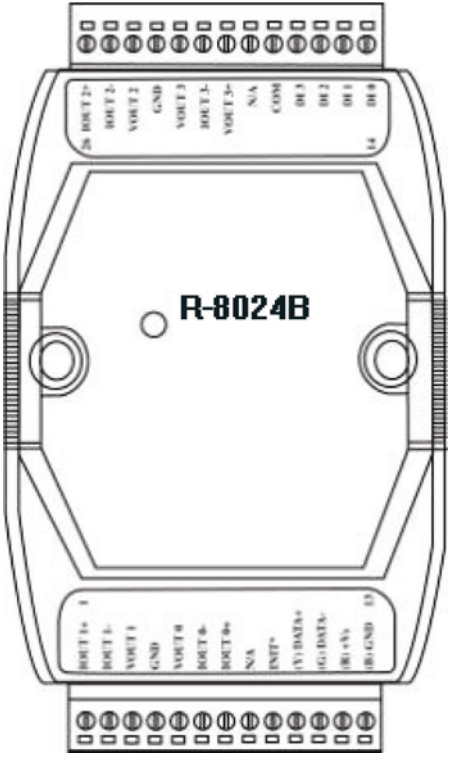
Beijing Gemotech Intelligent Technology Co.，Ltd

1 General Introduction

The RemoDAQ-8000 series are data acquisition and control modules based RS-485 network. They provide analog input, analog output, digital input/output, timer/counter, collection AC, wireless communication and other functions. These modules can be remote controlled by command.

The RemoDAQ-8024B is 4-channel analog output module.

1.1 Pin Assignment



1.2 Features

RemoDAQ-8024B is 4-channel analog output module.

Resolution：12 Bits

Input type： V 、mA、

Range：V:、+/-10V

mA：+/-20 mA、4-20 mA

Accuracy：+/-0.1% FSR current output

+/-0.2% FSR voltage output

zero drift：voltage output +/-30μV/℃，current output 0.2μA/℃

Temperature drift：+/-25ppm/℃

Isolated logic input

Channel：4个

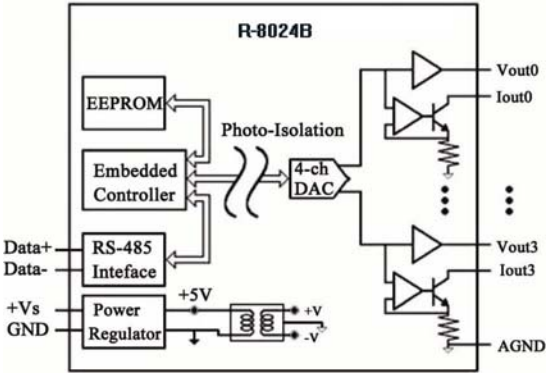
Level 0：+1V max

Level 1：+10-30Vdc

Over-voltage protection：+/-35V

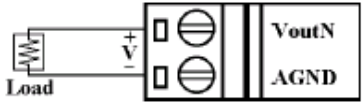
Power Consumption：1W@24VDC

1.3 Block Diagram

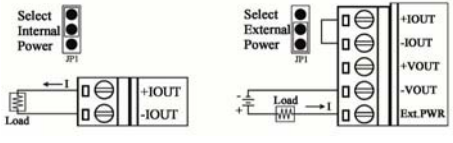


1.4 Wire Connection

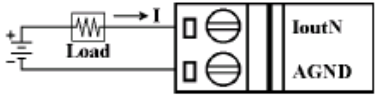
RemoDAQ-8024B Voltage Output Wire Connection



RemoDAQ-8024B Current Output Wire Connection



Voltage/current Output Wire Connection



1.5 Default Setting

- Address： 01
- Analog output type：0 ~ +10V
- Baudrate：9600bps
- Checksum：Disable
- Data format：engineering unit
- Output mode： change immediately

1.6 Calibration

RemoDAQ-8024B Voltage Output Calibration

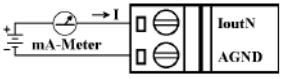
1.Connect meter according to the voltage connect instruction.

2. Adjust voltage range by R16 to make the output is 10V.

RemoDAQ-8024B Current Output Calibration Sequence:（Note that to calibrate voltage before current calibration）

1. Connect meter and external power supply to the

module's current output channel 0.



2. Warm-up for 30 minutes.
3. Setting type to 30.（0 ~ 20mA）
4. Output 20mA.
5. Check the meter and trim the output until 20mA matched by applying trim command.
6. Perform 20mA calibration command.

