DURAPULSE GS4 AC DRIVE USER MANUAL TABLE OF CONTENTS



<u>GS4 User Manual TOC</u>

Warnings and Trademarks	W-1
~ WARNING ~	W-1
Trademarks	W-1
~ AVERTISSEMENT ~	W–2
Marques de commerce	W–2
Warnings	W–3
DURApulse GS4 User Manual Revision History	H–1
DURApulse GS4 AC Drive User Manual Table of Contents	<i>.TOC</i> –1
Chapter 1: Getting Started	
User Manual Overview	
Overview of this Publication	
Who Should Read This Manual	
Supplemental Publications	
Technical Support	
Special Symbols	
Purpose of AC Drives	1–3
Selecting the Proper Drive Rating	1–3
Determine Motor Full-Load Amperage (FLA)	
Determine Motor Overload Requirements	1–3
Determine Application Type; Constant Torque or Variable Torque	1–3
Installation Altitude	1–4
Determine Maximum Enclosure Internal Temperature	
Derate Output Current Based on Carrier Frequency (if necessary)	1–6
DURAPULSE GS4 AC Drive Environmental Information	
Storage and Transportation	
Environmental Conditions	1–9
DURAPULSE GS4 AC Drive Specifications	
230V Class – Constant Torque – (Model-Specific Specifications)	
230V Class – Variable Torque – (Model-Specific Specifications)	
460V Class – Constant & Variable Torque – (Model-Specific Specifications)	
Specifications Applicable to All GS4 Models	
Receiving and Inspection	1–16
Drive Package Contents	1–16
Model Number Explanation	1–17
Nameplate Information	1–17
Unpacking Your GS4 DURApulse AC Drive	1–18
Lifting Eye Locations and Instructions	1–18
Unpacking the Drive	1–20

Table of Contents

Chapter 2: Installation and Wiring	2–1
Drive Models by Frame Size	. 2–2
Installation	. 2–2
Minimum Clearances and Air Flow	. 2–3
Minimum Clearance Distances	. 2–3
Airflow and Power Dissipation	. 2–6
Dimensions	. 2–7
Circuit Connections – RFI Jumper	.2–14
RFI Jumper Removal	.2–14
Isolating Main Power from Ground	.2–15
Floating Ground System (IT Systems)	.2–16
Asymmetric Ground System (Corner Grounded TN Systems)	.2–16
Circuit Connections – Warnings and Notes	.2–17
Danger!	.2–17
Wiring Terminal Access	.2–20
Control Terminal Access	.2–20
Removing the Control Terminal Block	.2–21
Main Circuit Wiring Terminals	.2–22
Main Terminal Specifications	
Wiring Terminal Connector Dimensions – Main-Circuit Terminals	.2–24
Main Terminal Diagrams	
Main Circuit Wiring Diagrams	.2–30
Control Circuit Wiring Terminals	
Control Terminal Specifications	
Control Terminal Block Diagram & Wiring Specifications	
Control Terminal Wiring Instructions	
Control Circuit Wiring Diagrams	
Digital Inputs.	
Full I/O with Sinking Inputs	
Full I/O with Sourcing Inputs	
Chapter 3: Keypad Operation and Quickstart	
The DURApulse GS4 Digital Keypad	
GS4 Start-Up Display	
Status Page	. 3–4
Мепи Раде	. 3–5
Quick-Start – Quick-Start Page	. 3–6
Keypad Fault Codes	.3–16
GS4 Start-Up Display	. 3–4
Status Page	. 3–4
Menu Page	. 3–5
Quick-Start – Quick-Start Page	. 3–6
Keypad Fault Codes	.3–16
Keypad Fault Codes	.3–16
Chapter 4: AC Drive Parameters	4–1
DURA pulse GS4 Parameter Summary	
Motor Parameters Summary (P0.xx)	
Ramps Parameters Summary (P1.xx).	
V/Hz Parameters Summary (P2.xx)	

Digital Parameters Summary (P3.xx)	4–6
Analog Parameters Summary (P4.xx)	4–10
Presets Parameters Summary (P5.xx).	4–13
Protection Parameters Summary (P6.xx)	4–14
PID Parameters Summary (P7.xx).	4–18
Display Parameters Summary (P8.xx)	4–19
Serial Communication Parameters Summary (P9.xx)	4–22
Pump Parameters Summary (P10.xx)	4–26
Fault Parameters Summary (P11.xx)	4–27
DURA PULSE GS4 Parameter Details	4–30
Explanation of Parameter Details format	4–30
Group P0.xx Details – Motor Parameters	4–30
Group P1.xx Details – Ramps Parameters	4–36
Group P2.xx Details – V/Hz Parameters	4–46
Group P3.xx Details – Digital Parameters	
Group P4.xx Details – Analog Parameters	
Analog Input Parameter Examples	
Group P5.xx Details – Presets Parameters	
Group P6.xx Details – Protection Parameters	
Group P7.xx Details – PID Parameters	-160
Group P8.xx Details – Display Parameters	
Group P9.xx Details – Serial Communication Parameters	
Block Transfer Explanation	
Group P10.xx Details – Pump Parameters	
	-191
Pump Parameters Details 4 Timing Charts for Circulative Control Modes P10.01 through P10.08 4	
Timing Charts for Circulative Control Modes P10.01 through P10.08	-194
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4	I–194 I–200
Timing Charts for Circulative Control Modes P10.01 through P10.08	I–194 I–200 I–200
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4	l–194 l–200 l–200 l–203
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4	l-194 l-200 l-200 l-203 4-3
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4 Ramps Parameters Summary (P1.xx). 4	l-194 l-200 l-200 l-203 4-3 4-4
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4 Ramps Parameters Summary (P1.xx). 4 V/Hz Parameters Summary (P2.xx). 5 Digital Parameters Summary (P3.xx). 6	-194 -200 -200 -203 4-3 4-4 4-6
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4 Ramps Parameters Summary (P1.xx). 4 V/Hz Parameters Summary (P2.xx). 5 Digital Parameters Summary (P3.xx). 5 Analog Parameters Summary (P4.xx). 5	l-194 l-200 l-200 l-203 4-3 4-4 4-6 4-10
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4 Ramps Parameters Summary (P1.xx). 4 V/Hz Parameters Summary (P2.xx). 5 Digital Parameters Summary (P3.xx). 6	I-194 I-200 I-200 I-203 4-3 4-4 4-6 4-10 4-13
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4 Ramps Parameters Summary (P1.xx). 4 V/Hz Parameters Summary (P2.xx). 6 Digital Parameters Summary (P3.xx). 6 Analog Parameters Summary (P4.xx). 6 Presets Parameters Summary (P5.xx). 6	l-194 l-200 l-203 4-3 4-4 4-6 4-10 4-13 4-14
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx).4V/Hz Parameters Summary (P2.xx).5Digital Parameters Summary (P3.xx).5Analog Parameters Summary (P5.xx).6Presets Parameters Summary (P5.xx).6PID Parameters Summary (P7.xx).6	I-194 I-200 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-200 I-203
