

multitrode

MultiSmart Pump Controller & RTU



MiniLogic Engine Programming Guide

This Manual is the support documentation for programming the MiniLogic engine for the MultiTrode MultiSmart Pump Controller and RTU.

Revision 02

18 December 2008

This manual is used for version v1.5.5 and above of the MultiSmart pump controller

NOTICE

MULTITRODE® and MULTISMART® are registered trademarks of MultiTrode Pty Ltd in Australia, USA and many countries worldwide. PUMPVIEW® is a registered trademark of MultiTrode Pty Ltd in Australia. Design registration is pending for the MultiSmart Pump Controller Remote and Base Modules in Australia, USA and many countries worldwide. Patents pending in Australia, USA and many countries worldwide.

©2008 MultiTrode Pty Ltd. This publication is protected by copyright. No part of this publication may be reproduced by any process, electronic or otherwise, without the express written permission of MultiTrode Pty Ltd.

Contents

1	Version Notes	7
2	The Tools	7
2.1	Introduction	7
2.2	The Logic Engine	7
2.3	Accessing the MultiSmart	7
2.4	Creating a New Logic Engine Script File	11
2.5	Enabling a Logic Engine File	13
2.6	Editing the Logic Engine Script File	14
2.7	Debugging the Logic Engine Script File.....	15
3	Programming	20
3.1	Arithmetic Operators	20
3.2	Relational Operators	20
3.3	Logical Operators.....	20
3.4	Mathematical Functions.....	20
3.5	Time and Date Related Functions	22
3.6	Comparison and Other Functions.....	22
3.7	Scratch Pad Tags	22
3.8	Tag Status Flags.....	22
3.9	Conditional Evaluations	25
3.10	Script Examples	26
4	MultiSmart Tag List.....	28
4.1	Parent Nodes	28
4.2	Tag Data Types	29
4.3	Tag List	30
4.4	Configuration (2)	30
4.5	DNP Slave 1 (3).....	31
4.6	Event Logger (4)	31
4.7	Faults (5).....	32
4.8	Flow (6)	35
4.9	I/O (7)	38
4.10	LCD (8)	40
4.11	Logic (9)	40
4.12	ModBus (10)	41
4.13	Point to Point Protocol Manager (pppm) (12)	43
4.14	Pump Control (13).....	44
4.15	Snap Shot (14).....	55
4.16	Supply Protection (15)	56
4.17	T3000 PumpView Modem Manager [t3pm] (16).....	57
4.18	Telemetry (17).....	59

4.19 Watch Dog (18).....	61
--------------------------	----

1 Version Notes

The following apply to firmware version 1.4.4 or greater:

- The “valueof” function is no longer required. Tags can now be referred to by their name alone. (e.g. *IO.Unit._1.TopBoard.Din._1.ValueDigital* instead of *valueof("IO.Unit._1.TopBoard.Din._1.ValueDigital")*).
- The scaled value of an Analog or Analog Control tag can now be read by a function called “scaledValue”
- The flags of any tag can be read using the function “getFlags”.

2 The Tools

2.1 Introduction

This guide is intended for users wishing to make use of the Mini-Logic Engine within the MultiSmart. An in-depth knowledge of computer programming is not required. This guide contains detailed information, easy to follow procedures and examples to enable a user to construct simple Logic Engine scripts to extend or enhance the existing functionality of the MultiSmart. Good programming techniques and practices are beyond the scope of this guide.

This guide is divided into three main sections:

- The Tools - this covers the procedures and programs needed to access and use the Logic Engine
- Programming - a full list of commands and programming examples are given
- Tag List - a comprehensive list of the MultiSmart tags is provided

2.2 The Logic Engine

The Mini-Logic Engine is a simple Boolean engine that allows basic customisation of control capabilities where the existing functionality does not extend to the desired requirements. The logic engine is an optional feature that must be either purchased with the MultiSmart or enabled at a later stage before it can be used.

The logic engine uses mathematical expressions which are evaluated at regular intervals. The expressions are generally associated with a MultiSmart tag to create an action when an expression changes state.

Expressions are written on a single line in a simple text file. Multiple expressions can be included in a text file but only one expression is allowed per line. The text file can be created in any basic text editor and saved as a text file with a “.lge” file extension so the MultiSmart can identify it as a Logic Engine file.

Files are either transferred to the MultiSmart using a File Transfer Protocol (FTP) program or created within the MultiSmart. Once installed the file must be enabled from the Logic Engine Settings screen on the MultiSmart.

The logic engine is limited in its capability and should only be used in simple situations where existing functionality within the MultiSmart is insufficient to cover a particular scenario. Before using the logic engine it is recommended that you first make sure the same functionality is not already provided by the MultiSmart.

2.3 Accessing the MultiSmart

To access the MultiSmart the following essential components required are:

- the Logic Engine software module is enabled
- the MultiSmart User *name* and *password* are known

- an RJ45 crossover network cable
- an FTP program such as Putty and/or an Internet Browser program

Before communications can be established with the MultiSmart, the IP address within the MultiSmart must be set along with the IP address range in the connected computer.

2.3.1 **Setup of MultiSmart IP Address**

Go to **Settings** → **More ...** → **Communications** → **IP Address**

Enter an IP address such as 192.168.0.3 and a subnet mask of 255.255.255.0

Press **Save** and restart the MultiSmart.

2.3.2 Setup of Connected Computer IP Address

To set the computer's IP address - select **Start / Settings / Network Connections / Local Area Connection** and then right click on **Properties**.

