

**eDAM-8000 DIO
series
User's manual**

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Table of Contents

Chapter 1	Introduction	7
1.1	Overview	7
1.2	Module Compatibility	7
1.3	Communication and Programming.....	7
Chapter 2	About the eDAM DIO Modules.....	8
2.1	Outline of eDAM DIO modules.....	8
2.2	Module Dimension.....	9
2.3	eDAM DIO modules.....	12
2.4	Block diagram of modules.....	13
2.5	Wire connection.....	22
2.6	EDAM specification	25
2.6.1	eDAM-8520 module	25
2.6.2	eDAM-8041D module	27
2.6.3	eDAM-8042D module	28
2.6.4	eDAM-8043D module	29
2.6.5	eDAM-8044D module	30
2.6.6	eDAM-8050D module	31
2.6.7	eDAM-8052D module	32
2.6.8	eDAM-8053D module	33
2.6.9	eDAM-8060D module	34
2.6.10	eDAM-8063D module	35
2.6.11	eDAM-8063AD module.....	36
2.6.12	eDAM-8063BD module.....	37
2.6.13	eDAM-8065D module	38
2.6.14	eDAM-8065AD module.....	39
2.6.15	eDAM-8065BD module.....	40

2.6.16	eDAM-8066D module	41
2.6.17	eDAM-8067D module	42
Chapter 3	Installation	43
3.1	Set up an eDAM network	44
3.2	eDAM modules	44
3.3	Host computer	44
3.4	Power supply	45
3.5	Communication Wiring.....	45
3.6	eDAM Utility Software.....	45
3.7	eDAM Isolated RS-232/RS485 Converter (optional)..	46
3.8	Initializing a Brand-New Module	46
3.9	Initialization Procedure.....	47
3.10	Install a New eDAM to a Existing Network	48
Chapter 4	Command Set	49
4.1	Introduction	49
4.2	Format of eDAM Commands	50
4.3	Response of Commands	52
4.4	Table of Command sets	53
4.5	Reset module.....	55
4.6	Set brand compatible	56
4.7	Read current brand ID.....	57
4.8	Set module LED on/off	58
4.9	Read LED control settings	59
4.10	Set Module configuration	60
4.11	Synchronized Sampling	64
4.12	Set Digital output channel	65
4.13	Read Digital input counter.....	67

4.14	Read Configuration	68
4.15	Read Synchronized data.....	70
4.16	Read reset status.....	72
4.17	Read digital I/O status	73
4.18	Read firmware version	75
4.19	Read module name	76
4.20	Clear latched digital input.....	77
4.21	Clear digital input counter	78
4.22	Read latched digital input.....	79
4.23	Read digital input/output status.....	81
4.24	Set digital output	82
4.25	Set module name	84
4.26	Host OK	85
4.27	Read module's watchdog timeout status.....	86
4.28	Reset module status.....	87
4.29	Read host watchdog timeout value	88
4.30	Set host watchdog timeout value.....	89
4.31	Read power-on/safe value	92
4.32	Set power-on/safe value	94
Appendix A INIT pin operation		95
Appendix B Input counter and input latch.....		97
Appendix C Power on/Safe value.....		99

Chapter 1 Introduction

1.1 Overview

The *eDAM-8000* DIO modules is a set of intelligent sensor to computer interface modules containing built-in microprocessor. They provide data comparison, and digital communication functions. Some modules provide digital I/O lines for controlling relays and TTL devices.

1.2 Module Compatibility

The *eDAM-8000* series are fully compatible to Advantech® ADAM-4000 series, ADlink® N μ DAM-6000 series and ICP® I-7000 series by Command “~AA2X01V” .(Ref. sec. 4.6)

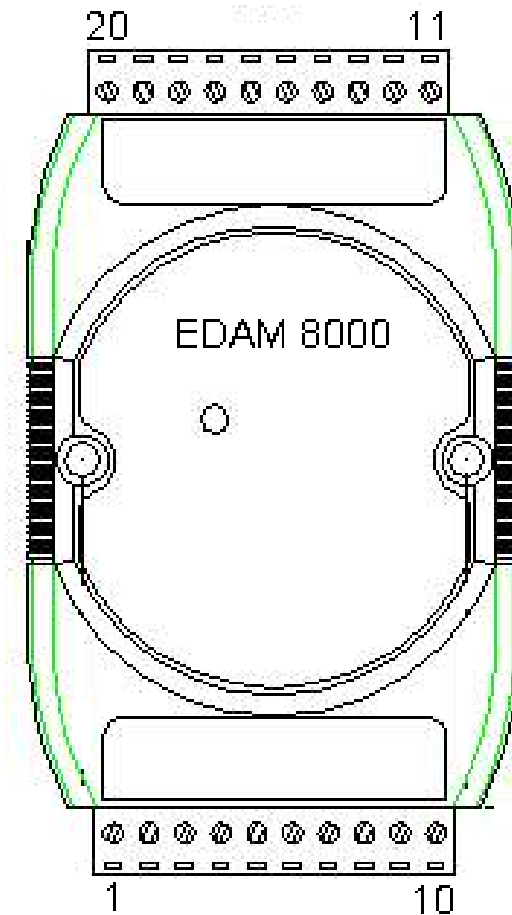
1.3 Communication and Programming

eDAM modules can connect to and communicate with all computers and terminals. They use RS-485 transmission standards, and communicate with ASCII format commands. All communications to and from the module are performed in ASCII, which means that eDAM modules can be programmed in virtually any high-level language.

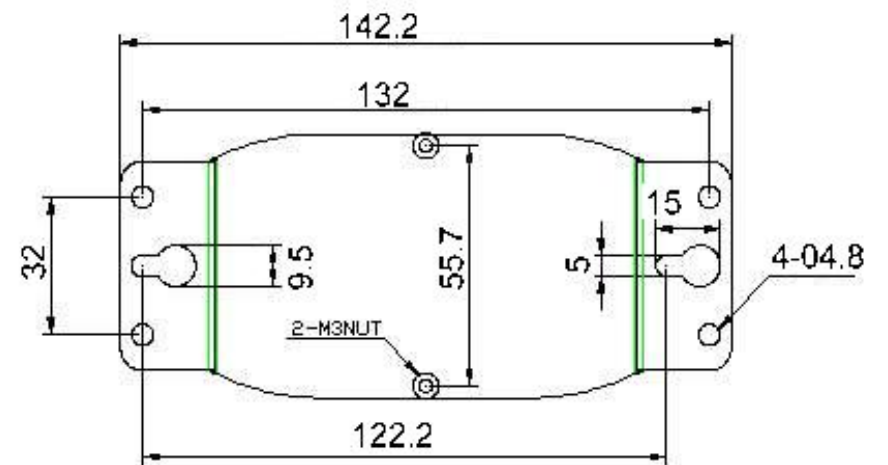
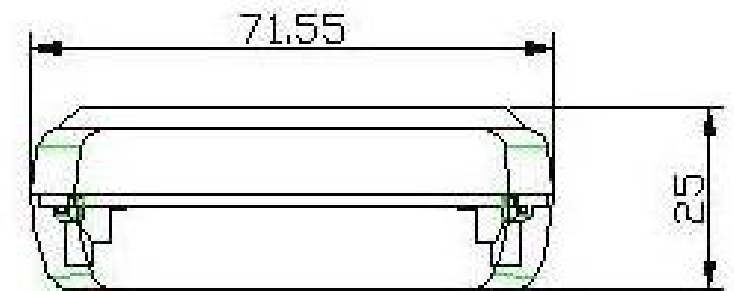
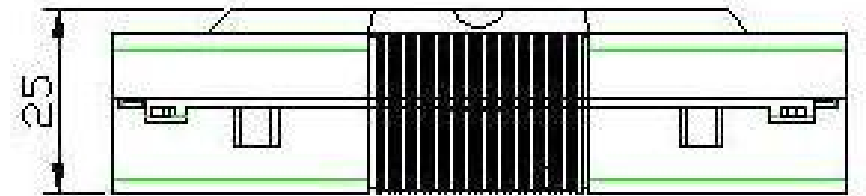
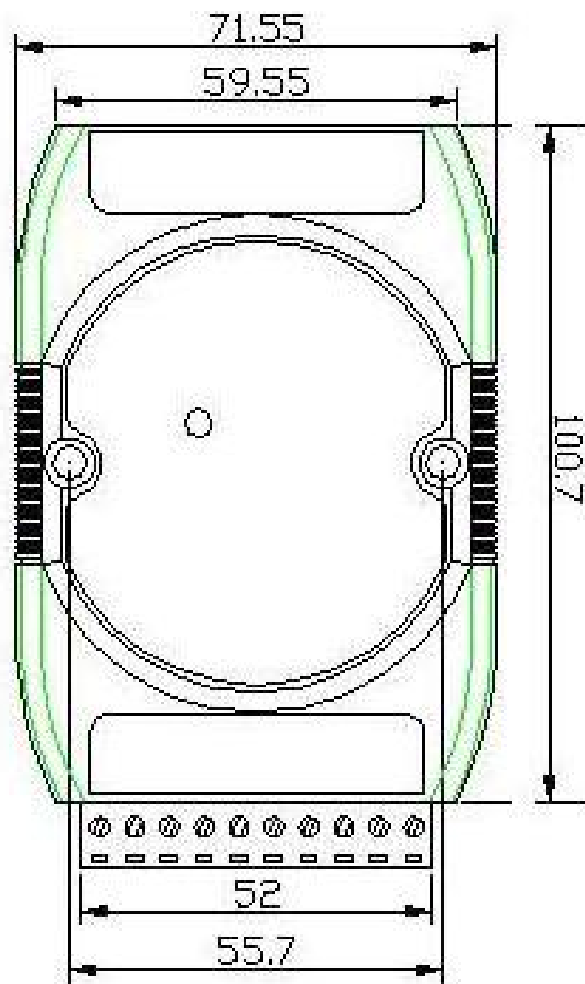
Up to 256 eDAM modules may be connected to an RS-485 multi-drop network by using the eDAM RS-485 repeater, extending the maximum communication distance to 4,000 ft.

