

Table of Contents

Chapter 1: Getting Started

Manual Introduction	1-2
The Purpose of this Manual	1-2
Supplemental Manuals	1-2
Who Should Read This Manual	1-2
Technical Support	1-2
Conventions Used	1-3
Key Topics for Each Chapter	1-3
Module Overview	1-4
Low-Cost Motion Control Solution	1-4
Typical Applications	1-4
Modes of Operation	1-4
Physical Characteristics	1-5
Input and Output Terminals	1-5
Module Indicators	1-5
Specifications	1-6
General	1-6
Input Specifications	1-6
Output Specifications	1-6
Modes of Operation	1-7
Mode 10: Up Counter	1-7
Mode 20: Standard or Quadrature Up/Down Counter (DL240/250-1/260 Only)	1-9
Mode 30: Pulse Output (DL240/250-1/260 Only)	1-11
Mode 40: External Interrupts	1-13
Mode 50: Pulse Catch Inputs	1-14
Mode 60: Discrete Inputs with Filter	1-15

Chapter 2: Installation & Field Wiring Guidelines

How to Install the Module	2-2
Insert the Module	2-2
General Guidelines for Field Wiring	2-3
Wiring Diagram for Modes 10, 20, 40, 50 and 60	2-4
Wiring Diagram for Mode 30	2-4
Solid State Field Device Wiring	2-5
NPN Field Device Example	2-5
PNP Field Device Example	2-5

Chapter 3: Mode 10 –High Speed UP Counters

Using the UP Counters, Mode 10	3-2
DL240/250-1/260 Applications	3-2
DL230 Applications	3-3
Understanding V-Memory Setup Locations	3-4
Setting Up the CPU	3-6
Configuring the V-Memory	3-6
Step 1: Entering the Selected Mode	3-6
Step 2: Select the Preset Mode (DL240/250-1/260 Only)	3-7
Step 3: Using Presets	3-9
Triggering Presets to Outside Events	3-10

Custom Configurations	.....	3-12
DL230 Custom Configuration	.....	3-12
DL240/250-1/260 Custom Configuration	.....	3-13
Writing the Control Program	.....	3-14
Example 1: UP Counters Without Presets	.....	3-15
Example 2: UP Counters with Multiple Presets	.....	3-17
Example 3: Speed Control for an AC Motor	.....	3-19
Example 4: Counting Pulses at a High Frequency Where Accuracy is Critical	.....	3-22
Troubleshooting	.....	3-24
Things to check	.....	3-24
Counter Doesn't Count	.....	3-24
No Input Signal	.....	3-24
LED's Do Not Light	.....	3-26
Non-Synchronous Pulsing	.....	3-26
No Reset	.....	3-26
Not Jumping to Interrupt	.....	3-26
Not Returning from Interrupt	.....	3-26

Chapter 4: Mode 20 –UP/DOWN Counter

Using the UP/DOWN Counter, Mode 20 (DL240/250-1/260 Only)	.....	4-2
UP/DOWN Counting Overview	.....	4-3
Encoders In General	.....	4-3
Standard UP/DOWN Counting	.....	4-3
Quadrature UP/DOWN Counting	.....	4-4
How a Quadrature Encoder Works	.....	4-5
Understanding V-Memory Setup Locations	.....	4-6
Setting Up the CPU	.....	4-8
Configuring the V-Memory	.....	4-8
Step 1: Entering the Mode Selected	.....	4-8
Step 2: Select the Preset Mode	.....	4-9
Step 3: The Presets	.....	4-11
Loading the Presets	.....	4-11
Using Negative Presets	.....	4-11
Triggering Presets to Outside Events	.....	4-11
The Other Channels	.....	4-14
Filtered Input–Point 03	.....	4-14
Discrete Filtered Inputs	.....	4-14
Point 02 – Reset w/o an External Interrupt	.....	4-15
External Reset with Interrupt	.....	4-15
Custom Configurations	.....	4-16
Mode 20 Custom Configuring	.....	4-16
Writing the Control Program for the UP/DOWN Counter	.....	4-17
Example 1: UP/DOWN Counting with an Interrupt	.....	4-18
Example 2: An UP/DOWN Counter with Standard Inputs	.....	4-19
Example 3: Quadrature Counting	.....	4-21
Troubleshooting	.....	4-24
What Can Go Wrong?	.....	4-24
Counter Doesn't Count	.....	4-25
LED's Do Not Light	.....	4-26
Non-Synchronous Pulsing	.....	4-26
No Reset	.....	4-26
Not Jumping to Interrupt	.....	4-26
Not Returning from Interrupt	.....	4-26
Rotary Encoders	.....	4-26

