CONTROL TECHNIQUES

Installation Guide

UD70
MD29

Second Processor Options
for Unidrive and Mentor II

Safety Information

The option card and its associated drive are intended as components 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 that 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 Installation Guide carefully.

Careful consideration must be given to the functions of the drive and option card which might result in a hazard, either through their intended functions, e.g. auto-start, or through incorrect operation due to a fault or trip, e.g. stop/start, forward/reverse, maximum speed, loss of a communications link.

In any application where a malfunction of the drive or option card could lead to damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk. 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.

General Information

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

The contents of this User 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 the User Guide, without notice.

Contents

1 Mechanical Installation

NOTE *Before attempting to install option modules or cards, ensure that the Unidrive or Mentor II is switched off. AC Drives should be left for 5 minutes to ensure that the DC link capacitors have completely discharged.*

1.1 Unidrive and UD70

- Slide the UD70 module under the display panel of the Unidrive, and push the module in until the connector locates with the plug inside the Unidrive.

- Apply firm pressure, and the module will click securely into place.

- To remove the UD70, pull firmly on the black tab, and the module will disengage from the connector.

⚠️ **WARNING**

Do not attempt to remove the UD70 module while the Unidrive is still powered up, as this may cause damage to the Unidrive.

1.2   Mentor II and MD29/MD29AN

The MD29 is fitted onto the 40-way pin header (PL1) on the MDA2B circuit board. The supplied mounting pillars should be attached to the MDA2B on the Mentor II.

• Tilt the MD29 at an angle and locate the first few pins into the MD29 header.

- Tilt the board to horizontal to engage the rest of the pins. Press firmly downwards to firmly fix the MD29 to the header and 4 mounting pillars.
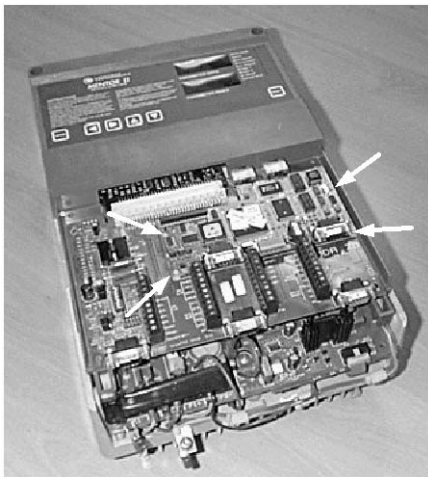
NOTE

Take care when locating the board onto this connector - do not force it on. Excessive force may bend and break the pins of the header.

When removing an MD29, unsnap the MD29 from the pillars before gently working the MD29 off the header. Do not tilt the MD29 excessively to one side, as this may bend and break the end groups of pins on the header.
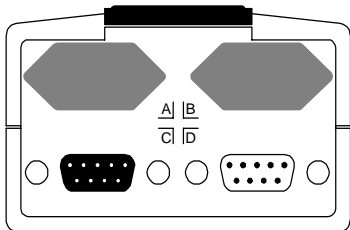
WARNING

Do not attempt to remove the MD29 while the Mentor II is still powered up, as this may cause damage to the Mentor II.

2 Electrical Installation

2.1 UD70

The UD70 provides a dedicated RS232 programming port (Connector C) and a general purpose RS485 communications port (Connector D)..

Connectors A and B provide the connectors for high speed fieldbus communication options, if fitted. Refer to the appropriate fieldbus option User Guide for full fieldbus connection details.

2.2 MD29

The MD29 provides a dedicated RS232 programming port (Connector SK2) and a general purpose RS485 communications port (Connector PL1). In addition, the MD29 also has a dedicated RS485 port (Connector TB1) for use with the Control Techniques I/O Box.