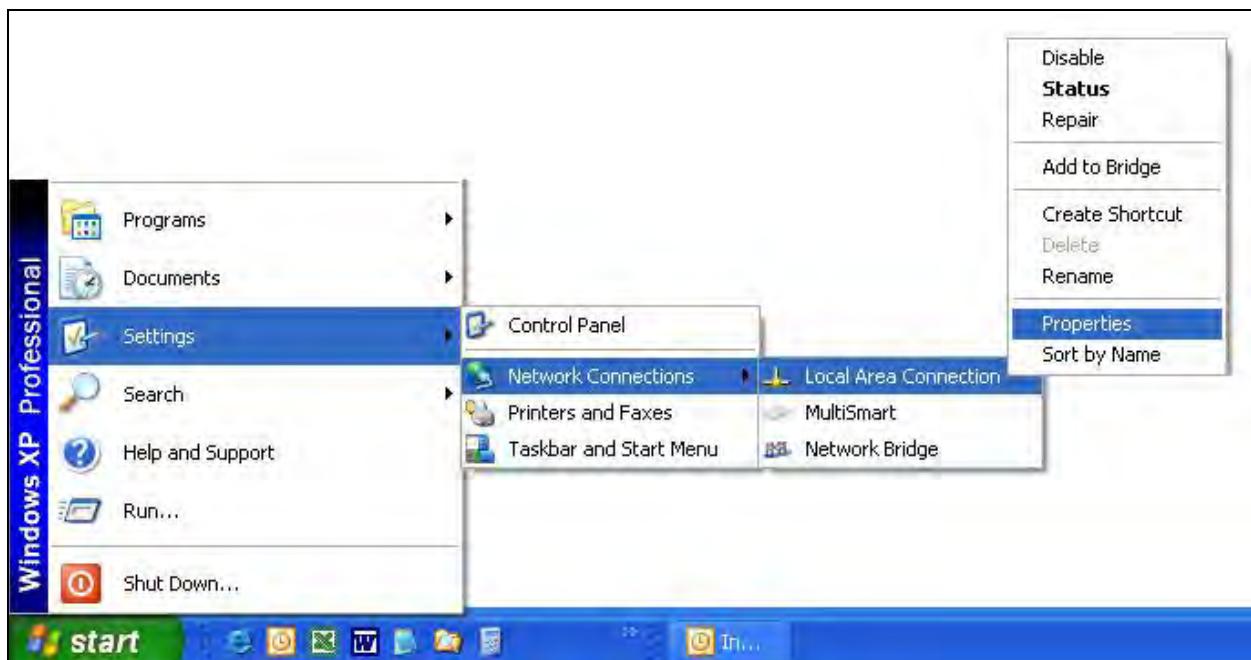


Figure 1 – Computer IP address setup: Part 1

In the **Local Area Connection Properties** dialog box (see below), highlight **Internet Protocol (TCP/IP)** and then select the **Properties** button, the **Internet Protocol (TCP/IP) Properties** dialog box will appear. Enter in the chosen IP address of the computer.

Note: On some computers the **Internet Protocol (TCP/IP)** option may appear under **Network Bridge** rather than **Local Area Connection**.

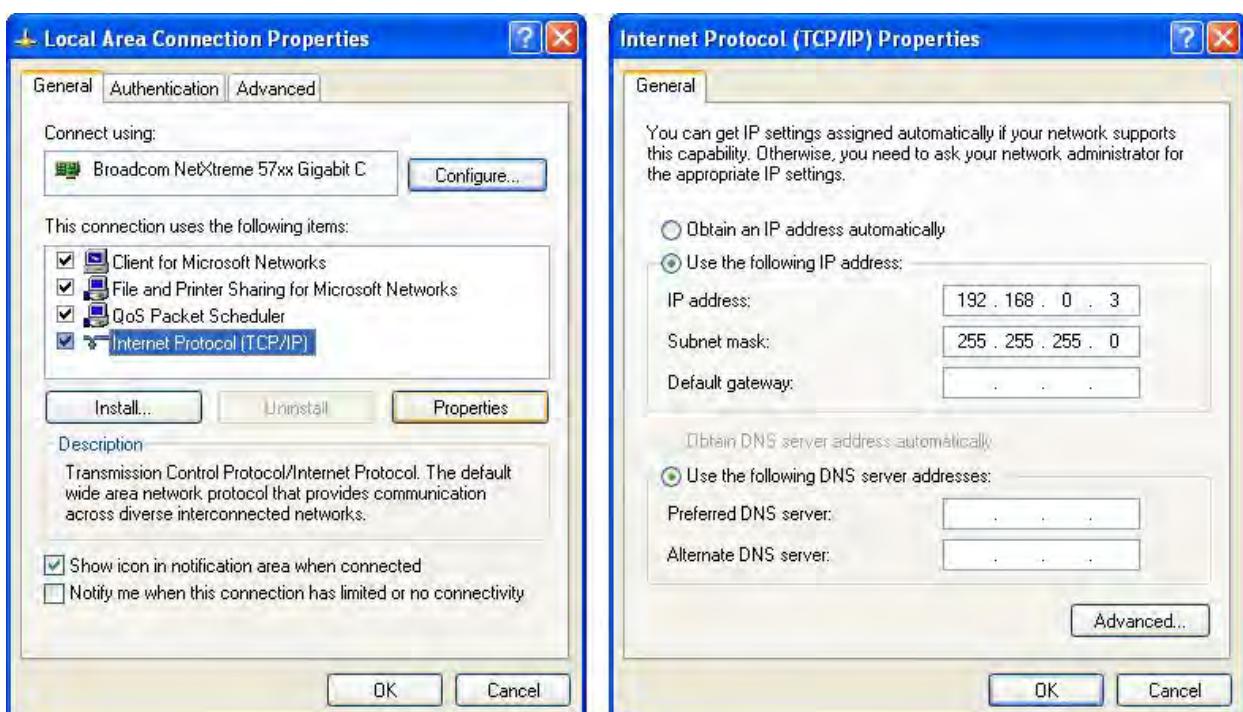


Figure 2 - Computer IP address setup: Part 2

2.4 Creating a New Logic Engine Script File

For the MultiSmart to recognise a Logic Engine file, it must:

- a) have the file extension ".lge" *
- b) have the file located in the correct directory (/var/config)
- c) be enabled (see Section 2.5)

*Note: *Ensure that the filename created is not of the form; filename.lge.txt – if so remove the second file extension (.txt or .doc).*

There are two ways to create a Logic Engine script file:

1. Using a Windows based text editor e.g. Notepad
2. Using a Linux based text editor e.g. VI

2.4.1 Using an Internet Browser to Transfer Files

Text files can be transferred into the MultiSmart unit using an Internet Browser. Corrections and changes can be made to the external copy of the file and then the file can be copied back to the MultiSmart.

Note, if the same file name is used or the name of another script file that has already been enabled on the MultiSmart is used, it avoids the need to restart the MultiSmart.

To establish an FTP session with a MultiSmart, enter the following command line into the Address bar of an Internet Browser.

ftp://Your_MultiSmart_IP_Address/var/config/

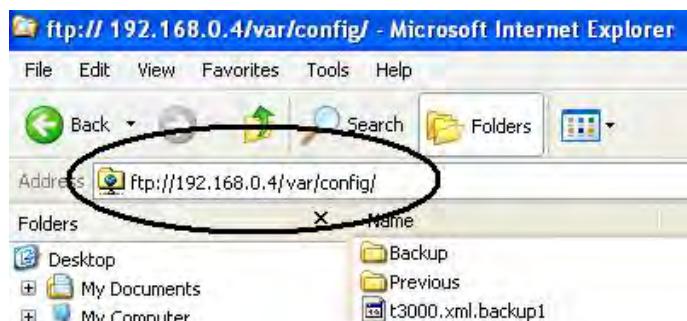


Figure 3 – MultiSmart access using an Internet browser.