Chapter 5: Mode 30 –Pulse Train Outputs

Using the Pulse Train Outputs, Mode 30 (DL240/250–1/260 only)	5–2
D2–CTRINT Limitations	5–3
Open Loop Stepper Motor System	5–3
Understanding V-Memory Setup Locations	5–5
Default Settings	5–6
Setting Up the CPU	5–7
Configuring the V–Memory	5–7
Assigning Module Functions	5–8
Custom Configurations	5–9
Custom Options for Mode 30	5–9
Determine the Positioning Profile	5–10
Automatic Accel/Decel Trapezoid Profile	5–10
Understanding the Positioning Profile of Setup Locations	5–12
Y4 use in the Absolute Mode: Bit 15 of V3630 set to 0	5–12
Y4 use in the Incremental Mode: Bit 15 of V3630 set to 1	5–12
Y4 use with an Interrupt –Bit 12 of V3630 set to 1	5–13
Actual Count V1175/V1174	5–13
The Automatic Accel/Decel Profile	5–14
Configuring V-Memory for the Method of Your Choice	5–14
Step 1: Setup V3630	5–15
Step 2: Set the Target Pulse Count and Shaft Direction	5–15
Step 3: Set the Starting Velocity	5–16
Step 4: Entering the Acceleration Time	5–16
Step 5: Entering the Deceleration Time	5–16
The Step Trapezoid Profile	5–18
Configuring V-Memory	5–18
Step Trapezoidal Profile Example	5–19
Step 1: Setup V3630	5–20
Step 2: Setup the Target Pulse Count	5–20
Step 3: Select the Height and Width	5–21
Step 4: Enter the Step Information Into Memory	5–22
Ladder Logic Example	5–23
The Straight Velocity Profile	5–25
Configuring V-Memory	5–25
Step 1: Setup V3630	5–25
Step 2: Set the Direction for Shaft Rotation	5–25
Step 3: Set Shaft Velocity	5–26
Velocity Control Used to Find the Home Position	5–26
Straight Velocity Profile Example	5–26
What Happens If the Ramping and Target Are Mismatched?	5–28
Activating the Positioning Profile	5–30
Putting It All Together	5–31
A Complete Program	5–31
Graphical Diagram of Positioning Profile	5–36
The External Interrupt at X1	5–37
How It Works	5–38
Memory When Using the Interrupt	5–39
Troubleshooting	5–40
Is The Module Working Properly?	5–40
CW and CCW Indicators	5–40
I/O Indicators 00 through 01	5–41
Verify Stepper Motor Rotation	5–41
Verify Calculations	5–41
Motor Overshoot and Stalls	5–41

Chapter 6: Mode 40 –High Speed Interrupts

Using the Interrupt Inputs, Mode 40	6-2
High Speed Interrupts	6-3
High Speed Interrupts Process	6-4
Single Input Signal Processing	6-4
Multiple Signals from Same Input	6-4
Simultaneous Skeans from Different Inputs	6-5
Leading Edge Triggering	6-5
Understanding V-Memory Setup Locations	6-6
Default Settings	6-7
Explanation the Values	6-7
Custom Configuration	6-8
Setting Up the CPU for the Interrupts	6-9
Configuring the V-Memory	6-9
Step 1: Enter the Mode	6-9
Step 2: How Many Interrupts	6-10
Step 3: Configure the V-Memory	6-10
Two Types of Interrupts	6-11
Troubleshooting	6-13
Interrupt Device Working But No Interrupt	6-13
Interrupt Occurs, But No Normal Scan Afterwards	6-13

Chapter 7: Mode 50 –Pulse Catch Inputs

Using the Pulse Catch Inputs, Mode 50	7-2
Pulse Catching Explained	7-3
Understanding V-Memory Setup Locations	7-4
Default Settings	7-5
Custom Configuration	7-6
Setting UP the CPU for the Pulse Catch Inputs	7-7
Configuring the V-Memory	7-7
Step 1: Enter the Mode Selected	7-7
Step 2: How Many Pulse Catch Inputs	7-8
Step 3: Configure the V-Memory	7-8
Troubleshooting	7-10

Chapter 8: Mode 60 –Discrete/Filter Inputs

Using the Discrete Filtered Inputs, Mode 60	8-2
Discrete Filtered Inputs	8-3
Understanding V-Memory Setup Locations	8-4
Default Settings	8-5
Custom Configuration	8-6
Setting Up the CPU for Discrete Filtered Inputs	8-7
Configuring the V-Memory	8-7
Step 1: Enter the Mode	8-7
Step 2: How many Channels	8-8
Step 3: Configure the V-Memory.	8-8
Troubleshooting	8-10