

User Manual

AMAX-3245

ADVANTECH

Enabling an Intelligent Planet

Copyright

The documentation and the software included with this product are copyrighted 2019 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties, which may result from its use.

Acknowledgements

Intel® and Pentium® are trademarks of Intel Corporation.

All other product names or trademarks are properties of their respective owners.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Technical Support and Assistance

1. Visit the Advantech web site at <http://support.advantech.com.cn> support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (OS, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1	Introduction.....	1
1.1	Introduction	2
1.2	Features	2
1.3	Hardware Specifications	2
1.3.1	Axis	2
1.3.2	Digital Input	2
1.3.3	Digital Output	3
1.3.4	Pulse Input	3
1.3.5	Pulse Output	3
1.3.6	General	4
Chapter 2	Hardware Wiring	5
2.1	Dimensions	6
2.1.1	Top view.....	6
2.1.2	Front View	6
2.1.3	Side View	6
2.2	Connection Terminal	7
2.2.1	Rotary switch (SW1-2)	7
2.2.2	Power terminal (CN1)	7
2.2.3	D-Sub Output Terminal (CN2-CN5)	8
2.2.4	5-pin Motion Control Signal Connectors (CN6-CN9)	8
2.2.5	6-pin general output connectors (CN10)	9
2.2.6	6-pin quick connectors (CN11)	9
2.2.7	LED Indicators	9
Chapter 3	Hardware Wiring	11
3.1	Output Pulse [CW \pm /PULS \pm , CCW \pm /DIR \pm]	12
	Figure 3.1 Optocoupler Interface	12
	Figure 3.2 Linear Drive Interface	12
3.2	Over Traveling Limit Switch Input [LMT+/-] & Home (ORG)	13
	Figure 3.3 Circuit Diagram of Limit Input Signals and Home (CN6-CN9)	13
3.3	Position latch [LTC]	13
3.4	In-Position Signal [INP]	13
3.5	Alarm [ALM]	13
3.6	Encoder Input [ECA+/-, ECB+/-, ECZ+/-]	14
	Figure 3.4 Circuit Diagram of Encoder Feedback	14
3.7	Emergency Stop Input [EMG]	14
	Figure 3.5 Circuit Diagram of Emergency Stop Input Signal	14
3.8	External Power Input [VEX]	14
3.9	Activate Servo ON [SVON]	14
3.10	Servo Error Counter Clear [ERC]	15
3.11	Position Compare Output [CMP]	15
3.12	Digital Input (CN10)	15
3.13	Digital Output (CN11)	16
	Figure 3.6 Circuit Diagram of General Output (Non-Inductive Load)	16
	Figure 3.7 Circuit Diagram of General Output (Inductive Load)	16

Chapter 1

Introduction

1.1 Introduction

The AMAX-3245 is an 4-axis EtherCAT pulse module that can connect to the upper EtherCAT motion control card PCI/PCI-1203 and pulsed stepper and servo motors. The open frame design makes it convenient to connect to Mitsubishi J3/J4, Yaskwa Sigma V/7 and Panasonic A4/A5 servo motor drives via a dedicated cable through the D-sub 26-pin interface.

In addition to high-precision motion interpolation, continuous contouring and axes synchronization, the AMAX-3245 also offers high-speed position comparison trigger (Compare Trigger) and latch (Latch) functions, making it ideal for a variety of automation industry applications.

1.2 Features

- Max. 5 MHz pulse output
- Up to 32 bit incremental encoder input. Encoder input is 2.5 MHz for CW/CCW mode, 2.5 MHz for 4xAB mode.
- Suitable for DIN-rail mounting; terminal on the module which can be directly connected to third party servo drive
- Easily visible LED indicators on board to do diagnosis
- Programmable interrupt
- Memory buffer (10K points) for trajectory planning
- 2-axis position compare triggering up to 100 KHz, and memory buffer is up to 100 K points
- Position latch
- Supports gantry control