A prompt should appear requesting a user name to be entered, followed by a password. A window of the files contained in the MultiSmart's /var/config directory should appear. The majority of these files will have the file extension .xml (HTML files). Under certain browser settings, access may be prevented, if so insert the user name and password of the MultiSmart into the Address bar as follows.

ftp://User_Name:Password@192.168.0.4/var/config/

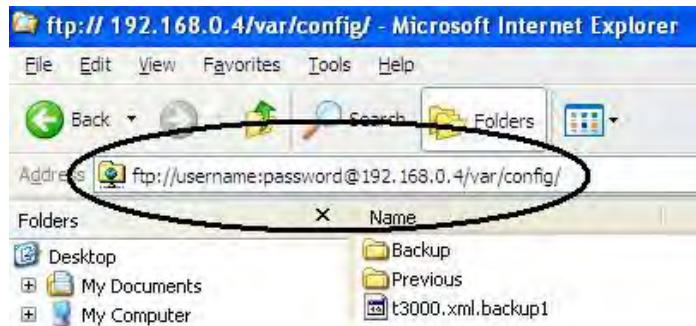


Figure 4 – Internet browser with username and password.

Note: If this address is saved as a favourite, it's saved without the user name and password and must be re-entered before it will allow access in the MultiSmart.

Now that an FTP session has been established, a Logic Engine script file can be copied and pasted (or dragged) into the current MultiSmart directory.

2.4.2 Using Putty to Gain Access to the MultiSmart

Putty an FTP program allows access to the MultiSmart and thereby allowing files to be created within the MultiSmart using the built-in text editor "VI".

Enter the IP address of the MultiSmart into Putty and select the **Open** button. (The IP address entered can be saved by selecting the **Save** button).

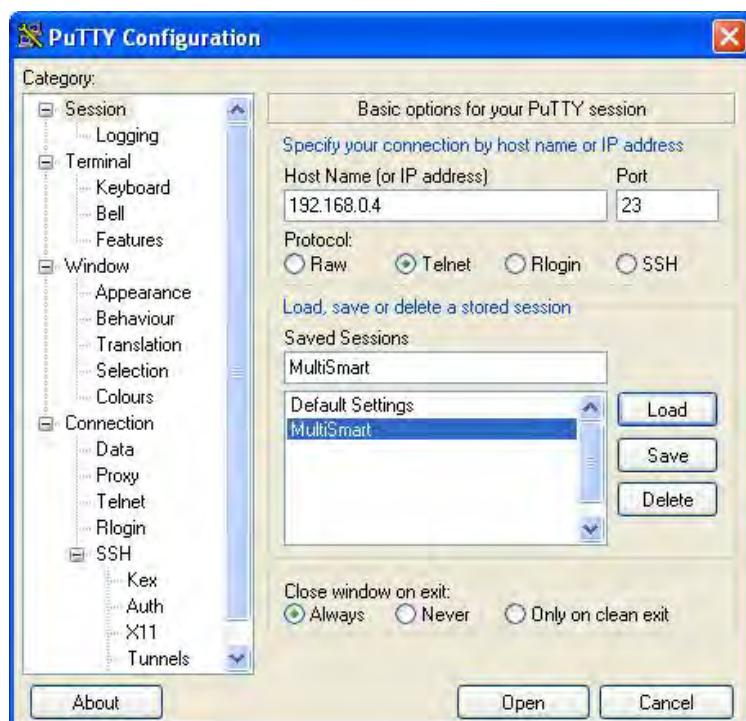


Figure 5 – PuTTY Configuration

A Putty window will open requesting the MultiSmart's user name followed by a password. Once access is granted, the Linux "\$" (dollar) prompt will appear.

Change to the correct directory before creating a file, i.e. at the \$ prompt type:

```
$ cd var/config.
```

The command to create (or open) a file is:

```
$ vi myfilename.lge
```

The file (myfilename.lge) will open if it already exists, if not, it will be created.

2.5 Enabling a Logic Engine File

To enable a Logic Engine file, go to:

Settings → **More ...** → **More ...** → **Logic Engine**

Highlight the file to be enabled and press the **Enable/Disable** button. Repeat for each file to be enabled.

The execution interval (in milliseconds) can also be set at this time. (This is the delay or the time between each successive execution of the script). Press **Save**, and **Restart Now**.

Once enabled, the Logic Engine script can be disabled and enabled without the need for a restart, however if the **Setup Wizard** is used, the Logic Engine file will need to be re-enabled.

2.6 Editing the Logic Engine Script File

Two different approaches can be taken in editing the Logic Engine file; use a Windows based text editor program or use the VI text editor within Linux / the MultiSmart.

The advantage of the Windows based text editor is that it has the “common” user interface, while VI’s interface is based on a combination of key strokes.

If the VI text editor is used, all operations are within the same operating system but a knowledge of the key commands is required - see the table; **Summary of Some Common VI Commands** below.

2.6.1 Using VI

VI has two modes of operation - *command* and *insert mode*.

Whenever a file is opened or created by VI, it always starts in command mode. To enter the insert mode, type ":i".(colon lower case i). Once in insert mode, text can be inserted and deleted in a similar manner to other text based programs. Use the **Backspace** key to delete (the **Delete** key has another function; it capitalises the three letters after and including the cursor position).

To save a file in VI, it's necessary to first return to command mode by pressing the "Esc" key and then type "**qw**" to save a file and exit. To exit, without saving, type "**q**".

VI Mode	Operation	Command
Command	Enter editing mode	:i (colon lower case i)
	Delete one or more characters	X or x
	Delete a line	dd
	Insert a line	I (capital I)
Insert	Exit editing mode	Esc (Escape key)
	Save	:w (colon lower case W)
	Save and quit	:wq (colon lower case W lower case Q)
	Quit without saving	:q! (colon lower case Q exclamation mark)

Table 1 - Summary of Common VI Commands

2.6.2 Useful Linux Commands

Some useful Linux commands are tabled below.

Category	Operation	Command
Files	List files	ls -l (ls space minus lower case L)
	To display the contents of a file	cat {filename.lge}
	Rename/copy a file	cp {existing filename.lge} {new filename.lge}
	Delete a file	rm {filename.lge}
Directory	Change directory up one level	cd .. (cd dot dot)
	Change directory	cd {directory name}.
	Return to the Root directory	cd /

Table 2 - Useful Linux Commands

2.7 Debugging the Logic Engine Script File

Since most syntax errors in the script are not detected and /or reported to the message log file, it pays to do the following:

- Visually double check the script for syntax errors
- Use the DBViewer (see Section 2.7.2) to check the tag names entered are correct
- Compare the use of functions with those in the examples
- Look through the message log file for logic engine related errors (see Section 2.7.5)

2.7.1 Multiple Sessions

As an aid to debugging, it's helpful to have multiple screens or login sessions with the MultiSmart. For example, one session to edit the script file, a second for the DBViewer and a third for the message log file.

2.7.2 Using DBViewer

This is a program within the MultiSmart that allows access the MultiSmart's tag database. To run the program type, "dbviewer" at the \$ prompt. To exit the program type, "X".

