MicroVision^{EX}

MICROPROCESSOR – BASED

WATER TREATMENT

CONTROLLER

Modbus TCP/IP User's Manual

Table of Contents

1. Scope

This purpose of this document is to provide an introduction to the MicroVision^{EX} Controller and its Modbus TCP/IP capabilities. The intent is to provide a Modbus developer with the information needed to interface the controller with a typical Supervisory Control and Data Acquisition (SCADA) system.

2. Introduction

MicroVision^{EX} is a microprocessor based cooling tower controller designed to monitor and control water quality parameters within the circulated tower water.

MicroVision^{EX} determines the TDS present in the tower water via a measurement of water conductivity.

Some MicroVision^{EX} models can also measure and control the tower water pH and Oxidation-Reduction Potential (ORP).

Additionally, all MicroVision^{EX} models come equipped with hardware based Timers which activate AC relays. These Timers are typically used to dose chemicals into the tower water and are highly configurable.

Depending on the model, MicroVision^{EX} is configurable using one or more of the methods listed below:

- Using buttons present on the MicroVision^{EX} front panel
- By importing a configuration file via the MicroVision^{EX} Universal Serial Bus (USB) interface
- Using PULSAlink – A cloud based IoT application with PC and Mobile Apps designed to provide remote status and control capabilities.

All MicroVision^{EX} models equipped with an Ethernet interface can connect to a SCADA system via the Modbus TCP Compunction protocol. MicroVision^{EX} supports simultaneous connections to both a Modbus master and the PULSAlink IoT cloud application. MicroVision^{EX} serves as a Modbus slave / client and can provide a Modbus master / server with the controller's current configuration settings and its operational status parameters.

The following sections within this document provide a Modbus developer with the MicroVision^{EX} memory map and other relevant interface information.

3. Connections and Installation

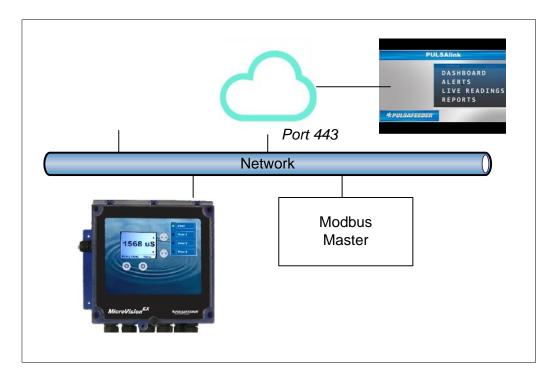Modbus Interface Type: Slave / Server
Modbus Protocol Type: Modbus TCP
Modbus Address: 99
Connection Port: 502
Data Encryption: none
Endianness: big-endian
Number of simultaneous connections: 1
Timeout: 1 Sec.
Function Codes Supported   4 (Read Input Registers)

Notes:

MicroVision^{EX} supports both Dynamic and Static IP addresses. However, whenever the Modbus interface is used a static IP address is recommended.

MicroVision^{EX} employs a secure connection with PULSAlink. When the controller is configured to use both Modbus and PULSAlink please ensure that your network supports an internet connection on port 443.

A typical installation is depicted in the figure below.

4. Modbus memory map

The availability and content of the registers listed in the following sections is model dependent.

The MicroVision^{EX} Modbus interface is designed to provide a Modbus Master / Client with controller configuration and status information via Modbus function code 4 (Read Input Registers). The Master / Client is not permitted to modify configuration parameters within the controller.

Relay Status

Relay 1 Status

This is the Conductivity relay on all controllers

Modbus Name	Start Address	End Address	Data Type	Details
Relay 1 Run Time	30009	30010	UINT32	The number of seconds this relay has been energized since the last power cycle
Relay 1 HOA Run Time Remain	30011	30012	UINT32	The number of seconds remaining in the HOA On (Forced On) mode count
Relay 1 HOA Mode	30013	30013	UINT16	0 = HOA OFF 1 = HOA ON 2 = HOA AUTO
Relay 1 HOA Run Time Set	30014	30015	UINT32	The number of seconds the relay will be energized when in HOA On (Forced On) mode
Relay 1 Relay Cnfg.	30016	30016	UINT16	Indicates the relay function 0 = Not Availible 1 = Conductivity Probe 2 = pH Probe 3 = ORP 4 = Timer 1 5 = Timer 2 6 = Timer 3 7 = Timer 4 8 = Timer 5 9 = Timer 6