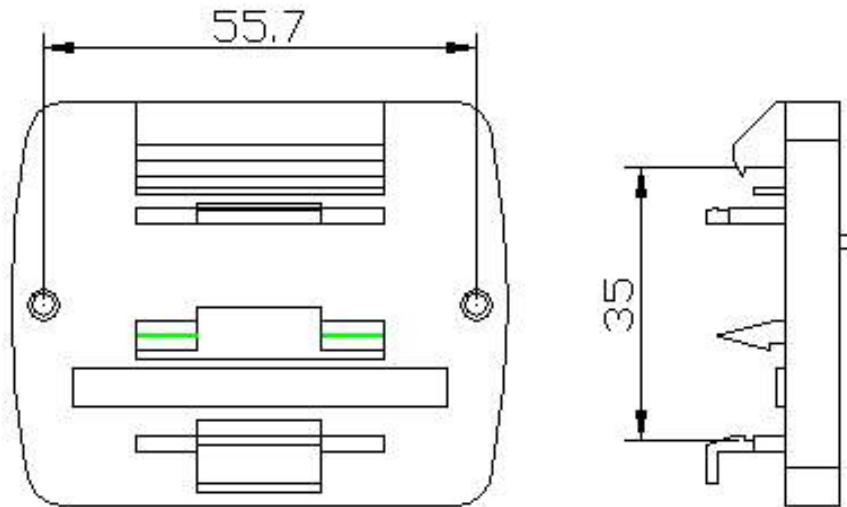
Chapter 2 About the eDAM DIO Modules

2.1 Outline of eDAM DIO modules



2.2 Module Dimension



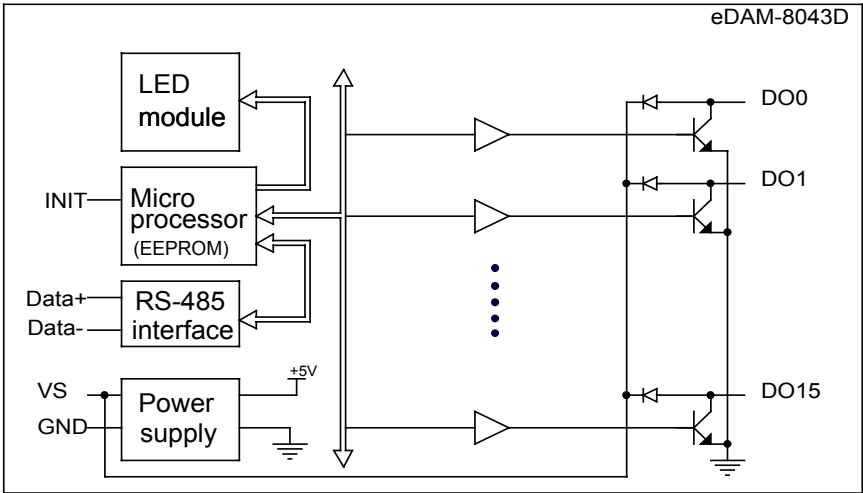
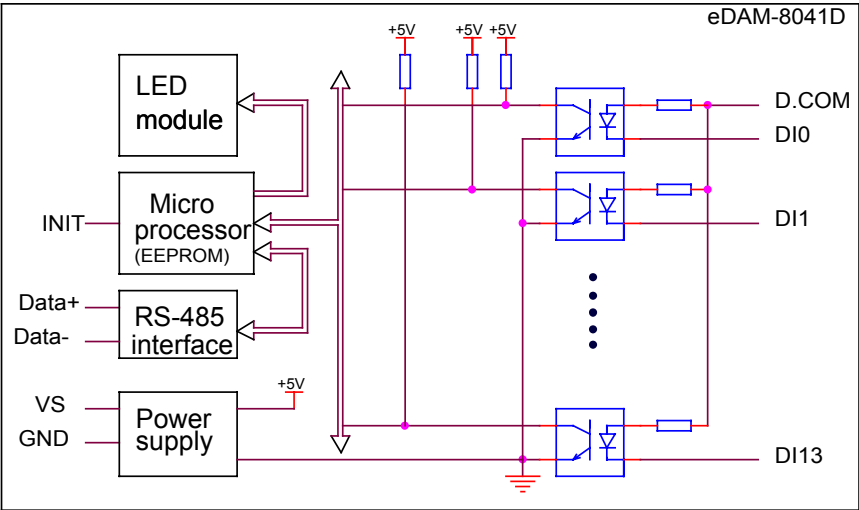
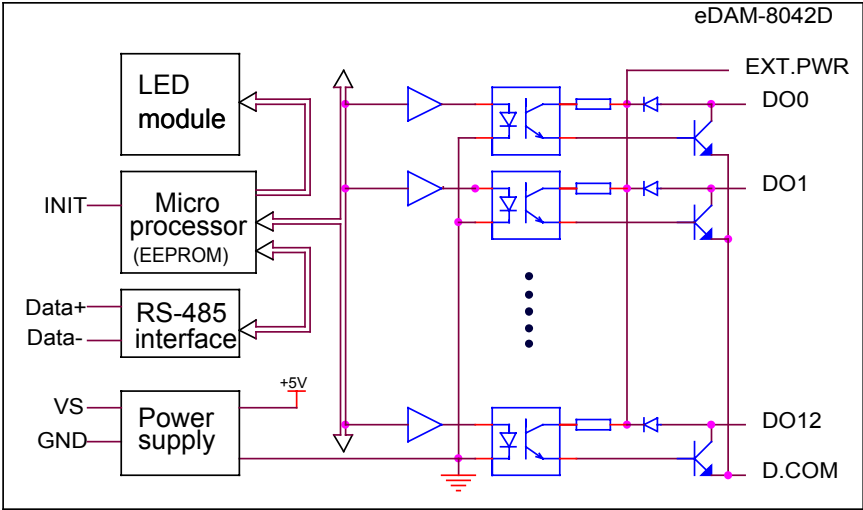
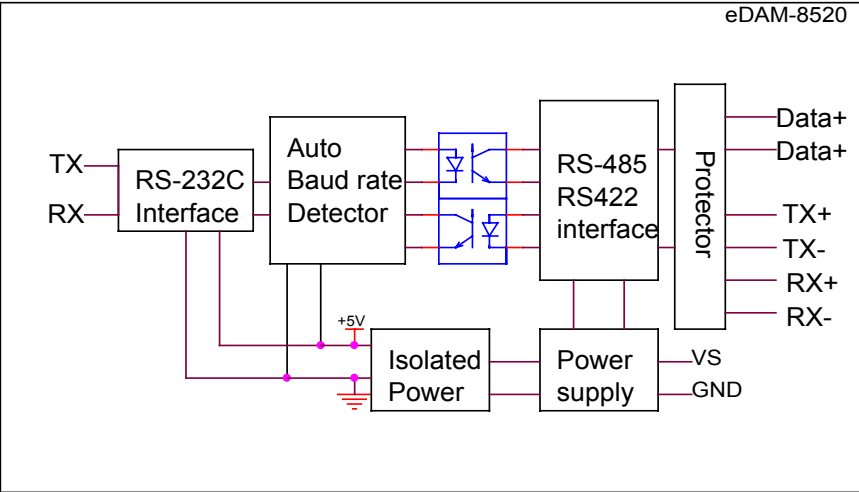


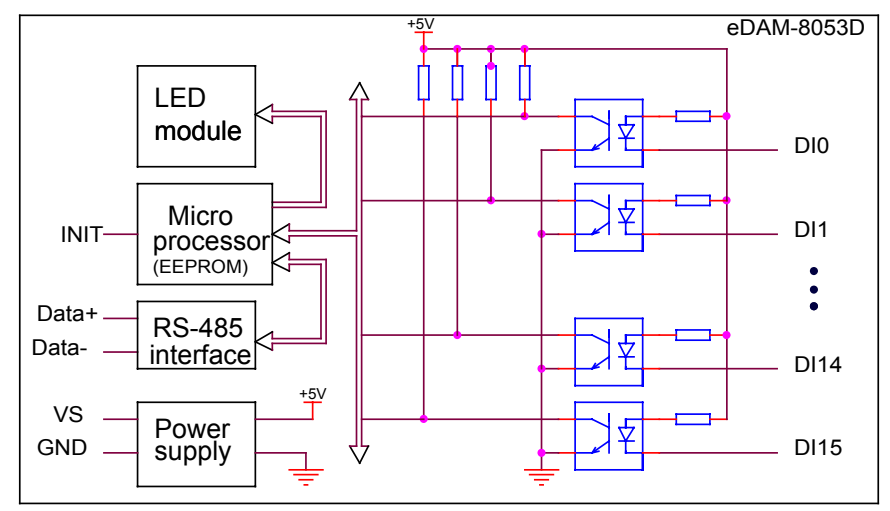
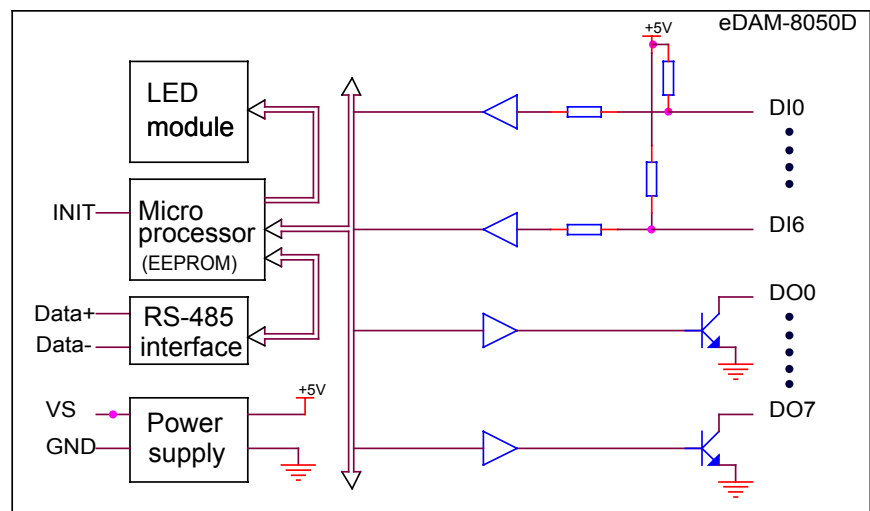
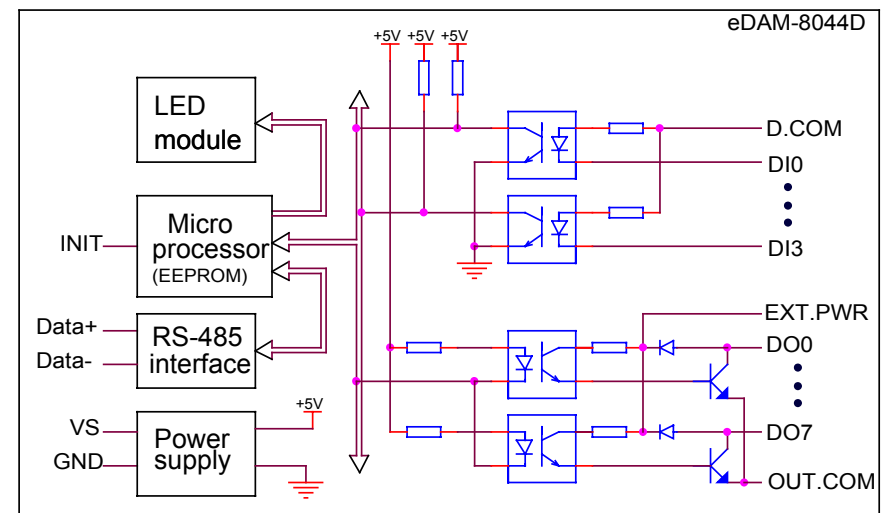
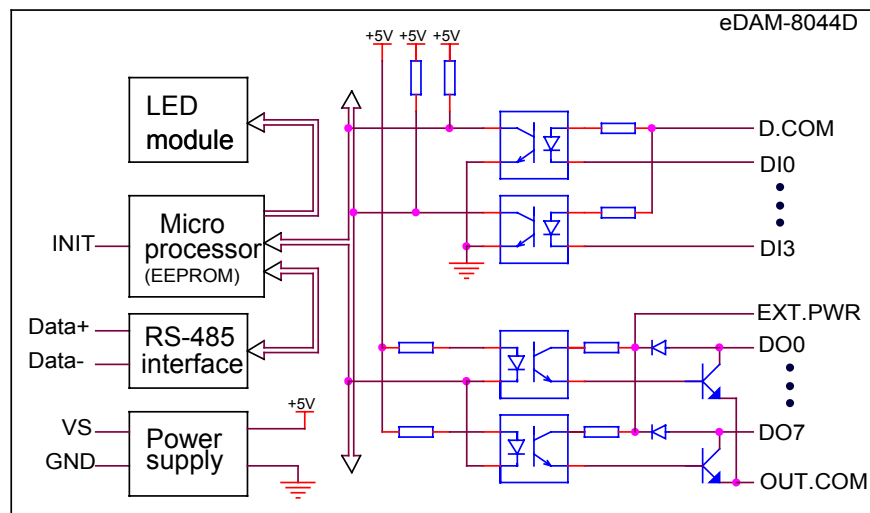
2.3 eDAM DIO modules