Timing Charts for Circulative Control Modes P10.01 through P10.08. 4 Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card) 4 Wiring Diagrams for Cyclical Pump Control. 4 Group P11.xx Details – Fault Parameters. 4 Ramps Parameters Summary (P1.xx). 4 V/Hz Parameters Summary (P2.xx). 5 Digital Parameters Summary (P3.xx). 5 Analog Parameters Summary (P5.xx). 6 Protection Parameters Summary (P6.xx). 6	I-194 I-200 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx).4V/Hz Parameters Summary (P2.xx).5Digital Parameters Summary (P3.xx).5Analog Parameters Summary (P4.xx).6Presets Parameters Summary (P5.xx).7Protection Parameters Summary (P6.xx).7PID Parameters Summary (P7.xx).7Display Parameters Summary (P8.xx)7	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)5Digital Parameters Summary (P3.xx)6Analog Parameters Summary (P4.xx).6Presets Parameters Summary (P5.xx).7Protection Parameters Summary (P6.xx).7PiD Parameters Summary (P7.xx).7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7Pump Parameters Summary (P3.xx).7Pump Parameters Summary (P3.xx).7Pump Parameters Summary (P3.xx).7Pump Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7	I-194 I-200 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-203 I-204 I-22 I-226
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)5Digital Parameters Summary (P3.xx)4Analog Parameters Summary (P4.xx).4Presets Parameters Summary (P5.xx).4Protection Parameters Summary (P6.xx).4PiD Parameters Summary (P7.xx).4Display Parameters Summary (P8.xx)4Serial Communication Parameters Summary (P9.xx).4	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)6Digital Parameters Summary (P3.xx)6Analog Parameters Summary (P4.xx)7Presets Parameters Summary (P5.xx)7Protection Parameters Summary (P6.xx)7PiD Parameters Summary (P7.xx)7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P1.xx)7Pump Parameters Summary (P10.xx)7Fault Parameters Summary (P10.xx)7Fault Parameters Summary (P11.xx)7	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27 4-30
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)6Digital Parameters Summary (P3.xx)6Analog Parameters Summary (P4.xx)6Presets Parameters Summary (P5.xx)7Protection Parameters Summary (P6.xx)7Piplay Parameters Summary (P7.xx)7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P9.xx)7Pump Parameters Summary (P10.xx)7Fault Parameters Summary (P11.xx)7DURAPULSE GS4 Parameter Details7Explanation of Parameter Details format7	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27 4-30 4-30
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)6Digital Parameters Summary (P3.xx)6Analog Parameters Summary (P4.xx).7Presets Parameters Summary (P5.xx).7Protection Parameters Summary (P6.xx).7PiD Parameters Summary (P7.xx).7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P10.xx).7Pump Parameters Summary (P10.xx).7Fault Parameters Summary (P11.xx)7DURAPULSE GS4 Parameter Details7	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27 4-26 4-27 4-30 4-30 4-30
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)5Digital Parameters Summary (P3.xx)6Analog Parameters Summary (P4.xx)7Presets Parameters Summary (P5.xx)7Protection Parameters Summary (P6.xx)7Pipl Parameters Summary (P7.xx)7Display Parameters Summary (P7.xx)7Display Parameters Summary (P1.xx)7Display Parameters Summary (P1.xx)7Display Parameters Summary (P1.xx)7Display Parameters Summary (P1.xx)7Dump Parameters Summary (P1.xx)7Pump Parameters Summary (P1.xx)7Purse GS4 Parameter Details7Explanation of Parameter Details format7Group P0.xx Details – Motor Parameters7	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27 4-30 4-30 4-30 4-30 4-30
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx).4V/Hz Parameters Summary (P2.xx).6Digital Parameters Summary (P2.xx).6Presets Parameters Summary (P4.xx).7Presets Parameters Summary (P4.xx).7Protection Parameters Summary (P5.xx).7Protection Parameters Summary (P6.xx).7PiD Parameters Summary (P7.xx).7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P9.xx).7Pump Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7Fault Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7Fault Parameters Summary (P1.xx).7PURAPUSE GS4 Parameter Details7Explanation of Parameter Details7Forup P0.xx Details – Motor Parameters7Group P0.xx Details – Ramps Parameters7Group P1.xx Details – Ramps Parameters7	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27 4-30 4-30 4-30 4-36 4-46
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control.4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx).7V/Hz Parameters Summary (P2.xx).9Digital Parameters Summary (P3.xx).7Analog Parameters Summary (P4.xx).7Presets Parameters Summary (P5.xx).7Protection Parameters Summary (P6.xx).7PiD Parameters Summary (P6.xx).7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P9.xx).7Pump Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7Display Parameters Summary (P1.xx).7Display Parameters Summary (P1.xx).7Pump Parameters Summary (P1.xx).7<	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-18 4-19 4-22 4-26 4-27 4-26 4-27 4-30 4-30 4-30 4-30 4-30 4-36 4-46 4-60
Timing Charts for Circulative Control Modes P10.01 through P10.08.4Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)4Wiring Diagrams for Cyclical Pump Control4Group P11.xx Details – Fault Parameters.4Ramps Parameters Summary (P1.xx)4V/Hz Parameters Summary (P2.xx)5Digital Parameters Summary (P3.xx)6Analog Parameters Summary (P4.xx)6Presets Parameters Summary (P5.xx)7Protection Parameters Summary (P6.xx)7Pip Darameters Summary (P7.xx)7Display Parameters Summary (P8.xx)7Serial Communication Parameters Summary (P9.xx)7Pump Parameters Summary (P1.xx)7Pump Parameters Summary (P1.xx)7DURAPUSE GS4 Parameter Details7Explanation of Parameter Details7Group P0.xx Details – Motor Parameters7Group P1.xx Details – Ramps Parameters7Group P2.xx Details – Notor Parameters7Group P2.xx Details – Digital Parameters7Group P3.xx Details – Di	I-194 I-200 I-203 4-3 4-4 4-6 4-10 4-13 4-14 4-14 4-18 4-19 4-22 4-26 4-27 4-30 4-30 4-30 4-30 4-30 4-30 4-30 4-30

Group P6.xx Details – Protection Parameters	4–121
Group P7.xx Details – PID Parameters	4–160
Group P8.xx Details – Display Parameters	
Group P9.xx Details – Serial Communication Parameters	
Block Transfer Explanation	
Group P10.xx Details – Pump Parameters	
Pump Parameters Details	
Timing Charts for Circulative Control Modes P10.01 through P10.08	
Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)	
Wiring Diagrams for Cyclical Pump Control	
Group P11.xx Details – Fault Parameters.	