1.3 Hardware Specifications

1.3.1 Axis

Item	Description
Number of axes	4
Control type	Pulse

1.3.2 Digital Input

Item	Description	
Channels	LMT+,LMT-, ORG, INP, ALM, EMG, LTC	
Type	Single-ended, optical isolation	
Input voltage:	L (max)	4Vdc
	H (min)	10Vdc
	H (max)	30Vdc
Max. input delay time	100Us	
Input impedance	6kΩ	
Protection	1,000V isolation	

1.3.3 Digital Output

Item	Description	
Channels	SVON, ERC, RST, CMP	
Type	Single-ended, optical isolation, sink (Sink)	
Operating voltage	Low	10Vdc
	High	30Vdc
Max. sink current	100mA/ channel	
Max. output delay time	100us	
Protection	1,000V isolation	

1.3.4 Pulse Input

Item	Description	
Max. frequency	2.5MHz x1, x2, x4 (A/B phase only)	
Type	Differential, optical isolation	
Input voltage	L (max)	1Vdc
	H (min)	3.5Vdc
	H (max)	5Vdc
Min. width for H / L pulse	200ns	

1.3.5 Pulse Output

Item	Description	
Max. frequency	5Mpps	
Type	Differential, optical isolation	
Output voltage	L (max)	0.7Vdc
	H (min)	2Vdc
	H (max)	3.9Vdc
Output current	3VDC/18mA	
Output signal mode	Linear drive differential output	
Control range	32bit	

1.3.6 General

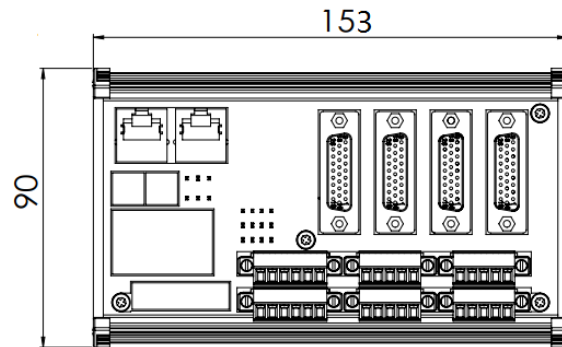
Item	Description
Connection terminal	2 x RJ-45: network interfaces 1 x Terminal block (4P) for power input 4 x Terminal block (5P) for home and Limit 1 x Terminal block (6P) for 4DI 1 x Terminal block (6P) for 4DO 4 x DB-26: connect servo drive
Dimension	165 x 75 x 56 mm (6.5 x 2.9 x 2.2")
Certification	CE, FCC Class A
Power consumption:	MAX 6W (250mA @ 24V)
Temperature	Operating 0~60 °C (refer to IEC 60068-2-1,2) Storage -20~85 °C
Relative humidity:	5~95% RH non-condensing (refer to IEC 60068-2-3)
External Power Voltage	DC +24 V

Chapter 2

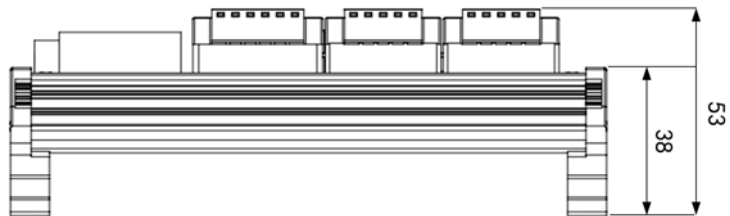
Hardware Wiring

2.1 Dimensions

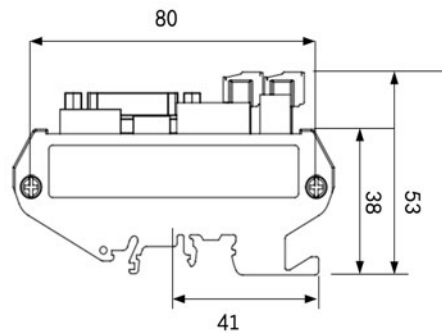
2.1.1 Top view



2.1.2 Front View



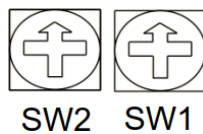
2.1.3 Side View



2.2 Connection Terminal

2.2.1 Rotary switch (SW1-2)

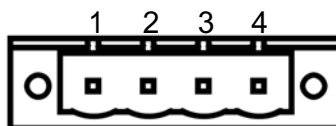
Two groups of rotary switches for salve module address configuration.



