MicroVission Controller

Operation And Service Manual • Version 1.4





Important Message



READ CAREFULLY BEFORE OPERATING YOUR COMPRESSOR.

The following instructions have been prepared to assist in operation of Vilter[™] MicroVission Controllers.

The entire manual should be reviewed before attempting to operate.

Only qualified personnel shall operate, install and maintain the equipment.

Qualified personnel shall be accredited by a local regulatory agency, which requires that they are continually scrutinized by an organization whose sole mission is to establish, maintain and assure that the highest industry standards are set and met in a continuous and ongoing basis. The credentials shall address topics ranging from plant safety, operating concepts and principles and operations through the basics of refrigeration compliance and PSM (Process Safety Management) requirements.

Follow local workplace occupational safety and health regulations.

Vilter[™] micro-controllers are thoroughly inspected at the factory. However, damage can occur in shipment. For this reason, the equipment should be thoroughly inspected upon arrival. Any damage noted should be reported immediately to the Transportation Company. This way, an authorized agent can examine the unit, determine the extent of damage and take necessary steps to rectify the claim with no serious or costly delays. At the same time, the local Vilter[™] representative or the home office should be notified of any claim made.

All inquires should include the Vilter[™] sales order number, compressor serial and model number. These can be found on the compressor nameplate on the compressor.

All requests for information, services or parts should be directed to:

Copeland Industrial LP (Vilter) Customer Service Department 5555 South Packard Ave Cudahy, WI 53110 USA Telephone: 1-414-373-7615 Fax:1-414-744-3483 E-mail: info.vilter@copeland.com

Equipment Identification Numbers:

Vilter Order Number:	Software Version:
Vilter Order Number:	Software Version:
Vilter Order Number:	Software Version:
Vilter Order Number:	Software Version:

This manual contains instructions for the MicroVission Operation & Service Manual. It has been divided into 23 Sections and Appendices.

Section 1: Installation Recommendations

Section 2: Main Screen

Section 3: Hardware Architecture

Section 4: Menu Screen

Section 5: Compressor Control Screen

Section 6: Alarms and Trips Screen

Section 7: Timers Screen

Section 8: Instrument Calibration Screen

- Section 9: Event List Screen
- Section 10: Input/Output Screen
- Section 11: User Access
- Section 12: Configuration Screen
- Section 13: Data Back-Up
- Section 14: Maintenance
- Section 15: Compressor Scheduling
- Section 16: Service Options
- Section 17: Trend Chart
- Section 18: Help Screen
- Section 19: Compressor Sequencing
- Section 20: Auxiliary I/O
- Section 21: Condenser Control
- Section 22: Parts
- Section 23: Warranty Claim Processing

Appendices

- Appendix A: Unloaders
- Appendix B: Communication Tables
- Appendix C: Remote Control and Monitoring
- Appendix D: Compressor Sequencing Setup
- Appendix E: Abbreviations Used on the MicroVission Panel Screen

We recommend you to review the manual prior to servicing the MicroVission system parts.

Figures and tables are included to illustrate key concepts.

Safety precautions are shown throughout the manual. They are defined as the following:

NOTICE - Notices are shown when there are important information that can help avoid system failure.

WARNING - Warning statements are shown when there are hazardous situations, if not avoided, will result in serious injury or death.

CAUTION - Caution statements are shown when there are potentially hazardous situations, if not avoided, will result in damage to equipment.

NOTE - Notes are shown when there are additional information pertaining to the instructions explained.

Additional Important Notes

- Due to continuing changes and unit updates, always refer to the www.vilter.com to make sure you have the latest manual.
- Any suggestions for manual improvements can be made to Vilter[™] Manufacturing at the contact information on Page iii.

Section	Page Number
Important Message	
How To Use This Manual	2

Section 1 • Installation Recommendations

Proper Wiring Sizing	1-1
Voltage Source	1-1
Grounding	1-2
Mixing Voltages	1-2
DC Signals	1-2
Wiring Methods	1-3
Best Practices	1-4
Transformer, Fusing and UPS Sizing	1-4

Section 2 • Hardware Architecture

Overview	2-1
Multi-I/O (Input/Output) Board	2-1
Multi-IO Board Digital I/O	
Multi-IO Board Analog I/O	2-4
Digital In-Out Board	
Digital In-Out Board I/O	
Analog Input Board	
Analog Input Board I/O	
Analog Input Board Jumper Tables	2-10
Advisory For First Generation Microvission Panels	2-12

Section 3 • Main Screen

Overview	3-1
Top Status Bar	
Parameters Bar	
Control Parameter Box	
Bottom Status Bar	
Splash Screen	
Manual Run Mode Buttons	
Progress Bar	

Section 4 • Menu Screen

Overview	4-1
Navigation Buttons	4-1

Section 5 • Compressor Control

Overview	5-1
How Compressor Control Setpoint Works?	5-1
Suction Pressure Control	
Process Temperature Control	5-3
Discharge Pressure Control	
Unload Interval	
Auto Cycle	
Active Control Mode	
Load Limiting	

Section	Page Number
Oil Control	5-12
Compressor Variable Frequency Drive(VFD) Control	5-13
Pumpdown Control	5-14
Pulldown Control	5-15

Section 6 • Alarms and Trips Screen

Overview	6-1
Warnings	6-1
Inhibits	6-1
Alarms	6-1
Trips	6-1
Freeze Screens	6-1
Logging – Event List	6-1
Alarms & Trips Setpoints	6-2
MicroVission Safety Messages	6-4
Low Suction Pressure	6-4
High Discharge Pressure	6-4
Low Process Temperature	6-4
High Process Temperature	6-5
Low Suction Temperature	6-5
High Discharge Temperature	6-5
Low Crankcase Oil Temperature - Start	6-6
Low Crankcase Oil Temperature - Run	6-6
High Crankcase Oil Temperature	6-6
Low Oil Pressure Diff.	6-7
High Filter Diff. Pressure - Start	6-7
High Filter Diff. Pressure - Run	6-8
High Motor Amps	6-8
High Discharge #2 Pressure	6-8
High Discharge #2 Temperature	6-9
Remote Communication Time-out	6-9
Compressor Interlock	6-9
High Level Shutdown	6-10
Starter	6-10
False Start	6-10
IO Comm	6-11
Low Oil Level	6-11
Low Discharge Pressure	6-11
Low Discharge Temperature	6-11
Low Oil Filter In Pressure	6-12
Low Oil Filter Out Pressure	6-12
Low Discharge #2 Pressure	6-12
Low Discharge #2 Temperature	6-12
Auxiliary Safety Messages	6-13
Digital Aux In 1	6-14
Digital Aux In 2	6-14
Digital Aux In 3	6-15
Digital Aux In 4	6-15
Analog Aux In 1	6-16
Analog Aux In 2	6-17
Analog Aux In 3	6-17
Analog Aux In 4	6-18
Analog Aux In 5	6-18

Section	Page Number
Analog Aux In 6	6-19
Analog Aux In 7	6-19
Analog Aux In 8	
Result Variable Safety Messages	
Digital Result Variable	
Analog Result Variable	

Section 7 • Timers

Overview7·	·1
Timer Setpoints	·1

Section 8 • Instruments Calibration

Overview	8-1
I/O	8-1
Pressure & Temperature Inputs	8-1
Device Calibration	8-1
Channel Calibration	
Analog Inputs – Pressure	
Analog Inputs – Temperature	
Analog Inputs	8-6
Motor Current	8-6
4-20mA Scale	
Process Temperature or Pressure	
Auxiliary Inputs	8-8
Device Calibration	8-8
Channel Calibration	
Analog Outputs	8-10
5	

Section 9 • Events List

verview	9-1
vent List Columns	9-1

Section 10 • Input/Output States Screen

)verview

Section 11 • User Access

Overview	
Login	
Manage Accounts	
Screen Security Levels	11-3
Server security Levels manufacture and a security levels	

Section 12 • Configuration Screen

Overview	
Compressor Control	
Oil Monitoring	
Oil Level Trip	
Touch Screen	
Anti-Recycle	
Compressor VED	
Restart On Power Failure	

Section Page Number

Section 13 • Data Backup

Overview	
Refresh	
Save / Load	
Available Devices	
Factory Reset	
Setpoints Report	
Database Backup Procedure	13-4

Section 14 • Maintenance Screen

Overview	
Chart Tab	
Notes Tab	
log Tab	
5	

Section 15 • Compressor Scheduling

Dverview	1
cheduling Setpoint	1

Section 16 • Service Options

Overview	
Digital Outputs	
Analog Outputs	

Section 17 • Trend Chart

Overview	
Chart Operation	
Trend Data Storage	
Trend Setup	
··	

Section Page Number Section 18 • Help Screen

Overview	18-1
Screen Features	18-1

Section 19 • Compressor Sequencing

9-1
9-1
9-2
9-3
9-3
9-5
9-5
9-6
9-7
9-9
)-10
)-11
)-11
))))

Section 20 • Auxiliary I/O

Overview	
Digital Inputs	
Digital Outputs	
Analog Inputs	
Analog Outputs	
Auxiliary IO Result Variables	
5	

Section 21 • Condenser Control

Overview	
Condenser Control Setpoints	
Step Control	21-4

Section 22 • Parts

How to Read a Parts List And Illustration	22-1
Vilter™ Aftermarket Parts Contact Information	22-1
MicroVission - Main Enclosure Electrical Components	
MicroVission - SBC Assembly	

Section 23 • Warranty Claim Processing

Warranty Claim Processing	
Process For Returning Products Covered By The Warranty	
Procedure For Parts Not Manufactured By Copeland Industrial LP	
Motor and Other Third Party Components Warranty Procedure	

Section

Page Number

Appendix A • Unloaders

Unloading Schemes	A-1
Table A-0. Unloading Schemes	A-1
Unloader Tables	A-2
Table A-1. Type 1 Unloader - Cylinders: 2, 4, or 6 Unloading Percentage: 50% *	A-2
Table A-2. Type 2 Unloader - Cylinders: 4 Unloading Percentage: 25%, 50%, 75% Sir	Igle cylinder on Unload-
er Output #1 *	A-2
Table A-3. Type 3 Unloader - Cylinders: 6 or 12 Unloading Percentage: 33%, 66% *	A-2
Table A-4. Type 4 Unloader - Cylinders: 8 or 16 Unloading Percentage: 25%, 50% *	A-2
Table A-5. Type 5 Unloader - Cylinders: 8, 16 Unloading Percentage: 25%, 50%, 75%	*A-3
Table A-6. Type 6 Unloader - Cylinders: 4 or 8 Unloading Percentage: 50%, 100%*	A-3
Table A-7. Type 7 Unloader - Cylinders: 6 or 12 Unloading Percentage: 33%, 66%, 10()%*A-3
Table A-8. Type 8 Unloader - Cylinders: 6 or 12 Unloading Percentage: 17%, 33%, 50)%, 66% Single cylinder
on Unloader Output #1 *	A-3
Table A-9. Type 9 Unloader - Cylinders: 6 or 12 Unloading Percentage: 17%, 33	%, 50%, 66%, 83% Single
cylinder on Unloader Output #1 *	A-4
Table A-10. Type 10 Unloader - Cylinders: 7 Unloading Percentage: 29%, 57% *	A-4
Table A-11. Type 11 - Compressor with no Unloading *	A-4
Table A-12. Type 12 Unloader - Cylinders: 3 Unloading Percentage: 33% *	A-4
Table A-13. Type 13 Unloader - Cylinders: 8, 16 Unloading Percentage: 25%, 50%, 75	%, 100% * A-5
Table A-14. Type 14 Unloader - Cylinders: 6 Unloading Percentage: 33%, 50%, 66% I	Jnloading - Single cylin-
der on Unloader Output #1 st	A-5
Table A-15. Type 15 Unloader - Cylinders: 8 Unloading Percentage: 13%, 25%, 38%,	50%, 63%, 75% Unload-
ing - Single cylinder on Unloader Output #1 and Output #2 st	A-5
Table A-16. Type 16 Unloader - Cylinders: 8 Unloading Percentage: 13%, 38%, 63% l	Jnloading - Single cylin-
der on Unloader Output #1 st	A-6
Table A-17. Type 17 Unloader - Cylinders: 6 Unloading Percentage: 33%, 50%, 66% I	Jnloading - Single cylin-
der on Unloader Output #1 st	A-6
Table A-18. Type 18 Unloader - Cylinders: 5 Unloading Percentage: 40%, 60% Sing	jle cylinder on Unloader
Output #1 *	A-6
Table A-19. Type 19 Unloader - Cylinders: 3 Unloading Percentage: 33%, 66% Sing	Jle cylinder on Unloader
Output #1 and Output #2*	A-7
Table A-20. Type 20 Unloader - Cylinders: 7 Unloading Percentage: 14%, 29%, 43%	, 57% Single cylinder on
Unloader Output #1	A-7

Appendix B • Communication Tables

MicroVission Communication Table	B-1
Table B-1. Digital Inputs Block	B-1
Table B-2. Digital Outputs Block	B-1
Table B-3. Analog Inputs Block	B-2
Table B-4. Analog Outputs Block	B-2
Table B-5. Calculated Values Block	B-3
Table B-6. Statuses Block	B-3
Alarm Status Words	B-4
Table B-7. Alarm Status Words	B-4
Warning Status Words	B-5
Table B-8. Warning Status Words	B-5
Trip Status Words	В-6
Table B-9. Trip Status Words (Words 1 & 2)	В-6
Table B-9. Trip Status Words (Words 3 & 4)	B-7
Table B-10. Commands Block	B-8
Table B-11. Compressor Control Setpoints Block	В-9
Table B-12. Auto Cycle Block	B-10
-	

Page Number

Table B-13. Stop Load & Force Unload Block	B-11
Table B-14. Oil Control Block	B-11
Table B-15. Compressor VFD Block	B-11
Table B-16. Pumpdown Block	B-11
Table B-17. Pulldown Block	B-12
Table B-18. Alarms/Trips Block (Page 1) (1 of 2)	B-12
Table B-18. Alarms/Trips Block (Page 1) (2 of 2)	B-13
Table B-19. Alarms/Trips Block (Page 2)	B-14
Table B-20. Alarms/Trips Block (Page 3)	B-14
Table B-21. Timers Block (Page 1)	B-14
Table B-22. Timers Block (Page 2)	B-15
Table B-23. Configuration (Time) Block	B-15
Table B-24. Configuration (Other) Block	B-16
Table B-25. Trend Chart	B-17
Table B-26. Compressor Scheduling Block	B-20
Table B-27. Compressor Sequencing Block	B-22
Table B-28. Condenser Control Block	B-23
Table B-29. Virtual Inputs and Result Variables Block	B-24

Appendix C • Remote Control and Monitoring

Section

Introduction	C-1
Networking	C-1
Communication Wire	C-1
Ethernet Cable Specifications	C-1
RS-422/485 Cable Specifications	C-1
Figure C-1. Configuration Screen (Page 3)	C-1
Figure C-2. Serial Communication Ports on Single Board Computer	C-2
Common Register Setup to Control the MicroVission (Compressor Control) Via Communications	C-2
Figure C-3. Setting MicroVission in Remote Mode	C-3
Compressor Start and Stop Commands	C-5
Figure C- 4. Remote Cap Hold without Compressor VFD	C-5
Figure C-5. Remote Cap Hold with Compressor VFD	C-5
Remote Control via Direct I/O (Hard-wired)	C-6
Figure C-6. Direct IO Cap Hold without Compressor VFD	C-8
Figure C-7. Direct IO Cap Hold with Compressor VFD	C-8
Control Scenario	C-9
Remote Monitoring	C-9
Communication Port Setup	C-9
Figure C-8. Analog Auxiliary Input (Remote Capacity %) Settings- Calibration Screen	C-9
Figure C-9. Ethernet Port Detection Failure Message - Home Screen	C-10

Appendix D • Compressor Sequencing Setup

MicroVission Compressor Sequencing Setup	D-1
Scope	D-1
Overview	D-1
Configuration Overview	D-1
Figure D-1. Setup of Compressor for Loading and Unloading Compressors (Page 1)	D-1
Figure D-2. Compressor Sequencing Control Setpoints (Page 2)	D-2
Figure D-3. Compressor Control Menu Setup (Load & Unload Setpoints) (Page 1)	D-3
Compressor Sequencing Equipment List	D-4
Table D-1. Status Symbols	D-5
Figure D-4. Compressor(s) Started in Sequencing (Page 1)	D-6
Configuring Sequencing Table On Compressor	D-6

Section	Page Number
Walk-Through Of Sequencing Loading And Unloading	D-6
Figure D-5. Compressor(s) Load Cycle in Sequencing (Page 1)	D-7
Figure D-6. Compressor(s) Unload Cycle in Sequencing (Page 1)	D-8
Overview Of Compressor Unloading	D-8
Compressor Experiencing a Failure	D-9
Figure D-7. Compressor Sequencing Log (Page 4)	D-9
MicroVission Compressor Sequencing Setup And Configuration Overview	D-10
Configuration Overview	D-11
Figure D-8. Configuration Screen - Compressor Sequencing Setup (Page 3)	D-11
Figure D-9. Adding Compressors to Devices List (Page 3)	D-12
Setting Up the MicroVission Compressor Sequencing Parameters	D-12
Adding MicroVission Panels To the Devices List	D-12
Figure D-10. Devices List in Compressor Sequencing Screen (Page 3)	D-13
Figure D-11. Testing Connection in Compressor Sequencing Screen (Page 3)	D-14
Testing the MicroVission Panel Connections	D-14
Deleting MicroVission Panels From the Devices List	D-15
Figure D-12. Deleting Device from Devices List in Compressor Sequencing Screen (Pag	ge 3) D-15
Figure D-13. Setting up Compressors for Sequencing (Page 1)	D-16
Setting Up the Compressor Sequencing Table	D-16
Final Steps For Setting Up Compressor Sequencing	D-17
Figure D-14. Placing Compressors in Auto Seq or Seq Stand-By	D-17
Figure D-15. Compressors in Ready to Run State (Page 1)	D-18

Appendix E • Abbreviations Used on the MicroVission Panel Screen

Abbreviations Used On the MicroVission Pane	Screen E-1	
Table E. Abbreviations Used	E-1	

Table / Figure

Page Number

List of Tables and Figures

Tables

Table 2-1. Multi-IO Board (Digital I/O)	
Table 2-2. Multi-IO Board (Analog I/O)	
Table 2-3. Multi-IO Board Analog Input Jumper Tables	
Table 2-4. Auxiliary (Digital I/O)	
Table 2-5. Auxiliary Analog Input	
Table 2-6. Analog Input Board Jumper Tables	2-10
Table 2-6. Analog Input Board Jumper Tables (continued)	2-11
Table 11-1. Security Access Levels	11-3
Table 12-1. 12/16 Cylinder Configuration Setup	
Table 12-2. Condenser Control Setup	
Table 12-3. Direct I/O Setup	12-6
Table 19-1. Status Symbols	

Figures

Figure 1-1. MicroVission with Individual Transformer	
Figure 1-2. EMI and MicroVission	
Figure 1-4. Mixed Voltage Wiring	
Figure 1-3. Ground Wiring	
Figure 1-5. Correct Transformer Wiring Method	1-3
Figure 1-6. Incorrect Transformer Wiring Method	
Figure 2-1. Hardware Architecture Overview	
Figure 2-2. Multi I/O Board Lavout	2-2
Figure 2-3. Digital Input-Output Board Lavout	2-6
Figure 2-4 Analog Input Board Layout	7-8
Figure 2-5. Jumper J4 on the Processor Board	2-12
Figure 3-1 Main Screen	3-1
Figure 3-7 Top Status Bar	3-7
Figure 3-3 Parameters Bar	3-3
Figure 3-4 Start Dialog Box	3-4
Figure 3-5. Rottom Status Bar	3-5
Figure 3-6 Warning Pon-up Window	3-6
Figure 3-7 Splash Screen	3-6
Figure 3-8 Manual Run Mode Ruttons and Progress Bar	3-6
Figure 3-9. Pumpdown Operation Running Icon	
Figure 3-10 Pulldown Operation Running Icon	
Figure 3-11 Compressor Sequencing Icon	
Figure 3-12 Condenser Control Operation Running Icon	2_Q
rigure 5-12. Condenser control operation kunning icon	
Figure 4-1. Menu Screen	4-1
Figure 5-1. Compressor Control Screen (Page 1) - Suction Pressure Control	5-2
Figure 5-2. Compressor Control Screen (Page 3) - Process Temperature Control	5-3
Figure 5-3. Compressor Control Screen (Page 1) - Discharge Pressure Control	5-4
Figure 5-4. Compressor Control Screen (Page 2) - Auto Cycle (Suction Pressure)	5-5

Table / Figure Page Nu	mber
Figure 5-5. Compressor Control Screen (Page 2)- Auto Cycle (Suction Pressure) with Pulldown Running	5-6
Figure 5-6. Compressor Control Screen (Page 4) – Auto Cycle (Process Temperature)	5-7
Figure 5-7. Compressor Control Screen (Page 4) – Auto Cycle (Process Temperature) with Pulldown Runnin	ng 5-8
Figure 5-8. Compressor Control Screen (Page 2) - Auto Cycle (Discharge Pressure)	
Figure 5-9. Compressor Control Screen (Page 5) – Active Control Mode - I/O Based Setpoint Control	5-10
Figure 5-10. Compressor Control Screen (Page 5) - Load Limiting	5-11
Figure 5-11. Compressor Control Screen (Page 4) - Oil Control	5-12
Figure 5-12. Compressor Control Screen (Page 3) - VFD Settings Control	5-13
Figure 5-13. Compressor Control Screen (Page 5) – Pumpdown Control	5-14
Figure 5-14. Compressor Control Screen (Page 5) – Pulldown Control (Active Control Mode – Suction Pres	sure SP1)
	5-16
Figure 5-15. Compressor Control Screen (Page 5) – Pulldown Control (Active Control Mode – Process Cont	trol SP1)
	5-17
Figure 6-1. Alarms and Trips Setpoints (Page 1)	6-2
Figure 6-2. Alarms and Trips Setpoints (Page 2)	6-3
Figure 6-3. Alarms and Trips Setpoints (Page 3)	6-3
Figure 6-4. Digital Inputs (Auxiliary I/O Screen) (Page 1)	6-13
Figure 6-5. Analog Inputs (Auxiliary I/O Screen) (Page 3)	6-16
Figure 6-6. Digital Result Variable Safety (Auxiliary I/O Screen) (Page 5)	6-21
Figure 6-7. Analog Result Variable Safety (Auxiliary I/O Screen) (Page 5)	6-22
Figure 7-1. Timers Screen (Page 1)	7-1
Figure 7-2. Timers Screen (Page 2)	7-2
Figure 8-1. Instrument Calibration Screen (Page 1) – Analog Inputs (Suction Pressure)	
Figure 8-2. Instrument Calibration Screen (Page 1) – Analog Inputs (Discharge Pressure)	
Figure 8-3. Instrument Calibration Screen (Page 1) – Analog Inputs (Oil Pressure)	
Figure 8-4. Instrument Calibration Screen (Page 1) – Analog Inputs (Filter In Pressure)	
Figure 8-5. Instrument Calibration Screen (Page 1) – Analog Inputs (Filter Out Pressure)	
Figure 8-6. Instrument Calibration Screen (Page 2) – Analog Inputs (Suction Temperature)	
Figure 8-7. Instrument Calibration Screen (Page 2) – Analog Inputs (Discharge Temperature)	8-5
Figure 8-8. Instrument Calibration Screen (Page 2) – Analog Inputs (Oil Temperature)	8-5
Figure 8-9. Instrument Calibration Screen (Page 3) – Analog Inputs (Motor Current)	
Figure 8-10. Instrument Calibration Screen (Page 3) – Analog Inputs (Process Temperature)	
Figure 8-11. Instrument Calibration Screen (Page 4) – Auxiliary Inputs	
Figure 8-12. Instrument Calibration Screen (Page 5) – Auxiliary Inputs	
Figure 8-13. Instrument Calibration Screen (Page 6) – Auxiliary Outputs	8-10
Figure 8-14. Instrument Calibration Screen (Page 6) – Auxiliary Outputs Disabled	8-11
Figure 9-1. Event List Screen	9-1
Figure 10-1. Input/Output States Screen (Page 1) - Live I/O Data	10-1
Figure 10-2. Input/Output States Screen (Page 2) - Live I/O Data	10-2
Figure 10-3. Input/Output States Screen (Page 3) – Live I/O Data	10-2
Figure 10-4. Input/Output States Screen (Page 4) – Live I/O Data	10-3
Figure 10-5. Input/Output States Screen (Page 5) – Live I/O Data	10-3
Figure 10-6. Input/Output States Screen (Page 6) – Live I/O Data	10-4
Figure 10-7. Input/Output States Screen (Page 1) - Freeze Data	10-4
Figure 10-8. Input/Output States Screen (Page 1) – Freeze Data (Trip Condition)	10-5
Figure 11-1. User Access Screen - Login	11-1
Figure 11-2. User Access Screen - Manage Accounts	11-2

Table / Figure

Page Number

Figure 12-1 Configuration Screen (Page 1)	17-1
Figure 12-2 Configuration Screen (Page 2)	12-4
Figure 12-3 Configuration Screen (Page 3) - Communication	12-7
Figure 12-4 Configuration Screen (Page 4) – Configurable Main Screen Settings	12-8
Figure 12-5 Configurable Parameters on Main Screen	17-9
Figure 12-6 Configuration Screen (Page 5) – Aux Analog and Aux Digital Inputs Configuration	17-10
Figure 12-7. Configuration Screen (Fage 6) Aux Analog and Aux Digital Inputs Configuration	12-10
Figure 12.9. Configuration Screen (Page 7) Virtual Analog and Virtual Digital Inputs Configuration	12-11
Figure 12-0. Configuration Screen (Page 2) – Virtual Analog and Virtual Digital Inputs Configuration	12-12
Tigure 12-5. Configuration Screen (Fage 8) - 1/O Configuration	12-13
Figure 13-1 Data Backup Screen - Savell oad	13-1
Figure 13-7 Data Backup Screen - Migrate and Factory Reset	13-7
Figure 13-3 Data Backup Screen - Setpoints Report	13-3
Figure 13-4. Data Backup Save Load Restart Ponun	13-6
Figure 12-5. Data Backup Save Load Missing File List	12.6
Figure 12 6. Data Backup Load Missilly File List	12 7
Figure 12-7. Data Backup Save Load Oser Comminduon For IP Address	12-7
Figure 12.9. CD Card Daplacement	12 0
Figure 13-8. SD Card Replacement	13-8
Figure 14-1. Maintenance Screen - Chart	14-1
Figure 14-2. Maintenance Screen – Information Icon	14-2
Figure 14-3. Maintenance Screen – Information Pop-up Window	14-2
Figure 14-4. Maintenance Screen – Maintenance Due Soon	14-3
Figure 14-5. Maintenance Screen – Maintenance Overdue	14-3
Figure 14-6. Maintenance Screen – Confirmation for Maintenance Sign-Off	14-4
Figure 14-7. Maintenance Screen – Maintenance Screen – Maintenance Sign-Off	14-4
Figure 14-8. Maintenance Screen – Custom Maintenance Task Pop-up	14-5
Figure 14-9. Maintenance Screen – Notes	14-6
Figure 14-10. Maintenance Screen – Log	14-7
5	
Figure 15-1. Compressor Scheduling Screen	15-1
5 1 5	
Figure 16-1 Service Options Screen (Page 1) - Digital Outputs	16-1
Figure 16-2. Service Options Screen (Page 1) – Digital Outputs	16_7
Figure 16.2. Service Options Screen (Page 7) – Occupied Digital Outputs Disabled	16.2
Figure 16.4 Service Options Screen (Page 2) – Analog Outputs	16 /
Figure 10-4. Service Options Screen (Page 2) – Occupied Analog Outputs Disabled	10-4
Figure 17-1. Irend Chart Screen	/-
Figure 17-2. Trend Setup Screen	17-3
	10.1
Figure 18-1. Help Screen	18-1
Figure 18-2. Help Screen in Full Screen Mode	18-2
Figure 18-3. Help Screen with List of Manuals Hidden	18-3
Figure 18-4. Version Pop-up Screen in Help Screen	18-4
Figure 19-1. Compressor Sequencing Screen (Page 1) – Sequencing Setup Screen	19-1
Figure 19-2. Compressor Sequencing Screen (Page 2) – Setpoints Configuration	19-3
Figure 19-3. Compressor Sequencing Screen (Page 2) – Control Mode Change	19-4
Figure 19-5. Compressor Sequencing Screen (Page 3) – Detected Devices	19-6
Figure 19-6. Compressor Sequencing Screen (Page 3) – Confirm Delete Device	19-7
Figure 19-7. Compressor Sequencing Screen (Page 3) – Select Delete Device	19-8
Figure 19-8. Compressor Sequencing Screen (Page 3) – Test Connection	19-9
Figure 19-9. Compressor Sequencing Screen (Page 4) – Compressor Sequencing Events Log	19-10

۲able / Figure	Page Number
Figure 19-10. Configuration Screen (Page 3) – Compressor Sequencing Setup	
Figure 19-11. Compressor Start Dialog – Auto Seg and Seg Stand-By	
Figure 19-12. Main Window – Auto Seg Stand-By	
Figure 19-13. Main Window – Auto Seg (Full Load)	
5	
Figure 20-1. Auxiliary I/O Screen (Page 1) – Digital Inputs	
Figure 20-2. Auxiliary I/O Screen (Page 2) – Digital Outputs Enabled with Timer	
Figure 20-3. Auxiliary I/O Screen (Page 2) – Digital Outputs Latching Enabled with Timer	
Figure 20-4. Auxiliary I/O Screen (Page 2) – Digital Outputs Latching Enabled with Digital Input	:
Figure 20-5. Auxiliary I/O Screen (Page 3) – Analog Inputs	
Figure 20-6. Auxiliary I/O Screen (Page 4) – Analog Outputs PID Control	
Figure 20-7. Auxiliary I/O Screen (Page 4) – Analog Outputs Scalable Control	
Figure 20-8. Auxiliary I/O Screen (Page 5) – Result Variables – Start Properties	
Figure 20-9. Auxiliary I/O Screen (Page 5) – Result Variables – Analog Variable Block Properties	
Figure 20-10. Auxiliary I/O Screen (Page 5) – Result Variables – Decision Block Properties	
Figure 20-11. Auxiliary I/O Screen (Page 5) – Result Variables – Digital Variable Block Propertie	s20-11
Figure 20-12. Auxiliary I/O Screen (Page 5) – Result Variables – Analog Safety Block Properties	
Figure 20-13. Auxiliary I/O Screen (Page 5) – Result Variables – Digital Safety Block Properties	
Figure 21-1. Condenser Control Setpoints (Page 1)	
Figure 21-2. Condenser Step Control (Page 2)	
5	
Figure 22-1. MicroVission - Main Enclosure Electrical Components	
Figure 22-2. MicroVission - SBC Assembly	

Proper Wiring Sizing

- Always size wire gauges as specified by the National Electrical Code (NEC) for electronic control devices.
- For improved noise immunity, install one size larger wire gauge than the NEC requirement to assure ample current-carrying capability.
- Never under size wire gauges.

Voltage Source

- Transformers block a large percentage of Electromagnetic Interference (EMI). We recommend that Vilter MicroVission should be isolated with its own control transformer for the most reliable operation. See Figure 1-1: MicroVission with Individual Transformer for reference.
- Avoid connecting MicroVission to breaker panels and central control transformers if possible, as the MicroVission is exposed to large amounts of EMI emitted from the other devices connected to the secondary terminals of the transformer. See Figure 1-2: EMI and MicroVission for reference.



Figure 1-1. MicroVission with Individual Transformer



Figure 1-2. EMI and MicroVission

Grounding

- Ensure that you run continuous grounds from the utility ground to the MicroVission. See Figure 1-3: Ground Wiring.
- Grounds must be copper or aluminum wire.
- Never use conduit grounds.

Mixing Voltages

• Separate different voltages from each other and separate AC from DC, see Figure 1-4: Mixed Voltage Wiring.

- Each voltage level must be run in separate conduit:
 - 460 VAC
 - 230 VAC
 - 120 VAC
 - 24 VAC
 - DC Signals
- If your installation site has wireways or conduit trays, you must install dividers between the different voltages.

DC Signals

• If your installation site has wireways or conduit trays, you must install dividers between the different voltages.



Figure 1-3. Ground Wiring



Figure 1-4. Mixed Voltage Wiring

Wiring Methods

Ensure each MicroVission panel has its own individual control transformer, see Figure 1-5: Correct Transformer Wiring method and Figure 1-6: Incorrect Transformer Wiring Method.



Figure 1-5. Correct Transformer Wiring Method



Figure 1-6. Incorrect Transformer Wiring Method

Best Practices

- Do's:
 - Keep AC wires away from circuit boards.
 - Always run conduit into the bottom or sides of an enclosure.
 - Use a water-tight conduit fitting to prevent water from entering the enclosure, if the conduit must be placed in the top of an enclosure.
 - The MicroVission is supplied with pre-punched conduit holes for your use.
- Don'ts:
 - Do not run wires through the MicroVission enclosure that are not related to the compressor control.
 - Do not add relays, timers, transformers, etc. In the MicroVission enclosure without first checking with Vilter[™].
 - Do not run conduit into the top of an enclosure.
 - Do not run refrigerant tubing inside the enclosure.
 - Do not drill metal enclosures without taking proper precautions to protect circuit boards from damage.

Transformer, Fusing and UPS Sizing

You can use the following information to determine the power requirements for a MicroVission panel. This information is helpful for sizing transformers or UPS devices that power the MicroVission panel.

- The MicroVission panel contains a single power supply
 - (1) 24VDC @ 4.5 A (108 watts).
- The DC loads that are attached to the power supply are divided approximately as follows;
 - 1. Each press transducer +24VDC @ 30 mA each (x4) = 120 mA.
 - 2. Each RTD (negligible), (the hardware applies a 25 mA pulsed signal, which is not constant).

For estimating purposes, assume: A total sum constant draw for total RTDs used 50 mA.

- 3. Each 4-20mA transmitter for an RTD = 10 mA.
- So, for 120V fusing consider 110 watts for the power supply, PLUS add any additional 120V loads that are connected to the digital outputs + relays added to the panel.
 - 1. Each unloader solenoid = 0.125 amps AC load.
 - 2. Each small solenoid = 50 watts (estimate read the nameplate for exact load rating).
 - 3. Large solenoids (water, hot gas) = 100 watts (estimate read nameplate for exact load rating).
 - 4. Each small pilot relay = 25 watts (estimate read the nameplate for exact load rating).
 - 5. Add load values for panel heaters if used, and heat trace tape if used.

Overview

The MicroVission control panel utilizes the ARM PC technology with a Linux operating system. For hardware architecture, see Figure 2-1.

The MicroVission has the following attributes

- Low power, Industrial rated ARM CPU
- 10" XGA, high resolution LCD display. (Outdoor viewable LCD optional)
- 8-wire touch screen operator interface
- Flexible and expandable I/O
- NEMA-4 enclosure (NEMA-4X optional)
- Industrial temperature range design



Figure 2-1. Hardware Architecture Overview

Multi-I/O (Input/Output) Board

This section explains about the Multi-IO board containing Digital Input/Output and Analog Input/Output signals.

The Multi-IO board converts signals generated by the MicroVission program into 120VAC signals as well as detect external 120VAC inputs to signal the MicroVission program. All the signals shown by connectors 1, 2, 3 and 4 are digital, in that there are only two states available either ON or OFF. See board layout, Figure 2-2.

The Multi-IO board converts the varying DC signals into a signal that the MicroVission program can interpret. The signals are considered analog because the input DC signal can vary from the minimum value to the maximum value. All the signals shown by connectors 6, 7, 8, 9 and 10 are analog inputs. This board can also convert signals from the MicroVission program into a current ranging from 4mA to 20mA. These are called analog outputs and shown by connectors 12 and 13. For more information about the board layout see Figure 2-2.





Multi-IO Board Digital I/O

For information about each Digital I/O signal, see Table 2-1. Multi-IO Board (Digital I/O).

Oil Return Solenoid Output

• When state of Low Oil Level Digital Input is found Active Low, this output is energized. When state of Low Oil Level Digital Input is changed to Active High from Active Low state, this output will be deenergized only once Oil Recovery Solenoid Shutoff Delay Timer is Lapsed.

Unloader (#1 to #4) Output

 These outputs are active only when the compressor is running. When the MicroVission determines that the compressor should increase or decrease capacity, these outputs will get de-energized or energized respectively in specific sequence as per Compressor Type set in Configuration screen. See Appendix A, Unloaders section for more details.

Trip Output

• This output is energized when the system has no Trips. If a trip is issued, the output de-energizes and stays de-energized until the trip condition is cleared.

Oil Crank Case Heater Output

• This output is active and energized when the oil temperature is lower than the oil temperature setpoint. It is de-energized when the oil temperature is higher than the oil temperature setpoint.

Compressor Start Output

 When the MicroVission signals the compressor to start, this output is energized. When the MicroVission signals the compressor to stop, this output is de-energized.

Remote Ready Output

- This output is energized when the MicroVission panel is enabled for Direct I/O control. This output will be de-energized in any of these cases:
 - If there is a warning/trip/inhibit condition present in the compressor
 - if there is still Anti-Recycle Time present
 - if the compressor is placed in the manual stop position

Setpoint 1/2 Input

• This input is monitored when I/O Based Setpoint Control is Enabled in Compressor Control Screen. When this input is de-energized, the MicroVission uses Setpoint 1 as Control Setpoint for modulating the compressor capacity. When this input is energized, the MicroVission uses Setpoint 2 as Control Setpoint for modulating the compressor capacity. For using Setpoint 2, you should make sure that No. of Controllers is set to 2 in Configuration screen.

Remote Decrease Input

• This input will be monitored when the MicroVission panel is enabled for Direct I/O control. When this input is energized, the MicroVission will unload compressor by one step.

Remote Increase Input

• This input will be monitored when the MicroVission panel is enabled for Direct I/O control. When this input is energized, the MicroVission will load compressor by one step.

Remote Start/Stop Input

• This input will be monitored when the MicroVission panel is enabled for Direct I/O control or if Run Permissive option is enabled. When this input is energized, the compressor will be allowed to start in selected run mode. If the compressor is running and this input is found de-energized, the compressor will be stopped and the compressor will have to wait for next start until this input gets energized.

Low Oil Level Input

• This input must be energized for the compressor to operate. If this input gets de-energized, the compressor will be stopped and issue a Low Oil Level trip provided Oil Level Trip option is enabled in Configuration screen.

High Level Shutdown Input:

• The MicroVission monitors this digital input to check whether the power is removed from the input module during compressor start. This input must be energized for the compressor to operate. If deenergized, the compressor will shut down and issue a High Level Shutdown trip.

Connector on Multi-IO Board	I/O #	Description	Channel Type
X1-1	1	Oil Return Solenoid	OUTPUT
X1 – 2	2	Unloader #4	OUTPUT
X1 – 3	3	Unloader #3	OUTPUT
X1-4	4	Unloader #2	OUTPUT
X2 – 1	5	Unloader #1	OUTPUT
X2 – 2	6	Trip	OUTPUT
X2 – 3	7	Oil Crank Case Heater	OUTPUT
X2 – 4	8	Compressor Start	OUTPUT
X3 – 1	9	Remote Ready	OUTPUT
X3 – 2	10	Setpoint 1/2	INPUT
X3 – 3	11	Remote Decrease	INPUT
X3 – 4	12	Remote Increase	INPUT
X4 – 1	13	Remote Start/ Stop	INPUT
X4 – 2	14	Low Oil Level	INPUT
X4 – 3	15	High Level Shutdown	INPUT
X4 – 4	16	Compressor Motor Auxiliary	INPUT

Table 2-1. Multi-IO Board (Digital I/O)

Connector on Multi-IO Board	I/O #	Description	Channel Type	Signals Type
X6 – 2	1	Process Temperature	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X6 – 5	2	Oil Temperature	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X7 – 2	3	Discharge Temperature	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X7 – 5	4	Suction Temperature	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X8 – 2	5	Filter Out Pressure	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X8 – 5	6	Filter In Pressure	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X9 – 2	7 Oil Manifold Pressure		INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X9 – 5	8	Discharge Pressure	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X10 – 2	9	Suction Pressure	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X10 – 5	10	Motor Amps (4-20 mA)	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X12 – 1	11	Compressor VFD	OUTPUT	4-20 mA
X12 – 3	12	Auxiliary Output #1	OUTPUT	4-20 mA
X12 – 5	X12 – 513Auxiliary Output #2		OUTPUT	4-20 mA
X13 – 1	X13 – 1 14 Auxiliary Output #3		OUTPUT	4-20 mA
X13 – 3	15	Auxiliary Output #4	OUTPUT	4-20 mA
X13 – 5	16	Auxiliary Output #5	OUTPUT	4-20 mA

Table 2-2. Multi-IO Board (Analog I/O)

Compressor Motor Starter Auxiliary Input:

• This input looks for a feedback signal from the compressor starter, confirming that the compressor starter is energized.

Multi-IO Board Analog I/O

For information about each Analog I/O signal, see Table 2-2. Multi-IO Board (Analog I/O).

Process Temperature

• Default signal is RTD. Process temperature calibration is set in the calibration screen.

Oil Temperature

• Default signal is RTD. Oil temperature calibration is set in the calibration screen.

Discharge Temperature

• Default signal is RTD. Discharge temperature calibration is set in the calibration screen.

Suction Temperature

• Default signal is RTD. Suction temperature calibration is set in the calibration screen.

Filter Out Pressure

• Default signal is 4-20 mA. Filter Out pressure transducer range and calibration are set in the Calibration screen.

Filter In Pressure

• Default signal is 4-20 mA. Filter In pressure transducer range and calibration are set in the calibration screen.

Oil Manifold Pressure

• Default signal is 4-20 mA. Oil manifold pressure transducer range and calibration are set in the calibration screen.

Discharge Pressure

• Default signal is 4-20 mA. Discharge pressure transducer range and calibration are set in the calibration screen.

Suction Pressure

• Default signal is 4-20 mA. Suction pressure transducer range and calibration is set in the calibration screen.

Motor Amps

• Default signal is a 4-20 mA. The Motor Amps calibration is set in the calibration screen.

Compressor VFD

• Default signal is a 4-20 mA output to control compressor motor speed with a Variable Frequency Drive (VFD).

Auxiliary Output #1 - #5:

• Optional outputs that can be configured in user defined manner. When Condenser Control option is selected in the configuration screen, Auxiliary Output can be used to control Condenser VFD Fan.

Multi-IO Board Analog Input Jumper Tables

With the following tables you can configure each channel of the Multi-IO board analog inputs, signal type and range, see Table 2-3.

Channel 1	Signal	JP - 1	JP - 2	JP - 3	JP - 4	Channel 2	Signal	JP - 5	JP - 6	JP - 7	JP - 8
A	0-5 VDC	OUT	OUT	OUT	OUT		0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT		4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT	Analog	ICTD	OUT	IN	OUT	OUT
Input 1	0-10 VOLT	OUT	OUT	IN	OUT	mput 2	0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN		RTD	OUT	OUT	OUT	IN

Table 2-3. Multi-IO Board Analog Input Jumper Tables

Channel 3	Signal	JP - 9	JP - 10	JP - 11	JP - 12	Channel 4	Signal	JP - 13	JP - 14	JP - 15	JP - 16
	0-5 VDC	OUT	OUT	OUT	OUT		0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT		4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT	Analog	ICTD	OUT	IN	OUT	OUT
Input 3	0-10 VOLT	OUT	OUT	IN	OUT	mput 4	0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN		RTD	OUT	OUT	OUT	IN

Channel 5	Signal	JP - 17	JP - 18	JP - 19	JP - 20
	0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT
input 5	0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN

Channel 6	Signal	JP - 21	JP - 22	JP - 23	JP - 24
	0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT
input 6	0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN

Channel 7	Signal	JP - 25	JP - 26	JP - 27	JP - 28
	0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT
Input 7	0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN

Channel 8	Signal	JP - 29	JP - 30	JP - 31	JP - 32
	0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT
input 8	0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN

Channel 9	Signal	JP - 33	JP - 34	JP - 35	JP - 36	Channel 1) Signal	JP - 37	JP - 38	JP - 39	JP - 40
	0-5 VDC	OUT	OUT	OUT	OUT		0-5 VDC	OUT	OUT	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT	Analog Input 10	4-20 mA	IN	OUT	OUT	OUT
Analog	ICTD	OUT	IN	OUT	OUT		ICTD	OUT	IN	OUT	OUT
Input 9	0-10 VOLT	OUT	OUT	IN	OUT		0-10 VOLT	OUT	OUT	IN	OUT
	RTD	OUT	OUT	OUT	IN		RTD	OUT	OUT	OUT	IN

Digital In-Out Board

The digital input - output board converts signals generated by the MicroVission program into 120VAC signals as well as detect external 120VAC inputs to signal the MicroVission program. All the signals are digital and in that there are only two states available either ON or OFF. See board layout, Figure 2-3.

Signal LEDs

 In the following diagram, the Signal LEDs for output are marked in a Blue color and for input they are marked in a Light Blue color. These LEDs indicate when a 120VAC output is being produced or a 120VAC signal is detected.

Voltage LEDs

 In the following diagram, the Voltage LEDs are marked in an Orange color. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs

In the following diagram, the Communication LEDs are marked in a Green color. These LEDs show the active communications between the digital inputoutput board and MicroVission CPU board.

Address Dipswitches

 In the following diagram, the Address Dipswitches are marked in a Red color. These dipswitches are used to assign each board its address position. The address is binary and therefore the address of a digital input-output board is 2 (0010).



Figure 2-3. Digital Input-Output Board Layout

Digital In-Out Board I/O

For information about each Digital I/O signal, see Table 2-4. Auxiliary Digital I/O.

Auxiliary Digital Output #1 - #4

• With Auxiliary Digital Output you can configure the digital output. When Condenser Control is selected in Configuration screen, these outputs can be used to control to condenser fans /pumps.

Auxiliary Digital Input #1 - #4

• These are optional digital inputs you can configure to control, alarm or trip. These are connected to external switched devices.

Connector on Auxil iary Digital-IO Board	I/O #	Description	Channel Type
X1 – 1	1	Auxiliary Output #1	OUTPUT
X1 – 2	2	Auxiliary Output #2	OUTPUT
X1 – 3	3	Auxiliary Output #3	OUTPUT
X1 – 4	4	Auxiliary Output #4	OUTPUT
X2 – 1	5	Auxiliary Input #1	INPUT
X2 – 2	6	Auxiliary Input #2	INPUT
X2 - 3	7	Auxiliary Input #3	INPUT
X2 – 4	8	Auxiliary Input #4	INPUT

Table 2-4. Auxiliary (Digital I/O)

Analog Input Board

The analog input board converts the varying DC signals into a signal that the MicroVission program can interpret. The signals are considered analog because the input DC signal can vary from the minimum value to the maximum value. See Figure 2-4.

Configuration Jumpers

 In the following diagram, the configuration jumpers are marked in Purple color. With the jumpers you can configure the signal type and range for incoming analog signals. For the correct jumper setting for a given application, see Table 2-6. Analog Input Board Jumper Tables.

Voltage LEDs

• In the following diagram, the Voltage LEDs are marked in Orange color. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs

In the following diagram, the Communication LEDs are marked in Green color. These LEDs show the active communications between the digital output board and the MicroVission CPU board.

Address Dipswitches

 In the following diagram, the Address Dipswitches are marked in Red color. These dipswitches are used to assign each board its address position. The address is binary and therefore the address of a analog input board will be 1 (0001).



Figure 2-4. Analog Input Board Layout

Analog Input Board I/O

For information about each Analog input signal, see Table 2-5. Auxiliary Analog Input.

Auxiliary Analog Input #1 - #8

• Optional analog inputs that can be configured to control, alarm or trip.

Connector on Auxiliary Analog Input Board	I/O #	Description	Channel Type	Signals Type
X1-4	1	Auxiliary Input #1	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X1 – 7	2	Auxiliary Input #2	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X2 – 2	3	Auxiliary Input #3	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X2 – 5	4	Auxiliary Input #4	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X3 – 2	5	Auxiliary Input #5	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X3 – 5	6	Auxiliary Input #6	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X4 – 2	7	Auxiliary Input #7	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD
X4 – 5	8	Auxiliary Input #8	INPUT	0-5 V, 0-10 V, 4-20 mA, RTD, ICTD

Table 2-5. Auxiliary Analog Input

Analog Input Board Jumper Tables

With this tables you can configure each channel of the analog input board signal type and range, see Table 2-6.

Channel 1	Signal	JP - 1	JP - 2	JP - 3	JP - 27	JP - 35
Analog Input 1-A*	0-5 AMP	OUT	OUT	OUT	OUT	IN
	0-5 VOLT	OUT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT	OUT
Analog	0-10 VOLT	OUT	OUT	IN	OUT	OUT
input 1-B**	4-20 mA	IN	OUT	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT	OUT
	RTD	OUT	OUT	OUT	IN	OUT

Table 2-6. Analog Input Board Jumper Tables

* Use Analog Input 1-A when 0-5 AMP secondary current transformers are installed in the motor starter.

** Use Analog Input 1-B when current transformers are installed in the motor starter.

Channel 2	Signal	JP - 4	JP - 5	JP - 6	JP - 28
Analog	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
Input 2	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

Channel 3	Signal	JP - 7	JP - 8	JP - 9	JP - 29
Analog Input 3	0-5 VOLT	0-5 VOLT OUT OUT		OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

annel 4	Signal	JP - 10	JP - 11	JP - 12	JP - 30	Channel 5	Signal	JP - 13	JP - 14	JP - 15	JP - 3 1
	0-5 VOLT	OUT	OUT	OUT	OUT		0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT		1-5 VOLT	OUT	OUT	OUT	OUT
Analog	0-10 VOLT	OUT	OUT	IN	OUT	Analog	0-10 VOLT	OUT	OUT	IN	OUT
nput 4	4-20 mA	IN	OUT	OUT	OUT	Input 5	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT		ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN		RTD	OUT	OUT	OUT	IN

C

Channel 6	Signal	JP - 16	JP - 17	JP - 18	JP - 32
Analog Input 6	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	0-10 VOLT OUT OUT		IN	OUT
	4-20 mA	20 mA IN OL		OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

Table 2-6. Analog Input Board Jumper Tables (continued)

Channel 7	Signal	JP - 19	JP - 20	JP - 21	JP - 33	JP – 25*
	0-5 VOLT	OUT	OUT	OUT	OUT	2
	1-5 VOLT	OUT	OUT	OUT	OUT	2
Analog Input 7	0-10 VOLT	OUT	OUT	IN	OUT	2
	4-20 mA	IN	OUT	OUT	OUT	2
	ICTD	OUT	IN	OUT	OUT	2
	RTD	OUT	OUT	OUT	IN	2
	ACTUATOR	OUT	OUT	OUT	OUT	1
	POTENTIOMETER	OUT	OUT	OUT	OUT	3

* |P-25

- Position 1 = sends +24VDC (unregulated) to "supply" terminal (2.2A limit)
- **Position 2** = sends +24VDC (regulated) to "supply" terminal (25mA limit)
- Position 3 = sends +5VDC (regulated) to "supply" terminal

Channel 8	Signal	JP - 22	JP - 23	JP - 24	JP - 34	JP – 26*
	0-5 VOLT	OUT	OUT	OUT	OUT	2
	1-5 VOLT	OUT	OUT	OUT	OUT	2
	0-10 VOLT	OUT	OUT	IN	OUT	2
Analog Input 8	4-20 mA	IN	OUT	OUT	OUT	2
	ICTD	OUT	IN	OUT	OUT	2
	RTD	OUT	OUT	OUT	IN	2
	ACTUATOR	OUT	OUT	OUT	OUT	1
	POTENTIOMETER	OUT	OUT	OUT	OUT	3

* **|**P-26

- Position 1 = sends +24VDC (unregulated) to "supply" terminal (2.2A limit)
- **Position 2** = sends +24VDC (regulated) to "supply" terminal (25mA limit)
- Position 3 = sends +5VDC (regulated) to "supply" terminal

Advisory For First Generation Microvission Panels

If your panel is a first generation MicroVission panel (with a software version newer than 1.0.1150), the software upgrade will require the placement of a jumper on the processor board (mounted on the back of the panel door).

The JP4 jumper should be placed from the center pin to the right pin, as shown in Figure 2-5 below.

All newer programs will require this jumper as well, and it will be factory installed in the newer versions of the panel.



Figure 2-5. Jumper J4 on the Processor Board

Overview

Main screen is the first screen displayed after turn on the MicroVission Panel. The Main screen is the starting point for all other screens in the system. It displays the values of all important setpoints that can help you to get the status of the compressor at a glance.

The Main screen is divided into four sections such as Top Status Bar, Bottom Status Bar, Parameters Bar and the Splash screen. See Figure 3-1.

When you navigate to any other screen, Top Status Bar, Bottom Status Bar and Parameters Bar remain visible so that you can always view the critical information. The Splash screen is a dynamic section of the Main screen. You can go to other screens through Main screen.





Top Status Bar

The standard view of the Status Bar displays the following information. From left to right, Status Bar shows Control Method, Current Run Mode & the difference between the desired control setpoint and actual value of the process variable. See Figure 3-2.

The Top Status Bar also displays the information that requires user attention or intervention. This information displayed is highlighted in different colors or by flashing additional information bars over standard status bar view.

Standard Bar - Black

Standard Bar with Black color indicates the condition where the compressor motor is not running.

Standard Bar - Green

The Standard Bar with Green color displays the information that the compressor motor is currently running.

Information Bars will flash the information over the top of the status bar. You will see the Status Bar and other Information Bars in a repetitive sequence.



Figure 3-2. Top Status Bar

Information Bar - Black

The Information Bar with Black color displays the operational modes, which are different than the normal running condition. For example, the load limit condition. The compressor is unable to completely load due to some setpoint conditions, like high motor current. This is notified on the information bar with Black color.

Information Bar - Yellow

The Information Bar with Yellow color displays the alarm conditions. Alarm conditions do not stop the compressor, but these are alerts for you that if they do not take any corrective action, may result in a compressor trip.

Information Bar - Red

The Information Bar with Red color displays the information that the compressor motor was stopped due to the condition listed on the Information Bar. Compressor trips are designed to protect the equipment and any personnel operating the equipment.



Figure 3-3. Parameters Bar

Parameters Bar

The Parameters Bar displays the common operational parameters that you want to view to understand the current compressor status at a glance. Additionally, it also give you access to critical buttons such as "STOP" & "START apart from "RESET" & "REMOTE" buttons. See Figure 3-3.

Start Button

With the START button you can start the compressor in Auto, Manual or Remote mode. When you tap the START button, a start dialog box that gives you several run options appears: Auto, Manual or Remote. See Figure 3-4.

Stop Button

With STOP button you can stop the compressor. Tap the STOP button to stop the compressor in all cases.

Reset Button

With RESET button you can clear any current alarms, trips, and status messages displayed on the Information Bar. Tap the RESET button to clear any current alarms, trips and status messages that may be displayed on the information bar.

NOTE

If the condition that created the alarm, trip or status message still exits after tapping the "RESET" button, the message reappears on the information bar.

Remote Button

With REMOTE button you can activate/de-activate the Remote Lock Out option. This is a safety feature that prevents any external devices from assuming control and starting the compressor. You can also release the Remote Lock Out, tap the "START" button and then the "REMOTE" button when the start dialog box appears.

Control Parameter Box

The parameter boxes provide updated data on several key control parameters.

Control Setpoint

The top box displays the desired control setpoint that is set in the Compressor Control Screen.

Suction Press

Displays the current Suction Pressure value.

Suction Temp

Displays the current Suction Temperature value.

Discharge Press

Displays the current Discharge Pressure value.

Discharge Temp

Displays the current Discharge Temperature value.



Figure 3-4. Start Dialog Box
Oil Press Diff

It is the difference between the Oil Manifold Pressure and Suction Pressure.

Oil Filter Diff

Oil Filter Differential is calculated depending on the Oil Monitoring setting in the Configuration screen. When Oil Monitoring Setting is set as:

a. No Oil Filter Monitoring

Oil Filter Differential is not calculated and value displayed is NA.

b. Only Oil Filter In

Oil Filter Differential is calculated as Filter Inlet Pressure minus Oil Manifold Pressure.

c. Oil Filter In and Oil Filter Out

Oil Filter Differential is calculated as Filter Inlet Pressure minus Filter Outlet Pressure.

Oil Temp

Displays the current Oil Temperature value.

Motor Amperage

Displays the current motor current.

Press Ratio

Displays ratio of Absolute Discharge Pressure to Absolute Suction Pressure.

Bottom Status Bar

The Bottom Status Bar gives you easy access to some basic functions and information. See Figure 3-5.

Status Bars

There are two status bars. The first status bar displays information about scheduled maintenance activities. The second status bar displays all types of currently active safety information like warnings, inhibits, alarms and trips in their respective colors. All warning messages can be collectively seen in a pop-up window. This pop-up is displayed when a warning condition is present and status bar for displaying warnings is pressed. See Figure 3-6.

The Bottom Status Bar displays following information:

- Current User (if any is logged in)
- Compressor Run Hours
- Current Date
- Current Time



Figure 3-5. Bottom Status Bar



Figure 3-6. Warning Pop-up Window

Right side of the status bar has following function buttons:

Maintenance Button

To access the maintenance charts and sign off tables tap the Maintenance button.

User Access Button

To login or create more users, tap the User Access button.

Log off Button

To log out, tap the Log off button.

Help Button

To go to Help screen, tap the Help button. Help button provides operation & service manual, and program information.

Splash Screen

The Splash screen is a dynamic portion of the screen that changes as you navigate through the MicroVission panel screens.

The Splash screen area displays status of loaded and unloaded cylinders through an image, a horizontal Blue progress bar from 0% to 100% to indicate the current capacity utilization of the compressor, the configurable parameters as per settings on Page 4 of the Configuration screen, and the Menu button. To go to other screens on MicroVission, tap the Menu button. Refer Figire 3-7.



Figure 3-7. Splash Screen



Figure 3-8. Manual Run Mode Buttons and Progress Bar

Manual Run Mode Buttons

When you run compressor in Manual run mode, two buttons "+" (plus) and "-" (minus) are available on the display along with both sides of progress bar, see Figure 3-8. With "+" button and "-" button you can increase or decrease compressor capacity respectively in pre-defined steps as per No. of Cylinders and No. of Unloaders settings of Configuration screen.

NOTE

Once Compressor is Loading or Unloading a step, next step would be allowed to Load or Unload by pressing "+" or "-" button respectively only after 5 seconds.

Progress Bar

The value shown on the Progress Bar depends on the capacity control the compressor is utilizing.

Compressor With VFD Disabled

The percentage value corresponds to the ratio of the number of Loaded Cylinders to the total number of Compressor Cylinders.

Compressor With VFD Enabled

The percentage value corresponds to the average of two values:

- The ratio of the number of Loaded Cylinders to the total number of Compressor Cylinders.
- The compressor VFD Load Percentage.

The compressor VFD Load Percentage is 0 when the VFD output is at 4 mA, and VFD Load Percentage is 100 when the VFD output is at 20 mA.

Status Icons On Main Screen

Main screen display's the status icons for features like Pumpdown, Pulldown and Compressor Sequencing and Condenser Control.

If Pumpdown operation is running, Main screen displays the icon for Pumpdown feature. See Figure 3-9.