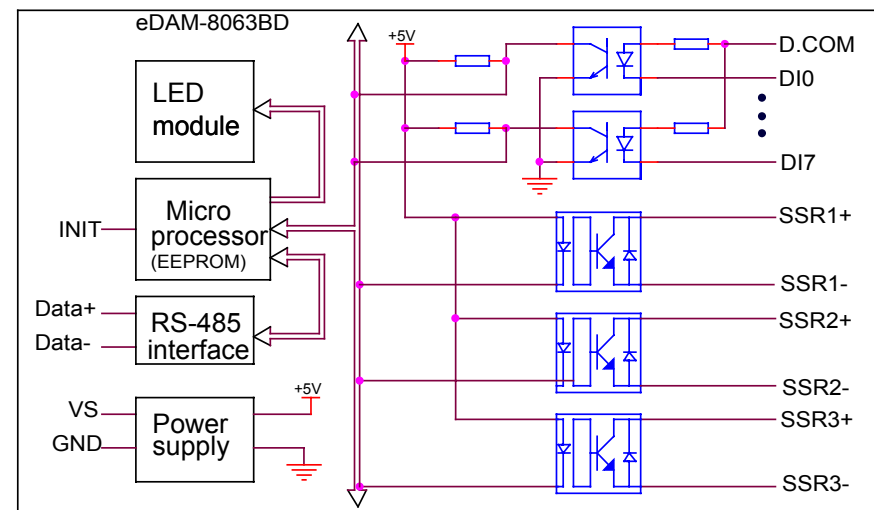
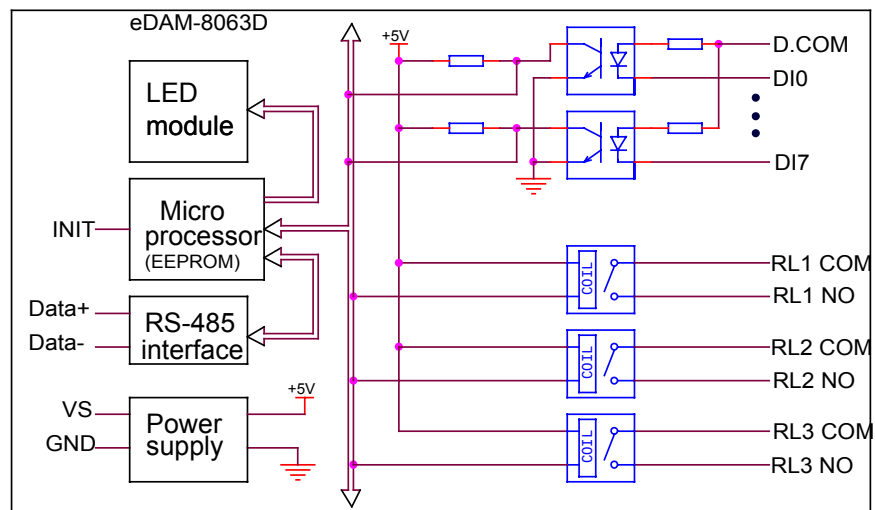
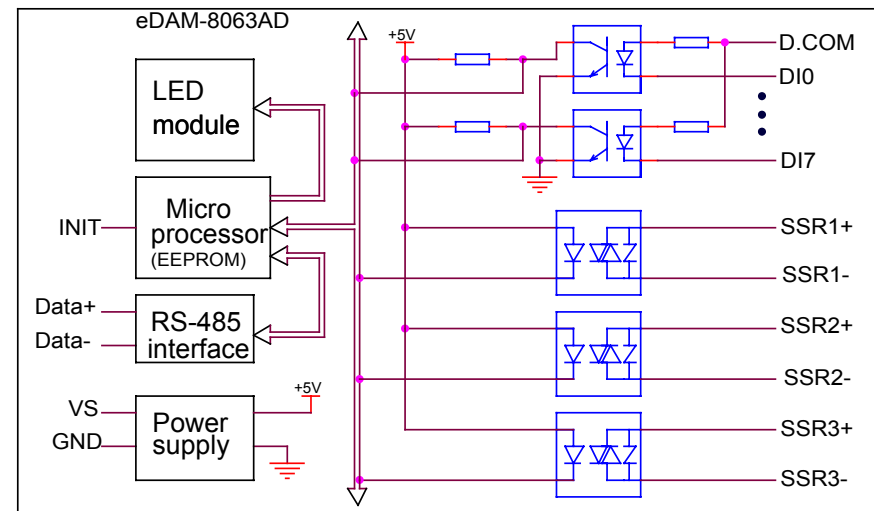
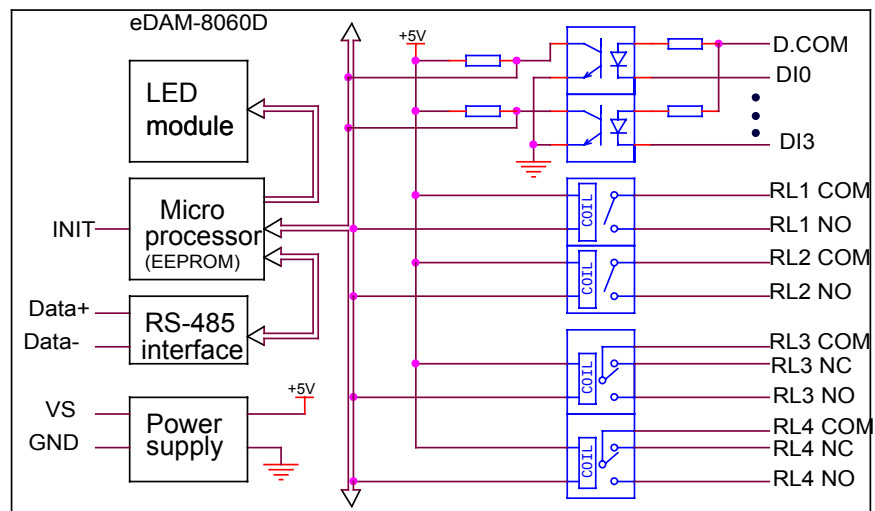
The eDAM provides a series of digital input or output modules to sense the digital signal or to control the remote devices.

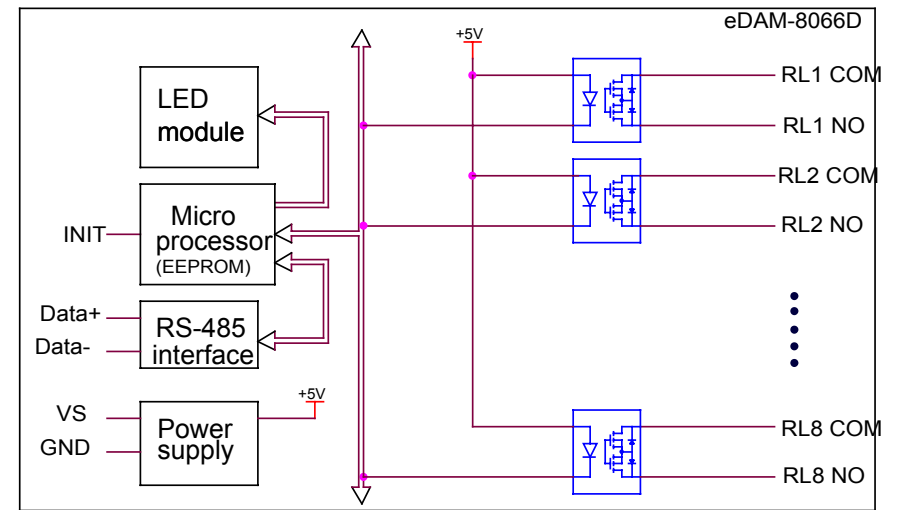
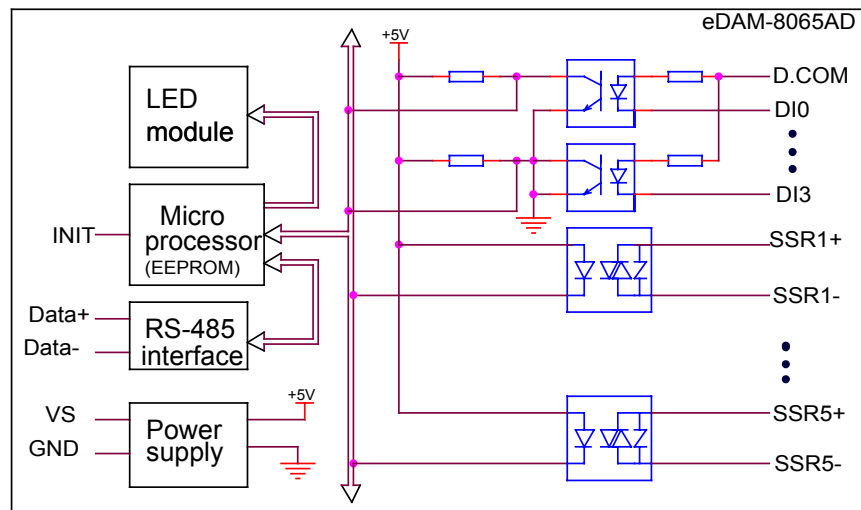
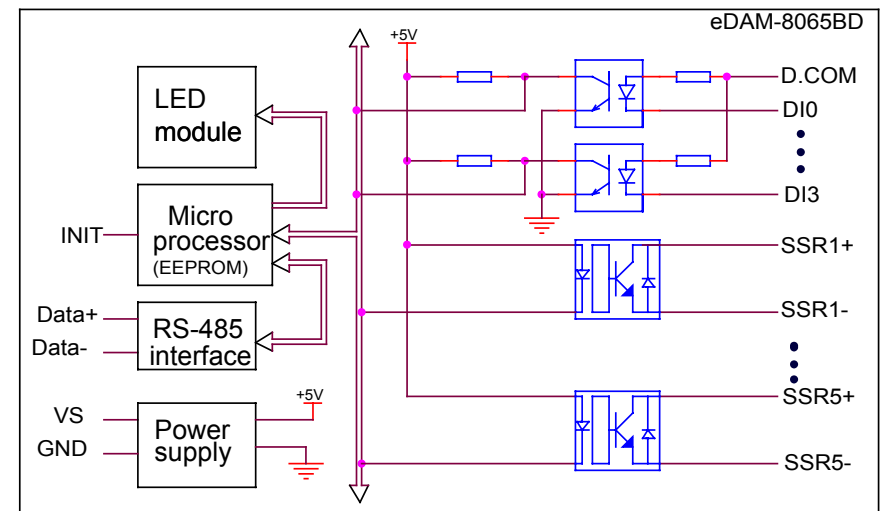
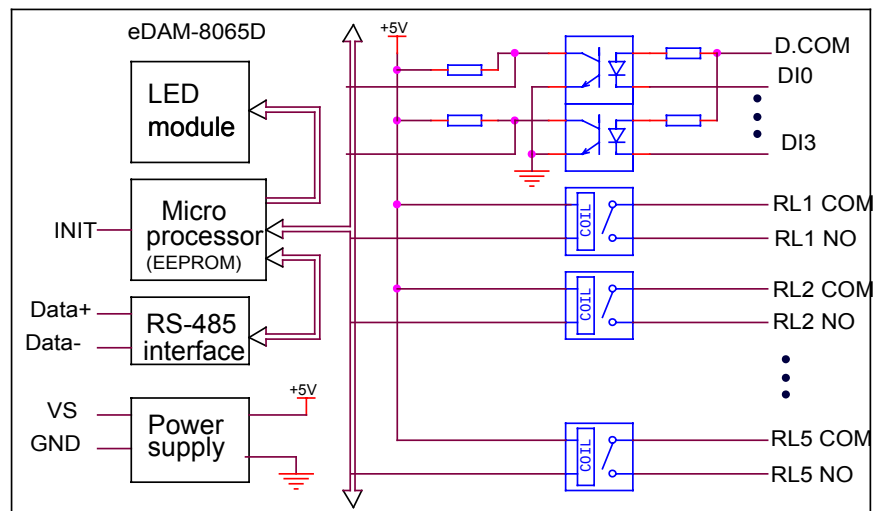
- eDAM-8520 : Isolated RS-232 to RS-422/485 converter
- eDAM-8041D : 14-channel isolated digital input module
- eDAM-8042D : 13-channel isolated digital output module
- eDAM-8043D : 16 channel digital output module
- eDAM-8044D : 8-out/ 4-in channel isolated digital I/O module
- eDAM-8050D : 8-out/ 7-in Digital I/O module
- eDAM-8052D : 8-channel Isolated digital input module
- eDAM-8053D : 16-channel digital input module
- eDAM-8060D : 4-channel isolated digital input and 4 - channel relay output module
- eDAM-8063D : 8-channel isolated digital inputs and 3 channel relay outputs module
- eDAM-8063AD : 8-channel isolated digital inputs and 3 channel AC-SSR outputs module
- eDAM-8063BD : 8-channel isolated digital inputs and 3 channel DC-SSR outputs module
- eDAM-8065D : 4 channel isolated digital inputs and 5 channel relay outputs
- eDAM-8065AD : 4 channel isolated digital inputs and 5 channel AC-SSR outputs
- eDAM-8065BD : 4 channel isolated digital inputs and 5 channel DC-SSR outputs
- eDAM-8066D : 8 channel Photo-MOS relay outputs
- eDAM-8067D : 8 channel relay outputs