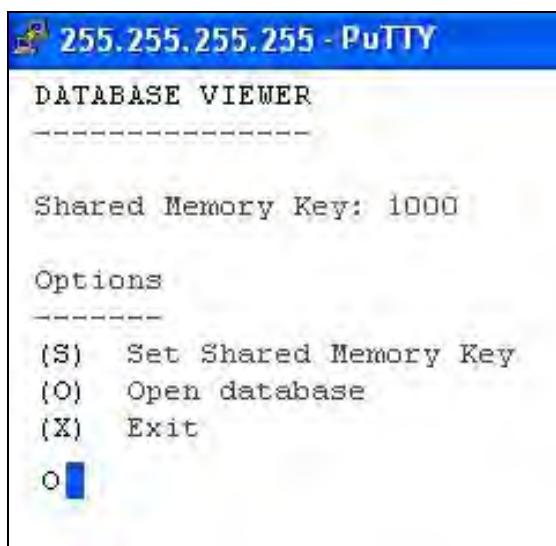


Figure 6 – DB Viewer Open Screen

- Enter "O" to open the database

```

255.255.255.255 - PuTTY

NODE LIST FOR NODE ""

Number of child nodes: 18
Number of tags: 0

INDEX CHILD NODE NUMBER OF TAGS
---- -----
 0 SnapShot           11
 1 IO                 2
 2 MotorProt          0
 3 SupplyProt          0
 4 Faults              14
 5 EventLogger          8
 6 CalcStats            1
 7 WatchDog             7
 8 Config                17
 9 DnpSlave              0
10 ModbusSlave            0
11 t3pm                  7
12 pppm                  8
13 Telemetry              0
14 PumpControl             9
15 Flow                  18
16 Logic                  0
17 Lcd                   13

(B) Back to previous screen
(V) View node
(S) Set number of tags to display (currently = 26)
(G) Go to tag index
(X) Exit

Select option: v
Enter node index: 17

```

Figure 7 – Parent Nodes

- To navigate use "V" and the appropriate index number.

```

255.255.255.255 - PuTTY

NODE LIST FOR NODE "Lcd"

Number of child nodes: 0
Number of tags: 13

INDEX CHILD NODE NUMBER OF TAGS
---- -----
(No child nodes to display)

(B) Back to previous screen
(T) View tags for this node
(S) Set number of tags to display (currently = 26)
(G) Go to tag index
(X) Exit

Select option: T

```

Figure 8 – LCD Child Node

- To view tags select "T" at the node.

TAG LIST FOR NODE "Lcd"						
INDEX	TAG	TYPE	VALUE	SET POINT	FLAGS	TIMESTAMP
0	Contrast	Integer	14		0x00000001	09:46:40.568
1	BackLightTimeout	Int Attr	3600	3600	0x00000001	
2	MainTimeout	Int Attr	900	900	0x00000001	
3	ScreenSaverTimeout	Int Attr	1200	1200	0x00000001	
4	Advanced	Bool Attr	1	1	0x00000001	
5	DemoCase	Bool Attr	0	0	0x00000001	
6	SecurityDinEnabled	Bool Attr	0	0	0x00000001	
7	SecurityDin	0Digital	2		0x00000001	09:46:45.857
8	LastLogInName	String				
9	LastLogInId	Integer	0		0x00000003	01/01/1970
10	InvalidPin	Integer	0		0x00000003	01/01/1970
11	FzInvalidPin	Integer	0		0x00000003	01/01/1970
12	InvalidAdmin	Integer	0		0x00000003	01/01/1970

(B) Back to previous screen
 (S) Set number of tags to display (currently = 19)
 (G) Go to tag index
 (V) Change tag value
 (C) Commit set point
 (D) Extra Tag Details
 (F) Change flags
 (T) Touch
 (X) Exit
 Any other key - Refresh screen

Select option:

Figure 9 – LCD Tags

- All the tags for that node are displayed.
- The "V" option can now be used to change the value of the tag.



NOTE:

If the DBViewer screen size is too small, the index number prompt is not displayed. If this occurs, either maximise the screen or reduce the number of lines displayed (command S) or enter the command and index number on the same line, e.g. V5.

On occasions the DBViewer may go into a "no node display" mode. If this occurs, exit and restart the program.

To minimise the risk of syntax errors entering the Logic Engine script, it's possible to copy and paste the tag name directly from DBViewer to the script file, however the procedure is slightly different to the usual cut and paste operation.

2.7.3 Linux to Windows - Copy and Paste

1. Highlight the text to be copied - DO NOT press the right mouse button.
2. Switch to the Windows program and paste as normal.

2.7.4 Linux to Linux - Copy and Paste

1. Highlight the text to be copied. ***DO NOT press the right mouse button.***
2. Switch to the other Linux window and click the right mouse button. The text will be pasted at the current cursor position (if the cursor position is incorrect it can be moved prior to the right click).

2.7.5 MultiSmart Message Log File

In the MultiSmart status and error messages are saved to a message log file. This file can be viewed by entering the following command.

```
$ tail -f /var/log/messages
```

To exit the message file, enter "Ctrl c".

If a syntax error is detected in the Logic Engine script, an error message may be displayed.

Following are three examples which illustrate the use of the log file.

2.7.5.1 Example 1 - Too Many Brackets

```
[user@Dreadnaught config]$ tail -f /var/log/messages
Jun 19 13:03:03 LOGIC[116]: Token:      )
Jun 19 13:03:03 LOGIC[116]: Position: 75
Jun 19 13:03:03 LOGIC[116]: Errc:      11
Jun 19 13:03:08 LOGIC[116]: Error:
Jun 19 13:03:08 LOGIC[116]: -----
Jun 19 13:03:08 LOGIC[116]: Message:  Missing parenthesis
Jun 19 13:03:08 LOGIC[116]: Formula:  Logic.Values.Integer04 =
valueof( ( "PumpControl.Well._1.MaxOnTime.Duration" )
```

The error is an extra bracket following "valueof". It should read:

```
... = valueof( "PumpControl.Well._1.MaxOnTime.Duration")
```

2.7.5.2 Example 2 - Capitalisation Incorrect

```
[user@Dreadnaught config]$ tail -f /var/log/messages
Jun 19 12:59:39 LOGIC[116]: Token:      (
Jun 19 12:59:39 LOGIC[116]: Position: 35
Jun 19 12:59:39 LOGIC[116]: Errc:      7
Jun 19 12:59:45 LOGIC[116]: Error:
Jun 19 12:59:45 LOGIC[116]: -----
Jun 19 12:59:45 LOGIC[116]: Message:  Unexpected parenthesis "(" at
position 35
Jun 19 12:59:45 LOGIC[116]: Formula:  Logic.Values.Integer01 =
if(Valueof("IO.Unit._1.TopBoard.Dout._5.ValueDigital") == 0, now(0),
Logic.Values.Integer01)
```

The reported error is an unexpected parenthesis but the actual error is a capital V was used in "Valueof". It should read "valueof".