If Pulldown operation is running, Main screen displays the icon for Pulldown feature. See Figure 3-10.

If Compressor is running in Auto-Seq or Auto Seq Stand-By run mode, Main screen will display the icon for Compressor Sequencing Feature. See Figure 3-11.

If Condenser Control operation is running, Main screen displays the icon for Condenser Control feature. See Figure 3-12.



Figure 3-9. Pumpdown Operation Running Icon

START	RESET	Suction Pressure 1	Auto	5.0 Psig ∆
STAIL I			Anti-Recycle	0:00
STOP	REMOTE		Remote Lock Ou	t OFF
Pulldown	Oil Press Diff			
20.6 Psig	73.9 Psig			
Suction Press	Oil Filter Diff			
25.6 Psig	NA	TO SOLENOID VALVE		
Suction Temp	Oil Temp			
91.6 °F	105.5 °F			
Birchause Broom		Л		
Discharge Press	Motor Amperage			
132.6 Psig	2.9 Amps	100%	'	1enu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help
70.8 °F	3.7	No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 4	08/10/20	19 04:55:33 PM

Figure 3-10. Pulldown Operation Running Icon



Figure 3-11. Compressor Sequencing Icon

START	RESET	Suction Pressure 1	Stopped	24.7 Psig Δ
			Anti-Recycle	0:00
STOP	REMOTE		Remote Lock	Out ON
Suction Setpoint	Oil Press Diff			
20.0 Psig	33.8 Psig			
Suction Press	Oil Filter Diff			
44.7 Psig	NA	TO SOLENOID VALVE		
Suction Temp	Oil Temp			
121.3 °F	125.4 °F			
-		50		
Discharge Press	Motor Amperage	28°		
63.6 Psig	0.0 Amps	0%		Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenan	ce Help
238.3 °F	1.3	No Alarm / Trips Present	User Acce	ss Log off
User : admin		Run Hours : 0	06/25/	2021 04:56:44 AM

Figure 3-12. Condenser Control Operation Running Icon

Overview

The Menu screen is the launching point to every other section of the MicroVission panel software. When you exit other screens it will take you to the Menu screen, see Figure 3-1.

Navigation Buttons

Compressor Control

With Compressor Control screen, you can set various compressor control parameters. To go to Compressor Control screen, tap the Compressor Control button.

Alarms and Trips

With Alarms and Trips screen, you can set the various alarm and trip parameters. To go to Alarms and Trips screen, tap the Alarms and Trips button.

Timers

With Timers screen, you can set the various time related parameters. To go to Timers screen, tap the Timers button.

Compressor Scheduling

With Compressor Scheduling screen, you can set the scheduler to change the control method at configured dates and times.

Instrument Calibration

With Instrument Calibration screen, you can calibrate all the system sensors. To go to Instrument Calibration screen, tap the Instrument Calibration button.

Service Options

With Service Options screen, you can manually turn on/ off digital and analog outputs for maintenance and diagnostics purposes. To go to Service Options screen, tap the Service Options button.

Trend Chart

With Trend Chart screen, you can select up to four parameters for graphical historical data trending. To go to Trend Chart screen, tap the Trend Chart button.

Event List

With Event List screen, you can view the system's events such as trips or alarms.

START	RESET	Suction Pressure 1 St			pped	22.0 Psig ∆	
		Menu					
STOP	REMOTE	Compressor Control	Instrumer	nt Calibration	n Tr	end Chart	
Suction Setpoint 20.0 Psig	Oil Press Diff 73.9 Psig	Alarms and Trips	Service Options		E	vent List	
Suction Press 42.0 Psig	Oil Filter Diff	Timers	Condenser Control		Input/	Input/Output States	
Suction Temp 40.2 °F	ош тетр 118.8 °F	Compressor Scheduling	Compressor Sequencing		ig Al	Auxiliary I/O	
Discharge Press 116.0 Psig	Motor Amperage 0.0 Amps	Configuration	Data	Backup	Main		
Discharge Temp	Press Ratio	No Scheduled Ma	intenance		Maintenance	Help	
		No Alarm / Trips Present			User Access	Log off	
User : admin		Run Hours : 0			04/19/202	1 12:05:52 PM	
		Figure 4-1. M	lenu Scree	n			

MicroVission Controller • Operation and Service Manual • Copeland • 35391MV V1.4

Input/ Output States

With Input/Output States, you can view live data of all analog and digital input and outputs. Also, you can view "snapshot" of all analog and digital input and outputs at the time of the last compressor fault event.

Configuration

With Configuration screen, you can configure all the initial system parameters. To go to Configuration screen, tap the Configuration button.

Data Backup

With Data Backup screen, you can back up setpoints, configuration parameters, and calibration settings to a USB memory device. Also, you can restore the previously saved database files.

Compressor Sequencing

With Compressor Sequencing screen, you can set-up compressor to sequence up to nine other compressors. This option is available only when you turn on the Compressor Sequencing option from Configuration screen Page 3.

Auxiliary IO

With Auxiliary IO screen, you can set-up 4 Auxiliary Digital Inputs, 4 Auxiliary Digital Outputs, 8 Auxiliary Analog Inputs and 5 Auxiliary Analog Outputs. Auxiliary IO option turns on from Configuration screen when any of the auxiliary is turned on.

Condenser Control

With Condenser Control screen, you can set-up Condenser Control Run Mode, Setpoints, Condenser VFD, Condenser Step Control, and Profile. This option is only available if you turn on the Condenser Control option from Configuration screen Page 2.

Main

With the Main button, you can go to the Main screen. To go back to the Main screen, tap the Main button.

Overview

With Compressor Control screen, you can configure majority of the compressor settings. These settings define how the compressor will operate and respond to changing loads. The Compressor Control screen consists of several pages.

NOTE

The pages become available depending upon how you configure the compressor control settings.

The use case of this feature is different based on the application. You can change the value of the parameters in several ways. But, to achieve efficient operation, you must fine-tune the settings according to the use case.

For Suction Pressure Control, Process Temperature Control & Discharge Pressure Control, you can use two different set of values for compressor control. These values are categorized as Setpoint 1 and Setpoint 2. Active Control Mode decides which set of values will be used to control the compressors.

How Compressor Control Setpoint Works?

The MicroVission loads and unloads reciprocating compressor cylinders to maintain the control setpoint. The control setpoint can be either of suction pressure control setpoint, process temperature control setpoint or discharge pressure control setpoint. It depends on the control mode you have selected.

The following figure shows how the MicroVission uses the setpoints and offset values to load / unload compressor in steps after a specific time interval.



Suction Pressure Control

When the Active Control Mode is set to "Suction Pressure SP1" or "Suction Pressure SP2", the control setpoint is Suction Pressure Control.

Pressure Control Setpoint

It is the suction pressure of the compressor that operates when the compressor is running in Auto, Remote Auto, or Direct I/O Auto mode.

Load Offset

It is the offset value when added to the "Pressure Control" setpoint, determines the suction pressure for loading the compressor.

Load Interval

It is the time interval for which control algorithm waits between the steps while loading the compressor.

When the suction pressure of the compressor is equal to or greater than the "Pressure Control" setpoint plus the "Load Offset" value, the control algorithm loads one step and then waits for the load interval time. Once the load interval time is lapsed, the control algorithm again checks if the suction pressure is equal to or greater than the "Pressure Control" setpoint plus the "Load Offset" value. If yes, MicroVission loads the next step.

Unload Offset

It is the offset value when removed from the "Pressure Control" setpoint, determines the suction pressure for unloading the compressor.

Unload Interval

It is the time interval for which control algorithm waits between the steps while unloading the compressor.

When the suction pressure of the compressor is less than or equal to the "Pressure Control" setpoint minus the "Unload Offset" value, the control algorithm unloads one step and then waits for the unload interval time. Once the unload interval time is lapsed, the control algorithm will again check if the suction pressure is less than or equal to the "Pressure Control" setpoint minus the "Unload Offset" value. If yes, MicroVission unloads the next step.

START	DECET	Suction Pressure 1		Stopp	ed	2.8 Psig Δ	
START	RESET	Compressor Control					
STOP	REMOTE	Setpoint	Max Limit		Mi	n Limit	
5101		Suction Pressure Control					
Suction Set Point	Oil Press Diff			Setpoint	1 Se	etpoint 2	
20.0 Psig	107.1 Psig	Pressure Control Setpoint		20.0 Psig	24.	0 Psig	
Suction Press	Oil Filter Diff	Load Offset		1.5 Psig	0.5	Psig	
22.8 Psig	30.0 "Hq	Load Interval	5 s		5 s	ec	
Suction Temp	Oil Temp	Unload Offset		1.5 Psig	0.5	0.5 Psig	
69.2 °F	117.2 °F	Unload Interval		5 sec	5 s	ec	
Discharge Press	Motor Amperage						
203.1 Psig	0.0 Amps	Page 1 2 3 4	5 6	5		Menu	
Discharge Temp	Press Ratio	No Scheduled Maintena	nce	Ma	intenance	Help	
55.2 °F	5.8	No Alarm / Trips Prese	nt	Us	er Access	Log off	
User : admin		Run Hours : 0			01/29/2019	9 02:24:53 PM	

Figure 5-1. Compressor Control Screen (Page 1) - Suction Pressure Control

Process Temperature Control

The control setpoint is Process Temperature Control when the Active Control Mode is set to "Process Temperature SP1" or "Process Temperature SP2".

Temp Control Setpoint

It is the process temperature of the compressor that operates when the compressor is running in Auto, Remote Auto, or Direct I/O Auto mode.

Load Offset

It is the offset value that determines the process temperature for loading the compressor when added to the "Temp Control" setpoint.

Load Interval

It is the time interval for which control algorithm waits between the steps while loading the compressor.

When the process temperature of the compressor is equal to or greater than the "Temp Control" setpoint plus the "Load Offset" value, the control algorithm loads one step and then waits for the load interval time. Once the load interval time is lapsed, the control algorithm again checks if the process temperature is equal to or greater than the "Temp Control" setpoint plus the "Load Offset" value. If yes, MicroVission loads the next step.

Unload Offset

It is the offset that determines the process temperature for unloading the compressor value when removed from the "Temp Control" setpoint.

Unload Interval

It is the time interval for which control algorithm waits between the steps while unloading the compressor.

When the process temperature of the compressor is less than or equal to the "Temp Control" setpoint minus the "Unload Offset" value, the control algorithm unloads one step and then waits for the unload interval time. Once the unload interval time is lapsed, the control algorithm again checks if the process temperature is less than or equal to the "Temp Control" setpoint minus the "Unload Offset" value. If yes, MicroVission unloads the next step.

START	DECET	Suction Pressure 1	s	topped	2.8 Psig Δ
START	REJET	Compressor Control			
STOP	REMOTE	Setpoint	Max Limit		Min Limit
		Process Temperature Contro			
Suction Set Point	Oil Press Diff		Set	tpoint 1	Setpoint 2
20.0 Psig	107.1 Psig	Temp Control Setpoint	25.0	°F 2	5.0 °F
Suction Press	Oil Filter Diff	Load Offset	2.0 °	F 2	.0 °F
22.8 Psia	30.0 "Ha	Load Interval	20 se	ec 2	0 sec
Sustian Tamp		Unload Offset	2.0 °	F 2	.0 °F
	117 3 °E	Unload Interval	10 se	ec 1	.0 sec
09.2 F	11/.2 F				
Discharge Press	Motor Amperage				
203.1 Psig	0.0 Amps	Page 1 2 3 4 5	6		Menu
Discharge Temp	Press Ratio				Mend
55.2 °F	5.8	No Scheduled Maintenance		Maintenance	e Help
		No Alarm / Trips Present	User Access	s Log off	
User : admin		Run Hours : 0		01/29/20	019 02:22:57 PM

Figure 5-2. Compressor Control Screen (Page 3) - Process Temperature Control

Discharge Pressure Control

The control setpoint is Discharge Pressure Control when the Active Control Mode is set to "Discharge Pressure SP1" or "Discharge Pressure SP2".

Pressure Control Setpoint

It is the discharge pressure of the compressor that operates when the compressor is running in Auto, Remote Auto, or Direct I/O Auto run mode.

Load Offset

It is the offset value that determines the discharge pressure for loading the compressor when removed from the "Pressure Control" setpoint.

Load Interval

It is the time interval for which control algorithm waits between the steps while loading the compressor.

When the discharge pressure of the compressor is less than or equal to the "Pressure Control" setpoint minus the "Load Offset" value, the control algorithm loads one step and then waits for the load interval time. Once the load interval time is lapsed, the control algorithm again checks if the discharge pressure is less than or equal to the "Pressure Control" setpoint minus the "Load Offset" value. If yes, MicroVission loads the next step.

Unload Offset

It is the offset value that determines the discharge pressure for unloading the compressor when added to the "Pressure Control" setpoint.

Unload Interval

It is the time interval for which control algorithm waits between the steps while unloading the compressor.

When the discharge pressure of the compressor is equal to or greater than the "Pressure Control" setpoint plus the "Unload Offset" value, the control algorithm unloads one step and then waits for the unload interval time. Once the unload interval time is lapsed, the control algorithm again checks if the discharge pressure is equal to or greater than the "Pressure Control" setpoint plus the "Unload Offset" value. If yes, MicroVission unloads the next step.

START	DECET	Discharge Pressure 1	Sto	opped	56.9 Psig ∆	
START	REJET	Compressor Control				
STOP	REMOTE	Setpoint	Max Limit	Mir	Limit	
STOP	KENOTE	Discharge Pressure Control				
Disch Set Point	Oil Press Diff		Setpo	oint 1 Se	tpoint 2	
260.0 Psia	107.1 Psia	Pressure Control Setpoint	260.0 F	Psig 260	.0 Psig	
C	011 5111 1014	Load Offset	4.0 Psi	g 4.0	Psig	
22 8 Peia		Load Interval	4 sec	4 se	ec 🛛	
22.0 F319	50.0 Hg	Unload Offset	4.0 Psi	g 4.0	4.0 Psig	
Suction Temp		Unload Interval	4 sec	4 se	ec 🛛	
69.2 °F	117.2 *					
Discharge Press	Motor Amperage					
203.1 Psia	0.0 Amps					
		Page 1 2 3 4			Menu	
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance	Help	
55.2 F	5.0	No Alarm / Trips Present		User Access	Log off	
User: admin		Run Hours : 0		01/29/2019	02:12:13 PM	

Figure 5-3. Compressor Control Screen (Page 1) - Discharge Pressure Control

Auto Cycle

The Auto Cycle setpoints are the control points in which the compressor will automatically cycle on and off when placed into "Auto" run mode. You can enable or disable these setpoints using the check boxes. The Auto Cycle function operates only in local "Auto" mode and "Direct I/O (Auto)" mode. If you enable the Auto Cycle feature while running in any other remote mode, the function is ignored.

When the compressor switches from Remote mode to Local "Auto" mode, the auto-cycle feature carries out normal operation.

Auto Cycle Suction Pressure

- **Enable**: The Enable feature, enables the Auto Cycle control. Clear the check box to disable the Auto cycle feature.
- **Start Pressure**: The compressor starts when the suction pressure equals or exceeds this setpoint.

- **Start Delay**: Before the compressor starts, there is a delay for the set time. The delay ensures that suction pressure remains equal to or greater than the "Start Pressure".
- **Stop Pressure**: If the suction pressure is less than or equal to this setpoint, the compressor stops running.
- **Stop Delay**: Before the compressor stops, there is a delay for the set time. The delay ensures that the suction pressure remains less than or equal to the "Stop Pressure".
- Min. Load Shutdown Timer: Enables the Min. Load Shutdown Timer functionality. Clear the check box to disable the Min. Load Shutdown Timer setpoint and feature.

This timer is available and functional only when the cylinders and unloaders are configured with 100% unload configuration. If the Compressor is 100% unloaded continuously for this amount of time then, the compressor stops on Auto-Cycle mode.

START	RESET	Suction Pressure 1		Sto	opped	326.3 Psig Δ
STRACT		Compressor Control				
STOP	PEMOTE	Setpoint	Max Li	imit		Min Limit
STOP	REMOTE	Auto Cycle (Suction Pres	ssure)			
Suction Setpoint	Oil Press Diff	✓ Enable				
20.0 Psia	350.3 "Ha			9	Setpoint 1	Setpoint 2
Custine Deven	011 5111-2 014	Start Pressure		20	.0 Psig	15.0 Psig
346.3 Psig	NA	Start Delay		20	sec	24 sec
54015 F Sig		Stop Pressure		6.0	0 Psig	11.0 Psig
Suction Temp	Oil Temp	Stop Delay		20	sec	24 sec
77.4 °F	111.0 °F					
		Min. Load Shutdown Timer		60	0 sec	
Discharge Press	Motor Amperage					
193.7 Psig	0.0 Amps	Page 1 2 3 4	5 6	7		Menu
Discharge Temp	Press Ratio	No Scheduled Mainter	nance		Maintenance	Help
193.3 °F	0.6				Prantenunce	
		No Alarm / Trips Pre	sent		User Access	Log off
User : admin		Run Hours : 0			04/17/20	21 03:21:02 AM

Figure 5-4. Compressor Control Screen (Page 2) - Auto Cycle (Suction Pressure)

- Pulldown Start Pressure: If Pulldown operation is running, then the Auto Cycle functionality uses Pulldown Start Pressure (Shown in Figure 5-5) instead of Setpoint 1 Start Pressure to start the compressor on Auto Cycle.
- **Pulldown Stop Pressure:** If Pulldown operation is running, then the Auto Cycle functionality uses Pulldown Stop Pressure (Shown in Figure 5-5) instead of Setpoint 1 Stop Pressure to stop the compressor on Auto Cycle.

START RESET		Suction Pressure 1	A	luto	5.3 Psig ∆		
JIANI	ALSC I	Compressor Control					
STOP	REMOTE	Setpoint Max Limit			Min Limit		
STOP	KENOTE	Auto Cycle (Suction Pressure)					
Pulldown	Oil Press Diff	✓ Enable					
30.0 Psig	135.4 Psig		Setpoint 1	S	etpoint 2	Pulldown	
Suction Press	Oil Filter Diff	Start Pressure	20.0 Psig	15.	.0 Psig	34.0 Psig	
35.3 Psig	NA	Start Delay	20 sec	24	sec		
Suction Temp	Oil Temp	Stop Pressure	6.0 Psig	11.	.0 Psig	26.0 Psig	
77.4 °F	111.0 °F	Stop Delay	20 sec	24	sec		
		Min. Load Shutdown Timer	600 sec				
Discharge Press	Motor Amperage						
193.7 Psig	3.6 Amps	Page 1 2 3 4	5 6	7		Menu	
Discharge Temp	Press Ratio	No Scheduled Maint	enance		Maintenan	ce Help	
193.3 °F	4.2	No Alarm / Trips Pr	No Alarm / Trips Present			s Log off	
User : admin		Run Hours : 0			04/17/2	021 06:14:35 AM	

Figure 5-5. Compressor Control Screen (Page 2)- Auto Cycle (Suction Pressure) with Pulldown Running

Auto Cycle Process Temperature

- **Enable**: With Enable option, you can enable the Auto cycle control. Clear the check box to disable the Auto cycle setpoints.
- **Start Temperature**: The compressor starts when the process temperature equals or exceeds this setpoint.
- **Start Delay**: Before the compressor starts, there is a delay for the set time. The delay ensures that process temperature remains equal to or greater than the "Start Pressure".
- **Stop Pressure:** If the process temperature is less than or equal to this setpoint, the compressor stops.

- **Stop Delay**: Before the compressor stops, there is a delay for the set time. The delay ensures that the process temperature remains less than or equal to the "Stop Temperature".
- Min. Load Shutdown Timer: With Min. Load Shutdown Timer, you can enable the Min. Load Shutdown Timer functionality. Clear the box to disable the Min. Load Shutdown Timer setpoint and functionality.

This timer is visible and functional only when the cylinders and unloaders are configured with 100% unload configuration. If the Compressor is 100% unloaded continuously for this amount of time then the compressor stops on Auto-Cycle.

START RESET		Suction Pressure	ı	St	topped	326.3 Psig	۵ (
START	RESET	Compressor Control					
STOP	PEMOTE	Setpoint	Max	Limit	Ν	1in Limit	
STOP	REMOTE	Auto Cycle (Process Temperature)					
Suction Setpoint	Oil Press Diff	✓ Enable					
20.0 Psia	350.3 "Ha				Setpoint 1	Setpoint 2	
	011 5111-0 114	Start Temperature		30	0.0 °F	30.0 °F	
346 3 Deig		Start Delay		5	sec	5 sec	
340.3 FSIg		Stop Temperature		10	0.0 °F	10.0 °F	
Suction Temp	Oil Temp	Stop Delay		5	sec	5 sec	
77.4 °F	111.0 °F	Min Load Shutdown Timer		6	00 sec		
Discharge Dress		• Min. Loud Shataowin Hinter			JO 360		
Discharge Press	Motor Amperage						
193.7 Psig	0.0 Amps	Page 1 2 3 4	5 6	7		Men	u
Discharge Temp	Press Ratio	No Scheduled Maint	tenance		Maintenance	Help	
193.3 °F	0.6	No Alarm / Trips P	resent		User Access	Log off	
User : admin		Run Hours : (0		04/17/202	21 03:22:17	7 AM

Figure 5-6. Compressor Control Screen (Page 4) – Auto Cycle (Process Temperature)

Section 5 • Compressor Control

Pulldown Start Temperature: If Pulldown operation is running, then the Auto Cycle functionality uses Pulldown Start Temperature (Shown in Figure 5-7) instead of Setpoint 1 Start Temperature to start the compressor on Auto Cycle. **Pulldown Stop Temperature:** If Pulldown operation is running, then the Auto Cycle functionality uses Pulldown Stop Temperature (Shown in Figure 5-7) instead of Setpoint 1 Stop Temperature to stop the compressor on Auto Cycle.

START	DESET	Process Control 1		А	luto	5.0 °F Δ	
JIANI	KESET	Compressor Control					
STOP	REMOTE	Setpoint	Max Lin	nit	Min Limit		
	HEPOTE -	Auto Cycle (Process Ter	Auto Cycle (Process Temperature)				
Pulldown	Oil Press Diff	✓ Enable					
35.6 °F	135.4 Psig		Setpoint 1	S	etpoint 2	Pulldown	
Suction Press	Oil Filter Diff	Start Temperature	30.0 °F	30.	.0 °F	39.6 °F	
35.3 Psig	NA	Start Delay	5 sec	5 s	ec		
Suction Temp	Oil Temp	Stop Temperature	10.0 °F	10.	.0 °F	31.6 °F	
77.4 °F	111.0 °F	Stop Delay	5 sec	5 s	ec		
		✓ Min. Load Shutdown Timer	600 sec				
Discharge Press	Motor Amperage						
193.7 Psig	3.6 Amps	Page 1 2 3 4	5 6	7		Menu	
Discharge Temp	Press Ratio						
193.3 °F	4.2	No Scheduled Mainte	enance	_	Maintenan	се негр	
		No Alarm / Trips Present			User Acces	ss Log off	
User : admin		Run Hours : 0			04/17/2	021 06:15:13 A	

Figure 5-7. Compressor Control Screen (Page 4) – Auto Cycle (Process Temperature) with Pulldown Running

Auto Cycle Discharge Pressure

- Enable: With Enable option, you can enable the Auto cycle control. Clear the check box to disable the Auto cycle setpoints.
- **Start Pressure**: If the discharge pressure is less than or equal to this setpoint, the compressor starts.
- **Start Delay**: Before the compressor starts, there is a delay for the set time. The delay ensures that discharge pressure remains less than or equal to the "Start Pressure".
- **Stop Pressure**: If the discharge pressure is equal to or greater than this setpoint, the compressor stops.

- **Stop Delay**: Before the compressor stops, there is a delay for the set time. The delay ensures that the discharge pressure is equal to or greater than the "Stop Pressure".
- Min. Load Shutdown Timer: With Min. Load Shutdown Timer option, you can enable the Min. Load Shutdown Timer functionality. Clear the check box to disable the Min. Load Shutdown Timer setpoint and functionality.

This timer is visible and functional only when the cylinders and unloaders are configured with 100% unload configuration. If the Compressor is 100% unloaded continuously for this amount of time then the compressor stops on Auto-Cycle.

START	RESET	Discharge Pressur	e 1	St	opped	66.3 Psi	g∆	
		Compressor Control						
STOP	PEMOTE	Setpoint	Max	Limit		Min Limit		
STOP	REMOTE	Auto Cycle (Discharge Pressure)						
Disch Setaolat	Oil Proce Diff	✓ Enable						
260 0 Psia	350 3 "Ha				Setpoint 1	Setpoint 2		
200.0 P sig	550.5 Hg	Start Pressure		24	10.0 Psig	240.0 Psig		
Suction Press	Oil Filter Diff	Start Delay		5	sec	5 sec		
346.3 Psig	NA	Start Delay					-	
Suction Temp	Oil Temp	Stop Pressure		28	SOLO PSIG	280.0 Psig		
77.4 °F	111.0 °F	Stop Delay		5	sec	5 sec		
		🗸 Min. Load Shutdown Time	r	60	00 sec			
Discharge Press	Motor Amperage							
193.7 Psig	0.0 Amps	Page 1 2 3 4				Me	nu	
Discharge Temp	Press Ratio	No Colordada Mala		_		u Univ		
193.3 °F	0.6	No Scheduled Mail	ntenance		Maintenand	e Help		
		No Alarm / Trips	Present		User Acces	s Log of	ff	
User : admin		Run Hours :	0		04/17/2	021 03:19:	43 AM	

Figure 5-8. Compressor Control Screen (Page 2) - Auto Cycle (Discharge Pressure)

Active Control Mode

With the Active Control Mode feature, you can change the type of Active Control Mode such as Suction Pressure, Process Temperature or Discharge Pressure. You can also switch from Setpoint 1 (SP1) and Setpoint 2 (SP2) for each control method. The options available in the drop-down box depend on the number and type of control you have selected in the Configuration screen. This drop-down box is not available for selection when compressor is running in Auto-Seq or Auto Seq Stand-by mode.

I/O Based Setpoint Control

If you select this check box, it will monitor the Remote Setpoint #1/#2 Digital Input (10th Digital Channel on Multi IO Board). The selection of Active Control Setpoint depends upon the state of Remote Setpoint #1/#2 Digital Input. When Remote Setpoint #1/#2 Digital Input is Energized, Active Control Mode will be Setpoint 2. When Remote Setpoint #1/#2 Digital Input is De-Energized, Active Control Mode will be Setpoint 1.

Load Limiting

The stop load and force unload feature prevents the compressor from tripping off due to instrument reading. For example, if the suction pressure drops to a low level, the compressor trips off for safety reasons. However, the stop load and force unload algorithm recognizes the potential trip and either stops the compressor from loading or even unloads the compressor step-by-step to prevent the trip.

Stop Load Setpoints

High Suction Pressure

 If the suction pressure value is equal to or greater than this setpoint, the algorithm does not allow loading of the compressor. However, if the suction pressure value drops below this setpoint, the algorithm allows loading of the compressor.

High Discharge Pressure

 If the discharge pressure value is equal to or greater than this setpoint, algorithm does not allow loading of the compressor. However, if the discharge pressure value drops below this setpoint, algorithm allows loading of the compressor.

START	DECET	Suction Pressure	1	St	topped 2.8 Ps		2.8 Psig ∆
START	RESET	Compressor Control					
STOP	REMOTE	Setpoint	Max Limit			Min L	.imit
		Active Control Mode	de Suction Pressure SP1				
Suction Set Point	Oil Press Diff	IO Based Setpoint Control					
20.0 Psia	107.1 Psia	Load Limiting					
Custion Deser				Stop	Load	Force I	Unload
22 8 Deig	30.0 "Ha	High Suction Pressure		84.0 P	sig	87.0 F	Psig
22.0 F 51g	50.0 Hg	High Discharge Pressure		206.0	Psig	210.0 Psig	
Suction Temp	Oil Temp	Low Suction Pressure		2.0 Psi	ig	0.0 Ps	ig
69.2 °F	117.2 °F	High Motor Current		5.0 Am	nps	10.0 Amps	
Discharge Press	Motor Amperage	Unload Timer		30 sec			
203.1 Psig	0.0 Amps			_			
203.21319	oro Ampa	Page 1 2 3 4	5 6	5			Menu
Discharge Temp	Press Ratio	No Scheduled Main	tenance		Maintenar	nce	Help
55.2 °F	5.8	No Alarm / Trips Present			User Access		Log off
User : admin		Run Hours :	0		01/29/	2019	02:15:08 PM

Figure 5-9. Compressor Control Screen (Page 5) – Active Control Mode - I/O Based Setpoint Control

Low Suction Pressure

 If the suction pressure value is equal to or less than this setpoint, algorithm does not allow loading of the compressor. However, if the suction pressure value exceeds this setpoint, algorithm allows loading of the compressor.

High Motor Current

• If the motor current value is equal to or greater than this setpoint, algorithm does not allow loading of the compressor. However, if the motor current value drops below this setpoint, algorithm allows loading of the compressor.

Force Unload Setpoints

High Suction Pressure

 If the suction pressure value is equal to or greater than this setpoint, algorithm unloads the compressor by one step. The algorithm continues unloading the compressor step-by-step to minimum load until the suction pressure value drops below this setpoint.

High Discharge Pressure

• If the discharge pressure value is equal to or greater than this setpoint, algorithm unloads the

compressor by one step. The algorithm continues unloading the compressor step-by-step to minimum load until the discharge pressure value drops below this setpoint.

Low Suction Pressure

• If the suction pressure value is equal to or less than this setpoint, the algorithm unloads the compressor by one step. The algorithm continues unloading the compressor step-by-step to minimum load until the suction pressure value exceeds this setpoint.

High Motor Current

• If the motor current value is equal to or greater than this setpoint, algorithm unloads the compressor by one step. The algorithm continues unloading the compressor step-by-step to minimum load until the motor current value drops below this setpoint.

Unload Timer

• The Force Unload Algorithm uses this Unload Timer while unloading each step during the force unload conditions. For example, when the suction pressure value is equal to or greater than the "High Suction Pressure" Force Unload setpoint, the algorithm unloads one step and wait for the time as defined by

START	RESET	Suction Pressure	1	St	opped		2.8 Psi	gΔ
START	NESET.	Compressor Control						
STOP	REMOTE	Setpoint	Max	Limit		Min	n Limit	
		Active Control Mode	Suction Pre	ssure SP1	•			
Suction Set Point	Oil Press Diff	IO Based Setpoint Control						
20.0 Psig	107.1 Psig	Load Limiting						
Suction Press	Oil Filter Diff			Stop	Load	Force	e Unload	
22.8 Psig	30.0 "Ha	High Suction Pressure		84.0 P	sig	87.0	Psig	
	011 7	High Discharge Pressure		206.0	Psig	210.	0 Psig	
69.2 °F	117 2 °F	Low Suction Pressure		2.0 Ps	ig	0.0	Psig	
03.2 1	11/.2 1	High Motor Current		5.0 Am	nps	10.0	Amps	
Discharge Press	Motor Amperage	Unload Timer		30 sec				
203.1 Psig	0.0 Amps	Page 1 2 3 4	5 6	5			М	enu
Discharge Temp	Press Ratio	No Scheduled Main	tenance		Mainte	nance	Helj	0
55.2 F	5.8	No Alarm / Trips F		User Access		Log o	off	
User : admin		Run Hours :	: 0		01/	29/2019	02:15	:08 PM

Figure 5-10. Compressor Control Screen (Page 5) - Load Limiting

this setpoint. Once the time set is lapsed, the algorithm checks again if the suction pressure value is equal to or greater than the "High Suction Pressure" Force Unload setpoint. If yes, then the algorithm unloads one more step.

Oil Control

This setpoint defines how the MicroVission will manage the crankcase's oil. If the compressor is used in cold climatic conditions, the compressor may not start due to low crankcase oil temperature.

Oil Crankcase Heater Temperature

• If the oil temperature falls below this setpoint, the oil heater (7th Digital Channel on Multi IO Board) turns ON. Note, there is a 2°F differential associated with this setpoint. For example, when set at 100 °F, the oil heater turns ON at 98 °F and turns OFF at 102 °F.

START	DECET	Suction Pressure	•1	Stopped	2.8 Psig Δ
STANT	RESET	Compressor Control			
STOP	REMOTE	Setpoint	Max	Limit N	lin Limit
5101	NEW OTE	State Below Setpoint		• N.O.	N.C.
Suction Set Point	Oil Press Diff	Oil Control			
20.0 Psia	107.1 Psia	Oil Crankcase Heater Temp	erature	100.0 °F	
Custing Bases					
22.0 Dain					
22.8 Psig	30.0 Hg				
Suction Temp	Oil Temp				
69.2 °F	117.2 °F				
Discharge Press	Motor Amperage				
203.1 Psig	0.0 Amps	Page 1 2 3 4	•		Menu
Discharge Temp	Press Ratio	No Scheduled Mai	intenance	Maintenance	Help
55.2 °F	5.8	No Alarm / Trips	Present	User Access	Log off
User : admin		Run Hours	: 0	01/29/20	L9 02:21:41 PM

Figure 5-11. Compressor Control Screen (Page 4) - Oil Control

Compressor Variable Frequency Drive(VFD) Control

With VFD setpoint, you can tune the motor's VFD for the desired operation, see Figure 5-12. Compressor Control screen - VFD Settings Control.

A reciprocating compressor uses the variable speed of a VFD-controlled motor to vary the amount of work or capacity of the compressor.

When you enable VFD Control, the first half of the total available capacity is controlled using load steps. The motor speed is used to control the second half of the total available capacity.

If the compressor needs to load to 100% of its capacity, the control algorithm first loads all the cylinders, and then the motor speed increases to its maximum speed. In the unloading direction, the motor speed first decreases to its minimum speed, and then the cylinders are unloaded.



START	RESET	Suction	Suction Pressure 1		St	topped		2.8 Psig	j ∆
START	NESET.	Compressor C	ontrol						
STOP	REMOTE	Setpoir	nt	Max Limit			Mir	Min Limit	
5101	REPIONE	Compressor V	FD		VFD Sp	eed			
Custing Cat Balat	OII Dress Diff	Р	0.0		м	linimum	м	laximum	
20 0 Peia	107 1 Peig	1	0.0		720) rpm	120	00 rpm	
20.0 Faig	IU/.I Faig	D	0.0						
Suction Press	Oil Filter Diff	Interval	1 sec						
22.8 Psig	30.0 "Hg	interval	1 300						
Suction Temp	Oil Temp								
69.2 °F	117.2 °F								
-									
Discharge Press	Motor Amperage								
203.1 Psig	0.0 Amps	Page 1 2	3 4	5				Me	inu
Discharge Temp	Press Ratio	No Se	cheduled Mainte	nance		Mainten	ance	Help	
55.2 °F	5.8	No.	Alarm / Trins Pro	sent		User Ac	Cass	Log o	ff
		No Alarm / Trips Present				USET AC		Log o	
User: admin			Run Hours : 0			01/2	29/2019	02:09:	44 PM

Total Capacity

Figure 5-12. Compressor Control Screen (Page 3) - VFD Settings Control

NOTE

VFD installation is not covered in this manual. A VFD that is not properly installed and configured has the potential of causing intermittent and dangerous problems. Please consult your VFD manual.

VFD Speed

- With VFD Speed you can define the minimum and maximum speed for the motor.
- P = Proportional (Gain) Setpoint
- Used to adjust the motor speed action in direct proportion to the difference between the control setpoint and the process variable (SP - PV error).
- This is a unit-less quantity and is used for coarse adjustment, and this setpoint should be set to the lowest value that gives adequate control system response.
- Increasing the Proportional setting increases the control system's sensitivity to small process fluctuations and the tendency to hunt.

I = Integral (Reset) Setpoint

- Used to adjust the load control action, integrating the error over time, to account for a small error that has remained for a long time.
- This quantity is used for fine adjustment, and this setpoint is used to smooth out process variations.
- This setpoint should be set high enough to prevent

hunting but low enough to prevent control system overshoot.

- D = Derivative (Rate) Setpoint
- Used to adjust the load control action, accounting for how fast the error is changing, positively or negatively. It's a standard PID loop variable, and it is not used for our applications.

Interval

• With this setpoint you can define the time interval for calculation of Integral Error.

Pumpdown Control

The Pumpdown Control defines a method of "pumping" down a chiller, which is to draw off refrigerant from it. You can enable or disable Pumpdown control from this page, see Figure 5-13. If you select Pumpdown check box, this feature only functions when the compressor is running in local Auto Mode and Control Mode Configured is Suction Pressure.

If the Pumpdown Operation is Running, Then;

• The Auto-cycle functionality is ignored. Pumpdown mode causes the compressor to cycle off via the Pumpdown Stop Pressure setpoint. The Pumpdown Stop Pressure setpoint is set lower

START	RESET	Suction Pressure 1		1	Auto	8.1 Psig Δ	
START		Compressor Control					
STOP REMOTE		Setpoint	Setpoint Max Limit		nit Min Limit		
		✓ Pumpdown					
Suction Setpoint	Oil Press Diff	Setpoint 1		• Init		Next Start	
20.0 Psig	114.6 Psig	Stop Pressure	10.0 Psig			Every Start	
Suction Press	Oil Eilter Diff	Stop Delay	15 sec	Step	Press 5.0	Psig	
28.1 Psia	NA	Setpoint 2		Delay	Per Step 5 h	our 0 min	
20.219319		Stop Pressure	15.0 Psig	Stop	Press 20.	0 Psig	
Suction Temp	Oil Temp	Stop Delay	15 sec	Auto	Cycle Differential		
//.9 °F	121.3 -	Pumpdown Operation	Run	Star	rt Press Offset	4.0 Psig	
Discharge Press	Motor Amperage			Stop	p Press Offset	4.0 Psig	
90.0 Psig	-8.6 Amps						
Discharge Trees	Drace Dable	Page 1 2 3	4 5 6			Menu	
	2 A	No Scheduled M	aintenance		Maintenance	Help	
00.0 1		No Alarm / Trips Present			User Access	Log off	
User : 3		Run Hours : 0			06/16/2023	11:54:24 AM	

Figure 5-13. Compressor Control Screen (Page 5) – Pumpdown Control

than the Auto-cycle Stop setpoint. Therefore, as the suction pressure is pulled down, the compressor is prevented from shutting down prematurely via the Auto-cycle Stop setpoint by automatically ignoring the Auto-cycle feature.

- Compressor loads/unloads as per Pumpdown Stop Pressure Setpoint. i.e. Pumpdown Stop Pressure setpoint acts as Control setpoint instead of Suction Pressure Control Setpoint.
- The compressor is switched to "Stop" mode after the suction pressure is equal to or goes below the Pumpdown Stop Pressure setpoint.

Pumpdown

• With Pumpdown check box, you can enable the Pumpdown feature. If you clear this check box, the Pumpdown setpoints are not available and cannot edit them.

Stop Pressure

• This setpoint defines the suction pressure value at which the compressor will cycle off. This setpoint is set below the Suction Pressure Auto-cycle Stop Pressure setpoint.

Stop Delay

• This setpoint delays the compressor from stopping when the suction pressure is equal to or less than the Stop Pressure.

Pumpdown Operation (Run/Stop)

• This button starts/stops the Pumpdown operation. This button is active only when compressor is in Local Auto run mode and the Control Mode configured is Suction Pressure. This button displays "Run" when Pumpdown operation is not started or stopped. The button displays "Stop" when Pumpdown operation is running.

If you select the Pumpdown check box, it enables the Pumpdown feature, and the Pulldown check box becomes unavailable. Similarly, if you select the Pulldown check box, it enables Pulldown feature, and the Pumpdown check box becomes unavailable. This is done to keep the Pumpdown and Pulldown features mutually exclusive.

NOTE

If the Pumpdown operation is running and you change the control mode to Process Control, then the Pumpdown operation waits till the control mode is changed back to Suction Pressure, and till then the Process Control setpoint is used to load/unload the compressor, not the Pumpdown Stop Pressure setpoint. Also, if you change the control mode while Pumpdown is running, the Pumpdown operation stops running.

Pulldown Control

The Pulldown control is a method to slowly pull down the suction pressure/process from a higher value. Sometimes, it is required on systems that have liquid recirculation systems or on new building to prevent structural damage by limiting the rate at which the building should be cooled. You can enable or disable the feature from this page, see Figure 5-14. The Pulldown feature only works when compressor is running in Local Auto / Direct I/O Auto mode and when the Control mode is Suction Pressure 1 / Process Control 1.

Pulldown feature provides a method to slowly pull the suction pressure / process control down to operating conditions. You can use the Pulldown feature to pull down suction pressure/process control at defined time intervals.

If Pulldown Operation is Running, Then;

- Compressor loads/unloads as per the Pulldown Setpoint. i.e. Pulldown Setpoint acts as Control setpoint instead of Suction Pressure Control Setpoint / Process Control Setpoint.
- For Suction Pressure, Pulldown Auto Cycle Start Pressure and Pulldown Auto Cycle Stop Pressure is used to start and stop the compressor using auto cycle instead of Suction Pressure Auto Cycle Start and Stop Pressure.
- For Process Temperature, Pulldown Auto Cycle Start Temperature and Pulldown Auto Cycle Stop Temperature is used to start and stop the compressor using auto cycle instead of Process Temperature Auto Cycle Start and Stop Temperature.

You Can Abort Pulldown Operation Through Following Actions:

- Switch run mode to Manual/Remote mode from Auto run mode.
- Switch Active Control Mode from any other mode.
- Stop compressor due to trip or tap the 'STOP' button.

If Suction Pressure is already below Pulldown Stop Pressure Setpoint during Compressor Start, Pulldown operation will not start. Similarly, if Process Temperature is already below Pulldown Stop Temperature Setpoint during Compressor Start, Pulldown operation does not start.

Pulldown

By using the Pulldown check box, you can enable the Pulldown feature. If you de-select the check box, the Pulldown setpoints are ignored and the feature is not available. The Pulldown setpoints depend on the Active Control Mode Selection. If you select Suction Pressure, then the Pulldown setpoint are in Pressure values or if you select Process Control then the Pulldown setpoints are in Temperature values. See Figure 5-14 and 5-15.

START	DESET	Suction Pressur	e 1 🛛	Sto	pped	8.	0 Psig ∆
START	RESET	Compressor Control					
STOP	REMOTE	Setpoint	Setpoint Max Limit		Min Limit		it
5101	REMOTE	Pumpdown		✓ Pulld	lown		
Suction Setpoint	Oil Press Diff	Setpoint 1		• Initia	ate Pulldown	at Next	Start
20.0 Psia	114.7 Psia	Stop Pressure		Initia	ate Pulldown	at Every	/ Start
		Stop Delay		Step P	ress 5	.0 Psig	I
Suction Press	Oil Filter Diff	Setpoint 2		Delay I	Per Step 5	hour	0 min
20.0 PSIg	NA	Stop Pressure		Stop Pr	ress 2	0.0 Psi	g
Suction Temp	Oil Temp	Stop Delay		0 sec Auto Cycle Differential			
77.9 °F	121.3 °F	Pumpdown Operation	Run	Start	t Press Offset	4.	0 Psig
Blackson Broom				Stop	Press Offset	4.	0 Psig
Discharge Press	Motor Amperage			L.			
90.0 Psig	0.0 Amps	Page 1 2 3	4 5 (5 7			Menu
Discharge Temp	Press Ratio	No Scheduled Ma	aintenance		Maintenanc	e	Help
88.8 °F	2.5	No Alarm / Trips Present			User Access	5	Log off
User:3		Run Hours	::0		06/16/20	21	11:44:49 AM

Figure 5-14. Compressor Control Screen (Page 5) – Pulldown Control (Active Control Mode – Suction Pressure SP1)

Initiate Pulldown at Next Start/Every Start

If you select Initiate Pulldown at Next Start, then Pulldown Operation will start at the next compressor start cycle only, and Pulldown feature will disable after the Pulldown Operation is completed. But, the Pulldown operation will start at every compressor start cycle if you select Initiate Pulldown at Every Start option. You can select only one option.

Step Pressure / Temperature

This setpoint defines the step value by which the Pulldown Setpoint decreases in each step when the Pulldown operation is running.

Delay Per Step

This setpoint defines the time interval between each pulldown step, i.e. Pulldown Setpoint decreases after the Delay Per Step time is elapsed when the Pulldown Operation is running.

Stop Pressure / Temperature

This Setpoint defines the value upto which the Pulldown Setpoint decreases, i.e. when the Pulldown Operation is running. The Pulldown Setpoint stops decreasing once the Pulldown Setpoint reaches this setpoint value.

Auto Cycle Differential Start Pressure / Temperature Offset

This Setpoint defines the value that is added as an offset in Pulldown Setpoint to calculate the value of Pulldown Auto Cycle Start Pressure/Temperature. When Pulldown operation is running, this value is used to start the compressor in Auto Cycle mode.

START	DECET	Process Control	11	St	opped	:	26.1 °F Δ	
START	RESET	Compressor Control						
STOP	REMOTE	Setpoint	Setpoint Max Limit		mit Min Limit			
5101	REMOTE	Pumpdown V Pull		down				
Process Setucint	Oil Press Diff	Setpoint 1		• Ini	tiate Pulldowr	n at Nex	xt Start	
25.0 °F	114.6 Psia	Stop Pressure		lni 🗌	tiate Pulldowr	n at Eve	ery Start	
		Stop Delay		Step	Temp	5.0 °F		
Suction Press	Oil Filter Diff	Setpoint 2		Delay	y Per Step	5 hour	r 0 min	
20.1 PSIg	NA	Stop Pressure		Stop	Temp	20.0 °	F	
Suction Temp	Oil Temp	Stop Delay		Auto	Cycle Differe	ntial		
77.9 °F	121.3 °F	Pumpdown Operation	Run	Sta	rt Temp Offse	et 4	4.0 °F	
Discharge Dress				Sto	p Temp Offse	t 4	4.0 °F	
Discharge Press	Motor Amperage							
90.0 Psig	0.0 Amps	Page 1 2 3 4	4 5 6	5 7			Menu	
Discharge Temp	Press Ratio	No Scheduled Ma	intenance		Maintenan	ce	Help	
88.8 °F	2.4	No Alarm / Trips	No Alarm / Trips Present			ss	Log off	
User: 3		Run Hours : 0			06/16/2	2021	11:48:33 AM	

Figure 5-15. Compressor Control Screen (Page 5) – Pulldown Control (Active Control Mode – Process Control SP1)

Auto Cycle Differential Stop Pressure / Temperature Offset

This Setpoint defines the value that is subtracted as an offset from Pulldown Setpoint to calculate the value of Pulldown Auto Cycle Stop Pressure/Temperature. When Pulldown operation is running, this value is used to stop the Compressor on Auto Cycle mode.

Example Operation

Assume that the current Suction Pressure value is at 85 psig and you want to get a setpoint of 20 psig and pulldown time of 48 hrs. You want a 48 hours of pulldown time. Pick a reasonable step pressure of 5 psig for every step. This defines a change of (80 - 20 = 60) psig.

- 1. Note: The first step is applied immediately. So, first step starts at (85 5 = 80) psig
- 2. Number of steps = delta (60 psig change * 1 step/5 psig) = 12 steps.
- Delay per Step = (48 hours / 12 steps) = 4 hours/ step.
- 4. So for the first 4 hours, the compressor runs at 80 psig.
- 5. Next 4 hours @ 75 psig
- 6. Next 4 hours @ 70 psig
- 7. And so forth.

After the 12th step (running at 25 psig), 48 hours elapse, and the new Pulldown setpoint becomes 20 psig, achieving the 20 psig setpoint after 48 hours. After the Pulldown setpoint is equal to Pulldown Stop Pressure, the Pulldown operation completes after three minutes.

When you select the Pulldown check box, Pulldown feature is unavailable and vice versa. This is done to keep the Pulldown and Pumpdown features mutually exclusive.

NOTE

Pulldown operation stops running if you change the Run Mode while Pulldown is running.

NOTE

If the Pulldown Operation is running and the compressor stops due to Auto Cycle, the Pulldown operation continues to run, even though the compressor run mode is not in Local Auto / Direct I/O Auto.

NOTE

If you turn on Pulldown operation and start the compressor in Manual/Remote/Process Control 2/ Suction Pressure 2 control mode, it does not run until you stop the compressor. You will need to restart the compressor in Local Auto / Direct I/O Auto and Suction Pressure 1 / Process Control 1 control mode.

NOTE

If you start the compressor first in Local Auto / Direct I/O Auto run mode with Suction, Pressure 1 / Process Control 1 control mode and then turn on Pulldown operation, the Pulldown operation does not run until you stop and restart the compressor in Local Auto / Direct I/O Auto run mode and Suction Pressure 1 / Process Control 1 control mode.

Overview

With Alarms and Trips screen, you can view and adjust compressor safety and alarm settings.

Warnings

Microvission panel displays Warnings when certain parameters that might inhibit the compressor when started. Warnings are monitored only when compressor is not running. Microvission uses alarm setpoints to detect and generate Warning messages. Warnings appear if the compressor is not running and when the value of the parameter drops below or rises above the configured alarm setpoint.

Warning messages appear in a pop-up window. Warning messages are displayed together in a pop-up window. When you clear the Warning, the corresponding warning messages are also cleared from the Bottom Status Bar.

Warnings are shown in an Orange color banner on the bottom status bar

Inhibits

The MicroVission uses start Inhibits to prevent the compressor from starting to protect the compressor and the refrigeration system. Inhibits are active only during Pre-Start condition. While starting the compressor, inhibits are checked first before the motor is started. Failed start due to an inhibit do not count toward any of the antirecycle timer including Hot Starts. Unless other specified, inhibits use alarm setpoints to abort the compressor start sequence and generate messages. The Inhibit condition occurs if the value of a parameter drops below or rises above the configured alarm setpoint during the compressor start.

> Inhibits are shown in a Red color banner on the top and bottom status bars

Alarms

Microvission uses Alarms to alert you of potential problems. For example, if you do not select parameters, it may result in compressor shutdown due to a trip. Alarms are active only when compressor is running. An Alarm condition occurs if the value of a parameter drops below or rises above the configured Alarm setpoint for a continuous delay time (default 5 seconds).

> Alarms are shown in a Yellow color banner on the top and the bottom status bars

Trips

Trips occur when there exist conditions that exceed the safety limits of the compressor or refrigeration system and stop the compressor. Trips are active only when compressor is running. A Trip condition occurs if the value of a parameter drops below or rises above the configured Trip setpoint for continuous delay time (default 5 seconds). When a Trip condition occurs, compressor run mode changes to 'Stopped' mode.

Trips are shown in a Red color banner on the top and bottom status bars

NOTE

When more than one safety condition is active/ present, Safety message for each condition (Except Warning) is displayed on Top Status Bar.

Freeze Screens

Trips also trigger the Input/Output screen to take snapshot of all input and output values as Freeze 1 screen. The Freeze screens are useful for you as a troubleshooting tool. Refer to Input/Output States section for Freeze Data (Trip) screen.

Logging – Event List

All Inhibits, Alarm and Trip conditions are logged in the Event List. It gives a complete operational history. You can access the Event List from the Menu screen. To view Event List, tap the Event List button.

Alarms & Trips Setpoints

The Alarm and Trips screen consists four tabs such as Setpoint, Max Limit, Min Limit, and Delay. You can configure Alarm and Trip setpoints using the Max Limit & Min Limit tab, and configure delay time using the Delay tab.

START	RESET	Suc	Suction Pressure 1			Stopped		2.8 Psig ∆	
START		Setpo	int	Max Limit	Min Limit		nit	Delay	
STOP	REMOTE	Alarm Trip Low Suction Pressure		Low P	Alarm Low Process Temper		Trip ture		
Suction Set Point	Oil Press Diff	Setpoint 1	3.0 "Hg	1.0 "Hg	Setpoir	nt 1	-50.0 °F	-55.0 °F	
20.0 Psig	107.0 Psig	Setpoint 2	1.0 "Hg	2.0 "Hg	Setpoir	nt 2	-40.0 °F	-45.0 °F	
Suction Press	Oil Filter Diff								
22.8 Psig	NA	High Discharge Pressure			High F	High Process Temperature			
Suction Temp	Oll Temp 117.2 °F	Setpoint 1	210.0 P	sig 220.0 Psig	Setpoir	nt 1	100.0 °F	NULL	
		Setpoint 2	220.0 P	sig 230.0 Psig	Setpoir	nt 2	120.0 °F	NULL	
Discharge Press	Motor Amperage								
203.1 Psig	0.0 Amps	Page 1	2 3					Menu	
Discharge Temp	Press Ratio		No Schedu	led Maintenance		Ma	aintenance	Help	
55.2 °F	5.8		No Alarm / Trips Present			U	ser Access	Log off	
User : admin		Run Hours : 0					01/29/2019	11:53:47 AM	

Figure 6-1. Alarms and Trips Setpoints (Page 1)

START	RESET	Suction Pr	Suction Pressure 1		topped	2.8 Ps	2.8 Psig ∆	
STAIL		Setpoint	Max Limit	м	lin Limit	Delay		
STOP	REMOTE	Low Suction Ter	nperature		Alarm -45.0 °F	Trip -50.0 °F		
Suction Set Point 20.0 Psig Suction Press 22 8 Psig	Oil Press Diff 107.0 Psig Oil Filter Diff NA	High Discharge Low Crankcase Low Crankcase High Crankcase	Temperature Oil Temperature - Sta Oil Temperature - Ru Oil Temperature	art in	295.0 °F 75.0 °F 105.0 °F 130.0 °F	300.0 °F 70.0 °F 100.0 °F 135.0 °F		
Suction Temp 69.2 °F	Oil Temp 117.2 °F							
Discharge Press 203.1 Psig	Motor Amperage 0.0 Amps	Page 1 2 3	3			N	lenu	
Discharge Temp	Press Ratio	No Sched	uled Maintenance		Maintenan	ce Hel	р	
55.2 °F	5.8	No Alarr	n / Trips Present		User Acces	s Log	Log off	
User : admin		Run	Hours : 0		01/29/2	2019 11:50	5:50 AM	

Figure 6-2. Alarms and Trips Setpoints (Page 2)

START	RESET	Suction Pr	Suction Pressure 1			2.8 Psig Δ	
START		Setpoint	Max Limit	Min Limit		Delay	
STOP	REMOTE			Alarm		Trip	
		Low Oil Pressure D	iff.	30.0 Psig	. 2	5.0 Psig	
Suction Set Point	Oil Press Diff	High Filter Diff. Pre	essure - Start	38.0 Psig	1 4	0.0 Psig	
20.0 Psig	107.1 Psig	High Filter Diff. Pre	essure - Run	12.0 Psig	1]	5.0 Psig	
Suction Press	Oil Filter Diff	High Motor Amps		15.0 Am;	os 1	5.0 Amps	
22.8 Psig	30.0 "Hg						
Suction Temp	Oll Temp						
69.2 °F	117.2 °F						
Discharge Press	Motor Amperage						
203.1 Psig	0.0 Amps	Page 1 2 3				Man	
Discharge Temp	Press Ratio					Ment	-
55.2 °F	5.8	No Sched	uled Maintenance	Mainte	enance	Help	
55.2 F	5.0	No Alarr	n / Trips Present	User A	Access	Log off	
User: admin		Run	Hours : 0	01	/29/2019	02:02:36	РМ
	F	igure 6-3. Alarms	and Trips Setpo	ints (Page 3)			

MicroVission Controller • Operation and Service Manual • Copeland • 35391MV V1.4

MicroVission Safety Messages

The following table lists all possible Warning, Inhibit, Alarm, and Trip messages generated by MicroVission while monitoring safety parameters.