2.3 MD29AN
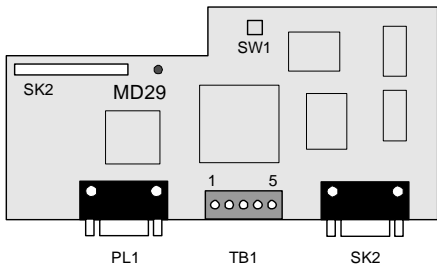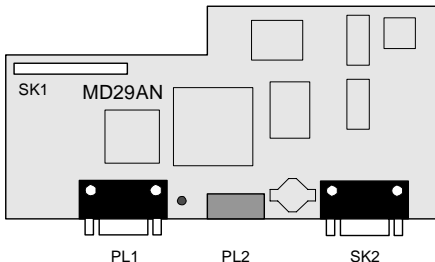
The MD29AN provides a dedicated RS232 programming port (Connector SK2) and a general purpose RS485 communications port (Connector PL1). In addition, the MD29 also has a dedicated CTNet port (PL2).

2.4 RS232 Port Connections

The pin connections for the RS232 port are given in the table below. The RS232 port can be connected to a 9 way serial port using a 9-way one-to-one ribbon cable lead.

Pin	Function	Description
2	TxD	Transmit line
3	RxD	Receive line
5	0V	0V

2.5 RS485 Port Connections

The pin connections for the RS485 port are given in the table below 0VSC is completely isolated from the main Unidrive and Mentor II 0V.

Pin	Function		Description
1	0VSC	0VSC	Isolated 0V for serial communications link.
2	TxA	/Tx	Inverted transmit line
3	RxA	/Rx	Inverted transmit line
6	TxB	Tx	Transmit line
7	RxB	Rx	Receive line

2.5.1 4 Wire RS485 Network

The diagram below shows the connections required for a 4 wire RS485 network, using a master controller with an RS485 port. The UD70 and MD29 can be configured to act as master controllers, but this requires DPL programming to control the network.
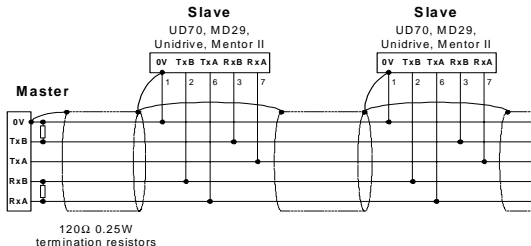
An RS232-to-RS485 converter is required to allow a standard PC serial port to communicate with a 4 wire RS485 network.
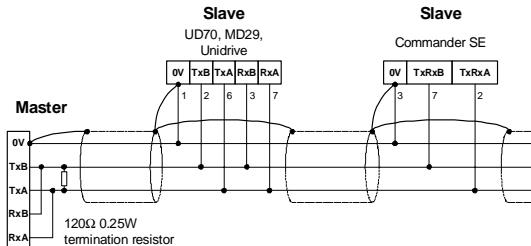
2.5.2 2 Wire RS485 Network

The diagram below shows the connections required for a 2 wire RS485 network, using a master controller with an RS485 port. The UD70 and MD29 can be configured to act as master controllers, but this requires DPL programming to control the network.

An RS232-to-RS485 converter with "intelligent transceiver switching" (also known as "magic" RS485 converters) is required to allow a standard PC serial port to communicate with a 2 wire RS485 network. An example of a "magic" converter is the MA485F converter from Amplicon.

NOTE

A "magic" converter is not required is the master contoller has an RTS control output. This output is enabled when the master is transmitting, and disabled when the master is not transmitting. Control Techniques software packages (UniSoft, MentorSoft and SystemWise) do NOT switch the RTS line.

2.6 I/O Box Port Connections (MD29 Only)

The I/O Box port is marked "PL2" and is only available on the MD29. The terminal connections are shown in the table below. Operation of this port is automatic, and no configuration is necessary.

Pin	Function		Description
1	0V	0V	0V
2	TxB	Tx	Transmit line
3	/TxA	/Tx	Inverted Transmit line
4	RxB	Rx	Receive line
5	/RxA	/Rx	Inverted Receive line

NOTE

To use the I/O Box with UD70 or MD29AN, connect it to the RS485 port, and select Mode 10 communications.

2.7 Digital I/O Connections

The RS485 connector has 2 TTL digital inputs and 1 TTL digital output. They are used in conjunction with the Timer/Counter unit. (For further details, refer to the User guide for the UD70 or MD29.)

NOTE

The 0VSC is isolated from the Unidrive or Mentor II 0V, and should not be used as the reference 0V for the TTL digital inputs and output.