2.7.5.3 Example 3

The code is:

```
Logic.Values.Integer01 = if(valueof("IO.Unit._1.TopBoard.Dout._5.  
Value") == 0, now(0), Logic.Values.Integer01)
```

```
[user@Dreadnaught config]$ tail -f /var/log/messages
```

No error messages are returned. The error is "Value", it should read "ValueDigital" so the complete line should read:

```
Logic.Values.Integer01 =  
if(valueof("IO.Unit._1.TopBoard.Dout._5.ValueDigital") == 0, now(0),  
Logic.Values.Integer01)
```

1.7 Programming Tips

- Debug, test and prove one line at a time.
- Use DBViewer to change the value of I/O points to test the script.
- Save a copy of the finished script file and the configuration file to a CF card. The following Linux copy command can be used to copy the script file to the CF card.

```
$ cp myfile.lge /mnt/cf/myfile.lge
```

NOTE:

If a full* firmware upgrade is performed on the MultiSmart, the Logic Engine script file will be overwritten. (* A full firmware upgrade is when the "Complete" option is chosen when using the PC upgrade program downloaded from the MultiTrode website rather than the "Firmware" option). A full firmware upgrade effectively deletes all files before installing the newer version).



NOTE:

A configuration file backup does not backup the Logic Engine script file. (From firmware version 1.4 the file will be backed up).



3 Programming

3.1 Arithmetic Operators

Operator	Description	Example
+	Addition	
-	Subtraction	
*	Multiplication	
/	Floating point division	
()	Parenthesis	
%	Modulus	

3.2 Relational Operators

Operator	Description	Example
>	Greater than	
>=	Greater or equal to	
<	Less than	
<=	Less than or equal to	
==	Equal to	
!=	Not equal to	

3.3 Logical Operators

Operator	Description	Example
and	Logical and	
or	Logical or	
xor	Logical exclusive or	
!	Logical not	

3.4 Mathematical Functions

Function	Description	Example
sin	Sine	
cos	Cosine	
tan	Tangent	
asin	Arc Sine	
acos	Arc Cosine	
atan	Arc Tangent	
sinh	Hyperbolic Sine	
cosh	Hyperbolic Cosine	
tanh	Hyperbolic Tangent	
log2	Logarithm to base 2	
log10	Logarithm to base 10	
ln	Natural Logarithm to base e	
log	Logarithm to base 10	
exp	e raised to the power of x	
sqrt	Square Root	
sign	Sign	
round	Round to nearest integer	
floor	Round down nearest integer	
ceil	Round up to nearest integer	
mod	Modulus	
^	Raise x to the power y	
abs	Absolute Value	
min	Minimum of an unlimited parameter list	
max	Maximum of an unlimited parameter list	
sum	Sum of an unlimited parameter list	

avg	Average of unlimited parameter list	
-----	-------------------------------------	--

3.5 Time and Date Related Functions

Function	Description	Example
year	Returns the year in local time.	
month	Returns the month of the year in local time.	
day	Returns the day of the month in local time.	
hour	Returns the hour of the day in 24 hr local time.	
minute	Returns the minutes of the current hour.	
second	Returns the seconds of the current minute.	
date	Convert a time broken into segments to sec's.	Date (1, 1, 2005, 12, 0, 0)
now	Get the current date/time in local time	Logic.Values.Integer01 = now(0)
delay	Pause the running of this expression for the number of milliseconds as specified by the delay parameter	Logic.Values.Integer01= delay(1000) Not recommended for any longer than a few seconds.

3.6 Comparison and Other Functions

Function	Description	Example
if	arg = if ... then ... else in the form; arg1 = if(arg2,arg3,arg4)	Logic.Values.Integer01 = if (10 > 1, 1, 0)
valueof <i>(deprecated as of V1.4.4)</i>	Get the value of a MultiSmart tag	valueof("Pump.1.Running")
scaledValue	Get the scaled value of an Analog or Analog Control Multismart tag.	scaledValue("Logic.Values.Analog20")
getFlags	Get the status flags of a MultiSmart Tag	getFlags("Pump.1.Running")

3.7 Scratch Pad Tags

Scratch Pad Tag	From	To
Analog	Logic.Values.Analog01	Logic.Values.Analog20
Digital	Logic.Values.Digital01	Logic.Values.Digital20
Fixed Point	Logic.Values.Decimal01	Logic.Values.Decimal20
Integer	Logic.Values.Integer01	Logic.Values.Integer20

3.8 Tag Status Flags

The status flags of a tag can be obtained by using the function "getFlags". The return value is an integer that represents all the flags status. Broken down into binary format, each bit of the integer represents one flag. If that bit is '1' the flag is active, if that bit is '0' then the flag is cleared.

To obtain the status of a single flag you must first filter the value returned from "getFlags". This can be done by using the 'and' operator with value returned from 'getFlags' and the filter value of the intended flag. The filter value of the intended flag can be calculated by raising 2 to the power of the flag's bit. For example, to get the Needs Commit flag (bit 11) you would need to following code:

```
NeedsCommitting = getFlags("Logic.Value.Integer01") and (2 ^ 11)
```

The order of the flags is represented below:

Flag	Bit
Online	0
Restart	1
Comms Lost	2
Remote Forced	3
Local Forced	4
Chatter Filter	5
Rollover	6
Over Range	7
Discontinuity	8
Reference Error	9
Non Volatile	10
Needs Commit	11
Configuration	12
Pre Validation	13
Post Validation	14
Control Error	15
Pending Flag	16
Not Configuration	17
Needs Saving	18
Setpoint Changed	19
Mathematical Error	20

The following section description each flag:

3.8.1 Online Flag

For input tags:

If clear, the tag is inactive or disabled and unable to obtain field data.

For output tags:

If clear, the output point is inactive, unavailable, out-of-service, not installed or operating in local mode only. The tag may not be observable or may not be controllable. Command sent to the tag may fail.

3.8.2 Restart Flag

The restart flag means that the tag has not been updated from the field since the device restarted.

For input tags:

If set, the tag is in the initialisation state, having a value that has never been update from the field since restart. The bit is cleared when the tag is first updated.

For output tags:

The Restart Flags shall only be set while a device is restarting. The flags shall be cleared after the device is available for local control tags. If the tag is a remote control tag then this flag shall remain set until it is overwritten from the remote device.

3.8.3 Comms Lost Flag

This flag indicates that there is a communications failure between the remote device where the data originates and the local device.

If set, the tag shall contain the last reported value before the communications were lost. It shall remain set until the value is updated from the remote device.