Warnings	Inhibits	Alarms	Trips				
Not Running (Idle)	Pre-Start	Running	Running				
Low Suction Pressure							
Below messages are displayed on Main screen, if Suction Pressure value drops below configured setpoints. Refer Figure 6- 1 for Alarm & Trip setpoints.							
There are two different set of Alarm & Trip setpoints which become active depending on Active Control Mode that you have selected from Compressor Control screen.							
Low Suction Pressure Warning	Low Suction Pressure Inhibit	Low Suction Pressure Alarm	Low Suction Pressure Trip				
Suction Pressure <= Low Suction Pressure Alarm Setpoint 1 / Setpoint 2	Suction Pressure <= Low Suction Pressure Alarm Setpoint 1 / Setpoint 2	Suction Pressure <= Low Suction Pressure Alarm Setpoint 1 / Setpoint 2	Suction Pressure <= Low Suction Pressure Alarm Setpoint 1 / Setpoint 2				
High Discharge Pressu	re						
Below messages are displayed on Main screen, if Discharge Pressure value rises above configured setpoints. Refer Figure 6- 1 for Alarm & Trip setpoints.							
There are two different set of Alarm & Trip setpoints which become active depending on Active Control Mode that you have selected from Compressor Control screen.							
High Discharge Pressure Warning	High Discharge Pressure Inhibit	High Discharge Pressure Alarm	High Discharge Pressure Trip				
Discharge Pressure >= High Discharge Pressure Alarm Setpoint 1 / Setpoint 2	Discharge Pressure >= High Discharge Pressure Alarm Setpoint 1 / Setpoint 2	Discharge Pressure >= High Discharge Pressure Alarm Setpoint 1 / Setpoint 2	Discharge Pressure >= High Discharge Pressure Trip Setpoint 1 / Setpoint 2				
Low Process Temperat	ure						
Below messages are display Figure 6- 1 for Alarm & Trip	yed on Main screen, if Process Tempo setpoints.	erature value drops below	configured setpoints. Refer				
There are two different se you have selected from Co	t of Alarm & Trip setpoints which be mpressor Control screen.	come active depending or	n Active Control Mode that				
These safeties become act Temperature SP1" or "Proc	ive only when Active Control Mode cess Temperature SP2".	selected from Compressor	Control screen is "Process				
Low Process Temperature Warning	Low Process Temperature Inhibit	Low Process Temperature Alarm	Low Process Temperature Trip				
Process Temperature <= Low Process Temperature Alarm Setpoint 1 / Setpoint 2	Process Temperature <= Low Process Temperature Alarm Setpoint 1 / Setpoint 2	Process Temperature <= Low Process Temperature Alarm Setpoint 1 / Setpoint 2	Process Temperature <= Low Process Temperature Trip Setpoint 1 / Setpoint 2				

Warnings	Inhibits	Alarms	Trips					
Not Running (Idle)	Pre-Start	Running	Running					
High Process Tempera	ture							
Below messages are displa Figure 6- 1 for Alarm setpo	Below messages are displayed on Main screen, if Process Temperature value rises below configured setpoints. Refer Figure 6- 1 for Alarm setpoints.							
There are two different set of Alarm setpoints which become active depending on Active Control Mode that you have selected from Compressor Control screen.								
These safeties become active only if Active Control Mode selected from Compressor Control is "Process Temperature SP1" or "Process Temperature SP2".								
		High Process						
		Temperature Alarm						
		Process Temperature >= High Process Temperature Alarm Setpoint 1 / Setpoint 2						
Low Suction Temperat	ure							
Below messages are displa Figure 6- 2 for Alarm & Trip	Below messages are displayed on Main screen, if Suction Temperature value drops below configured setpoints. Refer Figure 6- 2 for Alarm & Trip setpoints.							
Low Suction Temperature Warning	Low Suction Temperature Inhibit	Low Suction Temperature Alarm	Low Suction Temperature Trip					
Suction Temperature <= Low Suction Temperature Alarm Setpoint	Suction Temperature <= Low Suction Temperature Alarm Setpoint	Suction Temperature <= Low Suction Temperature Alarm Setpoint	Suction Temperature <= Low Suction Temperature Trip Setpoint					
High Discharge Tempe	erature							
Below messages are displa Refer Figure 6- 2 for Alarm	ayed on Main screen, if Discharge 1 & Trip setpoints.	Temperature value rises at	oove configured setpoints.					
High Discharge Temperat Discharge Temp Bypass Tir	ure Alarm & High Discharge Temp ner is lapsed.	erature Trip safeties are r	nonitored only once High					
High Discharge Temperature Warning	High Discharge Temperature Inhibit	High Discharge Temperature Alarm	High Discharge Temperature Trip					
Discharge Temperature >= High Discharge Temperature Alarm Setpoint	Discharge Temperature >= High Discharge Temperature Alarm Setpoint	Discharge Temperature >= High Discharge Temperature Alarm Setpoint	Discharge Temperature >= High Discharge Temperature Trip Setpoint					

Warnings	Inhibits	Alarms	Trips					
Not Running (Idle)	Pre-Start	Running	Running					
Low Crankcase Oil Ten	Low Crankcase Oil Temperature - Start							
Below messages are displayed on Main screen, if Oil Temperature value drops below configured setpoints. Refer Figure 6- 2 for Alarm & Trip setpoints.								
These safeties become act	These safeties become active only when Crankcase Oil Temp Changeover Timer is running.							
Low Crankcase Oil Temperature Start Warning	Low Crankcase Oil Temperature Start Inhibit	Low Crankcase Oil Temperature Alarm	Low Crankcase Oil Temperature Trip					
Oil Temperature <= Low Crankcase Oil Temperature – Start Alarm Setpoint	Oil Temperature <= Low Crankcase Oil Temperature – Start Alarm Setpoint	Oil Temperature <= Low Crankcase Oil Temperature – Start Alarm Setpoint	Oil Temperature <= Low Crankcase Oil Temperature – Start Trip Setpoint					
Low Crankcase Oil Temperature - Run Below messages are displayed on Main screen, if Oil Temperature value drops below configured setpoints. Refer Figure 6- 2 for Alarm & Trip setpoints. These safeties become active only once Crankcase Oil Temp Changeover Timer is lapsed.								
		Low Crankcase Oil Temperature Alarm	Low Crankcase Oil Temperature Trip					
		Oil Temperature <= Low Crankcase Oil Temperature – Run Alarm Setpoint	Oil Temperature <= Low Crankcase Oil Temperature – Run Trip Setpoint					
High Crankcase Oil Ter	mperature							
Below messages are displ Figure 6- 2 for Alarm & Trip	ayed on Main screen, if Oil Temper setpoints.	rature value rises above c	onfigured setpoints. Refer					
High Crankcase Oil Temperature Warning	High Crankcase Oil Temperature Inhibit	High Crankcase Oil Temperature Alarm	High Crankcase Oil Temperature Trip					
Oil Temperature >= High Crankcase Oil Temperature Alarm Setpoint	Oil Temperature >= High Crankcase Oil Temperature Alarm Setpoint	Oil Temperature >= High Crankcase Oil Temperature Alarm Setpoint	Oil Temperature >= High Crankcase Oil Temperature Trip Setpoint					

Warnings	Inhibits	Alarms	Trips		
Not Running (Idle)	Pre-Start	Running	Running		
Low Oil Pressure Diff.					
Below messages are displa Figure 6-3 for Alarm & Trip	Below messages are displayed on Main screen, if Oil Pressure Diff. value drops below configured setpoints. Refer Figure 6-3 for Alarm & Trip setpoints.				
These safeties become acti	ive once Oil Pressure Bypass Timer is	s lapsed.			
Oil Pressure Calculation is a	as follows: Oil Pressure = Oil Manifol	d Pressure – Suction Press	ıre		
		Low Oil Pressure Diff Alarm	Low Oil Pressure Diff Trip		
		Oil Pressure Diff. <= Low Oil Pressure Diff. Alarm Setpoint	Oil Pressure Diff. <= Low Oil Pressure Diff. Trip Setpoint		
High Filter Diff. Pressu	re - Start				
Below messages are displayed on Main screen, if Filter Diff. Pressure value rises above configured setpoints. Refer Figure 6- 3 for Alarm & Trip setpoints.					
These safeties become active only in below two conditions:					
1) When Oil Monitoring option selected in Configuration Screen is "Oil Filter In & Oil Filter Out" or "Only Oil Filter In".					
2) When Filter Diff. Pressure Changeover Timer is running.					
Filter Diff. Pressure Calculation for Oil Monitoring options, "Oil Filter In & Oil Filter Out" & "Only Oil Filter In" will be respectively as below:					
a) Filter Diff. Pressure = Oil Filter Inlet Pressure – Oil Filter Outlet Pressure.					
b) Filter Diff. Pressure = Oil Filter Inlet Pressure – Oil Manifold Pressure.					
High Filter Diff Pressure Start Warning	High Filter Diff Pressure Start Inhibit	High Filter Diff Pressure Alarm	High Filter Diff Pressure Trip		
Filter Diff. Pressure >= High Filter Diff. Pressure – Start Alarm Setpoint	Filter Diff. Pressure >= High Filter Diff. Pressure – Start Alarm Setpoint	Filter Diff. Pressure >= High Filter Diff. Pressure – Start Alarm Setpoint	Filter Diff. Pressure >= High Filter Diff. Pressure – Start Trip Setpoint		

Warnings	Inhibits	Alarms	Trips		
Not Running (Idle)	Pre-Start	Running	Running		
High Filter Diff. Pressu	re - Run				
Below messages are displayed on Main screen, if Filter Diff. Pressure value rises above configured setpoints. Refer Figure 6- 3 for Alarm & Trip setpoints.					
These safeties become act	These safeties become active only in below two conditions:				
1) When Oil Monitoring op	1) When Oil Monitoring option selected in Configuration Screen is "Oil Filter In & Oil Filter Out" or "Only Oil Filter In".				
2) When Filter Diff. Pressu	re Changeover Timer is lapsed.				
Filter Diff. Pressure Calcula respectively as below:	tion for Oil Monitoring options, "Oi	l Filter In & Oil Filter Out" &	& "Only Oil Filter In" will be		
a) Filter Diff. Pressure = Oi	l Filter Inlet Pressure – Oil Filter Out	let Pressure			
b) Filter Diff. Pressure = O	il Filter Inlet Pressure – Oil Manifold	Pressure			
		High Filter Diff Pressure Alarm	High Filter Diff Pressure Trip		
		Filter Diff. Pressure >= High Filter Diff. Pressure – Run Alarm Setpoint	Filter Diff. Pressure >= High Filter Diff. Pressure – Run Trip Setpoint		
High Motor Amps Below messages are displayed on Main screen, if Motor Amps value rises above configured setpoints. Refer Figure 6- 3 for Alarm setpoints.					
		High Motor Amps	High Motor Amps Trip		
		Motor Amps >= High Motor Amps Alarm Setpoint	Motor Amps >= High Motor Amps Trip Setpoint		
High Discharge #2 Pre	ssure				
Below messages are displayed on Main screen, if Discharge #2 Pressure value rises above configured setpoints. Refer Figure 6-1 for Alarm & Trip setpoints.					
There are two different set of Alarm & Trip setpoints which remain active depending on Active Control Mode selected from Compressor Control screen.					
These safeties are active if No. of Cylinders set in Configuration screen is "12 cyl" or "16 cyl".					
High Discharge 2 Pressure Warning	High Discharge 2 Pressure Inhibit	High Discharge 2 Pressure Alarm	High Discharge 2 Pressure Trip		
Discharge #2 Pressure >= High Discharge Pressure Alarm Setpoint 1 / Setpoint 2	Discharge #2 Pressure >= High Discharge Pressure Alarm Setpoint 1 / Setpoint 2	Discharge #2 Pressure >= High Discharge Pressure Alarm Setpoint 1 / Setpoint 2	Discharge #2 Pressure >= High Discharge Pressure Trip Setpoint 1 / Setpoint 2		

Warnings	Inhibits	Alarms	Trips		
Not Running (Idle)	Pre-Start	Running	Running		
High Discharge #2 Ten	nperature				
Below messages are displayed on Main screen, if Discharge #2 Temperature value rises above configured setpoints. Refer Figure 6- 2 for Alarm & Trip setpoints.					
These safeties become acti	ive only in below two conditions:				
1) When No. of Cylinders	s set in Configuration screen is "12 c	yl" or "16 cyl".			
2) High Discharge Temp	Bypass Timer is lapsed.				
High Discharge 2 Temperature Warning	High Discharge 2 Temperature Inhibit	High Discharge 2 Temperature Alarm	High Discharge 2 Temperature Trip		
Discharge #2 Temperature >= High Discharge Temperature Alarm Setpoint	Discharge #2 Temperature >= High Discharge Temperature Alarm Setpoint	Discharge #2 Temperature >= High Discharge Temperature Alarm Setpoint	Discharge #2 Temperature >= High Discharge Temperature Trip Setpoint		
Remote Communication	on Time-out				
Below messages are displayed on Main screen, if there is no remote communication to the MicroVission for time as set in Communication Failure Detect Timer. Refer Timers screen for setpoint.					
Remote Comm. Time-out Alarm is monitored only if "Revert to Local Control" option is set for On Communication Failure setting in Configuration screen.					
Remote Comm. Time-out ⁻ Failure setting in Configura	Trip is monitored only if "Stop Comp tion screen.	pressor with Trip" option is	set for On Communication		
		Remote Comm Time out Alarm	Remote Comm Time out Trip		
		Remote Comm. Inactive Time >= Compressor Failure Detect Timer	Remote Comm. Inactive Time >= Compressor Failure Detect Timer		
Compressor Interlock					
Below message is displayed on Main screen in following conditions:					
1) If Motor Auxiliary contact fails to close during compressor start.					
2) If Motor Auxiliary contact opens when compressor is running.					
	Compressor Interlock Inhibit		Trip		
	Motor Auxiliary Contact Fails to Close when Compressor is Starting		Motor Auxiliary Contact Opens when Compressor is Running		

Warnings	Inhibits	Alarms	Trips			
Not Running (Idle)	Pre-Start	Running	Running			
High Level Shutdown						
Below messages are displa	Below messages are displayed, if power is removed from the input module.					
High Level Shutdown switch is wired to the digital input normally closed. Usually connected to a float switch on a vessel containing liquid refrigerant. In case of multiple switches, any open switch will generate a relevant message depending on compressor operating mode.						
When "Idle Time Trip" check box is truned on in Configuration screen, High Level Shutdown Trip is monitored even if compressor is idle.						
High Level Shutdown Warning	High Level Shutdown Inhibit		High Level Shutdown Trip			
High Level Shutdown Digital Input is Active Low	High Level Shutdown Digital Input is Active Low during Compressor Start		High Level Shutdown Digital Input is Active Low while Compressor is Running			
Starter Below message is displayed on Main screen, if Motor Auxiliary Contact Fails to Open after Compressor shutdown.						
			Starter Shutdown Trip			
			Motor Auxiliary Contact is Closed after Compressor is Stopped			
False Start						
Below message is displayed on Main screen in following cases if compressor is idle.						
1) Motor Auxiliary contact is closed.						
2) Measured Motor Current value is greater than maximum load rating in amperes.						
			False Start			
			Motor Auxiliary Contact is Closed			
			OR			
			Motor Amperage > 20 % Maximum Amps			
Warnings	Inhibits	Alarms	Trips			
--	---	--	---	--		
Not Running (Idle)	Pre-Start	Running	Running			
IO Comm.						
Below message is displayed & MicroVission SBC Board.	d on Main screen, if there is problem	in Serial Modbus Commun	ication between IO Boards			
			I/O Comm Trip			
			Problem found in Communication between SBC & IO Boards			
Low Oil Level						
Below messages are display	yed on Main screen, if Low Oil Level	Digital Input is found Activ	e Low.			
Low Oil Level Trip become	active only when "Oil Level Trip" che	ck box is truned on in Con	figuration screen.			
Low Oil Level Warning	Low Oil Level Inhibit	Low Oil Level Alarm	Low Oil Level Trip			
Low Oil Level Digital Input is Active Low	Low Oil Level Digital Input is Active Low	Low Oil Level Digital Input is Active Low >= Low Oil Level Alarm Delay Time	Low Oil Level Digital Input is Active Low >= Low Oil Level Trip Delay Time			
Low Discharge Pressur	e					
Below messages are displa Measuring Instrument. The	ayed on Main screen, if there is a f ere is no user configured setpoint.	failure while reading Disch	narge Pressure value from			
Low Discharge Pressure Warning	Low Discharge Pressure Inhibit		Low Discharge Pressure Trip			
Discharge Pressure <= -66.5 Psig	Discharge Pressure <= -66.5 Psig		Discharge Pressure <= -66.5 Psig			
-						
Low Discharge Temper	rature					
Below messages are displayed on Main screen, if there is a failure while reading Discharge Temperature value from Measuring Instrument. There is no user configured setpoint.						
Low Discharge Temperature Warning	Low Discharge Temperature Inhibit		Low Discharge Temperature Trip			
Discharge Temperature <= -100 °F	Discharge Temperature <= -100 °F		Discharge Temperature <= -100 °F			

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running

Low Oil Filter In Pressure

Below messages are displayed on Main screen, if there is a failure while reading Filter Inlet Pressure value from Measuring Instrument. There is no user configured setpoint.

These safeties become active only if Oil Monitoring option selected in Configuration Screen is "Only Oil Filter In" or "Oil Filter In & Oil Filter Out".

Low Oil Filter In Pressure Warning	Low Oil Filter In Pressure Inhibit	Low Oil Filter In Pressure Trip
Filter Inlet Pressure <= -66.5 Psig	Filter Inlet Pressure <= -66.5 Psig	Filter Inlet Pressure <= -66.5 Psig

Low Oil Filter Out Pressure

Below messages are displayed on Main screen, if there is a failure while reading Filter Outlet Pressure value from Measuring Instrument. There is no user configured setpoint.

These safeties become active only if Oil Monitoring option selected in Configuration Screen is "Oil Filter In & Oil Filter Out."

Low Oil Filter Out	Low Oil Filter Out Pressure Inhibit	Low Oil Filter Out
Pressure Warning		Pressure Trip
Filter Outlet Pressure <= -66.5 Psig	Filter Outlet Pressure <= -66.5 Psig	Filter Outlet Pressure <= -66.5 Psig

Low Discharge #2 Pressure

Below messages are displayed on Main screen, if there is a failure while reading Discharge 2 Pressure value from Measuring Instrument. There is no user configured setpoint.

These safeties become active only if No. of Cylinders set in Configuration screen is "12 cyl" or "16 cyl".

Low Discharge 2 Pressure Warning	Low Discharge 2 Pressure Inhibit	Low Discharge 2 Pressure Trip
Discharge 2 Pressure <=	Discharge 2 Pressure <= -66.5	Discharge 2 Pressure <=
-66.5 Psig	Psig	-66.5 Psig

Low Discharge #2 Temperature

Below messages are displayed on Main screen, if there is a failure while reading Discharge 2 Temperature value from Measuring Instrument. There is no user configured setpoint.

These safeties become active only if No. of Cylinders set in Configuration screen is "12 cyl" or "16 cyl".

Low Discharge 2	Low Discharge 2 Temperature		Low Discharge 2
Temperature Warning	Inhibit		Temperature Trip
Discharge 2 Temperature	Discharge 2 Temperature <=		Discharge 2 Temperature
<= -100 °F	-100 °F		<= -100 °F
	·		

Auxiliary Safety Messages

The following table lists all possible Warning, Inhibit, Alarm and Trip messages generated by MicroVission while monitoring Auxiliary safety parameters. The names of safeties depend on the Auxiliary name configured in Configuration screen.

START	RESET	Suction	Pressure 1	St	opped	-4.3 Psig ∆
START		Digital Inputs				
STOP	REMOTE	Digital Aux In 1		Digital A	ux In 2	
5101	REPIOTE	Trip/Alarm	None -	Trip/A	Alarm None	•
Suction Setpoint	Oil Press Diff	Inhibit	None -	Inhibi	it None	•
20.0 Psig	58.0 Psig	Digital Aux In 3		Digital A	ux In 4	
Suction Press	Oil Eilter Diff	Trip/Alarm	None -	Trip/A	Alarm None	
15.7 Psia	NA	Inhibit	None -	Inhibi	it None	•
	011 7					
Suction Temp						
39.7 °F	114.7 °F					
Discharge Press	Motor Amperage					
92.8 Psig	0.0 Amps	Page 1 2	3 4 5	+		Menu
Discharge Temp	Press Ratio	No Sc	heduled Maintenance		Maintenance	Help
126.8 °F	3.5					neip
		No /	Alarm / Trips Present		User Access	Log off
User : admin			Run Hours : 0		01/07/202	21 03:19:26 AM

Figure 6-4. Digital Inputs (Auxiliary I/O Screen) (Page 1)

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running

Digital Aux In 1

Below messages are displayed, if Digital Aux In 1 satisfy safety conditions.

Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-4).

If you select "None" in Trips/Alarm then No Alarm and Trip for Digital Aux In 1 is monitored, similarly if you select "None" in Inhibit, then No Warning and Inhibit for Digital Aux In 1 is monitored.

Digital Aux In 1 Warning	Digital Aux In 1 Inhibit	Digital Aux In 1 Alarm	Digital Aux In 1 Trip
Inhibit Checked and "Start Inhibit if ON" and Digital Aux In 1 is HIGH	Inhibit Checked and "Start Inhibit if ON" and Digital Aux In 1 is HIGH	Trip/Alarm Checked and "Alarm if ON" and Digital Aux In 1 is HIGH Trip/Alarm Checked	Trip/Alarm Checked and "Trip if ON" and Digital Aux In 1 is HIGH Trip/Alarm Checked and
"Start Inhibit if OFF" and Digital Aux In 1 is LOW	if OFF" and Digital Aux In 1 is LOW	and "Alarm if OFF" and Digital Aux In 1 is LOW	"Trip if OFF" and Digital Aux In 1 is LOW

Digital Aux In 2

Below messages are displayed, if Digital Aux In 2 satisfy safety conditions.

Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-4).

If you select "None" in Trips/Alarm, then No Alarm and Trip for Digital Aux In 2 is monitored, similarly if you select "None" in Inhibit, then No Warning and Inhibit for Digital Aux In 2 is monitored.

Digital Aux In 2 Warning	Digital Aux In 2 Inhibit	Digital Aux In 2 Alarm	Digital Aux In 2 Trip
Inhibit Checked and "Start Inhibit if ON" and Digital Aux In 2 is HIGH Inhibit Checked and "Start Inhibit if OFF" and Digital Aux In 2 is LOW	Inhibit Checked and "Start Inhibit if ON" and Digital Aux In 2 is HIGH Inhibit Checked and "Start Inhibit if OFF" and Digital Aux In 2 is LOW	Trip/Alarm Checked and "Alarm if ON" and Digital Aux In 2 is HIGH Trip/Alarm Checked and "Alarm if OFF" and Digital Aux In 2 is LOW	Trip/Alarm Checked and "Trip if ON" and Digital Aux In 2 is HIGH Trip/Alarm Checked and "Trip if OFF" and Digital Aux In 2 is LOW

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running

Digital Aux In 3

Below messages are displayed, if Digital Aux In 3 satisfy safety conditions.

Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-4).

When you select "None" in Trips/Alarm then No Alarm and Trip for Digital Aux In 3 is monitored, similarly if you select "None" in Inhibit, then No Warning and Inhibit for Digital Aux In 3 is monitored.

Digital Aux In 3 Warning	Digital Aux In 3 Inhibit	Digital Aux In 3 Alarm	Digital Aux In 3 Trip
Inhibit Checked and	Inhibit Checked and "Start Inhibit	Trip/Alarm Checked	Trip/Alarm Checked and
"Start Inhibit if ON" and	if ON" and Digital Aux In 3 is	and "Alarm if ON" and	"Trip if ON" and Digital
Digital Aux In 3 is HIGH	HIGH	Digital Aux In 3 is HIGH	Aux In 3 is HIGH
Inhibit Checked and	Inhibit Checked and "Start Inhibit	Trip/Alarm Checked	Trip/Alarm Checked and
"Start Inhibit if OFF" and	if OFF" and Digital Aux In 3 is	and "Alarm if OFF" and	"Trip if OFF" and Digital
Digital Aux In 3 is LOW	LOW	Digital Aux In 3 is LOW	Aux In 3 is LOW

Digital Aux In 4

Below messages are displayed, if Digital Aux In 4 satisfy safety conditions.

Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-4)

If you select "None" in Trips/Alarm then No Alarm and Trip for Digital Aux In 4 is monitored, similarly if you select "None" in Inhibit then No Warning and Inhibit for Digital Aux In 4 is monitored.

Digital Aux In 4 Warning	Digital Aux In 4 Inhibit	Digital Aux In 4 Alarm	Digital Aux In 4 Trip
Inhibit Checked and	Inhibit Checked and "Start Inhibit	Trip/Alarm Checked	Trip/Alarm Checked and
"Start Inhibit if ON" and	if ON" and Digital Aux In 4 is	and "Alarm if ON" and	"Trip if ON" and Digital
Digital Aux In 4 is HIGH	HIGH	Digital Aux In 4 is HIGH	Aux In 4 is HIGH
Inhibit Checked and	Inhibit Checked and "Start Inhibit	Trip/Alarm Checked	Trip/Alarm Checked and
"Start Inhibit if OFF" and	if OFF" and Digital Aux In 4 is	and "Alarm if OFF" and	"Trip if OFF" and Digital
Digital Aux In 4 is LOW	LOW	Digital Aux In 4 is LOW	Aux In 4 is LOW

START	RESET	Suc	tion Pre	essure	1	Sto	pped		-4.3 Psig Δ	
STANT	KESET	Analog Inp	uts							
STOP	REMOTE	Aux 1, 2	2, 3	Au	ix 4, 5, 6	Aux	7, 8			
STOP	REMOTE	Analog Aux	In 1		Analog Aux	In 2	An	alog Aux I	n 3	
Suction Setpoint	Oil Press Diff	Alarm/Trip	Neither	•	Alarm/Trip	Neither	- AI	arm/Trip	Neither -	
20.0 Psig	58.1 Psig	Inhibit			Inhibit			Inhibit		
Suction Press	Oil Filter Diff	Low Alarm	0.0 °F		Low Alarm	0.0 °F	Lo	w Alarm	0.0 °F	
15.7 Psig	NA	High Alarm	0.0 °F		High Alarm	0.0 °F	Hi	gh Alarm	0.0 °F	
Suction Temp	Oil Temp	Low Trip	0.0 °F		Low Trip	0.0 °F	Lo	w Trip	0.0 °F	
39.7 °F	114.9 °F	High Trip	0.0 °F		High Trip	0.0 °F	Hi	gh Trip	0.0 °F	
		Delay	5 sec		Delay	5 sec	D	elay	5 sec	
Discharge Press	Motor Amperage									
92.8 Psig	0.0 Amps	Page 1	2	3	4 5	+			Menu	
Discharge Temp	Press Ratio	1	No Schedu	uled Ma	intenance		Mainte	nance	Help	
126.5 °F	3.5		No Alarm / Trips Present			User A	ccess	Log off		
User : admin			Run	Hours	: 0		01	/07/2021	03:22:28 4	AM

Figure 6-5. Analog Inputs (Auxiliary I/O Screen) (Page 3)

Warnings	Inhibits	Alarms	Trips				
Not Running (Idle)	Pre-Start	Running	Running				
Analog Aux In 1	Analog Aux In 1						
Below messages are displa	yed, if Analog Aux In 1 satisf	fy safety conditions.					
Warnings are displayed in	IDLE condition and it is mon	itored under Inhibit check box	(Refer Figure 6-5)				
If you select "Neither" in A	larm/Trip then No Alarm and	d Trip for Analog Aux In 1 is me	onitored.				
Alarm condition occurs if continuous delay time (de	the value of a parameter dro fault 5 seconds).	ops below or rises above the o	configured Alarm setpoint for a				
Trip condition occurs if th continuous delay time (de	ne value of a parameter dro fault 5 seconds).	ops below or rises above the	configured Trip setpoint for a				
Analog Aux In 1 Warning Analog Aux In 1 Inhibit Analog Aux In 1 Alarm Analog Aux In 1 Trip							
Inhibit Checked and	Inhibit Checked and	"Only Alarm" and Analog Aux In 1 <= Low Alarm	"Only Trip" and Analog Aux In 1 <= Low Trip				
Analog Aux In 1 <= Low Alarm	Analog Aux In 1 <= Low Alarm	"Only Alarm" and Analog Aux In 1 >= High Alarm	"Only Trip" and Analog Aux In 1 >= High Alarm				
Inhibit Checked and Analog Aux In 1 >= High	Inhibit Checked and Analog Aux In 1 >= High	"Both" and Analog Aux In 1 <= Low Alarm	"Both" and Analog Aux In 1 <= Low Trip				
Alarm	Alarm	"Both" and Analog Aux In 1 >= High Alarm	"Both" and Analog Aux In 1 >= High Trip				

Warnings	Inhibits	Inhibits Alarms Trips					
Not Running (Idle)	Pre-Start	Running	Running				
Analog Aux In 2	Analog Aux In 2						
Below messages are displa	aved, if Analog Aux In 2 satisf	fy safety conditions.					
Warnings are displayed in	IDLE condition and it is mon	itored under Inhibit check box	(Refer Figure 6-5)				
If you select "Neither" in A	Alarm/Trip, then No Alarm ar	nd Trip for Analog Aux In 2 is m	nonitored.				
Alarm condition occurs if continuous delay time (de	the value of a parameter dro fault 5 seconds).	ops below or rises above the o	configured Alarm setpoint for a				
Trip condition occurs if the continuous delay time (de	ne value of a parameter dro fault 5 seconds).	ops below or rises above the	configured Trip setpoint for a				
Analog Aux In 2 Warning	Analog Aux In 2 Inhibit	Analog Aux In 2 Alarm	Analog Aux In 2 Trip				
Inhibit Checked and	Inhihit Checked and	"Only Alarm" and Analog Aux In 2 <= Low Alarm	"Only Trip" and Analog Aux In 2 <= Low Trip				
Analog Aux In 2 <= Low Alarm	Analog Aux In 2 <= Low Alarm	"Only Alarm" and Analog Aux In 2 >= High Alarm	"Only Trip" and Analog Aux In 2 >= High Alarm				
Inhibit Checked and Analog Aux In 2 >= High	Inhibit Checked and Analog Aux In 2 >= High	"Both" and Analog Aux In 2 <= Low Alarm	"Both" and Analog Aux In 2 <= Low Trip				
Alarm	Alarm "Both" and Analog Aux In 2 >= High Alarm >= High Trip						
Analog Aux In 3							
Below messages are displayed, if Analog Aux in 3 satisfy safety conditions.							
warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-5)							
Alarm condition occurs if	the value of a parameter dr	ons below or rises above the	configured Alarm setpoint for a				
continuous delay time (de	fault 5 seconds).		.oningureu Alarin selpoint IOF a				
Trip condition occurs if the	he value of a parameter dro	ops below or rises above the	configured Trip setpoint for a				

continuous delay time (default 5 seconds).

Inhibit Checked and Analog Aux In 3 <= Low AlarmInhibit Checked and Analog Aux In 3 <= Low Alarm"Only Alarm" and Analog Aux In 3 <= Low Alarm	Analog Aux In 3 Warning	Analog Aux In 3 Inhibit	Analog Aux In 3 Alarm	Analog Aux In 3 Trip
Alarm "Both" and Analog Aux In 3 "Both" and Analog Aux In 3 + High Alarm >= High Alarm >= High Trip	Inhibit Checked and Analog Aux In 3 <= Low Alarm Inhibit Checked and Analog Aux In 3 >= High Alarm	Inhibit Checked and Analog Aux In 3 <= Low Alarm Inhibit Checked and Analog Aux In 3 >= High Alarm	"Only Alarm" and Analog Aux In 3 <= Low Alarm "Only Alarm" and Analog Aux In 3 >= High Alarm "Both" and Analog Aux In 3 <= Low Alarm "Both" and Analog Aux In 3 >= High Alarm	"Only Trip" and Analog Aux In 3 <= Low Trip "Only Trip" and Analog Aux In 3 >= High Alarm "Both" and Analog Aux In 3 <= Low Trip "Both" and Analog Aux In 3 >= High Trip

Warnings	Inhibits	Alarms	Trips		
Not Running (Idle)	Pre-Start	Running	Running		
Analog Aux In 4					
Below messages are displa	iyed, if Analog Aux In 4 satisf	y safety conditions.			
Warnings are displayed in	IDLE condition and it is mon	itored under Inhibit check box	(Refer Figure 6-5)		
If you select "Neither" is se	elected in Alarm/Trip, then N	No Alarm and Trip for Analog A	ux In 4 is monitored.		
Alarm condition occurs if continuous delay time (de	the value of a parameter dro fault 5 seconds).	ops below or rises above the o	configured Alarm setpoint for a		
Trip condition occurs if the continuous delay time (de	Trip condition occurs if the value of a parameter drops below or rises above the configured Trip setpoint for a continuous delay time (default 5 seconds).				
Analog Aux In 4 Warning	Analog Aux In 4 Inhibit	Analog Aux In 4 Alarm	Analog Aux In 4 Trip		
Inhibit Checked and	Inhibit Checked and	"Only Alarm" and Analog Aux In 4 <= Low Alarm	"Only Trip" and Analog Aux In 4 <= Low Trip		
Analog Aux In 4 <= Low Alarm	Analog Aux In 4 <= Low Alarm	"Only Alarm" and Analog Aux In 4 >= High Alarm	"Only Trip" and Analog Aux In 4 >= High Alarm		
Inhibit Checked and Analog Aux In 4 >= High	Inhibit Checked and Analog Aux In 4 >= High	"Both" and Analog Aux In 4 <= Low Alarm	"Both" and Analog Aux In 4 <= Low Trip		
Alarm	Alarm	"Both" and Analog Aux In 4 >= High Alarm	"Both" and Analog Aux In 4 >= High Trip		

Analog Aux In 5

Below messages are displayed, if Analog Aux In 5 satisfy safety conditions.

Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-5)

If you select "Neither" in Alarm/Trip then No Alarm and Trip for Analog Aux In 5 is monitored.

Alarm condition occurs if the value of a parameter drops below or rises above the configured Alarm setpoint for a continuous delay time (default 5 seconds).

Trip condition occurs if the value of a parameter drops below or rises above the configured Trip setpoint for a continuous delay time (default 5 seconds).

Analog Aux In 5 Warning	Analog Aux In 5 Inhibit	Analog Aux In 5 Alarm	Analog Aux In 5 Trip
Inhibit Checked and	Inhibit Checked and	"Only Alarm" and Analog Aux In 5 <= Low Alarm	"Only Trip" and Analog Aux In 5 <= Low Trip
Analog Aux In 5 <= Low Alarm Alarm	Analog Aux In 5 <= Low Alarm	"Only Alarm" and Analog Aux In 5 >= High Alarm	"Only Trip" and Analog Aux In 5 >= High Alarm
Inhibit Checked and Inh Analog Aux In 5 >= High Analo	Inhibit Checked and Analog Aux In 5 >= High	"Both" and Analog Aux In 5 <= Low Alarm	"Both" and Analog Aux In 5 <= Low Trip
Alarm	Alarm	"Both" and Analog Aux In 5 >= High Alarm	"Both" and Analog Aux In 5 >= High Trip

Warnings	Inhibits Alarms Trips					
Not Running (Idle)	Pre-Start	Pre-Start Running				
Analog Aux In 6						
Below messages are displa	ived, if Analog Aux In 6 satisf	v safety conditions.				
Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-5)						
If you select "Neither" is selected in Alarm/Trip, then No Alarm and Trip for Analog Aux In 6 is monitored.						
Alarm condition occurs if continuous delay time (de	the value of a parameter dro fault 5 seconds).	ops below or rises above the o	configured Alarm setpoint for a			
Trip condition occurs if th continuous delay time (de	ne value of a parameter dro fault 5 seconds).	ops below or rises above the	configured Trip setpoint for a			
Analog Aux In 6 Warning	Analog Aux In 6 Inhibit	Analog Aux In 6 Alarm	Analog Aux In 6 Trip			
Inhibit Checked and	Inhibit Checked and	"Only Alarm" and Analog Aux In 6 <= Low Alarm	"Only Trip" and Analog Aux In 6 <= Low Trip			
Analog Aux III 6 <- Low Alarm	Allalog Aux III 6 <- Low Alarm	"Only Alarm" and Analog Aux In 6 >= High Alarm	"Only Trip" and Analog Aux In 6 >= High Alarm			
Analog Aux In 6 >= High Alarm	Analog Aux In 6 >= High Alarm	"Both" and Analog Aux In 6 <= Low Alarm	"Both" and Analog Aux In 6 <= Low Trip			
	"Both" and Analog Aux In 6 >= High Alarm >= High Trip					
Analog Aux In 7						
Below messages are displa	yed, if Analog Aux In 7 satisf	y safety conditions.				
Warnings are displayed in	IDLE condition and it is moni	itored under Inhibit check box	(Refer Figure 6-5)			
If you select "Neither" in A	Alarm/Trip, then No Alarm ar	nd Trip for Analog Aux In 7 is m	nonitored.			
Alarm condition occurs if the value of a parameter drops below or rises above the configured Alarm setpoint for a continuous delay time (default 5 seconds).						
Trip condition occurs if the value of a parameter drops below or rises above the configured Trip setpoint for a continuous delay time (default 5 seconds).						
Analog Aux In 7 Warning	Analog Aux In 7 Inhibit	Analog Aux In 7 Alarm	Analog Aux In 7 Trip			
Inhibit Chacked and	Inhibit Chackad and	"Only Alarm" and Analog Aux In 7 <= Low Alarm	"Only Trip" and Analog Aux In 7 <= Low Trip			
Analog Aux In 7 <= Low Alarm	Analog Aux In 7 <= Low Alarm	"Only Alarm" and Analog Aux In 7 >= High Alarm	"Only Trip" and Analog Aux In 7 >= High Alarm			
Inhibit Checked and Analog Aux In 7 >= High	Inhibit Checked and Analog Aux In 7 >= High	"Both" and Analog Aux In 7 <= Low Alarm	"Both" and Analog Aux In 7 <= Low Trip			

Alarm

Alarm

Warnings	Inhibits	Alarms	Trips		
Not Running (Idle)	Pre-Start	Pre-Start Running			
Analog Aux In 8					
Below messages are displayed, if Analog Aux In 8 satisfy safety conditions. Warnings are displayed in IDLE condition and it is monitored under Inhibit check box (Refer Figure 6-5) If you select "Neither" in Alarm/Trip, then No Alarm and Trip for Analog Aux In 8 is monitored. Alarm condition occurs if the value of a parameter drops below or rises above the configured Alarm setpoint for a continuous delay time (default 5 seconds). Trip condition occurs if the value of a parameter drops below or rises above the configured Trip setpoint for a continuous delay time (default 5 seconds).					
Analog Aux In 8 Warning	Analog Aux In 8 Inhibit	Analog Aux In 8 Alarm	Analog Aux In 8 Trip		
Inhibit Checked and Analog Aux In 8 <= Low Alarm Inhibit Checked and Analog Aux In 8 >= High Alarm	Inhibit Checked and Analog Aux In 8 <= Low Alarm Inhibit Checked and Analog Aux In 8 >= High Alarm	"Only Alarm" and Analog Aux In 8 <= Low Alarm "Only Alarm" and Analog Aux In 8 >= High Alarm "Both" and Analog Aux In 8 <= Low Alarm "Both" and Analog Aux In 8 >= High Alarm	"Only Trip" and Analog Aux In 8 <= Low Trip "Only Trip" and Analog Aux In 8 >= High Alarm "Both" and Analog Aux In 8 <= Low Trip "Both" and Analog Aux In 8 >= High Trip		

Result Variable Safety Messages

The following table lists all possible Warning, Inhibit, Alarm and Trip messages generated by MicroVission while monitoring Result Variable safety parameters. The names of safeties depend on the previous block name of the variable assigned in Flow Chart in Auxiliary I/O screen ("Digital Result Variable" in Figure 6-6 and "Analog Result Variable" in Figure 6-7).



Figure 6-6. Digital Result Variable Safety (Auxiliary I/O Screen) (Page 5)

Warnings	Inhibits	Alarms Trips				
Not Running (Idle)	Pre-Start	Running	Running			
Digital Result Variable						
Below messages are displayed, if Digital Variable satisfy safety conditions. Warnings are displayed in IDLE condition and it is monitored under Inhibit Check box (Refer Figure 6-6) If you select "None" in Trips/Alarm, then No Alarm and Trip for Digital Variable is monitored, Similarly if you select "None" in Inhibit, then No Warning and Inhibit for Digital Variable is monitored.						
Digital Result Variable Warning	Digital Result Variable Inhibit	Digital Result Variable Alarm	Digital Result Variable Trip			
Inhibit Checked, "Start if ON" and Digital Variable is HIGH	Inhibit Checked and "Start if ON" and Digital Variable is HIGH	Trip/Alarm Checked and "Alarm if ON" and Digital Variable is HIGH	Trip/Alarm Checked and "Trip if ON" and Digital Variable is HIGH			
Inhibit Checked, "Start if OFF" and Digital Variable is LOW	Inhibit Checked and "Start if OFF" and Digital Variable is LOW	Trip/Alarm Checked and "Alarm if OFF" and Digital Variable is LOW	Trip/Alarm Checked and "Trip if OFF" and Digital Variable is LOW			

START	RESET	Suction Pressure 1	Stopped	36.4 Psig ∆
STAIL	NES ET	Auxiliary I/O		
STOP	REMOTE	Start		Apply
			Analog Res	ult Variable
Suction Setpoint	Oil Press Diff		Alarm/Trip	Only Alarm 🝷
20.0 Psig	85.6 Psig		✓ Inhibit	
Suction Press	Oil Filter Diff		Low Alarm	10.0
56.4 Psig	NA		High Alarm	20.0
Suction Temp	Oil Temp		Low Trip	5.0
39.5 °F	117.6 °F		High Trip	25.0
-			Cycles	5
Discharge Press	Motor Amperage			
104.6 Psig	0.0 Amps	Page 1 2 3 4 5	+	Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help
97.7 °F	1.7	No Alarm / Trins Present	User Access	Log off
User : admin		Run Hours : 0	07/21/2021	04:55:11 PM

Figure 6-7. Analog Result Variable Safety (Auxiliary I/O Screen) (Page 5)

Warnings	Inhibits	Alarms	Trips		
Not Running (Idle)	Pre-Start Running		Running		
Analog Result Variable	2				
Below messages are displa	yed, if Analog Variable satisf	y safety conditions.			
Warnings are displayed in	IDLE condition and it is moni	tored under Inhibit check box	(Refer Figure 6-7)		
If you select "Neither" in A	larm/Trip, then No Alarm an	d Trip for Analog Variable is m	onitored.		
Alarm condition occurs if continuous Cycles.	the value of a parameter dro	ops below or rises above the o	configured Alarm setpoint for a		
Trip condition occurs if th continuous Cycles.	ne value of a parameter dro	ops below or rises above the	configured Trip setpoint for a		
Analog Result Variable Warning	Analog Result Variable Trip				
Inhibit Charlesd and	Inhibit Checked and	"Only Alarm" and Analog Variable <= Low Alarm	"Only Trip" and Analog Variable <= Low Trip		
Analog Variable <= Low Alarm	Analog Variable <= Low Alarm	"Only Alarm" and Analog Variable >= High Alarm	"Only Trip" and Analog Variable >= High Alarm		
Inhibit Checked and Analog Variable >= High Alarm	Inhibit Checked andInhibit Checked and"Both" and AnalogInalog Variable >= HighAnalog Variable >= HighVariable <= Low Alarm				
	Aldiiii	"Both" and Analog Variable >= High Alarm	"Both" and Analog Variable >= High Trip		

Overview

With Timers screen, you can view and adjust timer settings associated with the compressor operation. There are different types of timers you can consider as listed below. For Timers screen pages, see Figures 7-1 & 7-2.

Changeover

The changeover timers change from one type control to another once the compressor starts and then the time has expired.

Bypass

The bypass timers prevent certain alarm and trip checks from occurring until the compressor has started and then the time has expired.

Delays

The delay timers require the condition to occur for the specified amount of time.

Timers

A general timer requiring the time to be expire before the listed event can occur.

Timer Setpoints

Given below are the setpoints that you can configure in MicroVission.

Load Increase Start Delay

At compressor startup, the compressor capacity is at minimum load for this time. This is to stabilize the compressor and system conditions. After this timer expires, the system modulates the compressor capacity according to the system demands.

Compressor Interlock Bypass

Once the MicroVission has sent a command to the compressor starter to start, it expects a return signal. This timer defines wait time for that signal before setting a trip condition.

Low Oil Pressure Diff. Bypass

This is the time period for which the "Low Oil Pressure" safety setpoints remain inactive. After the timer expires, the "Low Oil Pressure" safety setpoints become active and safeties related to "Low Oil Pressure" are monitored.

START	RESET	Suction Pressur	Suction Pressure 1 Stop	Stopped	2.	8 Psig Δ
		Setpoint	Max I	Limit	Min Limi	it
STOP	REMOTE				Value	
STOR	REMOTE	Load Increase Start [Delay		10 sec	
Custing Cat Baint	Oli Drass Diff	Compressor Interloci	< Bypass		10 sec	
		Low Oil Pressure Diff	. Bypass		10 sec	
20.0 Psig	107.1 Psig	Low Crankcase Oil Te	60 sec			
Suction Press	Oil Filter Diff	High Discharge Tem	255 sec			
22.8 Psig	30.0 "Hg	High Filter Diff. Press	60 sec			
Suction Temp	Oil Temp	High Motor Amps By	pass		15 sec	
69.2 °F	117.2 °F					
Discharge Press	Motor Amperage					
203.1 Psig	0.0 Amps	Page 1 2				Menu
Discharge Temp	Press Ratio	No Scheduled M	aintenance	Mainten	ance	Help
55.2 °F	5.8	No Alarm / Triv	r Drocont	lisor Ac	CASS	Log off
		No Alarm / Trip	s Present	User Ac		Log on
User: admin		Run Hours	s:0	01/2	9/2019	03:06:05 PM
203.1 Psig Discharge Temp 55.2 °F User : admin	0.0 Amps Press Ratio 5.8	Page 1 2 No Scheduled M No Alarm / Trip Run Hours Figure 7-1, Time	aintenance s Present s : 0 rs Screen (P	Mainten User Act 01/2 age 1)	ance cess 9/2019	He Log 03:0

MicroVission Controller • Operation and Service Manual • Copeland • 35391MV V1.4

Low Crankcase Oil Temperature Changeover

This is the time period for which the "Low Crankcase Oil Temperature – Start" safety setpoints remain active. When the timer expires, the "Low Crankcase Oil Temperature – Start" safety setpoints become inactive, and the "Low Crankcase Oil Temperature – Run" safety setpoints become active.

High Discharge Temperature Bypass

The "High Discharge Temperature" safety setpoints remain inactive for this time period. When the timer expires, the "High Discharge Temperature" safety setpoints become active and monitor related safeties.

High Filter Diff. Pressure Changeover

The "High Filter Diff. Pressure – Start" safety setpoints remain active for this time period. When the timer expires, the "High Filter Diff. Pressure – Start" safety setpoints will become inactive, and the "High Filter Diff. Pressure – Run" safety setpoints will become active.

High Motor Amps Bypass

Motors can draw high current than their rated full load amps for a short time when first turned on. This timer ignores that sudden inrush of current for the specified time.

Communication Failure Detect Timer

This timer forces the compressor to wait for the set time before displaying "Remote Comm Timeout" alarm or "Remote Comm Time-out" trip when there is no remote communication to MicroVission for the configured time.

Restart On Power Failure Timer

This timer forces the compressor to wait for the set time period after a power failure before it starts automatically in Auto mode. By staggering the time settings of this timer between other compressor panels, the compressors can be allowed to start automatically, one at a time, after a power failure. This prevents excessive load demand on the power system that could occur if all the compressor equipment were to start at the same time. This timer is accessible and functional only when "Timed" is configured in Restart On Power Failure in Configuration screen.

START	RESET	Suction Pressur	e 1	Stopped	10).7 Psig ∆		
		Setpoint	Max Lin	nit	Min Lim	it		
STOP	REMOTE				Value			
		Communication Fai	lure Detect Time	r	1 min			
Suction Setpoint	Oil Press Diff	Restart On Power F	ailure Timer		5 min			
20.0 Psig	74.1 Psig	True Anti-Recycle T						
Suction Press	Oil Filter Diff	Accumulative Anti-						
30.7 Psig	NA	Hot Starts per Hour	10					
Suction Temp	Oil Temp	Oil Recovery Solen	oid Shutoff Delay		10 sec			
91.6 °F	105.5 °F	Low Oil Level Alarn	n Delay		30 sec			
		Low Oil Level Trip [Delay		300 sec			
Discharge Press	Motor Amperage							
117.3 Psig	0.0 Amps	Page 1 2				Menu		
Discharge Temp	Press Ratio	No Scheduled M	aintenance	Mainte	nance	Help		
78.1 °F	2.9	No Alarm / Trip	No Alarm / Trips Present User					
User : admin		Run Hours	: : 0	09/	06/2019	01:09:51 PM		

Figure 7-2. Timers Screen (Page 2)

True Anti-Recycle Timer

This timer keeps the compressor off for the set time once the compressor is turned off. This timer prevents short cycling of the compressor.

NOTE

You can modify True Anti-Recycle Timer setpoint only if "True" option is set to "Anti-Recycle" in the Configuration screen.

Accumulative Anti-Recycle Timer

This timer forces a specified time between the consecutive compressor starts. When the compressor starts, this timer resets the time and starts accumulating the running time. Once the compressor shuts down, it is not allowed to restart for the remainder of time left on the Accumulative Anti-Recycle Timer. Unlike the True Anti-Recycle Timer, if the compressor has run for the entire time of the Accumulative Anti- Recycle Timer and then if compressor shuts down, the compressor is allowed to restart immediately.

NOTE

You can modify Accumulative Anti-Recycle Timer setpoint only if "Accumulative" option is set to "Anti-Recycle" in the Configuration screen.

Hot Starts per Hour

This is a setpoint that counts the number of compressor starts per hour. It resets only when the time between two compressor starts is at least one hour. If the counter reaches to its set value in one hour, it does not allow the compressor to start until an hour is complete since the last counter reset. The compressor can start consecutively up to the point that the counter reaches the set value. However, after reaching the set value, the counter requires a one-hour gap to reset before allowing another compressor start.

NOTE

You can modify Hot Starts per Hour setpoint only if "Hot Starts" option is set to "Anti-Recycle" in the Configuration screen.

Oil Recovery Solenoid Shutoff Delay

When the state of "Low Oil Level" digital input changes from Active Low to Active High, the Oil Recovery Solenoid Digital Output remains ON for this specified time. When this timer expires, the state of Oil Recovery Solenoid Digital Output changes to OFF.

Low Oil Level Alarm Delay

If the "Low Oil Level" digital input is found in an active low state, the "Low Oil Level Alarm" is not generated for the specified period of time. If the "Low Oil Level" digital input remains in Active Low state continuously for this specified time, then an alarm condition is generated and "Low Oil Level Alarm" message is displayed on the Main screen.

Low Oil Level Trip Delay

If the "Low Oil Level" digital input is in Active Low state, the "Low Oil Level Trip" is not generated for the specified period of time. If "Low Oil Level" digital input remains in Active Low state continuously for the specified time, then, a trip condition is generated and the "Low Oil Level Trip" message is displayed on the Main screen.

NOTE

You can detect and see "Low Oil Level Trip" message on Main screen only if you have enabled the "Oil Level Trip" check box in the Configuration screen.

Overview

With Instrument Calibration screen, you can define how the MicroVission will interpret the signal from any devices connected to panel's analog inputs. The Instrument Calibration screen consists of six pages. Each page is divided into individual tabs for every device. Each tab has section labeled "I/O" that provides the basic information for that device. The "A/D bit Value" field displays the unmodified value read by MicroVission analog to digital convertors. Any changes to the calibration settings do not affect this value. This field displays some value if a device is connected to the associated input. The "Calibrated Value" field displays the result of the calibration process. Therefore, any changes to the calibration setpoints affect the value shown in the field. Calibrated value for Pressure & Temperature values are displayed in pressure / temperature unit as configured in Configuration screen.

All instruments are calibrated using a two-point linear calibration process. Any device that has a non-linear response to environmental stimuli will not be able to be calibrated through the MicroVission.

I/O

Each I/O section provides basic information for a connected device.

A/D bit Value

The A/D bit Value field displays actual value read by MicroVission analog to digital convertors. Any change to the calibration settings does not change the value in this field. This field displays some value when a device is connected to the associated input.

Calibrated Value

The Calibrated Value field displays calibrated value which is the result of the calibration process. Calibrated value for Pressure & Temperature values are displayed in pressure / temperature unit as configured in Configuration screen.

All instruments are calibrated using a two-point linear calibration process. Any device that has a non-linear response to environmental stimuli cannot be calibrated through the MicroVission.

Pressure & Temperature Inputs

Pressure and temperature sensors are the most commonly used instruments. Using the first two pages of the Instrument Calibration screen, you can configure these Instruments; see Figure 8-1 up to Figure 8-8.

Each tab on these two pages consists of two sections such as Device Calibration and Channel Calibration.

Device Calibration

Using the Device Calibration section, you can define operation parameters of the Instrument.

Default Devices

If you select the Default Devices option, you will have a predefined list of common devices to select from a dropdown list. Upon selection a device, the setpoints are automatically set for you.

Custom Device

Using Custom Device option, you can choose the minimum and maximum value of the Instrument being used.

The Instrument Calibration screen provides a set of ranges for default devices. You must select appropriate range to calibrate the sensor. If you do not find a correct range, you can specify a custom range.

Based on the calibration range you select or specify, MicroVission displays the calibrated value. This calibrated value of the respective analog input is also shown on the Main screen.

Channel Calibration

The Channel Calibration section defines the type of signal sent by the Instrument.

Offset

Once the two-point calibration is complete, a small error may exist. By entering the value of the error from the calibrated value and the actual value into the "Adjustment" box, that error is added/subtracted from the "Total Offset". The offset is applied to the calibrated value which should correct the error.

Range

The Range option is available if you select the "Custom Device" option. Here you can define the range transmitted by the instrument and signal type. You can select a range from the drop-down list that has several predefined ranges or, enter a value.

Analog Inputs – Pressure

With the Instrument Calibration screen Page 1, you can calibrate adjacent pressure sensors:

- Suction Pressure
- Discharge Pressure
- Oil Pressure
- Filter In
- Filter Out



Figure 8-1. Instrument Calibration Screen (Page 1) – Analog Inputs (Suction Pressure)

START	RESET	Suction	Pressure 1		St	topped	2.8 Psig ∆	
START	NESET.	Analog Inputs (Presssure)					
6700	DEMOTE	Suction	Discharge	C	Dil	Filter In	Filter Out	
STOP	REMOTE	I/O	Device Ca	libratio	n			
		A/D bit Value	 Default D 	evices		Custom Device		
Suction Set Point	Oil Press Diff	2529				Min	Max	
20.0 Psig	107.0 Psig	Calibrated Value	/alue 0-414.5 psia (4-20ma) - 29.9 "Hg 400.0			400.0 Psig		
Suction Press	Oil Filter Diff	203.1 Psig	203.1 Psig Channel Calibration					
22.8 Psig	30.0 "Hg		Offset Range					
Suction Temp	Oil Temp		Adjustment		I/O Jumper Selection			
69.2 °F	117.2 °F				4ma - 2	20ma	-	
			Total Offset	:	Min	Max	(
Discharge Press	Motor Amperage		0.0				0 ma	
203.1 Psig	0.0 Amps	Page 1 2	3 4	5 6			Menu	
Discharge Temp	Press Ratio	No Sch	neduled Maintena	nce		Maintenance	Help	
55.2 °F	5.8	No Al	No Alarm / Trips Present User Access Lo					
User : admin		R	tun Hours : 0			01/29/201	9 02:47:52 PM	

Figure 8-2. Instrument Calibration Screen (Page 1) – Analog Inputs (Discharge Pressure)

START	DECET	Suction Pr	essure 1		s	topped	2.8 Psig Δ	
START	REJET	Analog Inputs (Pr	esssure)					
	DELLOTE.	Suction D	ischarge	0	ai i	Filter In	Filter Out	
STOP	REMOTE	I/O	Device Calibration					
		A/D bit Value	• Default D	evices		Custom Device		
Suction Set Point	Oil Press Diff	1952				Min	Max	
20.0 Psig	107.0 Psig	Calibrated Value	0-414.5 psia (4-20ma) - 29.9 "Hg 400.0 P			400.0 Psig		
Suction Press	Oil Filter Diff	129.8 Psig	8 Psig Channel Calibration					
22.8 Psig	30.0 "Hg		Offset Range					
Suction Temp	Oil Temp		Adjustment		I/O Jump	per Selection		
69.2 °F	117.2 °F				4ma - 3	20ma		
			Total Offset		Min	Max		
Discharge Press	Motor Amperage		0.0				0 ma	
203.1 Psig	0.0 Amps	Page 1 2 3	3 4	5 6			Menu	
Discharge Temp	Press Ratio	No Sched	theduled Maintenance Hel				Help	
55.2 °F	5.8	No Alarr	n / Trips Prese	Log off				
User: admin		Run	Hours : 0			01/29/201	9 02:48:54 PM	

Figure 8-3. Instrument Calibration Screen (Page 1) – Analog Inputs (Oil Pressure)

START	DECET	Suction Pro	essure 1	St	topped	2.8 Psig ∆	
START	RESET	Analog Inputs (Pr	esssure)				
	DEMOTE	Suction D	ischarge O	Dil	Filter In	Filter Out	
STOP	REMOTE	I/O	Device Calibration	n			
		A/D bit Value	 Default Devices 		Custom Device		
Suction Set Point	Oil Press Diff	553			Min	Max	
20.0 Psig	107.1 Psig	Calibrated Value	0-414.5 psia (4-20ma) - 29.9 "Hg 400.0 Psig				
Suction Press	Oil Filter Diff	30.0 "Hg	Channel Calibration				
22.8 Psig	30.0 "Hg		Offset Range				
Suction Temp	Oil Temp		Adjustment	I/O Jump	er Selection		
69.2 °F	117.2 °F			4ma - 2	20ma		
			Total Offset	Min	Max		
Discharge Press	Motor Amperage		0.0			0 ma	
203.1 Psig	0.0 Amps	Page 1 2 3	4 5 6			Menu	
Discharge Temp	Press Ratio	No Sched	uled Maintenance		Maintenance	Help	
55.2 °F	5.8	No Alarn	Alarm / Trips Present User Access Log				
User : admin		Run	Hours :0		01/29/201	9 02:48:16 PM	

Figure 8-4. Instrument Calibration Screen (Page 1) – Analog Inputs (Filter In Pressure)

Section 8 • Instruments Calibration

START	DESET	Suction Pro	essure 1	St	topped	2.8 Psig ∆	
START	RESET	Analog Inputs (Pr	esssure)				
		Suction D	ischarge C	Dil	Filter In	Filter Out	
STOP	REMOTE	1/0	Device Calibratio	n			
		A/D bit Value	 Default Devices 		Custom Device		
Suction Set Point	Oil Press Diff	1496			Min	Max	
20.0 Psig	107.0 Psig	Calibrated Value	0-414.5 psia (4-20ma) · 29.9 "Hg 400.0 Psi				
Suction Press	Oil Filter Diff	71.8 Psig	.8 Psig Channel Calibration				
22.8 Psig	30.0 "Hg		Offset Range				
Suction Temp	Oil Temp		Adjustment	I/O Jump	er Selection		
69.2 °F	117.2 °F			4ma - 2	20ma		
			Total Offset	Min	Max	ax	
Discharge Press	Motor Amperage		0.0				
203.1 Psig	0.0 Amps	Page 1 2 3	4 5 6			Menu	
Discharge Temp	Press Ratio	No Sched	uled Maintenance		Maintenance	Help	
55.2 °F	5.8	No Alarn	No Alarm / Trips Present User Access Lo				
User : admin		Run	Hours : 0		01/29/201	9 02:48:31 PM	

Figure 8-5. Instrument Calibration Screen (Page 1) – Analog Inputs (Filter Out Pressure)

Analog Inputs – Temperature

With the Instrument Calibration screen Page 2, you can calibrate adjacent temperature sensors.

- Discharge Temperature
- Suction Temperature
- Oil Temperature



Figure 8-6. Instrument Calibration Screen (Page 2) – Analog Inputs (Suction Temperature)

START	DECET	Suction P	ressure 1		St	topped	2.8 Psig ∆		
START	RESET	Analog Inputs (T	emperatur	e)					
	DELLOTE.	Suction C	Discharge	0	il				
STOP	REMOTE	I/O	Device Ca	libratio	n				
		A/D bit Value	Default	evices		Custom Device	ustom Device		
Suction Set Point	Oil Press Diff	2281				Min	Max		
20.0 Psig	107.0 Psig	Calibrated Value	RTD436.0 °F				500.0 °F		
Suction Press	Oil Filter Diff	55.2 °F	55.2 °F Channel Calibration						
22.8 Psig	30.0 "Hg		Offset Range						
Suction Temp	Oil Temp		Adjustment		I/O Jump	er Selection			
69.2 °F	117.2 °F				Ovdc - S	5vdc			
			Total Offset		Min	Max			
Discharge Press	Motor Amperage		0.0				vdc		
203.1 Psig	0.0 Amps	Page 1 2	3 4	5 6			Menu		
Discharge Temp	Press Ratio	No Sche	duled Maintena	ince		Maintenance	Help		
55.2 °F	5.8	No Alar	m / Trips Prese	Log off					
User: admin		Ru	n Hours : O			01/29/2019	02:54:30 PM		



START	DESET	Suction Pr	essure 1		Stopped	2.8 Psig ∆	
START	RESET	Analog Inputs (Te	mperature)				
	DEMOTE	Suction D	ischarge	Oil			
STOP	REMOTE	I/O	Device Calibra	tion			
		A/D bit Value	Default Device	es	Custom Device		
Suction Set Point	Oil Press Diff	2552			Min	Max	
20.0 Psig	107.0 Psig	Calibrated Value	RTD		-436.0 °F	500.0 °F	
Suction Press	Oil Filter Diff	117.2 °F	117.2 °F Channel Calibration				
22.8 Psig	30.0 "Hg		Offset Rang				
Suction Temp	Oil Temp		Adjustment				
69.2 °F	117.2 °F			0vdc	- 5vdc		
			Total Offset	Min	Max		
Discharge Press	Motor Amperage		0.0			vdc	
203.1 Psig	0.0 Amps	Page 1 2 3	4 5	6		Menu	
Discharge Temp	Press Ratio	No Sched	uled Maintenance		Maintenance	Help	
55.2 °F	5.8	No Alarn	n / Trips Present		User Access	Log off	
User : admin		Run	Hours : 0		01/29/201	9 02:54:42 PM	

Figure 8-8. Instrument Calibration Screen (Page 2) – Analog Inputs (Oil Temperature)

Analog Inputs

With the Page 3 of Instrument Calibration screen, you can calibrate instruments used for motor current and process control. It consists two sections as mentioned below.