Relay 1 Timer Set Point Mode	30017	30017	UINT16	0= Setpoint Mode Disabled 1 = MVEX Conductivity Probe 2 = MVEX pH Probe 3 = MVEX ORP Probe 4= mS / CM via 4-20mA Input 1 5 = pH via 4-20mA Input 1 6 = mV via 4-20mA Input 1 7 = PPB via 4-20mA Input 1 8 = PPM via 4-20mA Input 1 9 = % via 4-20mA Input 1 10 = mS / CM via 4-20mA Input 2 11 = pH via 4-20mA Input 2 12 = mV via 4-20mA Input 2 13 = PPB via 4-20mA Input 2 14 = PPM via 4-20mA Input 2 15= % via 4-20mA Input 2
Relay 1 Measurement Value	30018	30019	FLOAT	
Relay 1 Relay State Bit Field	30020	30021	UINT16	0 = Relay is OFF 1 = Relay is ON

Relay 2 Status

Depending on the model this relay may be pH, ORP, or a Timer. Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 2 Run Time	30021	30022	UINT32	
Relay 2 HOA Run Time Remain	30023	30024	UINT32	
Relay 2 HOA Mode	30025	30025	UINT16	
Relay 2 HOA Run Time Set	30026	30027	UINT32	
Relay 2 Relay Cnfg.	30028	30028	UINT16	
Relay 2 Timer Set Point Mode	30029	30029	UINT16	
Relay 2 Measurement Value	30030	30032	FLOAT	
Relay 2 Relay State Bit Field	30032	30032	UINT16	

Relay 3 Status

Depending on the model this relay may be ORP or a Timer – See appendix A.
Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 3 Run Time	30033	30034	UINT32	
Relay 3 HOA Run Time Remain	30035	30036	UINT32	
Relay 3 HOA Mode	30037	30037	UINT16	
Relay 3 HOA Run Time Set	30038	30039	UINT32	
Relay 3 Relay Cnfg.	30040	30040	UINT16	
Relay 3 Timer Set Point Mode	30041	30041	UINT16	
Relay 3 Measurement Value	30042	30043	FLOAT	
Relay 3 Relay State Bit Field	30044	30044	UINT16	

Relay 4 Status

On all models this relay is a Timer – See appendix A.
Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 4 Run Time	30045	30046	UINT32	
Relay 4 HOA Run Time Remain	30047	30048	UINT32	
Relay 4 HOA Mode	30049	30049	UINT16	
Relay 4 HOA Run Time Set	30050	30051	UINT32	
Relay 4 Relay Cnfg.	30052	30052	UINT16	
Relay 4 Timer Set Point Mode	30053	30053	UINT16	

Modbus Name	Start Address	End Address	Data Type	Details
Relay 4 Measurement Value	30054	30055	FLOAT	
Relay 4 Relay State Bit Field	30056	30056	UINT16	

Relay 5 Status

On all models this relay is a Timer– See appendix A.
Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 5 Run Time	30057	30058	UINT32	
Relay 5 HOA Run Time Remain	30059	30060	UINT32	
Relay 5 HOA Mode	30061	30061	UINT16	
Relay 5 HOA Run Time Set	30062	30063	UINT32	
Relay 5 Relay Cnfg.	30064	30064	UINT16	
Relay 5 Timer Set Point Mode	30065	30065	UINT16	
Relay 5 Measurement Value	30066	30067	FLOAT	
Relay 5 Relay State Bit Field	30068	30068	UINT16	

Relay 6 Status

On all models this relay is a Timer– See appendix A.
Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 6 Run Time	30069	30070	UINT32	
Relay 6 HOA Run Time Remain	30071	30071	UINT32	
Relay 6 HOA Mode	30073	30073	UINT16	
Relay 6 HOA Run Time Set	30074	30075	UINT32	
Relay 6 Relay Cnfg.	30076	30076	UINT16	
Relay 6 Timer Set Point Mode	30077	30077	UINT16	
Relay 6 Measurement Value	30078	30079	FLOAT	
Relay 6 Relay State Bit Field	30080	30080	UINT16	

Relay 7 Status

On all models this relay is a Timer– See appendix A.
Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 7 Run Time	30081	30082	UINT32	
Relay 7 HOA Run Time Remain	30083	30084	UINT32	
Relay 7 HOA Mode	30085	30085	UINT16	
Relay 7 HOA Run Time Set	30086	30087	UINT32	
Relay 7 Relay Cnfg.	30088	30088	UINT16	
Relay 7 Timer Set Point Mode	30089	30089	UINT16	
Relay 7	30090	30091	FLOAT	

Measurement Value				
Relay 7 Relay State Bit Field	30092	30092	UINT16	

Relay 8 Status

On all models this relay is a Timer– See appendix A.
Refer to Relay 1 table for field details.