3.8.4 Remote Forced Flag

If set, the remote forced flags means that the tag's value is overridden by a remote device. Only a remote device will set this flag when the remote device overrides the tag's value.

3.8.5 Local Forced Flag

If set, the local forced flag indicated that the tag's value is overridden by the local device. This may be due to the device operating in a diagnostic or temporary mode or due to human intervention.

3.8.6 Chatter Filter Flag

This flag is not implemented on MultiSmart devices.

3.8.7 Rollover Flag

This flag is obsolete on MultiSmart devices.

3.8.8 Over Range Flag

This flag is only applicable to Analog Tags. If set, it indicates that the tag's value has exceeded the valid measurement range of the tag.

3.8.9 Discontinuity Flag

This flag is only applicable to tags used as counters. If set, its reported counter value cannot be compared against a prior value to obtain a "total counts".

In a local tag:

This flag is set when the counter value is reinitialised. The flag is cleared after a new value has been acquired and transmitted to the host.

In a remote tag:

This flag is set when the remote device reports the discontinuity and is cleared after a new value is acquired and transmitted.

Note: the resetting of a counter through the use of Freeze and Clear commands is normal operation that shall not set this flag.

3.8.10 Reference Error Flag

This flag is only applicable to Analog tags. If set, it indicates that the value might not have the expected level of accuracy. For example, the reference signal used in the analog to digital conversion process is out of limits or a calculated value has been contaminated with noise

3.8.11 Non-Volatile Flag

This flag is not being used on MultiSmart units.

3.8.12 Configuration Flag

This flag indicates that the tag's value is used to configure the device.

3.8.13 Pre-Validation Flag

This flag is not being used on the MultiSmart units.

3.8.14 Post-Validation Flag

This flag is not being used on the MultiSmart units.

3.8.15 Control Error Flag

This flag is set when there is an error executing a control on a control tag.

3.8.16 Pending Flag

This flag indicates that a control on a control tag is pending. When the flag is clear, after being set, the operation is complete.

3.8.17 Not Configuration Flag

This flag indicates that the tag is not used to configure a device. If the tag is an attribute tag (see section 4.2) and this flag is set, then the tag is used for configuration purposes but not to configure the local device.

3.8.18 Not Configuration Flag

This flag is used by attribute tags (see section 4.2) only. When set, it indicates that the attribute is not a configuration item. This normally the case when the attribute tags are sent over the communications links. The attribute being sent for configuration purposes but does not participate in the configuration of the device.

3.8.19 Needs Saving Flag

This flag is used only by attribute tags used for configuration of the unit. When set, it indicates that the tag's value needs to be saved to configuration.

3.8.20 Setpoint Changed Flag

This flag is only used by control tags only. When set, it indicates that the tag's setpoint value has been changed.

3.8.21 Mathematical Error Flag

This flag indicates that the last attempt at setting the tag's value result in a mathematical error. When this flag is set, the tag's value should not be trusted.

3.9 Conditional Evaluations

Using the expressions defined above, it is not possible to evaluate an expression only when a certain condition occurs. For example, consider the case where a control should be sent to a remote device when the remote device's level is not equal to the level of this device. This may be represented by the following pseudo code:

```
If Remote Level != Local Level then
    Remote Level Control = Local Level
End If
```

In other words, we only want to trigger the control when the remote level doesn't match the local level. The way to implement this is to create a second script. The second script is only responsible for sending the control, and the command will look like this:

```
RemoteControl=LocalLevel
```

The primary script will be responsible for controlling whether or not the second script is enabled. It will have a command like this:

```
Logic.Script._2.Enabled = if (RemoteLevel != LocalLevel, 1, 0)
```

By using this command, the second script will only be enabled when the remote level does not match the local level. It would normally be desirable to set the interval of the second script to be larger than that of the primary script. This way, the primary script would detect when the remote level has updated to be equal to the local level, and would quickly respond by disabling the second script.

3.10 Script Examples

3.10.1 Example 1 – Changing the Lead (Duty) Pump Setpoint from an Analog Input

```
PumpControl.Behaviour._1.ActSetPoint =  
valueof("IO.Unit._1.TopBoard.Ain._1.Value")*4
```

This example allows the Lead (Duty) pump to have its activation setpoint changed via an analog input. The left side of the expression above represents the activation setpoint for the Lead pump. The right side of the expression is AIN1 on the topboard is multiplied by a factor of 4. So if AIN1 is 15mA, the Lead pump setpoint will be 60%.

3.10.2 Example 2 – Start the station if an analog input falls below a certain value

```
Logic.Values.Digital01 = valueof("IO.Unit._1.TopBoard.Ain._2.Value") < 12
```

In this example, a logic engine tag is set to trigger the pulse start instead of the usual “ValueDigital”. (This is configured in the standard menus). The Logic Engine script is used to define when the pulse start is activated. So rather than activating in response to a digital input, the analog input is used to set the logic engine digital value when it passes a set value, in this case when it's smaller than 12.

3.10.3 Example 3 – Change pump mode if an analog input falls below a set value

```
PumpControl.Pump._1.PumpMode = 2 *  
(valueof("IO.Unit._1.TopBoard.Ain._2.Value") < 7)
```

If AIN2 is below 7mA, the value of the expression on the right = 2. This value for pump mode puts the pump into semi-automatic manual (i.e., manual until the pump reaches its deactivation setpoint, at which time it reverts to auto mode). If AIN2 is above 7mA the value of the expression on the right = 0. This puts the pump into Auto mode. The above expression could also be achieved by the following:

```
PumpControl.Pump._1.PumpMode = if  
(valueof("IO.Unit._1.TopBoard.Ain._2.Value") < 7, 2, 0)
```

3.10.4 Example 4 – Timer

```
Logic.Values.Integer04 = valueof("PumpControl.Well._1.MaxOnTime.Duration")
Logic.Values.Integer01 = if(valueof("IO.Unit._1.TopBoard.Dout._5.Value") == 0, now(0), Logic.Values.Integer01)
IO.Unit._1.TopBoard.Dout._5.Value =
if(valueof("Faults.General.GeneralFault._1.Status.Active") == 1, 1,
IO.Unit._1.TopBoard.Dout._5.Value)
Logic.Values.Integer02 = if(valueof("IO.Unit._1.TopBoard.Dout._5.Value") == 1, now(0), 0)
Logic.Values.Integer03 = if(valueof("IO.Unit._1.TopBoard.Dout._5.Value") == 1, (Logic.Values.Integer02 - Logic.Values.Integer01), 0)
IO.Unit._1.TopBoard.Dout._5.Value = if(valueof("Logic.Values.Integer03") >= valueof("PumpControl.Well._1.MaxOnTime.Duration"), 0,
IO.Unit._1.TopBoard.Dout._5.Value)
Faults.General.GeneralFault._1.Status.Unacknowledged = 0
```

A preset time duration (in milliseconds) is stored in PumpControl.Well._1.MaxOnTime.Duration (and copied to Integer04). When this time period expires, the Dout5 switches off.