Motor Current

The MicroVission measures the motor current value using the 4-20 mA signal transmitted from the external device.

The calibration process for Motor Current is slightly different from all other calibration procedures. You must calibrate the motor current while the compressor is running at close to full amps as much as possible. In addition, the you will need a value into the "Enter Desired Value" box that is equal to the measured value in amps by a calibrating measurement device. After entering the measured value, the displayed motor current in "Calibrated Value" box may differ slightly. In this case reenter the desired value and the displayed value should get progressively closer.

4-20mA Scale

- **4mA:** This is read-only box. It displays/defines a minimum value in Amps represented by 4mA input.
- **20mA:** Defines the maximum value in Amps that is represented by 20mA input.
- Enter Desired Value: When you enter the correct current value each entry re-calculates the point slope calculations of the current calibration.
- Total Error: This is a read-only box. It displays the total error offset of the value from the "Enter Desired Value" setpoint.

START	DESET	Suction Pr	essure 1	Sto	pped	2.8 Psig ∆
START	REJET	Analog Inputs				
	DEMOTE	Motor Current Pro	cess Temp			
STOP	REMOTE	I/O	4-20ma Scale			
		A/D bit Value	4ma		20ma	
Suction Set Point	Oil Press Diff	873	0.0 Amps		250.0 Amps	
20.0 Psig	107.0 Psig	Calibrated Value	Enter Desired Value		Total Error	
Suction Press	Oil Filter Diff	4.4 Amps			0.0	
22.8 Psig	30.0 "Hg					
Suction Temp	Oil Temp					
69.2 °F	117.2 °F					
Discharge Press	Motor Amperage				Clear	
203.1 Psig	0.0 Amps	Page 1 2 3	4 5 6			Menu
Discharge Temp	Press Ratio	No Sched	uled Maintenance		Maintenance	Help
55.2 °F	5.8	No Alarn	No Alarm / Trips Present			Log off
User : admin		Run	Hours : 0		01/29/201	9 02:55:53 PM

Figure 8-9. Instrument Calibration Screen (Page 3) – Analog Inputs (Motor Current)

Process Temperature or Pressure

The Process Control tab displays either Process Temperature or Process Pressure depending on the "Process Control" type you select in the Configuration screen. For more information, see Configuration screen. The tab consists two sections such as Device Calibration and Channel Calibration with Default Devices and Custom Device options. The Channel Calibration section has features such as Offset, Range, Adjustment, and Total Offset for the standard pressure and temperature inputs.

START	DESET	Suction Pr	essure 1	St	opped	2.8 Psig ∆	
START	REJET	Analog Inputs					
	DEMOT	Motor Current Pro	cess Temp				
STOP	REMOTE	I/O	Device Calibratio	n			
		A/D bit Value	Default Devices	0	Custom Device		
Suction Set Point	Oil Press Diff	1894			Min	Max	
20.0 Psig	107.0 Psig	Calibrated Value	RTD		• -436.0 °F	500.0 °F	
Suction Press	Oil Filter Diff	-33.2 °F Channel Calibration					
22.8 Psig	30.0 "Hg	Offset Range					
Suction Temp	Oil Temp		Adjustment	I/O Jump	er Selection		
69.2 °F	117.2 °F			Ovdc - S	5vdc		
			Total Offset	Min	Max		
Discharge Press	Motor Amperage		0.0			vdc	
203.1 Psig	0.0 Amps	Page 1 2 3	4 5 6			Menu	
Discharge Temp	Press Ratio	No Scheduled Maintenance Held				Help	
55.2 °F	5.8	No Alarr	No Alarm / Trips Present User Arcess Lo				
User : admin		Run	Hours : 0		01/29/2019	9 02:56:30 PM	

Figure 8-10. Instrument Calibration Screen (Page 3) – Analog Inputs (Process Temperature)

Auxiliary Inputs

Using the Page 4 and Page 5 of the Instrument Calibration screen, you can define the parameters of an installed auxiliary analog instrument. These instruments are usually not part of a typical compressor set-up but MicroVission provides a way for you to add additional capabilities. The layout of this screen is similar to the pressure and temperature calibration screens.

NOTE

The Discharge 2 Pressure and Temperature tabs are available only if you have enabled "Analog Input 1" board and the number of cylinders configured are 12 or 16 in the Configuration screen.

Device Calibration

Using Device Calibration setpoints, you can define what the input from the auxiliary instrument means in terms of unit and range. If a temperature measuring instrument is connected, then you can select temperature from the "Units" drop-down list and then set the minimum and maximum value for the scale.

Channel Calibration

The Channel Calibration section defines the type of signal sent by the Instrument.

- Offset: Once the two-point calibration is complete, a small error may exist. By entering the value of the error from the calibrated value and the actual value into the "Adjustment" box, that error will be added/ subtracted from the "Total Offset". The offset is applied to the calibrated value which should correct the error.
- **Range:** Here you can define the signal type and range transmitted by the Instrument. You can select several predefined ranges from the drop-down list or enter a value.

START	DESET	Suction Pr	essure 1	Sto	pped		-4.3 Psig ∆
START	RESET	Auxiliary Inputs					
		Aux 1: Analog Au	Aux 2: Analog Au	Aux 3: Ar	alog Au	Aux	4: Analog Au
STOP	REMOTE	I/O	Device Calibratio	n			
		A/D bit Value	Units		Min		Max
Suction Setpoint	Oil Press Diff	1019	Temperature ·		0.0 °F		0.0 °F
20.0 Psig	58.1 Psig	Calibrated Value	Channel Calibrati	tion			
Suction Press	Oil Filter Diff	0.0 °F	Offset	Range			
15.7 Psig	NA		Adjustment	I/O Jumper Selection			
Suction Temp	Oil Temp			4ma - 20)ma		•
39.5 °F	115.1 °F		Total Offset	Min		Max	
			0.0 °F	4.0 ma		20.0	ma
Discharge Press	Motor Amperage						
92.8 Psig	0.0 Amps	Page 1 2 3					Monu
Discharge Temp	Press Patio	rage 1 2 5					Menu
106 E °E	3 E	No Scheduled Maintenance Maintenance					Help
120.5 P	5.5	No Alarr	Alarm / Trips Present User Access				Log off
User : admin		Run	Hours : 0		01/07/	2021	06:43:46 AM

Figure 8-11. Instrument Calibration Screen (Page 4) – Auxiliary Inputs

START	RESET	Suction Pr	essure 1	Sto	pped	-4.3 Psig Δ	
START	ILLU LI	Auxiliary Inputs					
		Aux 5: Analog Au	Aux 6: Analog Au	Aux 7: An	alog Au	Aux 8: Analog Au	
STOP	REMOTE	I/O	Device Calibratio	n			
		A/D bit Value	Units		Min	Max	
Suction Setpoint	Oil Press Diff	3	Temperature ·		0.0 °F	0.0 °F	
20.0 Psig	58.3 Psig	Calibrated Value	Channel Calibrat	ibration			
Suction Press	Oil Filter Diff	0.0 °F	Offset	Range			
15.7 Psig	NA		Adjustment	I/O Jumper Selection			
Suction Temp	Oil Temp			4ma - 20	ma		
39.2 °F	114.9 °F		Total Offset	Min	N	lax	
			0.0 °F	4.0 ma	:	20.0 ma	
Discharge Press	Motor Amperage						
92.8 Psig	0.0 Amps						
Discharge Terre	Dense Bable	Page 1 2 3	4 5 6	<u></u>		Menu	
	Press Ratio	No Sched	uled Maintenance		Maintenan	ce Help	
120.8 -	5.5	No Alarr	n / Trips Present		User Acces	s Log off	
User : admin		Run	Hours : 0		01/07/2	021 06:44:03 AM	

Figure 8-12. Instrument Calibration Screen (Page 5) – Auxiliary Inputs

Analog Outputs

Using the Page 6 of Instrument Calibration screen, you can Calibrate Analog Outputs. The Analog outputs of the MicroVission generate a 4–20mA signal to any attached devices. However, a small difference in the board components might result in a small difference in the output. So, using this screen you can fine tune the upper and lower output values, see Figure 8-13

Test Limits

• If you tap the Min button, the output goes to 4 mA. Whereas, if you tap the Max button it gives a 20 mA output. You can then measure the output for accuracy.

Min (mA)

• You can adjust the 4mA output by adding or subtracting a value through Offset (mA) if the output has an unacceptable amount of error.

Max (mA)

• You can adjust the 20mA output by adding or subtracting a value through Offset (mA) if the output has an unacceptable amount of error.

Offset (mA)

• By entering the value of the error from the calibrated value and the actual value into the offset entry box, that error is added/subtracted from the mA value. The offset is applied to the mA value which should correct the error. Resolution of error should not be less than 0.01.

Apply Changes

 To store the Min (mA) and Max (mA) values in the database tap the Apply Changes button. The offset (mA) value which is used to correct 4mA or 20mA output is not saved until this button is pressed.

NOTE

The Auxiliary Analog Outputs which are occupied by other services (like Condenser Control, Auxiliary IO screen) with run always option would be disabled in Instrument Calibration screen Page 6, see Figure 8-14.

START	DESET	Suction F	ressure	1		Stopped	-4.3 Psig Δ
START	KESET	Analog Outputs					
STOP	REMOTE		Test I	limits	Min (mA)	Offset (mA) Max (mA) Offset (mA)
STOP	REMOTE	Compressor VFD	Min	Max	4.0	20.0	
Suction Setpoint	Oil Press Diff	Analog Aux Out 1	Min	Max	4.0	20.0	
20.0 Psig	58.1 Psig	Analog Aux Out 2	Min	Max	4.0	20.0	
Suction Press	Oil Filter Diff	Analog Aux Out 3	Min	Max	4.0	20.0	
15.7 Psig	NA	Analog Aux Out 4	Min	Max	4.0	20.0	
Suction Temp	Oil Temp	Analog Aux Out 5	Min	Max	4.0	20.0	
39.9 °F	114.7 °F						
Discharge Press	Motor Amperage						Apply Changes
92.9 Psig	0.0 Amps	Page 1 2	3 4	5	6		Menu
Discharge Temp	Press Ratio						
126.8 °F	3.5	No Sch	eduled Mai	intenance		Maintenance	Help
		No Ala	nrm / Trips	Present		User Access	Log off
User : admin		R	un Hours	: 0		01/07/202	1 06:44:18 AM

Figure 8-13. Instrument Calibration Screen (Page 6) – Auxiliary Outputs

t (mA)
t (mA)
ges
lenu
D
off
nş M

Figure 8-14. Instrument Calibration Screen (Page 6) – Auxiliary Outputs Disabled

Overview

The Event List screen displays a list of all compressor events. The events are arranged in chronological order and latest event at the top. You can use the information on the screen to understand and troubleshoot the compressor operation. This screen is divided into four columns and can list up to 128 separate events. You can download the information on the Event List screen through the Data Backup screen.

Event List Columns

- Date: Displays the date of the event in MM/DD/ YYYY format.
- **Time**: Displays the time of the event in HH:MM:SS format. The time data displays AM/PM information when 12-hour format is configured in the Configuration screen.
- Event Type: Displays the type of message for a listing. The common event types are "Start", "Stop", "Trip", "Inhibit", "Alarm", "Info", and "System". These helps you understand the meaning of the "Message" column.
- **Message**: Displays the information that describes the event.

The Update button refreshes the event list data. To see latest events data, simply tap the Update button.

START	RESET	Suc	tion Pressur	el	S	topped	4.3	B Psig A	7
START	NESC.	Date	Time	Event Type	Message				-
STOP	REMOTE	02/02/2019 02/02/2019 02/02/2019 02/02/2019	01:24:29 AM 01:23:43 AM 01:21:15 AM 01:20:09 AM	Start Stop Start Stop	Auto Stopped Direct I/ Stopped	i (Remote) O (Auto-Cycle) i (Remote)			
		02/02/2019	01:18:41 AM	Start	Direct I	O (Auto-Cycle)			
Suction Set Point	Oil Press Diff	02/02/2019	01:17:46 AM 01:10:48 AM	Stop	Stopped False St	d (Local)			
20.0 Psig	112.2 Psig	02/02/2019 02/02/2019	01:04:26 AM 01:04:26 AM	Trip Stop	High Fil Stopped	ter Diff Pressure i (Safety)	Trip		
Suction Press	Oil Filter Diff	02/02/2019	01:04:24 AM	Start	Remote	(Manual)			
24.3 Psig	NA	02/02/2019 02/02/2019 02/02/2019	01:04:02 AM 01:03:41 AM 01:03:22 AM	Start Start Start	Manual Auto	(Auto)			
Suction Temp	Oil Temp	02/02/2019	00:52:40 AM	System	Power L	Jp			
69.2 °F	101.4 °F	02/02/2019 02/02/2019 02/02/2019	00:47:25 AM 00:47:25 AM 00:46:49 AM	Trip Stop Alarm	High Fil Stopped Low Sud	ter Diff Pressure I (Safety) tion Pressure Ala	Trip arm		
		02/02/2019	00:46:20 AM	Start	Auto				
Discharge Press	Motor Amperage	02/02/2019 02/02/2019	00:45:30 AM 00:45:30 AM	Inhibit Stop	Low Suc Stopped	tion Pressure Inf (Safety)	hibit		-
191.1 Psig	0.0 Amps					Up	date	Ment	
Discharge Temp	Press Ratio		No Scheduled Ma	intenance		Maintenance		Help	
89.8 °F	5.3						-		
			No Alarm / Trips	s Present		User Access		Log off	
User : admin			Run Hours	:0		02/07/201	.9	03:36:41	РМ

Figure 9-1. Event List Screen

Overview

The Live I/O screen displays the live data of all the Analog Inputs/Outputs, Digital Inputs/Outputs, Virtual Analog Inputs, Virtual Digital Inputs, Analog Result Variable, and Digital Result Variables being monitored. The Live I/O screen consists six different pages where you can view the Inputs/Outputs (I/O), see Figures 10-1, 10-2, 10-3, 10-4, 10-5 & 10-6. This screen also takes a snapshot of all the I/O points when you tap the "Freeze Data" button or if the compressor experiences a trip condition. The Freeze page displays the title that indicates whether the Freeze data is saved due to trip condition or "Freeze Data" button is pressed by you, see Figures 10-7 & 10-8. Latest Freeze data is shown in Freeze 1 tab. You can save upto five Freeze pages. The oldest Freeze page is removed when more than five Freeze events occur. You can download these freeze events to a USB drive through Data Backup screen.

START	RESET	Suction Pressure 1			opped	-4.3 Psig ∆	
		Live I/O					
STOP	REMOTE	Live I/O					
		Motor Amps	0.0 Amps	Discharg	ge Temp	126.8 °F	
Suction Setpoint	Oil Press Diff	Suction Pressure	15.7 Psig	Oil Tem	p	115.1 °F	
20.0 Psig	58.1 Psig	Discharge Pressure	92.9 Psig	Process	Control	84.3 °F	
15.7 Psig	NA	Oil Pressure	73.9 Psig	Aux 1: A	nalog Aux In 1	0.0 °F	
Suction Temp	Oil Temp	Filter In Pressure	90.2 Psig	Aux 2: A	nalog Aux In 2	0.0 °F	
39.9 °F	115.1 °F	Filter Out Pressure	76.3 Psig	Aux 3: A	nalog Aux In 3	0.0 °F	
Discharge Press	Motor Amperage	Suction Temp	39.9 °F	Aux 4: A	nalog Aux In 4	0.0 °F	
92.9 Psig	0.0 Amps	Page 1 2 3	4 5	6	Freeze Da	ta Menu	
Discharge Temp	Press Ratio	No Scheduled M	Maintenance	Help			
126.8 °F	3.5	No Alarm / Tris	No Alarm / Trips Present				
User : admin		Run Hour	s : 0		01/07/2023	06:55:04 AM	

Figure 10-1. Input/Output States Screen (Page 1) - Live I/O Data

START	DESET	Suction Pressu	re 1	Stopped	-4.3 Psig Δ
START	RESET	Live I/O			
STOP	REMOTE	Live I/O			
		Aux 5: Analog Aux In 5	0.0 °F	Remote Start / Sto	p 1
Suction Setpoint	Oil Press Diff	Aux 6: Analog Aux In 6	0.0 °F	Remote Increase	1
20.0 Psig	58.3 Psig	1		D	
Suction Press	Oil Filter Diff	Aux 7: Analog Aux In 7	0.0 *	Remote Decrease	
15.7 Psig	NA	Aux 8: Analog Aux In 8	0.0 °F	Setpoint 1 / 2	1
Suction Temp	Oil Temp	Comp Aux	0	Remote Ready	0
39.9 °F	115.1 °F	High Level Shutdown	1	Compressor Start	0
		Low Oil Level	1	Oil Crank Case Hea	ater 0
Discharge Press	Motor Amperage	LOW ON LEVEL		on crain case field	
92.9 Psig	0.0 Amps	Page 1 2 3	4 5	6 Free	eze Data Menu
Discharge Temp	Press Ratio	No Scheduled M	laintenance	Mainten	ance Help
127.0 °F	3.5	No Alarm / Trij	ps Present	User Ac	cess Log off
User : admin		Run Hour	s:0	01/0	7/2021 06:56:12 AM

Figure 10-2. Input/Output States Screen (Page 2) - Live I/O Data

START	RESET	Suction Pressu	re 1	St	opped	-4.3 Psig ∆	
		Live I/O					
STOP	REMOTE	Live I/O					
		Trip	1	Aux 2: D	Digital Aux In 2	0	
Suction Setpoint	Oil Press Diff	Unloader #1	0	Aux 3: D	Digital Aux In 3	0	
20.0 Psig	58.3 Psig			1			
Suction Press	Oil Filter Diff	Unloader #2	0	Aux 4: D	Digital Aux In 4	0	
15.7 Psig	NA	Unloader #3	0	Compre	ssor VFD	4.0 mA	
Suction Temp	Oil Temp	Unloader #4	0	Aux 1: A	analog Aux Out 1	4.0 mA	
39.9 °F	115.1 °F	Oil Return Solenoid	0	Aux 2: A	analog Aux Out 2	4.0 mA	
Discharge Press	Motor Amperage	Aux 1: Digital Aux In 1	1	Aux 3: A	analog Aux Out 3	4.0 mA	
92.8 Psig	0.0 Amps	Page 1 2 3	4 5	6	Freeze Da	ta Menu	
Discharge Temp	Press Ratio	No Scheduled M	aintenance		Maintenance	Help	
126.5 °F	3.5	No Alarm / Trip	s Present		User Access	Log off	
User : admin		Run Hour	s : 0		01/07/202	L 07:01:46 AM	

Figure 10-3. Input/Output States Screen (Page 3) – Live I/O Data

START	DESET	Suction Pressure	e 1	St	opped	-4.3 Psig ∆
START	RESET	Live I/O				
STOP	REMOTE	Live I/O				
		Aux 4: Analog Aux Out 4	4.0 mA			
Suction Setpoint	Oil Press Diff	Aux 5: Analog Aux Out 5	4.0 mA			
20.0 Psig	58.1 Psig	Aux 1: Digital Aux Out 1	0			
Suction Press	Oil Filter Diff	Aux 2: Digital Aux Out 2	0			
15.7 Psig	NA					
Suction Temp	Oil Temp	Aux 3: Digital Aux Out 3	0			
39.7 °F	114.7 °F	Aux 4: Digital Aux Out 4	0			
Discharge Press	Motor Amperage					
92.7 Psig	0.0 Amps	Page 1 2 3	4 5	6	Freeze Da	ata Menu
Discharge Temp	Press Ratio	No Scheduled Ma	intenance		Maintenance	Help
126.8 °F	3.5	No Alarm / Trips	Present		User Access	Log off
User : admin		Run Hours	: 0		01/07/202	1 07:02:02 AM

Figure 10-4. Input/Output States Screen (Page 4) – Live I/O Data

START	DESET	Suc	tion Pressu	re 1	St	opped	-4.3 Psig ∆
START	RESET	Live I/O					
STOP	REMOTE	Live I/O					
		Virt 1: Analog	y Virt In 1	0	Virt 1: D	ligital Virt In 1	0
Suction Setpoint	Oil Press Diff	Virt 2: Analog	Virt In 2	0	Virt 2: D	igital Virt In 2	0
20.0 Psig	58.1 Psig						
Suction Press	Oil Filter Diff	Virt 3: Analog	y virt in 3		Virt 3: D	ligital Virt In 3	0
15.7 Psig	NA	Virt 4: Analog	y Virt In 4	0	Virt 4: D	igital Virt In 4	0
Suction Temp	Oil Temp	Virt 5: Analog	y Virt In 5	0	Virt 5: D	igital Virt In 5	0
39.9 °F	115.1 °F						
Discharge Press	Motor Amperage						
92.5 Psig	0.0 Amps	Page 1	2 3	4 5	6	Freeze Dat	a Menu
Discharge Temp	Press Ratio	1	No Scheduled M	laintenance		Maintenance	Help
126.1 °F	3.5		No Alarm / Trij	ps Present		User Access	Log off
User : admin			Run Hour	s:0		01/07/2021	07:02:15 AM

Figure 10-5. Input/Output States Screen (Page 5) – Live I/O Data

START	DESET	Suction Press	ure 1	Sto	opped	-4.3 Psig ∆
START	RESET	Live I/O				
STOP	REMOTE	Live I/O				
		Var 1: Analog Result In 1	0.0	Var 1: Di	gital Result In 1	0
Suction Setpoint	Oil Press Diff	Var 2: Analog Result In 2	0.0	Var 2: Di	gital Result In 2	0
20.0 Psig	58.3 Psig					
Suction Press	Oil Filter Diff	Var 3: Analog Result In 3	0.0	Var 3: Di	gital Result In 3	0
15.7 Psig	NA	Var 4: Analog Result In 4	0.0	Var 4: Di	gital Result In 4	0
Suction Temp	Oil Temp	Var 5: Analog Result In 5	0.0	Var 5: Di	gital Result In 5	0
39.7 °F	114.9 °F	Var 6: Analog Result In 6	0.0	Var 6: Di	gital Result In 6	0
		Var 7: Appleg Pecult In 7		Var 7: Di	aital Pacult In 7	
Discharge Press	Motor Amperage	var 7: Analog Result in 7	0.0	var 7: Di	gital Result in 7	
92.9 Psig	0.0 Amps	Page 1 2	3 4 5	6	Freeze Dat	a Menu
Discharge Temp	Press Ratio	No Scheduled	Maintenance		Maintenance	Help
126.8 °F	3.5	No Alarm / T	rips Present		User Access	Log off
User : admin		Run Ho	urs : 0		01/07/2021	07:02:31 AM

Figure 10-6. Input/Output States Screen (Page 6) – Live I/O Data

START	DESET	Suct	ion Pressu	re 1	Sto	pped	5.1 Psig ∆
START	KESET	Live I/O	Freeze 1	Freeze 2	Freeze 3	Freeze 4	Freeze 5
STOP	REMOTE	(Freeze Da	ata) 04/19	/2021 03:11	L:57 PM		
		Motor Amps		14.3 Amps	Discharge	Temp	102.1 °F
Suction Setpoint	Oil Press Diff	Suction Press	ure	28.8 Psig	Oil Temp		118.5 °F
20.0 Psig	107.9 Psig	Disebury Dec				t I	
Suction Press	Oil Filter Diff	Discharge Pre	ssure	116.0 Psig	Process C	ontrol	206.5 *
25.1 Psig	NA	Oil Pressure		133.6 Psig	Aux 1: Analog Aux In 1		0.0 °F
Suction Temp	Oil Temp	Filter In Press	ure	99.8 Psig	Aux 2: An	alog Aux In 2	0.0 °F
47.9 °F	117.2 °F	Filter Out Pres	sure	37.4 Psig	Aux 3: Analog Aux In 3		0.0 °F
Discharge Press	Motor Amperage	Suction Temp		40.4 °F	Aux 4: An	alog Aux In 4	0.0 °F
131.4 Psig	15.7 Amps	Page 1	2 3	4 5	6		Menu
Discharge Temp	Press Ratio	N	o Scheduled M	laintenance		Maintenance	Help
97.5 °F	3.7		No Alarm / Tris	os Present		User Access	Log off
User : admin			Run Hour	s : 0		04/19/2021	03:15:26 PM

Figure 10-7. Input/Output States Screen (Page 1) - Freeze Data

START	DESET	Suc	tion Pressu	re 1	Stopped		5.1 Psig ∆
START	REDET	Live I/O	Freeze 1	Freeze 2	Freeze 3	Freeze 4	Freeze 5
STOP	REMOTE	(Trip) 04	/19/2021 0	3:13:08 PM			
		Motor Amps		12.6 Amps	Discharg	e Temp	105.5 °F
Suction Setpoint	Oil Press Diff	Suction Press	sure	26.2 Psig	Oil Temp)	114.2 °F
20.0 Psig	107.9 Psig	Discharge Pr	accura	110 8 Pela	Process	Control	208.2 *E
Suction Press	Oil Filter Diff	Discharge Pro	essure	119.0 PSIg	Process	control	200.3 F
25.1 Psig	NA	Oil Pressure		136.5 Psig	Aux 1: A	nalog Aux In 1	0.0 °F
Suction Temp	Oil Temp	Filter In Press	sure	97.7 Psig	Aux 2: A	nalog Aux In 2	0.0 °F
47.9 °F	117.2 °F	Filter Out Pre	ssure	42.0 Psig	Aux 3: A	nalog Aux In 3	0.0 °F
Discharge Press	Motor Amperage	Suction Temp	p	36.3 °F	Aux 4: A	nalog Aux In 4	0.0 °F
131.4 Psig	15.7 Amps	Page 1	2 3	4 5	6		Menu
Discharge Temp	Press Ratio		No Scheduled M	laintenance		Maintenance	Help
97.5 °F	3.7	No Alarm / Trips Present				User Access	Log off
User : admin			Run Hour	s:0		04/19/2021	03:17:28 PM

Figure 10-8. Input/Output States Screen (Page 1) – Freeze Data (Trip Condition)
Overview

Using the User Access screen, you can log in to the MicroVission Panel.

The operators, technicians, and/or supervisors are granted different sets of permissions to modify setpoints on each screen in the MicroVision panel, based on the security level of that screen. The MicroVission has four levels of security, see Figure 11-1.

- Level 0 This is the default level. No operator is logged in at the default level. This level allows only basic functionality such as start and stop the compressor.
- Level 1 This is a technician level of access. All the setpoints needed to operate and adjust the performance of the compressor are available to the operator.
- Level 2 This is a supervisor level of access. Setpoints that require a higher level of knowledge such as instrument calibration are available to the operator.
- Level 3 This is a contractor level of access. Setpoints available at this level may cause damage to the compressor. Therefore, the access is available only to the high level operators.

The User Access screen also allows to add new operators and modify or delete existing operators. Any operator can add an additional operator but can only add operator of lesser or equal security level.

The MicroVission is shipped with a Level 3 operator and password preassigned to the installing contractor. Later, the contractor can assign users the access with security level as needed.

To assign the user access levels, follow the steps given below.

Step 1: Tap the User Access button. The User Access screen appears. The preassigned Level 3 operator name is visible within the "Operators" section.

Step 2: Select the name and enter the password.

Step 3: Tap Apply button.

Step 4: Go to Manage Accounts tab.

Step 5: Now, enter the another operator name. Assign password and user level to the operator.

Step 6: Tap Add/Update button to add the operator to the list.

START	RESET	Suction Pressure 1	Stopped	4.3 Psig ∆		
STANT		User Access				
STOP	REMOTE	Operators	Operator Name			
5101	REMOTE	admin	admin			
Suction Set Point	Oil Press Diff	Logi	Operator Password			
20.0 Psig	112.2 Psig					
Suction Press	Oil Filter Diff					
24.3 Psig	NA	Turts				
Suction Temp	Oil Temp	Accou				
69.2 °F	101.4 °F	age /				
		Man				
Discharge Press	Motor Amperage					
191.1 Psig	0.0 Amps		A	oply Cancel		
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help		
89.8 °F	5.3		Maintenance	neip		
		No Alarm / Trips Present	User Access	Log off		
User : admin		Run Hours : 0	02/07/201	9 04:03:40 PM		

Figure 11-1. User Access Screen - Login

Login

Using Login screen, you can login to MicroVisssion screens. Enter the Username and Password. On successful login operator name is displayed on the Lower Status Bar. Access to the screens is given as per the security level.

Operators

This window displays a list of users added to the Micro-Vission panel. When a name is selected from this list, that name is added to the Operator Name box.

Operator Name

In this box you can enter your username. Select the username from the "Operators" window or manually enter the username.

Operator Password

This entry box is for your password. Make sure you enter correct password.

Manage Accounts

Using Manage Accounts screen, you can add, remove and modify information of authorized users. See Figure 11-2.

Operators

This window contains the list of authorized users already added to the MicroVisssion. Upon selecting the name, the name is added to the Operator Name box.

Operator Name

This box is for operator's username who you want to add, remove or modify. You can either select the username from the "Operators" window or enter the username manually.

Operator Password

This box is for your password. Make sure you enter the correct password.

START	RT RESET		Suction Pressure 1	s	topped		4.3 Psig ∆
S I AIL		Use	r Access				
STOP	REMOTE		Operators	Operator N	lame		
5101	REMOTE	_	admin	admin			
Suction Set Point	Oil Press Diff	Logir		Operator P	assword		
20.0 Psia	112.2 Psia						
				Verify Pass	sword		
Suction Press	Oil Filter Diff	Its					
24.3 Psig	NA	Ino		Security Le	evel		
Suction Temp	Oil Temp	Ac		1			
69.2 °F	101.4 °F	age		-			
		Man		Add /	Update		Delete
Discharge Press	Motor Amperage	-					
191.1 Psig	0.0 Amps						Cancel
Discharge Temp	Press Ratio			_		_	
89.8 °F	5.3		No Scheduled Maintenance		Maintenand	е	Help
			No Alarm / Trips Present		User Acces	s	Log off
User : admin			Run Hours : 0		02/07/2	019	04:03:58 PM

Figure 11-2. User Access Screen - Manage Accounts

Verify Password

This box is to verify the operator's password. Re-enter the correct password in this box.

Security Level

With this option, you can select the security level for the account you want to add or modify. Only levels that are equal to or less than your own security level are shown.

Add / Update

Using Add/Update button, you can add or update information. Tap the Add/Update button to add or update the information.

Screen Security Levels

The table given below lists all the screens and their base security levels, see Table 11-1. The most screens have more than one security level. The base security level gives the user access to the setpoints that can change the performance of the compressor. The secondary security level is typically level 3 and is reserved for those setpoints that require a high level of care and knowledge of the system to make changes safely without damaging the system.

Delete

Using Delete button, you can delete a specified account. Tap the Delete button to remove the account.

Security Access Levels						
Page	User Level	Note				
Event List	Level 0	View				
Input/Output States	Level 0	View/create freeze screen				
Trend Chart	Level 0	View/operate				
Help	Level 0	-				
Alarms & Trips	Level 1	Level 3 or Level 4 required for constraints				
Compressor Scheduling	Level 1	-				
Compressor Control	Level 1	Level 3 required for constraints				
Maintenance	Level 1	-				
Data Backup	Level 1	Level 3 required to upload data				
Instrument Calibration	Level 2	-				
Service Options	Level 2	-				
Configuration	Level 2	Level 3 required for Page 5 to Page 8				
Timers	Level 2	Level 3 or Level 4 required for constraints				
VNC Account	Level 3	-				
Compressor Sequencing	Level 2	-				
Auxiliary I/O	Level 2	-				
Condenser Control	Level 1	Level 3 required for constraints				

Table 11-1. Security Access Levels

Overview

With Configuration screen, you can configure and enable most of the MicroVision features. The initial setup of the MicroVission starts here, see Figure 12-1. You get access to different pages/setpoints of the MicroVission based on the features you have selected in the Configuration screen.

Units

This section sets how values are represented throughout the MicroVission program.

Temp. Units

• It is a drop-down list box you can use to select the temperature units from "Fahrenheit" and "Celsius". Once selected, the screen displays all temperatures in the chosen units.

Press. Units

• With Press. Units, you can select pressure units such as 'Psig', 'Bar', or 'Kpa' from the drop-down list. Once selected, all screen pressures are displayed in the selected units.

Run Hours

• With Run Hours option, you can change the compressor run hours. This is typically used when replacing an older micro controller on an existing compressor with a new MicroVission.

No. of Cylinders

With No. of Cylinders, you can select the number of cylinders based on the compressors connected. This setting informs the control program to properly process the number of analog channels for your compressor. For instance, if 12 or 16 cylinders is selected, then the control program processes a second discharge pressure safety and second discharge temperature safety. Disch 2 Press and Disch 2 Temp selection is allowed only when No. of Cylinders configured is 12 or 16. User can select one of the Auxiliary Analog Inputs for Disch 2 Press and Disch 2 Temp.

NOTE

If you configure number of cylinders to 12/16, you must select the Disch 2 Press and Disch 2 Temp combo box.

No. of Unloaders

 Choose the appropriate option from the drop-down list as per the compressor connected. This setting informs the control program to control unloader digital outputs which in turn modulates the capacity of compressor in steps. Each setting option displays the number of unloaders and the unload percentage steps for the compressor. This setting is based on "No. of Cylinders". For more information about Unloaders, see Appendix: Unloaders.

Run Hours	0	Restart On Power Failure				
Press. Units	Psig -	Never -				
Temp. Units	°F -	Oil Monitoring				
No. of Cylinders	8 -	No Oil Filter Monitoring -				
	None	✓ Oil Level Trip				
	None	Touchscreen				
No. of Unloaders	4 (25%, 50%, 75%, 100%)	Calibrate Washdown				
Compressor Control		Anti Barnula				
	Controllers	Anti-Recycle				
✓ Suction Pressure Co	ontrol 1	Hot Starts ·				
Process Control		Compressor VFD				
Temperature						
Page 1 2 3	4 5 6 7 8	Apply Close				
Figure 12-1. Configuration Screen (Page 1)						

12 / 16 Cylinder Configuration						
No. of Cylinders (12/16)Auxiliary Analog Input Board Enabled						
	Disch 2 Press	>	Auxiliary Analog Input availability for reading Discharge 2 Pressure			
	Disch 2 Temp	<	Auxiliary Analog Input availability for reading Discharge 2 Temperature			

Table 12-1. 12/16 Cylinder Configuration Setup

Compressor Control

Vilter compressors run in one of the three control modes: Suction Pressure Control, Process Control or Discharge Pressure Control. Discharge Pressure Control is mutually exclusive with Suction Pressure Control & Process Control. If you select Discharge Pressure Control, Suction Pressure Control and Process Control are not available. Similarly, if you select Suction Pressure Control and/or Process Control, Discharge Pressure Control is not available.

- Suction Pressure Control: With Suction Pressure Control you can define Suction Pressure input as the process variable and all controls are based on Suction Pressure. You can select up to two controllers where each has its own setpoints.
- **Process Control**: With Process Control you can define Process Control input as the process variable and all controls are based on either Process Temperature or Process Pressure. You have the option to select up to two controllers where each has its own set of setpoints. You must select one of the process control modes, either temperature or pressure as a process variable. Temperature and Pressure options are mutually exclusive.
- Discharge Pressure Control: This defines the Discharge Pressure input as the process variable and all controls are based on Discharge Pressure. You can select up to two controllers where each has its own setpoints.

Oil Monitoring

Using this section, you can monitor the Oil Filter related Analog Inputs. You can select any one option of the following options related to the Oil filter:

• No Oil Filter Monitoring: The Filter Inlet Pressure & Filter Outlet Pressure inputs are not monitored if you select this option. Oil Filter Differential Pressure are not calculated. Also, safeties related to "High Filter Differential Pressure" remain inactive.

- Only Oil Filter In: Filter Inlet Pressure input is monitored whereas Filter Outlet Pressure input is not monitored if you select this option. Oil Filter Differential Pressure is calculated as the difference between Filter Inlet Pressure and Oil Manifold Pressure. Safeties related to "High Filter Differential Pressure" are active and monitored.
- Oil Filter In and Oil Filter Out: When you select this option, both Filter Inlet Pressure input & Filter Outlet Pressure are monitored. Oil Filter Differential Pressure is calculated as the difference between Filter Inlet Pressure and Filter Outlet Pressure. Safeties related to "High Filter Differential Pressure" are active and monitored.

If the oil level drops below the required level, you can also choose an option to turn off the compressor.

Oil Level Trip

Using this check box, you can monitor the "Low Oil Level Trip". When this option is enabled, MicroVission program monitors the state of "Low Oil Level" digital input. When the compressor oil level drops below the minimum required level, the digital input remains low. For more information on monitoring related to safeties, see Alarms & Trips section.

Touch Screen

The "Calibrate" button sets the screen into calibration mode. Calibration of the touchscreen is only required if you find that the pointer's arrow is not following the finger while trying to use the MicroVission screens.

In calibration mode, the you need to touch the pointers as shown on the screen starting with the top-left corner. After touching the pointer, next pointer is shown. You should touch on all four pointers shown on corners of the screen in the given sequence to complete the calibration.

Anti-Recycle

With Anti-Recycle, you can prevent compressor motor failure due to repeated motor starts. The drop-down lists the following options that can be considered:

- Hot Starts: This option allows only a certain number of compressor starts in an hour before setting the time to the anti-recycle timer. The number of starts to be allowed is set through the "Hot Starts per Hour" setpoint of the Timers screen.
- True: This option adds the time to anti-recycle timer once the compressor is shutdown, hence forcing a specific wait time once compressor is stopped and next compressor start. The wait time required is set through the "True Anti-Recycle Timer" setpoint of the Timers screen. The compressor motor cannot be started if there is anti-recycle time left.
- Accumulative: This option immediately adds the time to anti-recycle timer once the compressor is started. The time to be added is set through the "Accumulative Anti-Recycle Timer" setpoint of the Timers screen. Unlike the True Anti-Recycle Timer, if the compressor has run for the entire time of the Accumulative Anti-Recycle Timer and then the compressor stops, the compressor will be allowed to restart immediately.

The anti-recycle time can be seen on the Main screen only if you select "Anti-Recycle" option in Configurable Main Screen settings on Page 4.

Compressor VFD

With this option, you can enable the compressor motor's VFD option.

Restart On Power Failure

With this feature you can define how the MicroVission should handle a power failure. Also, using this option a system controller can regain control of the MicroVission panel without operator intervention. You can configure the following options.

Always

If you select this option, it initiates a start after the panel powers back after a power failure, but only if the compressor was running before the power failure and starts the compressor in Auto mode.

Never

If you select this option, it prevents any automatic action once the panel powers back after a power failure.

Timed

If you select this option, initiates a start after the panel powers back after a power failure and the timer you set runs out. In a large system that has multiple compressors, we recommended you to give a different start time for each compressor. The compressor restarts in Auto mode only if it was running before the power failure.

Remote Lock Off

If you select this option, it turns the remote lock out off when the panel powers up. Select this option you want a system controller to regain control of the MicroVission without human interference.

Boot in Remote (Direct I/O)

If you select this option, it sets the MicroVission panel in Remote Idle mode when the panel powers up. Select this option when Direct I/O control and the system controller needs to gain the control of the MicroVission without human interference.

NOTE

If you have set the configuration to Always or Timed in Restart on Power Failure and if the compressor was running before power failure, then after the power is back, when the compressor restarts in auto mode due to Auto Restart, the "Start" event with a message "Auto Restart" is logged in the Event List, Instead of "Auto".

NOTE

If you have set the configuration in Restart on Power Failure and if the compressor was running before power failure, then after the power is back if tap Stop button or Remote Compressor Stop command is given through MODBUS or Ethernet IP before the compressor auto restarts, then Auto Restart is Aborted and a "Stop" event with a message "Auto Restart Aborted" is logged in the Event List screen.

NOTE

If the compressor is started in any of the run mode before auto restart, then auto restart is aborted, but the "Auto Restart Aborted" event is not logged. Instead, start event of the run mode in which the compressor started, is logged.

Compressor Identification

This section sets the identification for a MicroVission unit.

- Name: Unique identifier that is used for all MicroVission units.
- **Panel ID**: Panel Identifier used by controller when communicating with multiple panels.
- Order Num: Identifies the Order Number of the purchase of the compressor. This number is needed if you need help/support from the Vilter.

Date and Time

Using this section, you can set the date and time of the MicroVission. Accurate date and time are essential for accurate logging and troubleshooting. Setting these parameters will set the hardware clock embedded in the MicroVission CPU. If the time is not retained after powering down the panel, you should check and/or replace the coin style battery on the panel SBC placed right back of the touchscreen the touchscreen.

- Year: Using Year option, you can set the current year.
- Month: Using Month option, you can set the current month.
- Day: Using Day option, you can set the current date.

- Format: Using Format option, you can choose between 24 hours and 12 hours clock.
- Hour: Using Hour option, you can set the clock hours. AM or PM drop-down box is available if you select the 12 hours format.
- Minute: Using Minute option, you can set the clock minutes.
- **Second**: Using Second option, you can set the clock seconds.
- **Condenser Control:** Using Condenser Control option, you can enable or disable the condenser control feature. To enable this feature, select the Condenser Control check box.
- Condenser Pressure Input: Using Condenser Pressure Input option, you can select from either Discharge Pressure or any available Auxiliary Analog Input which is used as a process variable to control the condenser outputs and the condenser VFD. Note that if you select any available Auxiliary Analog Input then that input is renamed to Condenser Pressure.
- Ambient Sensor Input: Using Ambient Sensor Input option, you can select from any available Auxiliary Analog Input which is used as a process variable to switch the step control profile to summer or winter. Note that the input you select is renamed to Ambient Temperature.

Compressor Ide	ntification	✓ Condenser Control	
Name	Recip	Condenser Pressure Input	Discharge Pressure -
Panel ID	1	Ambient Sensor Input	Ambient Temperature -
Order Num.	1	No. of Digital Outputs	4 -
Date		Digital Output #1	Condenser Out 1 -
Year	2021	Digital Output #2	Condenser Out 2 -
Month	03	Digital Output #3	Condenser Out 3 -
Day	12	Digital Output #4	Condenser Out 4 -
		Analog VFD Output	Condenser VFD -
Time		Language	
Format 24	4 hour • 12 ho	r English	
Current			
Hour	12 PM	Alarms and Trips	
Minute	41	Idle Time Trip	
Second	13		
Page 1 2	3 4 5	6 7 8	Apply Close

Figure 12-2. Configuration Screen (Page 2)

- Num. of Digital Outputs: Using this option you can select the number of Auxiliary Digital Outputs that are used by condenser control algorithm. You can select from any available Auxiliary Digital Output from the drop down list Digital Output #1 to #4. The output you select is renamed to Condenser Out 1 to 4.
- Analog VFD Output: Using this option, you can select from any available Auxiliary Analog Output that is used as an output for the Condenser VFD. The output you select is renamed to Condenser VFD.

NOTE

If the condenser control feature is running in the "Run Always" or "Manual" run mode, you cannot disable the condenser control feature or change the configurations of condenser control feature from configuration screen. To change the configurations of condenser control, the run mode must be "Run Never" or "Run With Comp" (if the compressor is idle).

NOTE

The condenser control run mode resets to "Run Never" mode if the Auxiliary Analog Inputs are being used for the Condenser Pressure Input or the Ambient Sensor Input, and if you disable the Auxiliary Analog Input Board from configuration screen.

NOTE

The condenser control run mode resets to "Run Never" mode, if the Auxiliary Digital Outputs are being used as the condenser digital outputs, and if you disable the Auxiliary Digital IO Board from configuration screen.

Language

MicroVission allows you to select the languages in which the screens will be displayed. To change the language preference, select any option from the dropdown list.

Alarms and Trips

The "Idle Time Trip" check box works in conjunction with the "High Level Shutdown" digital input. If you select the check box, when the compressor is in idle state and this digital input is off, the compressor gives a trip message.

Communication

The communication section is the control center for all communications to the MicroVission panel. It is possible that you may use and enable multiple modes of communication. However, you can sue only one mode to control the MicroVission, which could be the one selected in the "Active Remote Control" drop-down box.

For a complete list of communication registers, see Appendix B, Communication Table.

Active Remote Control

Using this option you can select the mode of remote control. You can select any one option from the dropdown list. It consists four options such as Direct I/O, Ethernet, Serial, and None.

	F					
	Condenser Control					
1	Condenser Pressure Input (with Auxiliary)	>	Auxiliary Analog Input Board Enabled			
		>	Auxiliary Analog Input availability for reading Condenser Pressure			
2	Ambient Sensor Input (with Auxiliary)	>	Auxiliary Analog Input Board Enabled			
		>	Auxiliary Analog Input availability for reading Ambient Temperature			
3	No. of Digital Outputs	<	Auxiliary Digital Input / Output Board Enabled			
	Digital Output #1	>	Auxiliary Digital Output availability for regulating Condenser fan / pump #1			
	Digital Output #2	>	Auxiliary Digital Output availability for regulating Condenser fan / pump #2			
	Digital Output #3	>	Auxiliary Digital Output availability for regulating Condenser fan / pump #3			
	Digital Output #4	>	Auxiliary Digital Output availability for regulating Condenser fan / pump #4			
4	Analog VFD Output	~	Auxiliary Analog Output availability for regulating Condenser VFD Speed			

Table 12-2. Condenser Control Setup

Direct I/O

With this option, you can enable the Direct I/O Inputs. If you select the Direct I/O check box, the options such as Auto Control, (Digital) Manual Control, and Cap Hold Control become available.

- Auto Control: With this option you can run compressor in Direct I/O Auto Run mode. The algorithm uses setpoints of Compressor Control screen for loading & unloading of compressor cylinders.
- (Digital) Manual Control: With this option you can run compressor in Direct I/O Manual Run mode. The algorithm monitors the state of "Remote Increase" & "Remote Decrease" Digital Inputs for loading & unloading compressor cylinders respectively. If "Remote Increase" Digital Input is ON & "Remote Decrease" Digital Input is OFF then the compressor loads one step. Similarly, if "Remote Increase" Digital Input is OFF & "Remote Decrease" Digital Input is ON then the compressor unloads one step.
- Cap Hold Control: With this option you can run compressor in Direct I/O Cap Hold Run Mode. Using the combo-box options you can configure Auxiliary Analog Input as Remote Setpoint for controlling load/ unload functionality.

The algorithm monitors the Auxiliary Analog Input configured as "Remote Capacity %" for loading & unloading compressor cylinders.

NOTE

The Auxiliary Analog Input selected for Direct I/O Cap Hold is named as a "Remote Capacity %". This Name is updated in Configuration, Calibration, IO States and Auxiliary Screens for corresponding Auxiliary Analog Input. You must select the Direct I/O Cap Hold check box, to enable the Cap Hold Control option.

To run compressor in Direct I/O Run Mode, make sure you meet the following conditions:

- 1. Enable "Direct I/O" check box.
- 2. "Active Remote Control" setting is set to "Direct I/O".
- 3. "Remote Start/Stop" Digital Input is ON.

Once you meet the above conditions, you can start the compressor in Direct I/O mode. Tap the Start button on the Main screen and select the Remote option in pop-up window.

Run Permissive

If you enable this option, MicroVission monitors the "Remote Start/Stop" Digital Input. If "Remote Start/ Stop" Digital Input is energized (turned ON), the compressor can start in the selected run mode (Auto / Manual Remote). If the "Remote Start/Stop" Digital Input is deenergized (turned OFF), the compressor waits until the Digital Input is energized.

If you disable this option, MicroVission does not monitor the state of "Remote Start/Stop" Digital Input during the compressor start.

On Communication Failure

With this feature, you can define how the MicroVission will handle communication failure.

You can select any one option from below two options:

- Revert to Local Control: Once the compressor starts running in the Remote Run Mode, the "Communication Failure Detect Timer" as configured in Timers screen starts. If no further communication with MicroVission takes place for the configured time, the MicroVission is placed in Local Auto Mode. MicroVission also displays "Remote Comm Timeout" Alarm Message and adds time-stamped alarm event to Event List screen.
- Stop Compressor with Trip: Once the compressor starts running in the Remote Run Mode, the "Communication Failure Detect Timer" as configured in Timers screen will start. If no further communication with MicroVission takes place for the configured time, the compressor stops due to "Remote Comm Timeout" Trip. MicroVission also displays "Remote Comm Timeout" trip message and add timestamped trip event to Event List screen.

Direct I/O				
1	1 Cap Hold Control Image: Auxiliary Analog Input Board Enabled			
Auxiliary Analog Input availability for reading Remote Capacity %				

Table 12-3. Direct I/O Setup

Ethernet

If you select this check box, the network setting for the Ethernet port becomes available.

- IP Address: Using this option you can set the IP Address.
- **Subnet Mask**: Using this option you can set the Subnet Mask.
- Gateway: Using this option you can set the Gateway Address.
- **Protocol**: Using this option you can select the type of protocol used to remotely control the MicroVission. Select any one option from the drop-down list. Available options are "Modbus TCP" and "Ethernet IP".
- Node Address: Address used by the MicroVission when communicating with multiple panels.

Serial (Modbus RTU)

This check box when selected, enables the Serial Modbus RTU port. Other settings will be allowed for selection when this option is enabled.

• Node Address: It is the address used by the MicroVission when communicating with multiple panels.

- **Port**: The MicroVission has two ways to communicate on serial bus, either via the in-built serial port P12/RS485 or through the USB port. With this list box you can choose which one will be used.
- **Baud Rate**: With this option you can set the baud rate for the serial communication.
- Data Bits: This value is fixed at 8 Data bits.
- **Stop Bits:** If you select any one of the options it identifies the end of character for re-synchronizing.
- **Parity**: This feature identifies the type of error detection.

VNC Account

You can access MicroVission panels remotely by using a VNC client over TCP/ IP network. Using this section you can change default VNC password and VNC port number. For more information, see Figure 12-3.

- New Password: In the New Password box type your new password.
- Verify New Password: In the Verify New Password box, re-type your new password.
- **Port Number**: The default port number is 5900. You can change the port number for the VNC server from range 5900 to 6000.

Communication					
Active Remote Control Direct I/O -		On Communication Failure			
✓ Direct I/O			Revert to Local Cont	rol ·	
Auto Control			Serial (Modbus RTU	J)	
Oligital) Manual Cont	rol				
Cap Hold Control	None			P12/RS485	
				9600	
✓ Ethernet					
IP Address	192.168.1.12			•1 •2	
Subnet Mask	255.255.255.0			Even	
Gateway	192.168.1.1		VNC Account		
Protocol	Modbus TCP •		New Password		
Node Address	1		Verify New Password		
			Port Number	5900	
			-		
Page 1 2 3	4 5 6	7 8		Apply Close	

Figure 12-3. Configuration Screen (Page 3) - Communication

Compressor Sequencing

With the compressor sequencing feature, you can setup multiple compressors. The maximum numbers of compressors you can set to start, stop, and maintain system loads is ten. The compressor designated in the sequencing monitors system parameters and make decisions on how many compressors are required to meet the load as efficiently as possible.

Compressor Sequencing

- Enables the compressor sequencing algorithms and gives access to the compressor sequencing screen.
- Network Name: The network name is used to make local network between the MicroVission Panels. By-default the network name is "vilter". Network Name is considered at the time of detection of available devices.
- Compressor Name: Unique identifier that is Compressor Name and the IP address of the Panel is used for communication with all other MicroVission units in the sequencing network.

Configurable Main Screen Settings

With this section you can select as many as twelve custom fields for display of their values on the Main screen.

Each row has two list boxes. The first drop-down box has options such as "Standard Analog I/O", "Standard Digital I/O", Auxiliary Analog Inputs, Auxiliary Digital Inputs and "Status Value" with which you can select the type of value to display on the Main Screen. Based on the first drop-down box you select, the second drop-down box shows values for selection. The value set from the second list box is displayed on Main Screen. See Figure 12-4 & 12-5 for details.

For Analog Inputs, the calibrated values are shown on Main Screen. For Digital Inputs, values are displayed as "HIGH" & "LOW" depending on the current state of digital input if Energized or De-Energized respectively. For Digital Outputs, values are displayed as "ON" & "OFF" depending on whether MicroVission is trying to drive output High or Low respectively. For Status Values, calculated values or Anti-Recycle Time value are displayed. If value set in second list box is "None", that row remains blank on Main Screen.



Figure 12-4. Configuration Screen (Page 4) – Configurable Main Screen Settings

START	RESET	Suction Pressure 1	St	opped	2.8 Psig ∆
				Anti-Recycle	0:00
STOP	REMOTE	TO SOLENOID VALVE	Motor Amps Suction Pressure	0.0 Amps	
Suction Set Point	Oil Press Diff	TO SOLENOID VALVE	e 30.0 "Hg 129.8 Psig		
20.0 Psig	107.0 Psig			Comp Aux	LOW
Suction Press	Oil Filter Diff			High Level Shute	lown HIGH
22.8 Psig	30.0 "Hg	4 8		Remote Start / S	top LOW
Suction Temp	Oil Temp	TO SOLENOID VALVE		Unloader #1	OFF
69.2 °F	117.2 °F			Trip	ON
				Oil Pressure Diff	107.0 Psig
Discharge Press	Motor Amperage			Remote Lock Out	t OFF
203.1 Psig	0.0 Amps	0%		M	lenu
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance	Help
55.2 °F	5.8	No Alarm / Trips Present		User Access	Log off
User : admin		Run Hours : 0		01/29/201	9 02:36:18 PM

Figure 12-5. Configurable Parameters on Main Screen

Digital Inputs

The MicroVission has several digital inputs. You can choose and use the digital inputs. Once an input is enabled the Auxiliary I/O screen becomes available from the menu screen where you can the input's operation.

Enable Input #:

Enables the selected digital input.

Set Name:

With Set Name option you can assign a name to the input.

Analog Inputs

The MicroVission has several analog inputs. You can choose and use the analog inputs. Once an input is enabled the Auxiliary I/O screen becomes available from the input's operation.

Enable Input #:

If you select this option, it enables analog input that have selected.

Set Name:

With this option you can assign a name to the input.

Digital Outputs

The MicroVission has several Digital Outputs. You can choose and use the digital outputs. Once an output is enabled the Auxiliary I/O screen becomes available from the Menu screen where you can further define the operation of the output.

Enable Output #:

If you select this option, it enables the digital output that you have selected.

Set Name:

With this option you can assign a name to the output.

Analog Outputs

The MicroVission has several Analog Outputs you can choose and use analog outputs. Once an Output is enabled the Auxiliary I/O screen will be available from the Output's operation.

Enable Output #:

If you select this option, it enables the analog output that you have selected.

Set Name:

With this option you can assign a name to the output.

Auxiliary Analog Inputs ✓ Enable Input #1		Auxiliary Digital Inputs ✓ Enable Input #1	
Set Name	Analog Aux In 1	Set Name	Digital Aux In 1
✓ Enable Input #2		✓ Enable Input #2	
Set Name	Analog Aux In 2	Set Name	Digital Aux In 2
✓ Enable Input #3		✓ Enable Input #3	
Set Name	Analog Aux In 3	Set Name	Digital Aux In 3
✓ Enable Input #4		✓ Enable Input #4	
Set Name	Analog Aux In 4	Set Name	Digital Aux In 4
✓ Enable Input #5			
Set Name	Analog Aux In 5		
✓ Enable Input #6			
Set Name	Analog Aux In 6		
Enable Input #7			
Set Name	Analog Aux In 7		
✓ Enable Input #8			
Set Name	Analog Aux In 8		
Page 1 2 3	4 5 6 7 8		Apply Close

Figure 12-6. Configuration Screen (Page 5) – Aux Analog and Aux Digital Inputs Configuration

Auxiliary Analog Output ✓ Enable Output #1		Auxiliary Digital Output	
Set Name	Analog Aux Out 1	Set Name	Digital Aux Out 1
Enable Output #2		Enable Output #2	
Set Name	Analog Aux Out 2	Set Name	Digital Aux Out 2
Enable Output #3		Enable Output #3	
Set Name	Analog Aux Out 3	Set Name	Digital Aux Out 3
Enable Output #4		Enable Output #4	
Set Name	Analog Aux Out 4	Set Name	Digital Aux Out 4
Enable Output #5			
Set Name	Analog Aux Out 5		
Page 1 2 3 4	5 6 7 8]	Apply Close

Figure 12-7. Configuration Screen (Page 6) – Aux Analog and Aux Digital Outputs Configuration

Virtual Digital Inputs

The MicroVission has several Virtual Digital Inputs and you can choose and use the virtual digital inputs. Once an input is enabled the Auxiliary I/O screen becomes available from the Menu screen where you can further define the input's operation. The Virtual Digital can be written from Modbus TCP/ Modbus RTU starting from address 1000 to 1004.

Enable Input #:

If you select this option, it enables the virtual digital input you selected.

Set Name:

With this option you can assign a name to the virtual input.

Virtual Analog Inputs

The MicroVission has several Virtual Analog Inputs and you can choose and use the virtual analog inputs. Once an input is enabled the Auxiliary I/O screen becomes available from the input's operation. The Virtual Digital can be written from Modbus TCP/ Modbus RTU starting from address 1005 to 1009.

Enable Input #:

If you select this option, it enables the analog input you selected.

Set Name:

With this option you can assign a name to the input.

Virtual Analog Inputs Enable Input #1 		Virtual Digital Inputs ✓ Enable Input #1	
Set Name	Analog Virt In 1	Set Name	Digital Virt In 1
✓ Enable Input #2		✓ Enable Input #2	
Set Name	Analog Virt In 2	Set Name	Digital Virt In 2
✓ Enable Input #3		Enable Input #3	
Set Name	Analog Virt In 3	Set Name	Digital Virt In 3
✓ Enable Input #4		✓ Enable Input #4	
Set Name	Analog Virt In 4	Set Name	Digital Virt In 4
✓ Enable Input #5		✓ Enable Input #5	
Set Name	Analog Virt In 5	Set Name	Digital Virt In 5
Page 1 2 3	4 5 6 7 8]	Apply Close

Figure 12-8. Configuration Screen (Page 7) – Virtual Analog and Virtual Digital Inputs Configuration

I/O Configuration

If you add any additional I/O cards to the MicroVission, this is where these cards are enabled for use by its algorithms. Some features of the MicroVission are not available unless specific expansion cards are selected, see Figure 12-9.

- Analog Input 1: If you select this option, it enables the optional Analog Input card 1.
- **Digital Input/Output 1**: If you select this option, it enables the optional Digital Input/Output card 1.



Figure 12-9. Configuration Screen (Page 8) - I/O Configuration

Overview

With Database Backup screen you can back up the information for data recovery or diagnostics purposes. See Figure 13-1.

From this screen you can download all the Setpoint Databases, Maintenance Logs, Event Lists, Freeze Data, Trend Data, and Compressor Run Hours to a portable USB flash drive. The backed up information can be uploaded to MicroVission in case of data corruption or to update the MicroVission program.

Also, you can reset all values to the factory defaults.

The information saved to the USB flash drive non-encrypted (human readable format). Thus, you can examine it. The log files are all saved as simple ASCII text and the databases can be examined with SQLite.

Refresh

• Using the Refresh button you can scan the USB ports and list any devices found in the "Available Device" window.

Save / Load

With this section you can either save the MicroVission setpoints and log information to a USB flash drive or load from a USB flash drive back to the MicroVission.

Save

• With the Save button you can save MicroVission data to a USB flash drive using the information provided on the screen. The label of the button on the top right side changes Save if you select "Save" option.

Load

• With the Load option you can load data from a USB flash drive to the MicroVission using the information provided on the screen. If you select Load option, the label of the button on the top-right side changes to "Load".