V/Hz Parameters Summary (P2.xx)	
Digital Parameters Summary (P3.xx)	
Analog Parameters Summary (P4.xx).	
Presets Parameters Summary (P5.xx).	
Protection Parameters Summary (P6.xx).	
PID Parameters Summary (P7.xx).	
Display Parameters Summary (P8.xx)	
Serial Communication Parameters Summary (P9.xx)	
Pump Parameters Summary (P10.xx).	
Fault Parameters Summary (P11.xx)	
DURA pulse GS4 Parameter Details	
Explanation of Parameter Details format	
Group P0.xx Details – Motor Parameters	
Group P1.xx Details – Ramps Parameters	
Group P2.xx Details – V/Hz Parameters	
Group P3.xx Details – Digital Parameters	
Group P4.xx Details – Analog Parameters	
Analog Input Parameter Examples	
Group P5.xx Details – Presets Parameters	
Group P6.xx Details – Protection Parameters	
Group P7.xx Details – PID Parameters	
Group P8.xx Details – Display Parameters	
Group P9.xx Details – Serial Communication Parameters	
Block Transfer Explanation	
Group P10.xx Details – Pump Parameters	
Pump Parameters Details	
Timing Charts for Circulative Control Modes P10.01 through P10.08.	
Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)	
Wiring Diagrams for Cyclical Pump Control.	
Group P11 xx Details – Fault Parameters.	
Protection Parameters Summary (P6.xx).	
PID Parameters Summary (P7.xx)	
Display Parameters Summary (P8.xx)	
Serial Communication Parameters Summary (P9.xx)	
Pump Parameters Summary (P10.xx).	
Fullip Farameters Summary (F10.xx) Fault Parameters Summary (P11.xx) Fault Parameters Summary (P11.xx) Fault Parameters Summary (P11.xx)	
DURApulse GS4 Parameter Details	
Explanation of Parameter Details format	
	······································

Group P0.xx Details – Motor Parameters	4–30
Group P1.xx Details – Ramps Parameters	4–36
Group P2.xx Details – V/Hz Parameters	4–46
Group P3.xx Details – Digital Parameters	4–60
Group P4.xx Details – Analog Parameters	4–89
Analog Input Parameter Examples	. 4–108
Group P5.xx Details – Presets Parameters	. 4–119
Group P6.xx Details – Protection Parameters	. 4–121
Group P7.xx Details – PID Parameters	. 4–160
Group P8.xx Details – Display Parameters	
Group P9.xx Details – Serial Communication Parameters	
Block Transfer Explanation	. 4–189
Group P10.xx Details – Pump Parameters	. 4–190
Pump Parameters Details	
Timing Charts for Circulative Control Modes P10.01 through P10.08	
Terminal Specifications for GS4-06TR (Optional Six-Relay Output Card)	
Wiring Diagrams for Cyclical Pump Control	
Group P11.xx Details – Fault Parameters	. 4–203
Chapter 5: Serial Communications	. 5–1
Communications Parameters Summary	5–2
Summary – Serial Communication Parameters	5–2
Summary – Block Transfer Parameters	5–5
Serial Modbus Status Addresses	5–6
Status Addresses (Read Only)	5–6
Serial Communications Overview	5–8
Serial Communications Connectivity.	5–8
Minimum AC Drive Parameter Settings For Serial Communication	5–8
Common Third-Party Modbus RTU Masters	5–9
AutomationDirect PLCs as Modbus Master	5–9
Connecting Communication Cables	5–10
Detailed Serial Modbus Communication Information	
Data Format	5–12
Communication Protocol	5–13
CMD (command code) and DATA (data characters)	5–14
BACnet Serial Communication	5–18
About BACnet	5–18
Parameter Summary for BACnet	5–18
GS4 BACnet Object and Property	5–19
Steps to Setup the GS4 Parameters for BACnet	5–23
BACnet Protocol Implementation Conformance Statement	5–24
Chapter 6: Maintenance and Troubleshooting.	. 6–1
Maintenance and Inspections	6–2
Monthly Inspection	
Annual Inspection	6–2
Recharge Capacitors (for drives not in service)	6–3
Recommended Inspection Schedules	
Troubleshooting	
Warning Codes	6–8
Fault Codes.	6–16

Typical AC Drive Problems and Solutions	6–26
Grease and Dirt Problems	6–26
Fiber Dust Problem	6–27
Corrosion Problem.	6–28
Industrial Dust Problem	6–29
Wiring and Installation Problem	6–30
Digital Input/Output Terminal Problems	6–31
CHAPTER 7: GSOFT2 – GETTING STARTED	7–1
GS4 Drive Configuration Software	7–2
System Requirements	7–2
Installation Guide	7–3
System Requirement Configuration	7–3
Software Installation.	7–4
Opening GSoft2 Software Program	7–6
Software Functions	7–7
Firmware Upgrade Notes	
GSoft2 Help File Note	
CHAPTER 8: GSLOGIC INTRODUCTION.	