Modbus Name	Start Address	End Address	Data Type	Details
Relay 8 Run Time	30093	30094	UINT32	
Relay 8 HOA Run Time Remain	30095	30096	UINT32	
Relay 8 HOA Mode	30097	30097	UINT16	
Relay 8 HOA Run Time Set	30098	30099	UINT32	
Relay 8 Relay Cnfg.	30100	30100	UINT16	
Relay 8 Timer Set Point Mode	30101	30101	UINT16	
Relay 8 Measurement Value	30102	30103	FLOAT	
Relay 8 Relay State Bit Field	30104	30104	UINT16	

Alarms

Alarms are presented to the Modbus master /client as input registers in the form of bit fields. Alarm indicators are binary, meaning they have two states. A "0" indicates the alarm is inactive while a "1" indicates the alarm is active.

The following registers are accessible on all models. However, the content of these registers is model dependent. The user must interpret the content of these registers within the context of the model and the associated hardware – See appendix A.

Modbus Name	Start Address	End Address	Data Type	Details
Mstr Alarm Bit Field 1	30105	30105	UINT16	Bit 0 = Flow Switch Alarm Bit 1 = Drum Level 1 Alarm Bit 2 = Drum Level 2 Alarm Bit 3 = Drum Level 3 Alarm Bit 4 = Cond. High Alarm Bit 5 = Cond. Low Alarm Bit 6 = Cond. Limit Alarm Bit 7 = Cond. Prb Err Bit 8 = pH High Alarm Bit 9 = pH Low Alarm Bit 10 = pH Limit Alarm Bit 11 = pH Prb Err Bit 12 = ORP High Alarm Bit 13 = ORP Low Alarm Bit 14 = ORP Limit Alarm Bit 15 = ORP Prb Err

Modbus Name	Start Address	End Address	Data Type	Details
Mstr Alarm Bit Field 2	30106	30106	UINT16	Bit 0 = T1 Limit Alarm Bit 1 = T1 High Alarm Bit 2 = T1 Low Alarm Bit 3 = T2 Limit Alarm Bit 4 = T2 High Alarm Bit 5 = T2 Low Alarm Bit 6 = T3 Limit Alarm Bit 7 = T3 High Alarm

				Bit 8 = T3 Low Alarm
				Bit 9 = T4 Limit Alarm
				Bit 10 = T5 Limit Alarm
				Bit 11 = T6 Limit Alarm
				Bit 12 = PULSAlink Alarm

Water Meters

Water meter count data is presented to the Modbus master / client as floating point values.

The following registers are available on all models

Modbus Name	Start Address	End Address	Data Type	Details
Water Meter 1	30113	30114	float	Water meter count value
Water Meter 2	30115	30116	float	Water meter count value

The following registers are available on all models except CXXE and C5XE – See appendix A.

Modbus Name	Start Address	End Address	Data Type	Details
Water Meter 3	30117	30118	float	Water meter count value
Water Meter 4	30119	30120	float	Water meter count value
Water Meter 5	30121	30122	float	Water meter count value
Water Meter 6	30123	30124	float	Water meter count value

Conductivity Probe Temperature

The MicroVision[EX] Toroidal Conductivity Probe contains a built sensor to measure the cooling tower's fluid temperature. The temperature measurement is reported in both Fahrenheit and Celsius.

The following registers are available on all models.

Modbus Name	Start Address	End Address	Data Type	Details
Conductivity Probe Temp F	30109	30110	float	Conductivity Probe Temperature in degrees Fahrenheit
Conductivity Probe Temp C	30111	30112	float	Conductivity Probe Temperature in degrees Celsius

4-20mA

The content of the following registers is model dependent and will have no valid meaning unless the associated hardware is present and configured correctly.

The following registers are available on all models.