START	RESET	Suction Pre	ssure 1	Stop	ped	5.2 Psig ∆
		Save / Load	Migrate / Rese	t Setp	oints Report	
STOP	DEMOTE	• Save Load				Save
STOP	REMOTE	Filename				
		Available Device	Unmount	Select Fold	der / File	Back
Suction Setpoint	Oil Press Diff			>		
20.0 Psig	48.6 Psig	Data Items				
Suction Press	Oil Filter Diff	✓ Freeze Data	Z Run Hours			
25 2 Deia	NA	✓ Setpoints Report	/ Trend Data			
25.2 PSIg	NA	Maintenance Logs	/ Event List			
Suction Temp	Oil Temp	All • Select				
39.7 °F	114.7 °F	✓ Compressor Control	Calibration	ı	Trend Cha	art
		Alarms and Trips	Users		Configura	tion
Discharge Press	Motor Amperage	✓ Timers	✓ Condense	r Control	✓ Maintena	nce
		Compressor Schedu	ling V Compress	or Sequencing	g 🗸 Auxiliary	1/0
92.8 Psig	0.0 Amps				Refr	esh Menu
Discharge Temp	Press Ratio	No Schedu	led Maintenance		laintenance	Help
126.3 °F	2.7					пстр
		No Alarm	/ Trips Present		Jser Access	Log off
User : admin		Run	Hours : 0		04/20/2021	04:23:50 AM

Figure 13-1. Data Backup Screen - Save/Load

Available Devices

This section displays any USB flash drive plugged into one of the MicroVission USB ports. If you select one of the available devices, contents of the device are displayed in the Select Folder/File window. If the plugged in USB flash drive is not showing up, tap the "Refresh" button at the bottom of the screen.

NOTE

Not every USB flash drive is compatible with the MicroVission and might not be shown in the available devices list.

Select Folder/File

• The Select Folder/File section displays the files and folders of the USB flash drive that have been selected in the Available Device. The information from the MicroVission is stored into a .zip file. So, select a zip file to load the data or overwrite when saved. After you choose the file, the file name is shown in the Filename box.

Unmount

• The USB drive in "Available Device" box disconnects from the operating system if you tap the Unmount button. Now, it is safe to remove the USB drive from the USB port.

Back

• The Back button takes you to the previous window display of files and folders.

Filename

• With the Filename box you can name a saved backup file. This field auto-populates if you select a file in the Select Folder/File section.

Settings

• With the Settings table, you can save or load all or selective information of the MicroVission.

Data Items

• Using these check boxes, you can choose to save or load all or part of information contained in the MicroVission according to the selection of options.

START	RESET	Suction Press	ure 1	Sto	opped	5.2 Psig ∆
		Save / Load	Migrate / Rese	t Se	tpoints Report	
STOP	REMOTE	Migrate				Migrate
Suction Setpoint	Oil Press Diff					
20.0 Psig	48.7 Psig	Factory Reset				Reset
Suction Press	Oil Filter Diff					
25.2 Psig	NA					
Suction Temp	Oil Temp	Settings All • Select				
39.9 °F	114.7 °F	 Compressor Control 	Calibration		✓ Trend Ci	hart
Discharge Press	Motor Amperage	 Alarms and Trips Timers Compressor Scheduling 	Users ✓ Condenser ✓ Compresso	Control r Sequenci	✓ Configur Maintena Ing Auxiliary	ation ance 7 I/O
92.9 Psig	0.0 Amps				Ref	resh Menu
Discharge Temp	Press Ratio	No Scheduled	Maintenance		Maintenance	Help
126.5 °F	2.7	No Alarm / Tr	ips Present		User Access	Log off
User : admin		Run Hou	irs : 0		04/20/202	1 06:05:48 AM

Figure 13-2. Data Backup Screen - Migrate and Factory Reset

Factory Reset

With the Factory reset button you can reset all the MicroVission setpoints to the factory default settings or a specific database. If you select a screen and see that it does not load, it means the data associated with that screen may be corrupted. Data corruption may occur in a system. MicroVission provides a Factory Reset feature that with which you can regain control of the data, see Figure 13-2.

Reset

• With this button you can revert the MicroVission to factory default settings.

Setpoints Report

With the Setpoints Report screen you can generate a setpoints report for all screens. The reports are stored in .csv file format and can be saved to the USB drive during data backup. To save the files, go to the Save/Load screen and select the "Setpoints Report" option in the Data Items section. The .csv file can be imported in any spread sheet application. During operation, you can generate reports at any time. See Figure 13-3: Data Backup Screen - Setpoints Report.

All/ Select

• If you select All option, it includes all the screens in the generated report. And, when you select the "Select" option, you can choose screens to include in the report.

Generate

• With Generate button you can start process to generate setpoints report files.

START	RESET	Suction Pressur	e 1	St	opped	5.2 Psig ∆
		Save / Load	Migrate / Rese	set	points Report	
STOP	REMOTE	Setpoints Report				Generate
		Settings				
Suction Setpoint	Oil Press Diff	All • Select				
20.0 Psig	48.7 Psig	Compressor Control	 Calibration 	1	Trend Ch	hart
		Alarms and Trips	Maintenan	ce	Configur	ation
Suction Press	Oil Filter Diff	Timers	Condenser	Control	Auxiliary	/ I/O
25.2 Psig	NA	Compressor Scheduling	✓ Compresso	or Sequenc	ing	
Suction Temp	Oil Temp					
40.2 °F	115.3 °F					
Discharge Press	Motor Amperage					
92.9 Psig	0.0 Amps				Ref	resh Menu
Discharge Temp	Press Ratio		1.1			
127.0 °F	2.7	No Scheduled M	aintenance		Maintenance	Help
	11	No Alarm / Trip		User Access	Log off	
User : admin		Run Hours	::0		04/20/202	1 04:24:41 AM

Figure 13-3. Data Backup Screen - Setpoints Report

Database Backup Procedure

Upgrading the program in the MicroVission panel involves replacing the SD card. Note that all compressor operation setpoints, calibration values and maintenance information are stored on the SD card. So, when upgrading to a new program (new SD card), the task is simplified by using the "Database Backup" and "Database Restore" functions provided in the MicroVission to migrate the database of the original SD card to the new SD card.

There are three main steps to complete this process:

- 1. Backup the database of original SD card (currently in the MicroVission panel) onto a thumb drive or flash drive.
- 2. Replace the original SD card with new SD card.
- 3. Restore the original database to new SD card.

Backup Database of Original SD Card

NOTE

You must manually reenter the Alarms and Trip settings when upgrading some older version of programs. Therefore, we highly recommend you to create a hardcopy of all compressor operating setpoints, or to create and have handy a printout of the Setpoints Report .csv file.

We also recommend you to create a hardcopy of the configuration information and maintenance information prior to changing SD cards. For the list of all the information that you should record, see the "Record operating setpoints and configuration information" section below.

The data migration procedure (moving the original SD card database to new SD card) uses a "thumb drive" or "flash drive" to transfer data from the original SD card to the new SD card. Note there have been a few records of some thumb drives not being recognized by the MicroVission. If you have difficulty in getting the MicroVission to recognize the thumb drive – then try a different one. Vilter has successfully tested many different manufacturers and sizes; a partial list is given below:

- SanDisk micro cruzer 2.0 GB
- Imation 2.0GB
- Kingston DataTraveler 512 MB
- SanDisk mini cruzer 128 MB
- 1. With the original SD card installed into the MicroVission SBC, insert the flash drive into the USB port. This port is located along the left side of the single board computer above the ethernet connector. See Figure 13-4: SD Replacement.

- 2. Log into the MicroVission using your username and password (you will need to be Level 3 to upload data).
- 3. Navigate to the Data Backup screen.
- 4. In the "Available Devices" window, you should see something like "/media/usb0". If you do not see anything in this window, tap the "Refresh" button, and wait about 5 seconds. Now tap the button again. If you still do not see the device, then the MicroVission does not recognize the flash drive - try a different one. If you see it, highlight it.
- 5. Now highlight the "Filename" field (which also contains "/media/usb0"). A keyboard appears. Now, enter the name of file that you want for your database for this compressor. For instance, "cylinders_ month_day_year" or something similar for identifying the file to the compressor. Then press "Enter" key on keyboard.
- 6. Now tap the "Save" button. A "watch" icon appears. In few minutes, a File Saved Successfully. Unmount Device?, message box appears. Tap the "Yes" button. If the "watch" icon remains for more than a minute on the screen, the MicroVission fails to save the files in the USB flash drive. Turn off the MicroVission and try the procedure with a different thumb drive.

Replace Original SD Card With New SD card

Now that the database file has been saved to the thumb drive, you can replace the "original" SD card with a new SD card.

- 1. Turn off the MicroVission.
- 2. Remove the thumb drive and take out the "original" SD card and install the new one.
- 3. Label both the old and new cards to correctly identify the compressor.

Restore Original Database To New SD card

Now that the new card is inserted, power up the MicroVission panel. The MicroVission boots in few minutes.

- Once the MicroVission turns on and displays the Main Screen, tap the User Access button.
- Insert the thumb drive into the USB port.
- Navigate to the Data Backup screen. You should again see the USB flash drive listed in the "Available Devices" window.
- Select the Load function (above the "Available Devices" field), and then highlight the device that is listed in the "Available Devices" window.
- In the "Select Folder/File" window, find the backup file for this compressor, and highlight it.
- Now tap the "Load" button.

a. A message box "Loading new databases will require a program restart. Continue?" appears. Tap OK to continue. Refer Figure 13.4.

b. A message box, "One or more settings selected for loading were missing from the archive. Continue loading anyway?" appears. It lists the missing backup files. Tap OK to continue. Refer to Figure 13.5.

c. Another message box, "Do you wish to use IP address: xxx.xxx.xxx loaded from archive?" appears. Tap OK to use the IP address. Refer Figure 13.6.

• A "Settings were successfully loaded. Program will restart", message box appears. Tap OK to restart the program. Refer Figure 13.7.

When you tap the OK button, the program restarts. Now, using the documented settings you recorded, compare the setpoints on that list against those in the MicroVission. Make sure all the setpoints/configurations are loaded. Here are the known issues that we have found in this procedure.

• If you have communication connection issues after restoring the database, you may have to "reenter" the IP address that is shown on Page 3 of the configuration screen. If you experience problems after the "Restore" function – then reenter your communication settings.

Record Operating Setpoints And Configuration Information

Before powering down the MicroVission to replace the SD card, copy the following operating setpoints and configuration information.

- 1. Configuration Screen Page 1
 - a. No. of Cylinders and No. of Unloaders.
 - b. Compressor Control Type & Number of Controllers.
 - c. Oil Monitoring Settings.
 - d. Anti-Recycle Settings.
- 2. Configuration Screen Page 2
 - a. Order Number.
- 3. Configuration Screen Page 3
 - a. Active Remote Control Setting.
 - b. If Active Remote Control = Direct I/O, document "type" of Direct I/O selection.
 - c. Ethernet Settings.
- 4. Configuration Screen, Page 5

a. Optional I/O boards.

- 5. Compressor Control Setpoints all.
- 6. Alarms and Trips Setpoints all.
- 7. Timer Setpoints all.
- 8. Instrument Calibration Pressure Page
 - a. Record Transducer Range selection for Suction Pressure, Discharge Pressure, Oil Pressure, Filter Inlet Pressure & Filter Outlet Pressure.
 - b. Record 'Total Offset" value for Suction Pressure, Discharge Pressure, Oil Pressure, Filter Inlet Pressure & Filter Outlet Pressure.
- 9. Instrument Calibration Temperature Page
 - a. Record Transducer Range selection for Suction Temperature, Discharge Temperature, Oil Temperature & Process Temperature.
 - b. Record "Total Offset" value for Suction Temperature, Discharge Temperature, Oil Temperature & Process Temperature.
- 10. Instrument Calibration Motor Current Settings.
- 11. Compressor Runtime.

Section 13 • Data Backup

START	RESET	Suction Press	ure 1	Stopped	70.5 Psig Δ
		Save / Load	Migrate / Reset	Setpoints Report	
STOP	REMOTE	Save • Load			Load
		Filename Loadin	a new databases will r	require a program restart	
		Available Contin	ue?		Back
Suction Setpoint	Oil Press Diff	/media/u			
20.0 Psig	460.2 Psig	Data Ite			
Suction Press	Oil Filter Diff	✓ Freez			
90.5 Psig	29.9 "Hg	Maint Maint		OK Can	cel
Suction Temp	Oil Temp	• All Select			
143.3 °F	125.4 °F	Compressor Control	Calibration	Trend Cl	nart
		Alarms and Trips	√ Users	Configur	ation
Discharge Press	Motor Amperage	✓ Timers	Condenser Co	ntrol 🔽 Mainten	ance
110 2 Doig	0.0 Amps	Compressor Scheduling	Compressor Se	equencing 🔽 Auxiliary	/ 1/0
119.2 PSig	0.0 Amps			Ret	fresh Menu
Discharge Temp	Press Ratio	No Scheduled	Maintenance	Maintenance	Help
193.2 °F	1.3	no seneutieu	Huntenunce	Maintenance	neip
		No Alarm / Tr	ips Present	User Access	Log off
User : admin		Run	Hours : 1	04/16/202	4 12:02:01 PM

Figure 13-4. Data Backup Save Load Restart Popup

START	RESET	Suction Pre	ssure 1	Stopped	-12	2.9 Psig ∆
		Save / Load	Migrate / Rese	t Setpoints R	eport	
STOP	REMOTE	💿 Save 🔹 Load				Load
STOP		Filename	e or more settings se	lected for loading were	e missing 📑	
		Available	m the archive:- Comp	pressor Control		Back
Suction Setpoint	Oil Press Diff	/media/u	larms and Trips	ig .		
20.0 Psig	29.9 "Hg	Data Ite - Ti	imers alibration			
Suction Press	Oil Filter Diff	✓ Freezo - U	sers up Hours			25.csv 25.csv zin
7.2 Psig	NA	✓ Maint		ОК	Cancel	20.000.2.10
	o	Settings		·		
Suction Temp	Oli Temp	• All Select				
91.3 °F	79.9 °F	Compressor Control	Calibration	n 🔽 Tr		
		Alarms and Trips	√ Users			
Discharge Press	Motor Amperage	✓ Timers	Condense	r Control 🛛 🗸 M		
		Compressor Schedu	ling Compress	or Sequencing 🔽 A	uxiliary I/O	
201.2 Psig	0.0 Amps				Refresh	Menu
Discharge Temp	Press Ratio	No Schedu	led Maintenance	Mainter	nance	Help
110.5 °F	9.9					incip
		No Alarm	/ Trips Present	User A	ccess	Log off
User : admin		R	un Hours : 1	04/	18/2024	03:16:33 PM

Figure 13-5. Data Backup Load Missing File List

Section 13 • Data Backup

START	RESET	Suction Pres	sure 1	Stop	ped	70.	5 Psig Δ	
		Save / Load	Migrate / Rese	t Setpo	oints Report			
STOP	REMOTE	💿 Save 🔹 Load					Load	
STOP		Filename Do v	ou wish to use IP ad	dress: 192.168	.1.225 loaded	from		
		Available Available	ve?				Back	
Suction Setpoint	Oil Press Diff	/media/u						
20.0 Psig	460.0 Psig	Data Iter						
Suction Press	Oil Filter Diff	✓ Freez Setpo				-560		
90.5 Psig	29.9 "Hg	Maint 🗸			OK Car	ncel		
Suction Temp	Oil Temp	Settings • All Select						
143.3 °F	125.4 °F	Compressor Control	Calibration		Trend C			
		✓ Alarms and Trips	√ Users		Configu			
Discharge Press	Motor Amperade	✓ Timers	Condenser		Mainten			
		Compressor Schedulin	ng 🔽 Compresso		🗸 Auxiliar	y 1/0		
119.2 Psig	0.0 Amps				Re	fresh	Menu	
Discharge Temp	Press Ratio	No Schedule	d Maintenance	M	aintenance	1	Help	
193.2 °F	1.3							
		No Alarm /	Trips Present		ser Access		Log off	
User : admin		Rui	n Hours : 1		04/16/202	24 1	.2:02:12 PM	

Figure 13-6. Data Backup Save Load User Confirmation For IP Address

RESET	Suction Pres	sure 1	Stopp	ed	70.5	ō Psig Δ
	Save / Load	Migrate / Rese	t Setpoi	nts Report		
REMOTE	Save • Load					Load
REMOTE	Filename	ings were success	fully loaded. Pr	ogram will		
	Available rest	art.	and bound of the second s	ografit will		Back
Oil Press Diff	/media/u					
460.0 Psig	Data Ite					
Oil Filter Diff	✓ Freez					
29.9 "Ha	Setpo			Ok		
_ 313 Hg	Settings					
Oil Temp	All Select					
125.4 °F	Compressor Control	Calibration		Trend Cha		
	✓ Alarms and Trips	Users		Configura		
Motor Amperage	✓ Timers	Condense		✓ Maintena		
0.0 Amno	Compressor Scheduli	ng 🔽 Compress	or Sequencing	Auxiliary	1/0	
0.0 Amps				Refr	esh	Menu
Press Ratio	No Schedule	d Maintenance	Ma	intenance		Help
1.3				intendice		пер
	No Alarm /	Trips Present	Us	er Access		.og off
	Ru	n Hours : 1		04/16/2024	1	.2:03:29 PM
	RESET REMOTE Oil Press Diff 460.0 Psig Oil Filter Diff 29.9 "Hg 0il Temp 125.4 °F Motor Amperage 0.0 Amps Press Ratio 1.3	RESET Suction Press REMOTE Save / Load Oil Press Diff Save • Load 460.0 Psig Imedia/L 0il Filter Diff Data Ite 29.9 "Hg Settings 0il Temp All • Select 125.4 ° F Compressor Control Motor Amperage Alarms and Trips 0.0 Amps No Schedul Press Ratio No Schedul 1.3 No Alarm	RESET Suction Pressure 1 REMOTE Save / Load Save • Load Save • Load Filename Available Filename Available /media/L Ado.0 Psig Oil Press Diff 460.0 Psig Oil Filter Diff 29.9 "Hg Oil Temp 125.4 °F All • Select Compressor Control • Calibration Alarms and Trips • Olsers On Amperage 0.0 Amps Press Ratio 1.3 No Scheduled Maintenance I.3	RESET Suction Pressure 1 Stopp REMOTE Save / Load Migrate / Reset Setpoi Save • Load Save • Load Settings were successfully loaded. Press Oil Press Diff Available Settings were successfully loaded. Pressart. Oil Press Diff Data Ite Settings Oil Filter Diff Settings Settings Oil Temp All Select 125.4 °F Compressor Control Calibration Motor Amperage O Scheduled Maintenance Ma O.O Amps No Scheduled Maintenance Ma Press Ratio No Scheduled Maintenance Ma 1.3 No Alarm / Trips Present Us	RESET Suction Pressure 1 Stopped Save / Load Migrate / Reset Setpoints Report Save - Load Save - Load Filename Settings were successfully loaded. Program will Available Settings Oil Filter Diff Settings 29.9 "Hg Main Oil Temp All 125.4 °F Compressor Control Otherss and Trips Users Otherss and Trips Otherssor Sequencing Y Imers Condenser Control Y Imers Control of Control of Maintenance Otherss Ratio No Scheduled Maintenance 1.3 No Alarm / Trips Present Stopped User Access Kun Hours : 1 Od/16/2024	RESET Suction Pressure 1 Stopped 70.4 REMOTE Save / Load Migrate / Reset Setpoints Report Save • Load Filename Valiable Settings were successfully loaded. Program will Oil Press Diff Available Settings were successfully loaded. Program will 460.0 Psig Data tte Settings 0il Filter Diff Settings Settings 29.9 "Hg Maine OK 0il Temp All Select OK 125.4 °F Compressor Control © Calibration Trend Chart V Alarms and Trips Users Oconfiguration 0.0 Amps Motor Amperage O Scheduled Maintenance Press Ratio No Scheduled Maintenance Maintenance 1.3 No Alarm / Trips Present User Access

Figure 13-7. Data Backup Load Successful

Replace SD Card

- 1. Turn off the MicroVission panel.
- 2. Remove old SD card and install new SD card.
- 3. Turn on the MicroVission panel.

Reenter Operating Setpoints And Configuration Information

- 1. Log in as "admin" user (default password = admin).
- 2. Reenter all values in Configuration screen. The most vital thing is to re-enter the correct No. of Cylinders and No. of Unloaders. Reenter the Compressor Runtime on Page 2 of the Configuration screen. Ensure you re-select any optional boards that are installed, and apply those additions.
- 3. Reenter all Control Limits.
- Reenter all Alarm and Trip setpoints. The most vital thing is - under the "Delay" tab, enter 5 seconds for all alarm and trip delays.
- 5. Reenter all Timer Setpoints.
- Reenter all Instrument Calibration offsets for pressure transducers. Make sure you select the appropriate Suction Pressure transducer range (typically 0-200psia 4-20mA) – but re-check the setting.



Figure 13-8. SD Card Replacement

Overview

The Maintenance screen is a convenient place to keep track of the maintenance performed and of any upcoming maintenance recommended by Vilter[™]. Based on the information contained in this screen, banners are displayed on the lower status bar.

Yellow banners are to alert you of any up-coming maintenance and red banners indicate overdue maintenance.

Chart Tab

The chart on Figure 14-1 is the original maintenance chart that is provided with the compressor. This maintenance chart contains the list of maintenance items and their respective service intervals.

Using the Chart tab you can also perform maintenance sign-offs through the maintenance chart. Once you choose an item to sign off and tap the service interval item, it will perform the sign-off operation, and the maintenance performed is recorded on the maintenance log.

Inspection/Maintenance

This column lists down all the maintenance Items.

START	RESET		Suction Press	sure	1			s	itopp	bed			4.3 Psig ∆			
									Servic	e Inte	rval (F	lours)			
STOP	REMOTE	Charl	Inspection/ Maintenance	200	5,000	10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	000'06		
Suction Set Point	Oil Press Diff	Notes	Suction Screen Coupling Alignment and	1	1	1	1	1	т. Т	1	т. Т	1	1	1		
20.0 Psig	112.3 Psig	Log	V-Belt Drive Alignment and Integrity	T.	i.	i.	i.	i.	i.	i.	i.	i.	i.	÷.		
24.3 Psig	NA		Water Line Strainers	1	1		1	1	1	1	1	1	1	1	-	
Suction Temp	Oil Temp		Transducers		1	1	1	1	1	1	1	1	1	1		
69.2 °F	101.4 °F		RTD's	н.	Т	1	Т	Т	Т.	1	1	1	1	1		
			Oil Change 🔹 🕕		R	R	R	R	R	R	R	R	R	R		
Discharge Press	Motor Amperage		•											•		
191.1 Psig	0.0 Amps									C	ustom	Tas	ĸ	ок		
Discharge Temp	Press Ratio		No Scheduled	l Main	tenan	ce			Ma	inte	nance			lelp		
89.8 °F	5.3		No Alarm / 1	rips P	resen	t			Us	ser A	ccess		Lo	og off		
User : admin			Run Ho	urs :	0					02/	07/20	19	03	:55:42	2 PM	

Figure 14-1. Maintenance Screen - Chart

Maintenance Information Icon

If you tap the Information icon shown in Figure 14-2, it displays a pop-up window with information about the item, see Figure 14-3.



Figure 14-2. Maintenance Screen – Information Icon

STOP REMOTE Suction Setpoint Oll Press Diff 20.0 Psig 113.1 Psig Suction Press Oll Filter Diff 48.4 Psig NA Suction Temp Oll Temp 79.9 °F 127.7 °F	Service Interval (Hours) • 00 0 0 0 0
Suction Setpoint Oil Press Diff 20.0 Psig 113.1 Psig Suction Press Oil Filter Diff 48.4 Psig NA Suction Temp Oil Temp 79.9 °F 127.7 °F RD's	I I I I I I I I I I I I I I bil should be changed at these vals, unless oil analysis results et the allowable limits. The I I
	ency of changes will depend on the I I model in the II model i
Discharge Press Motor Amperage 196.5 PSig 0.0 Amps Discharge Temp Press Ratio 180.5 °F 3.3 No Alarm / Trips Present	R R R R R R R R R R R R R R R R R R R

Figure 14-3. Maintenance Screen – Information Pop-up Window

Service Interval (Hours)

The numbers indicate the intervals at which the maintenance have to be performed.

- When maintenance is up-coming, the service interval field is highlighted with a Yellow background, see Figure 14-4.
- When maintenance is overdue, the service interval field is highlighted with a Red background, see Figure 14-5.

START	RESET		Suction Pressure 1 Stopped									-7.7 Psig Δ			
									Servic	e Inte	rval (I	lours)		
STOP	REMOTE	Chart	Inspection/ Maintenance	200	5,000	10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	000'06	
		otes	Suction Screen	1	ч.	1	×.	I.	T.	T.	T.	×.	1	1	
Suction Set Point	Oil Press Diff	z	Coupling Alignment and Integrity	1.	1.	1	1	1	1	1	1	1.	1	1.	
20.0 Psig	67.1 Psig	60	V-Belt Drive Alignment and Integrity	η.	i.		i.	i.	i.	i.		i.	i.	τ.	
Suction Press	Oil Filter Diff	1													
12.3 Psig	NA		water Line Strainers	1	· ·	1	· ·	· ·	<u> </u>	<u> </u>	<u> </u>	· ·	1		-
Suction Temp	Oil Temp		Transducers	1	÷.	×.	×.	i.	×.	1	Т	1	×.	1	
10.9 °F	118.5 °F		RTD's	1.	1	1	1.	11	1.	1	1	1	1	1	
			Oil Change 🔹		R	R	R	R	R	R	R	R	R	R	
Discharge Press	Motor Amperage		•											Þ	
83.9 Psig	0.0 Amps									C	ustom	ı Tasl	ĸ	ОК	
Discharge Temp	Press Ratio		Maintenance Re	quire	t in 1	Hours		_	Ma	inte	nanc	. [leln	
138.2 °F	3.7	_	-Humcenance Re	quirec					Me	mice	manne			Telp	
			No Alarm / 1	Frips F	Presen	t			Us	ser A	ccess	5	Lo	og off	
User : admin			Run Hou	irs :	199					02,	/18/20	019	10	:29:10	AM



START	RESET		Suction Pressure 1 Stopped								ed -7.7 Psig Δ					
		+						;	Servic	e Inte	rval (Hours)			
STOP	REMOTE	Char	Inspection/ Maintenance	200	5,000	10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	000'06		
		es	Suction Screen	1	Т.	1	1	1	Т.	Т.	Т.	1	1	1		
Suction Set Point	Oil Press Diff	Not	Coupling Alignment and Integrity	1	i.	i.	i.	ı.	ī.	ı.	ī.	ī.	ī.	т		
20.0 Psig	67.1 Psig	Log	V-Belt Drive Alignment and Integrity	1	T.	i.	T.	1	Т	I.	Т	I.	i.	1		
12.3 Psig	NA		Water Line Strainers	1	Т	Т	Т	Т	1	1	Т	Т	Т	T.	-	
Suction Temp	Oil Temp		Transducers	1	1	1	1	1	1	1	×.	1	×.			
10.9 °F	118.5 °F		RTD's	1	1	1	1	э.	1	1	1	1	Т	Т.,	.	
			Oil Change 🔹		R	R	R	R	R	R	R	R	R	R	•	
Discharge Press	Motor Amperage		•											•		
83.9 Psig	0.0 Amps									C	uston	n Tasl	<	ок		
Discharge Temp	Press Ratio		Maintenance Ite	ems Ai	re Ove	rdue			Ma	ainte	nanc	e	1	Help		
138.2 °F	3.7		No Alarm / 1	Trips P	resen	it			U	ser A	cces	5	Lo	og off		
User : admin			Run Hou	ırs : 2	200					02,	/18/20	019	10	:30:0	I AM	

Figure 14-5. Maintenance Screen – Maintenance Overdue

When the maintenance is up-coming or overdue, you can sign-off on a maintenance item. Tap the service interval field, and a confirmation pop-up is displayed. Refer to Figure 14-6.

START	RESET		Suction Pressure 1					s	Stopped				-7.7 Psig Δ		
		4					Service Interval (Hours)						s) 🔺		
STOP	REMOTE	Char	Inspection/ Maintenance	200	5,000	10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	000'06	
Suction Set Point	Oil Press Diff	Votes	Suction Screen	1	1	1	1	1	1	1	1	1	1	1	
		~	Integrity		1	-	-	-	-		-	-	-1	1	
20.0 Psig	67.1 Psig		V-Belt Drive Align		Confi	rm Ma	ainten	ance	for Su	n by					
Suction Press	Oil Filter Diff	Lo	and Integrity		Gann	in aber							ľ	÷.	
12.3 Psig	NA		Water Line Strain										- þ.	1	
Suction Temp	Oil Temp		Transducers						Car	Guna				1	-
10.9 °F	118.5 °F		RTD's						Cor	mirm	Car	ncer		1	
			Oil Change 🕠		R	R	R	R	R	R	R	R	R	R	•
Discharge Press	Motor Amperage		•											,	
83.9 Psig	0.0 Amps									C	ustom	Tas	k	ОК	
Discharge Temp	Press Ratio		Maintenance Ite	ms A	e Ove	rdue			Maintenance					Help	
138.2 °F	3.7								Manitemance				meip		
			No Alarm / Trips Present					User Access					Log off		
User : admin			Run Hours : 200						02/18/2019 10:31:33 A						3 AM

Figure 14-6. Maintenance Screen – Confirmation for Maintenance Sign-Off

If you sign off, the service interval field is highlighted in a Green background and the maintenance log is updated with the item that has been signed off. Refer to Figures 14-7 & 14-10.

START	RESET	Suction Pressure 1					Stopped					-7.7 Psig Δ				
		4							Servio	e Inte	rval (Hours	;)		-	
STOP	REMOTE	Char	Inspection/ Maintenance	200	5,000	10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	000'06	1 00 000	
		tes	ction Screen	1	Т	Т.	Т.	Т.	1	Т	1	Т.	Т	1	1	
Suction Set Point	Oil Press Diff	No	upling Alignment and	η.	1	1	T.	T.	1	1	1	÷.	1	1		
20.0 Psig	67.1 Psig		Belt Drive Alignment													
Suction Press	Oil Filter Diff	Log	d Integrity		Ľ.	÷.,		÷.		÷.	1					
12.3 Psig	NA		ater Line Strainers	1	1	1	1	1	1	1	1	1	1	1		
Suction Temp			ansducers	1	Т.	1	1	1	1	1	1	1	1	1	1	
10.9 °F	118.5 °F		'D's		1		τ.			π.	η.	η.		1		
															_	
Discharge Bress	Motor Amperade		I Change		R	R	R	R	R	R	R	R	R	R	R 🗸	
Discharge Press	Motor Amperage		•							_				_	<u> </u>	
83.9 Psig	0.0 Amps										Custo	om Ta	ask OK			
Discharge Temp	Press Ratio		No Scheduled Maintenance							Maintenance				Help		
138.2 °F	3.7		No Schedared Maintenance						Maintenance				neip			
			No Alarm	/ Trip	s Pres	ent				User Access				Log off		
User : admin			Run Hours : 200							02/18/2019 10					:23 AM	

Figure 14-7. Maintenance Screen – Maintenance Screen – Maintenance Sign-Off

Custom Task

The operator can record custom maintenance tasks not listed on the Inspection/Maintenance column in the "Chart" tab. Refer to Figure 14-8.

If you tap the Custom Task button, the Custom Maintenance Task pop-up appears. You can enter a description for the task performed on the entry box, and tap "OK" to save it and add it to the Maintenance Log. Now, using the "Cancel" button you can close the Custom Maintenance Task pop-up window.

START	RESET		Suction Pressure 1 St						topped -7.7 Psi						Δ	
			Custom Maintenance Task													
STOP	REMOTE															
											C)k		Ca	ncel	
Suction Set Point	Oil Press Diff	Vot	Coupling Aligne	ment and												
20.0 Psia	67.1 Psia		Integrity	incine unio	1	1	1	1	1	1	1			1		
		Log	V-Belt Drive Ali and Integrity	gnment	1	1	1	1	1	1	1	1	1	1		
Suction Press	Oil Filter Diff	_	Water Line Stra	iners	1	Т.	1	Τ.	Т.	Т.	1	1	т.	Т.	1	
12.3 Psig	NA		Transducore													-
Suction Temp	Oil Temp		Transducers		l '				÷.	÷.	1		÷.	÷.	· ·	
10.9 °F	118.5 °F		RTD's		1	1	1	1	1	1	1	1	1	1	1	
-			Oil Change	۰		R	R	R	R	R	R	R	R	R	R	•
Discharge Press	Motor Amperage		•												•	
83.9 Psig	0.0 Amps										C	ustom	n Task		ок	
Discharge Temp	Press Ratio		No	- h - dula					_							
138.2 °F	3.7		No Scheduled Maintenance No Alarm / Trips Present							Maintenanc			e	e Help		
										User Access				Log off		
User : admin				Run Ho	ours :	0				02/18/2019 10:26:34 AM						AM I

Figure 14-8. Maintenance Screen – Custom Maintenance Task Pop-up

Notes Tab

- With the Notes you can make notes for any personnel who has access to the MicroVission. Refer to Figure 14-9.
- Using the entry box you can add a new line in maintenance notes. Tap the box and enter the new line. Tap "Add Line" button to add the new line in maintenance notes.
- With the entry box to the left of "Edit Line" button you can edit existing line in maintenance notes. Tap the box and edit the line. Tap Edit Line to modify the notes.

Delete

Using the Delete button in Notes tab you can delete the selected line in maintenance notes.

Clear All

Using the Clear All button in Notes tab you can clear all existing maintenance notes.

START	RESET		Suction Pressure 1	Stopped	-1.0	Psig ∆
		ť				Add Line
STOP	REMOTE	Cha	MICROVISSION			Edit line
		s	LINE2 MICROVISSION			
Suction Setpoint	Oil Press Diff	Not				
20.0 Psig	138.2 Psig	-				
Suction Press	Oil Filter Diff	Log				
19.0 Psig	NA					
Suction Temp	Oil Temp					
80.2 °F	119.5 °F					
Discharge Press	Motor Amperage					
208.7 Psig	0.0 Amps			Clear All D	elete	ОК
Discharge Temp	Press Ratio		No Schodulad Maintonanco	Maintonanc		dala
90.4 °F	6.6		No scheduled Maintenance	Maintenanc		Terp
			No Alarm / Trips Present	User Acces	s Lo	og off
User: admin			Run Hours : 0	02/10/20	020 07	20:50 PM

Figure 14-9. Maintenance Screen – Notes

Log Tab

All the maintenance tasks performed are listed in a descending order in the Log tab, see Figure 14-10.

Date

Lists the date of the maintenance task performed.

Time

Lists the time of the maintenance task performed.

User

Lists the name of the user that performed the maintenance task.

Maintenance Performed

Lists the maintenance tasks performed.

Run Hours

Lists the run hours at which the maintenance task was performed.

START	RESET	Suction Pressure 1 Stopped	4.3 Psig ∆
		Date Time User Maintenance Performed Run Hours	
STOP	REMOTE	 01/02/2038 11:20:59 AM admin Run Hours Updated 01/02/2038 11:16:35 AM admin Suction Screen 01/02/2038 11:16:35 AM admin Run Hours Updated 01/02/2038 06:52:56 AM admin Run Hours Updated 01/01/2038 00:08:56 AM admin Run Hours Updated 01/01/2038 00:08:56 AM admin Run Hours Updated 01/01/2038 00:08:56 AM admin Run Hours Updated 	
Suction Set Point	Oil Press Diff	O1/01/2038 00:08:06 AM admin Run Hours Updated from 0 Hours to 21 Hours O2/02/2019 01:11:01 AM admin Run Hours Updated from 1000 Hours to 0 Hours O2/02/2019 01:09:36 AM admin Run Hours Updated from 16 Hours to 1000 Hours O2/02/2019 01:09:36 AM admin Run Hours Updated from 25 Hours to 0 Hours	
20.0 Psig	112.2 Psig		
Suction Press	Oil Filter Diff	2	
24.3 Psig	NA		
Suction Temp	Oil Temp		
69.2 °F	101.4 °F		
Discharge Press	Motor Amperage		
191.1 Psig	0.0 Amps		ОК
Discharge Temp	Press Ratio	No Scheduled Maintenance Maintenance	Help
89.8 °F	5.3	No Alarm / Tring Descent	Log off
		No Alarm / Trips Present User Access	Log on
User: admin		Run Hours : 0 02/07/2019	03:56:32 PM

Figure 14-10. Maintenance Screen – Log

Overview

With the Compressor Scheduling screen you can schedule control setpoint switching during the day and week, according to application needs.

You can enable or disable this feature from the Compressor Scheduling screen. Per day, you can schedule up to four setpoint "switch" events, see Figure 15-1.

Scheduling Setpoint

Schedule

The options available are "Enabled" & "Disabled". If you want to configure the setpoints related to scheduled events, the Schedule must have been disabled first.



You can enable the Compressor Scheduling feature only if the established time intervals for all days are set in an increasing order. That is, Event #1 is always scheduled to happen before Event #2, Event #2 is always scheduled to happen before Event 3, etc.

If the Events are not in the correct time order, the invalid events are marked with the caution symbol. This is to inform you of a conflict which has to be resolved before you enable the feature.

Control Mode

Using these drop-down boxes you can select the operating modes which get switched once the schedule event time is achieved.

The list of available operating modes depends on the number of controllers you have selected in the Configuration screen.

For example, if the number of Suction Pressure Control Setpoints selected is "2", and the number of Process Control Setpoints selected is "1", then the Control Mode drop-down box shows the following options for you to select:

> "Unscheduled" "Suction Pressure SP1" "Suction Pressure SP2" "Process Control SP1"

If the selected Control Mode is "Unscheduled", a switch does take place when the set time for that Event is achieved. Hence the Control Mode can be left as "Unscheduled" if you do not want to use all 4 events per day.

START	RESET	Suc	tion Pre	ssure 1			Stoppe	d	:	11.5	Psig ∆	
STOP	REMOTE	Schedule	O E	Enabled	Disal Wedge	bled	Thursda	w 1	Friday		Saturday	
Suction Set Point	Oil Press Diff	Junuary	Honday	Control Mod	ie		manoda	Time	e		Jacarady	
Suction Press	Oli Filter Diff	Schedule Ever	nt #1 nt #2	Process Contro Process Contro	ol SP1 ol SP2	• @	12 12	: 00 : 01		ам ам	•	
Suction Temp	Oil Temp 101.4 °F	Schedule Ever	nt #3 nt #4	Suction Press	ire SP1	• @	12	: 02 : 03		АМ	•	
Discharge Press	Motor Amperage											
191.1 Psig	0.0 Amps										Menu	
Discharge Temp 89.8 °F	Press Ratio 4.5	1	No Schedu	led Maintena	nce		Mair	ntenan	ce	Help		
User : admin			No Alarm / Trips Present Run Hours : 0						s 019	Log off 02:52:43 PM		

Figure 15-1. Compressor Scheduling Screen

Time

With this setpoint you can select Hours, Minutes and AM/PM values for an event. When time set for an event is achieved, control mode changes as selected for that event.

The range of values you can set for Hours setpoint is 1 - 12 for 12 hour format and 0 - 23 for 24 hour format. The range of values you can set for Minutes setpoint is 0 - 59. AM/PM selection is active for selection only when Time Format selected in Configuration screen is 12 hour.

When the scheduling feature is enabled and No. of controllers for Suction Pressure Control & Process Control are changed in Configuration screen (which makes control modes selected in compressor scheduling screen invalid), then the feature gets disabled automatically and indication is sent to you to correct the setting.
Overview

With the Service Option screen you can force individual digital or analog outputs ON.

You can use this feature for diagnostic purposes during the initial setup, or when you suspect there is an issue with the outputs.

The buttons on this screen are not available while the compressor is running.

Digital Outputs

The Digital Output buttons are momentary-toggle buttons. If you tap the OFF button, it will turn ON and vice versa.

You can measure the output at the terminal block using a multimeter, or visually check the output by watching the LEDs located on the Multi-IO Board.

See Figure 16-1 for Digital Output screen.

Oil Return Solenoid

Activates the output assigned to the Oil Return Solenoid. The output is connected to terminal X1-1 and is the 1st LED on the Multi-IO Board.

Unloader #4

Activates the output assigned to the Unloader #4. The output is connected to terminal X1-2 and is the 2nd LED on the Multi-IO Board.

Unloader #3

Activates the output assigned to the Unloader #3. The output is connected to terminal X1-3 and is the 3rd LED on the Multi-IO Board.

Unloader #2

Activates the output assigned to the Unloader #2. The output is connected to terminal X1-4 and is the 4th LED on the Multi-IO Board.

Unloader #1

Activates the output assigned to the Unloader #1. The output is connected to terminal X2-1 and is the 5th LED on the Multi-IO Board.

Trip

Deactivates the output during a trip or inhibit condition. This is an inverse acting output, connected to terminal X2-2 and is the 6th LED on the Multi-IO Board.

START	RESET	Suction Pressure	1	St	topped	-4.	3 Psig ∆
		Digital Outputs	Digital Outputs				
STOP	REMOTE		Status				Status
		Oil Return Solenoid	OFF	Compr	essor Start		OFF
Suction Setpoint	Oil Press Diff	Unloader #4	OFF	Remot	e Ready		OFF
20.0 Psig	58.1 Psig	Unloader #3	OFF	Digital	Aux Out 1		OFF
Suction Press	Oil Filter Diff	Unloader #2	OFF	Digital	Aux Out 2		OFF
15.7 Psig	NA	Unloader #1	OFF	Digital	Aux Out 3		OFF
Suction Temp	Oil Temp	Trip	ON	Digital	Aux Out 4		OFF
39.5 °F	114.7 °F	Oil Crank Case Heater	OFF				
-							
Discharge Press	Motor Amperage						
92.9 Psig	0.0 Amps	Page 1 2					Menu
Discharge Temp	Press Ratio	No Scheduled Mair	ntenance		Maintenance		Help
126.3 °F	3.5	No Alarm / Trips I	Present		User Access		Log off
User : admin		Run Hours :	0		01/07/202	1	06:48:22 AM

Figure 16-1. Service Options Screen (Page 1) – Digital Outputs

Oil Crank Case Heater

Activates the output assigned to the Oil Crank Case Heater. The output is connected to terminal X2-3 and is the 7th LED on the Multi-IO Board.

Compressor Start

Activates the output assigned to the compressor motor starter. The output is connected to terminal X2-4 and is the 8th LED on the Multi-IO Board.

Remote Ready

Activates the output assigned to the remote ready. The output is connected to terminal X3-1 and is the 9th LED on the Multi-IO Board.

Digital Aux Out #1

Activates the output assigned to the Digital Auxiliary Output 1. The output is connected to terminal X1-1 and LED on Digital Auxiliary-IO Board.

Digital Aux Out #2

Activates the output assigned to the Digital Auxiliary Output 2. The output is connected to terminal X1-2 and LED on Digital Auxiliary-IO Board.

Digital Aux Out #3

Activates the output assigned to the Digital Auxiliary Output 3. The output is connected to terminal X1-3 and LED on Digital Auxiliary-IO Board.

Digital Aux Out #4

Activates the output assigned to the Digital Auxiliary Output 4. The output is connected to terminal X1-4 and LED on Digital Auxiliary-IO Board.

NOTE

The Auxiliary Digital Outputs which are occupied by other services (like Condenser Control, Auxiliary IO screen) with run always option would be disabled in Service Options Screen Page 1, see Figure 16-2.

START	RESET	Suction Pressure 1		St	opped	24.	7 Psig ∆
		Digital Outputs	Digital Outputs				
STOP	REMOTE		Status				Status
		Oil Return Solenoid	OFF	Compr	essor Start	l	OFF
Suction Setpoint	Oil Press Diff	Unloader #4	OFF	Remot	e Ready		OFF
20.0 Psig	33.7 Psig	Unloader #3	OFF	Digital	Aux Out 1		OFF
Suction Press	Oil Filter Diff	Unloader #2	OFF	Digital	Aux Out 2		ON
44.7 Psig	NA	Unloader #1	OFF	Conde	nser Out 1		ON
Suction Temp	Oil Temp	Trip	ON	Digital	Aux Out 4	-	OFF
121.1 °F	122.7 °F	Oil Crank Case Heater	OFF				
Discharge Press	Motor Amperage						
63.4 Psig	0.0 Amps	Page 1 2					Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance Maintenance					Help
237.8 °F	1.3	No Alarm / Trips Present			User Access	1	.og off
User : admin		Run Hours :	8		06/21/2023	1 1	1:25:00 AM

Figure 16-2. Service Options Screen (Page 1) – Occupied Digital Outputs Disabled

Analog Outputs

With Analog Output (AO) option you can enter a desired value of the output then turn ON the output, see Figure 16-3. Measure the output using a meter capable of measuring a 4-20mA signal.

Compressor VFD

Sets the analog output assigned to the Compressor VFD. The output is connected to X12-1 on Multi-IO Board.

Analog Aux Out #1

Sets the analog output assigned to the Analog Auxiliary Output 1. The output is connected to X12-3 on Multi-IO Board.

Analog Aux Out #2

Sets the analog output assigned to the Analog Auxiliary Output 2. The output is connected to X12-5 on Multi-IO Board.

Analog Aux Out #3

Sets the analog output assigned to the Analog Auxiliary Output 3. The output is connected to X13-1 on Multi-IO Board.

Analog Aux Out #4:

Sets the analog output assigned to the Analog Auxiliary Output 4. The output is connected to X13-3 on Multi-IO Board.

Analog Aux Out #5:

Sets the analog output assigned to the Analog Auxiliary Output 5. The output is connected to X13-5 on Multi-IO Board.

NOTE

The Auxiliary Analog Outputs which are occupied by other services (like Condenser Control, Auxiliary IO screen) with run always option would be disabled in Service Options Screen Page 2, see Figure 16-4.

START	RESET	Suction Pressure 1	Stopped	-4.3 Psig Δ
		Analog Outputs		
STOP	REMOTE			Status
		Compressor VFD	0 %	OFF
Suction Setpoint	Oil Press Diff	Analog Aux Out 1	0 %	OFF
20.0 Psig	58.3 Psig	Analog Aux Out 2	0 %	OFF
Suction Press	Oil Filter Diff	Analog Aux Out 3	0 %	OFF
15.7 Psig	NA	Analog Aux Out 4	0 %	OFF
Suction Temp	Oil Temp	Analog Aux Out 5	0 %	OFF
39.7 °F	114.9 °F			
Discharge Press	Motor Amperage			
92.9 Psig	0.0 Amps	Page 1 2		Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help
126.8 °F	3.5	No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 0	01/07/202	1 06:48:36 AM

Figure 16-3. Service Options Screen (Page 2) – Analog Outputs

START	RESET	Suction Pressure 1	Stopped	24.7 Psig ∆
		Analog Outputs		
STOP	REMOTE			Status
		Compressor VFD	0 %	OFF
Suction Setpoint	Oil Press Diff	Analog Aux Out 1	0 %	OFF
20.0 Psig	33.7 Psig	Condenser VFD		OFF
Suction Press	Oil Filter Diff	Analog Aux Out 3		OFF
44.7 Psig	NA	Analog Aux Out 4	0 %	OFF
Suction Temp	Oil Temp	Analog Aux Out 5	0 %	OFF
121.1 °F	122.7 °F			
Discharge Press	Motor Amperage			
63.4 Psig	0.0 Amps	Page 1 2		Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help
237.8 °F	1.3	No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 8	06/21/202	21 11:25:21 AM

Figure 16-4. Service Options Screen (Page 2) – Occupied Analog Outputs Disabled

Overview

Using Trend Chart screen you can view and adjust settings for the Trend Chart, see Figure 17-1.

You can start the trending feature from this screen and can select up to four variables for on-screen plotting.

Each variable is assigned a specific color, and both the plotted trace and the vertical axis labels for the variable are of the same color.

Other than the variables, you can select the time intervals for plotting as necessary. The vertical axis scale and offset for each variable plotted is based on the range of values of the entire data plotted on screen.

The available data for display is 120 hours maximum.

Chart Operation

Pen Selection

With the Pen option you can select up to four different variables to plot on the screen (In red, blue, green and yellow). You can select "None" as an option to disable the plotting of data for a pen. The options in the pen selection drop-down boxes depend on the channels you have selected in the Trend Setup screen.

Start/Stop

Using this button you can Start/Stop the trend feature. When the trend feature is not running, the button displays "Start" and is turns Green. While the trend feature runs, the button displays "Stop" and turns Red. You can save the trend data using the "Stop" button.

Zoom In/Out

Using these buttons you can adjust the number of data points plotted on the screen. At the maximum zoom level, 3 minutes of trend data occupy the whole screen, and the zoom in button remains inactive. At the minimum zoom level, the full 120 hours of trend data is available on the screen and the Zoom Out button remain inactive.



Figure 17-1. Trend Chart Screen

MicroVission Controller • Operation and Service Manual • Copeland • 35391MV V1.4

Back/Forward

Using these buttons you can move the plot and view trend data at different time intervals.

The Forward button is inactive when you are viewing the first data point plotted on the screen (i.e. when the displayed time interval is 0:00). The Back button is inactive when you are viewing the last data point on the screen (i.e. when the displayed time interval is 120:00). At minimum zoom level, both the Back & Forward buttons remain inactive.

Trace

Using this button you can move a white cursor line across all four trend lines and receive a read out of all four variables at that point in time. When you tap the Trace button, the cursor position is displayed along with the values of all four variables on the screen.

Hold

Using this button you can stop the data from advancing on the screen, without stopping the trend feature itself. When you tap the Hold button, the Hold Time is displayed on the screen.

Trace Back (<) / Forward (>)

Using these buttons you can move a white cursor line across the trend lines, and to view the trend data values at that point. These buttons are active only when you tap the Trace button. Use these buttons to move the cursor, and the trace position is updated on the screen.

Setup

Using this button you can open the Trend Setup screen. This button is inactive when the trend feature is running.

Trend Data Storage

The Trend Analysis screen shows recorded data for problem analysis or tuning improvements. A logging buffer holds 5 minutes of data sampled at 10 second intervals.

When the logging buffer fills up with 5 minutes of data, it is automatically transferred to a temporary .csv file. A temp trend file holds up to 1MB of accumulated data. When the temp file reaches this 1MB limit, the data is written to new trend file, and the temp file is overwritten with new data from the logging buffer until reaching again 1MB of data.

When a total of 15MB of trend data accumulates, and the logging buffer is filled with another 5 minutes of data to write, the file with the oldest trend data is deleted.

NOTE

Trend data is stored with either temperature or pressure units depending on the Process Control Mode you have selected.

Trend Setup

With Trend Setup screen you can modify trending options through the Trend Setup screen, see Figure 17-2.

Tap the Setup button to access the Trend Setup screen. The trending feature is unavailable when trending feature is running. You can select a maximum of 10 analog I/O channels to populate the drop-down boxes for trending.

You can also set a path for the trend data files to be stored from the drop-down box in the setup screen. The default option is saving on the Hard-Disk, but a USB drive appears as an option as long as it has already been mounted on the panel. If there is no space available on the USB, the trend data files are written to hard disk.

If you change Press/Temp units or switches Process Control Modes or disables Analog/Digital Input Output Boards or disables individual IO channels (if they are configured in trend setup) from the Configuration screen when running the trending feature, then the background trending stops.

START	RESET	Suction Pressur	e 1	Stop	ped	22.0 Psig Δ
		Trend Setup				
STOP	REMOTE	✓ Motor Current	Auxiliary Ir	nput #1	Auxiliary	Output #1
		✓ Suction Pressure	Auxiliary Ir	nput #2	Auxiliary	Output #2
Suction Setpoint	Oil Press Diff	Discharge Pressure	Auxiliary Ir	nput #3	Auxiliary	Output #3
20.0 Psig	73.9 Psig	✓ Oil Pressure	Auxiliary Ir	nput #4	Auxiliary	Output #4
	AH 510- A14	✓ Filter In Pressure	Auxiliary Ir	nput #5	Auxiliary	Output #5
Suction Press	Oil Filter Diff	Filter Out Pressure	Auxiliary Ir	nput #6	Virtual Ing	out #1
42.0 Psig	NA	✓ Suction Temperature	Auxiliary Ir	nput #7	Virtual Ing	out #2
Suction Temp	Oil Temp	✓ Discharge Temperature	Auxiliary Ir	nput #8	Virtual Ing	out #3
40.2 °F	118.8 °F	✓ Oil Temperature	Compresso	or Load	Virtual Ing	out #4
		✓ Process Control	Compresso	or VFD	Virtual Ing	out #5
Discharge Press	Motor Amperage	•				
116.0 Psig	0.0 Amps	Trend Files Location Har	rd-Disk	•		ок
Discharge Temp	Press Ratio			_		
101 9 °F	23	No Scheduled M	aintenance	М	aintenance	Help
101.5		No Alarm / Trip	s Present	U	ser Access	Log off
User : admin		Run Hours : 0			04/19/2021	11:31:03 AM

Figure 17-2. Trend Setup Screen

Overview

With Help screen you can access the help files. These help files can be accessed from any screen. The help files describe the functionality of that screen as well as the compressor operation. See Figure 18-1.

Screen Features

List of Manuals

• Contains the list of available manual sections to be displayed in the display window. To access a manual, select the manual from the list. It displays selected manual in the manual display window. Slide one finger up and down to see more options in the list.

Display Window

• This window displays the content of the manual. Slide one finger up or down on the display window to see more information. Tap the zoom in button and slide one finger up and down or side to side to slide left/ right or slide up/down.

START	RESET	Suction Pre	ssure 1	St	topped	9.0 Psig Δ		
		∃ Manuals						
STOP	REMOTE	Installation Recomm Hardware Architecture	Section 5 • Compres	sor Control				
Suction Setpoint 20.0 Psig	Oil Press Diff 76.7 Psig	Main Screen Menu Screen Compressor Control Alarms and Trips	Auto Cycle The auto-cycle setpoints defi which the compressor will auto when placed into "Auto" run n be "enabled" or "disabled" usi to-cycle function will operate: and "Direct I/O (Auto)" mode is enabled while running in am	ine the control point ornatically cycle on and node. These setpoints ng the check box. The only in local "Auto" m . If the auto cycle feat y other remote mode.	Stop Delay: Before a delay for the set pressure remains I Pressure". Auto Cycle Process Ten the Enable: Enables th	: the compressor stop, there is time to ensure that the suction ess than or equal to the "Stop perature e Auto cycle control. Uncheck		
Suction Press	Oil Filter Diff	Timers Instrument Calibration	 is enabled while running in any other remote mode, the function will simply be ignored. if the compressor changes from a Remote mode back to Local "Auto" mode, the auto-cycle feature will operate normally. Start Temperature: When the process temperate normally. Start Temperature: When the process temperate normally. Start Temperature: Start being that and the second start, the operator is second start, the operator is second start, the operator is second start. Start Delay: Before the compressor start, there delay for the set time to ensure that process to perature remains equal to or greater than the "Start Delay: Before the compressor start, there delay for the set time to ensure that process to perature". 			he Auto cycle setpoints. : When the process temperature ter than this setpoint, the com-		
29.0 Psig	NA	Event List Input Output States				the compressor start, there is a me to ensure that process tem- qual to or greater than the "Start		
Suction Temp	0il Temp 105.7 °F	User Access Configuration Screen Data Backup	 Start Pressure: When the to or greater than this sety start. Start Delay: Before the codelay for the set time to delay for	suction pressure is en point, the compressor ompressor start, there ensure that suction p	Stop Pressure: Will less than or equal to will stop. Stop Delay: Before a delay for the set temperature remai	 Pressure: When the process temperature is than or equal to this setpoint, the compressor top. Delay: Before the compressor stop, there is lay for the set time to ensure that the process perature remains less than or equal to the "Stop 		
Discharge Press	Motor Amperage	Maintenance Screen Compressor Scheduli	 sure remains equal to or Pressure". Stop Pressure: When the than or equal to this setp stop. 	r greater than the "S e suction pressure is oint, the compressor	tart Temperature". less will			
117.4 Psig	0.0 Amps	了 Fullscreen 🤤 🕀	Page 5 / 11	🕅 Prev	Next \	/ersion OK		
Discharge Temp	Press Ratio	No Schedul	ed Maintenance		Maintenanc	e Help		
	5.0	No Alarm	Alarm / Trips Present User Access L			s Log off		
User : admin		Run H	lours : 0		10/25/20	019 04:09:33 PM		

Figure 18-1. Help Screen

Section 18 • Help Screen

Full Screen

• With this button you can view the contents in fullscreen mode. See Figure 18-2.

Page

• With Page option you can enter the page number you want to display in the window.

Back

• Back button exits full screen window. Refer to figure 18.2. After exiting full screen refer to figure 18.1.

Next

• With Next button navigate to the following page of the selected manual.

Previous

• With Previous button you can to go to the previous page of the selected manual.

Zoom In/Zoom Out

• With Zoom In/Zoom Out button you can get a closeup of contents or see more items on the Display Window.



Figure 18-2. Help Screen in Full Screen Mode

Manuals

• With Manuals button you can view different sections of the manual. Tap the Manuals button to expand or collapse the list of manual. See Figure 18-3.

START	RESET	Suction Pressure 1	St	topped	9.0 Psig ∆		
		≡ Manuals					
STOP	REMOTE	Section 5 • Compressor Control					
Suction Setpoint 20.0 Psig	Oil Press Diff 76.7 Psig	Auto Cycle The auto-cycle setpoints define the control points in which the compressor will automatically cycle on and off when placed into "Auto" run mode. These setpoints can be automatically cycle on and set of the set of the set of the set of the set of th	 Stop D a delay pressure Pressure 	elay: Before the compre- for the set time to ensu e remains less than or e e".	rssor stop, there is re that the suction requal to the "Stop		
Suction Press	Oil Filter Diff	be "enabled" or "disabled" using the check box. The au- to-cycle function will operate only in local "Auto" mode and "Direct IJO (Auto)" mode. If the auto cycle feature is enabled while running in any other remote mode, the	Auto Cycle I Enable: the box	ycle Process Temperature able: Enables the Auto cycle control. Uncheck e box to disable the Auto cycle setpoints. art Temperature: When the process temperature equal to or greater than this setpoint, the com- essor will start.			
Suction Temp	Oil Temp	If the compressor changes from a Remote mode back to Local "Auto" mode, the auto-cycle feature will operate normally.	 Start Te is equal pressor 				
91.8 °F	105.7 °F	Auto Cycle Suction Pressure	 Start De delay fo perature 	 Start Delay: Before the compressor start, there is a delay for the set time to ensure that process tem- perature remains equal to or greater than the "Start 			
Discharge Press	Motor Amperage	 Enable: Enables the Auto cycle control. Uncheck the box to disable the Auto cycle setpoints. Start Pressure: When the suction pressure is equal to or gravitier than this setpoint. The compressor will 	Stop Pr less tha will stop	ature". ressure: When the proc n or equal to this setpoi b.	ess temperature is nt, the compressor		
117.4 Psig	0.0 Amps	🖸 Fullscreen 🔍 🗨 Page 5/11	M Prev	Next V	ersion OK		
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance	Help		
59.1 °F	3.0	No Alarm / Trips Present	User Access	Log off			
User : admin		Run Hours : 0		10/25/20	19 04:09:53 PM		

Figure 18-3. Help Screen with List of Manuals Hidden

Section 18 • Help Screen

Version

• With Version button you can view the information related to current software version in the product, as well as the contact details. See Figure 18-4.

