CONTROL TECHNIQUES

UNIDRIVE M700
UNIDRIVE M701
UNIDRIVE M702

High Performance AC/Servo Drives

Quick Startup, Operation and Maintenance Guide

DRIVE OBSESSED

WARNING! This document is a guide only. It does not provide safety information. Incorrect installation or operation of the drive could result in injury or equipment damage. Refer to the Unidrive M700/M701/M702 Control User Guide for essential safety information.

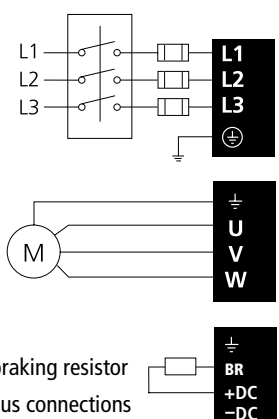
Heatsink mounted braking resistor

A resistor has been especially designed to mount within the heatsink of the Unidrive M sizes 3, 4 & 5. The design of the resistor is such that no thermal protection circuit is required, as the device will fail safely under fault conditions. On Unidrive M sizes 3, 4 & 5 the software overload protection is set up at default for the designated heatsink mounted resistor. If an external brake resistor is used, a thermal overload device is required. NOTE: The heatsink mounted resistor is suitable for applications with a low level of regen energy only.

WARNING

For complete wiring and fusing instructions, refer to the Unidrive M Power Installation guide.

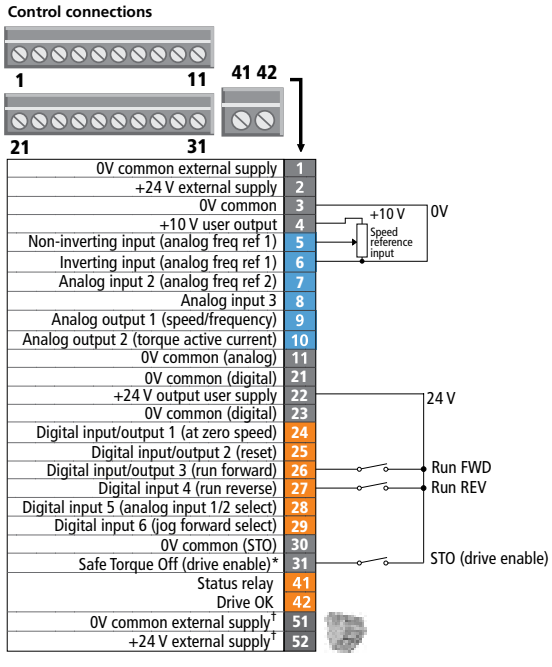
*Thermal overload for braking resistor to protect against fire risk. This must be wired to interrupt the AC supply in the even of a fault. This is not required if the optional heatsink mounted braking resistor is used.



*Optional braking resistor

Common DC bus connections

Control Wiring – Unidrive M700/M701



Minimum connections to run motor

Programmable analog

Programmable digital

Non-programmable

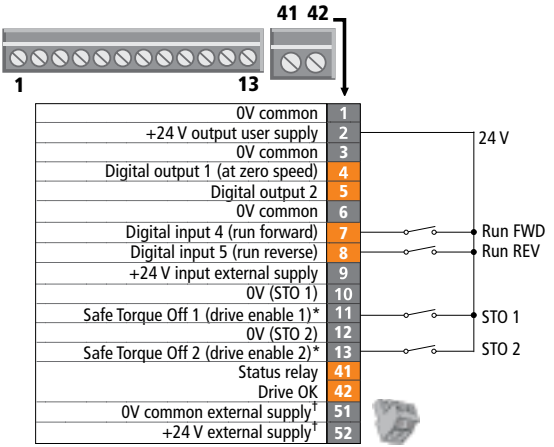
The 0V terminals on the Safe Torque Off are not isolated from each other and the 0V common.

*** The Safe Torque Off/drive enable terminal is a positive logic only input.**

† Terminal 51 and 52 must be connected to an external 24 V power supply if backup is required (frame sizes 6-11E only).