If a digital input is open-circuit or connected to +5V, this will be read by #86.01 (input 0) or #86.02 (input 1) as logic 0. These parameters will change to logic 1 when the inputs are connected to 0V Digital on pin 9.

The digital output will give +5V when #86.03 is set to logic 0, and 0V when set to logic 1. The digital output is rated to a maximum of 15mA. The maximum length of cable that should be connected to these terminals is 0.5 metres, so buffering will be required for longer lengths of cable, and for interfacing to different logic levels.

NOTE

The Digital inputs and output must be connected to 0V Digital (pin 9), NOT OVSC (pin 1). The inputs and output will not work properly if connected to OVSC, as pin 1 is isolated from the Drive. Noise generated along the screen of the serial communications cable may cause spurious operation, and damage to the UD70 or MD29 may result.

3 RS485 Port Configuration

The RS485 port can be used to communicate with the Drive using Control Techniques' standard software communications packages such as UniSoft, MentorSoft, CTFile and Systemwise. (Refer to the Help file in Unisoft, MentorSoft, etc. for connection details.) The ANSI protocol is the standard protocol used by the Control Techniques' software packages, but Modbus RTU and ASCII modes are also supported as slave nodes only.

The RS485 port is configured by setting certain user parameters on the Unidrive or Mentor II. These control individual features about the port. Any changes take effect when the configuration parameters are stored and the UD70 or MD29 is reset.

The following parameters used to configure the RS485 port.

Function	Unidrive (UD70)	Mentor II (MD29/MD29AN)
Node Address	#17.05	#14.01
Data Rate	#17.07	#14.03
Serial Comms Mode	#17.06	#14.02
Pointer 1	#17.08	#11.09
Pointer 2	#17.09	#11.10
Scaling Factor	#17.10	#11.11
Global Trip Enable	#17.14	#14.07
RS485 Trip Enable	#17.15	#14.08

3.1 Node Address

Unidrive: #17.05   Mentor II: #14.01

Range: 11 to 99, excluding 00 to 09, 10, 20, 30, 40, etc for ANSI.

   1 to 99 for Modbus RTU and Modbus ASCII

Default: 11

Every node on an ANSI or Modbus network MUST be assigned a unique serial address. Changes to the node address will not take effect until the parameters have been stored, and the UD70 or MD29 has been reset.

The serial address ensures that only the intended node responds to commands issued by the network master controller. Each node should be assigned a unique address BEFORE it is connected to the RS485 network.

3.2 Data Rate

Unidrive: #17.07   Mentor II: #14.03
Range: 300 to 38400 bits per second
Default: 4800

Every node on an ANSI or Modbus network must be configured to operate at the same data rate. Set the appropriate value as shown in the table below to configure the RS485 port data rate.

Data Rate (bits/sec)	Unidrive	Mentor II
300	300	3
600	600	6
1200	1200	12
2400	2400	24
4800	4800	48
9600	9600	96
19200	19200	192
38400	38400	38

3.3 RS485 Port Communications Modes

Unidrive: #17.06   Mentor II: #14.02

The serial communications mode selector determines the mode of operation of the RS485 serial port, and the protocol supported. Only slave modes are described here. (Modes 6 to 9, 11 and 12 require DPL code to control the RS485.)

3.3.1 Standard CT ANSI Protocol

Mode 1 - 4 Wire ANSI Slave Mode (Default)
Mode 5 - 2 Wire ANSI Slave Mode

The UD70 and MD29 will communicate using the Control Techniques' standard ANSI protocol with a 4-wire or 2-wire connection. This mode allows the Unidrive or Mentor II to communicate with standard CT software packages, such as UniSoft, MentorSoft, SystemWise, etc.

Menu 0 parameters are not accessible through a UD70 or MD29. Refer to the User's Guide for MD29 or UD70 for a detailed description of the ANSI protocol.

3.3.2 Modbus RTU

Mode 13 - 4 Wire Modbus RTU Slave Mode
Mode 15 - 2 Wire Modbus RTU Slave Mode

The UD70 and MD29 will communicate using the Modicon Modbus RTU protocol with a 4-wire or 2-wire connection. The data frame used for Modbus RTU is 1 start bit, 8 data bits, no parity, 2 stop bits. (Even parity with 1 stop bit is NOT currently supported.)