Repeat step 1~6 for channel 1，2 and 3.

1.7 Setting List

Baudrate Setting（CC）

Code	03	04	05	06	07	08	09	0A
Baudrate	1200	2400	4800	9600	19200	38400	57600	115200

Analog output type setting (TT)

Code	30	31	32
Min	0mA	4mA	0V
Max	20mA	20mA	10V

Data format setting（FF）

7	6	5	4	3	2	1	0
0	*1	*2				*3	

*****1：Checksum bit： 0= Disable, 1=Enable

*2：Slew rate control：RemoDAQ-8021/24

*3：00 = Engineering unit format

01 = Percentage format

10 = 2's complement HEX format

Analog output type and data format table (RemoDAQ-8024B)				
Code	Output type	Data format	Max	Mix
30	0 ~ 20mA	Engineer unit	20.000	00.000
		%(FSR)	+100.00	+000.00
		HEX	FFF	0000
31	4 ~ 20mA	Engineer unit	20.000	04.000
		%(FSR)	+100.00	+000.00
		HEX	FFF	0000
32	-10 ~ 10 V	Engineer unit	10.000	00.000
		%(FSR)	+100.00	+000.00
		HEX	FFF	0000

2 Command Set

Command format:

（Leading）(Address)(Command)(CHK)(cr)

Response format:**（Leading）(Address)(Data)(CHK)(cr)**

[CHK] 2-character checksum

[cr] Command terminated character, carriage return（0x0D）

Calculate Checksum：

1. Calculate ASCII sum of all characters of command (or response) string except the character return (cr).
2. The sum should be between 00~FFH.

Example：

Command string：$012(cr)

Sum of string=‘$’+‘0’+‘1’+‘2’=24h+30h+31h+32h=B7h

The checksum is B7h，and [CHK] = “B7”

Command string with checksum：$012B7(cr)

Response string：!01300600(cr)

Sum of string：‘!’+‘0’+‘1’+‘3’+‘0’+‘0’+‘6’+‘0’+‘0’ =21h+30h+31h+33h+30h+30h+36h+30h+30h=1ABh

The checksum is AAh，and [CHK] = “AB”

Response string with checksum ： !01300600AB(cr)

RemoDAQ-8024B command set

Command	Name	Description
%AANNTTCCFF	Configuration	Set address, baudrate, status and I/O mode.
#AACn(data)	Analog data out	Direct output data to module
#AASCn(data)	Set startup data	Set data as CHn startup data
#AAECn(data)	Set emergency stop	Set data as CHn emergency stop data
#**	N/A	Synchronous sample IDI
$AA0Cn	4mA calibration	Tells the module to store parameter for 4mA calibration
$AA1Cn	20mA calibration	Tells the module to store parameter for 20mA calibration
$AA2	Configuration status	Return the configuration parameters for the module
$AA3Cn (m)	Set offset value	Set offset value at calibration status
$AA4	Readback the data of synchronous sample	Read back the IDI input by synchronous #**
$AA5	Reset status	Checks if module has been reset since the last $AA5 command
$AA6Cn	Last value readback	Return either last value sent to the module by #AA command

$AA7CnRrr	Set output type	Set channel N output type
$AA8Cn	Read channel value	Return the output value of channel n
$AAF	Read firmware version	Return the firmware version code
$AAACnZ	EMS flag setting	Enable/disable CHn EMS flag. Z=1,enable; Z=0,disable
$AABCn	Read EMS flag	Read CHn EMS flag
$AADCn	Read startup data	Read back CHn startup data
$AAECn	Read emergency stop	Read back CHn emergency stop data
$AAG	Reset current trim	Reset current trim data variable to 0
$AAH	Read current trim	Read current trim data variable
$AAI	Read IDI	Read IDI
$AANCn	Read 4mA calibration parameter	Read back CHn 4mA calibration parameter
$AAOCn	Read 20mA calibration parameter	Read back CHn 20mA Calibration parameter
$AAPCn	Clear 4mA calibration parameter	Clear CHn 4mA calibration parameter/EEPROM
$AAQCn	Clear 4mA calibration parameter	Clear CHn 20mA calibration parameter/EEPROM
$AAXnnnn	Watchdog timer setting	Set communication WDT cycle time 0000-9999

$AAY	Read watchdog setting	Read the cycle time setting of communication WDT

2.1 %AANNTTCCFF

Description： Configuration

Syntax： %AANNTTCCFF (cr)

%　delimiter character.