Pin	Name	Description
SW1	X1	Range: 0-F
SW2	X10	Range: 0-F

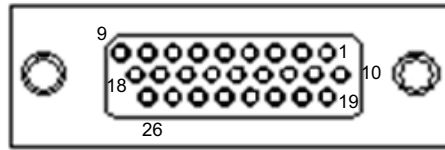
Note: (SW1, SW2)=(F,4), Slave ID=4 x 16 + F x 1= 79

2.2.2 Power terminal (CN1)



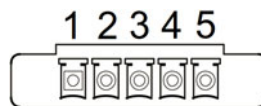
Pin	Name	Description
1	+VEX	+24V power input
2	-VEX	Power ground
3	EMG	Emergency stop
4	GND Earth	Earth

2.2.3 D-Sub Output Terminal (CN2-CN5)



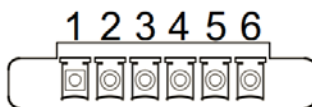
Pin	Name	Description
1	SVON	Servo motor excitation
2	INP	Servo motor in-position
3	ERC	Servo motor error cleared
4	NC	No Connection
5	CW-/PULS-	Output pulse CW/ Pulse-
6	CW+/PULS+	Output pulse CW/Pulse+
7	ECA-	Encoder phase A-
8	ECA+	Encoder phase A+
9	NC	No Connection
10	RST	Servo drive reset
11	ALM	Servo error alarm
12	+VEX	External voltage (24VDC)
13	-VEX	Earth
14	NC	No Connection
15	NC	No Connection
16	ECB-	Encoder phase B-
17	ECB+	Encoder phase B+
18	DGND	Signal Earth
19	EMG	Emergency stop
20	-VEX	Earth
21	-VEX	Earth
22	NC	No Connection
23	CCW-/DIR-	Output pulse CCW/DIR-
24	CCW+/DIR+	Output pulse CCW/DIR+
25	ECZ-	Encoder phase Z-
26	ECZ+	Encoder phase Z+

2.2.4 5-pin Motion Control Signal Connectors (CN6-CN9)



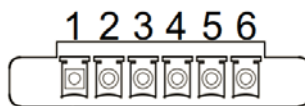
Pin	Name	Description
1	DICOM	Digital Input Concurrent
2	LMT+	Limit input+
3	LMT-	Limit input-
4	ORG	Home
5	NC	No Connection

2.2.5 6-pin general output connectors (CN10)



Pin	Name	Description
1	DICOM	Digital Input Concurrent
2	DIO	General Input / Position Latch (0 axis)
3	DI1	General Input / Position Latch (1 axis)
4	DI2	General Input / Position Latch (2 axis)
5	DI3	General Input / Position Latch (3 axis)
6	NC	No Connection

2.2.6 6-pin quick connectors (CN11)



Pin	Name	Description
1	FW_COM	Earth
2	DO0	General Output / Position Comparison (AX0)
3	DO1	General Output / Position Comparison (AX1)
4	DO2	General Output / Position Comparison (AX2)
5	DO3	General Output / Position Comparison (AX3)
6	DOGND	Digital Output Ground

2.2.7 LED Indicators

2.2.7.1 Status

LED	Name	Description
D1	PWR	Power supply
D2	STS	Running status
D3	RUN	Running
D4	ERR	Error
D5	LINK0	Communication in
D6	LINK1	Communication out

PWR LED (Green)

LED Status	System Status	Description
Off	Power Off	Power supply disconnection
Off	System Reset	The system restarts.
On	Power On	System power connection

LINKO & LINK1 LED (Green)