Control Wiring – Unidrive M702

Control connections



Minimum connections to run motor

Programmable digital

Non-programmable

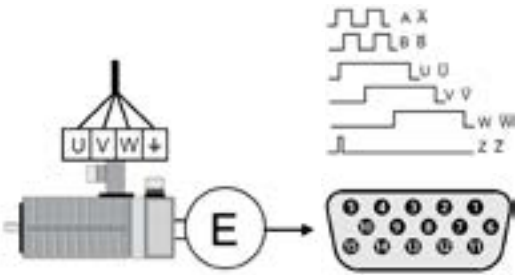
*** The Safe Torque Off/drive enable terminal is a positive logic only input.**

† Terminal 51 and 52 must be connected to an external 24V power supply if backup is required (frame sizes 6-11E only).

Encoder Wiring

Encoder connector 15-pin D-type as standard on Unidrive M700/M701/M702

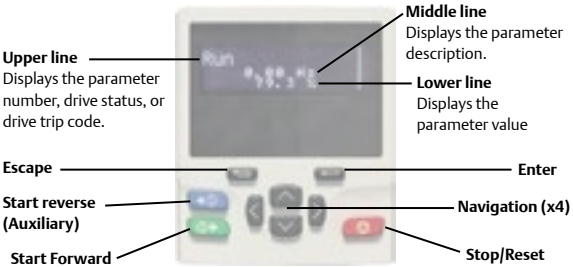
Encoder shielding connected to drive 0V and encoder 0V



Terminal	Induction	Servo / PM	
	AB Pr 03.038 = 0	Endat Pr 03.038 = 8	AB Servo Pr 03.038 = 3
1	A	DATA	A
2	A\	DATA\	A\
3	B	CLK	B
4	B\	CLK\	B\
5	Z	Freeze	Z
6	Z\	Freeze\	Z\
7	Asim Out		U
8	Asim\ Out		U\
9	Bsim Out		V
10	Bsim\ Out		V\
11	Zsim Out		W
12	Zsim\ Out		W\
13	+V (power supply output)		
14	0V		
15	Thermistor		

For further information see the Unidrive M700/M701/M702 Control User Guide.

Keypad & Display



By default, the keypad display is in "Status Mode" for viewing current drive conditions, and can be changed to "Parameter Mode" for viewing and editing drive configuration settings.

Status mode

When in status mode, the drive status message/alarm/trip code is displayed on the upper left corner of the upper line, i.e., "Ready", "Inhibit", "Trip". See the "Display Messages" topic for more details.

Parameter mode

When in parameter mode, drive functionality can be viewed or modified by using the keypad. The parameter number is displayed on the upper line of the display (ex, 00.010), the parameter description is displayed on the second line, and the parameter value is displayed on the right-hand side of the bottom line.

Viewing parameters

The parameter number format is S.MM.PPP, where S = slot number for option modules and built-in communications, MM = menu number (menus are groupings of common functions), and PPP = parameter number (parameters are specific drive functions). For example: Pr. 00.010 is menu 0, parameter 10. Note: Menu 0 contains the most common parameters used in a typical setup and is programmable.

Keypad & Display

Navigating menus and parameters

You can find any parameter value using the arrow buttons. The  and  buttons are used to navigate between the slots and menus. The  and  buttons are used to navigate between the parameters in a menu.

To edit/modify parameters

In order to change the value of a parameter, go to the parameter you would like to change and then press the enter button. Now the cursor shifts to the parameter value. You can increase the parameter value by pressing the up button or decrease the parameter value by pressing the down button. The right and left buttons can be used to switch between the digits within the parameter value. Pressing the enter button again will set the newly selected parameter value, and the cursor will return to the parameter number.

Note: Certain parameters are read only (RO) and cannot be changed. For example Pr. 0.11– drive output frequency, cannot be changed. Pressing the return button will return the keypad to status.

To Save parameter values

Changes made to parameters will be lost when the drive is turned off unless parameters are saved. To save new parameter changes, enter 1001 into any Pr.MM.000 and then press the Stop/Reset  button.

To reset to USA (60 Hz) defaults

To reset the drive to USA default parameter settings, open the drive enable signal (Terminal 31), enter 1244 into Pr MM.000 and then press the Stop/Reset button. Save the parameter values by entering 1001 into Pr MM.000 and then pressing the Stop/Reset button.