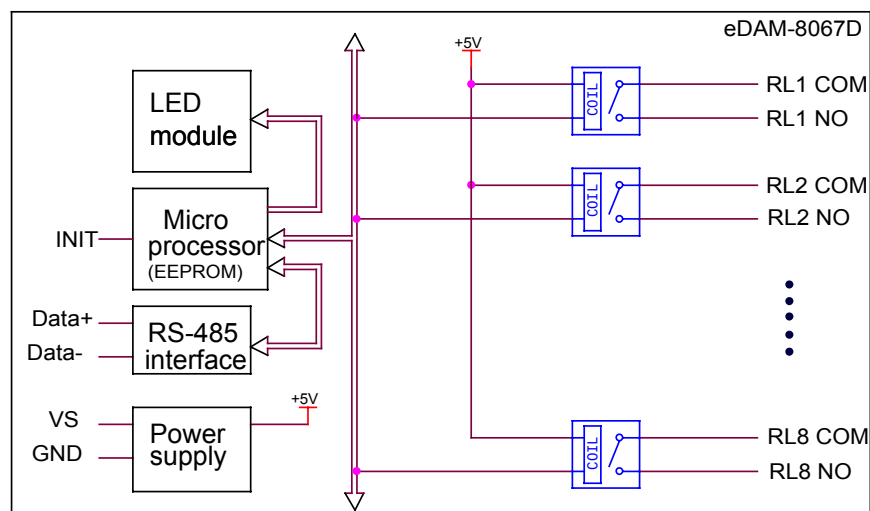
2.4 Block diagram of modules







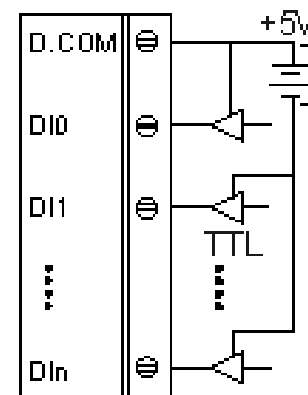




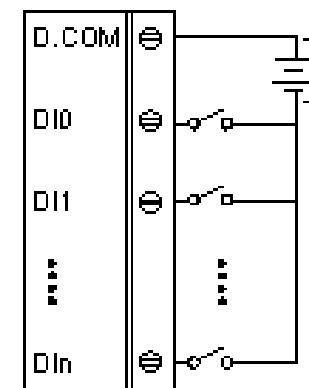
2.5 Wire connection

■ EDAM-8041D/44D/60D/63D/65D/65AD/65BD

TTL/COMS Signal input

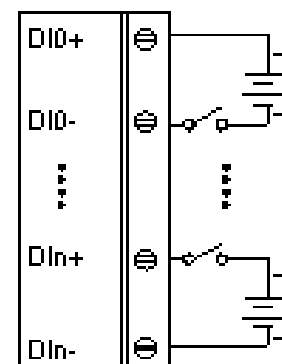


Dry/Contact Signal input

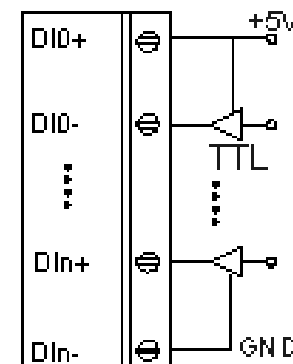


■ EDAM-8050D/53D

Dry/Contact Signal input

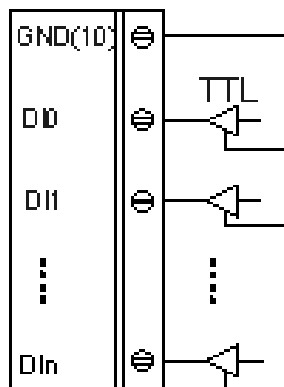


TTL/COMS Signal input

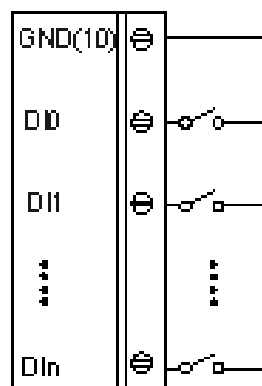


■ EDAM-8050D/53D

TTL/COMS Signal input

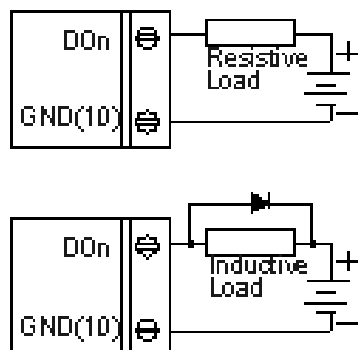


Dry/Contact Signal input



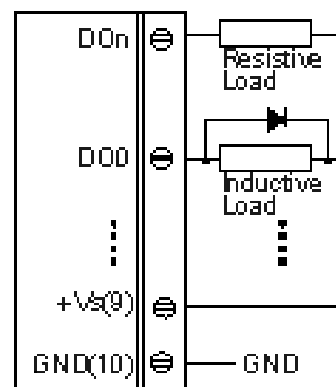
■ EDAM-8050D

Open collector output



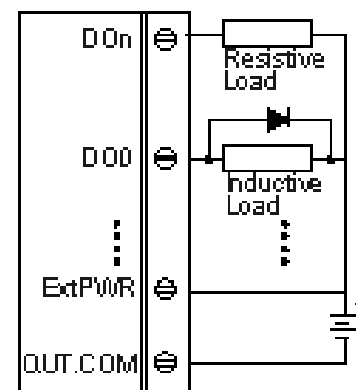
■ EDAM-8043D

Open collector output



EDAM-8042D

Open collector output



2.6 EDAM specification

2.6.1 eDAM-8520 module

eDAM-8520 is an isolated RS-232 to RS-422/RS-485 converter, it converts the RS-232 signal to the RS-422/RS-485 signals. The eDAM-8520 equips a “*Auot baud rate detector*” inside, it can detect the baud rate and data format and control the direction of the RS-485 network automatically

Specifications:

- Input Interface : standard RS-232 9 pin female D-type connector
- Output Interface :RS-485, differential, 2 half-duplex wires
RS-422, differential, 4 full-duplex wires
- Max RS-485 network distance : 4000 ft. (1200m)
- Speed (bps) : auto switching baud rate
- Isolation voltage : 3000 Vrms
- Max loading : 128 eDAMs on a RS-485 network
- Power supply : +10V to +30V, 0.95 W

Pin Definitions

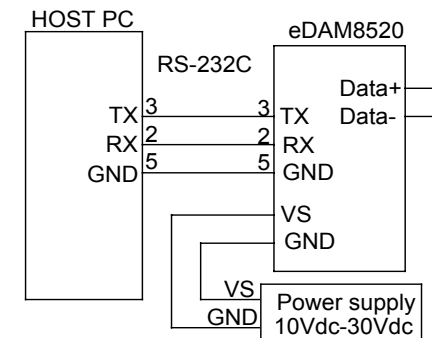
- RS-232 connector (9-pin D-type female)

Pin	Name	Description
1	N.C	No used
2	RXD	Receiver
3	TXD	Transmitter
4	N.C	No used
5	GND	Ground
6	N.C	No used
7	N.C	No used
8	N.C	No used
9	N.C	No used

- RS-422/485 terminal (10-pin plug-in screw terminal block)

Pin	Name	Description
1	DATA+	RS-485 transmission line, positive
2	DATA-	RS-485 transmission line, negative
3	N.C	No used
4	TX+	RS-422 transmission line, positive
5	TX-	RS-422 transmission line, negative
6	RX+	receiving line, positive
7	RX-	receiving line, negative
8	N.C	No used
9	+Vs	power supply +10V~+30V
10	GND	Power GND

- Connection Between Host and eDAM-8520



- RS-422/RS-485 settings

The switch called “S1” inside the module is used to set the eDAM-8520 to be RS-422 or RS-485 operating mode.

Pin1	Pin2	Pin3	Pin4	Operating mode
off	off	off	off	RS-422
on	on	on	off	RS-485

2.6.2 eDAM-8041D module

eDAM-8041D provides 14 isolated digital input channels and all channels are single-ended with common ground. The isolation voltage is up to 3750 Vrms.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Channel numbers : 14 isolated single ended with common source
- Isolation Voltage: 3750Vrms
- Logical level 0 : +1V Max.
- Logical level 1: +4.0V ~ +30V
- Input impedance: 3K ohms
- LED: 14 digital input status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.2W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI10	Digital input 10+	11	DI0	Digital input 0+
2	DI11	Digital input 11+	12	DI1	Digital input 1+
3	DI12	Digital input 12+	13	DI2	Digital input 2+
4	DI13	Digital input 13+	14	DI3	Digital input 3+
5	D.COM	Digital COMMON	15	DI4	Digital input 4+
6	INIT*	Initial	16	DI5	Digital input 5+
7	DATA+	RS-485 +	17	DI6	Digital input 6+
8	DATA-	RS-485 -	18	DI7	Digital input 7+
9	+Vs	+10V~+30V	19	DI8	Digital input 8+
10	GND	Power GND	20	DI9	Digital input 9+

2.6.3 eDAM-8042D module

eDAM-8042D provides 13 isolated digital output(open collector) channels and all channels are single-ended with common ground. The isolation voltage is up to 3750 Vrms.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Channel numbers : 13 isolated single ended with common power
- Output characteristic: open collector transistor
- Isolation Voltage: 3750Vrms
- Max. Load Voltage: +30Vdc
- Maximum current sink: 100mA
- LED: 13 digital output status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.6W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DO 10	Digital output 10+	11	DO0	Digital output 0+
2	DO 11	Digital output 11+	12	DO1	Digital output 1+
3	DO 12	Digital output 12+	13	DO2	Digital output 2+
4	Ext.Pwr	Ext. power	14	DO3	Digital output 3+
5	D.COM	Digital COMMON	15	DO4	Digital output 4+
6	INIT*	Initial	16	DO5	Digital output 5+
7	DATA+	RS-485 +	17	DO6	Digital output 6+
8	DATA-	RS-485 -	18	DO7	Digital output 7+
9	+Vs	+10V~+30V	19	DO8	Digital output 8+
10	GND	Power GND	20	DO9	Digital output 9+

2.6.4 eDAM-8043D module

eDAM-8043D provides 16 non-isolated digital output(open collector) channels and all channels are single-ended with common ground.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Channel numbers : 16 non-isolated single ended
- Output characteristic: open collector transistor
- Max Load voltage: 30 Vdc
- Maximum current sink:100mA
- LED: 16 digital output status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.2W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DO 10	Digital output 10+	11	DO0	Digital output 0+
2	DO 11	Digital output 11+	12	DO1	Digital output 1+
3	DO 12	Digital output 12+	13	DO2	Digital output 2+
4	DO 13	Digital output 13+	14	DO3	Digital output 3+
5	DO 14	Digital output 14+	15	DO4	Digital output 4+
6	INIT/DO15	INIT* or DO15*	16	DO5	Digital output 5+
7	DATA+	RS-485 +	17	DO6	Digital output 6+
8	DATA-	RS-485 -	18	DO7	Digital output 7+
9	+Vs	+10V~+30V	19	DO8	Digital output 8+
10	GND	Power GND	20	DO9	Digital output 9+

* : Pin-6 are jumper selectable to INIT* or DO15(Ref. Sec 3.8)

2.6.5 eDAM-8044D module

eDAM-8044D provides 8 isolated digital output(open collector) channels and 4 isolated digital input channels. All output channels are single-ended with common power.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Output channels : 8 isolated output channels
- Isolation Voltage: 3750Vrms
- Output characteristic: open collector transistor
- Max output Load voltage: 30 Vdc
- Maximum output current sink: 375mA
- Input channels : 4 isolated input channels with common source
- Input impedance: 3K ohms
- Logical level 0 : +1V Max., Logical level 1: +4.0V ~ +30Vdc
- LED: 12 digital input/output status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.8W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI 3	Digital input 3+	11	Ext.Pwr	Ext. power
2	DI 2	Digital input 2+	12	out.COM	OUT COM
3	DI 1	Digital input 1+	13	DO0	Digital output 0+
4	DI 0	Digital input 0+	14	DO1	Digital output 1+
5	D.COM	Digital COM	15	DO2	Digital output 2+
6	INIT*	Initial	16	DO3	Digital output 3+
7	DATA+	RS-485 +	17	DO4	Digital output 4+
8	DATA-	RS-485 -	18	DO5	Digital output 5+
9	+Vs	+10V~+30V	19	DO6	Digital output 6+
10	GND	Power GND	20	DO7	Digital output 7+

2.6.6 eDAM-8050D module

eDAM-8050D provides 8 non-isolated digital output(open collector) channels and 7 non-isolated digital input channels. All input/output channels are single-ended with common ground.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Output channels : 8 non-isolated output channels
- Output characteristic: open collector transistor
- Max output Load voltage: 30 Vdc
- Maximum output current sink: 30mA
- Input channels : 7 non-isolated input channels
- Logical level 0 : +1V Max., Logical level 1: +3.5V ~ +30V
- LED: 15 digital input/output status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.2W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DO7	Digital output 7+	11	DO2	Digital output 2+
2	DO6	Digital output 6+	12	DO1	Digital output 1+
3	DO5	Digital output 5+	13	DO0	Digital output 0+
4	DO4	Digital output 4+	14	DI 0	Digital input 0+
5	DO3	Digital output 3+	15	DI 1	Digital input 1+
6	INIT*	Initial	16	DI 2	Digital input 2+
7	DATA+	RS-485 +	17	DI 3	Digital input 3+
8	DATA-	RS-485 -	18	DI 4	Digital input 4+
9	+Vs	+10V~+30V	19	DI 5	Digital input 5+
10	GND	Power GND	20	DI 6	Digital input 6+

2.6.7 eDAM-8052D module

eDAM-8052D provides 6 isolated differential digital input channels and 2 isolated single end with common ground digital input channels.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Input channels : 6 isolated differential input channels and 2 single end with common ground input channels
- Isolation Voltage: 5000Vrms
- Input impedance : 3K ohms
- Logical level 0 : +1V Max., Logical level 1: +4.0V ~ +30V
- LED: 8 digital input status LED
- Power input : +10V to +30VDC
- Power Consumption : 0.7W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI5+	Digital input 5+	11	DI0+	Digital input 0+
2	DI5-	Digital input 5-	12	DI0-	Digital input 0-
3	DI6+	Digital input 6+	13	DI1+	Digital input 1+
4	D.GND	Digital Input GND	14	DI1-	Digital input 1-
5	DI7+	Digital input 7+	15	DI2+	Digital input 2+
6	INIT*	Initial	16	DI2-	Digital input 2-
7	DATA+	RS-485 +	17	DI3+	Digital input 3+
8	DATA-	RS-485 -	18	DI3-	Digital input 3-
9	+Vs	+10V~+30V	19	DI4+	Digital input 4+
10	GND	Power GND	20	DI4-	Digital input 4-

2.6.8 eDAM-8053D module

eDAM-8053D provides 16 non-isolated digital input channels and all channels are single-ended with common ground.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Channel numbers : 16 non-isolated single ended
- Input impedance : 820 ohms
- Logical level 0 : +2V Max.
- Logical level 1: +4.0V ~ +30V
- LED: 16 digital input status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.1W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI10	Digital input 10+	11	DI0	Digital input 0+
2	DI11	Digital input 11+	12	DI1	Digital input 1+
3	DI12	Digital input 12+	13	DI2	Digital input 2+
4	DI13	Digital input 13+	14	DI3	Digital input 3+
5	DI14	Digital input 14+	15	DI4	Digital input 4+
6	INIT*/DI15	INIT or Input 15+	16	DI5	Digital input 5+
7	DATA+	RS-485 +	17	DI6	Digital input 6+
8	DATA-	RS-485 -	18	DI7	Digital input 7+
9	+Vs	+10V~+30V	19	DI8	Digital input 8+
10	GND	Power GND	20	DI9	Digital input 9+

* Signal assignment of Pin-6 is jumper selectable by setting JP1 in module (Ref. Sec 3.8)

2.6.9 eDAM-8060D module

eDAM-8060D provides 4 isolated digital input channels and 4 relay output channels. all relay output channels are differential with individually common .