Purpose of This Chapter	
For More Detailed Information	
GSLogic Introduction	
GS4 PLC Summary.	
Notes on Using GSLogic, the GS4 PLC, and the GS4 Drive.	
Getting Started	
Connect to PLC.	
Installation of GSLogic Programming Software.	
System Requirements	
About Getting Started.	
Software and Online Help Files.	
Technical Support	
Installing GSLogic Programming Software	
Program Writing.	
Connecting GSLogic PC to GS4 PLC	
Basic Ladder Program Example.	
Program Download	
Program Download	
GS4 GSLogic Program Examples	
APPENDIX A: Accessories	
Line/Load Reactors	
Line/Load Reactors Selection Charts.	
Line/Load Reactor Specification Charts	
DC Reactors (Choke) Specification Charts	
Line Reactor Dimensions	
Line Reactor Applications and Wiring Connections.	
Drive Output Filters	
VTF Part Number Explanation	
VTF Part Number Explanation	
	A-23

Output Filter Dimensions – VTF Series	.A–24
EMI Input Filters	A-30
EMI Filter Dimensions	.A–31
EMI Filter Installation	.A–33
Reflective Wave Phenomenon	.A–34
Recommended Motor Cable Length	.A–34
Motor Cable Length Charts	.A–35
Fuses	A–36
Dynamic Braking	A–37
Braking Units	.A–37
USB to RS-485 PC Adapter	A–38
USB-485M to GS4 Wiring and Pin-out	.A–38
Conduit Box Kit	A–39
Conduit Box Installation – Frames D0 and D	.A–40
Conduit Box Installation – Frame E	.A–41
Conduit Box Installation – Frame F	.A–42
Conduit Box Installation – Frame G	.A–43
Flange Mounting Kits (Frames A, B, C)	A–45
Flange Mounting Kits – Frame A.	
Flange Mounting Kits – Frame B	
Flange Mounting Kits – Frame C	
Instructions for Built-in Flange Mounting (Frames D0, D, E, F).	
Cutout Dimensions	
Flange Mounting Instructions – Frames D0, D, E	
Flange Mounting Instructions – Frame F	
Spare Keypad	
GS4-KPD	
Keypad Panel Mounting Kit GS4-BZL	A–57
Spare Fan Kits	
<i>Fan Removal</i>	
DC Reactors (Choke) Specification Charts	
Line Reactor Dimensions	
Line Reactor Applications and Wiring Connections.	
Drive Output Filters	
VTF Part Number Explanation	
VTF Specifications	
Output Filter Dimensions – VTF Series	
EMI Input Filters	
, EMI Filter Dimensions	
EMI Filter Installation	
Reflective Wave Phenomenon	
Recommended Motor Cable Length	
Motor Cable Length Charts.	
Fuses	
Dynamic Braking	
Braking Units.	
USB to RS-485 PC Adapter	
USB-485M to GS4 Wiring and Pin-out.	
Conduit Box Kit	

ر	A–40
Conduit Box Installation – Frame E	A–41
Conduit Box Installation – Frame F	A–42
Conduit Box Installation – Frame G	A–43
Flange Mounting Kits (Frames A, B, C).	4–45
Flange Mounting Kits – Frame A	A–45
Flange Mounting Kits – Frame B	A–48
Flange Mounting Kits – Frame C	A–50
Instructions for Built-in Flange Mounting (Frames D0, D, E, F)	4–52
	A-52
Flange Mounting Instructions – Frames D0, D, E	A–53
Flange Mounting Instructions – Frame F	A–54
Spare Keypad	4–55
GS4-KPD	A-55
Keypad Panel Mounting Kit GS4-BZL	4–57
Spare Fan Kits	4–59
· Fan Removal	A-62
Keypad Panel Mounting Kit GS4-BZL	4–57
Spare Fan Kits	
, Fan Removal	
Appendix B: Optional I/O and Communication Cards	B–1
Removing the Card Slot Cover	
Option Card Installation and Removal.	
Removal	
Optional I/O Cards	
GS4-06CDD Combo I/O card.	
GS4-06NA Input card	
GS4-06TR Output card	
Optional Communications Cards.	
GS4-CM-xxxxx Circuit Board Layout	
Connecting Comm Card to PC	
Communication Card Firmware Update Instructions	
GS4-CM-MODTCP and GS4-CM-ENETIP IP Address and Network Configuration	
GS4-CM-MODTCP Specifications.	