Alarm indications

Alarm string	Description
Brake resistor	Brake resistor overload. Braking resistor thermal accumulator (10.039) in the drive has reached 75.0% of the value at which the drive will trip.
Motor overload	Motor protection accumulator (04.019) in the drive has reached 75.0% of the value at which the drive will trip and the load on the drive is >100%.
Inductor overload	Regen inductor overload. Inductor protection accumulator (04.019) in the drive has reached 75.0% of the value at which the drive will trip and the load on the drive is >100%.
Drive overload	Drive over temperature. Percentage of drive thermal trip level (07.036) in the drive is greater than 90%.
Autotune	The autotune procedure has been initialized and an autotune in progress.
Limit switch	Limit switch active. Indicates that a limit switch is active and that is causing the motor to be stopped.

Status indications

Display	Description
Inhibit	The drive is inhibited and cannot be run.
Ready	The drive is ready to run.
Stop	The drive is stopped/holding zero speed.
Run	The drive is active and running.
Trip	The drive has tripped and no longer controlling the motor.
Under voltage	The drive is in the under voltage state either in low voltage or high voltage mode.

Trip codes

Display	Description - troubleshooting tips
Over volts	• Increase deceleration ramp (Pr 00.004). • Decrease the braking resistor value (staying above the minimum value). • Check nominal AC supply level.
OI.AC	• Acceleration/deceleration rate is too short. • If seen during auto-tune reduce the voltage boost. • Check for short circuit on the output cabling.
Encoder2	• Ensure that the position feedback device type selected in Pr 03.038 is correct for the position feedback device connected to the P1 interface on the drive. • If wire break detection on the drive encoder input is not required, set Pr 03.040 = XXX0 to disable the encoder 2 trip. • Check cable continuity. • Check wiring of feedback signals is correct. • Check encoder power supply is set correctly (Pr 03.036).

For other display messages and trip codes with more recommended actions please refer to the Unidrive M700/M701/M702 Control User Guide or to the mobile Diagnostic Tool app.

Open loop

Unidrive M70x open loop induction motor setup		
Parameter description	**Parameter**	**Comments**
USA defaults	00.000 = 1254	Drive USA defaults (60 Hz)
	00.048 (11.031) = 1	(Open loop) mode
Reset the drive	RESET	Red button on keypad
User security status	00.049 (11.044) = 1	All menus
Reference selector	00.005 (01.014) = 4 (Keypad)	Keypad control
Reset the drive	RESET	Red button on keypad
Max reference clamp	00.002 (01.006) =	Motor nameplate value
Acceleration rate	00.003 (02.011) = 5.0	s/1000 rpm
Deceleration rate	00.004 (02.021) = 10.0	s/1000 rpm
Ramp mode	00.015 (02.004) = Standard	"Fast" ramp if braking resistor installed. Also ensure Pr 10.030, Pr 10.031 & Pr 10.061 are set correctly.
Motor rated voltage	00.044 (05.009) =	Motor nameplate value
Rated speed	00.045 (05.008) =	Motor nameplate value
Motor rated current	00.046 (05.007) =	Motor nameplate value
Motor rated frequency	00.047 (05.006) =	Motor nameplate value
Save parameters to NVM	00.000 = 1001	
Reset the drive	RESET	Red button on keypad

Perform an autotune		
Warning: A rotating autotune will cause the motor to accelerate up to 2/3 base speed in the direction selected regardless of the reference provided. Once complete the motor will coast to a stop. The enable signal must be removed before the drive can be made to run at the required reference.		
Autotune	00.040 (05.012) = 2	Motor loaded stationary autotune = 1 Motor unload/uncoupled autotune = 2
Close drive Safe Torque Off signal(s) – M700/701: (jumper terminal 22 to terminal 31); M702: (jumper Terminals 2, 11, and 13)		
Press keypad RUN (green) button		
******* Wait for drive/motor to stop rotating and display "Ready" or "Inhibit" *******		
Save parameters to NVM	00.000 = 1001	
Reset the drive	RESET	Red button on keypad
Open Drive Safe Torque Off signal(s) – M700/701: (remove jumper from T22 to T31); M702: (remove jumpers from T2, T11, and T13)		
Save parameters to NVM	00.000 = 1001	
Reference selector	00.005 (01.014) = 0 (AI A2)	Terminal strip control
Reset the drive	RESET	Red button on keypad