AA　address of setting module (00-FF)

NN　New address (00-FF)

TT　New type

CC　New baudrate

FF　New data format

Response： !AA(cr)　if the command was valid.

?AA(cr)　if an invalid operation was entered. If the INIT* terminal was not grounded when attempting to change baud rate or checksum settings.

Syntax error or communication error may get no response.

!　command is valid.

?　command is invalid.

AA　address of setting module (00-FF)

Example：

Command：%0102320600(cr)　Response：!02(cr)

Change address from 01 to 02, return success.

Relative command：$AA2

2.2 #AACn(data)

Description：Analog Data Out of Channel N

Syntax：#AACn (data)(cr)

delimiter character.

AA address of reading module (00~FF)

Cn channel

(data) analog data out value

Response：valid command：!AA[CHK] (cr)

invalid command：?AA[CHK] (cr)

Syntax error or communication error may get no response.

! Delimiter character of valid command.

? Delimiter character of invalid command.

AA Module address（00 ~ FF）

Example：Command #02C2+07.7456

Response: !02

It means the module which address is 02 outputs to channel 2 with 07.7456.

Command #02C2-06.7456

Response: !02

It means the module which address is 02 outputs to channel

2 with –06.7456.

2.3#AASCn(data)

Description： Set startup data

Syntax： #AASCn (data)(cr)

delimiter character.

AA address of setting module (00~FF)

S the set startup data command

Cn channel

(data) analog data out value

Response： !AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of response module (00~FF)

Example：Command: #02SC2+07.7456

Response: !02

It means the module which address is 02 outputs to channel 2 with startup value 07.7456.

2.4 #AAECn(data)

Description： Set data as CHn emergency stop data

Syntax：#AAECn (data)(cr)

delimiter character.

AA address of setting module (00~FF)

E the set startup data command

Cn channel

(data) emergency stop data

Response：valid command：!AA[CHK] (cr)

invalid command：?AA[CHK] (cr)

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of response module (00~FF)

Example：Command: #02EC2+07.7456

Response: !02

Set address 02 channel 2 emergency stop data 07.7456, return success.

2.5 #**

Description：Synchronous sample IDI

Syntax：#**（cr）

delimiter character

** command for synchronous sample IDI

Response：No response

2.6 $AA0Cn

Description： 4mA Calibration of Channel N
Syntax： $AA0Cn (cr)
$ delimiter character.
AA address of the module that is to be calibrated (00~FF)
0 4mA calibration command.
Cn channel
Example：Command:$020C2
Response:!02
4mA calibration of channel 2 of the module at address 02, return success.

2.7 $AA1Cn

Description： 20mA Calibration of Channel N
Syntax： $AA1Cn (cr)
$ delimiter character.
AA address of the module that is to be calibrated (00~FF)
1 20mA calibration command.
Cn channel
Example： Command: $021C2
Response: !02
20mA calibration of channel 2 of the module at address 02, return success.

2.8 $AA2

Description： Read Configuration Status

Syntax： $AA2[CHK](cr)

$ delimiter character.

AA address of reading module (00~FF)

2 the Configuration Status command.

Response： !AATTCCFF (cr) if the command is valid.

?AA(cr)if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of module(00~FF)

TT represents the type code.

CC represents the baud rate code.

FF data format

Example：

Command：$012 Response：!01080600

Read address 01 configuration, return success.

Command：$022 Response：!020A0602

Read address 02 configuration, return success.

Relative command： %AANNTTCCFF

2.9 $AA3Cn（m）

Description： Set offset value at calibration status

Syntax： $AA3Cn（m）

$ delimiter character.

AA address of the module that is to be calibrated (00~FF)

3 the trim calibration command.

Cn channel

m trim value,0~127. m:80~89 denote negative value; m:00~09 denote positive value.

Response: valid command: !AATTCCFF[CHK](cr)

invalid command: ?AA[CHK](cr)

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

TT input signal type code of the module

CC baudrate code of the module

FF data format of the module

Example:

Command: $023C108

Return:! 02

Set channel 1 of the module at address 02 trim value 08, return success.

Command: $023C191

Response:! 02

Set channel 1 of the module at address 02 trim value -1, return success.