GS4-CM-MODTCP LED Indicators and Troubleshooting	
GS4-CM-MODTCP Common Communication Parameters	
GS4-CM-MODTCP Control Words	B–17
GS4-CM-MODTCP Status Words	B–18
GS4-CM-ENETIP Specifications.	B–19
GS4-CM-ENETIP LED Indicators and Troubleshooting	B–20
GS4-CM-ENETIP Common Parameters	B–21
GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)	B–22
GS4-CM-ENETIP Explicit Messaging	B–26
EtherNet/IP Communication Card Register Settings	
Using Speed Mode as a Control Method	
Appendix C: Analog and Digital I/O Parameter Maps	С–1

G54 Digital Outputs – Main Control Board C-4 G54 Digital Outputs – Option Cards. C-5 G54 Digital Outputs – Option Cards. C-6 G54 Digital Outputs – Virtual. C-7 G54 Analog Common Parameters C-8 G54 Analog Input 1 Parameters C-8 G54 Analog Input 2 Parameters C-9 G54 Analog Output 1 Parameters C-10 G54 Analog Output 1 Parameters C-11 G54 Analog Output 1 Parameters C-11 G54 Frequency Output Parameters C-11 G54 Frequency Output Parameters C-11 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-1 Appendix D: USING G54 AC DRIVES WITH AUTOMATIONDIRECT PLCS D-2 <	GS4 Digital Inputs – Main Control Board	. C–3
GS4 Digital Inputs - Option Cards. C-5 GS4 Digital Outputs - Option Cards. C-6 GS4 Digital Outputs - Option Cards. C-7 GS4 Analog Common Parameters. C-8 GS4 Analog Input 1 Parameters C-9 GS4 Analog Input 3 Parameters C-9 GS4 Analog Input 3 Parameters C-10 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Frequency Output Parameters C-11 GS4 Frequency Output Parameters C-11 Aprexionx D: Usins GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Distikg IPLC output card is sourcing) D-4 Drive Wired with D C Sourcing Inputs (PLC output card is sinking) D-5 Drive Wired with D Sourcing Inputs (PLC output card is sinking) D-5 Drive Wired with D Sourcing Inputs (PLC output card is sinking) D-5 Drive Wired with D Sourcing Inputs (PLC output card is sinking) D-5 Drive Wired with D Sourcing Inputs (PLC output card is sinking) <td>GS4 Digital Outputs – Main Control Board</td> <td>. C–4</td>	GS4 Digital Outputs – Main Control Board	. C–4
GS4 Digital Outputs – Virtual. C-7 GS4 Analog Common Parameters C-8 GS4 Analog Input 1 Parameters C-9 GS4 Analog Input 2 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Frequency Output Parameters C-11 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Input Wired for Voltage and Current D-7 Analog Outputs D-7 Analog Outputs Wired with Sourcing PLC Modules D-10 Serial Modbus Monitoring and Control D-10		
GS4 Digital Outputs – Virtual. C-7 GS4 Analog Common Parameters C-8 GS4 Analog Input 1 Parameters C-9 GS4 Analog Input 2 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Frequency Output Parameters C-11 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Basics. D-2 Sinking/Sourcing Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Input Wired for Voltage and Current D-7 Analog Outputs D-7 Analog Outputs Wired with Sourcing PLC Modules D-10 Serial Modbus Monitoring and Control D-10	GS4 Digital Outputs – Option Cards	. C–6
GS4 Analog Common Parameters C-8 GS4 Analog Input 1 Parameters C-9 GS4 Analog Input 3 Parameters C-10 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Analog Output Parameters C-11 GS4 Frequency Output Parameters C-11 Appendix D Overview. D-2 Sinking/Sourcing Basics D-2 GS4-to-PLC I/O Wiring Examples D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sinking Outputs (PLC input card is sourcing) D-4 Drive Wired with DC Sourcing Inputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Relay Outputs Wired of Voltage and Current D-7 Analog Input Wired for Voltage and Current D-8 Analog Output Wired for Voltage and Current D-8 Analog Output Wired for Voltage and Current </td <td></td> <td></td>		
GS4 Analog Input 2 Parameters C-9 GS4 Analog Input 2 Parameters C-10 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 1 Parameters C-11 GS4 Analog Output 2 Parameters C-11 GS4 Frequency Output Parameters C-11 Aprenoux D: USING GS4 AC D RIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 GS4-to-PLC I/O Wiring Examples D-4 Drive Wired with D C Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with D C Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with D C Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with D C Sourcing Outputs (PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Input Wired for Voltage and Current D-7 Drive Analog Outputs D-7 Drive Relay Outputs D-9 Communication with GS4 Drives. D-10 Getting Stated. D-10		
GS4 Analog Input 2 Parameters C-9 GS4 Analog Dutput 3 Parameters C-10 GS4 Analog Output 1 Parameters C-11 GS4 Frequency Output Parameters C-11 GS4 Frequency Output Parameters C-11 APPENDIX D: USING GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics D-2 Siking/Sourcing Basics D-2 Siking/Sourcing Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC Modules D-6 Drive Wired with DC Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Input Wired for Voltage and Current D-7 Drive Analog Input Wired for Voltage and Current D-8 Drive Frequency Output (High-speed pulse output) D-9 Communication with GS4 Drives D-10 Getting Started D-10 Modtus RT0 D-10 Modtus RT0 D-18 Modbus RT0 CLICK Pro	5	
GS4 Analog Input 3 Parameters .C-10 GS4 Analog Output 1 Parameters .C-11 GS4 Analog Output 2 Parameters .C-11 GS4 Frequency Output Parameters .C-11 APPENDIX D: USING GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. .D-2 Sinking/Sourcing Basics. .D-2 Sinking/Sourcing Basics. .D-2 Sinking/Sourcing Basics. .D-2 Sinking/Sourcing Basics. .D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) .D-4 Drive Wired with DC Sinking Outputs (PLC input card is sourcing) .D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) .D-5 Drive Wired with DC Sourcing PLC Modules .D-6 Drive Relay Outputs Wired with Sinking PLC Modules .D-6 Drive Analog Inputs .D-7 Analog Output Wired for Voltage and Current .D-7 Drive Analog Outputs .D-8 Drive Frequency Output (High-speed pulse output) .D-9 Communication with GS4 Drives. .D-10 Getting Started. .D-10 Serial Modbus Monitoring and Control .D-15 EtherNet/		
GS4 Analog Output 1 Parameters C-11 GS4 Frequency Output Parameters C-11 GS4 Frequency Output Parameters C-11 APPENDIX D: USING GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics D-2 Sinking/Sourcing Basics D-2 GS4 to-DE (L/O Wing Examples D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Input Wired for Voltage and Current D-7 Analog Outputs D-8 Drive Relay Outputs (PLC Input card is sinking) D-9 Communication with GS4 Drives. D-10 Getting Started. D-7 Analog Input Wired for Voltage and Current D-8 Drive Frequency Output (High-speed pulse output) D-9 Communication with GS4 Drives.		