Closed loop

Unidrive M70x closed loop induction motor setup		
Parameter description	**Parameter**	**Comments**
USA defaults	00.000 = 1254	Drive USA defaults (60 Hz)
	00.048 (11.031) = 2 (RFC-A)	Rotor Flux Control-Asynchronous
Reset drive	RESET	Red button on keypad
User security status	00.049 (11.044) =1	(All menus)
Reference selector	00.005 (01.014) = 4 (Keypad)	Keypad control
Reset drive	RESET	Red button on keypad
Max reference clamp	00.002 (01.006) =	Motor nameplate value
Acceleration rate	00.003 (02.011) = 2.000	s/1000 rpm
Deceleration rate	00.004 (02.021) = 2.000	s/1000 rpm
Ramp mode	00.015 (02.004) = Standard	"Fast" ramp if braking resistor installed. Also ensure Pr 10.030, Pr 10.031 & Pr 10.061 are set correctly.
Motor rated voltage	00.044 (05.009) =	Motor nameplate value
Rated speed	00.045 (05.008) =	Motor nameplate value
Motor rated current	00.046 (05.007) =	Motor nameplate value
Motor rated frequency	00.047 (05.006) =	Motor nameplate value
Drive encoder lines per rev	03.034 = 1024	Encoder technical information
Drive encoder supply voltage	03.036 = 0 (5V)	Encoder technical information
Drive encoder type	03.038 = 0 (AB)	Encoder setup
Save parameters to NVM	00.000 = 1001	
Reset drive	RESET	Red button on keypad

Perform an autotune		
Warning: A rotating autotune will cause the motor to accelerate up to 2/3 base speed in the direction selected regardless of the reference provided. Once complete the motor will coast to a stop. The enable signal must be removed before the drive can be made to run at the required reference.		
Autotune	00.040 (05.012) = 2	Motor loaded stationary autotune = 1 Motor unload/uncoupled autotune = 2
Close drive Safe Torque Off signal(s) – M700/701: (jumper terminal 22 to terminal 31); M702: (jumper Terminals 2, 11, and 13)		
Press keypad RUN (green) button		
******* Wait for drive/motor to stop rotating and display "Ready" or "Inhibit" *******		
Save parameters to NVM	00.000 = 1001	
Reset the drive	RESET	Red button on keypad
Open Drive Safe Torque Off signal(s) – M700/701: (remove jumper from T22 to T31); M702: (remove jumpers from T2, T11, and T13)		
Save parameters to NVM	00.000 = 1001	
Reference selector	00.005 (01.014) = 0 (AI A2)	Terminal strip control
Reset the drive	RESET	Red button on keypad

Closed loop

Unidrive M70x closed loop permanent magnet motor setup		
Parameter description	**Parameter**	**Comments**
USA defaults	00.000 = 1254	Drive USA defaults (60 Hz)
	00.048 (11.031) = 3 (RFC-S)	Rotor Flux Control-Synchronous
Reset the drive	RESET	Red button on keypad
User security status	00.049 (11.044) = 1	(All menus)
Reference selector	00.005 (01.014) = 4 (Keypad)	Keypad control
Reset the drive	RESET	Red button on keypad
Max reference clamp	00.002 (01.006) =	Set to 1.2 x Pr 05.008 (rpm)
Acceleration rate	00.003 (02.011) = 2.000	s/1000 rpm
Deceleration rate	00.004 (02.021) = 2.000	s/1000 rpm
Ramp mode	00.015 (02.004) = Standard	"Fast" ramp if braking resistor installed. Also ensure Pr 10.030, Pr 10.031 & Pr 10.061 are set correctly.
Catch a spinning motor	00.033 (06.009) = 0 (Off)	
Max switching frequency	00.041 (05.018) =	Motor nameplate value (min.Fsw) (kHz)
Number of motor poles	00.042 (05.011) =	Motor nameplate value
Motor rated voltage	00.044 (05.009) =	Motor nameplate value
Rated speed	00.045 (05.008) =	Motor nameplate value
Motor rated current	00.046 (05.007) =	Motor nameplate value
Volts per 1000 rpm	00.047 (05.033) =	Motor nameplate value
Drive encoder lines per rev	03.034 = 1024 (Lines)	Encoder technical info
Drive encoder supply voltage	03.036 = 0 (5V)	Encoder technical info
Drive encoder type	03.038 = 0 (AB servo)	0 (AB servo) encoder technical info
Current reference filter	04.012 = 0.2 ms	Current reference filter 1 time constant
High speed mode	05.022 = -1 (Limit)	
Stop mode	06.001 = 1 (Ramp)	No ramp is default
Hold zero speed	06.008 = 0 (Off)	
Reset the drive	RESET	Red button on keypad
Save parameters to NVM	00.000 = 1001	
Reset the drive	RESET	Red button on keypad