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 4 relay output channels
- Relay contact rating : 0.6A/125Vac, 2A/30Vdc
- Surge strength: 500V
- Operate Time: 3mS, Release Time: 2mS, Min Life: 5*10⁵ ops.
- Input channels : 4 isolated input channels with common source
- Isolation Voltage: 3750Vrms.
- Input impedance: 3K ohms
- Input logical level 0 : +1V Max.,
- logical level 1: +4.0V ~ +30V
- LED: 8 digital input/output status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.8W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	RL1 NO	Relay 1 (NO)
2	DI2	Digital input 2+	12	RL1 COM	Relay 1 COM
3	DI1	Digital input 1+	13	RL2 NO	Relay 2 (NO)
4	DI0	Digital input 0+	14	RL2 COM	Relay 2 COM
5	D.COM	Digital COM	15	RL3 NO	Relay 3 (NO)
6	INIT*	Initial	16	RL3 NC	Relay 3 (NC)
7	DATA+	RS-485 +	17	RL3 COM	Relay 3 COM
8	DATA-	RS-485 -	18	RL4 NO	Relay 4 (NO)
9	+Vs	+10V~+30V	19	RL4 NC	Relay 4 (NC)
10	GND	Power GND	20	RL4 COM	Relay 4 COM

NO: Normal open, NC: Normal Close

2.6.10 eDAM-8063D module

eDAM-8063D provides 8 isolated digital input channels and 3 relay output channels. All input channels are single ended with common source and all relay output channels are differential with individually common .

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 3 relay output channels
- Surge strength: 4000V
- Relay contact rating : 5A/250Vac, 5A/30Vdc
- Operate Time: 6mS, Release Time: 3mS, Min Life: 10⁵ ops.
- Input channels : 8 isolated input channels with common source
- Isolation Voltage: 3750Vrms • Input impedance: 3K ohms
- Input logical level 0 : +1V Max., logical level 1: +4.0V ~ +30V
- LED: 11 digital input/output status LED
- Power input : +10V to +30VDC • Power Consumption : 1.8W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	RL1 NO	Relay 1 (NO)
2	DI2	Digital input 2+	12	RL1 COM	Relay 1 COM
3	DI1	Digital input 1+	13	RL2 NO	Relay 2 (NO)
4	DI0	Digital input 0+	14	RL2 COM	Relay 2 COM
5	D.COM	Digital Input COM	15	RL3 NO	Relay 3 (NO)
6	INIT*	Initial	16	RL3 COM	Relay 3 COM
7	DATA+	RS-485 +	17	DI7	Digital input 7+
8	DATA-	RS-485 -	18	DI6	Digital input 6+
9	+Vs	+10V~+30V	19	DI5	Digital input 5+
10	GND	Power GND	20	DI4	Digital input 4+

NO: Normal open, NC: Normal Close

2.6.11 eDAM-8063AD module

eDAM-8063AD provides 8 isolated digital input channels and 3 AC-SSR output channels.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 3 AC-SSR output channels with Normal Open
- Output voltage rating : 24 to 265 Vrms
- Output current rating : 1.0 Arms, Leakage current: 1.5mArms
- Min. Operate Time: 1mS, Min. Release Time: 1.5mS
- Dielectric Strength : 2500Vrms
- Input channels : 8 isolated input channels with common source
- Isolation Voltage: 3750Vrms
- Input impedance: 3K ohms
- Input logical level 0 : +1V Max., logical level 1: +4.0V ~ +30V
- LED: 11 digital input/output status LED
- Power input : +10V to +30VDC • Power Consumption : 1.6W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	SSR1-	SSR 1-
2	DI2	Digital input 2+	12	SSR1+	SSR 1+
3	DI1	Digital input 1+	13	SSR2-	SSR 2-
4	DI0	Digital input 0+	14	SSR2+	SSR 2 +
5	D.COM	Digital Input COM	15	SSR3-	SSR 3-
6	INIT*	Initial	16	SSR3+	SSR 3 +
7	DATA+	RS-485 +	17	DI7	Digital input 7+
8	DATA-	RS-485 -	18	DI6	Digital input 6+
9	+Vs	+10V~+30V	19	DI5	Digital input 5+
10	GND	Power GND	20	DI4	Digital input 4+

2.6.12 eDAM-8063BD module

eDAM-8063BD provides 8 isolated digital input channels and 3 DC-SSR output channels. All input channels are single ended with common source and all SSR output channels are differential with individually common .

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 3 DC-SSR output channels with Normal Open
- Output voltage rating : 3 to 30 Vdc
- Output current rating : 1.0 A, Leakage current: 0.1mA
- Min. Operate Time: 1mS, Min. Release Time: 1mS
- Dielectric Strength : 2500Vrms Isolation Voltage: 3750Vrms
- Input channels : 8 isolated input channels with common source
- Input impedance: 3K ohms
- Input logical level 0 : +1V Max., logical level 1: +4.0V ~ +30V
- LED: 11 digital input/output status LED
- Power input : +10V to +30VDC Power Consumption : 1.6W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	SSR1-	SSR 1-
2	DI2	Digital input 2+	12	SSR1+	SSR 1+
3	DI1	Digital input 1+	13	SSR2-	SSR 2-
4	DI0	Digital input 0+	14	SSR2+	SSR 2 +
5	D.COM	Digital Input COM	15	SSR3-	SSR 3-
6	INIT*	Initial	16	SSR3+	SSR 3 +
7	DATA+	RS-485 +	17	DI7	Digital input 7+
8	DATA-	RS-485 -	18	DI6	Digital input 6+
9	+Vs	+10V~+30V	19	DI5	Digital input 5+
10	GND	Power GND	20	DI4	Digital input 4+

2.6.13 eDAM-8065D module

eDAM-8065D provides 4 isolated digital input channels and 5 relay output channels. All input channels are single ended with common source and all relay output channels are differential with individually common .

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 5 relay output channels
- Relay contact rating : 5A/250Vac, 5A/30Vdc
- Surge strength: 4000V
- Operate Time: 6mS, Release Time: 3mS, Min Life: 10⁵ ops
- Input channels : 4 isolated input channels with common source
- Isolation Voltage: 3750Vrms
- Input impedance: 3K ohms
- Input logical level 0: +1V Max., Logical level 1: +4.0V ~ +30V
- LED: 9 digital input/output status LED
- Power input : +10V to +30VDC Power Consumption : 2.4W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	RL1 NO	Relay 1 (NO)
2	DI2	Digital input 2+	12	RL1 COM	Relay 1 COM
3	DI1	Digital input 1+	13	RL2 NO	Relay 2 (NO)
4	DI0	Digital input 0+	14	RL2 COM	Relay 2 COM
5	D.COM	Digital input COM	15	RL3 NO	Relay 3 (NO)
6	INIT*	Initial	16	RL3 COM	Relay 3 COM
7	DATA+	RS-485 +	17	RL4 NO	Relay 4 (NO)
8	DATA-	RS-485 -	18	RL4 COM	Relay 4 COM
9	+Vs	+10V~+30V	19	RL5 NO	Relay 5 (NO)
10	GND	Power GND	20	RL5 COM	Relay 5 COM

NO: Normal open, NC: Normal Close

2.6.14 eDAM-8065AD module

eDAM-8065A provides 4 isolated digital input channels and 5 AC-SSR output channels. All input channels are single ended with common source.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 5 AC-SSR output channels with Normal Open
- Output voltage rating : 24 to 265 Vrms
- Dielectric Strength : 2500Vrms
- Output current rating : 1.0 Arms, Leakage current: 1.5mArms
- Min. Operate Time: 1mS, Min. Release Time: 1.5mS
- Input channels : 4 isolated input channels with common source
- Isolation Voltage: 3750Vrms
- Input impedance: 3K ohms
- Input logical level 0 : +1V Max., Logical level 1: +4.0V ~ +30V
- LED: 9 digital input/output status LED
- Power input : +10V to +30VDC Power Consumption : 1.7W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	SSR1-	SSR 1 -
2	DI2	Digital input 2+	12	SSR1+	SSR 1 +
3	DI1	Digital input 1+	13	SSR2-	SSR 2 -
4	DI0	Digital input 0+	14	SSR2+	SSR 2+
5	D.COM	Digital Input COM	15	SSR3-	SSR 3-
6	INIT*	Initial	16	SSR3+	SSR 3+
7	DATA+	RS-485 +	17	SSR4-	SSR 4-
8	DATA-	RS-485 -	18	SSR4+	SSR 4+
9	+Vs	+10V~+30V	19	SSR5-	SSR 5-
10	GND	Power GND	20	SSR5+	SSR 5+

2.6.15 eDAM-8065BD module

eDAM-8065BD provides 4 isolated digital input channels and 5 DC-SSR output channels.

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K
- Output channels : 5 DC-SSR output channels with Normal Open
- Output voltage rating : 3 to 30 Vdc
- Output current rating : 1.0 A, Leakage current: 0.1mA
- Min. Operate Time: 1mS, Min. Release Time: 1mS
- Dielectric Strength : 2500Vrms
- Input channels : 4 isolated input channels with common source
- Isolation Voltage: 3750Vrms
- Input impedance: 3K ohms
- Input logical level 0 : +1V Max., Logical level 1: +4.0V ~ +30V
- LED: 9 digital input/output status LED
- Power input : +10V to +30VDC Power Consumption : 1.7W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	DI3	Digital input 3+	11	SSR1-	SSR 1 -
2	DI2	Digital input 2+	12	SSR1+	SSR 1 +
3	DI1	Digital input 1+	13	SSR2-	SSR 2 -
4	DI0	Digital input 0+	14	SSR2+	SSR 2+
5	D.COM	Digital Input COM	15	SSR3-	SSR 3-
6	INIT*	Initial	16	SSR3+	SSR 3+
7	DATA+	RS-485 +	17	SSR4-	SSR 4-
8	DATA-	RS-485 -	18	SSR4+	SSR 4+
9	+Vs	+10V~+30V	19	SSR5-	SSR 5-
10	GND	Power GND	20	SSR5+	SSR 5+

NO: Normal open, NC: Normal Close

2.6.16 eDAM-8066D module

eDAM-8066D provides 8 channel PhotoMOS digital outputs. all output channels are differential with individually common .

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Output channels : 8 PotoMOS output CH. with Normal Open
- Turn-On time: 0.7ms., Turn-Off time: 0.05ms.
- Out RES.: 23 ohms., I/O CAP. : 0.8pf (f=1Mhz)
- Output voltage rating : 350 V max (peak AC/DC)
- Output current rating :0.13 A (Peak AC/DC)
- Isolation Voltage: 5000VAC
- LED: 8 digital output status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.0W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	RL6 NO	MOS OUT 6	11	RL1 NO	MOS OUT 1
2	RL6 COM	MOS COM 6	12	RL1 COM	MOS COM 1
3	RL7 NO	MOS OUT 7	13	RL2 NO	MOS OUT 2
4	RL7 COM	MOS COM 7	14	RL2 COM	MOS COM 2
5	RL8 NO	MOS OUT 8	15	RL3 NO	MOS OUT 3
6	INIT/ COM8	Initial or COM8	16	RL3 COM	MOS COM 3
7	DATA+	RS-485 +	17	RL4 NO	MOS OUT 4
8	DATA-	RS-485 -	18	RL4 COM	MOS COM 4
9	+Vs	+10V~+30V	19	RL5 NO	MOS OUT 5
10	GND	Power GND	20	RL5 COM	MOS COM 5

* NO: Normal open, NC: Normal Close.

* Signal assignment of Pin-6 is jumper selectable by setting JP1 in module (Ref. Sec 3.8)

2.6.17 eDAM-8067D module

eDAM-8067D provides 8 channel relay outputs. all output channels are differential with individually common .

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Output channels : 8 relay output channels
- Relay contact rating : 0.5A/120Vac, 1.0A/24Vdc
- Surge strength: 1500V
- Operate Time: 5mS, Release Time: 2mS, Min Life: 10⁵ ops.
- LED: 8 digital output status LED
- Power input : +10V to +30VDC
- Power Consumption : 2.0W

Pin Definitions

Pin	Name	Description	Pin	Name	Description
1	RL6 NO	Relay OUT 6	11	RL1 NO	Relay OUT 1
2	RL6 COM	Relay COM 6	12	RL1 COM	Relay COM 1
3	RL7 NO	Relay OUT 7	13	RL2 NO	Relay OUT 2
4	RL7 COM	Relay COM 7	14	RL2 COM	Relay COM 2
5	RL8 NO	Relay OUT 8	15	RL3 NO	Relay OUT 3
6	INIT/ COM8	Initial or COM8	16	RL3 COM	Relay COM 3
7	DATA+	RS-485 +	17	RL4 NO	Relay OUT 4
8	DATA-	RS-485 -	18	RL4 COM	Relay COM 4
9	+Vs	+10V~+30V	19	RL5 NO	Relay OUT 5
10	GND	Power GND	20	RL5 COM	Relay COM 5

* NO: Normal open, NC: Normal Close.