OK

• With OK button you can close the Help screen.

START	RESET	Suction Pre	ssure 1	Sto	pped	70.5 Psig ∆
STOP	REMOTE	Installation_Recomm Hardware_Architecture	Section 5 •	Comprose or Control		
Suction Setpoint 20.0 Psig Suction Press	Oil Press Diff 459.9 Psig Oil Filter Diff	MicroVission Co Vilter by Copelan 5555 South Packa Cudahy, WI 5311 (414) 744-0111	o ntroller d ard Ave. 0	Sales Order # OS Version: Software Versio Release Date:	1 1-0 on: 1.0.2849 2024-03-1	s? cating point esure tpoint ng on ke. n uses npres-
90.5 Psig	29.9 "Hg	E		Current Date:	04/11/2024	4
Suction Temp	Oil Temp					_
643.3 °F	111.2 °F	c				Close
Discharge Press	Motor Amperage	Data_Backup Maintenance_Screen Compressor_Scheduli	values are cate; Active Control N used to control t	gorized as Setpoint 1 and Setpo tode decides which set of values w the compressors.	int 2.	Unload
200.6 PSIg	0.0 Amps	\Box Fullscreen \bigcirc \oplus	Page 1/18	M Prev	Next Versio	on OK
Discharge Temp	Press Ratio	No Schedu	led Maintenance		Maintenance	Help
160.3 °F	2.0	No Alarm	/ Trips Present		User Access	Log off
User : admin		R	un Hours : 1		04/11/202	4 04:36:24 PM

Figure 18-4. Version Pop-up Screen in Help Screen

Overview

With the Compressor Sequencing screen you can sequence more than one MicroVission panel in network using Modbus TCP. These settings define how the compressors should control sequenced MicroVission panels. You can enable this feature from the Configuration screen. Refer Section 12 for Compressor Sequencing.

Compressor Sequencing Table

With the Compressor Sequencing Table screen you can view and adjust settings that are used for compressor sequencing, see Figure 19-1.

Equipment

• This is read only value and you can change the value by changing the compressor name from Configuration screen. This is updated depending on devices shown in Devices List page. This contains names of all the compressors in the network communicating with the other compressor. The same Equipment name might be configured with the different IP Address in the sequencing table.

IP Address

• This is read only value and you can change it by changing the IP address from the configuration screen. This contains the IP addresses of all the connected devices corresponding to the Equipment List.

Priority

• This defines the priorities of the compressors on the network. This priority will decide the sequence in which compressors will be turned on and off during the sequence cycle. The lower the priority number, the greater the priority of the compressor.

Status Symbols

• The Status Symbols show status of the compressors on the sequencing table, see Table 19-1 for further details.

START RESET		Suction Pressure 1 Auto Seq -4.3 P				Psig ∆
START	REDET	Compressor Sequencing				
		Equipment	IP Address Pr		iority Status	
STOP	REMOTE	Recip	192.168.1.54		•	
		Recip2	192.16	8.1.56 3	٠	C
Auto Seq Setpoint	Oil Press Diff	Recip3	192.16	8.1.57 2		I
22.0 Psig	143.1 Psig	None		0		
Suction Press	Oil Filter Diff	None				
17.8 Psig	NA	None				
Suction Temp	Oil Temp	None				
79.9 °F	120.1 °F	None		0		
		None				
Discharge Press	Motor Amperage	None				
194.6 Psig	1.8 Amps	Page 1 2 3 4				Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance		Help
90.0 °F	6.4	No Alarm / Trips Present		User Access	L	og off
User : admin		Run Hours : 2		03/20/202	:0 04	1:06:10 PM

Figure 19-1. Compressor Sequencing Screen (Page 1) – Sequencing Setup Screen

Status Symbols

Compressor Sequencing status symbols are automatically refreshed every second. For symbols see Table 19-1.

NOTE

Before configuring the sequencing table on the compressor, log on to the other compressors one by one and put each compressor in Stand-By mode. Then wait till other compressors show up under detected devices pop-screen in Page 3. Add compressors which are shown in Device list screen and also in Equipment list.

Symbol	Description
—	Default, if Compressor is not present.
?	Compressor is configured in sequencing table but is not configured in "Seq Stand-By" mode or is not detected in network or compressor sequencing table configuration or control mode is not correct or Compressor is waiting in Anti-recycle or Run Permissive.
\checkmark	Compressor configured in sequencing table and is in ready to run state.
	Compressor is running with Alarm / Load Limit condition.
$\boldsymbol{\otimes}$	Compressor stopped due to Error Condition.
Ш	Compressor running at maximum capacity or in partially loaded state without any error.
\mathcal{O}	Compressor active.
ŧ	Compressor running into its stop timer, will be stopped.
1	Compressor running into its start timer, will be started.
$\overline{1}$	Compressor is next in sequence for unloading.

Table 19-1. Status Symbols

Suction Pressure Control Setpoint

The Compressor sequencing screen defines settings that are used by the compressor for sequencing. Use the radio button to select Suction Pressure Sequencing Control mode. A Warning message box appear asking for change in sequencing control mode. If you tap OK, the compressor exits from Auto Seq. run mode and changes to Auto run mode. For Suction Pressure Control Setpoints see Figure 19-2 and for the warning see Figure 19-3.

Setpoint

• It is the process temperature that allows the compressor to operate when it is running in Auto Sequencing mode.

Start Offset

 Defines the offset from suction pressure control setpoint to start compressor. If suction pressure surpasses start offset setpoint and compressor capacity reaches the maximum level, then the sequencing algorithm allows the starting and loading of compressors to serve for increasing load requirements. The lead compressor should bypass this setpoint(i.e. should not wait for start time period when suction pressure is below setpoint + start offset). min level, then the sequencing algorithm allows the stop and unloading of compressor to cater for decreasing load requirements. The lead compressor in sequencing should bypass this offset (i.e should not stop and keep running with min load).

Start Timer

• If suction pressure surpasses the suction pressure control setpoint then this timer's value is used to make periodic sequencing decisions.

Stop Timer

• If suction pressure drops below the suction pressure control setpoint then this timer's value is used to make periodic sequencing decisions.

Process Temp. Control Setpoint

The Compressor Sequencing screen defines settings that are used by the compressor for sequencing. Use the radio button to select the Process Temperature Sequencing Control mode. A Warning message box appears asking for change in sequencing control mode. If you tap OK, the compressor exits from Auto Seq. run mode and changes to Auto run mode. For Process Temperature Control Setpoints see Figure 19-2 and for the warning see Figure 19-3.

Setpoint

Stop Offset

- Defines the offset from suction pressure control setpoint to stop compressor. If suction pressure exceeds stop offset setpoint and compressor capacity reaches
- It is the process temperature that allows the compressor to operate when it is running in Auto Sequencing mode.

START RESET		Suction Pressu	re 1	Au	to Seq	53.4 Psig ∆		
		Compressor Sequenc	Compressor Sequencing					
CTOD	DEMOTE	Sequencing Control Mode	 Suction 	Pressure	Process C	ontrol		
STOP	REMOTE	Suction Pressure Contr						
		Setpoint	22.0 Psig					
Auto Seq Setpoint	Oil Press Diff	Start Offset	6.0 Psig	Start Ti	mer s	0 sec		
22.0 Psig	21.6 Psig	Stop Offset	6.0 Psig	Stop Tir	mer	0 sec		
Suction Press	Oil Filter Diff	Process Temperature (ontrol					
75.4 Psig	NA	Setnoint	25.0.*5					
Suction Temp	Oil Temp	Stephen	23.0 F	Charle T.		0.000		
469.1 °F	125.2 °F	Start Offset	6.0 °F	Start II	mer	o sec		
		Stop Offset	6.0 °F	Stop Tir	mer	0 sec		
Discharge Press	Motor Amperage							
106.4 Psig	6.2 Amps	Page 1 2 3	4			Menu		
Discharge Temp	Press Ratio	No Scheduled I	laintenance		Maintenance	Help		
237.6 °F	1.3	No Alarm / Tri	ps Present		User Access	Log off		
User : admin		Run Hours : 0			07/03/202	1 02:39:31 AM		

Figure 19-2. Compressor Sequencing Screen (Page 2) – Setpoints Configuration

Start Offset

 Defines the offset from process temperature control setpoint to start compressor. If process temperature surpasses start offset setpoint and compressor capacity has reached max, then the sequencing algorithm allows the starting and loading of compressors to cater for increasing load requirements. The lead compressor should bypass this setpoint(i.e. should not wait for start time period when suction pressure is below setpoint + start offset).

Stop Offset

 Defines the offset from process temperature control setpoint to stop compressor. If process temperature surpasses stop offset setpoint and compressor capacity has reached min, then the sequencing algorithm allows the stop and unloading of compressors to cater for decreasing load requirements. The lead compressor in sequencing should bypass this offset (i.e should not stop and keep running with min load).

Start Timer

• If process temperature surpasses the process temperature control setpoint then this timer's value is used to make periodic sequencing decisions.

Stop Timer

• If process temperature drops below the process temperature control setpoint then this timer's value is used to make periodic sequencing decisions.

START	DESET	Suction Pressure 1	Auto Seq	13.3 Psig Δ					
START	RESET	Compressor Sequencing							
STOP	REMOTE	Sequencing Control Mode OSuction	Pressure • Process Contro	Ы					
		Suction Pressure Control	Suction Pressure Control						
Suction Setpoint	Oil Press Diff	Setpon Warning: If Compressor Compressor Sequencing	Control Active Control Mode a o Control Mode are not Matchi	ind na					
20.0 Psig	318.8 Psia	Start of then Compressor will go	o out of sequencing. Do you wa	ant to					
20.0 Faig	510.0 Faig	Stop Of							
Suction Press	Oil Filter Diff								
33.3 Psig	NA								
Suction Temp	Oil Temp		OK Can	cel					
40.2 °F	111.9 °F								
Discharge Press	Motor Amperage								
168.6 Psig	2.0 Amps	Page 1 2 3 4		Menu					
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Halp					
68.7 °F	3.8	No scheduled Maintenance	Maintenance	neip					
		No Alarm / Trips Present	User Access	Log off					
User: admin		Run Hours : 0	03/27/2020	0 02:32:21 PM					

Figure 19-3. Compressor Sequencing Screen (Page 2) – Control Mode Change

Sequencing Control Mode

This option is used to change the control mode of compressor sequencing. Use the radio button to select any one control mode at a time. A Warning message box appears asking for change in sequencing control mode. If you tap OK, the compressor exits from Auto Seq. run mode and changes to Auto run mode. See Figure 19-3. The control mode should be same for all the sequenced compressor. If there is a mismatch in control mode between the sequenced compressors, an error may appear and an error event and an error event is logged into compressor sequencing event log.

Devices List

This screen displays, delete and test connection with the other compressors that are used by the compressor for sequencing. For Devices List screen see Figure 19-4.

Device Name

• Displays the name of the other compressor.

Device Type

• Displays the type of compressor controller, whether it's MicroVission or not.

IP Address

• Displays the IP address of the other compressor.

START	DESET	Suction Pressure 1	st	opped	5.2 Psig ∆
JIANI	REDET	Compressor Sequencing			
STOP	REMOTE	Devices List Devices Name Device Recip Microv	s Type /ission	IP Address 192.168.1.9	96
Suction Setpoint	Oil Press Diff	Recip Microv	lission	192.168.1.9	95
20.0 Psig	48.7 Psig				
Suction Press	Oil Filter Diff				
25.2 Psig	NA				
Suction Temp	Oil Temp				
39.7 °F	114.9 °F				
Discharge Press	Motor Amperage	View Detected Devices	Delete Device	Test Co	onnection
92.9 Psig	0.0 Amps	Page 1 2 3 4			Menu
Discharge Temp	Press Ratio	No Scheduled Maintenan	ce	Maintenance	Help
127.0 °F	2.7	No Alarm / Trips Presen	t	User Access	Log off
User : admin		Run Hours : 0		04/20/2021	11:42:17 AM

Figure 19-4. Compressor Sequencing Screen (Page 3) - Devices List

View Detected Devices

This screen displays a list of devices detected by the MicroVission. Tap the View Detected Devices button, the Detected Devices pop-up window appears. See Figure 19-5.

Device Name

• Displays the name of the detected device.

IP Address

• Displays the IP Address of the detected device.

Add

• Displays the check boxes which you can use to select the detected device.

OK

• With OK button you can add Detected MicroVission devices as other compressors.

START	DESET	Suct	ion Pre	ssure 1	St	opped	15.7 Psig ∆
START	REDET	Compresso	Compressor Sequencing				
STOP	REMOTE	Devices Lis Devices Nam	Detecte Add	ed Devices Device Name	18	P Address	
Suction Setpoint 20.0 Psig	Oil Press Diff 38.1 Psig		H	Recip Recip	1	192.168.1.95 192.168.1.96	
Suction Press	Oil Filter Diff						
35.7 Psig	NA						
Suction Temp	Oil Temp						
40.2 °F	114.9 °F						
Discharge Press	Motor Amperage	View De			0	K Cancel	nection
92.9 Psig	0.0 Amps	Page 1	2 3	4			Menu
Discharge Temp	Press Ratio		lo Schedu	led Maintenance		Maintenance	Help
127.0 °F	2.1		No Alarm / Trips Present			User Access	Log off
User : admin			Run	Hours : 0		07/02/2023	L 03:33:42 PM

Figure 19-5. Compressor Sequencing Screen (Page 3) – Detected Devices

Delete Device

With Delete Device button you can delete the detected device from the list Device List screen. See Figure 19-6 and 19-7. After deleting the compressor, the deleted compressor is reset to its own compressor entry in the device list.

Ok

With this button you can delete a selected compressor from the Sequencing Network.

Cancel

With this button you can cancel deletion of a selected compressor from the Sequencing Network.

START	DESET	Suction Pressure 1	Stopped	5.2 Psig ∆
START		Compressor Sequencing		
STOP	REMOTE	Devices List Devices Name Devices Type Recip MicroVission	P IP Address	95
Suction Setpoint 20.0 Psig Suction Press 25.2 Psig Suction Temp 39.9 °F	Oil Press Diff 48.7 Psig Oil Fliter Diff NA Oil Temp 114.7 °F	Recip Confirm Delete Device	ок Са	ncel
Discharge Press 92.8 Psig	Motor Amperage 0.0 Amps	View Detected Devices Dele Page 1 2 3 4	ete Device Test C	Connection Menu
126.5 °E	2 7	No Scheduled Maintenance	Maintenance	Help
12015		No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 0	04/20/202	1 07:37:10 AM

Figure 19-6. Compressor Sequencing Screen (Page 3) – Confirm Delete Device

START	RESET	Suction Pressure 1	Stopped	5.2 Psig ∆
51661		Compressor Sequencing		
STOP	REMOTE	Devices List Devices Name Devices Type Recip MicroVission	P Address	5
Suction Setpoint 20.0 Psig Suction Press 25.2 Psig Suction Temp 39.9 °F	Oil Press Diff 48.7 Psig Oil Filter Diff NA Oil Temp 114.9 °F	Recip MicroVission Please Select the Device to	192.168.1.9 Delete ОК	96
Discharge Press 92.9 Psig Discharge Temp 126.5 °F	Motor Amperage 0.0 Amps Press Ratio 2.7	View Detected Devices Dele Page 1 2 3 4 No Scheduled Maintenance	ete Device Test C Maintenance	Menu Help
User : admin		No Alarm / Trips Present Run Hours : O	User Access 04/20/202	Log off 07:36:02 AM

Figure 19-7. Compressor Sequencing Screen (Page 3) – Select Delete Device

Test Connection

With MicroVission panel you can easily test the physical connection with the other compressors. You can use test connection for troubleshooting other devices in the network. Tap Test Connection to view the connection result. See Figure 19-8.

START	RESET	Suction Pressure 1	Stopped	5.2 Psig ∆
START	Reser	Compressor Sequencing		
STOP	REMOTE	Devices List Devices Name Devices Type Recip MicroVission	P IP Address	95
Suction Setpoint 20.0 Psig Suction Press 25.2 Psig Suction Temp 39.9 °F	Oil Press Diff 48.7 Psig Oil Filter Diff NA Oil Temp 114.9 °F	Recip MicroVission	192.168.1. I OK	96
Discharge Press 92.9 PSig Discharge Temp 127.2 °F	Motor Amperage 0.0 Amps Press Ratio 2.7	View Detected Devices Dele Page 1 2 3 4 No Scheduled Maintenance	ete Device Test C Maintenance	Connection Menu Help
		No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 0	04/20/202	1 07:36:48 AM

Figure 19-8. Compressor Sequencing Screen (Page 3) – Test Connection

Compressor Sequencing Events Log

This screen displays type of sequencing events in a chronological order. Information displayed on the screen helps understand the operation of the sequencing feature and troubleshooting, see Figure 19-9. The information displayed on this screen is organized into four columns and can list up to 128 separate events. You can download the information on the sequencing event list through the Data Backup screen. Slide one finger up and down or side to side to see the event details.

Events List Columns

Date

Displays the date of the event in MM-DD-YYYY format.

Time

Displays the time of the event in HH: MM format.

Event Type

Displays the type of message for a particular listing. The common event types are "Error", "Alarm" and "Info". This helps you understand the message in the next column.

Message

Displays the detailed information of the event.

START	RESET	Suction Pressure 1	Stopped	14.8 Psig ∆
		Compressor Sequencing		
STOP	REMOTE	Date Time Type Mess 01/28/2021 08:43 PM Error TCP 0 01/28/2021 08:39 PM Error Anti-1 01/28/2021 08:39 PM Error Anti-1	age Communication Error On: Comp ecycle On: Comp3.97 ecycle On: Comp3.96	2.96
		01/28/2021 08:39 PM Error Andri 01/28/2021 08:39 PM Info Comp	pressor Stopped On: Comp2.96	
Suction Setpoint	Oil Press Diff	01/28/2021 08:39 PM Into Stop 01/28/2021 08:39 PM Error Trip 0	Condition On: Comp3.97	
20.0 Psig	97.0 Psig	01/28/2021 08:39 PM Alarm Alarm Alarm	Condition On: Comp3.97	
		01/28/2021 08:39 PM Info Comp 01/28/2021 08:39 PM Info Start	Timer Initiated On: Comp3.97	
Suction Press	Oil Filter Diff	01/28/2021 08:39 PM Info Comp	ressor Started On: Comp2.96	
34.8 Psig	NA	01/28/2021 08:39 PM Info Start 01/28/2021 08:39 PM Info Comp	Timer Initiated On: Comp2.96 pressor Stopped On: Comp2.96	
-		01/28/2021 08:39 PM Info Stop	Timer Initiated On: Comp2.96	
Suction Temp	Oil Temp	01/28/2021 08:39 PM Info Comp 01/28/2021 08:39 PM Info Stop	pressor Stopped On: Comp3.97	
38.6 °F	119.2 °F	01/28/2021 08:39 PM Info Reco	vered from Load Limit: Comp3.97	97
		01/28/2021 08:39 PM Error Stop	Load On: Comp3.97	
		01/28/2021 08:39 PM Info Comp 01/28/2021 08:39 PM Info Start	Timer Initiated On: Comp3.97	
Discharge Press	Motor Amperage	01/28/2021 08:39 PM Info Comp	pressor Started On: Comp2.96	
118.1 Psig	0.0 Amps		Times labord On. Come 3 OC	
		Page 1 2 3 4		Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help
206.1 °F	2.7	the scheduled Plaintenance	maintenance	neip
		No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 0	01/28/202	21 08:43:31 PM

Figure 19-9. Compressor Sequencing Screen (Page 4) – Compressor Sequencing Events Log

Configuration Overview

First, you should enable the Compressor Sequencing from the Configuration screen and then configure the sequencing setpoints.

With the Configuration screen you can:

- 1. Enable Ethernet port.
- 2. Enable / Disable Compressor Sequencing.
- 3. Assign a compressor name.
- 4. Assign network name for sequencing.
- 5. Select Modbus TCP protocol.
- 6. Assign a unique Ethernet IP address.

Setting Up the Other Compressors For Sequencing

- 1. Log on to one compressor at a time and navigate to the Configuration screen, see Figure 19-10.
- 2. Select the Ethernet check box to enable the ethernet port and select Modbus TCP protocol.
- 3. Set up a unique Ethernet IP address for each compressor.
- 4. Set up the Subnet Mask for the IP address.
- 5. Set up the Gateway address (**Important**: You must set up the Gateway Address before taking any further action).
- 6. Assign a Name for each compressor.

Communication			
Active Remote Contro	Ethernet	- On Communication	n Failure
Direct I/O		Revert to Local C	ontrol -
Auto Control		Serial (Modbus	RTU)
	None		P12/RS485
Run Permissive			
Z Ethernet		Data Bits	
IP Address	192.168.1.12	Stop Bits	• 1 0 2
Subnet Mask	255.255.255.0	Parity	
Gateway	192.168.1.1	VNC Account	
Protocol	Modbus TCP	New Password	
Node Address	1	Verify New Passwor	rd
✓ Compressor Sequ	uencing	Port Number	5900
	ullter		

Figure 19-10. Configuration Screen (Page 3) – Compressor Sequencing Setup

- 7. Set the Communications Active Remote Control to "Ethernet" for each compressor.
- 8. Apply the settings before you close the Configuration screen.
- 9. Select the Compressor Sequencing check box to enable the compressor sequencing.
- 10. Enter a network name in the Network Name box.
- 11. Tap Apply to apply the settings and Close.

NOTE

Ethernet settings should be set before setting compressor sequencing settings in the configuration screen. Available devices in the same network would be automatically added to compressors device list when sequencing option is enabled from configuration screen. At this point, the compressor begins multicasting its status information over the network at a rate of every 20 seconds. (After you configure all your compressors, the information of the compressors is displayed in the Sequencing screen). Tap Close to exit the Configuration screen. Now, to set the rest of the compressors in Seq Stand-By mode, first tap START and, then tap Seg Stand-By button. The main window top status bar displays run mode as Seg Standby and Auto Seg-Stand-by message on the top banner. See Figure. 19-12. If other compressors are placed in seq standby and tap START and then tap Auto Seq button to start compressor sequencing. If Compressor starts to run based on set priority, the main window top status bar displays the run mode as Auto Seq. See Figure. 19-13. To stop the compressor sequencing, tap the Stop button on the Main screen and vice versa, see Figure 19-11.

START	RESET	Suction P	ressure 1	St	topped	8.0 F	sig ∆
STOP	REMOTE	Tos	IOLENDID VALVE		Anti-Recycle Remote Lock Out		0:00 ON
STOP	KENOTE						
Suction Setpoint	Oil Press Diff		7				
20.0 Psig	114.6						
Suction Press	Oil Filter	Auto	Manual		Remote		
28.0 Psig	NA						
Suction Temp	Oil Temp	Auto Seq	Seq Stand-By		Cancel		
77.9 °F	121.3						
-							
Discharge Press	Motor Amperage			_			_
90.1 Psig	0.0 Amps		0%			enu	
Discharge Temp	Press Ratio	No Sche	No Scheduled Maintenance			н	elp
00.0 F	2.5	No Ala	rm / Trips Present		User Access	Lo	g off
User : admin		Ru	n Hours : 0		06/09/2023	1 05:	54:56 PM

Figure 19-11. Compressor Start Dialog – Auto Seq and Seq Stand-By



Figure 19-12. Main Window – Auto Seq Stand-By



Figure 19-13. Main Window – Auto Seq (Full Load)

Overview

With Auxiliary Input/Output (I/O) screen of the MicroVission you can add peripheral instruments and/or devices such as motors, valves and solenoids. With these additions, customer configurable I/O's are useful to expand the functions of the MicroVission where it was not explicitly designed to control.

You can set one or more Auxiliary I/O of the MicroVission from the Configuration screen. Before setting up the auxiliary I/O, make sure the MicroVission has expandable I/O cards. Select the card on Page 8 of the Configuration screen.

Digital Inputs

With Digital Inputs section you can configure the auxiliary digital inputs, see Figure 20-1. You can configure the Digital Inputs screen setpoints to set alarm/trip and inhibit on high or low input. A low input is 0VAC and a high is 120VAC on the enabled input. If you do not change the default settings, no action is taken on the enabled input will mean no action will be taken on an enabled input. The input is available only to view at the panel or by communications.

Trip/Alarm Check

The Trip/Alarm feature enables alarms/trips of the MicroVission for the specified digital input. Select the check box to enable alarm/trip. You can select an option from the drop-down list to specify when an alarm and/or trip should trigger (when the input value is high or low).

Inhibit Check

The Inhibit Check feature prevents the compressor start if there exists a trip condition. Select the Inhibit check box to enable inhibit feature. You can select Inhibit to act on a high or low input and to work with or without the alarm and trip function.

START	RESET	Suction	Pressure 1	Ste	opped	-4.3 Psig ∆
		Digital Inputs				
STOP	PEMOTE	Digital Aux In 1		Digital Au	ux In 2	
3104	REMOTE	Trip/Alarm	None -	Trip/A	larm None	
furtion Catnoint	Oil Brass Diff	Inhibit	None -	Inhibi	t None	
20.0 Psia	58.3 Psia	Digital Aux In 3		Digital Au	ux In 4	
20.0 Faig	JUIJ Falg	Trip/Alarm	None -	Trip/A	larm None	
Suction Press	Oil Filter Diff	Inhibit	None -	Inhibi	t None	
15.7 Psig	NA					
Suction Temp	Oil Temp					
39.9 °F	115.1 °F					
Discharge Press	Motor Amperage					
92.9 Psig	0.0 Amps	Page 1 2	3 4 5	+		Menu
Discharge Temp	Press Ratio	No Se	cheduled Maintenance		Maintenance	Help
127.0 °F	3.5	No	Marm / Trips Present		User Access	Log off
User : admin			Run Hours : 0		01/07/202	1 03:10:14 AM

Figure 20-1. Auxiliary I/O Screen (Page 1) – Digital Inputs

Digital Outputs

With Digital Outputs screen of the Auxiliary I/O screen you can configure the auxiliary digital outputs, see Figure 20-2. You can configure the digital output to activate (High, 120VAC) based on either a digital input or a specified level on an analog input. Every digital and analog input in the MicroVission is made available to control a digital output.

Analog Input

If you select the Analog Input option, all the analog inputs in the Active Input drop-down list become available. You can now select the analog input to control the digital output.

Digital Input

If you select the Digital Input option, all the available digital inputs in the Active Input drop-down list become available. You can now select the digital inputs to control the digital outputs.

Calculated Value

If you select the Calculated Value option, all the available calculated values in the Active Input drop-down list become available. You can now select a calculated value to control the digital outputs.

Run Always

If you select Run Always option, it enables the digital output when the compressor is running or runs all the time. Select the Run Always check box to enable the feature.

N/O & N/C

Defines whether the output will be above or below the trigger value. If you select the N/O option while the input is below trigger value, the output will be low (0VAC). Whereas, if you select N/C option while the input is below trigger value, the output will be high (120VAC).

Analog Trigger

The Analog Trigger turns on/off the digital output based on a specified value plus the specified differential value. This option is available only if you select the Analog Input option.

Analog Trigger value

This defines the specified value in which the output turns on/off. This is an absolute value and not based on units. For example, 100 could mean temperature or pressure depending on the type of input selected.

Differential

This is a differential around the trigger value. For example, if a trigger value of 100 is entered with a differential of 1, then as the value increases to 101, the output is triggered. If the value decreases to 99, then the output turns on/off in the opposite direction.

Enable Timer

The Enable Timer controls the digital output when activated based on the ON Time and OFF Time. Select the check box to enable this feature.

Timers

ON Time: Using ON Time option, you can define the ON Time of the timer for the digital input.

OFF Time: Using OFF Time option, you can define the OFF Time of the timer for the digital output.

For example, if an analog input is selected with a trigger value of 100 and differential of 1 and ON Time and OFF Time of 1 min each and N/O setting, then as the analog input value increases to 101, the output is high (120VAC) for 1 min and then the output is low (0VAC) for 1 min. The output keeps on changing from high to low and then low to high until the analog input value decreases to 99.

Active Input	Latching Input	Output
0	0	0
0	1	0
1	1	1
0	1	1
0	0	0

Latching

Latching consists of two types; one is with timer and another is with the digital input.

Latching with Digital Input: The below truth table is for the latching with digital input. When both Active Input & Latching Input are LOW, the output is LOW. When Active Input is HIGH, the output is HIGH. Now if Active Input is turned LOW when Latching Input is HIGH, the output stays HIGH until Latching Input is turned LOW i.e. the output would be Latched.

Latching with Timer: The below truth table is for the latching with timer. When Active Input is LOW, the

Section 20 • Auxiliary I/O

output would be LOW. When Active Input is HIGH, the output would be HIGH. Now if Active Input is turned LOW turn Latching Timer would become active. The output would remain HIGH till the time Latching Timer is Running i.e. the output would be Latched. Once the Latching Timer is Lapsed, the output would go LOW.

Active Input	Timer	Output
0	No Timer	0
1	No Timer	1
0	Run Timer	1
0	Expired Timer	0

START	RESET	Suction Pr	essure 1	Stopped	25.9 Psig Δ
		Digital Outputs			
STOP	REMOTE	Aux 1	Aux 2	Aux 3	Aux 4
STOP	REMOTE	Digital Aux Out 1			
		 Analog Input 	Digital Input	✓ Enable Timer	
Suction Setpoint	Oil Press Diff	O Calculated Value		On Time	1.0 min
20.0 Psig	40.8 Psig	Active Input None	2		1.0 min
Suction Press	Oil Filter Diff				
45.9 Psig	NA				
Suction Temp	Oil Temp	Analog Trigger Valu	e 0.0	Latched with secor	nd Digital Input
23.7 °F	122.4 °F	Differential	5.0		None
Discharge Press	Motor Amperage				
92.2 Psig	0.0 Amps				
		Page 1 2	3 4 5	+	Menu
Discharge Temp	Press Ratio	No Sched	uled Maintenance	Maintenar	nce Help
211.1 *	1.0	No Alarr	n / Trips Present	User Acce	ess Log off
User : admin			Run Hours : 3	02/21/	2024 10:01:00 PM

Figure 20-2. Auxiliary I/O Screen (Page 2) – Digital Outputs Enabled with Timer

START	RESET	Suction Pr	essure 1	Stopped	25.9 Psig Δ
		Digital Outputs			
STOP	REMOTE	Aux 1	Aux 2	Aux 3	Aux 4
STOP	REPIOTE	Digital Aux Out 1			
		Analog Input	 Digital Input 		
Suction Setpoint	Oil Press Diff	O Calculated Value			.0 min
20.0 Psig	40.8 Psig	Active Input None	\$	Off Time	0 min
Suction Press	Oil Filter Diff			(Latching	
45.9 Psig	NA				
Suction Temp	Oil Temp	Analog Trigger Valu		Latched with Timer	
23.7 °F	122.4 °F	Differential		Timer	50 sec
Discharge Press	Motor Amperage				
92.2 Psig	0.0 Amps				
Disebaura Tama	Dunna Datia	Page 1 2	3 4 5	+	Menu
Discharge Temp	ress katio	No Sched	uled Maintenance	Maintenan	ce Help
210.9 F	1.0	No Aları	n / Trips Present	User Acces	s Log off
User : admin		Run Hours : 6 02/22/2024 03			024 03:40:42 PM

Figure 20-3. Auxiliary I/O Screen (Page 2) – Digital Outputs Latching Enabled with Timer

START	DESET	Suction Pr	essure 1	Stopped	25.8 Psig Δ
STANT	RESET	Digital Outputs			
STOP	DEMOTE	Aux 1	Aux 2	Aux 3	Aux 4
STOP	REMOTE	Digital Aux Out 1			
		Analog Input	• Digital Input		
Suction Setpoint	Oil Press Diff	Calculated Value			1.0 min
20.0 Psig	40.9 Psig	Active Input None	2 .	• Off Time	1.0 min
Suction Press	Oil Filter Diff	Run Always	• N/O N/C	✓ Latching	
45.8 Psig	NA	Analog Trigger Valu	50.0	Latchod with socor	d Digital Input
Suction Temp	Oil Temp	Difforential			
23.7 °F	122.4 °F	Differential		Latching Input	None •
Discharge Press	Motor Amperage				
92.2 Psig	0.0 Amps	Page 1 2	3 4 5	+	Menu
Discharge Temp	Press Ratio	No Sched	uled Maintenance	Maintena	nce Help
210.9 °F	1.8	No Aları	n / Trips Present	User Acce	ess Log off
User : admin			Run Hours : 6	02/22/	2024 02:43:14 PM

Figure 20-4. Auxiliary I/O Screen (Page 2) – Digital Outputs Latching Enabled with Digital Input

Analog Inputs

With Analog Inputs screen of the Auxiliary I/O screen you can define the function of an instrument connected to the MicroVission. You can configure the Analog Inputs setpoints to monitor an input for informational purpose or to use it as a control input for the auxiliary digital and analog outputs. Also, you can configure the analog inputs to alarm, trip, and inhibit on specified values. See Figure 20-5 for reference.

- Alarm / Trip: With this drop-down box you can determine whether the analog input should generate an alarm, trip, or both when the input value exceeds the limits entered into the Alarm and Trip boxes.
- Inhibit: If you enable this feature it prevents a start if the input value exceeds the alarm limit values.
- Low Alarm: With this option you can determine the lower limit of the input value that when exceeded will generate an alarm.

- **High Alarm:** With this option you can determine the upper limit of the input value, that when exceeded will generate an alarm.
- Low Trip: With this option you can determine the lower limit of the input value that when exceeded will generate a trip.
- **High Trip:** With this option you can determine the upper limit of the input value that when exceeded will generate a trip.
- **Delay:** With this option you can determine the time period for which input value is checked with alarm/trip setpoints before showing alarm or trip. It generates an alarm or trip only if the input value is continuously above or below the alarm or trip setpoints.

START	RESET	Suction Pressure 1			St	topped -4.3 Psig		Psig ∆		
		Analog Inputs								
STOP	REMOTE	Aux 1, 2	2, 3	Au	ix 4, 5, 6	Au	x 7, 8			
STOP	REPIOTE	Analog Aux	In 1		Analog Aux In 2		Analog Aux		In 3	
Suction Setpoint	Oil Press Diff	Alarm/Trip	Neither	•	Alarm/Trip	Neither	•	Alarm/Trip	Neith	er -
20.0 Psig	58.1 Psig	Inhibit			Inhibit			Inhibit		
Suction Press	Oil Filter Diff	Low Alarm	0.0 °F		Low Alarm	0.0 °F		Low Alarm	0.0 °F	-
15.7 Psig	NA	High Alarm	0.0 °F		High Alarm	0.0 °F		High Alarm	0.0 °I	
Suction Temp	Oil Temp	Low Trip	0.0 °F		Low Trip	0.0 °F		Low Trip	0.0 °F	
39.7 °F	114.9 °F	High Trip	0.0 °F		High Trip	0.0 °F	High Trip 0.0 °F		-	
-		Delay	5 sec		Delay	5 sec		Delay	5 sec	
Discharge Press	Motor Amperage									
92.8 Psig	0.0 Amps	Page 1 2 3 4 5 + Menu				Menu				
Discharge Temp	Press Ratio	No Scheduled Maintenance Help				lelp				
126.5 °F	3.5	No Alarm / Trips Present User Access			Lo	g off				
User : admin			Run	Hours	: 0		(01/07/2021	03	:22:28 AM

Figure 20-5. Auxiliary I/O Screen (Page 3) – Analog Inputs

Analog Outputs

With the Analog Outputs screen you can map any standard analog input or auxiliary input to any of the five analog auxiliary outputs. Go to the Page 4 to configure the auxiliary outputs. See Figures 20-6 and 20-7.

- Active Input: You can select the active Input from the available standard analog inputs/auxiliary inputs/ calculated values list. The Active Input option maps to the selected auxiliary output.
- **Run Always:** The "Run Always" option activates the mapped auxiliary output irrespective of the compressor's run state. If you do not select the "Run Always" option, then the mapped auxiliary output is enabled only when the compressor is running.
- Trigger: With Trigger option you can enable/disable the auxiliary output according to the configured trigger input. You can select the Trigger input from the available standard analog inputs, standard digital inputs, auxiliary analog inputs or digital inputs, calculated values. Trigger value and differential in combination with trigger type ("enable if above / On" or "enable if below / Off") enables or disables the auxiliary output. Control Auxiliary outputs can be PID Controlled or Scalable Controlled.

PID Control

P = **Proportional (gain):** Used to adjust the auxiliary output in direct proportion to the difference between the control setpoint and the active input. The proportional term is a unitless quantity and is used for coarse adjustment. You must set this setpoint to the lowest value that gets adequate control system response. If you increase the proportional setting, it increases the sensitivity of control system to small process fluctuations and the tendency to hunt. See Figure 20-6 for reference.

I + (Reset): Used to integrate the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. When this setpoint is set / non-zero, integral error gets accumulated.

Examples:

Case I -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error gets accumulated when process variable is below setpoint i.e. 20.

Case II -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
l + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, if you select the negative error check box, the integral error gets accumulated when process variable is above setpoint i.e. 20.

I-(Reset): Used to remove the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment and smooth out process variations. When this setpoint is set / non-zero, integral error is removed.

Examples

Case I -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error is removed from the accumulated error when process variable is above setpoint i.e. 20.

Case II -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
l + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case if you select the Negative Error check box, the integral error is removed from the accumulated error when the process variable is below setpoint i.e. 20.

D = **Derivative (rate)**: Used to account for how fast the error is changing, positively or negatively.

Setpoint

• It is a setpoint used by PID engine.

I Op. Band:

 This setpoint defines the operational band for accumulation of integral error as per value of I+ (Reset).

Examples

Case I -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 5
l + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error get accumulated when the value of process variable falls within the lower band as determined by I Op. Band setpoint. (Setpoint – I Op. Band) <= Process Variable < Setpoint. Hence 15 <= Process Variable < 20.

Case II -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 5
l + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, if you enable the Negative Error feature, the integral error gets accumulated when the value of process variable falls within the upper band as determined by I Op. Band setpoint. Setpoint < Process Variable <= (Setpoint + I Op. Band). Hence 20 < Process Variable <= 25.

Inverse (20 – 4 mA): This option is used to inverse an Analog Aux Output, to vary its output from 20 mA to 4 mA. Typically used where normally open solenoids are to be operated.

Examples

Case I -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
l + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Disabled

	D = 1	Inverse (20 – 4 mA) = Enabled
--	-------	-------------------------------

In this case, the error calculated by the PID engine will modulates analog output from 20 mA to 4 mA when process variable is below setpoint i.e., 20. Similarly, analog output gets modulated towards 20 mA when process variable is above setpoint.

Case II -

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I + (Reset) = 1	Interval = 1 sec
I – (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Enabled

In this case when negative error is enabled, the error calculated by the PID engine will modulates analog output from 20 mA to 4 mA when process variable is above setpoint i.e., 20. Similarly, analog output will gets modulated towards 20 mA when process variable is below setpoint.

Negative Error: The negative error option determines the calculation of error by the PID engine to modulate the analog output. When negative error option is enabled, the error is calculated as Process Variable minus Setpoint (Process Variable – Setpoint). Hence when Process Variable is above Setpoint, PID engine will ramp up analog output towards 20 mA when Inverse (20–4 mA) option is disabled.

Similarly, if negative error option is disabled, the error will be calculated as Setpoint minus Process Variable (Setpoint – Process Variable). Hence when Process Variable is below Setpoint, PID engine will ramp up analog output towards 20 mA when Inverse (20 – 4 mA) option is disabled.

Interval: This setpoint defines the time interval for calculation of Integral Error.

Examples

PID Settings	Other Settings			
P = 1	Setpoint = 20, I Op. Band = 0			
I + (Reset) = 1	Interval = 10 sec			
I – (Reset) = 1	Negative Error = Disabled			
D = 1	Inverse (20 – 4 mA) = Disabled			

In this case, the integral error will get accumulated or removed at every 10 second time interval.

Scalable Control

- Minimum Input / Maximum Input
- These setpoints define minimum and maximum Input range for a configured active input.
- Minimum Output / Maximum Output
- These setpoints define minimum and maximum output. The Auxiliary output produces a linear value based on these settings. See Figure 20-7 for reference.

START	RESET	Suction Pressure 1			Stopped			26.4 Psig ∆		
		Analog Outputs								
STOP	DEMOTE	Aux 1	Aux 2	Au	IX 3	Aux	4	Aux 5		
STOP	REMOTE	Analog Aux Out	1							
Standard Analog Input Aux				iliary Analog Input Ocalculated Value						
Suction Setpoint	Oil Press Diff	Run Always		Con	Control Method					
20.0 Psig	40.3 Psig	Active Input Nor	ne 🔹	PIC	PID Control *					
Suction Press	Oil Filter Diff	✓ Trigger		Р (Gain)	0.0	Setpoint	0.0		
46.4 Psig	NA	 Analog Input Digital Input 			(Reset)	0.0	l Op Bar	nd 0.0		
Suction Temp	Oil Temp	Calculated Va	alue		(Decet)	0.0	Interval	1.000		
23 7 °E	100 / °E	None	•	1- (Resel)	0.0	interval	I Sec		
23.7 F	122.4 F	Enable if above / ON 🔹			(Rate)	0.0				
Discharge Bress	Motor Amperage	Trigger 0.0	Diff 2.0		Vegative	Error	Invers	e (20 - 4mA)		
92.2 PSIg	0.0 Amps	Page 1	2 3 4	5	+			Menu		
Discharge Temp	Press Ratio	No S	9		Mainte	nance	Help			
210.9 °F	1.7	No	Alarm / Trips Present			llser A	CCASS	Log off		
		NO			oser A	Log on				
User : admin			Run Hours : 6			02,	/22/2024	02:45:26 PM		

Figure 20-6. Auxiliary I/O Screen (Page 4) – Analog Outputs PID Control

START	RESET	Suction Pressure 1			st	opped	26.2 Psig ∆		
		Analog Outputs							
STOP	DEMOTE	Aux 1	Aux 2		Aux 3	Aux 4	Aux 5		
STOP	REMOTE	Analog Aux Out 1							
		Standard Analog Input Aux			ary Analog In	put 📀 Calcu	llated Value		
Suction Setpoint	Oil Press Diff	Run Always			Control Method				
20.0 Psig	40.5 Psig	Active Input None -			Scalable Control				
Suction Press	Oil Filter Diff	 ✓ Trigger Analog Input Digital Input Calculated Value None Enable if above / ON 				Input	Output (mA)		
46.2 Psig	NA				Minimum	4.0	4.0		
Suction Temp	Oil Temp				Maximum	20.0	20.0		
33 7 °E	100 / °E								
23.7 F	122.4 F								
Discharge Press	Motor Amperage	Trigger 0.0	Diff 2.0						
92 2 Deig									
52.2 FSIg	0.0 Amps	Page 1	2 3 4	5	+		Menu		
Discharge Temp	Press Ratio	No Scheduled Maintenanc				Maintenance	Help		
210.9 °F 1.8		No Alarm / Trips Present				liser Access	Log off		
						osci Access	Log of		
User : admin			Run Hours	5:6		02/22/2024	4 02:44:39 PM		

Figure 20-7. Auxiliary I/O Screen (Page 4) – Analog Outputs Scalable Control

Auxiliary IO Result Variables

Result Variable can be created by using available blocks i.e. Analog Variable Block, Decision Variable Block and Digital Variable Block. These blocks help to create a flow chart which have result variables. "Apply" button is to save the settings of each block. Based on the current block the next suitable block is enabled. To delete the block from the flow chart, the last item of the flow chart can be deleted on press of delete button.

Start Block

To start the execution of the flow chart, when "Compressor Running" the flow chart is executed when compressor is running with given interval in seconds. When Run Always, the flow chart is executed always irrespective of the state of the compressor. When Run Never, the flow chart is never executed. Tap Apply button once all properties are entered, to enable next block. Figure 20-8 shows the start block properties.

Analog Variable Block

It is the arithmetic analog output of the given analog inputs. The operation can be Average of two numbers, Addition, Subtraction, Multiplication, Division and Modulo operation. You must enter the variable name and tap the Apply button to enable the next block item. Figure 20-9 shows the properties of Analog Variable Block.

Decision Block

It is a comparative output of the given analog input and any constant value. The operation can be greater than equal, less than equals. You must enter the variable name and tap the Apply button to enable the next Block item. Figure 20-10 shows the properties of Decision Block box.

Digital Variable Block

It is the logical digital output of the given digital inputs. The operation can be AND, OR, NAND, NOR, EXOR, EXNOR. You must enter the variable name and tap the Apply button to enable the next block item. Figure 20-11 shows the properties of Digital Variable Block box.

Analog Safety Block

The analog variable inputs can be configured to simply monitor an input for informational purposes or used as a control input for the analog outputs. The analog inputs can also be configured to alarm, trip, and inhibit on specified values. Figure 20-12 shows the properties of Analog Safety Block box.

Digital Safety Block

It is the digital variable input you can configure to produce an alarm, a trip, and an inhibit on either a high or low input. You can view the input in the panel. Tap the Apply button to enable the next block item. Figure 20-13 shows the properties of Digital Safety Block box.



Figure 20-8. Auxiliary I/O Screen (Page 5) – Result Variables – Start Properties



Figure 20-9. Auxiliary I/O Screen (Page 5) – Result Variables – Analog Variable Block Properties



Figure 20-10. Auxiliary I/O Screen (Page 5) – Result Variables – Decision Block Properties


Figure 20-11. Auxiliary I/O Screen (Page 5) – Result Variables – Digital Variable Block Properties



Figure 20-12. Auxiliary I/O Screen (Page 5) – Result Variables – Analog Safety Block Properties



Figure 20-13. Auxiliary I/O Screen (Page 5) – Result Variables – Digital Safety Block Properties

Overview

Using the Condenser Control screen you can view and adjust condenser setpoint settings associated with condenser operation. This screen is active only if you have enabled the Condenser Control option from the Configuration screen, Page 2. When Condenser Control is running, a status icon appears on the bottom left corner of the Main screen to make the user aware of it. The Condenser Control operation allows the cycling of fans and pumps in order to maintain a specific condensing pressure. The five different steps in step control allow selection of fans, pumps and VFD in one or more steps. When a VFD is employed, VFD is allowed to reach maximum speed, if additional capacity is needed, the next fan or pump is turned on. The VFD modulates down and then once it is back up to 100% again, then the next fan or pump is turned on. This method allows the smoothest condenser control by spacing the VFD between the fan and pump steps, while maintaining a condenser pressure that matches the setpoint. Refer Figure 21-1 for reference.



Figure 21-1. Condenser Control Setpoints (Page 1)

Condenser Control Setpoints

Run Mode

With Run Mode option you can select different modes of operation for condenser control. The choices for selection are:

Run Never

The mode of operation by default. Condenser Control operation will not be performed when this mode is active.

Run With Comp

Automatic operation of condenser control selected when control of the condenser is required to only run when the compressor is running.

Run Always

Automatic operation of condenser control selected when control of the condenser is required to run even when the compressor is off.

Manual

Mode for controlling condenser operation manually. You can control the operation by manual stepping using an on/off toggle button at each step.

Condenser Pressure

This is a read only parameter and it displays the present value of condenser pressure.

Condenser Setpoint

This is the condenser pressure setpoint that needs to be maintained.

Upper Deadband

This is the condenser pressure setpoint, upper deadband value. No additional condenser capacity is added when the condenser is selected for automatic step control and the condenser pressure falls within this dead-band.

Lower Deadband

This is the condenser pressure setpoint, lower deadband value. Condenser capacity is not reduced when the condenser is selected for automatic step control and the condenser pressure falls within this dead-band.

Ambient Temp

This is a read-only parameter and it displays the present value of ambient temperature. This is displayed only when Ambient Sensor is enabled from Configuration screen.

Summer/Winter Auto Switch

When you enable this check box, you can switch profiles

automatically depending on the ambient temperature setpoint when Run Mode is "Auto". When ambient temperature falls below the ambient temperature setpoint, winter profile is used. Similarly when ambient temperature is above the ambient temperature setpoint, summer profile is used.

Switch Temp

This is the ambient temperature setpoint you can use for automatic switching of profile from summer to winter and vice-versa.

High-Low Speed Fan Delay

This is a time delay for the fan spin down you can configure in case of 2- speed motor/dual speed fan.

VFD Settings

This section is active only when Condenser VFD is not set to None in the Configuration screen. When a VFD Fan is used for condenser control operation, the speed of the VFD is controlled using PID algorithm.

P = Proportional (gain)

Used to adjust the fan speed action in direct proportion to the difference between the control setpoint and the process variable (SP - PV = error). The proportional term is a unitless quantity and is used for coarse adjustment. You should set this setpoint to the lowest value that gives adequate control system response. Increasing the proportional setting increases the control system's sensitivity to small process fluctuations and the tendency to hunt.

I = Integral (reset)

Used to adjust the capacity control action, integrating the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. This setpoint should be set high enough to prevent hunting but not too high or it will cause control system overshoot.

D = Derivative (rate)

Used to adjust the capacity control action, accounting for how fast the error is changing, positively or negatively.

Maximum Speed

This setpoint defines the maximum speed in percentage for Condenser VFD Fan at which it should run for continuous step delay time to increase condenser steps. E.g. let's say setpoint is kept at 95%. Then condenser VFD fan will have to run at speed of 95% or more to advance to next step. Maximum Speed can be set as 100%, which is when analog output (at which condenser VFD fan is connected) reaches to 20mA in its normal range of 4-20 mA.

Minimum Speed

This setpoint defines the minimum speed in percentage for Condenser VFD Fan at which it should run for continuous step delay time to decrease condenser steps. E.g. let's say setpoint is kept at 5%. Then condenser VFD fan will have to run at speed 5% or less to advance to next step. Minimum Speed can be set as 0%, which is when analog output (at which condenser VFD fan is connected) reaches 4mA in its normal range of 4-20 mA.

Profile Selection

Using Profile option, you can select two different output profiles for summer and winter. You can select different fans, pumps & VFD in five steps of step control table. With different profiles you can include/exclude water pumps in cold weather when summer/winter auto switch is enabled. This section is inactive if you have enabled Summer/Winter Auto Switch. Refer Figure 21-2 for reference.

START	DECET	Su	ction	Pressur	'e 1		St	topped	34	4.9 Psig ∆
START	RESET	Condense	r Con	trol						
		Se	tpoin	t		Max L	.imit		Min Lir	mit
STOP	REMOTE	Profile		Summer						
		Step Cont	rol							
Suction Setpoint	Oil Press Diff	Stens	Out	Out	Out	Out	VED	Step	Low	Control
20.0 Psig	94.0 Psig	steps	#1	#2	#3	#4	vrb	Delay	Fan	control
Suction Press	Oil Filter Diff	✓ Step 1	\checkmark	V				60 sec	Out #1	- OFF
54.9 Psig	NA	✓ Step 2		~	V			15 sec	Out #2	- OFF
Suction Temp	Oil Temp	✓ Step 3			V	v		15 sec	Out #3	- OFF
100.7 °F	102.5 °F	✓ Step 4				v	V	15 sec	Out #4	- OFF
		✓ Step 5	\checkmark	~	v			15 sec	None	- OFF
Discharge Press	Motor Amperage									
137.3 Psig	0.0 Amps	Page 1	2							Menu
Discharge Temp	Press Ratio		No Sci	neduled M	aintenar	ce	_	Maintena	nce	Help
105.3 °F	2.2		No.4	la sua / Tola	o Drocer			Licor Ac		Lon off
			No Alarm / Trips Present				User Acc	.055	Log off	
User : admin			F	tun Hours	5:0			03/12	2/2021	12:43:58 PM

Figure 21-2. Condenser Step Control (Page 2)

Step Control

Using Step Control screen you can setup the manner in which Fans, Pumps & VFD will be turned on/off. Fans & Pumps are connected on digital outputs Out #1 to Out #4. VFD Fan is connected on Analog Output. Each step can have a maximum of five outputs connected to it. You can enable each step depending on the check box you select.

When Run Mode is Auto and condenser pressure rises above the upper dead-band, the condenser step increments from Step 1 up to Step 5 and hence switching on/ off Pumps, Fans & VFD connected on outputs. This holds true when decreasing steps from Step 5 to Step 1 when condenser pressure falls below the lower dead-band.

Step Delay

With the Step Delay option you can set time delays between condenser steps. Condenser Pressure must be outside upper or lower dead-band continuously for delay time to increase or decrease condenser steps.

While in a VFD step, you can add an additional step only when VFD has reached its maximum speed setpoint and after that the delay timers are satisfied. Similarly in a VFD step, you can remove a step only when VFD has reached its minimum speed setpoint and after that the delay timers are satisfied.

Low Speed Fan

Allows steps to have option for time delay in case of fan spin down. Any of Out #1 to Out #4 can be selected as Low Speed Fan through combo box. For current step, The Low Speed Fan delay will only be considered if that output was not already ON and the current step number is Lower than the Previous Step Number. E.g.: Let's say Out #2 is selected as Low Speed Fan in Step 2. Before entering Step 2 if the step in execution was Step 3, 4 or 5, then when entered in Step 2 (Automatically or Manually) if the output selected as Low Speed Fan was Off then that output will turn on only after High to Low Speed Fan delay is satisfied unlike other outputs selected in that step turns on immediately once entered in that step. If the Previous Step in execution was Step 1 or we directly started from Step 2, then the High to Low Speed Fan delay will not be considered and that output will turn ON immediately once entered in that step.

The step delay timer will only start timing once the High to Low Speed Fan delay is satisfied. Note that, if the output selected as Low Speed Fan was already on then High to Low Speed Fan delay will not get considered.

Control

With this option you can turn any of the steps On/Off during Manual operation of Condenser Control. This button is active only when Run Mode selected is Manual. During Auto operation of Condenser Control, control button for active step will be "ON".

NOTE

In case of automatic or manual profile switch, if the step which was executing in previous profile is enabled in current profile, then it will continue its execution. Otherwise if that step is not enabled in current profile and if higher step is available then condenser control increase the step, otherwise if higher step is not available then condenser control will decrease the step.

How to Read a Parts List And Illustration

A parts list may consist of the following information:

- Item No.
 - Item number associated with the number shown in the parts illustration.
- Description
 - A description of the item.
- VPN
- VPN stands for Vilter[™] Part Number.

In the associated illustration, Item numbers are listed in a 11 o'clock format to make finding easier. Sub assemblies are noted by "." periods. For example, VPN 35197A is a sub assembly of VPN 1833G:

Description	VPN
FILTER, OIL (INCLUDES VPN 35197A)	1833G
.GASKET, OIL FILTER COVER	35197A

Since the Oil Filter Cover Gasket (VPN 35197A) is part of the Oil Filter (VPN 1833G), ordering the Oil Filter (VPN 1833G) will also include the Oil Filter Cover Gasket. Also note that the Oil Filter Cover Gasket can be ordered separately.

Vilter^{III} Aftermarket Parts Contact Information

Website	Copeland.com/Vilter or Vilter.com
E-mail	Parts.Vilter@Copeland.com
Fax	1-800-862-7788
Phone	1-800-862-2677

Section 22 • Parts





MicroVission - Main Enclosure Electrical Components

Item No.	Description	VPN
1	STANDOFF #6X6/32X3/4" STEEL METAL HEX	3485SP
2	SCREW 6-32NCX3/8 MACHINE RD HD GALV	2078B
3	(OPTIONAL) - DIGITAL INPUT / OUTPUT BOARD	3485D4
4	(OPTIONAL) - ANALOG INPUT BOARD - 8 INPUT	3485A8
5.1	MULTI I/O BOARD	3669MIO
5.2	240VAC VERSION OF MULTI I/O BOARD	3669MIO-240V
6	24VDC POWER SUPPLY -100 WATT	3669KPS
7	FUSE 2A	3669F
8.1	RELAY 2 POLE 120VAC	3669Z
8.2	RELAY 2 POLE 240VAC	3669Z-240V
9.1	SOCKET RELAY 2 POLE 120VAC	3669ZS
9.2	240V - SOCKET RELAY 2 POLE 240VAC	3669ZS-240V
10	TERMINAL BLOCK CDU 2.5 DECA DIN	3485TB
11	EMIFILTER	3485EMF
12	FERRITE BEAD CORE	3485FBC
13	EMERGENCY STOP SWITCH	3485H





Figure 22-2. MicroVission - SBC Assembly

MicroVission - SBC Assembly

Item No.	Description	VPN
1	CPU BOARD, BASEBOARD, MOUNTING PLATE, AND 10" DISPLAY (INCLUDES VPN 3669MCA + 3669MDA)	3669MLA
2	.CPU AND BASEBOARD	3669MCA
3	.DISPLAY ASSEMBLY (LESS CPU BOARD),10" INDOOR/OUTDOOR, AND MOUNTING PLATE	3669MDA
4	RESISTIVE TOUCHSCREEN 10"	3669J

Warranty Claim Processing

Process For Returning Products Covered By The Warranty

STEP 1. To return a product or part for warranty consideration, you will need to provide the original Copeland Industrial LP sales order number on all submitted documents.

For a parts warranty request, you will also need:

- To provide Copeland Industrial LP a detailed and accurate description of the issue.
- To provide Copeland Industrial LP a valid purchase order for the new part(s)—you must pay the freight.
- One copy of Return Merchandise Authorization (RMA) sent to you for your records.
- One copy of RMA sent to you to include in the return shipment of parts back to Copeland Industrial LP for warranty consideration.

STEP 2. Return the parts (freight prepaid) to:

COPELAND INDUSTRIAL LP 5555 South Packard Avenue Cudahy, WI 53110-8904

STEP 3. Upon receipt of the returned part(s), Copeland Industrial LP will complete a timely evaluation of the part(s).

STEP 4. You will be contacted with Copeland Industrial LP decision once the final report is completed.

STEP 5. If approved, the warranty will be credited (excluding freight) to your account. Copeland Industrial LP will retain the returned part(s) for final disposition. If a warranty request is not approved, you will be provided with a written response and the parts will be held for 30 days from the date of the response. After such time, Copeland Industrial LP reserves the right to dispose of the parts. If you wish to have the part(s) returned within the 30 days, you will need to contact Vilter[™] and the part(s) will be returned freight collect.

Procedure For Parts Not Manufactured By Copeland Industrial LP

Although Copeland Industrial LP does not provide any warranty for parts and products that are not manufactured by Copeland Industrial LP, Copeland Industrial LP does pass through any manufacturer's warranty to you (to the maximum extent permitted by the manufacturer). Copeland Industrial LP will work with you in facilitating your warranty claim with the manufacturer.

To facilitate your warranty claim for a third party, please follow the following four steps:

STEP 1. Determine if the part or product is within the original equipment manufacturer's warranty.

STEP 2. If the part or product is not a motor, send a description containing the specifications of the part/product and the alleged defect to:

Service.Vilter@Copeland.com.

If the part or product is a motor or starter, please complete the following form and return it to:

Service.Vilter@Copeland.com.

STEP 3. Copeland Industrial LP will communicate with you, if necessary, to ascertain additional information and will reasonably assist with the OEM to determine the part/product's warranty status.

STEP 4. For motor or starter claims, if the motor or starter falls within the OEM's warranty time frame:

- The motor or starter will need to be taken to a manufacturer approved shop for diagnosis. Copeland Industrial LP can help you locate motor shops in your area that are manufacturer approved. The shop will diagnose the root cause, submit a report to the OEM, and the motor OEM will make the determination of warranty coverage.
- If a warranty claim is approved, the OEM will either have the motor or starter repaired by the motor shop or send a new replacement motor to the site, depending on the OEM's warranty terms.