LED Status	Connection Status	Activation	Trigger Requirements
Last	Yes	No	Port On / Connection
Flash	Yes	Yes	Port On / Connection
Off	No	No	Port Off / Disconnection

Run LED (Green)

LED Status	Salve Module Status	Requirements
Off	INITIALISATION	The device in initialization
Slow Flash	PRE-OPERATIONAL	The device in pre-operation
Single Flash	SAFE-OPERATIONAL	The device in safe-operation
Last	OPERATIONAL	The device in normal operation.
		The device boots states
Quick Flash	BOOTSTRAP	<ol style="list-style-type: none">1. The device is starting up and doesn't begin initialization.2. The device is upgrading firm-ware.

Err LED (Red)

LED Status	Error Description	Description	Reasons
Off	Correct	Salve module in normal running	
Quick Flash	Wrong Configuration	Wrong salve module configuration	<ol style="list-style-type: none">1. Wrong packet parameters of EtherCAT cause wrong salve module status.2. Control chip in salve module detects wrong hardware configuration.
Single Flash	Wrong salve module	Status switch caused by mistakes	Synchronization errors cause salve module turn from 0P to Safe0P status.
Double Flash	Data processing or EtherCAT watchdog timer overtime	Watchdog timer overtime	Watchdog in Sync Manger overtime

STS LED (Green)

LED Status	Description
OFF	Power supply disconnection
Flash	The device in normal operation

2.2.7.2 Running

LED	Axis	Name	Description
D7/10/13/16	Axis 0-4	ORG	Home
D8/11/14/17	Axis 0-4	LMT+	Limit+
D9/12/15/18	Axis 0-4	LMT-	Limit-

Chapter 3

Hardware Wiring

3.1 Output Pulse [CW±/PULS±, CCW±/DIR±]

The pulse command has two types: one is in clockwise/ counterclockwise mode; the other is in pulse/direction mode. CW+/PULS+ and CW-/PULS- are differential signal pairs, and CCW+/DIR+ and CCW-/DIR- are different signal pairs. The default setting for pulse output mode is Pulse/Direction. User can change the output mode by programming.



Figure 3.1 Optocoupler Interface

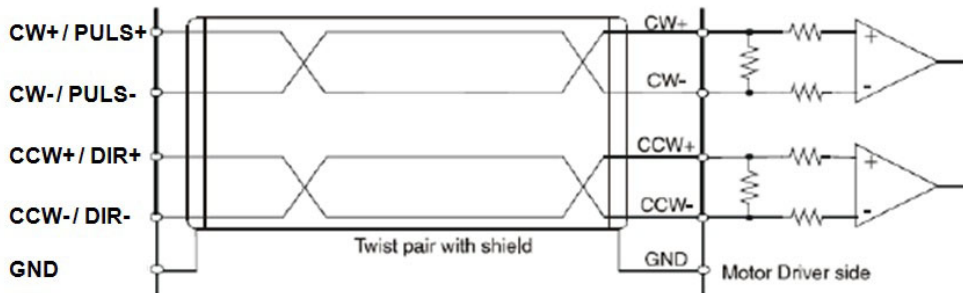


Figure 3.2 Linear Drive Interface

3.2 Over Traveling Limit Switch Input [LMT+/-] & Home (ORG)

Over traveling limit switches are used for system protection. When the limit switch is applied, the signal will flow the optocoupler and the external power VEX DC 24 V will be the source of the photo coupler.

The Home are used for fixing original position and signal of every axis.

