



TABLE OF CONTENTS

Chapter 1: Getting Started

Introduction	1-2
Purpose of this Manual.....	1-2
About Getting Started.....	1-2
Online Help Files and Other Documentation.....	1-2
Technical Support.....	1-2
Conventions Used	1-3
Key Topics for Each Chapter.....	1-3
Before you begin	1-4
Productivity Suite System Requirements	1-5
Step 1: Install Programming Software	1-6
Step 2: Launch Programming Software	1-11
Online Help.....	1-12
Step 3: Install Hardware	1-13
Step 4: Apply Power to CPU	1-16
Step 5: Establish PC to CPU Communications	1-17
Step 6: Open/Read Hardware Configuration	1-18
Step 7: Create a Project	1-20
Step 8: Save Project	1-26
Step 9: Write Project to CPU	1-27
Step 10: Place CPU in RUN Mode	1-28
Step 11: Test the Project Using the Monitor Mode	1-29

Chapter 2: Specifications

Overview	2-2
CPU System:.....	2-2
P3-03B, P3-05B, P3-08B, P3-11B Bases	2-3
P3-01AC and P3-01DC Power Supplies	2-5
P3-01AC Specifications.....	2-6
P3-01DC Specifications	2-7
Power Connections	2-8
Productivity3000 CPU Modules	2-9
P3-550 Specifications	2-11
LCD Message Display (P3-550)	2-13
Front Panel LCD Monitoring and Configuration (P3-550).....	2-14
P3-550E Specifications.....	2-15
LCD Message Display (P3-550E).....	2-17
Front Panel LCD Monitoring and Configuration (P3-550E).....	2-18
P3-530 Specifications	2-19
Battery (Optional)	2-21
Port Specifications	2-22
USB IN Port (P3-550 only).....	2-22
Ethernet Port.....	2-23
Remote I/O Port (P3-550(E))	2-23
USB OUT Port	2-24
EXP I/O OUT Port.....	2-24
RS-232 Port.....	2-25
RS-485 Port.....	2-26
P3-EX Expansion Module	2-27
Port Specifications	2-30
EXP I/O IN Port / EXP I/O OUT Port.....	2-30
Remote Slave Modules	2-31
P3-RS Remote Slave Module Specifications.....	2-33
P3-RS Remote Slave Module Front Panel	2-34
LCD Message Display (P3-RS only)	2-35
P3-RX Remote Slave Module Specifications	2-36
P3-RX Remote Slave Module Front Panel.....	2-37
Setting the Remote Slave Address	2-38

Port Specifications	2-40
USB IN Port (P3-RS only)	2-40
Remote I/O Port	2-41
EXP I/O OUT Port	2-42
RS-232 Serial Port	2-43
RS-485 Serial Port	2-44
I/O Modules Overview	2-45
Discrete I/O Modules	2-46
P3-16SIM Input Simulator	2-47
P3-08ND3S Isolated Sinking/Sourcing Input	2-48
P3-16ND3 Sinking/Sourcing Input	2-51
P3-32ND3 Sinking/Sourcing Input	2-54
P3-64ND3 Sinking/Sourcing Input	2-56
P3-08NAS AC Isolated Input	2-58
P3-16NA AC Input	2-61
P3-08TD1S Sinking Output	2-64
P3-08TD2S Sourcing Output	2-67
P3-16TD1 Sinking Output	2-70
P3-16TD2 Sourcing Output	2-73
P3-32TD1 Sinking Output	2-76
P3-32TD2 Sourcing Output	2-79
P3-64TD1 Sinking Output	2-82
P3-64TD2 Sourcing Output	2-85
P3-08TAS Isolated AC Output	2-88
P3-16TA AC Output	2-91
P3-08TRS Isolated Relay Output	2-94
P3-16TR Relay Output	2-97
P3-08TRS-1 Isolated Relay Output	2-100
P3-16TD3P Sinking/Sourcing Protected Output	2-103

Chapter 3: Analog I/O Specifications

Analog I/O Modules Overview	3-2
Analog I/O Modules	3-3
P3-04ADS Isolated Analog Input	3-4
P3-08AD Analog Input	3-10

Table of Contents

P3-16AD-1 Analog Input	3-15
P3-16AD-2 Analog Input	3-20
P3-08RTD Analog Input.....	3-25
P3-08THM Analog Input	3-30
P3-04DA Analog Output	3-35
P3-08DA-1 Analog Output	3-41
P3-08DA-2 Analog Output	3-46
P3-06DAS-1 Isolated Analog Output	3-51
P3-06DAS-2 Isolated Analog Output	3-56
P3-16DA-1 Analog Output	3-61
P3-16DA-2 Analog Output	3-66
P3-8AD4DA-1 Analog Input/Output.....	3-71
P3-8AD4DA-2 Analog Input/Output.....	3-77

Chapter 4: Specialty Module Specifications

High-Speed Input (HSI) Module Overview	4-2
HSI Specifications	4-2
HSI LED Indicators	4-5
HSI Wiring Examples	4-6
High-Speed Output (HSO) Module Overview	4-9
HSO Specifications	4-9
HSO LED Indicators	4-12
HSO Wiring Examples	4-12
High-Speed Module Tester Utility.....	4-16
P3-SCM Serial Communications Module	4-17
P3-SCM Specifications.....	4-17
P3-SCM LED Indicators.....	4-21

Chapter 5: Installation and Wiring

Safety Guidelines	5-2
Plan for Safety	5-2
Three Levels of Protection	5-3
Orderly System Shutdown.....	5-3
System Power Disconnect	5-3
Emergency Stop Circuits	5-4