GS4 Analog Output 2 Parameters .C-11 GS4 Frequency Output Parameters .C-11 APPENDIX D: Using GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 Siking/Sourcing Basics. D-2 Siking/Sourcing Basics. D-2 Siking/Sourcing Basics. D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Inputs (PLC output card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Inputs D-7 Analog Output Wired for Voltage and Current D-8 Analog Output Wired for Voltage and Current D-8 Drive Frequency Output (High-speed pulse output) D-9 Communication with GS4 Drives. D-10 Getting Started. D-10 Serial Modbus Monitoring and Control D-16 GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging) D-16 Program Examples Using AutomationDirect CLICK PLC		
GS4 Frequency Output Parameters .C-11 Appendix D: USING GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 SG84-to-PLC I/O Wiring Examples D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sinking Outputs (PLC input card is sourcing) D-4 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Relay Outputs Wired with Sourcing PLC Modules. D-6 Drive Relay Outputs Wired with Sourcing PLC Modules. D-6 Drive Relay Outputs Wired or Voltage and Current D-7 Analog Input Wired for Voltage and Current D-7 Drive Frequency Output Hilfigh-speed pulse output) D-9 Communication with GS4 Drives. D-10 Getting Started. D-10 Serial Modbus Monitoring and Control D-15 EtherNet/IP Monitor and Control D-15 EtherNet/IP Monitor and Control D-18 Modbus RTU CLICK Program Example D-22 Appendix Modbus RTU CLICK Program Example D-12 <tr< td=""><td></td><td></td></tr<>		
APPENDIX D: USING GS4 AC DRIVES WITH AUTOMATIONDIRECT PLCS. D-1 Appendix D Overview. D-2 Sinking/Sourcing Basics. D-2 GS4-to-PLC I/O Wiring Examples D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Inputs (PLC output card is sinking) D-4 Drive Wired with DC Sourcing Outputs (PLC output card is sinking) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Inputs D-7 Analog Inputs D-7 Drive Analog Inputs D-7 Drive Analog Inputs D-7 Drive Analog Inputs D-7 Drive Analog Outputs D-8 Analog Output Wired for Voltage and Current D-9 Communication with GS4 Drives. D-10 Getting Started. D-10 Serial Modbus Monitoring and Control D-15 EtherNet/IP Monitor and Control D-15 EtherNet/IP Monitor and Control D-16 GS4-CM-ENETR EtherNet/IP I/O Messaging (
Appendix D Overview.D-2Sinking/Sourcing Basics.D-2GS4-to-PLC I/O Wiring ExamplesD-4Drive Wired with DC Sinking Inputs (PLC output card is sourcing)D-4Drive Wired with DC Sourcing Inputs (PLC input card is sourcing)D-5Drive Wired with DC Sourcing Outputs (PLC input card is sourcing)D-5Drive Wired with DC Sourcing Outputs (PLC input card is sourcing)D-5Drive Relay Outputs Wired with Sinking PLC ModulesD-6Drive Relay Outputs Wired with Sourcing PLC ModulesD-6Drive Analog InputsD-7Analog Input Wired for Voltage and CurrentD-7Drive Frequency OutputsMinesDrive Frequency Output (High-speed pulse output)D-9Communication with GS4 Drives.D-10Gerting Started.D-10ModDus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-16Frogram Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program Example.D-218Modbus RTU CLICK Program Example.C-218STO ParametersE-4Operating Sequence DescriptionE-5STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=0.E-5STO P6.71=0.E-5STO P6.71=0.E-5 <td></td> <td></td>		
Sinking/Sourcing Basics.D-2GS4-to-PLC I/O Wiring ExamplesD-4Drive Wired with DC Sinking Inputs (PLC output card is sourcing)D-4Drive Wired with DC Sourcing Outputs (PLC output card is sourcing)D-5Drive Wired with DC Sourcing Outputs (PLC input card is sourcing)D-5Drive Relay Outputs Wired with Sourcing PLC ModulesD-6Drive Relay Outputs Wired with Sourcing PLC ModulesD-7Analog InputsD-7Analog InputsD-7Drive Analog OutputsNet Sourcing PLC ModulesD-7Drive Analog OutputsDrive Analog OutputsD-8Analog Output Wired for Voltage and CurrentD-7Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 Drives.D-10Getting Started.D-10Serial Modbus Monitoring and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTCP CLICK Program Example.D-22Safe Fonctuo Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
GS4-to-PLC I/O Wiring Examples D-4 Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Inputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sourcing) D-5 Drive Relay Outputs Wired with Sinking PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-7 Analog Inputs D-7 Analog Outputs Wired for Voltage and Current D-7 Drive Analog Outputs (High-speed pulse output) D-9 Communication with GS4 Drives. D-10 Getting Started. D-10 Serial Modbus Monitoring and Control D-15 EtherNet/IP Monitor and Control D-16 GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging) D-16 Program Examples Using AutomationDirect CLICK PLC D-18 Modbus TCP CLICK Program Example. D-12 Safe Function Failure Rate E-2 Safe Torque Off Terminal Function Description. E-2 Wring Diagrams. E-3 Internal STO Circuit E-3 Control Loop Wiring		
Drive Wired with DC Sinking Inputs (PLC output card is sourcing) D-4 Drive Wired with DC Sourcing Inputs (PLC output card is sinking) D-4 Drive Wired with DC Sinking Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Relay Outputs Wired with Sinking PLC Modules D-6 Drive Analog Inputs D-7 Analog Input Wired for Voltage and Current D-7 Drive Analog Outputs Wired with Sourcing PLC Modules D-8 Drive Analog Outputs D-7 Analog Output Wired for Voltage and Current D-7 Drive Frequency Output (High-speed pulse output) D-9 Communication with GS4 Drives D-10 Getting Started. D-10 Serial Modbus Monitoring and Control D-10 Serial Modbus Monitoring and Control D-16 GS4-CM-ENETIP EtherNet/TP I/O Messaging (Implicit Messaging) D-16 Program Examples Using AutomationDirect CLICK PLC D-18 Modbus RTU CLICK Program Example D-22 AppenDIX E: SAFE TORQUE OFF E-1 Safe Function Failure Rate E-2 Safe Torque Off Terminal Function Description E-3 <tr< td=""><td></td><td></td></tr<>		