If Dout5 is off, the current time using the "now" function is saved to Integer01. Once Dout5 becomes active (when General fault 01 becomes active) the time in Dout5 is no longer updated.

The current time is then saved to Integer02 and the difference between the times is stored in Integer03. It is then compared with the preset time period. When the difference is larger than or equal to the set time period, Dout5 is turned off. The general fault 01 is activated when another pump stops. The fault is acknowledged on every pass to stop it from flashing and the fault is cleared manually.

4 MultiSmart Tag List

4.1 Parent Nodes

#	Parent Node Description	Node Name
1	Calculated Statistics	CalcStats
2	Configuration	Config
3	DNP Slave	DnpSlave
4	Event Logger	EventLogger
5	Faults	Faults
6	Flow	Flow
7	I/O	IO
8	LCD	Lcd
9	Logic	Logic
10	Modbus Slave	ModbusSlave
11	Motor Protection	MotorProt
12	Point to Point Protocol Manager	pppm
13	Pump Control	PumpControl
14	Snap Shot	SnapShot
15	Supply Protection	SupplyProt
16	T3000 PumpView Modem Manager	t3pm
17	Telemetry	Telemetry
18	Watch Dog	WatchDog

4.2 Tag Data Types

Type Description	Description	Type
Alias Tag	@ Alias Tag	@Alias Tag
Analog	Analog Control	Alg Cntrl
Boolean	Boolean Attribute	Bool Attr
Date	Date	Date
	Date Attribute	Date Attr
Digital	@ Digital	@Digital
	@ Digital Control	@Dig Cntrl
	Digital	Digital
	Digital Control	Dig Cntrl
Fixed Point	@ Fixed Point	@Fixed Pt
	Fixed Point	Fixed Pt
	Fixed Point Attribute	FP Attr
Integer	@ Integer	@Integer
	Integer	Integer
	Integer Attribute	Int Attr
String	String	String
	String Attribute	Str Attr

4.3 Tag List

4.3.1 Calculated Statistics (1)

Tag Description	Tag Name	Type	Default
Restart	CalcStats.Restart	Dig Cntrl	0

4.3.2 Statistics^T (1.2)

Tag Description	Tag Name	Type	Default
Counter	CalcStats.Stats._1.Counter	*	
FreezePeriod	CalcStats.Stats._1.FreezePeriod	Int Attr	
Tag	CalcStats.Stats._1.Tag	@Fixed Pt	
Type	CalcStats.Stats._1.Type	Int Attr	

T Number of statistics is dependent on station configuration

* Tag type varies from tag to tag.

4.4 Configuration (2)

Tag Description	Tag Name	Type	Default
Application Failed	Config.AppFailed	Digital	
Backup	Config.Backup	Dig Cntrl	0
Backup Configuration	Config.BackupConfig	String	~Thu May 15 10:02:09 2008*
Base Directory	Config.BaseDirectory	String	/var/config*
Current Configuration	Config.CurrentConfig	String	~Mon Jun 4 10:24:07 2007*
Current Config Failed	Config.CurrentConfigFailed	Digital	
Date Format	Config.DateFormat	Str Attr	%d %b %Y, %H*
Loaded Configuration	Config.LoadedConfig	String	
Mac Address	Config.MacAddress	String	00:50:C2:59:A0:07*
Previous Configuration	Config.PreviousConfig	String	~Mon Jun 4 10:19:59 2007*
Previous Config Failed	Config.PreviousConfigFailed	Digital	
Restore Backup	Config.RestoreBackup	Dig Cntrl	0
Restore Previous	Config.RestorePrevious	Dig Cntrl	0
Save	Config.Save	Dig Cntrl	0
Snapshot Started	Config.SnapshotStarted	Digital	
Upload	Config.Upload	Dig Cntrl	0
Upload Directory	Config.UploadDirectory	String	/tmp/multismart/config

* These values are examples of the string format

4.5 DNP Slave 1 (3)

Tag Description
Session
Link
Comms
dins
dots
ains
aots
counters
frzncounters
strings
vterm
files

* For tags names refer to the DBViewer

4.6 Event Logger (4)

For tags names refer to the DBViewer.

4.7 Faults (5)

4.7.1 Station Faults (5.1)

Tag Description	Tag Name	Type	Default
DC Over Voltage	Faults.Station.DCOverVoltage.Status.Active		
	Faults.Station.DCOverVoltage.Status.Unacknowledged		
DC Under Voltage	Faults.Station.DCUnderVoltage.Status.Active		
	Faults.Station.DCUnderVoltage.Status.Unacknowledged		
MaxOffTime	Faults.Station.MaxOffTime.Status.Active		
	Faults.Station.MaxOffTime.Status.Unacknowledged		
MaxOnTime	Faults.Station.MaxOnTime.Status.Active		
	Faults.Station.MaxOnTime.Status.Unacknowledged		
OverVoltage	Faults.Station.OverVoltage.Status.Active		
	Faults.Station.OverVoltage.Status.Unacknowledged		
PowerFail	Faults.Station.PowerFail.Status.Active		
	Faults.Station.PowerFail.Status.Unacknowledged		
UnderVoltage	Faults.Station.UnderVoltage.Status.Active		
	Faults.Station.UnderVoltage.Status.Unacknowledged		
Volts Phase Imbalance Status	Faults.Station.VoltsPhaseImbalanceStatus.Active		
	Faults.Station.VoltsPhaseImbalanceStatus.Unacknowledged		
Volts Phase Rotation	Faults.Station.VoltsPhaseRotation.Status.Active		
	Faults.Station.VoltsPhaseRotation.Status.Unacknowledged		