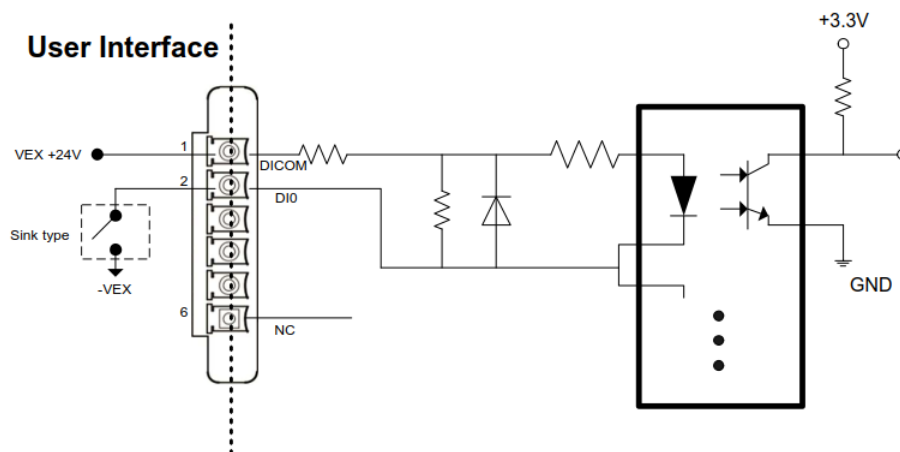


Figure 3.3 Circuit Diagram of Limit Input Signals and Home (CN6-CN9)

3.3 Position latch [LTC]

When the position capture signal LTC is triggered, the buffer will latch the current encoder position information, and the user can read the position counter by programming.

Note! *LTC and general input share interfaces which can be switched by software function. (Refer to Figure 3.6 Circuit Diagram of general input)*



3.4 In-Position Signal [INP]

The In-Position range (or deviation) is usually defined by servo drive. When the motor moves and converges within this range (or deviation), the servo driver will send the signal out to indicate that the motor is in the defined position.

3.5 Alarm [ALM]

This input is from servo drive which will generate the alarm signal to indicate any operation error.

3.6 Encoder Input [ECA+/-, ECB+/-, ECZ+/-]

When the feedback encoder signals arrive, ECA+/ECA- will connect to phase A of encoder output. It is a differential pair. The same rule is for ECB+/- and ECZ+/- . The default setting is quadrature input (4xAB phase). The following diagram shows the interface circuit for one channel:

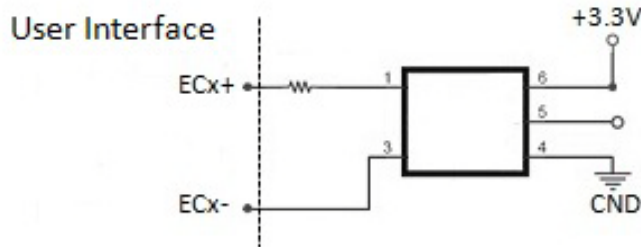


Figure 3.4 Circuit Diagram of Encoder Feedback

In the circuit diagram above, high speed optocoupler is used for isolation. The source's encoder output can be differential mode or open-collector mode. And the maximum acceptable 4xAB phase feedback frequency is about 10 MHz.

3.7 Emergency Stop Input [EMG]

When emergency stop input signal is enabled, the output of the drive pulse for all axes will be stopped.

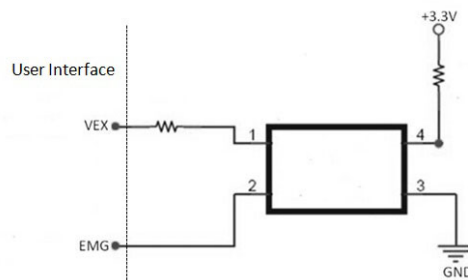


Figure 3.5 Circuit Diagram of Emergency Stop Input Signal

This signal should be used in combination with external power DC 24 V. The response time of circuitry should take about 0.25 msec because of the delay of photo coupled and RC filter.

3.8 External Power Input [VEX]

External power is necessary for all input signals of each axis. Applying DC 24 V voltage as required.

Note! Do not connect the VEX pin directly to an inductive load.



3.9 Activate Servo ON [SVON]

This SVON is to generate a digital output to activate the servo drive to be ready for move status.

3.10 Servo Error Counter Clear [ERC]

The deviation counter clear is generated by servo drive and enabled by ERC function. The counter will be cleared by some instances: homing, emergency stop case, servo alarm and over travelling limit activated.