Modbus Name	Start Address	End Address	Data Type	Details
4-20mA Input 1 milliamp measurement	30001	30002	float	The raw current measurement
Translated 4-20mA Input 1 milliamp measurement	30103	30104	float	The raw current measurement transformed to represent the selected sensor

The following registers are available on all models except CXXE and C5XE – See appendix A.

Modbus Name	Start Address	End Address	Data Type	Details
4-20mA Input 2 milliamp measurement	30005	30006	float	The raw current measurement
Translated 4-20mA Input 2 milliamp measurement	30007	30008	float	The raw current measurement transformed to represent the selected sensor

Relay States

Relay states are presented to the Modbus master /client as input registers in the form of bit fields. Relay state indicators are binary, meaning they have two states. A "0" indicates the relay is inactive while a "1" indicates the relay is active.

The following registers are accessible on all models. However, the content of these registers is model dependent. The user must interpret the content of these registers within the context of the model and the associated hardware.

Modbus Name	Start Address	End Address	Data Type	Details
Mstr Relay Bit Field	30107	30107	UINT16	Bit 0 = Relay 1 (Conductivity) Bit 1 = Relay 2 Bit 2 = Relay 3 Bit 3 = Relay 4 Bit 4 = Relay 5 Bit 5 = Relay 6 Bit 6 = Relay 7 Bit 7 = Relay 8 Bit 8 = N/A Bit 9 = N/A Bit 10 = N/A Bit 11 = N/A Bit 12 = N/A Bit 13 = N/A Bit 14 = N/A Bit 15 = N/A

Digital Input States

The states of the digital inputs are presented to the Modbus master /client as input registers in the form of bit fields. Digital input state indicators are binary, meaning they have two states. A "0" indicates the input is inactive while a "1" indicates the input is active.

The following registers are accessible on all models. However, the content of these registers is model dependent. The user must interpret the content of these registers within the context of the model and the associated hardware.

Modbus Name	Start Address	End Address	Data Type	Details
Mstr Digital Input Bit Field	30108	30108	UINT16	Bit 0 = P1 (Flow Switch) Bit 1 = P2 (Drum Level 1) Bit 2 = P3 (Drum Level 2) Bit 3 = P4 (Drum Level 4) Bit 4 = P5 (Water Meter 1) Bit 5 = P6 (Water Meter 2) Bit 6 = P7 (Water Meter 3) Bit 7 = P8 (Water Meter 4) Bit 8 = P9 (Water Meter 5) Bit 9 = P10 (Water Meter 6) Bit 10 = N/A Bit 11 = N/A Bit 12 = N/A Bit 13 = N/A Bit 14 = N/A Bit 15 = N/A

Configuration Parameters

The following registers are accessible on all models. However, the content of these registers is model dependent. The user must interpret the content of these registers within the context of the model and the associated installed hardware.

Modbus Name	Start Address	End Address	Data Type	Details
Company Name	30125	30133	String	9 registers, 2 ASCII Characters per Modbus reg.
Controller Name	30134	30142	String	9 registers, 2 ASCII Characters per Modbus reg.
Model Number	30143	30149	String	7 registers, 2 ASCII Characters per Modbus reg.
Controller Time and Date	30150	30151	int32_t	UNIX Time UTC (Universal Time)
Software Ver	30152	30155	String	4 registers, 2 ASCII Characters per Modbus reg.
Units	30156	30156	uint16_t	0 = Gallons 1 = Liters
Qty 4-20mA Out	30157	30157	uint16_t	0 = None 1 = 1 Board installed 2 = 2 Boards installed 3 = 3 Boards installed
Qty 4-20mA In	30158	30158	uint16_t	0 = None 1 = 1 Board installed 2 = 2 Boards installed
Dampen Rate	30159	30159	uint16_t	66 = DAMP_HIGH 33 = DAMP_MED 16 = DAMP_LOW 0 = DAMP_OFF
Cond Relay Name	30160	30167	String	8 registers, 2 ASCII Characters per Modbus reg.
Cond Setpt. Type	30168	30168	uint16_t	0 = Rising Setpoint 1 = Falling Setpoint
Cond Setpt.	30169	30170	float	0- 9999 uS
Cond Dffrntl.	30171	30172	float	1 - 9999 uS
Cond High Alrm Setpt.	30173	30174	float	0- 9999 uS
Cond Low Alrm Setpt.	30175	30176	float	0 - 9999 uS
Cond Lmt Tmr	30177	30178	uint32_t	0 – 86340 Seconds
Cond Relay HOA Run Time	30179	30180	uint32_t	0 - 86399 Seconds