Perform an autotune		
Warning: A rotating autotune will cause the motor to accelerate up to 2/3 base speed in the direction selected regardless of the reference provided. Once complete the motor will coast to a stop. The enable signal must be removed before the drive can be made to run at the required reference.		
Autotune	00.040 (05.012) = 2	Motor loaded stationary autotune = 1 Motor unload/uncoupled autotune = 2
Close drive Safe Torque Off signal(s) – M700/701: (jumper terminal 22 to terminal 31); M702: (jumper Terminals 2, 11, and 13)		
Press keypad RUN (green) button		
******* Wait for drive/motor to stop rotating and display "Ready" or "Inhibit" *******		
Save parameters to NVM	00.000 = 1001	
Reset the drive	RESET	Red button on keypad
Open Drive Safe Torque Off signal(s) – M700/701: (remove jumper from T22 to T31); M702: (remove jumpers from T2, T11, and T13)		
Save parameters to NVM	00.000 = 1001	
Reference selector	00.005 (01.014) = 0 (AI A2)	Terminal strip control
Reset the drive	RESET	Red button on keypad

Servo Motor Setup

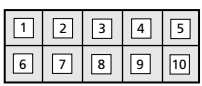
Unidrive M70x servo motor setup		
Parameter description	**Parameter**	**Comments**
USA defaults	00.000 = 1254	Drive USA defaults (60 Hz)
	00.048 (11.031) = 3 (RFC-S)	Rotor Flux Control-Synchronous
	RESET	Red button on keypad
User security status	00.049 (11.044) = 1	(All Menus)
Reference selector	00.005 (01.014) = 4 (Keypad)	Keypad control
	RESET	Red button on keypad
Max reference clamp	00.002 (01.006) =	Motor nameplate value
Acceleration rate	00.003 (02.011) = 0.200	s/1000 rpm
Deceleration rate	00.004 (02.021) = 0.200	s/1000 rpm
Ramp mode	00.015 (02.004) = Standard	"Fast" ramp if braking resistor installed. Also ensure Pr 10.030, Pr 10.031 & Pr 10.061 are set correctly.
Number of motor poles	00.042 (05.011) =	Motor nameplate value
Motor rated voltage	00.044 (05.009) =	Motor nameplate value
Rated speed	00.045 (05.008) =	Motor nameplate value
Motor rated current	00.046 (05.007) =	Motor nameplate value
Drive encoder lines per rev	03.034 =	Encoder technical info
Drive encoder supply voltage	03.036 = 0 (5V)	Encoder technical info
Drive encoder type	03.038 = 8 (EnDat)	8 (EnDat), 3 (AB Servo)
Encoder termination select	03.039 = 1	
Stop mode	06.001 = 1 (Ramp)	No ramp is default
	RESET	Red button on keypad
Save parameters to NVM	00.000 = 1001	
	RESET	Red button on keypad

Perform an autotune		
Warning: A rotating autotune will cause the motor to accelerate up to 2/3 base speed in the direction selected regardless of the reference provided. Once complete the motor will coast to a stop. The enable signal must be removed before the drive can be made to run at the required reference.		
Autotune	00.040 (05.012) = 2	Motor loaded stationary autotune = 1 Motor unload/uncoupled autotune = 2
Close drive Safe Torque Off signal(s) – M700/701: (jumper terminal 22 to terminal 31); M702: (jumper Terminals 2, 11, and 13)		
Press keypad RUN (green) button		
******* Wait for drive/motor to stop rotating and display "Ready" or "Inhibit" *******		
Save parameters to NVM	00.000 = 1001	
Reset the drive	RESET	Red button on keypad
Open Drive Safe Torque Off signal(s) – M700/701: (remove jumper from T22 to T31); M702: (remove jumpers from T2, T11, and T13)		
Save parameters to NVM	00.000 = 1001	
Reference selector	00.005 (01.014) = 0 (AI A2)	Terminal strip control
Reset the drive	RESET	Red button on keypad

SI-UNI-ENCODER system integration module

This option provides an additional incremental or absolute encoder feedback port and simulated encoder output.