Introduction to the Productivity3000 Mechanical Design	5-5
Dimensions and Installation.....	5-6
Mounting Guidelines.....	5-7
Enclosures	5-7
Mounting Position.....	5-7
Mounting Clearances	5-7
Grounding	5-7
Temperature Considerations.....	5-7
Power Considerations.....	5-7
Class 1, Division 2 Approval	5-9
Agency Approvals.....	5-9
Using Mounting Rails	5-10
Installing the Power Supply	5-11
Installing the CPU.....	5-12
Installing the I/O Modules.....	5-13
Wiring Guidelines	5-14
Wiring to the Power Supply	5-14
Grounding	5-14
Fuse Protection.....	5-15
I/O Modules Wiring Options.....	5-16
ZIPLink Wiring System.....	5-16
ZIPLink System Compatibility Matrix	5-17
Removable Terminal Blocks (Optional)	5-18
Planning the I/O Wiring Routes.....	5-19
System Wiring Strategies	5-20
CPU Isolation Boundaries	5-20
Sinking/Sourcing Concepts	5-21
I/O “Common Terminal” Concepts.....	5-22
DC Input Wiring Methods.....	5-23
DC Output Wiring Methods.....	5-23
Relay Outputs - Wiring Methods	5-25
Relay Outputs – Transient Suppression for Inductive Loads in a Control System.....	5-26

Chapter 6: PLC Communications

Communications: Capabilities.....	6-3
--	------------

Table of Contents

Communication Ports.....	6-3
Communications: Connectivity	6-11
Communication Ports.....	6-11
Communications: ASCII and Custom Protocol Functionality	6-17
ASCII Instructions	6-17
Custom Protocol Instructions	6-18
Communications: Ethernet.....	6-20
TCP and UDP Port Numbers	6-20
IP Addressing and Subnetting	6-20
PC Setup	6-21
CPU Setup.....	6-22
TCP Connection Behavior with Modbus TCP and Network Instructions	6-23
Communications Modbus Functionality	6-24
Master/Client Function Code and Data Type Support	6-24
Slave/Server Function Code and Data Type Support	6-26
Assigning Modbus Addresses to Tags	6-27
Modbus Options	6-30
Modbus Instructions.....	6-33
Network Instructions	6-35
Automatic Poll versus Manual Polling and Interlocking.....	6-36
Message Queue.....	6-38
EtherNet/IP for the Productivity Series	6-39
Terminology Definitions	6-39
Network Layer Chart	6-40
EtherNet/IP Data	6-40
Class 1 and Class 3 Connections	6-41
Example Setup: Productivity3000 as EtherNet/IP Adapter	6-41
Example Setup: Productivity3000 as EtherNet/IP Scanner	6-44
Troubleshooting Tips.....	6-47
Communications: Remote I/O and GS-Drives	6-50
Things to Consider for The Design of Remote I/O Networks	6-50
Configuration of Remote Slaves.....	6-51
Configuration of GS-Drive Connections.....	6-54
Communications: Port Configuration	6-58
Ethernet Configuration.....	6-58
External Ethernet Port Settings	6-59

Local Ethernet Port Settings..... 6-60

Remote Access Configuration 6-60

Serial Configuration..... 6-61

RS-232 and RS-485 Port Settings..... 6-61

Communications: Error Codes 6-64

 Productivity3000 Communication Error Codes..... 6-64

P3000 EtherNet/IP Error Codes 6-65

Chapter 7: Maintenance & Troubleshooting

Hardware Maintenance 7-2

 Standard Maintenance 7-2

 Air Quality Maintenance..... 7-2

 CPU Battery Replacement..... 7-2

Diagnostics 7-3

 Diagnostics..... 7-3

 Critical Errors..... 7-3

 Non-Critical Errors..... 7-3

 Finding Diagnostic Information 7-3

 Error Codes 7-3

CPU Indicators 7-4

PWR Indicator 7-5

 Incorrect Base Power 7-5

 Faulty CPU 7-5

 Device or Module Causing the Power Supply to Shutdown 7-6

RUN Indicator 7-7

CPU Indicator..... 7-7

Communications Problems 7-7

I/O Module Troubleshooting 7-8

 Things to Check..... 7-8

 Error Codes 7-8

 Some Quick Steps 7-8

 Testing Input Points 7-9

Noise Troubleshooting 7-10

 Electrical Noise Problems..... 7-10

 Reducing Electrical Noise..... 7-10

Table of Contents

Run Time vs. Stop Transfer Instruction	7-11
Run Time Transfers.....	7-12
Stop Mode Transfers	7-12
Forcing I/O Points	7-14
Advantages of Forces.....	7-14
Enabling Forces	7-14
Forcing Tags in Your System	7-15
Identifying Forced Values	7-17
Forced Values Timing Chart	7-18
 Appendix A: European Union Directives (CE)	
European Union Directives.....	A-2
Member Countries	A-2
Applicable Directives	A-2
Compliance	A-2
General Safety	A-3
Special Installation Manual	A-4
Other Sources of Information	A-4
Basic EMC Installation Guidelines	A-4
Enclosures ..	A-4
Mains Filters	A-5
Suppression and Fusing.....	A-5
Internal Enclosure Grounding.....	A-5
Equi-potential Grounding.....	A-5
Communications and Shielded Cables	A-6
Analog and RS232 Cables	A-7
Multidrop Cables.....	A-7
Shielded Cables Within Enclosures.....	A-7
Analog Modules and RF Interference.....	A-7
Network Isolation	A-8
Items Specific to the Productivity3000	A-9
 Appendix B: Productivity3000 Error Codes	
Communications Error Codes.....	B-2
Module Error Codes	B-3
CPU Error Codes	B-5
Project Error Codes.....	B-6
Project Error Messages	B-8