Motor and Other Third Party Components Warranty Procedure

Step 1: Determine if the part of product is within the original equipment manufacturer's warranty.

Step 2: If the part or product is not a motor, send a description containing the specifications of the part/product and the alleged defect to <u>Service.Vilter@Copeland.com</u>.

If the part or product is a motor or starter, please complete the following form and return it to <u>Service.Vilter@Copeland.</u> <u>com.</u>

Step 3: Copeland Industrial LP will communicate with you, if necessary, to ascertain additional information and will reasonably assist with the OEM to determine the part/product's warranty status.

Step 4: For motor or starter claims, if the motor or starter falls within the OEM's warranty time frame:

• The motor or starter will need to be taken to a manufacturer approved shop for diagnosis. Copeland Industrial LP can help you locate motor shops in your area that are manufacturer approved. The shop will diagnose the root cause, submit a report to the OEM, and the motor OEM will make the determination of warranty coverage.

• If a warranty claim is approved, the OEM will either have the motor or starter repaired by the motor shop or send a new replacement motor to the site, depending on the OEM's warranty terms.

Model:	Serial Number:	Manufacturer:	
Starter Type:	Run Hours:	Start Date:	
Soft Start Cross the Line VFD	Alignment Data Available: Lubrication Records Available: Vibration Report Available: Grease Type:	Yes, please include Yes, please include Yes, please include	No No No

Describe Motor Symptoms:

Unloading Schemes

The following table lists different types of Unloading Schemes provided for balancing Vilter Reciprocating Compressor's capacity to varying load requirements.

Туре	Unloaders
TYPE1	2, 4 or 6 cylinders with 50% unloading
TYPE2	4 cylinders with 25%, 50%, 75% unloading. Single cylinder on Unloader Output #1
TYPE3	6 or 12 cylinders with 33%, 66% unloading
TYPE4	8 or 16 cylinders with 25%, 50% unloading
TYPE5	8 or 16 cylinders with 25%, 50%, 75% unloading
TYPE6	4 or 8 cylinders with 50%, 100% unloading
TYPE7	6 or 12 cylinders with 33%, 66%, 100% unloading
TYPE8	6 or 12 cylinders with 17%, 33%, 50%, 66% unloading. Single cylinder on Unloader Output #1
TYPE9	6 or 12 cylinders with 17%, 33%, 50%, 66%, 83% unloading. Single cylinder on Unloader Output #1
TYPE10	7 cylinders with 29%, 57% unloading
TYPE11	Compressor with NO unloading
TYPE12	3 cylinders with 33% unloading
TYPE13	8 or 16 cylinders with 25%, 50%, 75%, 100% unloading
TYPE14	6 cylinders with 33%, 50%, 66% unloading. Single cylinder on Unloader Output #1
TYPE15	8 cylinders with 13%, 25%, 38%, 50%, 63%, 75% unloading. Single cylinder on Unloader Output #1 and Output #2
TYPE16	8 cylinders with 13%, 38%, 63% unloading. Single cylinder on Unloader Output #1
TYPE17	6 cylinders with 33%, 50%, 66% unloading. Single cylinder on Unloader Output #1
TYPE18	5 cylinders with 40%, 60% unloading. Single cylinder on Unloader Output #1
TYPE19	3 cylinders with 33%, 66% unloading. Single cylinder on Unloader Output #1 and Output #2
TYPE20	7 cylinders with 14%, 29%, 43%, 57% unloading. Single cylinder on Unloader Output #1

Table A-0. Unloading Schemes

Unloader Tables

The following tables provide the status of Unloader Outputs for each type of unloading scheme at every step.

Table A-1 T	vne 1 Unloader - C	vlinders 2 4 or	6 Unloading P	ercentage: 50% *
	ype i offioader e	ymuci 3, 2, 4, 0i	o omoading i	ciccillage. 50/0

% Load	Compressor Start Output	Unloader Output #1	% Unload
0 (OFF)	0	0	100
50	1	1	50
100	1	0	0

Table A-2. Type 2 Unloader - Cylinders: 4 Unloading Percentage:25%, 50%, 75% | Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	% Unload
0 (OFF)	0	0	0	100
25	1	1	1	75
50	1	0	1	50
75	1	1	0	25
100	1	0	0	0

Table A-3. Type 3 Unloader - Cylinders: 6 or 12 Unloading Percentage: 33%, 66% *

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	% Unload
0 (OFF)	0	0	0	100
33	1	1	1	66
66	1	0	1	33
100	1	0	0	0

Table A-4. Type 4 Unloader - Cylinders: 8 or 16 Unloading Percentage: 25%, 50% *

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	% Unload
0 (OFF)	0	0	0	100
50	1	1	1	50
75	1	0	1	25
100	1	0	0	0

* 0 = output OFF

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	Unloader Output #3	% Unload
0 (OFF)	0	0	0	0	100
25	1	1	1	1	75
50	1	0	1	1	50
75	1	0	0	1	25
100	1	0	0	0	0

Table A-5. Type 5 Unloader - Cylinders: 8, 16 Unloading Percentage: 25%, 50%, 75% *

Table A-6. Type 6 Unloader - Cylinders: 4 or 8 Unloading Percentage: 50%, 100%*

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	% Unload
0 (OFF)	0	0	0	100
0 (ON)	1	1	1	100
50	1	0	1	50
100	1	0	0	0

Table A-7. Type 7 Unloader - Cylinders: 6 or 12 Unloading Percentage: 33%, 66%, 100%*

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	Unloader Output #3	% Unload
0 (OFF)	0	0	0	0	100
0 (ON)	1	1	1	1	100
33	1	0	1	1	66
66	1	0	0	1	33
100	1	0	0	0	0

Table A-8. Type 8 Unloader - Cylinders: 6 or 12 Unloading Percentage: 17%, 33%, 50%, 66% | Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	Unloader Output #3 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	100
33	1	0	1	1	66
50	1	1	0	1	50
66	1	0	0	1	33
83	1	1	0	0	17
100	1	0	0	0	0

* 0 = output OFF

Table A-9. Type 9 Unloader - Cylinders: 6 or 12 Unloading Percentage: 17%, 33%, 50%, 66%, 83% Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	Unloader Output #3 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	100
17	1	1	1	1	83
33	1	0	1	1	66
50	1	1	0	1	50
66	1	0	0	1	33
83	1	1	0	0	17
100	1	0	0	0	0

Table A-10. Type 10 Unloader - Cylinders: 7 Unloading Percentage: 29%, 57% *

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	% Unload
0 (OFF)	0	0	0	100
43	1	1	1	57
71	1	0	1	29
100	1	0	0	0

Table A-11. Type 11 - Compressor with no Unloading *

% Load	Compressor Start Output
0 (OFF)	0
100	1

Table A-12. Type 12 Unloader - Cylinders: 3 Unloading Percentage: 33% *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	% Unload
0 (OFF)	0	0	100
66	1	1	33
100	1	0	0

* 0 = output OFF

% Load	Compressor Start Output	Unloader Output #1	Unloader Output #2	Unloader Output #3	Unloader Output #4	% Unload
0 (OFF)	0	0	0	0	0	100
0 (ON)	1	1	1	1	1	100
25	1	0	1	1	1	75
50	1	0	0	1	1	50
75	1	0	0	0	1	25
100	1	0	0	0	0	0

Table A-13. Type 13 Unloader - Cylinders: 8, 16 Unloading Percentage:
25%, 50%, 75%, 100% *

Table A-14. Type 14 Unloader - Cylinders: 6 Unloading Percentage: 33%, 50%, 66% Unloading - Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	Unloader Output #3 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	100
33	1	0	1	1	66
50	1	1	0	1	50
66	1	0	0	1	33
100	1	0	0	0	0

Table A-15. Type 15 Unloader - Cylinders: 8 Unloading Percentage: 13%, 25%, 38%, 50%, 63%, 75% Unloading - Single cylinder on Unloader Output #1 and Output #2 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (single cylinder)	Unloader Output #3 (double cylinder)	Unloader Output #4 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	0	100
25	1	1	1	1	1	75
37	1	0	1	1	1	63
50	1	0	0	1	1	50
62	1	0	1	0	1	38
75	1	0	0	0	1	25
87	1	0	1	0	0	13
100	1	0	0	0	0	0

* 0 = output OFF

Table A-16. Type 16 Unloader - Cylinders: 8 Unloading Percentage: 13%, 38%, 63% Unloading - Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	Unloader Output #3 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	100
37	1	1	1	1	63
62	1	1	0	1	38
87	1	1	0	0	13
100	1	0	0	0	0

Table A-17. Type 17 Unloader - Cylinders: 6 Unloading Percentage: 33%, 50%, 66% Unloading - Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	Unloader Output #3 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	100
33	1	0	1	1	66
50	1	1	0	1	50
66	1	0	0	1	33
100	1	0	0	0	0

Table A-18. Type 18 Unloader - Cylinders: 5 Unloading Percentage:40%, 60% | Single cylinder on Unloader Output #1 *

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	% Unload
0 (OFF)	0	0	0	100
40	1	1	1	60
60	1	0	1	40
100	1	0	0	0

* 0 = output OFF

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (single cylinder)	% Unload
0 (OFF)	0	0	0	100
33	1	1	1	66
66	1	0	1	33
100	1	0	0	0

Table A-19. Type 19 Unloader - Cylinders: 3 Unloading Percentage:33%, 66% Single cylinder on Unloader Output #1 and Output #2*

Table A-20. Type 20 Unloader - Cylinders: 7 Unloading Percentage: 14%, 29%, 43%, 57% Single cylinder on Unloader Output #1

% Load	Compressor Start Output	Unloader Output #1 (single cylinder)	Unloader Output #2 (double cylinder)	Unloader Output #3 (double cylinder)	% Unload
0 (OFF)	0	0	0	0	100
43	1	0	1	1	57
57	1	1	1	0	43
71	1	0	0	1	29
86	1	1	0	0	14
100	1	0	0	0	0

* 0 = output OFF

MicroVission Communication Table

Scope: MicroVission Programs – Version 1.1

NOTES:

- All ENUM variables are of INT (Integer) type
- All F-INT data types represent floating point values as INT types multiplied by 10
- All Pressures are in Psig
- All Temperatures are in Fahrenheit
- Modbus TCP addressing is PLC-style (Base 1) addressing
- On Error, Modbus TCP server only returns an error code of "Illegal Data Address"

- All registers returned (INT and F-INT) are 2 bytes long
- For Ethernet/IP, use INT data type and PLC-5 Word Range Read/Write MSG instructions
- Remote commands cannot be issued if the panel is in the "Remote Lock" mode
- Polling rates should not be less than 5 secs
- Writes to the MicroVission should only occur when a value needs to be changed
- Lower Range and Higher Range values mentioned are default values of MicroVission setpoints
- Users can modify Lower Range & Higher Range values from MicroVission Panel and accordingly maintain their own table

Ethernet IP Address	Modbus Address	Digital Inputs	Data Type	Value	Mode	Lower Range	Higher Range
N50:0	40001	Setpoint 1/2	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:1	40002	Remote Decrease	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:2	40003	Remote Increase	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:3	40004	Remote Start/Stop	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:4	40005	Low Oil Level	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:5	40006	High Level Shutdown	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:6	40007	Compressor Auxiliary	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:7	40008	Auxiliary 1	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:8	40009	Auxiliary 2	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:9	40010	Auxiliary 3	INT	0 = OFF, 1 = ON	Read	NA	NA
N50:10	40011	Auxiliary 4	INT	0 = OFF, 1 = ON	Read	NA	NA

Table B-1. Digital Inputs Block

Table B-2. Digital Outputs Block

Ethernet IP Address	Modbus Address	Digital Outputs	Data Type	Value	Mode	Lower Range	Higher Range
N51:0	40030	Oil Return Solenoid	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:1	40031	Unloader #4	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:2	40032	Unloader #3	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:3	40033	Unloader #2	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:4	40034	Unloader #1	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:5	40035	Trip	INT	0 = OFF, 1 = ON (ON when no Trip)	Read	NA	NA
N51:6	40036	Oil Crank Case Heater	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:7	40037	Compressor Start	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:8	40038	Remote Ready	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:9	40039	Auxiliary Output#1	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:10	40040	Auxiliary Output#2	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:11	40041	Auxiliary Output#3	INT	0 = OFF, 1 = ON	Read	NA	NA
N51:12	40042	Auxiliary Output#4	INT	0 = OFF, 1 = ON	Read	NA	NA

MicroVission Controller • Operation and Service Manual • Copeland • 35391MV V1.4

Appendix B • Communication Tables

Ethernet IP Address	Modbus Address	Analog Inputs	Data Type	Value	Mode	Lower Range	Higher Range
N52:0	40060	Process Control	F-INT		Read	NA	NA
N52:1	40061	Oil Temperature	F-INT		Read	NA	NA
N52:2	40062	Discharge Temperature	F-INT		Read	NA	NA
N52:3	40063	Suction Temperature	F-INT		Read	NA	NA
N52:4	40064	Filter Outlet Pressure	F-INT		Read	NA	NA
N52:5	40065	Filter Inlet Pressure	F-INT		Read	NA	NA
N52:6	40066	Oil Manifold Pressure	F-INT		Read	NA	NA
N52:7	40067	Discharge Pressure	F-INT		Read	NA	NA
N52:8	40068	Suction Pressure	F-INT		Read	NA	NA
N52:9	40069	Motor Amps	F-INT		Read	NA	NA
N52:10	40070	Auxiliary 1	F-INT		Read	NA	NA
N52:11	40071	Auxiliary 2	F-INT		Read	NA	NA
N52:12	40072	Auxiliary 3	F-INT		Read	NA	NA
N52:13	40073	Auxiliary 4	F-INT		Read	NA	NA
N52:14	40074	Auxiliary 5	F-INT		Read	NA	NA
N52:15	40075	Auxiliary 6	F-INT		Read	NA	NA
N52:16	40076	Auxiliary 7	F-INT		Read	NA	NA
N52:17	40077	Auxiliary 8	F-INT		Read	NA	NA

Table B-3. Analog Inputs Block

Table B-4. Analog Outputs Block

Ethernet IP Address	Modbus Address	Analog Outputs	Data Type	Value	Mode	Lower Range	Higher Range
N53:0	40100	Compressor VFD Speed	F-INT		Read	NA	NA
N53:1	40101	Standard Analog Output #1	F-INT		Read	NA	NA
N53:2	40102	Standard Analog Output #2	F-INT		Read	NA	NA
N53:3	40103	Standard Analog Output #3	F-INT		Read	NA	NA
N53:4	40104	Standard Analog Output #4	F-INT		Read	NA	NA
N53:5	40105	Standard Analog Output #5	F-INT		Read	NA	NA

Appendix B • Communication Tables

Ethernet IP Address	Modbus Address	Calculated Values	Data Type	Value	Mode	Lower Range	Higher Range
N54:0	40120	Filter Differential Pressure	F-INT		Read	NA	NA
N54:1	40121	Pressure Ratio	F-INT		Read	NA	NA
N54:2	40122	Oil Pressure Differential	F-INT		Read	NA	NA
N54:3	40123	Compressor VFD RPM	INT		Read	NA	NA
N54:4	40124	Compressor Run Load %	INT		Read	NA	NA

Table B-5. Calculated Values Block

Table B-6. Statuses Block

Ethernet IP Address	Modbus Address	Statuses	Data Type	Value	Mode	Lower Range	Higher Range
N55:0	40140	Anti-Recycle Time (Minutes)	INT		Read	NA	NA
N55:1	40141	Compressor Status	ENUM		Read	NA	NA
N55:2	40142	Alarm Status Word #1	WORD		Read	NA	NA
N55:3	40143	Alarm Status Word #2	WORD		Read	NA	NA
N55:4	40144	Warning Status Word #1	WORD		Read	NA	NA
N55:5	40145	Warning Status Word #2	WORD		Read	NA	NA
N55:6	40146	Trip Status Word #1	WORD		Read	NA	NA
N55:7	40147	Trip Status Word #2	WORD		Read	NA	NA
N55:8	40148	Trip Status Word #3	WORD		Read	NA	NA
N55:9	40149	Trip Status Word #4	WORD		Read	NA	NA
N55:10	40150	Current Run Mode	ENUM	0 = Idle 1 = Waiting 2 = Starting 3 = Manual 4 = Auto 5 = Remote Auto 6 = Remote Manual 7 = Remote Step Hold % 8 = Remote Ready (Idle) 9 = Direct I/O Auto 10 = Direct I/O Manual 11 = Direct I/O Step Hold % 12 = Auto Sequencing 13 = Sequencing Stand-by	Read	NA	NA
N55:11	40151	Status Message	WORD	Bit 0 = High Suction Pressure Bit 1 = High Discharge Pressure Bit 2 = Low Suction Pressure Bit 3 = High Motor Current Bit 4 = Auto Cycle Bit 5 = Run Permissive	Read	NA	NA
N55:12	40152	Remote Lock Mode	INT	0 = OFF, 1 = ON	Read	NA	NA
N55:13	40153	Runtime Hours (x1000)	INT		Read	NA	NA
N55:14	40154	Runtime Hours (1-999)	INT		Read	NA	NA

Alarm Status Words

Statuses: Alarm Status Word(s) – currently 17 alarms, so both Alarm Status Word 1 and 2 are used, with each position indicating an alarm:

MSB	LSB
[Bit 15, Bit 14, Bit 13 Bit 3, Bit 2, Bit 1, Bit 0]

Word 1	Word 2
Bit 0 = Low Suction Pressure Alarm	Bit 0 = Remote Comm Time out
Bit 1 = Low Process Temperature Alarm	Bit 1 = Unused
Bit 2 = Low Process Pressure Alarm	Bit 2 = Unused
Bit 3 = Low Suction Temperature Alarm	Bit 3 = Unused
Bit 4 = Low Crankcase Oil Temperature Alarm	Bit 4 = Unused
Bit 5 = Low Oil Pressure Diff. Alarm	Bit 5 = Unused
Bit 6 = Low Oil Level Alarm	Bit 6 = Unused
Bit 7 = High Discharge Pressure Alarm	Bit 7 = Unused
Bit 8 = High Discharge 2 Pressure Alarm	Bit 8 = Unused
Bit 9 = High Process Temperature Alarm	Bit 9 = Unused
Bit 10 = High Process Pressure Alarm	Bit 10 = Unused
Bit 11 = High Discharge Temperature Alarm	Bit 11 = Unused
Bit 12 = High Discharge 2 Temperature Alarm	Bit 12 = Unused
Bit 13 = High Crankcase Oil Temperature Alarm	Bit 13 = Unused
Bit 14 = High Filter Differential Pressure Alarm	Bit 14 = Unused
Bit 15 = High Motor Current Alarm	Bit 15 = Unused

Table B-7. Alarm Status Words

Warning Status Words

Statuses: Warning Status Word(s) – currently 20 warnings, so both Warning Status Word 1 and 2 are used, with each position indicating an alarm:

MSB	LSB
[Bit 15, Bit 14, Bit 13 Bit 3, Bit 2, Bit 1, Bit 0]	

Word 1	Word 2				
Bit 0 = Low Suction Pressure Warning	Bit 0 = Low Discharge 2 Pressure Warning				
Bit 1 = Low Process Temperature Warning	Bit 1 = Low Discharge 2 Temperature Warning				
Bit 2 = Low Process Pressure Warning	Bit 2 = Low Oil Filter In Pressure Warning				
Bit 3 = Low Suction Temperature Warning	Bit 3 = Low Oil Filter Out Pressure Warning				
Bit 4 = Low Crankcase Oil Temperature Start Warning	Bit 4 = Unused				
Bit 5 = Low Oil Level Warning	Bit 5 = Unused				
Bit 6 = High Discharge Pressure Warning	Bit 6 = Unused				
Bit 7 = High Discharge 2 Pressure Warning	Bit 7 = Unused				
Bit 8 = High Process Pressure Warning	Bit 8 = Unused				
Bit 9 = High Discharge Temperature Warning	Bit 9 = Unused				
Bit 10 = High Discharge 2 Temperature Warning	Bit 10 = Unused				
Bit 11 = High Crankcase Oil Temperature Warning	Bit 11 = Unused				
Bit 12 = High Filter Diff. Pressure Start Warning	Bit 12 = Unused				
Bit 13 = High Level Shutdown Warning	Bit 13 = Unused				
Bit 14 = Low Discharge Pressure Warning	Bit 14 = Unused				
Bit 15 = Low Discharge Temperature Warning	Bit 15 = Unused				

Table B-8. Warning Status Words

Trip Status Words

Statuses: Trip Status Word(s) – currently 48 trips, so all Trip Status Words 1, 2, 3 and 4 are used, with each position indicating an alarm:

MSB	LSB
[Bit 15, Bit 14, Bit 13 Bit 3, Bit 2, Bit 1, Bit 0]	

•	
Word 1	Word 2
Bit 0 = Low Suction Pressure Inhibit	Bit 0 = Low Discharge Temperature Inhibit
Bit 1 = Low Process Temperature Inhibit	Bit 1 = Low Discharge 2 Pressure Inhibit
Bit 2 = Low Process Pressure Inhibit	Bit 2 = Low Discharge 2 Temperature Inhibit
Bit 3 = Low Crankcase Oil Temperature Start Inhibit	Bit 3 = Low Oil Filter In Pressure Inhibit
Bit 4 = Low Oil Level Inhibit	Bit 4 = Low Oil Filter Out Pressure Inhibit
Bit 5 = Low Suction Temperature Inhibit	Bit 5 = Unused
Bit 6 = High Discharge Pressure Inhibit	Bit 6 = Unused
Bit 7 = High Discharge 2 Pressure Inhibit	Bit 7 = Unused
Bit 8 = High Process Pressure Inhibit	Bit 8 = Unused
Bit 9 = High Discharge Temperature Inhibit	Bit 9 = Unused
Bit 10 = High Discharge 2 Temperature Inhibit	Bit 10 = Unused
Bit 11 = High Crankcase Oil Temperature Inhibit	Bit 11 = Unused
Bit 12 = High Filter Differential Pressure Start Inhibit	Bit 12 = Unused
Bit 13 = Compressor Interlock Inhibit	Bit 13 = Unused
Bit 14 = High Level Shutdown Inhibit	Bit 14 = Unused
Bit 15 = Low Discharge Pressure Inhibit	Bit 15 = Unused

Table B-9. Trip Status Words (Words 1 & 2)

Word 3	Word 4
Bit 0 = Low Suction Pressure Trip	Bit 0 = Compressor Interlock Trip
Bit 1 = Low Process Temperature Trip	Bit 1 = False Start
Bit 2 = Low Process Pressure Trip	Bit 2 = Starter Shutdown Trip
Bit 3 = Low Suction Temperature Trip	Bit 3 = Remote Comm Time out
Bit 4 = Low Crankcase Oil Temperature Trip	Bit 4 = IO Comm Trip
Bit 5 = Low Oil Pressure Diff. Trip	Bit 5 = Low Discharge Pressure Trip
Bit 6 = Low Oil Level Trip	Bit 6 = Low Discharge Temperature Trip
Bit 7 = High Discharge Pressure Trip	Bit 7 = Low Discharge 2 Pressure Trip
Bit 8 = High Discharge 2 Pressure Trip	Bit 8 = Low Discharge 2 Temperature Trip
Bit 9 = High Process Pressure Trip	Bit 9 = Low Oil Filter In Pressure Trip
Bit 10 = High Discharge Temperature Trip	Bit 10 = Low Oil Filter Out Pressure Trip
Bit 11 = High Discharge 2 Temperature Trip	Bit 11 = Unused
Bit 12 = High Crankcase Oil Temperature Trip	Bit 12 = Unused
Bit 13 = High Filter Differential Pressure Trip	Bit 13 = Unused
Bit 14 = High Level Shutdown Trip	Bit 14 = Unused
Bit 15 = High Motor Amps Trip	Bit 15 = Unused

Table B-9. Trip Status Words (Words 3 & 4)

Ethernet IP Address	Modbus Address	Commands	Data Type	Value	Mode	Lower Range	Higher Range
N56:0	40170	Alarm Reset	INT	1 = Perform Reset	Read- Write	NA	NA
N56:1	40171	Active Remote Control	ENUM	0 = None (Local) 1 = Direct I/O 2 = Serial 3 = Ethernet	Read- Write	NA	NA
N56:2	40172	Remote Control Select	ENUM	0 = Auto Control 1 = Step Load / Unload 2 = Hold Capacity %	Read- Write	NA	NA
N56:3	40173	Auto Control Type	ENUM	0 = Suction Pressure (if enabled) 1 = Process Control (if enabled) 2 = Discharge Pressure (if enabled)	Read- Write	NA	NA
N56:4	40174	Remote Step Load	INT	1 - Load	Read- Write	NA	NA
N56:5	40175	Remote Step Unload	INT	1 - Unload	Read- Write	NA	NA
N56:6	40176	Capacity Hold %	INT	0-100	Read- Write	NA	NA
N56:7	40177	Active Setpoint	ENUM	1 = Setpoint 1 2 = Setpoint 2 (if enabled)	Read- Write	NA	NA
N56:8	40178	Start Command	INT	1 = Remote Auto 2 = Auto Sequencing 3 = Sequencing Stand-By	Read- Write	NA	NA
N56:9	40179	Stop Command	INT	1 = Stop	Read- Write	NA	NA
N56:10	40180	Auto-Cycle Enable/ Disable	INT	0 = Disable 1 = Enable	Read- Write	NA	NA
N56:11	40181	Pumpdown Enable/ Disable	INT	0 = Disable 1 = Enable	Read- Write	NA	NA
N56:12	40182	Pulldown Enable/ Disable	INT	0 = Disable 1 = Enable	Read- Write	NA	NA

Table B-10. Commands Block

NOTE

Commands: Start Command – starts the compressor in the currently active control mode. If anti-recycle time exists, this command will fail.

Ethernet IP Address	Modbus Address	Compressor Control Setpoints	Data Type	Value	Mode	Lower Range	Higher Range
N57:0	40200	Control Setpoint #1 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(-15.0, -100.0, -15.0)	(150.0, 300.0, 400.0)
N57:1	40201	Load Offset Setpoint #1 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(0.1, 0.1, 0.5)	(150.0, 300.0, 20.0)
N57:2	40202	Load Interval Setpoint #1 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 600, 5)
N57:3	40203	Unload Offset Setpoint #1 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(0.1, 0.1, 0.5)	(150.0, 300.0, 20.0)
N57:4	40204	Unload Interval Setpoint #1 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 600, 5)
N57:5	40205	Control Setpoint #2 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(-15.0, -100.0, -15.0)	(150.0, 300.0, 400.0)
N57:6	40206	Load Offset Setpoint #2 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(0.1, 0.1, 0.5)	(150.0, 300.0, 20.0)
N57:7	40207	Load Interval Setpoint #2 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 600, 5)
N57:8	40208	Unload Offset Setpoint #2 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(0.1, 0.1, 0.5)	(150.0, 300.0, 20.0)
N57:9	40209	Unload Interval Setpoint #2 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 600, 5)
N57:10	40210	IO Based Setpoint Control	INT	0 = Disable 1 = Enable	Read	NA	NA

Table B-11. Compressor Control Setpoints Block

Ethernet IP Address	Modbus Address	Auto Cycle	Data Type	Value	Mode	Lower Range	Higher Range
N58:0	40220	Start Setpoint #1 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(-15.0, -100.0, -15.0)	(150.0, 150.0, 400.0)
N58:1	40221	Start Delay Time Setpoint #1 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 300, 300)
N58:2	40222	Stop Setpoint #1 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(-15.0, -100.0, -15.0)	(150.0, 150.0, 400.0)
N58:3	40223	Stop Delay Time Setpoint #1 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 300, 300)
N58:4	40224	Start Setpoint #2 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(-15.0, -100.0, -15.0)	(150.0, 150.0, 400.0)
N58:5	40225	Start Delay Time Setpoint #2 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 300, 300)
N58:6	40226	Stop Setpoint #2 (Suction Press, Process Control, Discharge Press)	F-INT		Read- Write	(-15.0, -100.0, -15.0)	(150.0, 150.0, 400.0)
N58:7	40227	Stop Delay Time Setpoint #2 (Suction Press, Process Control, Discharge Press)	INT		Read- Write	(1, 1, 1)	(600, 300, 300)
N58:8	40228	Minimum Load Shutdown Timer	INT		Read- Write	(1, 1, 1)	(3600, 3600, 3600)
N58:9	40229	Minimum Load Shutdown Timer Enable/ Disable (Suction Press, Process Control, Discharge Press)	INT	0 = Disable 1 = Enable	Read		

Table B-12. Auto Cycle Block

Ethernet IP Address	Modbus Address	Stop Load & Force Unload	Data Type	Value	Mode	Lower Range	Higher Range
N59:0	40240	High Suction Pressure Stop Load Setpoint	F-INT		Read	NA	NA
N59:1	40241	High Discharge Pressure Stop Load Setpoint	F-INT		Read	NA	NA
N59:2	40242	Low Suction Pressure Stop Load Setpoint	F-INT		Read	NA	NA
N59:3	40243	High Motor Current Stop Load Setpoint	F-INT		Read	NA	NA
N59:4	40244	High Suction Pressure Force Unload Setpoint	F-INT		Read	NA	NA
N59:5	40245	High Discharge Pressure Force Unload Setpoint	F-INT		Read	NA	NA
N59:6	40246	Low Suction Pressure Force Unload Setpoint	F-INT		Read	NA	NA
N59:7	40247	High Motor Current Force Unload Setpoint	F-INT		Read	NA	NA
N59:8	40248	Unload Timer	INT		Read	NA	NA

Table B-13. Stop Load & Force Unload Block

Table B-14. Oil Control Block

Ethernet IP Address	Modbus Address	Oil Control	Data Type	Value	Mode	Lower Range	Higher Range
N60:0	40260	Oil Crankcase Heater Temperature	F-INT		Read	NA	NA

Table B-15. Compressor VFD Block

Ethernet IP Address	Modbus Address	Compressor VFD	Data Type	Value	Mode	Lower Range	Higher Range
N61:0	40270	VFD Gain (P)	F-INT		Read	NA	NA
N61:1	40271	VFD Reset (I)	F-INT		Read	NA	NA
N61:2	40272	VFD Rate (D)	F-INT		Read	NA	NA
N61:3	40273	VFD Interval	INT		Read	NA	NA
N61:4	40274	Minimum Speed (rpm)	INT		Read	NA	NA
N61:5	40275	Maximum Speed (rpm)	INT		Read	NA	NA

Table B-16. Pumpdown Block

Ethernet IP Address	Modbus Address	Pumpdown	Data Type	Value	Mode	Lower Range	Higher Range
N62:0	40280	Stop Pressure Setpoint #1	F-INT		Read-Write	-15.0	200.0
N62:1	40281	Stop Delay Time Setpoint #1 (seconds)	INT		Read-Write	1	60
N62:2	40282	Stop Pressure Setpoint #2	F-INT		Read-Write	-15.0	200.0
N62:3	40283	Stop Delay Time Setpoint #2 (seconds)	INT		Read-Write	1	60
N62:4	40284	Pumpdown Operation	INT	0 = Stop, 1 = Run	Read-Write		

Ethernet IP	Modbus	Pulldown	Data	Value	Mode	Lower	Higher
Address	Address	T dildowit	Туре	Value	Mode	Range	Range
N63:0	40290	Step Value (Suct. Press/ Proc Temp)	F-INT		Read-Write	0.0	10.0
N63:1	40291	Delay Per Step Hours (Suct. Press/Proc Temp)	INT		Read-Write	0	20
N63:2	40292	Delay Per Step Minutes (Suct. Press/Proc Temp)	INT		Read-Write	0	59
N63:3	40293	Stop Value (Suct. Press/ Proc Temp)	F-INT		Read-Write	-15.0	200.0
N63:4	40294	Auto Cycle Differential Start Offset (Suct. Press/ Proc Temp)	F-INT		Read-Write	1.0	20.0
N63:5	40295	Auto Cycle Differential Stop Offset (Suct. Press/ Proc Temp)	F-INT		Read-Write	1.0	20.0
N63:6	40296	Initiate Pulldown at Next Start / Every Start	INT	1 = Initiate Pulldown at Next Start, 2 = Initiate Pulldown at Every Start	Read-Write		

Table B-17. Pulldown Block

Table B-18. Alarms/Trips Block (Page 1) (1 of 2)

Ethernet IP Address	Modbus Address	Alarms/Trips (Page 1)	Data Type	Value	Mode	Lower Range	Higher Range
N65:0	40400	Low Suction Pressure Alarm Setpoint #1	F-INT		Read- Write	-15	300
N65:1	40401	Low Suction Pressure Trip Setpoint #1	F-INT		Read- Write	-15	300
N65:2	40402	High Discharge Pressure Alarm Setpoint #1	F-INT		Read		
N65:3	40403	High Discharge Pressure Trip Setpoint #1	F-INT		Read		
N65:4	40404	Low Process Temperature Alarm Setpoint #1	F-INT		Read- Write	-100	210
N65:5	40405	Low Process Temperature Trip Setpoint #1	F-INT		Read- Write	-100	210
N65:6	40406	High Process Temperature Alarm Setpoint #1	F-INT		Read- Write	-100	210
N65:7	40407	Low Suction Pressure Alarm Setpoint #2	F-INT		Read- Write	-15	300
N65:8	40408	Low Suction Pressure Trip Setpoint #2	F-INT		Read- Write	-15	300
N65:9	40409	High Discharge Pressure Alarm Setpoint #2	F-INT		Read		
N65:10	40410	High Discharge Pressure Trip Setpoint #2	F-INT		Read		
N65:11	40411	Low Process Temperature Alarm Setpoint #2	F-INT		Read- Write	-100	210

Ethernet IP Address	Modbus Address	Alarms/Trips (Page 1)	Data Type	Value	Mode	Lower Range	Higher Range
N65:12	40412	Low Process Temperature Trip Setpoint #2	F-INT		Read- Write	-100	210
N65:13	40413	High Process Temperature Alarm Setpoint #2	F-INT		Read- Write	-100	210
N65:14	40414	Low Process Pressure Alarm Setpoint #1	F-INT	(Currently Unused)	Read- Write	-15	300
N65:15	40415	Low Process Pressure Trip Setpoint #1	F-INT	(Currently Unused)	Read- Write	-15	300
N65:16	40416	High Process Pressure Alarm Setpoint #1	F-INT	(Currently Unused)	Read- Write	-15	350
N65:17	40417	High Process Pressure Trip Setpoint #1	F-INT	(Currently Unused)	Read- Write	-15	350
N65:18	40418	Low Process Pressure Alarm Setpoint #2	F-INT	(Currently Unused)	Read- Write	-15	300
N65:19	40419	Low Process Pressure Trip Setpoint #2	F-INT	(Currently Unused)	Read- Write	-15	300
N65:20	40420	High Process Pressure Alarm Setpoint #2	F-INT	(Currently Unused)	Read- Write	-15	300
N65:21	40421	High Process Pressure Trip Setpoint #2	F-INT	(Currently Unused)	Read- Write	-15	300

Table B-18. Alarms/Trips Block (Page 1) (2 of 2)

Appendix B • Communication Tables

Ethernet IP Address	Modbus Address	Alarms/Trips (Page 2)	Data Type	Value	Mode	Lower Range	Higher Range
N66:0	40430	Low Suction Temperature Alarm	F-INT		Read- Write	-100	210
N66:1	40431	Low Suction Temperature Trip	F-INT		Read- Write	-100	210
N66:2	40432	High Discharge Temperature Alarm	F-INT		Read	NA	NA
N66:3	40433	High Discharge Temperature Trip	F-INT		Read	NA	NA
N66:4	40434	Low Crankcase Oil Temperature - Start Alarm	F-INT		Read	NA	NA
N66:5	40435	Low Crankcase Oil Temperature - Start Trip	F-INT		Read	NA	NA
N66:6	40436	Low Crankcase Oil Temperature - Run Alarm	F-INT		Read	NA	NA
N66:7	40437	Low Crankcase Oil Temperature - Run Trip	F-INT		Read	NA	NA
N66:8	40438	High Crankcase Oil Temperature Alarm	F-INT		Read	NA	NA
N66:9	40439	High Crankcase Oil Temperature Trip	F-INT		Read	NA	NA

Table B-19. Alarms/Trips Block (Page 2)

Table B-20. Alarms/Trips Block (Page 3)

Ethernet IP Address	Modbus Address	Alarms/Trips (Page 3)	Data Type	Value	Mode	Lower Range	Higher Range
N67:0	40460	Low Oil Pressure Alarm	F-INT		Read	NA	NA
N67:1	40461	Low Oil Pressure Trip	F-INT		Read	NA	NA
N67:2	40462	High Filter Diff. Pressure - Start Alarm	F-INT		Read	NA	NA
N67:3	40463	High Filter Diff. Pressure - Start Trip	F-INT		Read	NA	NA
N67:4	40464	High Filter Diff. Pressure - Run Alarm	F-INT		Read	NA	NA
N67:5	40465	High Filter Diff. Pressure - Run Trip	F-INT		Read	NA	NA
N67:6	40466	High Motor Amps Alarm	F-INT		Read	NA	NA
N67:7	40467	High Motor Amps Trip	F-INT		Read	NA	NA

Table B-21. Timers Block (Page 1)

Ethernet IP Address	Modbus Address	Timers (Page 1)	Data Type	Value	Mode	Lower Range	Higher Range
N68:0	40500	Load Increase Start Delay (seconds)	INT		Read	NA	NA
N68:1	40501	Compressor Interlock Bypass (seconds)	INT		Read	NA	NA
N68:2	40502	Low Oil Pressure Diff. Bypass (seconds)	INT		Read	NA	NA
N68:3	40503	Low Crankcase Oil Temperature Changeover (seconds)	INT		Read	NA	NA
N68:4	40504	High Discharge Temperature Bypass (seconds)	INT		Read	NA	NA
N68:5	40505	High Filter Diff. Pressure Changeover (seconds)	INT		Read	NA	NA
N68:6	40506	High Motor Amps Bypass (seconds)	INT		Read	NA	NA
Ethernet IP Address	Modbus Address	Timers (Page 2)	Data Type	Value	Mode	Lower Range	Higher Range
------------------------	-------------------	--	-----------	-------	----------------	----------------	-----------------
N69:0	40520	Communication Failure Detect Timer (minutes)	INT		Read	NA	NA
N69:1	40521	Restart On Power Failure Timer (minutes)	INT		Read- Write	1	120
N69:2	40522	True Anti-Recycle Timer (minutes)	INT		Read- Write	6	60
N69:3	40523	Accumulative Anti-Recycle Timer (min- utes)	INT		Read- Write	6	60
N69:4	40524	Hot Starts per Hour	INT		Read- Write	1	10
N69:5	40525	Oil Recovery Solenoid Shutoff Delay (seconds)	INT		Read	NA	NA
N69:6	40526	Low Oil Level Alarm Delay (seconds)	INT		Read	NA	NA
N69:7	40527	Low Oil Level Trip Delay (seconds)	INT		Read	NA	NA

Table B-23. Configuration (Time) Block

Ethernet IP Address	Modbus Address	Configuration (Time)	Data Type	Value	Mode	Lower Range	Higher Range
N70:0	40600	Time – Hours	INT	(HH)	Read-Write	0	23
N70:1	40601	Time – Min	INT	(MM)	Read-Write	0	59
N70:2	40602	Time – Secs	INT	(SS)	Read-Write	0	59
N70:3	40603	Date – Year	INT	(YYYY)	Read-Write	1970	2037
N70:4	40604	Date – Month	INT	(1-12)	Read-Write	1	12
N70:5	40605	Date – Day	INT	(1-31)	Read-Write	1	31

Appendix B • Communication Tables

Ethernet IP Address	Modbus Address	Configuration (Other)	Data Type	Value	Mode	Lower Range	Higher Range
N71:0	N71:0 40610 No. of Cylinders $0 = 2 \text{ cyl}$ ENUM $0 = 2 \text{ cyl}$ 2 = 4 cyl 3 = 5 cyl 4 = 6 cyl 5 = 7 cyl 6 = 8 cyl		0 = 2 cyl 1 = 3 cyl 2 = 4 cyl 3 = 5 cyl 4 = 6 cyl 5 = 7 cyl	Read	NA	NA	
			-	6 = 8 cyl 7 = 12 cyl 8 = 16 cyl			
N71:1	40611	No. of Unloaders	ENUM	0 = No Unloader 1 = 1 Unloader, 33% 2 = 1 Unloader, 50% 3 = 2 Unloaders, 25, 50% 4 = 2 Unloaders, 25, 50, 75% 5 = 2 Unloaders, 29, 57% 6 = 2 Unloaders, 33, 66% 7 = 2 Unloaders, 40, 60% 8 = 2 Unloaders, 50, 100% 9 = 3 Unloaders, 13, 38, 63% 10 = 3 Unloaders, 14, 29, 43, 57% 11 = 3 Unloaders, 17, 33, 50, 66, 83% 12 = 3 Unloaders, 17, 33, 50, 66, 83% 13 = 3 Unloaders, 33, 50, 66% 15 = 3 Unloaders, 33, 66, 100% 16 = 4 Unloaders, 13, 25, 38, 50, 63, 75% 17 = 4 Unloaders, 25, 50, 75, 100%	Read	NA	NA
N71:2	40612	Suction Pressure Con- trol Available	INT	0 = No, 1 = Yes	Read	NA	NA
N71:3	40613	Suction Pressure Con- trol # of Setpoints	INT		Read	NA	NA
N71:4	40614	Process Control Avail- able	INT	0 = No, 1 = Yes	Read	NA	NA
N71:5	40615	Process Control # of Setpoints	INT		Read	NA	NA
N71:6	40616	Process Control Type	ENUM	0 = Temperature 1 = Pressure	Read	NA	NA

Table B-24. Configuration (Other) Block (1 of 2)

Ethernet IP Address	Modbus Address	Configuration (Other)	Data Type	Value	Mode	Lower Range	Higher Range
N71:7	40617	Discharge Pressure Control Available	INT	0 = No, 1 = Yes	Read	NA	NA
N71:8	40618	Discharge Pressure Con- trol # of Setpoints	INT	0 = No, 1 = Yes	Read	NA	NA
N71:9	40619	Restart On Power Failure	ENUM	0 = Always 1 = Never 2 = Timed 3 = Remote Lock Off 4 = Boot in Remote (Direct I/O)	Read- Write	NA	NA
N71:10	40620	Oil Monitoring	ENUM	0 = No Oil Filter Monitoring 1 = Only Oil Filter In 2 = Oil Filter In and Oil Filter Out	Read	NA	NA
N71:11	40621	Oil Level Trip Available	INT	0 = No, 1 = Yes	Read	NA	NA
N71:12	40622	Anti-Recycle	ENUM	0 = True Anti-Recycle 1 = Accumulative Anti-Recycle 2 = Hot Starts	Read	NA	NA
N71:13	40623	Compressor Sequencing	INT	0 = No, 1 = Yes	Read	NA	NA
N71:14	40624	Idle Time Trip	INT	0 = No, 1 = Yes	Read	NA	NA
N71:15	40625	On Communication Failure	ENUM	0 = Revert to Local Control 1 = Stop with Alarm	Read	NA	NA
N71:16	40626	Panel ID	INT		Read	NA	NA
N71:17	40627	Compressor VFD	INT	0 = Disable 1 = Enable	Read	NA	NA
N71:18	40628	Condenser Control Enabled	INT	0 = Disable 1 = Enable	Read	NA	NA

Table B-24. Configuration (Other) Block (continued) (2 of 2)

Table B-25. Trend Chart

	(1013)									
Ethernet IP Address	Modbus Address	Trend Chart	Data Type	Value	Mode	Lower Range	Higher Range			
N72:0	40650	Trend Files Location	ENUM	0 = Hard Disk 1 = USB Drive	Read	NA	NA			
N72:1	40651	Motor Current Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA			
N72:2	40652	Suction Pressure Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA			
N72:3	40653	Discharge Pressure Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA			
N72:4	40654	Oil Pressure Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA			

Ethernet IP Address	Modbus Address	Trend Chart	Data Type	Value	Mode	Lower Range	Higher Range
N72:5		Filter In Pressure Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:6		Filter Out Pressure Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:7		Suction Temperature En- abled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:8		Discharge Temperature Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:9		Oil Temperature Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:10		Process Control Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:11		Auxiliary Input #1 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:12		Auxiliary Input #2 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:13		Auxiliary Input #3 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:14		Auxiliary Input #4 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:15		Auxiliary Input #5 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:16		Auxiliary Input #6 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:17		Auxiliary Input #7 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:18		Auxiliary Input #8 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:19		Compressor Load Percent- age Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:20		Compressor VFD Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:21		Standard Analog Output #1 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:22		Standard Analog Output #2 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:23		Standard Analog Output #3 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:24		Standard Analog Output #4 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:25		Standard Analog Output #5 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:26		Virtual Input #1 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA

Table B-25. Trend Chart (2 of 3)

Appendix B • Communication Tables

Ethernet IP Address	Modbus Address	Trend Chart	Data Type	Value	Mode	Lower Range	Higher Range
N72:27		Virtual Input #2 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:28		Virtual Input #3 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:29		Virtual Input #4 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:30		Virtual Input #5 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:31		RV Input #1 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:32		RV Input #2 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:33		RV Input #3 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:34		RV Input #4 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:35		RV Input #5 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:36		RV Input #6 Enabled	INT	0 = Disabled 1 = Enabled	Read	NA	NA
N72:37		RV Input #7 Enabled		0 = Disabled 1 = Enabled	Read	NA	NA

Table B-25. Trend Chart (3 of 3)

Ethernet IP Address	Modbus Address	Compressor Scheduling	Data Type	Value	Mode	Lower Range	Higher Range
N73:0		Sunday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:1	40801	Sunday Event #1 Hour	INT		Read-Write	0	23
N73:2	40802	Sunday Event #1 Minute	INT		Read-Write	0	59
N73:3	40803	Sunday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:4	40804	Sunday Event #2 Hour	INT		Read-Write	0	23
N73:5		Sunday Event #2 Minute	INT		Read-Write	0	59
N73:6	40806	Sunday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:7	40807	Sunday Event #3 Hour	INT		Read-Write	0	23
N73:8	40808	Sunday Event #3 Minute	INT		Read-Write	0	59
N73:9	40809	Sunday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:10		Sunday Event #4 Hour	INT		Read-Write	0	23
N73:11	40811	Sunday Event #4 Minute	INT		Read-Write	0	59
N73:12	40812	Monday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:13	40813	Monday Event #1 Hour	INT		Read-Write	0	23
N73:14	40814	Monday Event #1 Minutes	INT		Read-Write	0	23
N73:15		Monday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:16	40816	Monday Event #2 Hour	INT		Read-Write	0	23
N73:17	40817	Monday Event #2 Minute	INT		Read-Write	0	59
N73:18	40818	Monday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:19	40819	Monday Event #3 Hour	INT		Read-Write	0	23
N73:20		Monday Event #3 Minute	INT		Read-Write	0	59
N73:21	40821	Monday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:22	40822	Monday Event #4 Hour	INT		Read-Write	0	23
N73:23	40823	Monday Event #4 Minute	INT		Read-Write	0	59
N73:24	40824	Tuesday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:25		Tuesday Event #1 Hour	INT		Read-Write	0	23
N73:26	40826	Tuesday Event #1 Minutes	INT		Read-Write	0	23
N73:27	40827	Tuesday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:28	40828	Tuesday Event #2 Hour	INT		Read-Write	0	23
N73:29	40829	Tuesday Event #2 Minute	INT		Read-Write	0	59
N73:30		Tuesday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:31	40831	Tuesday Event #3 Hour	INT		Read-Write	0	23
N73:32	40832	Tuesday Event #3 Minute	INT		Read-Write	0	59
N73:33	40833	Tuesday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:34	40834	Tuesday Event #4 Hour	INT		Read-Write	0	23
N73:35		Tuesday Event #4 Minute	INT		Read-Write	0	59
N73:36	40836	Wednesday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:37	40837	Wednesday Event #1 Hour	INT		Read-Write	0	23
N73:38	40838	Wednesday Event #1 Minutes	INT		Read-Write	0	23

Table B-26. Compressor Scheduling Block (1 of 3)

Ethernet IP Address	Modbus Address	Compressor Scheduling	Data Type	Value	Mode	Lower Range	Higher Range
N73:39	40839	Wednesday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:40		Wednesday Event #2 Hour	INT		Read-Write	0	23
N73:41	40841	Wednesday Event #2 Minute	INT		Read-Write	0	59
N73:42	40842	Wednesday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:43	40843	Wednesday Event #3 Hour	INT		Read-Write	0	23
N73:44	40844	Wednesday Event #3 Minute	INT		Read-Write	0	59
N73:45		Wednesday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:46	40846	Wednesday Event #4 Hour	INT		Read-Write	0	23
N73:47	40847	Wednesday Event #4 Minute	INT		Read-Write	0	59
N73:48	40848	Thursday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:49	40849	Thursday Event #1 Hour	INT		Read-Write	0	23
N73:50		Thursday Event #1 Minutes	INT		Read-Write	0	23
N73:51	40851	Thursday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:52	40852	Thursday Event #2 Hour	INT		Read-Write	0	23
N73:53	40853	Thursday Event #2 Minute	INT		Read-Write	0	59
N73:54	40854	Thursday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:55		Thursday Event #3 Hour	INT		Read-Write	0	23
N73:56	40856	Thursday Event #3 Minute	INT		Read-Write	0	59
N73:57	40857	Thursday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:58	40858	Thursday Event #4 Hour	INT		Read-Write	0	23
N73:59	40859	Thursday Event #4 Minute	INT		Read-Write	0	59
N73:60		Friday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:61	40861	Friday Event #1 Hour	INT		Read-Write	0	23
N73:62	40862	Friday Event #1 Minutes	INT		Read-Write	0	23
N73:63	40863	Friday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:64	40864	Friday Event #2 Hour	INT		Read-Write	0	23
N73:65		Friday Event #2 Minute	INT		Read-Write	0	59
N73:66	40866	Friday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:67	40867	Friday Event #3 Hour	INT		Read-Write	0	23
N73:68	40868	Friday Event #3 Minute	INT		Read-Write	0	59
N73:69	40869	Friday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:70		Friday Event #4 Hour	INT		Read-Write	0	23
N73:71	40871	Friday Event #4 Minute	INT		Read-Write	0	59
N73:72	40872	Saturday Event #1 Control Mode	ENUM		Read-Write	0	6
N73:73	40873	Saturday Event #1 Hour	INT		Read-Write	0	23
N73:74	40874	Saturday Event #1 Minutes	INT		Read-Write	0	23
N73:75		Saturday Event #2 Control Mode	ENUM		Read-Write	0	6
N73:76	40876	Saturday Event #2 Hour	INT		Read-Write	0	23
N73:77	40877	Saturday Event #2 Minute	INT		Read-Write	0	59

Table B-26. 0	Compressor	Scheduling	Block	(2 of 3)
---------------	------------	------------	-------	----------

Ethernet IP Address	Modbus Address	Compressor Scheduling	Data Type	Value	Mode	Lower Range	Higher Range
N73:78	40878	Saturday Event #3 Control Mode	ENUM		Read-Write	0	6
N73:79	40879	Saturday Event #3 Hour	INT		Read-Write	0	23
N73:80	40880	Saturday Event #3 Minute	INT		Read-Write	0	59
N73:81	40881	Saturday Event #4 Control Mode	ENUM		Read-Write	0	6
N73:82	40882	Saturday Event #4 Hour	INT		Read-Write	0	23
N73:83	40883	Saturday Event #4 Minute	INT		Read-Write	0	59
N73:84	40884	Comp Schedule Enable/Disable	INT	0 = Dis- able 1 = Enable	Read-Write		

Table B-26. Compressor Scheduling Block (3 of 3)

 Table B-27. Compressor Sequencing Block

Ethernet IP Address	Modbus Address	Compressor Sequencing	Data Type	Value	Mode	Lower Range	Higher Range
N74:0	40900	Control Mode	ENUM		Read	NA	NA
N74:1	40901	Control Setpoint (Suct. Press, Pro- cess, Disch. Press)	F-INT		Read	NA	NA
N74:2	40902	Start Offset	F-INT		Read	NA	NA
N74:3	40903	Stop Offset	F-INT		Read	NA	NA
N74:4	40904	Start Timer	F-INT		Read	NA	NA
N74:5	40905	Stop Timer	F-INT		Read	NA	NA

Ethernet IP Address	Modbus Address	Condenser Control	Data Type	Value	Mode	Lower Range	Higher Range
N75:0		Run Mode	ENUM	0 = Run Never 1 = Run With Comp 2 = Run Always 3 = Manual	Read-Write		
N75:1	40951	Summer Winter Profile	ENUM	0 = Summer 1 = Winter	Read-Write		
N75:2	40952	High to Low Speed Fan Delay (seconds)	INT		Read-Write	5	30
N75:3	40953	Condenser Setpoint	F-INT		Read-Write	100	150
N75:4	40954	Upper Deadband	F-INT		Read-Write	0.5	20
N75:5		Lower Deadband	F-INT		Read-Write	0.5	20
N75:6	40956	Switch Temp	F-INT		Read-Write	25	45
N75:7	40957	Summer/Winter Auto Switch Enabled	INT	0 = Disabled 1 = Enabled	Read-Write		
N75:8	40958	Condenser VFD Gain (P)	F-INT		Read-Write	0	10
N75:9	40959	Condenser VFD Reset (I)	F-INT		Read-Write	0	10
N75:10		Condenser VFD Rate (D)	F-INT		Read-Write	0	10
N75:11	40961	Condenser VFD Minimum Speed (%)	INT		Read-Write	0	20
N75:12	40962	Condenser VFD Maximum Speed (%)	INT		Read-Write	80	100
N75:13	40963	Step #1 Enabled (Summer, Winter)	INT	0 = Disabled 1 = Enabled	Read-Write		
N75:14	40964	Step #2 Enabled (Summer, Winter)	INT	0 = Disabled 1 = Enabled	Read-Write		
N75:15		Step #3 Enabled (Summer, Winter)	INT	0 = Disabled 1 = Enabled	Read-Write		
N75:16	40966	Step #4 Enabled (Summer, Winter)	INT	0 = Disabled 1 = Enabled	Read-Write		
N75:17	40967	Step #5 Enabled (Summer, Winter)	INT	0 = Disabled 1 = Enabled	Read-Write		
N75:18	40968	Step #1 Manual On/Off (Summer, Winter)	INT	0 = OFF 1 = ON	Read-Write		
N75:19	40969	Step #2 Manual On/Off (Summer, Winter)	INT	0 = OFF 1 = ON	Read-Write		
N75:20		Step #3 Manual On/Off (Summer, Winter)	INT	0 = OFF 1 = ON	Read-Write		
N75:21	40971	Step #4 Manual On/Off (Summer, Winter)	INT	0 = OFF 1 = ON	Read-Write		
N75:22	40972	Step #5 Manual On/Off (Summer, Winter)	INT	0 = OFF 1 = ON	Read-Write		

Table B-28. Condenser Control Block

Ethernet IP Address	Modbus Address	Virtual Inputs and Result Variables	Data Type	Value	Mode	Lower Range	Higher Range
N76:0		Virtual Digital Input #1	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
N76:1	41001	Virtual Digital Input #2	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
N76:2	41002	Virtual Digital Input #3	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
N76:3	41003	Virtual Digital Input #4	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
N76:4	41004	Virtual Digital Input #5	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
N76:5		Virtual Analog Input #1	INT		Read-Write	0	1000
N76:6	41006	Virtual Analog Input #2	INT		Read-Write	0	1000
N76:7	41007	Virtual Analog Input #3	INT		Read-Write	0	1000
N76:8	41008	Virtual Analog Input #4	INT		Read-Write	0	1000
N76:9	41009	Virtual Analog Input #5	INT		Read	0	1000
N76:10		Result Variable Digital Input #1	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:11	41011	Result Variable Digital Input #2	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:12	41012	Result Variable Digital Input #3	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:13	41013	Result Variable Digital Input #4	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:14	41014	Result Variable Digital Input #5	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:15		Result Variable Digital Input #6	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:16	41016	Result Variable Digital Input #7	INT	0 = OFF, 1 = ON	Read	NA	NA
N76:17	41017	Result Variable Analog Input #1	F-INT		Read	NA	NA
N76:18	41018	Result Variable Analog Input #2	F-INT		Read	NA	NA
N76:19	41019	Result Variable Analog Input #3	F-INT		Read	NA	NA
N76:20		Result Variable Analog Input #4	F-INT		Read	NA	NA
N76:21	41021	Result Variable Analog Input #5	F-INT		Read	NA	NA
N76:22	41022	Result Variable Analog Input #6	F-INT		Read	NA	NA
N76:23	41023	Result Variable Analog Input #7	F-INT			NA	NA

Table B-29. Virtual Inputs and Result Variables Block

NOTE

- **Compressor Scheduling Enable/Disable:** if a valid schedule has not been defined (on screen or through communications), this command will fail.
- Compressor Scheduling Control Mode ENUM values:
 - 0 = Unscheduled
 - 1 = Suction Pressure SP1
 - 2 = Suction Pressure SP2
 - 3 = Process Control SP1
 - 4 = Process Control SP2
 - 5 = Discharge Pressure SP1
 - 6 = Discharge Pressure SP2
- If the control mode being set isn't active in the configuration, the command will result in error. This value can be changed only when the schedule is disabled
- Compressor Scheduling Hour INT This value can be changed only when the schedule is disabled
- Compressor Scheduling Minute INT This value can be changed only when the schedule is disabled

Introduction

This document provides the guidelines to successfully communicate and integrate with the MicroVission control panel.

Networking

The MicroVission supports two different hardware networks:

- Ethernet: Supporting Modbus TCP and Ethernet IP protocols
- RS485: Supporting serial Modbus RTU protocol

Communication Wire

For any communication network to work properly, you must use a proper wire.

Ethernet Cable Specifications

For Ethernet communication, we recommend to use the Category 6 cable. Many installations now use gigahertz switches, and category 6 provides greater immunity to signal crosstalk.

RS-422/485 Cable Specifications

We recommend you following cables for RS-422/485 serial communications.

Although you may elect to use other cables, a low capacitance (less than 15 pF/ft.) is important for high-speed digital communication links. The cables listed below are all 24-gauge, 7x32 stranded, with 100-ohm nominal impedance and a capacitance of 12.5 pF/ft.

Select from the following four-pair, three-pair, and twopair cables, depending on your application needs. All will yield satisfactory results. We recommend you to choose a cable with one more pair than your application requires.

Use one of the extra wires, rather than a shield, for the common.

