

User Guide

UD52

SIN-COS encoder
interface
small option module
for Unidrive

Part Number: 0460 - 0085

Issue Number: 3

General Information

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the operating parameters of the equipment or from mismatching the Drive with the motor.

This option module is intended for use only with Control Techniques Unidrive products. Any other use invalidates the warranty and may cause a safety hazard.

The contents of this Guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of this Guide, without notice.

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Use within the European Union, etc

The following information applies where the end use of the Drive is within the European Union, the European Economic Area, or other regions which have implemented Directives of the European Council or equivalent measures.

The Drive, together with its associated option modules, complies with the Low Voltage Directive 73/23/EEC.

The installer is responsible for ensuring that the equipment into which the Drive is incorporated complies with all relevant Directives.

The complete equipment must comply with the EMC Directive 89/336/EEC.

If the Drive is incorporated into a machine, the manufacturer is responsible for ensuring that the machine complies with the Machinery Directive 89/392/EEC. In particular, the electrical equipment should generally comply with European Harmonised standard EN60204-1.

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1 Introduction

1.1 Main features of the UD52

Note

The UD52 can be used only with Drives equipped with version 3 (or later) software. (Parameter 0.50 indicates the software version.)

Applications The UD52 SIN-COS encoder *small option module* is an interface module for installation in a Unidrive. The UD52 operates with encoders having 256, 512, 1024, 2048 or 4096 lines per revolution, and has a maximum operating frequency of 102.4kHz (3000RPM with a 2048-line encoder).

The UD52 can be used in a Drive operating in either the Closed-loop Vector or Closed-loop Servo mode in order to obtain speed feedback and very high resolution shaft position. The UD52 is fully compatible with the following *Stegmann* SIN-COS encoders:

SCS60, SCM60, SCS70, SCM70

These encoders are compatible with the two-wire serial communications port in the UD52.

Absolute-position information The UD52 can determine the absolute position within a revolution of a single-turn encoder, or in many revolutions of a multi-turn encoder. Unlike the case for a standard encoder, which must be rotated past its marker pulse in order to obtain absolute-position information, absolute-position information from a (suitable) SIN-COS encoder is obtained when the Drive is powered-up.

Speed and position information is displayed in parameters which can be read on the Drive display and/or via serial communications.

Selection of encoder function When a UD52 is fitted in the Drive, the Drive automatically uses the SIN-COS encoder as speed and position feedback for the motor. Alternatively, a standard quadrature encoder can be used for speed and position feedback, and the SIN-COS encoder used as an incremental reference.

Simulated encoder outputs The UD52 has simulated encoder outputs which normally use the SIN-COS encoder as the source, but can be reconfigured to use the main encoder (Encoder 1) connected to the 15-way D-type on the Drive as the source. These outputs produce *quadrature A/B* signals corresponding to the *line counts* from the source encoder. Also, these outputs can be configured for frequency and direction (**F/D**) signals.

Installation The UD52 must be fitted in the *small option module* bay of the Unidrive.

All connections to the Drive are made by a multi-way connector.

Connections from external equipment are made by a pluggable 16-way screw-terminal block on the UD52.

1.2 Principle of operation

The UD52 converts the sinusoidal output signals of a SIN-COS encoder into square waves and counts the edges (as in the case of a standard encoder) to yield position counts at a rate of four times the number of lines per revolution of the encoder. The constantly varying amplitudes of the sine waves are also measured by the UD52 in order to produce 2^{11} (2048) interpolated counts between encoder lines.

The overall resolution is the product of the number of interpolated counts and the number of encoder lines. For example, the UD52 used with a 512-line (2^9) encoder can give a resolution of 2^{20} (1 048 576) counts per revolution).

2 Safety Information

2.1 Warnings, Cautions and Notes

A **Warning** contains information which is essential for avoiding a safety hazard.

A **Caution** contains information which is necessary for avoiding a risk of damage to the product or other equipment.

A **Note** contains information which helps to ensure correct operation of the product.

2.2 Electrical safety – general warning

The voltages used in the Drive can cause severe electric shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the Drive.

Specific warnings are given at the relevant places in this User Guide.

The installation must comply with all relevant safety legislation in the country of use.

The Drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the Drive has been energized, the AC supply must be isolated at least ten minutes before work may continue.

2.3 System design

The Drive is intended as a component for professional incorporation into complete equipment or systems. If installed incorrectly the Drive may present a safety hazard. The Drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control mechanical equipment which can cause injury.