* Signal assignment of Pin-6 is jumper selectable by setting JP1 in module (Ref. Sec. 3.8)

Chapter 3 Installation

This chapter provides guidelines to what is needed to set up and install an eDAM network. A quick hookup scheme is provided that lets you configure modules before they are installed in a network. To help you to connect eDAM modules with sensor inputs, several wiring examples are provided. Finally, you will find at the end of this chapter a programming example using the eDAM command set.

Be sure to carefully plan the layout and configuration of your network before you start. Guidelines regarding layout are given in Appendix E: RS-485 Network.

NOTICE: Except for changing eDAM to other compatible modules, which have on-board switches for their baud rate setting, eDAM modules should not be opened. There is no need to open the eDAM modules: all configuration is done remotely and there are no user serviceable parts inside. Opening the cover will therefore void the warranty.

3.1 Set up an eDAM network

The following list gives an overview of what is needed to setup, install and configure an eDAM environment.

- A host computer that can output ASCII characters with an RS-232C or RS-485 port.
- Power supply for the eDAM modules (+10 to +30 V_{DC})
- eDAM Series Utility software

3.2 eDAM modules

The eDAM module which you are going to install

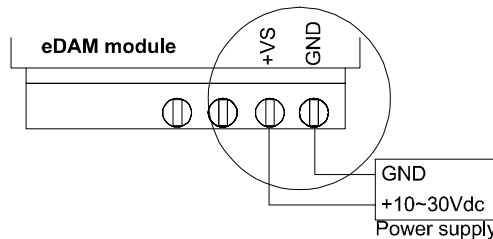
3.3 Host computer

Any computer or terminal that can output in ASCII format over either RS-232 or RS-485 can be connected as the host computer. When only RS-232 is available, an eDAM-8520 module (RS-232/RS-485 converter) is required to transform the host signals to the correct RS-485 protocol. The converter also provides opto-isolation and transformer-based isolation to protect your equipment.

For the ease of use in industrial environments the eDAM modules are designed to accept industry standard +24 V_{DC} unregulated power. Operation is guaranteed when using any power supply between +10 and +30 V_{DC}. Power ripples must be limited to 5 V peak to peak while the voltage in all cases must be maintained between +10 and +30 V_{DC}. All power supply specifications are referenced at module connector. When modules are powered remotely, the effects of line voltage drops must be considered.

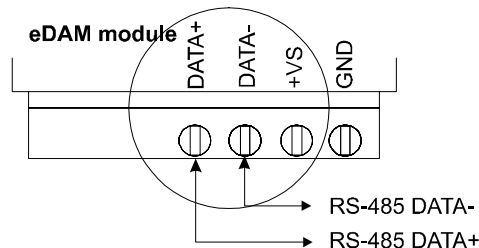
3.4 Power supply

All modules use on-board switching regulators to sustain good efficiency over the 10-30V input range, therefore we can assume that the actual current draw is inversely proportional to the line voltage. The following example shows how to calculate the required current that a power supply should be able to provide.



3.5 Communication Wiring

We recommend that shielded-twisted-pair cables that comply with the EIA RS-485 standard be used with the eDAM network to reduce interference.



3.6 eDAM Utility Software

A menu-driven utility program called “DOSEDAM.EXE” for DOS or “WINEDAM.EXE” for Windows is provided for eDAM module configuration, monitoring and calibration. It also includes a terminal emulation program that lets you easily communicate through the eDAM command set

3.7 eDAM Isolated RS-232/RS485 Converter (optional)

When the host computer or terminal has only a RS-232 port, an eDAM-8520 Isolated RS-232/RS-485/422 converter connected to the host’s RS-232 port is required.

This module equips a “Auto baud rate detector” inside, therefore it can detect the baud rate and data format automatically and control the direction of RS-485 precisely

3.8 Initializing a Brand-New Module

All eDAM modules in a RS-485 network must have an *unique* address ID. Therefore, to configure the brand-new eDAM before using is necessary

Factory default settings:

- Address ID is 01
- Baud rate is 9600 bps
- Check-sum disable
- eDAM command sets

INIT* State settings:

The eDAM I/O modules must be set at **INIT* State** when you want to change the default settings, such as the *ID address*, *baud rate*, *check-sum status* etc. All eDAM I/O modules have an special pin labeled as **INIT***. The module will be in *Default State* if the **INIT*** pin is shorted to ground when power ON. Under this state, the default configuration is set as following :

- Address ID is 00
- Baud rate is 9600 bps
- Check-sum disable
- eDAM command sets

Therefore, the communication between host and the module will

can be easily set as the same configuration, the initialization of a module will be possible no matter what configuration is set under operating state.

Note:

For eDAM-8043D,eDAM-8053D, the pin-6 is used for both DO15 (DI15) and INIT* (default)

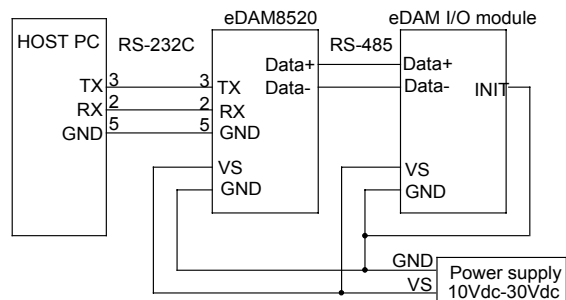
For eDAM-8066D,eDAM-8067D, the pin-6 is used for both RL8_COM and INIT* (default)

When you want to use pin 6 of eDAM-8043D as DO15(DI15) or pin 6 of eDAM-8067D as RL8_COM, you should open the module case to set the JP1.



3.9 Initialization Procedure

1. Connect a brand new eDAM module with the RS-485. Set the module in *Default State* by shorting the **INIT*** pin to GND. Refer to Figure 2.1 for detailed wiring.
2. Power on the power supply for eDAM modules.
3. Use the **eDAM utility** to configure the address ID, baud rate, check-sum status and command sets of the module.



3.10 Install a New eDAM to a Existing Network

1. Equipments for Install a New Module
2. A existing eDAM network
3. New eDAM modules.
4. Power supply (+10 to +30 VDC)

Installing Procedures

1. Configure the new eDAM module according to the initialization procedure in section 3.8
2. The baud rate and check-sum status of the new module must be identity with the existing RS-485 network. The address ID must not be conflict with other eDAM modules on the network.
3. Power off the eDAM power supply of the existing RS-485 network.
4. Wire the power lines for the new eDAM with the existing network. Be careful about the signal polarity as wiring.
5. Wire the RS-485 data lines for the new eDAM with the existing network. Be careful about the signal polarity as wiring.
6. Wire to the input or output devices. Refer to section 0 for illustrations.
7. Power on the eDAM local power supply.
8. Use the eDAM utility to check entire network.

4.1 Introduction

The eDAM 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 eDAM module except those synchronized commands with wildcard address command “#*”. The eDAM may or may not give response to the command. The host should check the response to handshake with the modules.

4.2 Format of eDAM Commands

Syntax: (Leading code)(Addr)(Command)[Data] <Cksum><CR>
Every command begins with a delimiter character. There are four valid characters: a dollar sign \$, a pound sign #, a percentage sign % and an at sign @.

The delimiter character is followed by a two-character address (hexadecimal) that specifies the target module. The actual two character command follows the address. Depending on the command, an optional data segment follows the command string. An optional two character checksum may be appended to the total string. Every commands is terminated by a carriage return (cr).

Conventions

Leading Code	The first characteristic of the eDAM command, such as %, \$, #, ~, @, ...etc(1- character)
Addr	Module’s address ID, the value is in the range of 00 – FF (Hex) 2- character
Command	Command codes or value of variables
Data	Data needed by some output command
Checksum	Checksum in brackets indicate optional parameter, only checksum is enable then this field is required (2- character)
<CR>	carriage return(0x0D)

Note:

- 1. all commands should be issued in **UPPERCASE** characters!
 - 2. There is no spacing between characters.
-

Calculate Checksum:

1. Calculate ASCII sum of all characters of command (or response) string except the character return(cr)
[Checksum]={ (Leading code)+(addr)+(command)+[data]} MOD 0x100
2. Mask the sum of string with 0ffh

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 : !01400600(cr)

Sum of string='!'+ '0'+ '1'+ '4'+ '0'+ '0'+ '6'+ '0'+ '0'

=21h+30h+31h+34h+30h+30h+36h+30h+30h=1ACh

The checksum is ACh, and [CHK]="AC"

Response string with checksum=!01400600AC(cr)

4.3 Response of Commands

The response message depends on eDAM 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.

But under the following conditions, there will have no response message.

- The specified address ID is not exist.
- Syntax error.
- Communication error
- Some special commands does not have response.

4.4 Table of Command sets

■ eDAM Special commands

Command	Syntax	Modules
eDAM Special commands		
Reset module	\$AARS[CHK](cr)	All eDAM modules
Set compatible to other brand	~AA2X01V[CHK](cr)	All eDAM modules
Read current brand setting	~AA2X02[CHK](cr)	All eDAM modules
Set module LED on/off	!AA2X03IO[CHK](cr)	8041,8042,8043,8044,8050,8052 8053,8060,8063,8065,8066,8067
Read module LED setting	!AA2X03[CHK](cr)	8041,8042,8043,8044,8050,8052 8053,8060,8063,8065,8066,8067

■ General Commands

Command	Syntax	Modules
General Commands		
Set Configuration	%AANNTTCCFF[CHK](cr)	All eDAM modules
Read Configuration	\$AA2[CHK](cr)	All eDAM modules
Set Module Name	~AAO[CHK](cr)	All eDAM modules
Read Module Name	\$AAM[CHK](cr)	All eDAM modules
Read Firmware Version	\$AAF[CHK](cr)	All eDAM modules
Read reset status	\$AA5[CHK](cr)	All eDAM modules

■ Function Commands

Command	Syntax	Modules
Function Commands		
Synchronized Sampling	#[**][CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Read Synchronized Data	\$AA4[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Digital Output	#AAPPDD[CHK](cr)	8042,8043,8044,8050,8060,8063, 8065,8066,8067
Read Digital Input Counter	#AAN[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Read Digital I/O status	\$AA6[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Clear Latched Digital Input	\$AAC[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Clear Digital Input Counter	\$AACN[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Read Latched Digital Input	\$AALS[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Read Digital Input /Output status	@AA[CHK](cr)	8041,8044,8050,8052,8053,8060, 8063,8065
Set Digital Output	@AA(data)[CHK](cr)	8042,8043,8044,8050,8060,8063, 8065,8066,8067

4.5 Reset module

Modules:	All eDAM modules	
Description:	Reset all existing eDAM modules	
Command:	\$AARS[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	RS	Reset command
	CHK	Check sum
	(cr)	Carriage return
Response:	No response	

Note: Reset command will reset module to default settings.
This command has no response from module

Example: Reset module with ID address is 02

Command: \$02RS(cr)

Response: No response

4.6 Set brand compatible

Modules:	All eDAM modules	
Description:	Set compatible to other brand	
Command:	~AA2X01V[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	2X	eDAM exclusive code
	01	Set Compatible command.
	V	Brand ID 0= eDAM , 1=ADAM 2=NuDAM, 3=I-7000
	CHK	Check sum
	(cr)	Carriage return
Response:	!AA[CHK](cr)	Valid Command
	?AA[CHK](cr)	Invalid Command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Note: Module will be set to default states after this command issued

Example: Set eDAM-8050 module with ID=02 to command compatible with NuDAM-6050

Command: ~022X012(cr)

Response: !02((cr)

Example: Set eDAM-8050 module with ID=02 to command compatible with I-7050

Command: ~022X013(cr)

Response: !02(cr)

4.7 Read current brand ID

Modules:	All eDAM modules	
Description:	Read current brand ID setting	
Command:	~AA2X02[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	2X	eDAM exclusive code
	02	Read Brand ID com..
	CHK	Check sum
	(cr)	Carriage return
Response:	!AAV[CHK](cr) Valid command	
	?AA[CHK](cr) Invalid command	
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	V	Brand ID
	CHK	Check sum
	(cr)	Carriage return

Example: Read current brand ID of eDAM-8050 module with ID=02

Command: ~022X02(cr)

Response: !022((cr) (current module is compatible to NuDAM-6050

4.8 Set module LED on/off

Modules:	All eDAM modules with LED display panel options	
Description:	Set eDAM module LED on/off	
Command:	~AA2X03IO[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	2X	eDAM exclusive code
	03	status LED control command.
	I	Input status LED control 1=Turn-on input status LED, when input high 0=Turn-on input status LED, when input low
	O	Output status LED control 1=Turn-on output status LED, when output active high 0=Turn-on output status LED, when output active low
	CHK	Check sum
	(cr)	Carriage return
Response:	!AA[CHK](cr) Valid command	
	?AA[CHK](cr) Invalid command	
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Example: Set module with ID=02 to turn-on the LED when relative input channels are high and output channels are active

Command: ~022X0311(cr)

Response: !02((cr)

4.9 Read LED control settings

Modules:	All eDAM modules with LED display panel options	
Description:	Read status LED control settings	
Command:	~AA2X03[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	2X	eDAM exclusive code
	03	Read LED setting command.
	CHK	Check sum
	(cr)	Carriage return
Response:	!AAIO[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	I	Input status LED setting (see 4.8)
	O	Output status LED setting (see 4.8)
	CHK	Check sum
	(cr)	Carriage return

Example: Read LED control settings of module with ID=02

Command: ~022X03(cr)

Response: !0210((cr)

Input LED will turn-on when input channels are high and output LED will turn-on when output channels are low

4.10 Set Module configuration

Modules:	All eDAM modules	
Description:	Set module configuration	
Command:	%AANNTTCCFF[CHK](cr)	
Syntax:	%	Command leading code
	AA	Module address ID (00 to FF)
	NN	New eDAM address ID (00 to FF)
	TT	Type =40 for DIO module
	CC	Set new baud rate of module (See *)
	FF	Data format (See **)
	CHK	Check sum
	(cr)	Carriage return
Response:	!AA[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	New Module address ID
	CHK	Check sum
	(cr)	Carriage return

* :Baud Rate settings (CC)

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

** :Data format settings (FF)

bit	7	6	5	4	3	2	1	0
-----	---	---	---	---	---	---	---	---

Bit7: Input counter update direction: 1=Falling edge, 0=rising edge (see 4.13)

Bit6:Checksum 1=Enable, 0=disable

Bit5~bit0: reserved must be 0

Note:

It's needed to short the INIT pin to ground while changing baud rate and/or enable/disable checksum (see following examples)*

Example: Change ID address from 01 to 03 (Assume current baud rate is 9600 and checksum disabled)

Command: %0103400600(cr)

Response: !03(cr)

response new module ID address 03 (change ID address only)

Example: Change baud rate from 9600 to 19200(Assume current ID is 03, baud rate is 9600, and checksum disabled).