Drive Wired with DC Sourcing Inputs (PLC output card is sinking)D-4Drive Wired with DC Sinking Outputs (PLC input card is sourcing)D-5Drive Wired with DC Sourcing Outputs (PLC input card is sinking)D-5Drive Relay Outputs Wired with Sinking PLC ModulesD-6Drive Relay Outputs Wired with Sourcing PLC ModulesD-6Drive Analog InputsD-7Analog Input Wired for Voltage and CurrentD-7Drive Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 DrivesD-10Getting StartedD-10Serial Modbus Monitoring and ControlD-10Serial Modbus Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-18Modbus RTO CLICK Program ExampleD-18Modbus RTO CLICK Program ExampleE-2Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Started.E-3STO P6.71=0.E-5STO P6.71=1.E-5		
Drive Wired with DC Sinking Outputs (PLC input card is sourcing) D-5 Drive Wired with DC Sourcing Outputs (PLC input card is sinking) D-5 Drive Relay Outputs Wired with Sinking PLC Modules D-6 Drive Relay Outputs Wired with Sourcing PLC Modules D-6 Drive Analog Inputs D-7 Analog Input Wired for Voltage and Current D-7 Drive Analog Outputs D-8 Analog Output Wired for Voltage and Current D-8 Drive Frequency Output (High-speed pulse output) D-9 Communication with G54 Drives. D-10 Getting Started. D-10 Serial Modbus Monitoring and Control D-10 ModTCP (Ethernet) Monitor and Control D-15 EtherNet/IP Monitor and Control D-16 GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging) D-16 Program Examples Using AutomationDirect CLICK PLC D-18 Modbus RTU CLICK Program Example. D-12 Safe Function Failure Rate E-2 Safe Torque Off Terminal Function Description. E-3 Control Loop Wiring Diagrams. E-3 Internal STO Circuit E-3 Control Loop Wiring Diagrams. E-3 <		
Drive Wired with DC Sourcing Outputs (PLC input card is sinking)D-5Drive Relay Outputs Wired with Sinking PLC ModulesD-6Drive Relay Outputs Wired with Sourcing PLC ModulesD-6Drive Analog InputsD-7Analog Input Wired for Voltage and CurrentD-7Drive Analog OutputsD-8Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 DrivesD-10Getting StartedD-10Serial Modbus Monitoring and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus TCP CLICK Program ExampleD-22Appendix F Fonque Off Terminal Function DescriptionE-2Safe Function Failure RateE-2Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3Control Loop Wiring DiagramsE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5	5 1 1 5	
Drive Relay Outputs Wired with Sinking PLC ModulesD-6Drive Relay Outputs Wired with Sourcing PLC ModulesD-6Drive Analog InputsD-7Analog Input Wired for Voltage and CurrentD-7Drive Analog OutputsD-8Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 DrivesD-10Getting StartedD-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program ExampleD-22Appendix E: SAFE TORQUE OFFE-1Safe Forque Off Terminal Function DescriptionE-2Wiring DiagramsE-3Internal STO CircuitE-3Control Loop Wiring DiagramsE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0E-5STO P6.71=1E-5		
Drive Relay Outputs Wired with Sourcing PLC ModulesD-6Drive Analog InputsD-7Analog Input Wired for Voltage and CurrentD-7Drive Analog OutputsD-8Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 Drives.D-10Getting Started.D-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus TCP CLICK Program Example.D-22APPENDIX E: SAFE TORQUE OFFE-11Safe Function Failure RateE-22Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3Control Loop Wiring Diagrams.E-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
Drive Analog InputsD-7Analog Input Wired for Voltage and CurrentD-7Drive Analog OutputsD-8Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 DrivesD-10Getting StartedD-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-10ModTCP (Ethernet) Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus TC CLICK Program ExampleD-22ApPENDIX E: SAFE TORQUE OFFE-11Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-3STO PArametersE-4Operating Sequence DescriptionE-5STO P6.71=0, P6.29=1E-5STO P6.71=1.E-5		
Analog Input Wired for Voltage and CurrentD–7Drive Analog OutputsD–8Analog Output Wired for Voltage and CurrentD–8Drive Frequency Output (High-speed pulse output)D–9Communication with GS4 DrivesD–10Getting Started.D–10Serial Modbus Monitoring and ControlD–10ModTCP (Ethernet) Monitor and ControlD–16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D–16Program Examples Using AutomationDirect CLICK PLCD–18Modbus TCP CLICK Program ExampleD–22APPENDIX E: SAFE TORQUE OFFE–1Safe Function Failure RateE–2Safe Torque Off Terminal Function DescriptionE–3Internal STO CircuitE–3STO ParametersE–3STO ParametersE–4Operating Sequence DescriptionE–5STO P6.71=0.E–5STO P6.71=1.E–5		
Drive Analog OutputsD-8Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 DrivesD-10Getting StartedD-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus TCP CLICK Program ExampleD-22APPENDIX E: SAFE TORQUE OFFE-11Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0E-5STO P6.71=1E-5		
Analog Output Wired for Voltage and CurrentD-8Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 Drives.D-10Getting Started.D-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus TCP CLICK Program Example.D-12AppenNIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function Description.E-3Internal STO CircuitE-3STO ParametersE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