10-way pluggable connector



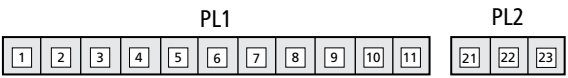
15-way female D-type connector

Terminal		Encoder		
15 way D-type connector	10 way pluggable connector	AB Pr 1x.038 = 1	EnDat Pr 1x.038 = 4	AB Servo Pr 1x.038 = 3
1		A	DATA	A
2		A\	DATA\	A\
3		B	CLK	B
4		B\	CLK\	B\
5		Z	Freeze	Z
6		Z\	Freeze\	Z\
7	3	Asim Out		U
8	4	Asim\ Out		U\
9	5	Bsim Out		V\
10	6	Bsim\ Out		V\
11	8	Zsim Out		W
12	9	Zsim\ Out		W\
13	10	+V (power supply output)		
14	2, 7	0V		
15		Thermistor		
	1	+24 V freeze input		

For further information see the SI-Universal Encoder User Guide.

SI-I/O system integration module

This option increases the number of I/O points on a drive. All connections from the option module to the drive are made via the drive connector.



PL1	Function
T1	0V common
T2	Digital input/output 1
T3	Digital input/output 2
T4	Digital input/output 3
T5	Digital input/output 4
T6	0V common
T7	Analog input 1/digital input 5
T8	Analog input 1/digital input 6
T9	Analog input 1/digital input 7
T10	0V common
T11	Analog input 1/digital input 8

11 way pluggable screw connector

PL2	Function
T21	Relay 1
T22	Relay common
T23	Relay 2

3 way pluggable screw connector

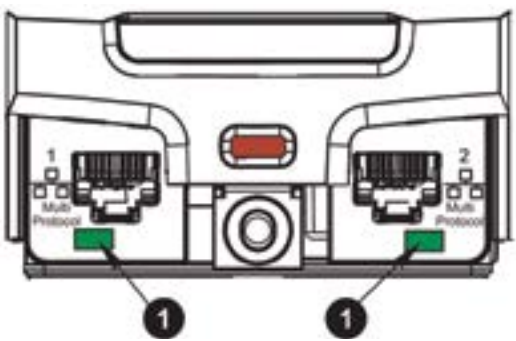
For further information see the SI-I/O User Guide.

Unidrive M Connect commissioning tool

The Unidrive M700/M702 comes with built-in Ethernet. The Unidrive **M Connect** PC software can be used on a computer to access drive parameters once the following drive and computer adjustments have been made.

Slot 4 - drive configuration

Parameter	Function
Pr. 4.02.005 = Off	Disable DHCP
Pr. 4.02.006 = 192.168.1.100	Set an IP address
Pr. 4.02.007 = 255.255.255.0	Set the subnet
Pr. 4.00.007 = On	Enable new changes
Pr. s.mm.000 = '1001'	Save the parameters



LED Status	Description
Off	Ethernet connection not detected
Solid green	Ethernet connection detected but no data
Flashing green	Ethernet connection detected and data flow

The Unidrive M701 comes with built-in RS485. The Unidrive **M Connect** PC software can be used on a computer to access drive parameters by connecting the computer to the drive using a CT-USB-CABLE (pictured below).

Parameter storage / cloning

The Smartcard is a memory device that can be used to back-up parameter sets and PLC programs, and copy them from one drive to another.

Pr 0.30 = rEAD +

Drive reads all parameters from the Smartcard.

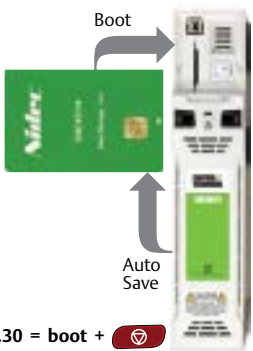
Pr 0.30 = Prog +

Programs all drive parameters to the Smartcard.

Note: overwrites only data already in block 1.

Pr 0.30 = AutO +

Drive automatically writes to the Smartard when a parameter save is performed.



Pr 0.30 = boot +

Drive boots from the Smartcard on power-up and automatically writes to the Smartcard when a parameter save is performed.

Notes

Notes

Notes

Support

24/7 technical support

- 1-800-893-2321
- CTdrives.com/techsupport

For manuals, application notes and information on our support services visit our website: www.controltechniques.com

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QSG-M70X 03/21