Four-Pair

- Belden P/N 8104 (with overall shield)
- Belden P/N 9728 (individually shielded)
- Belden P/N 8164 (individually shielded with overall shield)
- Manhattan P/N M3477 (individually shielded with overall shield)
- Manhattan P/N M39251 (individually shielded with overall shield)

Communication							
Active Remote Control	Ethernet		On Communication Failure				
✓ Direct I/O			Revert to Local Control				
Auto Control			✓ Serial (Modbus RTU)				
Oligital) Manual Cont	trol		Node Address	1			
Cap Hold Control	None		Port	P12/RS485			
			Baud Rate	9600 -			
✓ Ethernet			Data Bits	8			
IP Address	192.168.1.12		Stop Bits	• 1 2			
Subnet Mask	255.255.255.0		Parity	Even -			
Gateway	192.168.1.1		VNC Account				
Protocol	Modbus TCP -		New Password				
Node Address	1		Verify New Password				
Compressor Seque	ncing		Port Number	5900			
Page 1 2 3	4 5 6]	Apply Close				
	Figure C-1.	Configura	ntion Screen (Page 3	3)			

Appendix C • Remote Control and Monitoring



Figure C-2. Serial Communication Ports on Single Board Computer

Three-Pair

- Belden P/N 8103 (with overall shield)
- Belden P/N 9730 (individually shielded)
- Belden P/N 8163 (individually shielded with overall shield)
- Manhattan P/N M3476 (individually shielded with overall shield)
- Manhattan P/N M39250 (individually shielded with overall shield)

Two-Pair

- Belden P/N 8102 (with overall shield)
- Belden P/N 9729 (individually shielded)
- Belden P/N 8162 (individually shielded with overall shield)
- Manhattan P/N M3475 (individually shielded with overall shield)
- Manhattan P/N M39249 (individually shielded with overall shield)

Common Register Setup to Control the MicroVission (Compressor Control) Via Communications

Register Setup and Control Scenario

First, place the MicroVission panel in **REMOTE** mode before the sending the Compressor Control commands (Registers 40170 through 40182).

To do this, tap the **START** button on the Main page and then the **REMOTE** button, see Figure C-3.

Modbus Register 40171 - Active Remote Control

Reading this register can be used to verify the Active Remote Control mode, which was previously setup from the Configuration screen. Writing to this register can change the Active Remote Control mode, however this is not common.

- 0 = None (internal local setpoints will be used to control the compressor)
- 1 = Direct I/O (hardwired control via digital inputs. Refer to wiring diagram)
- 2 = Serial (serial communications via RS485 Modbus RTU)
- 3 = Ethernet (Modbus TCP or Ethernet IP communications)

Appendix C • Remote Control and Monitoring



Figure C-3. Setting MicroVission in Remote Mode

Typically, the following registers are setup (written to) before a "START" command is given to the compressor.

Modbus Register 40172 - Remote Control Select

- 0 = Auto Control: If you select Auto Control, the MicroVission will control compressor capacity from its internal Control Setpoints.
- 1 = Pulse Load / Unload: If you select Pulse Load / Unload, the MicroVission will control compressor load from contents of Remote Step Load register 40174 and Remote Step Unload register 40175.
- 2 = Hold Capacity %: If you select Capacity Hold , the MicroVission will control compressor capacity from contents of Capacity Hold % register 40176.

If you select Hold Capacity, then it is necessary to write a Capacity Hold value to register 40176 before the compressor is started, typically 0% to prevent the compressor from loading immediately.

Modbus Register 40176 - Capacity Hold %

Value = 0-100

Cap Hold Operation without VFD

The Capacity Hold % value defines the capacity for the compressor to operate at. The MicroVission loads the steps based on the Capacity Hold % value provided in the range of 0% - 100%. Refer to Figure C-4 for reference.

For example, if the number of Unloaders configured in Configuration screen is 4 (25%, 50%, 75%, 100%), then Load Steps would be 0%, 25%, 50% & 75%. Progress Bar on Main screen should display capacity at which the compressor is currently operating. The rules of capacity hold algorithm are:

- If Capacity Hold % value is greater than or equal to (Next Load Step % - Offset), step is added. When Capacity Hold % value is above 20% (25 – 5), then compressor operates at 25% capacity and Progress Bar should be loaded at 25%, refer Figure C-4. When Capacity Hold % value is above 45% (50 – 5), then compressor would operate at 50% capacity and progress bar should be loaded at 50%. When Capacity Hold % value is above 70% (75 – 5), then compressor would operate at 75% capacity and progress bar should be loaded at 75%. When Capacity Hold % value is above 95% (100 – 5), then compressor would operate at 100% capacity and progress bar should be loaded at 100%.
- 2. If Capacity Hold % value is less than or equal to (Previous Load Step % + Offset), step is removed. When Capacity Hold % value is below 80% (75 + 5), then compressor operates at 75% capacity and progress bar should be loaded at 75%. When Capacity Hold % value is below 55% (50 + 5), then compressor operates at 50% capacity and progress bar should be loaded at 50%. When Capacity Hold % value is below 30% (25 + 5), compressor would operate at 25% capacity and progress bar should be loaded at 25%. When Capacity Hold % value is below 5% (0 + 5), then compressor would operate at 0% capacity and progress bar should be loaded at 0%.
- If Capacity Hold % value varies within the range of (Previous Load Step % + Offset) and (Next Load Step % - Offset), then compressor capacity would not vary and would stay at current step. When Capacity Hold % value is greater than 30% (25 + 5) and lesser than 45% (50 - 5), then compressor operates at 50% capacity and progress bar should be loaded at 50%.

NOTE

Offset is used at Load Step % and is 5%.

NOTE

Once Compressor is Loading or Unloading a step, next step is allowed to Load or Unload respectively only after 5 seconds.

Cap Hold Operation With VFD

Using a VFD with a compressor requires considering the VFD capacity as part of the entire capacity of the compressor. When Capacity Hold % value is varied from 0% to 50% compressor capacity is varied based on unloader steps and when Capacity Hold % value is varied from 50% to 100%, compressor capacity is varied based on the VFD speed. Hence, the unloader steps are considered the first 1/2 of the total capacity and VFD is considered as the other ½ of the total capacity. When a VFD is employed, the normal control method is to first move the steps from 0% - 100% (i.e. first ½ of the total capacity) and when additional capacity is still required, then the VFD speed is ramped up from 0% - 100% (i.e. other ½ of the total capacity) When capacity needs to be removed from the system, first VFD speed is ramped down till 0% and then unloader steps are removed. Refer to Figure C-5 for reference.

For example, If the number of Unloaders configured in Configuration screen is 4 (25%, 50%, 75%, 100%), then Load Steps would be 0%, 25%, 50% & 75%. Progress bar on Main screen should display the total capacity at which the compressor is currently operating. The rules of capacity hold algorithm with VFD are:

1. If Capacity Hold % value is greater than or equal to ((Next Load Step % - Offset) / 2), step is added. When Capacity Hold % value is above 10% ((25 - 5) / 2), then unloader steps would be loaded at 25% and progress bar should be loaded at 12% (25 / 2), refer Figure C-5. When Capacity Hold % value is above 22.5% ((50 – 5) / 2), then unloader steps would be loaded at 50% and progress bar should be loaded at 25% (50 / 2). When Capacity Hold % value is above 35% ((75 - 5) / 2), then unloader steps would be loaded at 75% and progress bar should be loaded at 37% (75 / 2). When Capacity Hold % value is above 47.5% ((100 - 5) / 2), then unloader steps would be loaded at 100 % and progress bar should be loaded at 50% (100 / 2) i.e. ½ of the total capacity. Once unloader steps are loaded to 100%, it constitutes ½ of the total capacity (i.e. 50%), then if Capacity Hold % value goes above 50%, VFD speed will start ramping up and progress bar should be loaded at Capacity Hold % value. For example, when Capacity Hold % is set to 75%, then unloader steps would be loaded at 100% & VFD Speed would be set at 50% (VFD Output at 12 mA) and progress bar should be loaded at 75% ((100 + 50) / 2). VFD Speed would be at maximum (VFD Output at 20 mA) when Capacity Hold % value is set at 100%.

- 2. If Capacity Hold % value is varied from 100% to 50%, VFD speed would be ramped down from 100% till 0%. VFD Speed would be at minimum (VFD Output at 4 mA) when Capacity Hold % value is set at 50%. If Capacity Hold % value goes below 50%, then unloader steps will start getting removed. If Capacity Hold % value is less than or equal to ((Previous Load Step % + Offset) / 2), step will be removed. When Capacity Hold % value is below 40% ((75 + 5) / 2), then unloader steps would be loaded at 75% and progress bar should be loaded at 37% (75 / 2). When Capacity Hold % value is below 27.5% ((50 + 5) / 2), then unloader steps would be loaded at 50% and progress bar should be loaded to 25% (50 / 2). When Capacity Hold % value is below 15% ((25 + 5) / 2), then unloader steps would be loaded at 25% and progress bar should be loaded at 12% (25 / 2). When Capacity Hold % value is below 2.5% ((0 + 5) / 2), then unloader steps would be loaded at 0% and progress bar should be loaded at 0%.
- 3. If Capacity Hold % value varies within the range of ((Previous Load Step % + Offset) / 2) and ((Next Load Step % - Offset) / 2), then unloader step would not vary and would stay at current step. When Capacity Hold % value is greater than 15% ((25 + 5) / 2) and lesser than 22.5% ((50 - 5) / 2), then unloader steps would be loaded at 50% and progress bar should be loaded at 25% (50 / 2). This is only applicable when Capacity Hold % value is varying from 0% to 50%.

Modbus Register 40177 - Active Setpoint

This register is used in conjunction with Register 40172 = 0, Auto Control mode.

- 1 = Setpoint #1 Active
- 2 = Setpoint #2 Active (note: you must enable two setpoints from Configuration screen first).

Sometimes compressors are switched from Suction Pressure control mode to Process Temp control mode or vice versa. This can be done via communications using the following register.

Modbus Register 40173 - Auto Capacity Control Type

- 0 = Suction Pressure (if enabled from Configuration screen)
- 1 = Process Temp (if enabled from Configuration screen)
- 2 = Discharge Pressure (if enabled from Configuration screen)

Compressor Start and Stop Commands

Modbus Register 40178 – Start Command

• 1 = Start Compressor in Remote Auto Mode

Two (2) minute Remote mode time-out timer

Once the compressor has been started in Remote Auto mode using the Start Compressor Command, a 2 - minute timer starts. If no further communication takes place to the MicroVission within 2 minutes, the MicroVission is placed in Local Auto mode, a yellow banner is displayed on the MicroVission indicating that a "Remote Comm Time-out" occurred, and the Event List will get populated with a time-stamped "Remote Comm Time-out" event.

Modbus Register 40179 - Stop Command

• 1 = Stop Compressor Command

MicroVission panel will remain in Remote (Idle) mode after a Stop Compressor command has been given.

START	RESET	Suction Pressure 1	Remote	(Cap Hold)	-4.0 % Δ
JIANI			[Anti-Recycle	47:28
STOP	REMOTE	10 SOLENDID VALVE		Remote Lock Out	OFF
Remote Setpoint	Oil Press Diff	3 70 SOLENOD VALVE			
21.0 %	165.9 Psig				
Suction Press	Oil Filter Diff				
4.7 Psig	NA	TO SOLENDID VALVE			
Suction Temp	Oil Temp				
77.2 °F	111.0 °F				
Discharge Press	Motor Amperage				
180.8 Psig	4.3 Amps	25%		Me	enu
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance	Help
193.3 °F	10.1	No Alarm / Trips Present		User Access	Log off
User : admin		Run Hours : 5		04/22/2021	01:33:33 AM

Figure C-4. Remote Cap Hold without Compressor VFD

START	DESET	Suction Pressure 1	Remote	e (Cap Hold)	-1.0 % Δ
STANT				Anti-Recycle	0:00
STOP	REMOTE	10 SOLENDID VALVE		Remote Lock Out	OFF
Remote Setpoint 11.0 %	Oil Press Diff 165.9 Psig				
Suction Press	Oil Filter Diff				
4.7 Psig	NA	TO SOLENOID VALVE			
Suction Temp	Oil Temp	(2) (6)			
77.4 °F	111.0 °F				
Discharge Press	Motor Amperage				
180.8 Psig	4.3 Amps	12%		Me	nu
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance	Help
193.3 °F	10.1	No Alarm / Trips Present		User Access	Log off
User : admin		Run Hours : 5		04/22/2021	01:37:31 AM

Figure C-5. Remote Cap Hold with Compressor VFD

Remote Control via Direct I/O (Hard-wired)

Remote Control of the compressor can also be accomplished using hard-wired inputs. These include Remote Start-Stop digital input, Remote Increase digital input and Remote Decrease digital input. For communication register information, refer to Appendix B: Communication Table.

Configuration Screen Setup

Refer to Figure C-1. Configuration screen (Page 3).

For Direct I/O control:

- Configure the "Active Remote Control" drop-down box to "Direct I/O". This selection activates the Remote Start-Stop digital input. This is the only selection that activates the Remote Start-Stop digital input.
- Below the "Active Remote Control" selection box, select the "Direct I/O" check box.

Now, radio-buttons for selecting the desired control method are available:

- Auto Control
- (Digital) Manual Control Compressor Capacity controlled via Remote Increase and Remote Decrease Digital Inputs.
- Cap Hold Control Compressor Capacity controlled via Remote Capacity % Analog Input.

Auto Control

The compressor starts or stops based on the status of Remote Start/Stop Digital Input, but the compressor capacity is controlled from the internal compressor control setpoints entered in the MicroVission. You can enable or disable the Auto-cycle setpoints as required.

(Digital) Manual Control

The compressor starts or stops based on the status of Remote Start/Stop Digital Input, but the compressor capacity is controlled from the Remote Increase and Remote Decrease Digital Inputs.

Cap Hold Control

The compressor starts and stops based on the status of Remote Start/Stop Digital Input, but the compressor capacity is controlled from an Auxiliary Analog Input. The Auxiliary Analog Input value will be proportional to 0% - 100% capacity hold value. Auxiliary Analog Input range can be configured using I/O jumper selection settings in Instrument Calibration screen, refer Figure C-8. For instance, 4mA = 0%, 12mA = 50%, and 20mA = 100%.

Cap Hold Operation without VFD

The Remote Capacity % (Aux Analog Input value) defines the capacity for the compressor to operate at. The MicroVission loads the steps based on the Remote Capacity % value provided in the range of 0% - 100%.

For example, If the number of Unloaders configured in Configuration screen is 4 (25%, 50%, 75%, 100%), then Load Steps would be 0%, 25%, 50% & 75%. Progress bar on Main screen should display capacity at which the compressor is currently operating. The rules of capacity hold algorithm are:

- If Remote Capacity % value is greater than or equal to (Next Load Step % - Offset), step will be added. When Remote Capacity % value is above 20% (25 – 5), then compressor will operate at 25% capacity and progress bar should be loaded at 25%, refer Figure C-6. When Remote Capacity % value is above 45% (50 – 5), then compressor would operate at 50% capacity and progress bar should be loaded at 50%. When Remote Capacity % value is above 70% (75 – 5), then compressor would operate at 75% capacity and progress bar should be loaded at 75%. When Remote Capacity % value is above 95% (100 – 5), then compressor would operate at 100% capacity and progress bar should be loaded at 100%.
- 2. If Remote Capacity % value is less than or equal to (Previous Load Step % + Offset), step will be removed. When Remote Capacity % value is below 80% (75 + 5), then compressor will operate at 75% capacity and progress bar should be loaded at 75%. When Remote Capacity % value is below 55% (50 + 5), then compressor will operate at 50% capacity and progress bar should be loaded at 50%. When Remote Capacity % value is below 30% (25 + 5), compressor would operate at 25% capacity and progress bar should be loaded at 25%. When Remote Capacity % value is below 5% (0 + 5), then compressor would operate at 0% capacity and progress bar should be loaded at 0%.
- 3. If Remote Capacity % value varies within the range of (Previous Load Step % + Offset) and (Next Load Step % Offset), then compressor capacity would not vary and would stay at current step. When Remote Capacity % value is greater than 30% (25 + 5) and lesser than 45% (50 5), then compressor will operate at 50% capacity and progress bar should be loaded at 50%.

NOTE

Offset is used at Load Step % and is 5%.

NOTE

Once Compressor is Loading or Unloading a step, next step would be allowed to Load or Unload respectively only after 5 seconds.

Cap Hold Operation With VFD

Using a VFD with a compressor requires considering the VFD capacity as part of the entire capacity of the compressor. When Remote Capacity % value is varied from 0% to 50% compressor capacity is varied based on unloader steps and when Remote Capacity % value is varied from 50% to 100%, compressor capacity is varied based on the VFD speed. Hence the unloader steps are considered the first ½ of the total capacity and VFD is considered as the other ½ of the total capacity. When a VFD is employed, the normal control method is to first move the steps from 0% - 100% (i.e. first ½ of the total capacity) and when additional capacity is still required, then the VFD speed is ramped up from 0% - 100% (i.e. other ¹/₂ of the total capacity). When capacity needs to be removed from the system, first VFD speed is ramped down till 0% and then unloader steps are removed.

For example, If the number of Unloaders configured in Configuration screen is 4 (25%, 50%, 75%, 100%), then Load Steps would be 0%, 25%, 50% & 75%. Progress bar on s Screen should display the total capacity at which the compressor is currently operating. The rules of capacity hold algorithm with VFD are:

- 1. If Remote Capacity % value is greater than or equal to ((Next Load Step % - Offset) / 2), step will be added. When Remote Capacity % value is above 10% ((25 - 5) / 2), then unloader steps would be loaded at 25% and progress bar should be loaded at 12% (25 / 2), refer Figure C-7. When Remote Capacity % value is above 22.5% ((50 - 5) / 2), then unloader steps would be loaded at 50% and progress bar should be loaded at 25% (50 / 2). When Remote Capacity % value is above 35% ((75 – 5) / 2), then unloader steps would be loaded at 75% and progress bar should be loaded at 37% (75 / 2). When Remote Capacity % value is above 47.5% ((100 – 5) / 2), then unloader steps would be loaded at 100 % and progress bar should be loaded at 50% (100 / 2) i.e. ½ of the total capacity. Once unloader steps are loaded to 100%, it constitutes ½ of the total capacity (i.e. 50%), then if Remote Capacity % value goes above 50%, VFD speed will start ramping up and progress bar should be loaded at Remote Capacity % value. For example, when Remote Capacity % is set to 75%, then unloader steps would be loaded at 100% & VFD Speed would be set at 50% (VFD Output at 12 mA) and progress bar should be loaded at 75% ((100 + 50) / 2). VFD Speed would be at maximum (VFD Output at 20 mA) when Remote Capacity % value is set at 100%.
- 2. If Remote Capacity % value is varied from 100% to 50%, VFD speed would be ramped down from 100% till 0%. VFD Speed would be at minimum (VFD Output at 4 mA) when Remote Capacity % value is set at 50%. If Remote Capacity % value goes below 50%, then unloader steps will start getting removed. If Remote Capacity % value is less than or equal to ((Previous Load Step % + Offset) / 2), step will be removed. When Remote Capacity % value is below 40% ((75 + 5) / 2), then unloader steps would be loaded at 75% and progress bar should be loaded at 37% (75 / 2). When Remote Capacity % value is below 27.5% ((50 + 5) / 2), then unloader steps would be loaded at 50% and progress bar should be loaded to 25% (50 / 2). When Remote Capacity % value is below 15% ((25 + 5) / 2), then unloader steps would be loaded at 25% and progress bar should be loaded at 12% (25 / 2). When Remote Capacity % value is below 2.5% ((0 + 5) / 2), then unloader steps would be loaded at 0% and progress bar should be loaded at 0%.
- 3. If Remote Capacity % value varies within the range of ((Previous Load Step % + Offset) / 2) and ((Next Load Step % - Offset) / 2), then unloader step would not vary and would stay at current step. When Remote Capacity % value is greater than 15% ((25 + 5) / 2) and lesser than 22.5% ((50 - 5) / 2), then unloader steps would be loaded at 50% and progress bar should be loaded at 25% (50 / 2). This is only applicable when Remote Capacity % value is varying from 0% to 50%.



Figure C-6. Direct IO Cap Hold without Compressor VFD

START	RESET	Suction Pressure 1	Direct I/O (Cap Hold)	-1.3 % Δ
JIANI	NESCI		Anti-Recycle	0:00
STOP	REMOTE	TO SOLENOID VALVE	Remote Lock Out	OFF
Remote Setpoint	Oil Press Diff	TO SOLENOID VALVE		
10.8 %	165.8 Psig			
Suction Press	Oil Filter Diff			
4.7 Psig	NA	TO SOLENOID VALVE		
Suction Temp	Oil Temp	2 6		
77.2 °F	110.8 °F			
-				
Discharge Press	Motor Amperage			
180.8 Psig	4.3 Amps	12%	м	enu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenance	Help
193.0 °F	10.1	No Alarm / Trips Present	User Access	Log off
User : admin		Run Hours : 5	04/22/202	1 01:21:31 AM

Figure C-7. Direct IO Cap Hold with Compressor VFD

START	DESET	Suction Pr	essure 1	st	topped		8.6 Psig ∆
START	NES ET	Auxiliary Inputs					
		Aux 1: Analog Au	Aux 2: Remote C.	Aux 3: A	Analog Au	Aux 4	: Analog Au
STOP	REMOTE	I/O	Device Calibratio	n			
		A/D bit Value	Units		Min	1	Max
Suction Setpoint	Oil Press Diff	3423	Percent				
20.0 Psig	142.1 Psig	Calibrated Value	Channel Calibrat	ion			
Suction Press	Oil Filter Diff	79.9 %	Offset	Range			
28.6 Psig	NA		Adjustment	I/O Jumper Selection			
Suction Temp	Oil Temp			4ma - 2	20ma		
77.4 °F	111.0 °F		Total Offset	Min		Max	
			0.0 %	4.0 ma		20.0	ma
Discharge Press	Motor Amperage						
203.1 Psig	0.0 Amps						
		Page 1 2 3	3 4 5 6	5			Menu
Discharge Temp	Press Ratio	No Sched	luled Maintenance		Maintena	nce	Help
193.3 °F	5.0	No Alar	m / Trips Present	User Access Log off			
User : admin		Run	Hours : 13		04/24	2021	01:52:00 AM

Figure C-8. Analog Auxiliary Input (Remote Capacity %) Settings- Calibration Screen

Control Scenario

Once the Configuration screen is configured to the desired type of Digital I/O control, the MicroVission needs to be placed in REMOTE mode. To do this, tap the green color START button on the Main page, and then tap the REMOTE button.

The Remote Start-Stop input now becomes active. The state of the Remote Enable Output should be determined by the controlling device. When it is determined to be ON, then the controlling device can energize the Remote Start-Stop input. After the compressor starts, then the compressor capacity is controlled by the selected option. To restart the compressor after a power failure, refer to Restart on Power Failure options available in the Configuration screen.

Remote Monitoring

It should be noted that while the compressor is being controlled (starting, stopping and load control) via hard-wired inputs, monitoring of compressor operating parameters can also be carried out by using the communication ports available in the MicroVission. Remote monitoring can be accomplished by utilizing either the Ethernet communication port (via Ethernet IP or Modbus TCP/IP) or the serial port (via RS485 Modbus RTU). For communication register information, refer to Appendix B: Communication Table.

Communication Port Setup

See Figure C-1. Configuration screen (Page 3).

For Serial Port Modbus RTU Monitoring

- Check the "Serial" box inside the "Communications" section.
- Configure serial port settings (baud rate, # data bits, # stop bits, parity) and panel ID number (which is "node" number for Modbus RTU).

For Ethernet Monitoring

- Check the "Ethernet" box inside the "Communications" section.
- Configure IP address and Subnet Mask.
- Select Protocol (Ethernet IP or Modbus TCP/ IP)

Once the port is setup properly, communication can be established. You will be able to read from and write to registers. In Direct I/O mode, you cannot write to registers in the Control Block region of Modbus registers 40170 through 40182.

NOTE

If you see Figure C – 9. Ethernet Port Detection Failure message on Main screen. Please turn off the panel and wait for 10 sec. and then turn on the panel.



Figure C-9. Ethernet Port Detection Failure Message - Home Screen

MicroVission Compressor Sequencing Setup

Scope

MicroVission programs – version 1.2 and later.

Overview

Compressor sequencing in the MicroVission panel is carried out by utilizing the Ethernet communication port using TCP protocol.

Compressor sequencing is accomplished by every compressor, monitoring its own control parameter (either suction pressure, process temperature). As its control parameter changes value, it will make decisions based on the own priority and status of other compressors configured in sequencing to start, stop, load and unload the compressor as needed, to maintain the control setpoint which is defined in the Compressor Sequencing screen. The following explanation is provided taking into consideration that the physical ethernet network has been installed between all MicroVission panels.

Configuration Overview

Setup Of Compressor For Sequencing

Logon to the Compressor and navigate to the Compressor Sequencing screen, Page 1. You can setup compressors for sequencing from Equipment List. Options under Equipment List are populated depending on devices shown in Device List screen of Compressor Sequencing menu.

START	RESET	Suction Pressure 1	w	aiting	-7.0	-7.0 Psig ∆	
START	neset	Compressor Sequencing					
	The second second	Equipment	IP Addr	ess Pr	iority	Status	
STOP	REMOTE	Compl	192.16	8.1.95 1		1	
		Comp2	192.16	8.1.96 2		C	
Auto Seq Setpoint	Oil Press Diff	Comp3	192.16	8.1.97 3		\checkmark	
22.0 Psig	58.8 Psig	None		9			
Suction Press	Oil Filter Diff	None		0			
15.0 Psig	NA	None					
Suction Temp	Oil Temp	None					
39.7 °F	119.0 °F	None					
		None					
Discharge Press	Motor Amperage	None					
93.2 Psig	2.0 Amps	Page 1 2 3 4				Menu	
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance		Help	
127.0 °F	3.6	No Alarm / Trips Present		User Access	Le	og off	
User : admin		Run Hours : 7		07/09/202	20 11	:56:18 AM	

Figure D-1. Setup of Compressor for Loading and Unloading Compressors (Page 1)

Compressor Sequencing Menu Setup

The compressor loads and unloads itself based on the control settings that are set in Compressor Sequencing Setpoints (see Figure D-2) and Compressor Control Setpoints menu (see Figure D-3).

With Page 2 of the Compressor Sequencing screen (see Figure D-2), you can view and adjust compressor sequencing settings. The pressure / temperature control setpoints, Start/Stop offset and Start/Stop timers to accomplish sequencing control are defined here:

- 1. Suction Pressure / Process Temperature Setpoint
- 2. Start Offset
- 3. Start Timer
- 4. Stop Offset
- 5. Stop Timer
- 6. Compressor Sequencing Control Mode

Suction Pressure / Process Temperature

• Compressor Sequencing Algorithm modifies Compressor Capacity to maintain the Suction Pressure / Process Temperature at this value.

Start Offset

 Defines the offset from pressure/temperature control setpoint to start Compressor. If suction pressure / process temperature goes above start offset setpoint and highest priority compressor is loaded fully then sequencing algorithm allows starting of second highest priority compressor according to Start Timer and load to cater increasing load requirements. The lead (highest priority) compressor should not wait to meet this condition (i.e should bypass this settings).

Start Timer

• Provides delay to start the next compressor in sequencing. In start/load sequence if suction pressure/ process temperature goes above start offset then it is monitored for start time period.

Stop Offset

 Defines the offset from control setpoint to stop compressor. If suction pressure / process temperature goes below this setpoint value, then it allows to stop the compressor if it is not the highest priority compressor. The lead (highest priority) compressor should not stop in the sequencing if Suction Pressure/ process temperature drops below (Setpoint – Stop Offset).

STADT	DESET	Suction Pressu	ire 1	Auto S	eq	53.4 Psig ∆	
START	REDET	Compressor Sequenc	ing				
STOP	REMOTE	Sequencing Control Mode • Suction Pressure Process Control Suction Pressure Control					
Auto Can Categolat		Setpoint	22.0 Psig				
22 0 Peig	21 6 Peig	Start Offset	6.0 Psig	Start Timer	90	sec	
22.0 PSig	21.0 PSig	Stop Offset	6.0 Psig	Stop Timer	90	sec	
Suction Press	Oil Filter Diff	Process Temperature (Process Temperature Control				
75.4 Psig	NA	Setpoint	25.0 °F				
Suction Temp	Oil Temp	Start Offset	6.0 °F	Start Timer	90	sec	
469.1 °F	125.2 °F	Stop Offset	6.0 °F	Stop Timer	90	0 sec	
Discharge Press	Motor Amperage	1					
106.4 Psia	6.2 Amps						
		Page 1 2 3	4			Menu	
Discharge Temp	Press Ratio	No Scheduled I	Maintenance	Mai	ntenance	Help	
237.0 F	1.5	No Alarm / Tri	ps Present	Use	r Access	Log off	
User : admin		Run Hou	rs : 0		07/03/2021	02:39:31 AM	

Figure D-2. Compressor Sequencing Control Setpoints (Page 2)

Stop Timer

• Provides delay to stop the next compressor in sequencing. In unload/stop sequence if Suction Pressure/ Process Temperature goes below Stop Offset then it will be monitored for stop time period.

Compressor Sequencing Control Mode

• Defines the control mode for compressor sequencing.

NOTE

Load / Unload offset setpoint and Load / Unload Interval settings refer from Compressor Control screen (see Figure D-3).

Users below security level 2 (Supervisor) are not allowed to edit the sequencing settings.

Example:

Compressor Sequencing Setpoints:

Pressure control setpoints for setpoint 22 psig,

Suction Pressure setpoint = 22 psig Start Offset = 6 psig Start Timer = 10 sec Stop Offset = 6 psig Stop Timer = 10 sec **Compressor Control Setpoints:** Load Offset = 2 psig Load Interval = 20 sec Unload Offset = 2 psig Unload Interval = 20 sec

Assumptions:

Compressor Sequencing Table on Page 1 has below settings.

Equipment	uipment IP Address		Status
Comp1	192.168.1.95	1	>
Comp2	192.168.1.96	2	\checkmark

START	DESET	Suction Pressure 1	Stopped	2.8 Psig Δ
START	RESET	Compressor Control		
STOP	REMOTE	Setpoint Max	Limit	Min Limit
		Suction Pressure Control		
Suction Set Point	Oil Press Diff		Setpoint 1	Setpoint 2
20.0 Psig	107.1 Psig	Pressure Control Setpoint	20.0 Psig	24.0 Psig
Suction Press	Oil Filter Diff	Load Offset	1.5 Psig	0.5 Psig
22.8 Psig	30.0 "Ha	Load Interval	5 sec	5 sec
	All 7	Unload Offset	1.5 Psig	0.5 Psig
69.2 °F	117 2 °E	Unload Interval	5 sec	5 sec
05.2 1	11/.2			
Discharge Press	Motor Amperage			
203.1 Psig	0.0 Amps	Page 1 2 3 4 5 (5	Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance	Mainten	ance Help
55.2 °F	5.8	No Alarm / Trips Present	User Ac	cess Log off
User : admin		Run Hours : 0	01/2	29/2019 02:24:53 PM

Figure D-3. Compressor Control Menu Setup (Load & Unload Setpoints) (Page 1)

- The above compressor sequencing settings are in sync with all connected compressors (in example it is Comp1 and Comp2).
- Comp1 started in Auto Sequencing mode and Comp2 started in auto sequence standby.
- Both the compressors are waiting for its turn showing status as green checked mark (i.e. "Ready to Run").

Suction pressure currently = 18 psig, it is below start offset defined above. The sequencing will start.Comp1 would start in auto sequence and run at minimum step/ load without monitoring start offset condition for start time period.

Now assume suction pressure currently = 30 psig, Highest priority compressor (comp1) will start loading according to load offset and load Interval defined in Compressor Control menu of Comp1. As suction pressure is above suction pressure control setpoint, compressor will load fully. Once Comp1 is loaded fully, Comp2 will get its turn and starts monitoring start pressure against start offset for start time period then starts running in auto sequencing. Comp2 will load according to load Interval settings defined in Compressor Control Menu.

Suction pressure currently = 17 psig, it is less than suction control setpoint, so program will start unloading first lowest priority compressor (i.e. Comp2) according to unload Interval defined in Compressor Control Menu of Comp2. Once it is unloaded Comp2 will be running at minimum load, checking for further drop/ rise of suction pressure. Comp1 will be in fully loaded state.

Suction pressure currently = 12 psig, it is less than stop offset, so program will start monitoring suction pressure for stop time period (i.e.10 sec) and once it is elapsed Comp2 will shut off. It will go in "Auto Seq Standby" Mode showing status as "Ready to Run". If suction pressure is still below stop offset then Comp1 will not be allowed to STOP as it is the highest priority compressor in the sequencing. It will be running in Auto sequence with minimum load.

Compressor Sequencing Equipment List

With the first page of the Compressor Sequencing screen, you can view and adjust settings that are used for sequencing the compressors, see Figure D-1.

Equipment

• This label is updated depending on devices shown in Page 3 of Devices List. This contains names of all the compressors in the network communicating with the compressor. Equipment name is automatically updated when new device is added from Page 3.

Examples of acceptable unique names:

- comp1, comp2, etc.
- **IP Address**
- This label is updated depending on devices shown in Page 3 of Devices List. This contains IP Address of all the compressors in the network communicating with the compressor. IP Address is automatically updated when new device added from Page 3 or when new fresh device is added the sequencing network.

Priority

• Options of this combo box are updated depending on number of devices shown in Page 3 of Devices List. This defines priorities of compressors on the network. This priority decides the sequence order in which compressors will be turned on and off during sequence cycle. The lower the priority number, the greater is the priority of the compressor. You should choose the priorities of the compressors.

Example:

"1" is highest priority.

Compressor with priority "2" has higher priority than compressor with priority "4".

You can configure all settings for a compressor and set the priority to 0, so that it won't be a part of sequencing steps. If you decide to turn on this compressor by setting non-zero, then it is considered for the next load / unload cycle.

NOTE

Setting a compressors priority to 0 while it is running in Auto Sequencing mode puts the respective compressor into local Auto mode. This feature is used to add / remove compressors to/from sequence table when running in auto sequence mode. You can put the compressor back into Auto Sequence mode for sequencing. Simply, tap Start->Auto Seq on the compressor.

Status

• It is status Symbols shown on the Compressor Sequencing screen. It shows the status of compressors, see Table D-1.

NOTE

Before configuring the Compressor Sequencing table on one of the compressors, log on to compressors one by one and set the IP address, Compressor Name from Configuration screen and tap the Apply button to save the changes and then select the Compressor sequencing check box from the Configuration screen Page 3. Now, log on to one of the compressors and check if devices are available in the device list. Else, add other compressors from Device List screen Page 3 of Compressor Sequencing screen. After adding, configure compressors from Equipment List table in Page 1. Once the devices are added and configured in the table, then same settings will be synced with all compressors configured in table. User can view and modify the compressor sequencing settings from any compressor which are configured in table. Now, go to compressors one by one, then put each Compressor in Seq Stand-By mode and start sequencing by tapping Auto Seq button from one of the Compressors. Before tapping Auto Seg button make sure other compressors are in Standby mode.

Table D-1. Status Symbols

Symbol	Description
-	Default, if compressor is not configured in sequencing table.
?	Compressor is configured in sequencing table but is not configured in "Auto Seq- Standby" mode or is not detected in network or control mode is not correct or sequencing table configuration is not correct or Compressor is waiting in Anit- recycle or Run Permissive.
~	Compressor configured in sequencing table and is in ready to run state. You'll normally see this icon when you have initiated Compressor Sequencing on the compressor by pressing the green Unit Start button and then the Auto Seq button or Seq Standby button.
	Compressor is running with Alarm / Load Limit condition.
8	Compressor is in Error Condition.
П	Compressor running at full load without any error or running with partial load without any error.
C	Compressor is under active control (loading/unloading steps).
↓	Compressor running into its stop timer, will be stopped.
$\overline{\mathbf{h}}$	Compressor is next in sequence for unloading.
1	Compressor running into its start timer, will be started.

Configuring Sequencing Table On Compressor

Compressor name in Equipment is updated when new device is added from Device List Page 3.

Assign Priority for the compressor.

You can start auto sequencing (from the any one of the compressors). Tap the green START button and then the "Auto Seq" button. Before you start Auto Sequence, first start other compressors in Auto Seq Standby mode. For this, select the green START button and then the "Seq Stand-By" button.

Walk-Through Of Sequencing Loading And Unloading

(Assume Suction Pressure Control)

Example:

Pressure control setpoints for setpoint 22 psig,

Comp Sequencing Control Mode – Suction Pressure

Suction pressure control setpoint = 22 psig

Start Offset = 6 psig

Start Timer = 90 sec

Stop Offset = 6 psig

Stop Timer = 90 sec

Compressor Control screen settings:

Load Offset = 2 psig

Load Interval = 20 sec

Unload Offset = 2 psig

Unload Interval = 20 sec

Priority settings:

Compressor Sequencing Table on Page 1 has below settings.

Equipment	IP Address	Status	
Comp1	192.168.1.95	1	?
Comp2	192.168.1.96	2	?
Comp3	192.168.1.97	3	?

Sequencing Loading mode operates in the following way:

Once table is configured and, Comp2 and Comp3 are placed in auto seq stand-by mode by tapping "Seq Stand-By" button from start menu, then start sequencing by pressing "Auto Seq" button in Comp1. Refer Figure D-4.

START	DECET	Auto Seq Stand-by			-7.0 Psig ∆	
START	REJET	Compressor Sequencing				
STOP REMOTE		Equipment	IP Address		/ Status	
		Compl	192.168.1.95	1	• 🗸	
		Comp2	192.168.1.96	2	• 🗸	
Auto Seq Setpoint	Oil Press Diff	Comp3	192.168.1.97	3	• 🗸	
22.0 Psig	58.8 Psig	None				
Suction Press	Oil Filter Diff	None		0		
15.0 Psig	NA	None		0	-	
Suction Temp	Oil Temp	None				
39.5 °F	118.8 °F	None				
ż		None				
Discharge Press	Motor Amperage	None				
93.0 Psig	2.0 Amps	Page 1 2 3 4			Menu	
Discharge Temp	Press Ratio	No Scheduled Maintenance Maintenance			Help	
126.8 °F	3.6	No Alarm / Trips Present		ess	Log off	
User : admin		Run Hours : 7	07/09	/2020	10:51:26 PM	

Figure D-4. Compressor(s) Started in Sequencing (Page 1)

NOTE

"1" is highest priority.

Compressor with priority "2" has higher priority than compressor with priority "3".

The Comp1 (being highest priority device) program monitors its suction pressure value.During load cycle when suction is below the configured start offset value (22+6 = 28 psig), then also the Comp1 starts running in auto sequencing mode with the minimum step (bypassing this setpoint) and start loading compressor Comp1 according to load offset and load interval when suction press goes above setpoint(22 + 2 Psig). Program loads Comp1 as per steps configured until it reaches its full load/ maximum step. Once Comp1 starts running at full load and suction pressure is still above Start Pressure Offset (i.e. > start offset value of 22+6 = 28 psig), then second highest priority compressor Comp2 starts monitoring suction pressure against start offset for start time (90 sec) period. This process is continued till either setpoint is achieved or all compressors are running at their full load/ maximum step. Refer Figure D-5 for load cycle status details.

START RESET		Suction Pressure 1	uto Seq	6.5	Psig ∆	
		Compressor Sequencing				
		Equipment	IP Address		Priority	Status
STOP	REMOTE	Compl	192.16	8.1.95	1 -	11
		Comp2	192.16	8.1.96	2 -	1
Auto Seq Setpoint	Oil Press Diff	Comp3	192.16	8.1.97	3.	1
22.0 Psig	324.0 Psig	None			o -	
Suction Press	Oil Filter Diff	None			0 0	
28.5 Psig	NA	None				
Suction Temp	Oil Temp	None				
40.4 °F	112.6 °F	None				
		None				
Discharge Press	Motor Amperage	None			0	
168.8 Psig	2.0 Amps	Page 1 2 3 4				Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenand	:e	Help
69.0 °F	4.3	No Alarm / Trips Present		User Access		og off
User : admin		Run Hours : 7		07/09/2	020 09	20:43 PM

Figure D-5. Compressor(s) Load Cycle in Sequencing (Page 1)

Overview Of Compressor Unloading

If suction pressure drops below control setpoint (22-2=20 psig), then lowest priority compressor starts unloading and unloads to its minimum step. If Suction Pressure further drops below Stop Offset (22-6=16 psig) for stop time period, then compressor shuts off and is placed in Auto Seq standby mode. Once lowest priority compressor is stopped and suction pressure is below unload offset, then second lowest priority compressor starts unloading.

In this example, during unloading cycle when suction pressure falls below a value less than suction control setpoint value (22-2 = 20 psig) for the time period of the unload timer, then the program selects the lowest priority compressor (Comp3) from the list and starts unloading the compressor. The program unloads Comp3 as per steps configured until it reaches its minimum step. Once Comp3 is unloaded to its minimum step and suction pressure drops below stop offset for stop time period, then Comp3 shuts off and switches to seq standby mode. Once Comp3 turns off then program picks second lowest priority compressors (in this case Comp2) from all running compressors list and starts unloading it if suction pressure is still below unload offset (22-2 = 20 psig). Program unloads Comp2 and if suction pressure stays below stop offset (22-6 = 16 psig) then Comp2 turns off. Once Comp2 turns off, Comp1 starts unloading and unloads to its minimum load and does not turn off, Comp1 continue running at minimum load. Refer Figure D-6 for unload cycle.

During load / unload phase, if the communication with any of the active / running / idle compressor is lost, then highest priority compressor logs event for the same. Compressor with errors / trip / alarm/ load limit conditions can be identified with its respective status symbol.

START RESET		Suction Pressure 1 Auto Seq -7.0 Ps				
		Compressor Sequencing				
		Equipment	IP Addr	ress Pr	iority	Status
STOP	REMOTE	Compl	192.16	8.1.95 1		1
		Comp2	192.16	8.1.96 2		11
Auto Seq Setpoint	Oil Press Diff	Comp3	192.16	8.1.97 3		1
22.0 Psig	58.9 Psig	None				
Suction Press	Oil Filter Diff	None		9		
15.0 Psig	NA	None				
Suction Temp	Oil Temp	None				
40.2 °F	118.5 °F	None				
		None				
Discharge Press	Motor Amperage	None				
93.0 Psig	2.0 Amps	Page 1 2 3 4				Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance		Help
126.8 °F	3.6	No Alarm / Trips Present		User Access		og off
User: admin		Run Hours : 7		07/09/202	20 13	:53:45 AM

Figure D-6. Compressor(s) Unload Cycle in Sequencing (Page 1)

Compressor Experiencing a Failure

When compressor experiences an operational failure, then that compressor is temporarily skipped during the sequencing decisions. The compressor is placed into a "Local Auto" mode. You need to reset and clear the fault before placing the compressor back in sequencing mode. To put the compressor back in seq mode, tap the Start-> Auto Seq on the compressor. It resumes its "set" priority order. If you give any further command to increase compressor load, the compressor restarts.

1. Compressor Experiencing a Failure

When the compressor experiences an operational failure then that compressor is temporarily skipped during the sequencing decisions. The failure messages are logged into compressor sequencing log reference Figure D-7.

Failure Type

• Communication Error / Power To Compressor is Turned Off: If the compressor power is turned off/ TCP communication is failed, then the compressors that are currently being sequenced will get a "TCP Comm Error". It is an indication that the compressor has lost communication to the other compressors. This takes approximately 1 minute to occur and the "TCP Comm Error" message is logged into the comp sequencing log on the compressors. Once Communication Error is detected, then compressor is placed in local Auto if it is running in Auto Seq.

- **Trip:** If compressor is stopped due to trip condition, then "Trip on Compressor" message is logged into the comp sequencing log on the compressors.
- Stop Load / Force Unload Conditions: While the compressor is running, if there occurs stop load/force unload condition, then "Stop Load on Compressor"/ "Force Unload on Compressor" message is logged into the comp sequencing log on the compressors.
- Compressor Sequencing Control Mode Changed: If compressor sequencing control mode is different than active control mode in Compressor Control screen, then "Control Mode Changed on Compressor" is logged into the comp sequencing log. Once Compressor Sequencing Control Mode Changed Error is detected then compressor is placed in local Auto mode if it is running in Auto Seq.
- **Priority Set To Zero:** If priority of compressor is set to zero, then compressor will be considered out of sequence. Compressor will be placed in local auto if it is running in auto seq.

START	RESET	Suction Pressure 1	Stopped	14.8 Psig Δ		
START	RESET	Compressor Sequencing				
STOP	REMOTE	Date Time Type Mess 01/28/2021 08:43 PM Error TCP 01/28/2021 08:39 PM Error Anti- 01/28/2021 08:39 PM Error Anti-	sage Communication Error On: Con recycle On: Comp3.97 recycle On: Comp3.96	1p2.96		
		01/28/2021 08:39 PM Error Anti-	pressor Stopped On: Comp2.96	6		
Suction Setpoint	Oil Press Diff	01/28/2021 08:39 PM Info Stop 01/28/2021 08:39 PM Error Trip	Timer Initiated On: Comp2.96 Condition On: Comp3.97	5		
20.0 Psig	97.0 Psig	01/28/2021 08:39 PM Alarm Alarr 01/28/2021 08:39 PM Info Com	n Condition On: Comp3.97 pressor Started On: Comp3.93	,		
Suction Press	Oil Filter Diff	01/28/2021 08:39 PM Info Start 01/28/2021 08:39 PM Info Com	Timer Initiated On: Comp3.9 pressor Started On: Comp2.9	5		
34.8 Psig	NA	01/28/2021 08:39 PM Info Start 01/28/2021 08:39 PM Info Com 01/28/2021 08:39 PM Info Stop	Timer Initiated On: Comp2.9 pressor Stopped On: Comp2.9 Timer Initiated On: Comp2.9	6 16		
Suction Temp	Oil Temp	01/28/2021 08:39 PM Info Com 01/28/2021 08:39 PM Info Stop	pressor Stopped On: Comp3.9 Timer Initiated On: Comp3.9	7		
38.6 °F	119.2 °F	01/28/2021 08:39 PM Info Reco 01/28/2021 08:39 PM Error Stop	Recovered from Load Limit: Comp3.97 Stop Load On: Comp3.97			
		01/28/2021 08:39 PM Info Com	pressor Started On: Comp3.97	7		
Discharge Press	Motor Amperage	01/28/2021 08:39 PM Info Start	pressor Started On: Comp3.9	5		
118.1 Psig	0.0 Amps	Page 1 2 3 4		Menu		
Discharge Temp	Press Ratio	No Scheduled Maintenance	Maintenan	e Help		
206.1 °F	2.7	Ho scheduled Maintenance				
		No Alarm / Trips Present	No Alarm / Trips Present User Access Log o			
User : admin		Run Hours : 0	01/28/2	021 08:43:31 PM		

Figure D-7.	Compressor	Sequencing	Log	(Page 4)
······································			5	()

NOTE

Compressor sequencing log is synced with all compressors configured in the sequencing table provided compressors are available in network. User can see compressor sequencing log from any of the compressors. If comp is waiting in Anti Recycle or Run Permissive condition then that comp is skipped and control is passed to next comp.

Troubleshooting

- 1. If compressor's status shows 🕐 symbol, then you should check if the compressor is in seq standby mode/ control mode error is present/ priority is set to zero.
- 2. Check status symbols of all compressors on sequencing table.
- 3. Check errors / info log on Compressor Sequencing Event Log screen.

MicroVission Compressor Sequencing Setup And Configuration Overview

This document should be used as a supplement to the MicroVission micro-controller Operation and Service manual. This document is intended to help with the steps involved in setting up a compressor sequencing network. Compressor sequencing is accomplished using a distributed communication arrangement. Compressor sequencing in the MicroVission panel is carried out through the MicroVission Ethernet communication port, using the TCP protocol.

Compressor sequencing is accomplished by the MicroVission compressor panel monitoring its own control parameter (either suction pressure or process temperature). As the control parameter changes value and deviates from the control setpoint, the highest priority compressor panel makes decisions to start, load and unload compressors as needed, in order to maintain the control setpoint. The control setpoint is defined in the Compressors "Compressor Sequencing" menu.

NOTE

The order of which compressors are started, stopped, loaded and unloaded is determined by "compressor priority" which is defined in the MicroVission panel – the Compressor Sequencing Menu. The following explanation is provided taking into consideration that all the panels are configured for sequencing, as shown in Figure D-8.

Configuration Overview

(Note that before carrying out the further steps, you must configure the compressors).

Steps Required for Setting Up MicroVission Compressor

Enable compressor sequencing setup from the Configuration screen. Log on and go to Page 3 of the Configuration screen of the compressor. (Reference Figure D-8).

- Assign a unique compressor name.
- Set the Active Remote Control to "Ethernet".
- Enable Ethernet port.
- Assign a unique Ethernet IP address. Assign "family" subnet mask and gateway.
- Once above steps have been completed, then tap Apply button and do not exit the Configuration screen. Next configure compressor sequencing parameters.

- Enable compressor sequencing.
- Identify (create) compressor sequencing network name.
- Once above steps have been completed, then tap Apply button and exit the Configuration screen.

The compressor adds other devices available in the same network and begin sharing its status information over the network at a rate of once every 20 seconds at this point.

Repeat the setup steps for all MicroVission compressor on the network, assigning unique addresses and compressor name. Make note that the Network Name must be the same for all compressors which will participate in the sequencing. Also, ensure that the Gateway Address is of the same subnet of IP addresses for the compressor to be recognized by other compressors.

Communication						
Active Remote Control	Ethernet	- On Communicatio	On Communication Failure			
Direct I/O		Revert to Local C	Revert to Local Control			
Auto Control		Serial (Modbus	RTU)			
	None		P12/RS485			
Run Permissive						
✓ Ethernet						
IP Address	192.168.1.12		• 1 • 2			
Subnet Mask	255.255.255.0					
Gateway	192.168.1.1	VNC Account				
Protocol	Modbus TCP	New Password				
Node Address	1	Verify New Passwo	ord			
✓ Compressor Seque	ncing	Port Number	5900			
Network Name	vilter					
Page 1 2 3	4 5 6 7	8	Apply Close			

Figure D-8. Configuration Screen - Compressor Sequencing Setup (Page 3)

Setting Up the MicroVission Compressor Sequencing Parameters

NOTE

The changes made from compressor are always synced with all compressors which are configured in device list.

Adding MicroVission Panels To the Devices List

Now that the network is configured, the next step is to add the compressors into the sequencing algorithm and start assigning priorities to the compressors on the network. To add the MicroVission compressors for sequencing, navigate to the Compressor Sequencing screen – Page 3 and tap the "View Detected Devices" button, which displays all MicroVission panels those are reachable. See Figure D-9.

In this example – we have connected two MicroVission panels to the Ethernet Network. To add these compressors so that it will be included in the compressor sequencing algorithm, check the "Add" box as shown in Figure D-9. Then tap the OK button.

After you tap the OK button, it will take you to the Page 3 of the sequencing screen and you'll see compressors listed in the Device List as shown in Figure D-10.



Figure D-9. Adding Compressors to Devices List (Page 3)

START	RESET	Suction Pressure 1	St	opped	5.2 Psig ∆
		Compressor Sequencing			
STOP	REMOTE	Devices List Devices Name Device Recip Micro	es Type	IP Address	95
Suction Setpoint	Oil Press Diff	Recip Micro	Vission	192.168.1.	96
20.0 Psig	48.7 Psig				
Suction Press	Oil Filter Diff				
25.2 Psig	NA				
Suction Temp	Oil Temp				
39.7 °F	115.1 °F				
Discharge Press	Motor Amperage	View Detected Devices	Delete Device	Test C	onnection
92.8 Psig	0.0 Amps	Page 1 2 3 4			Menu
Discharge Temp	Press Ratio	No Scheduled Maintena	ince	Maintenance	Help
126.5 °F	2.7	No Alarm / Trips Present		User Access	Log off
User : admin		Run Hours : 0		04/20/202	1 07:35:10 AM

Figure D-10. Devices List in Compressor Sequencing Screen (Page 3)

Testing the MicroVission Panel Connections

After the MicroVission panels are added to the Devices List, we recommend you to test the network connections of these devices. Reference Figure D-11.

Highlight the MicroVission panel that you'd like to test. Then tap the "Test Connection" button. A pop-up window "Test Connection Successful" appears. If the test is unsuccessful, double check the Ethernet settings to ensure that those parameters in the MicroVission panels are configured properly.

Continue to select the compressors listed in the Devices List and test the connection of all compressors.

START	RESET	Suction Pre	ssure 1	St	opped	5.2 Psig ∆
START	RESET	Compressor Seque	encing			
STOP	REMOTE	Devices List Devices Name Recip	Devices Type MicroVission	e	IP Address 192.168.1.1	95
Suction Setpoint 20.0 Psig Suction Press 25.2 Psig Suction Temp 39.9 °F	Oll Press Diff 48.7 Psig Oll Filter Diff NA Oll Temp 114.9 °F	Recip Test Cor	MicroVission	1	192.168.1. ОК	96
Discharge Press 92.9 Psig Discharge Temp	Motor Amperage 0.0 Amps Press Ratio	View Detected D Page 1 2 3	evices Dele	ete Device	Test C	onnection Menu
127.2 °F	2.7	No Schedu	/ Trips Present		User Access	Log off
User : admin		Run I	Hours : 0		04/20/202	1 07:36:48 AM

Figure D-11. Testing Connection in Compressor Sequencing Screen (Page 3)
Deleting MicroVission Panels From the Devices List

After the MicroVission panels are added to the Devices List, if you want to remove device from sequencing, it can be done using Delete Device button in the Page 3 of Compressor Sequencing screen. Reference Figure D-12.

Highlight the MicroVission panel that you'd like to delete. Then tap the "Delete Device" button. A dialog box, "Confirm Delete Device" appears. Tap OK to delete the device from the list. On tapping OK button, it will delete the device from list.

START	DESET	Suction Pressure 1	51	topped	5.2 Psig ∆		
START	RESET	Compressor Sequencing					
STOP	REMOTE	Devices List Devices Name Device Recip Micro	Devices Type MicroVission		95		
Suction Setpoint 20.0 Psig	Oil Press Diff 48.7 Psig	Recip Confirm Delete	Device ?				
Suction Press	Oil Filter Diff						
25.2 Psig	NA						
Suction Temp	Oil Temp	OK Cancel					
39.9 °F	114.7 °F						
Discharge Press	Motor Amperage	View Detected Devices	Delete Device	Test C	onnection		
92.8 Psig	0.0 Amps	Page 1 2 3 4		Menu			
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance Help			
126.5 °F	2.7	No Alarm / Trips Prese	nt	User Access	Log off		
User : admin		Run Hours : 0		04/20/202	1 07:37:10 AM		

Figure D-12. Deleting Device from Devices List in Compressor Sequencing Screen (Page 3)

Setting Up the Compressor Sequencing Table

Once the network connections of all the compressors have been tested, then they can be added to the Compressor Sequencing table of the MicroVission panel. Reference Figure D-13.

Under the Equipment Column compressor names will be listed. Select the priority (1 to 10) you want to give for the compressor from the drop-down list box. Once the MicroVission panel has added the compressors to the sequencing algorithm and has verified communication with every other compressor, the Status column shows a question mark icon as shown in Figure D-13.

START	RESET	Suction Pressure 1	si	topped	-5.0 Psig ∆	
START		Compressor Sequencing				
STOP	REMOTE	Equipment	IP Add	ress Pri	ority	Status
		Compl	192.16	8.1.95 1	•	2
		Comp2	192.16	8.1.96 2	•	?
Suction Setpoint	Oil Press Diff	Comp3	192.16	8.1.97 3		?
20.0 Psig	58.8 Psig	None			-	
Suction Press	Oil Filter Diff	None				
15.0 Psig	NA	None				
Suction Temp	Oil Temp	None				
39.7 °F	119.0 °F	None				
		None				
Discharge Press	Motor Amperage	None				
93.0 Psig	0.0 Amps	Page 1 2 3 4 Menu				Menu
Discharge Temp	Press Ratio	No Scheduled Maintenance No Alarm / Trips Present		Maintenance		Help
126.5 °F	3.6			User Access		Log off
User : admin		Run Hours : 7		07/09/202	0 02	:08:47 PM

Figure D-13. Setting up Compressors for Sequencing (Page 1)

Final Steps For Setting Up Compressor Sequencing

The MicroVission panels now needs to be placed into Seq Standby mode for the compressor being allowed to sequence them. Reference Figure D-14.

At the MicroVission panel Comp2 and Comp3, press the green START button, then tap the Seq Stand-By button. This places Comp2 and Comp3 into seq standby mode to allow the MicroVission panel to start in sequencing.

You will see the top banner that displays "Auto Seq Stand-By" to signify that the MicroVission panel is now in ready to run state showing status green checked mark. Reference Figure D-15. Then tap the green START button, then tap the Auto Seq button on Comp1 to start the compressor sequencing.



Figure D-14. Placing Compressors in Auto Seq or Seq Stand-By

START	RESET	Auto Seq Stand-by			-7.0 Psig ∆		
START		Compressor Sequencing					
STOP	REMOTE	Equipment IP Address		ress Pr	iority	Status	
		Compl	192.16	8.1.95 1		\checkmark	
		Comp2	192.168.1.96			\checkmark	
Auto Seq Setpoint Oil Press Diff		Comp3	192.16	8.1.97 3	×	1	
22.0 Psig	58.8 Psig	None		0			
Suction Press	Oil Filter Diff	None		0			
15.0 Psig	NA	None		0			
Suction Temp	Oil Temp	None					
39.5 °F	118.8 °F	None					
		None					
Discharge Press	Motor Amperage	None		0			
93.0 Psig	2.0 Amps	Page 1 2 3 4				Menu	
Discharge Temp	Press Ratio	No Scheduled Maintenance		Maintenance		Help	
126.8 °F 3.6		No Alarm / Trips Present		User Access		Log off	
User : admin		Run Hours : 7		07/09/2020 10:51:26 PN			

Figure D-15. Compressors in Ready to Run State (Page 1)

Abbreviations Used On the MicroVission Panel Screen

As space is limited on the screen of the MicroVission panel, at times we have used abbreviations to refer to parameters, variables, etc. Given below is a list of abbreviations used on the screens and its expanded form.

Abbreviation	Meaning		
Max	Maximum		
Min	Minimum		
Admin	Administrator		
Press	Pressure		
Temp	Temperature		
Diff	Differential		
Disch.	Discharge		
Auto	Automatic		
Seq	Sequence		
SP	Setpoint		
VFD	Variable Frequency Drive		
Sync	Synchronize		
I/O	Input/Output		
VNC	Virtual Network Computing		
RTD	Resistance Temperature Detector		

Table E. Abbreviations Used

About Vilter

Vilter is a technology leader in energy-efficient, environmentally conscious solutions in its industry. The 150-year history of the Vilter brand tells a rich story of perseverance and drive to cultivate continuous innovation within the industrial refrigeration and gas compression industries. Vilter offers unprecedented efficiency, productivity and reliability in cooling, recovery, and compression. It combines best-in-class technology with proven engineering and design to create quality products and latest solutions for customers worldwide.

About Copeland

Vilter is a business segment of Copeland, a global leader in providing sustainable climate solutions for customers in industrial, commercial and consumer markets around the world. Copeland combines category-leading brands in compression, controls, software and monitoring for heating, cooling and refrigeration. With best-in-class engineering and design and the broadest portfolio of modulated solutions, we're not just setting the standard for compressor leadership; we're pioneering its evolution. Combining our technology with our smart energy management solutions, we can regulate, track, and optimize conditions to help protect temperature-sensitive goods over land and sea, while delivering comfort in any space. Through energyefficient products, regulation-ready solutions, and expertise, we're revolutionizing the next generation of climate technology for the better. For more information please visit

Copeland.com

Copeland.com/Vilter

Copeland Industrial LP (Vilter) reserves the right to make changes in design and specifications without notice. 35391MV Rev. 2 (09/24) Copeland and Vilter are trademarks of Copeland or one of its affiliated companies. ©2024 Copeland LP. All rights reserved.

COPELAND. ENGINEERED FOR SUSTAINABILITY.