2.10 $AA4

Description： Read back the synchronous sample data
Syntax： $AA4 (cr)
$ delimiter character.
AA address of reading module (00~FF)
4 the read back the synchronous sample data command
Response： !AA(status)(data) (cr) if the command was valid.
?AA(cr) if an invalid operation was entered.
Syntax error or communication error may get no response.
! command is valid.
? command is invalid.
AA address of response module (00~FF)
status 1= data has been transmitted in the synchronized sampling first time
0= data in front of previous sampling is transmitted
(data) synchronous sample data
? AA (cr) means the command is invalid.
Example: Command: **$074 (cr)**
Response: >071+5.8222

Read address 01 module sample data, return 5.8222, and Status=1 means the data was transmitted synchronized.

2.11 $AA5

Description： Reset Status command
Syntax： $AA5 (cr)
$ is a delimiter character.
AA address of reading module (00~FF)
5 is the Reset Status command.
Response： !AAS (cr) if the command is valid.
?AA (cr) if an invalid command was issued.
Syntax error or communication error may get no response.
! command is valid.
? command is invalid.
AA address of response module (00~FF)
S reset status，1=the module has been reset
0=the module has not been reset
Example：

Command：$395

Response：!390
Read the module at address 39H, and return 0. It means the module hasn't reset after executing previous command.

2.12 $AA6Cn

Description： Readback CHn Last Output Value

Syntax：$AA6Cn (cr)

$ delimiter character.

AA address of reading module (00~FF)

6 the last value readback command

Cn channel

Response：!AA (data) if the command valid.

(data) channel output value

?AA if command is invalid.

Example：Command: $026C2

Response:!02+07.456

2.13 $AA7CnRrr

Description：Set Channel N Output Type

Syntax：$AA7CnRrr (cr)

$ delimiter character.

AA address of setting module (00~FF)

7 the set channel N output type command

Cn the specified output channel you want to configure.

Rrr represents the type and range you want to set

Response： !AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Example：Command：$027C5R32（cr）

Response： ! 02

The command configures the range of channel 5 in the module at address 01 as ±10V.

2.14 $AA8Cn

Name： Read Channel N Range Configuration command
Syntax： $AA8Cn (cr)
$ delimiter character.
AA address of reading module (00~FF)
8 read single channel range configuration command.
Cn the specified channel you want to read
Response： !AARrr(cr) if the command was valid.
?AA(cr) if an invalid operation was entered.
Relative command: $AA7CiRrr

2.15$AAF

Description： Read Firmware Version
Syntax： $AAF (cr)
$ delimiter character.
AA address of reading module (00~FF)
F identifies the version command.

Response： !AA(data)(cr) if the command is valid.
?AA (cr) if an invalid command was issued.
Syntax error or communication error may get no response.
! command is valid.
? command is invalid.
AA address of response module(00~FF)

Data is the version code of the module's firmware.

Example：

Command：$01F Receive：!0120051201

Read address 01 firmware version，return version 20051201.

Command：$02F Receive：!0120040101

Read address 02 firmware version，return version 20040101.

2.16 $AAACnZ

Description：Set Channel N EMS Flag.

Syntax：$AAACnZ cr)

$ delimiter character.

AA address of setting module (00~FF)

A set channel N EMS flag command.

Cn the specified channel you want to set

Z EMS flag, 1=Enable 0=Disable

Response：!AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

Example: Command:!02AC21

Response:!02

Set address 02 and channel 2 of the module EMS flag as 1, and return success.

2.17 $AABCn

Description： Read Channel N EMS Flag.

Syntax： $AABCn (cr)

$ delimiter character.

AA address of reading module (00~FF)

B read channel N EMS flag command.

Cn the specified channel you want to set

Response: !AA(data) if the command is valid.

(data) EMS flag

?AA if the command is invalid.

Example: Command:!02BC2

Response:!021

Read address 02 and channel 2 of the module EMS flag, return Eable.

2.18 $AADCn

Description： Read Channel N Startup Data.

Syntax： $AABCn (cr)

$ delimiter character.

AA address of reading module (00~FF)

D read channel N startup data command.

Cn the specified channel you want to set

Response: !AA(data) valid command

(data) startup data

?AA invalid command.

Example: Command: #02DC2+07.7456

Response: !02+07.7456

Read address 02 and channel 2 of the module startup data, return 07.7456.

Relative command: #AASCn(data)

2.19 #AAECn

Description：Read Channel N Emergency Stop Data

Syntax：$AAECn (cr)

$ delimiter character.

AA address of reading module (00~FF)

E read channel N emergency stop data command.

Cn the specified channel you want to set.