Because that the baud rate is changed from 9600 to 19200, the following procedures should be done before sending this command

1. Power off the module
2. Short INIT* pin to GROUND (see Appendix A)
3. Power on the module
4. send command string
Command: %0003400700(cr)
Response: !03(cr)
response module ID address 03
5. Power off module
6. Open INIT* pin
7. Power on module again (Baud rate changed to 19200)

Example: Enable checksum(Assume current ID is 03, baud rate is 9600 and checksum disabled).

Because that the checksum is changed from disable to enable, the following procedures should be done before sending this command

1. Power off the module
2. Short INIT* pin to GROUND (see Appendix A)
3. Power on the module
4. send command string
Command: %0003400640(cr)
Response: !03(cr)
response module ID address 03
5. Power off module
6. Open INIT* pin
7. Power on module again (checksum enabled)

Example: Change baud rate from 9600 to 19200 and enable checksum (Assume current ID is 03, baud rate is 9600 and checksum disabled).

Because that both the baud rate and checksum is changed , the following procedures should be done before sending this command

1. Power off the module
2. Short INIT* pin to GROUND (see Appendix A)
3. Power on the module
4. send command string
Command: %0003400740(cr)
Response: !03(cr)
response module ID address 03
5. Power off module
6. Open INIT* pin
7. Power on module again

(Baud rate changed to 19200 and checksum enabled)
*It is recommended to use the setup utility to configure the module
(see section 3.8 and 3.9)*

4.11 Synchronized Sampling

Modules:	For eDAM modules involving digital input channel	
Description:	Synchronize all modules to sample input values and store 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.	
Command:	#**[CHK](cr)	
Syntax:	#	Command leading code
	**	Synchronized Sampling command
	CHK	Check sum
	(cr)	Carriage return
Response:	No response	

Example :

command: #**<CR>

Synchronized sampling command has no response

4.12 Set Digital output channel

Modules:	For eDAM modules involving digital output channel	
Description:	Set digital output channels	
Command:	#AAPPDD[CHK](cr)	
Syntax:	#	Command leading code
	AA	Module address ID (00 to FF)
	PP	Output command type
	DD	Output data
	CHK	Check sum
	(cr)	Carriage return
Response:	>[CHK](cr)	Valid command
	?[CHK](cr)	Invalid command
	![CHK](cr)	Ignored command
	>	Delimiter for valid command
	?	Delimiter for invalid command
	!	Delimiter for ignore command(The watchdog timeout status is set)
	CHK	Check sum
	(cr)	Carriage return

PP=00,0A – Multi-channel output and DD=low byte data (DO0~DO7)

PP=0B – Multi-channel output and DD=high byte data (DO8~DO15)

PP=1C,AC – Single channel output and C=low byte channel

Number (0~7), and DD=output data

PP=BC – Single channel output and C=High byte channel

Number (C=0 –channel 8, C=1 –channel 9,…….,
C=7 – channel 15) , and DD=0 to reset channel,
DD=1 to set channel

Also see *Set digital output command* (refer to 4.24)

Example1:

Command: #01000F<cr>

AA=01 - address ID

PP=00 - Multi-channel output and output to low byte (DO0~DO7)

DD=0F – Set DO0~DO3 to “1” and DO4~DO7 to “0”

<cr> carriage return

Response : >(cr)

Example2:

Command: #010B20<cr>

AA=01 - address ID

PP=0B - Multi-channel output and output to high byte
(DO8~DO15)

DD=20 - Set DO8~DO13 to “0” and DO14~DO15 to “1”

<cr> carriage return

Response : >(cr)

Example3:

Command: #011300<cr>

AA=01 - address ID

PP=13 - Single-channel output and channel number=3

DD=00 - Set DO3 to “0”

<cr> carriage return

Response : >(cr)

Example4:

Command: #01B301<cr>

AA=01 - address ID

PP=13 - Single-channel output and high byte channel number=3

DD=01 - Set DO11 to “1”

<cr> carriage return

Response : >(cr)

4.13 Read Digital input counter

Modules:	For eDAM modules involving digital input channel		
Description:	Read Digital input counter value		
Command:	#AAN[CHK](cr)		
Syntax:	#	Command leading code	
	AA	Module address ID (00 to FF)	
	N	Digital input channel number (0~F)	
	CHK	Check sum	
	(cr)	Carriage return	
Response:	!AADDDDD[CHK](cr)		Valid command
	? AA[CHK](cr)		Invalid command
	!	Delimiter for valid command	
	?	Delimiter for invalid command	
	AA	Module address ID	
	DDDDD	Counter value in decimal (00000~65535)	
	CHK	Check sum	
	(cr)	Carriage return	

Example: Read counter value of channel 5

Command: #025(cr)

Response: !0200012(cr)

Read counter value of digital input channel 5 is 12

Ref. command: Sec 4.21 \$AACN

4.14 Read Configuration

Modules:	For eDAM modules		
Description:	Read module configuration		
Command:	\$AA2[CHK](cr)		
Syntax:	\$	Command leading code	
	AA	Module address ID (00 to FF)	
	2	Command for reading configuration	
	CHK	Check sum	
	(cr)	Carriage return	
Response:	!AATTBBFF[CHK](cr)		Valid command
	?AA[CHK](cr)		Invalid command
	!	Delimiter for valid command	
	?	Delimiter for invalid command	
	AA	Module address ID	
	TT	Module type(=40 for DIO modules)	
	BB	Baud rate	
	FF	Configuration value (see *)	
	CHK	Check sum	
	(cr)	Carriage return	

*: Configuration value (FF):

- bit 7: Counter update direction:
0=Falling edge, 1=Rising edge
- bit 6: Checksum: 1=enable, 0=disable
- bit 5~bit 3: always 0
- bit 2~bit 0: =000 for eDAM-8050
=001 for eDAM- 8060
=010 for eDAM-8052
=011 for eDAM-8053

Example: Read configuration of module with ID address=05

Command: \$052(cr)

Response: !05400600(cr)

Read address ID=05 module configuration

40=DIO module

06=9600 baud rate

00=no checksum, Module number=eDAM-8050

Example: Read configuration of module with ID address=06

Command: \$062(cr)

Response: !06400641(cr)

Read address ID=06 module configuration

40=DIO module

06=9600 baud rate

41= checksum enable, Module number=eDAM-8060

4.15 Read Synchronized data

Modules:	For eDAM modules involving digital input channel	
Description:	Read synchronized data	
Command:	\$AA4[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	4	Command for reading synch. data
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!SHHLL00[CHK](cr) Valid command	
	? AA[CHK](cr) Invalid command	
	!	Delimiter for valid command
	?	Delimiter for invalid command
	S	Data status, S=1 first read, S=0 been readed
	HH	First data byte(D8~D15) (2 characters)
	LL	Second data byte(D0~D7) (2 characters)
	00	Always be 00
	CHK	Check sum
	(cr)	Carriage return

Note:

eDAM8041 response :!(Status)(DataInH)(DataInL)00<cr>
 eDAM8042 response :!(Status)(DataOutH)(DataOutL)00<cr>
 eDAM8043 response :!(Status)(DataOutH)(DataOutL)00<cr>
 eDAM8044 response :!(Status)(DataOut)(DataIn)00<cr>
 eDAM8050 response :!(Status)(DataOut)(DataIn)00<cr>
 eDAM8052 response :!(Status)(DataIn)0000<cr>
 eDAM8053 response :!(Status)(DataInH)(DataInL)00<cr>
 eDAM8060 response :!(Status)(DataOut)(DataIn)00<cr>
 eDAM8063x response :!(Status)(DataOut)(DataIn)00<cr>
 eDAM8065x response :!(Status)(DataOut)(DataIn)00<cr>
 eDAM8066/67 response :!(Status)(DataOut)0000<cr>

Example1: Read Synchronized data from eDAM8053 (ID=05)

Command: \$054(cr)

Response: !1097800(cr)

Read synchronized data from address ID=05 module

S=1 – first read

synchronized data=0978 (D8~15=09H, D0~7=78H)

4.16 Read reset status

Modules:	For eDAM modules	
Description:	Read reset status	
Command:	\$AA5[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	5	Command for reading reset status
	CHK	Check sum
	(cr)	Carriage return
Response:	!AAS[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	S	S=1 has been reset, S=0 not been reset
	CHK	Check sum
	(cr)	Carriage return

Example1: read digital input data from eDAM8053 (ID=03)

Command: \$035(cr)

Response: !031(cr)

Read reset status from address ID=03 module

(S=1 module has been reset)

4.17 Read digital I/O status

Modules:	For eDAM DIO modules	
Description:	Read the digital input channel value and readback the digital output channel value.	
Command:	\$AA6[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	6	Command for reading digital I/O status
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!FFSS00[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	FF	First byte of I/O status (See **)
	SS	Second byte of I/O status (See **)
	00	Always be 00
	CHK	Check sum
	(cr)	Carriage return

Note:

eDAM8041 response: !(DataInH)(DataInL)00<CR>
 eDAM8042 response: !(DataOutH)(DataOutL)00<CR>
 eDAM8043 response: !(DataOutH)(DataOutL)00<CR>
 eDAM8044 response: !(DataOut)(DataIn)00<CR>
 eDAM8050 response: !(DataOut)(DataIn)00<CR>
 eDAM8052 response: !(DataIn)0000<CR>
 eDAM8053 response: !(DataInH)(DataInL)00<CR>
 eDAM8060 response: !(DataOut)(DataIn)00<CR>
 eDAM8063x response: !(DataOut)(DataIn)00<CR>
 eDAM8065x response: !(DataOut)(DataIn)00<CR>
 eDAM8066/67 response: !(DataOut)0000<CR>

Example1: read digital input data from eDAM8050 (ID=05)

Command: \$056(cr)

Response: !397800(cr)

Read data=3978

Digital output status :DO0~DO7=39H

Digital input data : DI0~DI6=78H

4.18 Read firmware version

Modules:	For eDAM DIO modules	
Description:	Read module's firmware version.	
Command:	\$AAF[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	F	Command for reading firmware version.
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!AA(data)[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	data	Module's firmware version.
	CHK	Check sum
	(cr)	Carriage return

Example: Read firmware version of module address ID=30

Command: \$30F<CR>

Response: !30A1.04<CR>

! Command is valid., Address ID=30, Firmware Version=A1.04

4.19 Read module name

Modules:	For eDAM DIO modules	
Description:	Read module's name	
Command:	\$AAM[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	M	Command for reading module's name
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!AA(data)[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	data	Module's name
	CHK	Check sum
	(cr)	Carriage return

Example: Read module's name of address ID=30

Command: \$30M<CR>

Response: !308042<CR>

! Command is valid., Address ID=30, module's name=8042

4.20 Clear latched digital input

Modules:	For 8041,8044,8050,8052,8053,8060,8063X,8065X	
Description:	Clear latched digital input	
Command:	\$AAC[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	C	Command for clearing latched digital input
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!AA[CHK](cr) Valid command	
	?AA[CHK](cr) Invalid command	
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Example: Clear latched input of module address ID=30