The following MOdbus RTU commands are supported:

FC3   PRESET SINGLE REGISTER
FC6   PRESET MULTIPLE REGISTERS
FC16   READ MULTIPLE REGISTERS

The maximum number of registers that can be transferred on a single message is limited to 20, and the range of allowed node addresses is limited from 1 to 99.

3.3.3 Modbus ASCII

Mode 14 - 4 Wire Modbus ASCII Slave Mode

Mode 16 - 2 Wire Modbus ASCII Slave Mode

The UD70 and MD29 will communicate using the Modicon Modbus ASCII protocol with a 4-wire or 2-wire connection. The data frame used for Modbus RTU is 1 start bit, 7 data bits, no parity, 2 stop bits.

The following Modbus ASCII commands are supported:

FC3	PRESET SINGLE REGISTER
FC6	PRESET MULTIPLE REGISTERS
FC16	READ MULTIPLE REGISTERS

The maximum number of registers that can be transferred on a single message is limited to 20, and the range of allowed node addresses is limited from 1 to 99.

3.3.4 Master/Slave

Mode 2 - Master Mode

Mode 3 - Slave Mode

In Mode 2, the node acts as a master, and continuously broadcasts a source parameter, as defined by the Pointer parameter, from the RS485 port at a fixed data rate of 9600 bits/sec. The value of the source parameter is scaled to ±16000.

In Mode 3, the node acts as a slave to receive the continuous data stream transmitted by a Mode 2 master. The incoming data is multiplied by the scaling parameter, and written to the destination parameter, as defined by the Pointer parameter.
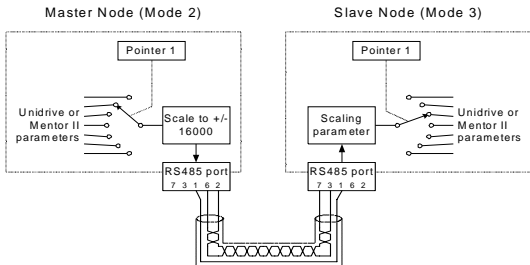

If the serial communications link is broken, the slave node can be made to trip. This is done by setting the Global Trip Enable and RS485 Trip Enable parameters.

3.3.5 Cascade

Mode 4 - Cascade Mode

Mode 4 provides allows UD70 and/or MD29 RS485 ports to be "cascaded". This mode is similar to the Master/Slave mode, except that each node can be a slave to an "upstream" node, AND a master to a "downstream" node.
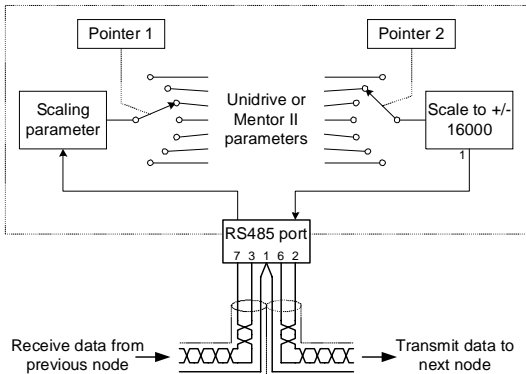
3.3.6 I/O Box Mode (UD70 and MD29AN only)

Mode 10 - I/O Box Mode

Unlike the MD29, the UD70 and MD29AN do not have a dedicated port for use with the I/O Box. The general purpose RS485 port can be configured to communicate directly with an I/O Box by configuring the RS485 port to use Mode 10 communications.

3.4   Storing configuration parameters

In all cases, the configuration parameters must be stored, and the UD70 or MD29 reset before changes will take effect.

3.4.1 Unidrive

- To store changes in menu 17 parameters, set #MM.00 to 1000 and press the red RESET button.
- To reset the UD70, set #MM.00 to 1070 and press the red RESET button.

3.4.2 Mentor II

- Ensure that the Mentor II is disabed
- To store changes in menu 11 and 14 parameters, set #MM.00 to 1 and press RESET. This will also reset the MD29.