Response：!AA(data)(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

data emergency stop data

Example： Command: #02SC2+07.7456

Response: !02+07.7456

Read address 02 and channel 2 of the module emergency stop data, and return 07.7456.

2.20 $AAG

Description： Set Current Trim Data Variable To 0
Syntax： $AAG (cr)
Response： !AA (cr) if the command was valid.
?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.
? command is invalid.
AA address of the module (00~FF)

2.21$AAH

Description： Read Current Trim Data
Syntax： $AAH (cr)
Response： !AA(data) (cr) if the command was valid.
?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.
? command is invalid.
AA address of the module (00~FF)
(data) current trim data

Example： Command:$02H

Response: !0208

Read address 02 module current trim data, and return 8.

Relative command: $AA3Cn(m)

2.22 $AAI

Description： Read IDI Data

Syntax： $AAI (cr)

Response： !AAX (cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)

X IDI data

2.23$AANCn

Description： Read Channel N 4mA Calibration Parameter

Syntax： $AANCn (cr)

Response： !AA(data)(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.

? command is invalid.

AA address of the module (00~FF)
data calibration parameter

Example： Command:$02NC2
Response: !0206

Read channel 2 of the module at address 02 module 4mA calibration parameter, and return 6.

2.24 $AAOCn

Description： Read Channel N 20mA Calibration Parameter
Syntax： $AANCn (cr)
Response： !AA(data)(cr) if the command was valid.
?AA(cr) if an invalid operation was entered.

Syntax error or communication error may get no response.

! command is valid.
? command is invalid.
AA address of the module (00~FF)
data calibration parameter

Example： Command:$020C2
Response: !0206

Read channel 2 of the module at address 01 module 20mA calibration parameter, and return 06.

2.25 $AAPCn

Description： Clear Channel N 4mA Calibration Parameter
Syntax： $AAPCn (cr)

Response： !AA(cr) if the command was valid.
?AA(cr) if an invalid operation was entered.
Syntax error or communication error may get no response.
! command is valid.
? command is invalid.
AA address of the module (00~FF)

2.26 $AAQCn

Description： Clear Channel N 20mA Calibration Parameter
Syntax： $AANCn (cr)
Response： !AA(cr) if the command was valid.
?AA(cr) if an invalid operation was entered.
Syntax error or communication error may get no response.
! command is valid.
? command is invalid.
AA address of the module (00~FF)

2.27 $AAXnnnn

Description： Watchdog Timer Setting command
Syntax： $AAXnnnn (cr)
$ delimiter character.
AA address of the module that is to be setted (00~FF)
X the watchdog timer setting command
nnnn watchdog timer value 0000~9999

Response： !AA (cr)　if the command was valid.
?AA(cr)　if an invalid operation was entered.

Example： Command: $02X1234

Response: ! 02

The command sets the WDT cycle as 1234 in the input module at address 02.

2.28 $AAY

Description： Read Watchdog Timer Setting command
Syntax： $AAY (cr)
$　delimiter character.
AA address of reading module (00~FF)
Y　the read watchdog timer setting command
Response： !AAnnnn (cr)　if the command was valid.
?AA(cr)　if an invalid operation was entered.

Example： Command: $02Y

Response: ! 020030

Read the WDT in the module at address 01, and return 0030.

3 Application Notes

3.1 INIT* pin operation

Every RemoDAQ-8000 module has an EEPROM inside, use to save the configuration information of the module, such as: address, baudrate, message type and other parameters. Sometimes, user may forget to configure the module. So, RemoDAQ-8000 series have a special mode: “INIT mode”, which can help user to solve this problem. Under “INIT mode”, the module is forced to set as **Address=00, baudrate=9600, no checksum**.

If you want to enable INIT mode, only need to do as follows:

1. Connect the INIT pin to GND.

Set command $002(cr) at 9600bps, then it will read module configuration information from EEPROM.

3.2 Dual Watchdog Operation

Dual watchdog= module watchdog+ main watchdog

The module watchdog is the hardware restoration circuitry of module. When work at atrocious or serious

interfere environment, this hardware circuitry will make the module restore on time when the module suffer interfere. This make the module can't crash forever and advanced the reliability.

The main watchdog is the watchdog implement by software in the module. It mainly uses to prevent the net communication happen problems or the PC crash. When the main watchdog overflows, the module will output the "safe valve". This can make sure the control object can't occur accident.

The dual watchdog function of RemoDAQ-8000 series modules will insure the system more reliability and safety.