pH Setpt. Type	30181	30181	uint16_t	0 = Rising Setpoint 1 = Falling Setpoint
pH Setpt.	30182	30183	float	0 - 14.00
pH Dffrntl.	30184	30185	float	0 - 14.00
pH High Alrm Setpt.	30186	30187	float	0 - 14.00
pH Low Alrm Setpt.	30188	30189	float	0 - 14.00
pH Lmt Tmr	30190	30191	uint32_t	0 - 14.00
ORP Setpt. Type	30192	30192	uint16_t	0 = Rising Setpoint 1 = Falling Setpoint
ORP Setpt.	30193	30194	float	-2000 - +2000 mV
ORP Dffrntl.	30195	30196	float	0 - 2000 mV
ORP High Alrm Setpt.	30197	30198	float	-2000 - +2000 mV
ORP Low Alrm Setpt.	30199	30200	float	-2000 - +2000 mV
ORP Lmt Tmr	30201	30202	uint32_t	0 - 86340 Seconds
T1 SetptMode Snsr Type	30203	30203	uint16_t	0= Setpoint Mode Disabled 1 = MVEX Conductivity Probe 2 = MVEX pH Probe 3 = MVEX ORP Probe 4= mS / CM via 4-20mA Input 1 5 = pH via 4-20mA Input 1 6 = mV via 4-20mA Input 1 7 = PPB via 4-20mA Input 1 8 = PPM via 4-20mA Input 1 9 = % via 4-20mA Input 1 10 = mS / CM via 4-20mA Input 2 11 = pH via 4-20mA Input 2 12 = mV via 4-20mA Input 2 13 = PPB via 4-20mA Input 2 14 = PPM via 4-20mA Input 2 15= % via 4-20mA Input 2
T1 SetptMode Setpt. Type	30204	30204	uint16_t	Sensor Type dependent
T1 SetptMode Setpt.	30205	30206	float	Sensor Type dependent
T1 SetptMode Dffrntl.	30207	30208	float	Sensor Type dependent
T1 SetptMode High Alrm Setpt.	30209	30210	float	Sensor Type dependent
T1 SetptMode Low Alrm Setpt.	30211	30212	float	Sensor Type dependent
T1 SetptMode Lmt Tmr	30213	30214	uint32_t	0 - 86340 Seconds
T2 SetptMode Snsr Type	30215	30215	uint16_t	See T1 SetptMode Setpt. Type
T2 SetptMode	30216	30216	uint16_t	Sensor Type dependent

Setpt. Type				
T2 SetptMode Setpt.	30217	30218	float	Sensor Type dependent
T2 SetptMode Dffrntl.	30219	30220	float	Sensor Type dependent
T2 SetptMode High Alrm Setpt.	30221	30222	float	Sensor Type dependent
T2 SetptMode Low Alrm Setpt.	30223	30224	float	Sensor Type dependent
T2 SetptMode Lmt Tmr	30225	30226	uint32_t	0 - 86340 Seconds
T3 SetptMode Snsr Type	30227	30227	uint16_t	See T1 SetptMode Setpt. Type
T3 SetptMode Setpt. Type	30228	30228	uint16_t	Sensor Type dependent
T3 SetptMode Setpt.	30229	30230	float	Sensor Type dependent
T3 SetptMode Dffrntl.	30231	30232	float	Sensor Type dependent
T3 SetptMode High Alrm Setpt.	30233	30234	float	Sensor Type dependent
T3 SetptMode Low Alrm Setpt.	30235	30236	float	Sensor Type dependent
T3 SetptMode Lmt Tmr	30237	30238	uint32_t	0 - 86340 Seconds
Water Meter 1 Name	30239	30246	String	8 registers, 2 ASCII Characters per Modbus reg.
Water Meter 2 Name	30247	30254	String	8 registers, 2 ASCII Characters per Modbus reg.
Water Meter 3 Name	30255	30262	String	8 registers, 2 ASCII Characters per Modbus reg.
Water Meter 4 Name	30263	30270	String	8 registers, 2 ASCII Characters per Modbus reg.
Water Meter 5 Name	30271	30278	String	8 registers, 2 ASCII Characters per Modbus reg.
Water Meter 6 Name	30279	30286	String	8 registers, 2 ASCII Characters per Modbus reg.
4-20mA In 1 Name	30287	30294	String	8 registers, 2 ASCII Characters per Modbus reg.
4-20mA In 1 Type	30295	30295	uint16_t	0 = mA 1 = uM/YR 2 = Mil/Y 3 = mS/CM 4 = pH 5 = mV 6 = Gallons 7 = Liters