Close attention is required to the electrical installation and the system-design to avoid hazards either in normal operation or in the event of equipment malfunction. System-design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this User Guide carefully.

To ensure mechanical safety, additional safety devices such as electro-mechanical interlocks may be required. The Drive must not be used in a safety-critical application without additional high-integrity protection against hazards arising from a malfunction.

2.4 Environmental limits

Instructions in this User Guide regarding transport, storage, installation and use of Drives must be complied with, including the specified environmental limits. Drives must not be subjected to excessive physical force.

2.5 Compliance with regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses or other protection, and protective earth (ground) connections.

The *Unidrive Installation Guide* contains instructions for achieving compliance with specific EMC standards.

Within the European Union, all machinery in which this product is used must comply with the following directives:

89/392/EEC: Safety of Machinery

89/336/EEC: Electromagnetic Compatibility

2.6 Safety of personnel

The STOP function of the Drive does not remove dangerous voltages from the output of the Drive or from any external option unit.

The Stop and Start controls or electrical inputs of the Drive must not be relied upon to ensure safety of personnel. If a safety hazard could exist from unexpected starting of the Drive, an interlock that electrically isolates the Drive from the AC supply must be installed to prevent the motor being inadvertently started.

Careful consideration must be given to the functions of the Drive which might result in a hazard, either through their intended functions (eg. Auto-start) or through incorrect operation due to a fault or trip (eg. stop/start, forward/reverse, maximum speed).

Under certain conditions, the Drive can suddenly discontinue control of the motor. If the load on the motor could cause the motor speed to be increased (eg. hoists and cranes), a separate method of braking and stopping the motor must be used (eg. a mechanical brake).

Before connecting the AC supply to the Drive, it is important that you understand the operating controls and their operation. If in doubt, do not apply AC power to the Drive. Damage may occur, or lives put at risk. Carefully follow the instructions in this User Guide.

Before making adjustments to the Drive, ensure all personnel in the area are warned. Make notes of all adjustments that are made.

2.7 Risk analysis

In any application where a malfunction of the Drive could lead to damage, loss of life or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk. This would normally be an appropriate form of independent safety back-up system using simple electro-mechanical components.

2.8 Signal connections

The control circuits are isolated from the power circuits in the Drive by basic insulation only, as specified in IEC664–1. The installer must ensure that the external control circuits are insulated from human contact by at least one layer of insulation rated for use at the AC supply voltage.

If the control circuits are to be connected to other circuits classified as Safety Extra Low Voltage (SELV) (eg. to a personal computer), an additional isolating barrier must be included in order to maintain the SELV classification.

2.9 Adjusting parameters

Some parameters have a profound effect on the operation of the Drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

3 Installing the UD52



Warning

Before using the following procedure, refer to the Warnings at the beginning of Chapter 2 *Installing the Drive in the Unidrive Installation Guide*.

- 1 Ensure the Drive is operating in either the Closed-loop Vector or the Closed-loop Servo mode (this is indicated by parameter **11.31 (0.48)**).
- 2 Before installing the UD52 in the Unidrive, ensure the AC supply has been disconnected from the Drive for at least 10 minutes.
- 3 Check that the exterior of the UD52 is not damaged, and that the multi-way connector is free from dirt and debris. Do not install a damaged or dirty UD52 in the Drive.
- 4 Remove the terminal cover from the Drive (for removal instructions, see *Installing the Drive* in Chapter 2 of the Unidrive Installation Guide).
- 5 Position the multi-way connector on the rear of the UD52 over the connector in the Drive (see Figure 1), and press on the thumb pad to push the UD52 into place.
- 6 Re-fit the terminal cover to the Drive.
- 7 Connect the AC supply to the Drive.
- 8 Set parameter **.00** at **149** to unlock security.
- 9 Check that Menu-16 parameters are now available.
- 10 Check that parameter **16.01** is set at **4**.
- 11 If the checks in steps 8 and 9 fail, perform the following:
 - Remove the AC supply from the Drive.
 - Wait at least 10 minutes.
 - Remove the terminal cover.
 - Check that the UD52 is fully inserted.
 - Replace the terminal cover.
 - Re-apply the AC supply.
 - Check again that parameter **16.01** is set at **4**.