3.11 Position Compare Output [CMP]

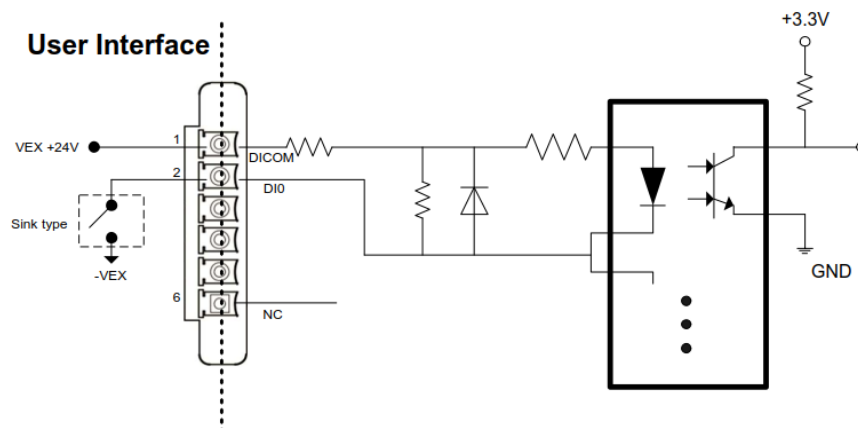
This is specially designed for the customers who can use the position compare output to further manage other 3rd party vision devices.

Note! *CMP and general output share interfaces which can be switched by software function. (Refer to Figure 3.7 Circuit Diagram of general output)*



3.12 Digital Input (CN10)

The wiring recommendations for digital inputs are as follows:



3.13 Digital Output (CN11)

The wiring recommendations for digital outputs are as follows:

1. The wiring recommendations for non-inductive load.

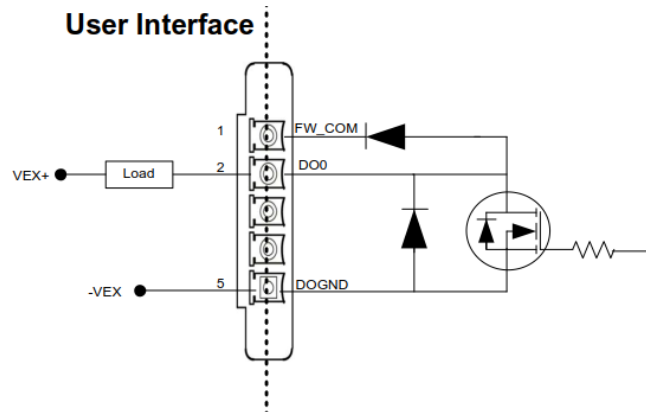


Figure 3.6 Circuit Diagram of General Output (Non-Inductive Load)

2. The wiring recommendations for inductive load.

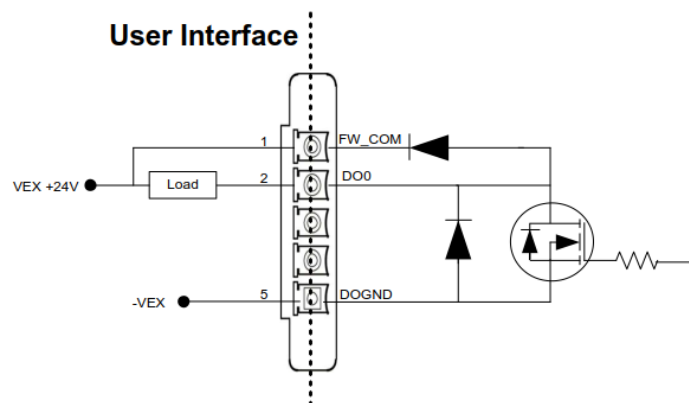


Figure 3.7 Circuit Diagram of General Output (Inductive Load)

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

No part of this publication may be reproduced in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission of the publisher.

All brand and product names are trademarks or registered trademarks of their respective companies.

© Advantech Co., Ltd. 2019