				8 = Temp. C 9 = Temp. F 10 = PPB 11 = PPM 12 = PSI 13 = %
4-20mA In 2 Name	30296	30303	String	8 registers, 2 ASCII Characters per Modbus reg.
4-20mA In 2 Type	30304	30304	uint16_t	See 4-20mA In 1 Type
Relay 2 Name	30305	30312	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 2 Cnfg	30313	30313	uint16_t	0 = Not Available 1 = Conductivity Probe 2 = pH Probe 3 = ORP 4 = Timer 1 5 = Timer 2 6 = Timer 3 7 = Timer 4 8 = Timer 5 9 = Timer 6
Relay 2 HOA Run Time	30314	30315	uint32_t	Number of seconds relay is active in HOA On Mode
Relay 3 Name	30316	30323	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 3 Cnfg	30324	30324	uint16_t	See Relay 2 Cnfg
Relay 3 HOA Run Time	30325	30326	uint32_t	Number of seconds relay is active in HOA On Mode
Relay 4 Name	30327	30334	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 4 Cnfg	30335	30335	uint16_t	See Relay 2 Cnfg
Relay 4 HOA Run Time	30336	30337	uint32_t	Number of seconds relay is active in HOA On Mode
Relay 5 Name	30338	30345	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 5 Cnfg	30346	30346	uint16_t	See Relay 2 Cnfg
Relay 5 HOA Run Time	30347	30348	uint32_t	Number of seconds relay is active in HOA On Mode
Relay 6 Name	30349	30356	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 6 Cnfg	30357	30357	uint16_t	See Relay 2 Cnfg
Relay 6 HOA Run Time	30358	30359	uint32_t	Number of seconds relay is active in HOA On Mode
Relay 7 Name	30360	30367	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 7 Cnfg	30368	30368	uint16_t	See Relay 2 Cnfg
Relay 7 HOA Run	30369	30370	uint32_t	Number of seconds relay is

Time				active in HOA On Mode
Relay 8 Name	30371	30378	String	8 registers, 2 ASCII Characters per Modbus reg.
Relay 8 Cnfg	30379	30379	uint16_t	See Relay 2 Cnfg
Relay 8 HOA Run Time	30380	30381	uint32_t	Number of seconds relay is active in HOA On Mode

5. Appendix A: MVEX Model Features

Model /	CXXE	C5XE	CPXX	COXX	CPOX
Control Parameters	Conductivity only	Conductivity only	Conductivity & PH	Conductivity & ORP	Conductivity & PH & ORP
Relay 1	Conductivity Probe	Conductivity Probe	Conductivity Probe	Conductivity Probe	Conductivity Probe
Relay 2	Timer 1	Timer 1	pH Probe	ORP Probe	pH Probe
Relay 3	Timer 2	Timer 2	Timer 1	Timer 1	ORP Probe
Relay 4	Timer 3	Timer 3	Timer 2	Timer 2	Timer 1
Relay 5	N/A	Timer 4	Timer 3	Timer 3	Timer 2
Relay 6		N/A	Timer 4	Timer 4	Timer 3
Relay 7			Timer 5	Timer 5	Timer 4
Relay 8			Timer 6	Timer 6	Timer 5
4-20mA Input 1	Yes, if installed	Yes, if installed	Yes, if installed	Yes, if installed	Yes, if installed
4-20mA Input 2	N/A	N/A	Yes, if installed	Yes, if installed	Yes, if installed
4-20mA output 1	Yes, if installed	Yes, if installed	Yes, if installed	Yes, if installed	Yes, if installed
4-20mA output 2	N/A	N/A	Yes, if installed	Yes, if installed	Yes, if installed
4-20mA output 3			Yes, if installed	Yes, if installed	Yes, if installed
4-20mA output 4			Yes, if installed	Yes, if installed	Yes, if installed
Flow Switch	INSTALLED	INSTALLED	INSTALLED	INSTALLED	INSTALLED
Drum Level 1	INSTALLED	INSTALLED	INSTALLED	INSTALLED	INSTALLED
Drum Level 2	INSTALLED	INSTALLED	INSTALLED	INSTALLED	INSTALLED
Drum Level 3	INSTALLED	INSTALLED	INSTALLED	INSTALLED	INSTALLED
Water Mater 1	Dry Contact or Hall Effect	Dry Contact or Hall Effect	Dry Contact or Hall Effect	Dry Contact or Hall Effect	Dry Contact or Hall Effect
Water Meter 2	Dry Contact	Dry Contact	Dry Contact	Dry Contact	Dry Contact
Water Meter 3	N/A	N/A	Dry Contact	Dry Contact	Dry Contact
Water Meter 4			Dry Contact or Hall Effect	Dry Contact or Hall Effect	Dry Contact or Hall Effect
Water Meter 5			Dry Contact or Hall Effect	Dry Contact or Hall Effect	Dry Contact or Hall Effect
Water Meter 6			Dry Contact or Hall Effect	Dry Contact or Hall Effect	Dry Contact or Hall Effect