Drive Frequency Output (High-speed pulse output)D-9Communication with GS4 Drives.D-10Getting Started.D-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program Example.D-18Modbus TCP CLICK Program Example.D-22APPENDIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
Communication with GS4 Drives.D-10Getting Started.D-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program Example.D-18Modbus TCP CLICK Program Example.D-22APPENDIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
Getting Started.D-10Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program Example.D-18Modbus TCP CLICK Program Example.D-22APPENDIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0E-5STO P6.71=1E-5		
Serial Modbus Monitoring and ControlD-10ModTCP (Ethernet) Monitor and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program ExampleD-12AppenDix E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0E-5STO P6.71=1E-5		
ModTCP (Ethernet) Monitor and ControlD-15EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program Example.D-18Modbus TCP CLICK Program Example.D-22APPENDIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-2Wiring Diagrams.E-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
EtherNet/IP Monitor and ControlD-16GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)D-16Program Examples Using AutomationDirect CLICK PLCD-18Modbus RTU CLICK Program Example.D-18Modbus TCP CLICK Program Example.D-22APPENDIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-2Wiring Diagrams.E-3Internal STO CircuitE-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
Program Examples Using AutomationDirect CLICK PLCD–18Modbus RTU CLICK Program ExampleD–18Modbus TCP CLICK Program ExampleD–22APPENDIX E: SAFE TORQUE OFFE–1Safe Function Failure RateE–2Safe Torque Off Terminal Function DescriptionE–2Wiring DiagramsE–3Internal STO CircuitE–3Control Loop Wiring DiagramsE–3STO ParametersE–4Operating Sequence DescriptionE–5STO P6.71=0E–5STO P6.71=1E–5		
Program Examples Using AutomationDirect CLICK PLCD–18Modbus RTU CLICK Program ExampleD–18Modbus TCP CLICK Program ExampleD–22APPENDIX E: SAFE TORQUE OFFE–1Safe Function Failure RateE–2Safe Torque Off Terminal Function DescriptionE–2Wiring DiagramsE–3Internal STO CircuitE–3Control Loop Wiring DiagramsE–3STO ParametersE–4Operating Sequence DescriptionE–5STO P6.71=0E–5STO P6.71=1E–5	GS4-CM-ENETIP EtherNet/IP I/O Messaging (Implicit Messaging)	. D–16
Modbus RTU CLICK Program Example.D–18Modbus TCP CLICK Program Example.D–22APPENDIX E: SAFE TORQUE OFFE–1Safe Function Failure RateE–2Safe Torque Off Terminal Function DescriptionE–2Wiring Diagrams.E–3Internal STO CircuitE–3Control Loop Wiring Diagrams.E–3STO ParametersE–4Operating Sequence DescriptionE–5STO P6.71=0.E–5STO P6.71=1.E–5		
Modbus TCP CLICK Program ExampleD-22APPENDIX E: SAFE TORQUE OFFE-1Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-2Wiring Diagrams.E-3Internal STO CircuitE-3Control Loop Wiring Diagrams.E-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=1.E-5		
Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-2Wiring Diagrams.E-3Internal STO CircuitE-3Control Loop Wiring Diagrams.E-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=0, P6.29=1E-5STO P6.71=1.E-5		
Safe Function Failure RateE-2Safe Torque Off Terminal Function DescriptionE-2Wiring Diagrams.E-3Internal STO CircuitE-3Control Loop Wiring Diagrams.E-3STO ParametersE-4Operating Sequence DescriptionE-5STO P6.71=0.E-5STO P6.71=0, P6.29=1E-5STO P6.71=1.E-5	Appendix E: Safe Torque Off	. E—1
Safe Torque Off Terminal Function DescriptionE–2Wiring Diagrams.E–3Internal STO CircuitE–3Control Loop Wiring Diagrams.E–3STO ParametersE–4Operating Sequence DescriptionE–5STO P6.71=0.E–5STO P6.71=0, P6.29=1E–5STO P6.71=1.E–5		
Wiring Diagrams. E–3 Internal STO Circuit E–3 Control Loop Wiring Diagrams. E–3 STO Parameters E–4 Operating Sequence Description E–5 STO P6.71=0. E–5 STO P6.71=1. E–5		
Internal STO Circuit E-3 Control Loop Wiring Diagrams E-3 STO Parameters E-4 Operating Sequence Description E-5 STO P6.71=0 E-5 STO P6.71=0, P6.29=1 E-5 STO P6.71=1 E-5	, , ,	
Control Loop Wiring Diagrams E-3 STO Parameters E-4 Operating Sequence Description E-5 STO P6.71=0 E-5 STO P6.71=0, P6.29=1 E-5 STO P6.71=1 E-5		
STO Parameters E-4 Operating Sequence Description E-5 STO P6.71=0. E-5 STO P6.71=0, P6.29=1 E-5 STO P6.71=1. E-5		
Operating Sequence Description E-5 STO P6.71=0. E-5 STO P6.71=0, P6.29=1 E-5 STO P6.71=1. E-5 STO P6.71=1. E-5		
STO P6.71=0. E-5 STO P6.71=0, P6.29=1 E-5 STO P6.71=1. E-5		
STO P6.71=0, P6.29=1 E-5 STO P6.71=1 E-5		
STO P6.71=1		

Table of Contents

STL2 P6.71=1, P6.29=1 E	-6
Error Codes for STO Function	-6
APPENDIX F: PID CONTROL	-1
Function of PID Control.	-2
What Does PID Control Accomplish?	-2
PID Control Analogy	-2
Common Applications for PID Control	-3
Definition of PID Loop "Directions"	-3
Forward-Acting PID Loop (Heating Loop) (Negative-Feedback Loop)	-3
Reverse-Acting PID Loop (Cooling Loop) (Positive-Feedback Loop)	-3
PID Control Overview	-4
Concept of GS4 PID Control & Tuning	-5
$Proportional \ Gain \ (P) \ . \ . \ . \ . \ . \ . \ . \ . \ . \ $	-5
Integral Time (I)	-5
Derivative Value (D)	-6
$Proportional Integral Control (PI) \dots \dots \dots \dots \dots \dots \dots \dots \dots $	-6
$Proportional Derivative Control (PD). \dots F$	
Proportional Integral Derivative Control (PID). \ldots . F	-6
Tuning Example for PID Control	-7
DURAPULSE GS4 and GS3 PID Parameter Comparisons	-9
GS4 Parameters Involved in PID Control – Summary	10
GS4 Parameters Involved in PID Control – Details	11
GS4 Parameters Involved in PID Control – Details	11