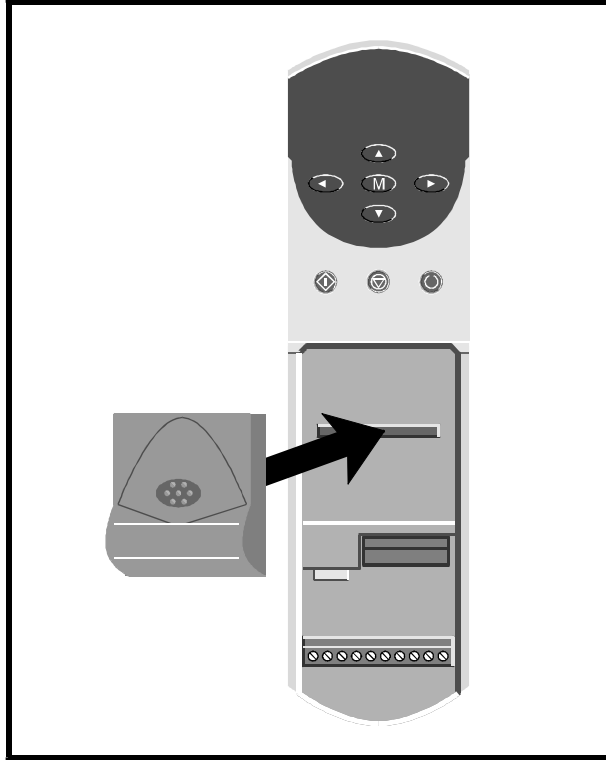


Figure 1 *Installing the UD52 in the Unidrive*

4 Making Connections



Warning

The control circuits are isolated from the power circuits in the Drive by basic insulation only, as specified in IEC664-1. The installer must ensure that the external control circuits are insulated from human contact by at least one layer of insulation rated for use at the AC supply voltage.

If the control circuits are to be connected to other circuits classified as Safety Extra Low Voltage (SELV) (eg. to a personal computer), an additional isolating barrier must be included in order to maintain the SELV classification.

4.1 Locations of the terminals

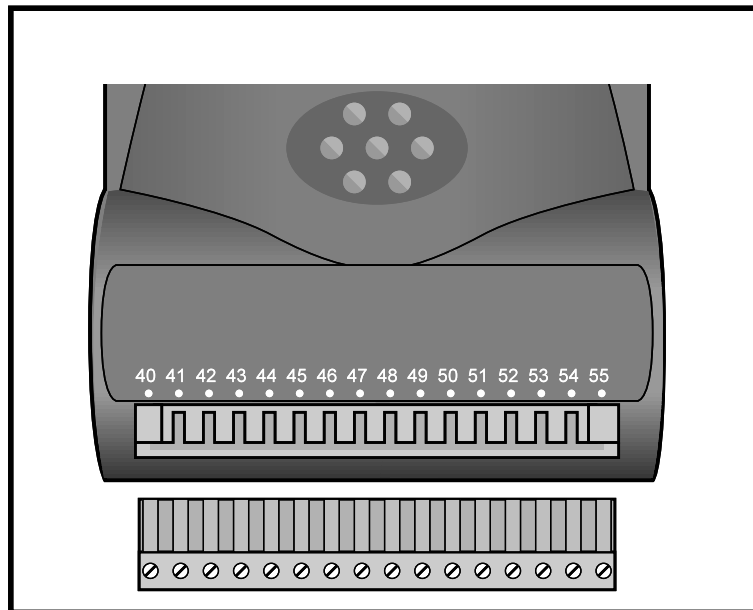


Figure 2 Location of the two-part terminal block

4.2 Functions of the terminals

(Note that \ indicates *not* (eg. **F**\ indicates **not F**)

Terminal	Name	Function	Comments
40	SININ	Sine input signal	Always required
41	SINREF	Sine input reference	
42	COSIN	Cosine input signal	
43	COSREF	Cosine input reference	
44	OV	OV common	
45	+VENC	DC supply to encoder	
46	SC DATA	Serial comms. EIA485 input and output	Use for Closed-loop Servo mode or when absolute position is required
47	SC DATA\	Serial comms. EIA485 input and output	
48	FREEZE	Freeze SC DATA input	Optional
49	FREEZE\	Freeze SC DATA\ input	
50	A (F)	Simulated-encoder phase quadrature output A or frequency output F (EIA485 serial link)	Optional
51	A\ (F\)	Simulated-encoder phase quadrature output A \ or frequency output F \ (EIA485 serial link)	
52	OV	OV common	
53	B (D)	Simulated-encoder phase quadrature output B or direction output D (EIA485 serial link)	
54	B\ (D\)	Simulated-encoder phase quadrature output B \ or direction output D \ (EIA485 serial link)	
55	OV	OV common	