6. Appendix B: Uploading ModBus Software to Existing MVEX Controller

Download existing datalog from the controller.

Data stored on the controller will be lost when the software is updated.   Data which has been uploaded from the controller to PULSAlink.net will NOT be lost and will remain on the PULSAlink server.

Download the configuration file from the controller.

Your controller settings will be erased after the software upgrade.   If you wish to restore your controller settings after the software upgrade, install a separate USB flash drive onto the USB pigtail on the controller.   Export the configuration file using the MVEX menu commands: COMMUNICATIONS/USB/EXPORT CONFIG FILE.

Upload the MVEX / ModBus software to your controller

Remove / shut-off power to the controller.

Plug the USB flash drive with the software upgrade files into the USB pigtail on the controller.

On the front of the controller, press the "UP" button and the left "MENU" button at the same time and hold it while power is restored to the controller. Wait 10 seconds, then release the buttons.   A short delay may be observed before the controller powers up completely.

Once the controller boots up completely, confirm the controller software has been upgraded by reading the latest version of software in the menu screen located at MENU / CONFIGURE / VERSION.   It should be the same as the file name provided on the USB flash drive for software upgrade.

Perform a "Factory Reset" on the controller from the menu: MENU / CONFIGURE / FACTORY RESET

Perform a "Power Reset" by removing power from the controller. Restore power after 10 seconds.

Upload your configuration file to restore your original settings to the device. Insert the flash drive from step 6.2 into the USB port on the controller. Follow menu prompt: MENU / COMMUNICATIONS / USB / IMPORT CONFIG FILE.

PROCEDURE COMPLETE

Factory Service Policy

The MicroVision^{EX} is a state of the art microprocessor based controller. If you are experiencing a problem with this instrument, first consult the troubleshooting guide in the User Manual. If the problem is not covered or cannot be solved, contact Technical Services for assistance:

PULSAFEEDER INC. (SPO)

27101 AIRPORT ROAD

PUNTA GORDA, FL 33982

941-575-3800

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the controller to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder. Warranty parts returned as defective which test good will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

Warranty

Pulsafeeder, Inc. warrants control systems of its manufacture to be free of defects in material or workmanship. Liability under this policy extends for 24 months from date of shipment including the toroidal sensor. Electrodes/probes other than the toroidal conductivity sensor are considered maintenance items and as such are warranted for six (6) months from the date of shipment of the controller. Electrodes/probes purchased as spare parts are warranted for 90 days from date of shipment. The manufacturer's liability is limited to repair or replacement of any failed equipment or part, which is proven defective in material or workmanship upon completion of the manufacturer's examination. This warranty does not include removal or installation costs and in no event shall the manufacturer's liability exceed the selling price of such equipment or part.

The manufacturer disclaims all liability for damage to its products through improper installation, maintenance, use, or attempts to operate such products beyond their functional capacity, intentionally or otherwise, or any unauthorized repair. The manufacturer is not responsible for consequential or other damages, injuries, or expense incurred through the use of its products.

The above warranty is in lieu of any other warranty, whether expressed or implied. The manufacturer makes no warranty of fitness or merchantability. No agent of ours is authorized to provide any warranty other than the above.

PULSAFEEDER

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