Command: \$30C<CR>

Response: !30<CR>

! Command is valid., Address ID=30, latched inputs are cleared

4.21 Clear digital input counter

Modules:	For 8041,8044,8050,8052,8053,8060,8063X,8065X	
Description:	Clear digital input counter	
Command:	\$AACN[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	C	Command for clearing digital input counter
	N	Digital counter channel N be cleared
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!AA[CHK](cr) Valid command	
	?AA[CHK](cr) Invalid command	
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Example: Read channel 2 input counter of module addr. ID=30

Command: #302<CR>

Response: !3000123<CR>

! Command is valid., channel 2 input counter value =00123

Example: Clear channel 2 input counter of module addr. ID=30

Command: \$30C2<CR>

Response: !30<CR>

! Command is valid., channel 2 input counter cleared

Example: Read channel 2 input counter of module addr. ID=30

Command: #302<CR>

Response: !3000000<CR>

! Command is valid., channel 2 input counter value =00000

4.22 Read latched digital input

Modules:	For 8041,8044,8050,8052,8053,8060,8063X,8065X	
Description:	Read latched digital input	
Command:	\$AALS[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	L	Command for reading latched digital input
	S	=1 latched high status =0 latched low status
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)\	!HHLL[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	HH	High byte Latched input status
	LL	Low byte latched input status
	00	Always be 00
	CHK	Check sum
	(cr)	Carriage return

Example: Read latched input status of module address ID=30

Command: \$30L1<CR>

Response: !012300<CR>

! Command is valid.,

High byte latched status(D8~D15)=01

Low byte latched status(D0~D7)=23

Example: Clear latched input status of module address ID=30

Command: \$30C<CR>

Response: !30<CR>

! Command is valid., and clear latched input status

Example: Read latched input status of module address ID=30

Command: \$30L1<CR>

Response: !000000<CR>

! Command is valid.,

High byte latched status(D8~D15)=00

Low byte latched status(D0~D7)=00

4.23 Read digital input/output status

Modules:	For all eDAM DIO modules	
Description:	Read digital input/output status	
Command:	@AA[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)\	>HHLL[CHK](cr) Valid command	
	?AA[CHK](cr) Invalid command	
	> Delimiter for valid command	
	? Delimiter for invalid command	
	HH	High byte input/output status(2 characters)
	LL	Low byte input/output status(2 characters)
	CHK	Check sum
	(cr)	Carriage return

Example: Read input/output status of module from eDAM-8060 address ID=30

Command: @30<CR>

Response: >0203<CR>

! Command is valid.,

High byte output status(DO1~DO4)=02

Low byte input status(DI1~DI4)=03

Ref. sec. 4.17 notes

4.24 Set digital output

Modules:	For8042,8043,8044,8050,8063X,8065X,8066,8067	
Description:	Set digital output channel value at specified address.	
Command:	@AA(Data)[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	Data	Data=0~F(1 character) for 8060 Data=0~7(1 character) for 8063X Data=00~FF(2 characters) for 8044,8050 Data=00~1F(2 characters) for 8065X Data=00~7F(2 characters) for 8066,8067 Data=0000~1FFF (four characters) for 8042 Data=0000~FFFF(four characters) for 8043
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)\	> [CHK](cr) Valid command	
	?[CHK](cr) Invalid command	
	![CHK]<cr> * Ignore command	
	> Delimiter for valid command	
	? Delimiter for invalid command	
	! Delimiter for ignore command	
	CHK	Check sum
	(cr)	Carriage return

*: Ignore command returned, if the module is in host watchdog timeout mode and output is set to safe value

*: Also see *Set digital output channel* command (see sec.4.12)

Example: Set output of eDAM 8060 with address ID=30

Command: @306<CR>

Set eDAM8060 relay output to 6 (0110)

Response: ><CR>

> Command is valid.,

Example: Set output of eDAM 8044 with address ID=30

Command: @3055<CR>

Set eDAM8044 output to 55 (01010101)

Response: ><CR>

> Command is valid.,

Example: Set output of eDAM 8042 with address ID=30

Command: @300805<CR>

Set eDAM842 output to 0805 (0000100000000101)

Response: ><CR>

> Command is valid.,

Example: Set output of eDAM 8042 with address ID=30

Command: @300805<CR>

Set eDAM842 output to 0805 (0000100000000101)

Response: !<CR>

! Command is ignored, because that the module is in host watchdog timeout state

4.25 Set module name

Modules:	For all eDAM modules	
Description:	Set new module name.	
Command:	~AAODD[CHK](cr)	
Syntax:	\$	Command leading code
	AA	Module address ID (00 to FF)
	O	Command for setting new name
	DD	Module name, Max. 6 characters
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	!AA [CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Example: Set new module name at address ID=30

Command: ~30O4042<CR>

Set new name 4042 to the module at address ID=30

Response: !30<CR>

! Command is valid.,

4.26 Host OK

Modules:	For all eDAM modules	
Description:	Host send this command to all modules for send the information "Host OK"	
Command:	~**[CHK](cr)	
Syntax:	~	Command leading code
	**	For all modules
	CHK	Check sum
	(cr)	Carriage return
Response:	No response	

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

4.27 Read module's watchdog timeout status

Modules:	For all eDAM modules	
Description:	Read watchdog timeout status	
Command:	~AA0[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	0	Command for reading timeout status
	CHK	Check sum
	(cr)	Carriage return
Response:	! AASS[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	SS	SS=00 - watchdog timeout is cleared SS=04 - watchdog timeout is set
	CHK	Check sum
	(cr)	Carriage return

Note:

1. the watchdog timeout status will be stored in EEPROM of the module and can only be cleared by issuing ~AA1 command (see ~AA1 and ~AA3EVV commands)
2. When the module's watchdog timeout value is reached, this command will be responded with SS=04 otherwise SS=00

4.28 Reset module status

Modules:	For all eDAM modules	
Description:	Reset watchdog timeout status	
Command:	~AA1[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	1	Command for resetting watchdog timeout status
	CHK	Check sum
	(cr)	Carriage return
Response:	! AA [CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

(reference to ~AA3EVV command)

4.29 Read host watchdog timeout value

Modules:	For all eDAM modules	
Description:	Read host watchdog timeout value	
Command:	~AA2[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	2	Command for reading watchdog timeout value
	CHK	Check sum
	(cr)	Carriage return
Response:	! AA EVV[CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	E	Host watchdog enabled status E=1 – Enable E=0 – Disable
	VV	Timeout value in Hex format from 01 to FF=25.5 seconds (one unit is 0.1 sec)
	CHK	Check sum
	(cr)	Carriage return

(also see section 4.30)

4.30 Set host watchdog timeout value

Modules:	For all eDAM modules	
Description:	Set host watchdog timeout value	
Command:	~AA3E VV[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	3	Command for setting watchdog timeout value
	E	1= enable, 0= disable Host watchdog
	VV	Timeout value (01~FF, each for 0.1 second)
	CHK	Check sum
	(cr)	Carriage return
Response:	! AA [CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Note:

If host watchdog timer is enabled, the host should send *Host OK* (see section 4.26) command periodically within Timeout value to refresh the timer, otherwise the module will be forced to safety state (see section 4.32)

Example1: Set module (ID=04) to have watchdog timeout value 10.0 seconds and enable host watchdog

Command: ~043164<cr>

Set watchdog timeout value 10.0 sec and enable host watchdog

Response: !04<cr> Valid command

Example2: Read watchdog timeout value form module (ID=04)

Command: ~042<cr>

Read watchdog timeout value

Response: !04164

Watchdog timeout value=10.0 seconds, and host watchdog is enabled

Example3: Reset watchdog timer

Command: ~**<cr>

Read host watchdog timer

Stop sending any command string to modules for at least 10.0 seconds. The LED on the module will go to flash. The flash LED indicates the host watchdog is timeout and timeout status is set

Example4: Read watchdog timeout status

Command: ~040<cr>

Read module (ID=04) watchdog timeout status

Response: !0404<cr>

Timeout status is set

Example5: Read watchdog timeout value form module (ID=04)

Command: ~042<cr>

Read watchdog timeout value

Response: !04164

Watchdog timeout value=10.0 seconds, and host watchdog is enabled

Example6: Reset watchdog timeout status

Command: ~041<cr>

Reset watchdog timeout status

Response: !04<cr>

Watchdog timeout is cleared and LED stop flashing, and host watchdog is disabled

Example7: Read watchdog timeout status

Command: ~040<cr>

Read module (ID=04) watchdog timeout status

Response: !0400<cr>

Timeout status is cleared

4.31 Read power-on/safe value

Modules:	For all eDAM modules	
Description:	Read Power on and safe value	
Command:	~AA4V[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	4	Command for reading power on and safe value
	V	V=P – Read power on value V=S – Read safe value
	CHK	Check sum
	(cr)	Carriage return
Response: (see Note)	! AADD[CHK](cr) Valid command	
	?AA[CHK](cr) Invalid command	
	!	Delimiter for valid command
	?	Delimiter for invalid command
	AA	Module address ID
	DD	DD=XXXX for eDAM8042,8043X DD=XX00 for other modules
	CHK	Check sum
	(cr)	Carriage return

Note: DD - Power on value for V=P
- Safe value for V=S

Example1: Set module (ID=04) to have output value AA

Command: @04AA<cr>

Set value AA to module (ID=04) outputs

Response: ><cr>

> Valid command

Example2: Set module (ID=04) current output as safe value

Command: ~045S<cr>

Set current output value AA as safe value

Response: !04<cr>

! Valid command

Example3: Set module (ID=04) to have output value FF

Command: @04FF<cr>

Set value FF to module (ID=04) outputs

Response: ><cr>

> Valid command

Example4: Set module (ID=04) current output as power on value

Command: ~045S<cr>

Set current output value FF as power on value

Response: !04<cr>

! Valid command

Example5: Read Power on value

Command: ~044P<cr>

Read power on value

Response: !04FF00<cr>

FF=power on value

Example6: Read safe value

Command: ~044S<cr>

Read safe value

Response: !045500<cr>

55=safe value

4.32 Set power-on/safe value

Modules:	For all eDAM modules	
Description:	Set current output value as power on or safe value	
Command:	~AA5V[CHK](cr)	
Syntax:	~	Command leading code
	AA	Module address ID (00 to FF)
	5	Command for setting power on or safe value
	V	V=P – set current output value as power on value V=S – set current output value as safe value
	CHK	Check sum
	(cr)	Carriage return
Response:	! AA [CHK](cr)	Valid command
	?AA[CHK](cr)	Invalid command
	!	Delimiter for valid command
	?	Delimiter for valid command
	AA	Module address ID
	CHK	Check sum
	(cr)	Carriage return

Examples: See sec.4.31

Appendix A INIT*pin operation

The “INIT*mode” has two purposes, one for reading module current configuration, and another for configuring the module baud rate and checksum

■ Reading module current configuration

Each eDAM module has a built-in EEPROM which is used to store the configuration information such as address ID, type, baud rate etc..

If the user unfortunately forget the configuration of the module. User may use a special mode called “INIT* mode” to resolve the problem

When the module is set to “INIT* mode”, the default settings are ID=00, baud rate=9600, and checksum=disable

The following steps show you how to enable INIT* mode and read the current configuration

1. Power off the module
2. Connect the “INIT*” pin to GND pin
3. Power on the module
4. Send command \$002<cr> in 9600 baud rate to read the current configuration stored in the EEPROM
5. Power off the module again
6. Open “INIT*” pin to force the module to normal mode

■ Configuring the module baud rate and checksum

The module should be set to “INIT* mode”, While changing baud rate and/or checksum state by sending “Set module configuration” command(see section 4.10).

The following steps show you how to enable INIT* mode and change baud rate and/or checksum state

1. Power off the module
2. Connect the “INIT*” pin to GND pin
3. Power on the module
4. Send command %AANNTTCCFF in 9600 baud rate to set baud rate and/or checksum state (*ID should be set to 00 in “INIT* mode”*)
5. Power off the module again
6. Open “INIT*” pin to force the module to normal mode

Appendix B Input counter and input latch

Input counter:

Each input channel has internal counter used to count the state change (falling edge or rising edge) of input signal. The counting value can be read and cleared by sending “Read digital input counter” command or “Clear digital input counter command (see section 4.13 and 4.21)

Input latch:

Each input channel has internal latch which is used to latch the pulse signal from the input. This latched state can be read by sending “*Read latched digital input* “ command (see section 4.22) and cleared by sending “Clear latched digital input” command (see section 4.20)

For example, if the digital input is connected to a key switch. The key switch is a pulse signal. The user may lose the strike information by sending command \$AA6.

The digital input latch can latch the pulse and ready be read by sending “*Read latched digital input* “ command. If the latched state=1 means that there is a key strike occurred.

Appendix C Power on/Safe value

Power on value:

Power on value are used to set the module default output value when the module is turned-on or watch dog timeout reset. This function is especially importance in some application where the specified initial output states are required

User can set power on value by sending *Set power-on/safe value* command (see section 4.32)

Safe value:

Safe value are used to set the module outputs into the specified values when Host watchdog timeout

If The host watchdog timer is enabled by sending *Set host watchdog timeout value*(see section 4.30), the host should send *Host OK* (see section 4.26) command periodically within Timeout value to refresh the timer, otherwise the module will be forced to safety state (see section 4.32)