4.7.2 Well Faults (5.2)

Tag Description	Tag Name	Type	Default
Backup Level Ain Over Range	Faults.Well._1.BackupLevelAinOverRange.Status.Active		
	Faults.Well._1.BackupLevelAinOverRange.Status.Unacknowledged		
BackupLevelAin UnderRange	Faults.Well._1.BackupLevelAinUnderRange.Status.Active		
	Faults.Well._1.BackupLevelAinUnderRange.Status.Unacknowledged		
Backup Level Invalid	Faults.Well._1.BackupLevelInvalid.Status.Active		
	Faults.Well._1.BackupLevelInvalid.Status.Unacknowledged		
High High Level	Faults.Well._1.HighHighLevel.Status.Active		
	Faults.Well._1.HighHighLevel.Status.Unacknowledged		
High Level	Faults.Well._1.HighLevel.Status.Active		
	Faults.Well._1.HighLevel.Status.Unacknowledged		
Low Level	Faults.Well._1.LowLevel.Status.Active		
	Faults.Well._1.LowLevel.Status.Unacknowledged		
Low Low Level	Faults.Well._1.LowLowLevel.Status.Active		
	Faults.Well._1.LowLowLevel.Status.Unacknowledged		
Primary Level High Range	Faults.Well._1.PrimaryLevelHighRange.Status.Active		
	Faults.Well._1.PrimaryLevelHighRange.Status.Unacknowledged		
Primary Level Low Range	Faults.Well._1.PrimaryLevelLowRange.Status.Active		
	Faults.Well._1.PrimaryLevelLowRange.Status.Unacknowledged		
Primary Level Invalid	Faults.Well._1.PrimaryLevelInvalid.Status.Active		
	Faults.Well._1.PrimaryLevelInvalid.Status.Unacknowledged		
Primary Level AinOverRange	Faults.Well._1.PrimaryLevelAinOverRange.Status.Active		
	Faults.Well._1.PrimaryLevelAinOverRange.Status.Unacknowledged		
PrimaryLevelAinUnder Range	Faults.Well._1.PrimaryLevelAinUnderRange.Status.Active		
	Faults.Well._1.PrimaryLevelAinUnderRange.Status.Unacknowledged		

4.7.3 Pump 1 Faults (5.3)

Tag Description	Tag Name	Type	Default
AmpsPhaseImbalance	Faults.Pump._1.AmpsPhaseImbalance.Status.Active		
	Faults.Pump._1.AmpsPhaseImbalance.Status.Unacknowledged		
AmpsPhaseRotation	Faults.Pump._1.AmpsPhaseRotation.Status.Active		
	Faults.Pump._1.AmpsPhaseRotation.Status.Unacknowledged		
CBOffTrip	Faults.Pump._1.CBOffTrip.Status.Active		
	Faults.Pump._1.CBOffTrip.Status.Unacknowledged		
ClsSeal	Faults.Pump._1.ClsSeal.Status.Active		
	Faults.Pump._1.ClsSeal.Status.Unacknowledged		
ClsThermal	Faults.Pump._1.ClsThermal.Status.Active		
	Faults.Pump._1.ClsThermal.Status.Unacknowledged		
Contactor Auxiliary	Faults.Pump._1.ContactorAux.Status.Active		
	Faults.Pump._1.ContactorAux.Status.Unacknowledged		
DelayFail	Faults.Pump._1.DelayFail.Status.Active		
	Faults.Pump._1.DelayFail.Status.Unacknowledged		
EarthFault	Faults.Pump._1.EarthFault.Status.Active		
	Faults.Pump._1.EarthFault.Status.Unacknowledged		
High Flow Fault	Faults.Pump._1.Flow.HighFlowFault.Status.Active		
	Faults.Pump._1.Flow.HighFlowFault.Status.Unacknowledged		
High Flow Warning	Faults.Pump._1.Flow.HighFlowWarning.Status.Active		
	Faults.Pump._1.Flow.HighFlowWarning.Status.Unacknowledged		
Low Flow Fault	Faults.Pump._1.Flow.LowFlowFault.Status.Active		
	Faults.Pump._1.Flow.LowFlowFault.Status.Unacknowledged		
Low Flow Warning	Faults.Pump._1.Flow.LowFlowWarning.Status.Active		
	Faults.Pump._1.Flow.LowFlowWarning.Status.Unacknowledged		
FLS Seal	Faults.Pump._1.FlsSeal.Status.Active		
	Faults.Pump._1.FlsSeal.Status.Unacknowledged		
FLS Thermal	Faults.Pump._1.FlsThermal.Status.Active		
	Faults.Pump._1.FlsThermal.Status.Unacknowledged		
IRT (Current Resistance Testing)	Faults.Pump._1.IRT.Status.Active		
	Faults.Pump._1.IRT.Status.Unacknowledged		
Maximum Starts	Faults.Pump._1.MaxStarts.Status.Active		
	Faults.Pump._1.MaxStarts.Status.Unacknowledged		
Motor Over-temp	Faults.Pump._1.MotorOvertemp.Status.Active		
	Faults.Pump._1.MotorOvertemp.Status.Unacknowledged		
Over Current	Faults.Pump._1.OverCurrent.Status.Active		
	Faults.Pump._1.OverCurrent.Status.Unacknowledged		
Seal	Faults.Pump._1.Seal.Status.Active		
	Faults.Pump._1.Seal.Status.Unacknowledged		
Thermal Overload	Faults.Pump._1.ThermalOverload.Status.Active		
	Faults.Pump._1.ThermalOverload.Status.Unacknowledged		
Under Current	Faults.Pump._1.UnderCurrent.Status.Active		
	Faults.Pump._1.UnderCurrent.Status.Unacknowledged		

4.8 Flow (6)

Tag Description	Tag Name	Type	Default
Averaging Cycles	Flow.AveragingCycles	Int Attr	0
Enabled	Flow.Enabled	Bool Attr	0
Frz OverflowVolume	Flow.FrzOverflowVolume	Fixed Pt	
Frz Volume Pumped	Flow.FrzVolumePumped	Fixed Pt	
Inflow Rate	Flow.InflowRate	Fixed Pt	
Last Overflow Time	Flow.LastOverflowTime	Date	
Mode	Flow.Mode	Int Attr	0
Outflow Meter	Flow.OutflowMeter	@Alias Tag	
Overflow	Flow.Overflow	Digital	
Overflow Enabled	Flow.OverflowEnabled	Bool Attr	0
Overflow Volume	Flow.OverflowVolume	Fixed Pt	
Units	Flow.Units	Int Attr	0
Volume Last Week	Flow.VolumeLastWeek	Fixed Pt	
Volume Meter	Flow.VolumeMeter	@Alias Tag	
Volume Pumped	Flow.VolumePumped	Fixed Pt	
Volume This Week	Flow.VolumeThisWeek	Fixed Pt	
Volume Today	Flow.VolumeToday	Fixed Pt	
Volume Yesterday	Flow.VolumeYesterday	Fixed Pt	

4.8.1 Flow (6.1)

Tag Description	Tag Name	Type	Default
Current Level	Flow.Level.CurrentLevel	@Fixed Pt	
Overflow Level	Flow.Level.OverflowLevel	FP Attr	0.0000

4.8.1.1 Sensor 1 (6.1.1)

Tag Description	Tag Name	Type	Default
Percentage	Flow.Level.Sensor._1.Percentage	FP Attr	100
Volume	Flow.Level.Sensor._1.Volume	FP Attr	1000

4.8.1.2 Sensor 10 (6.1.2)

Tag Description	Tag Name	Type	Default
Percentage	Flow.Level.Sensor._10.Percentage	FP Attr	10
Volume	Flow.Level.Sensor._10.Volume	FP Attr	100

4.8.2 Pump 1 – Flow (6.2)

Tag Description	Tag Name	Type	Default
Flow Rate	Flow.Pump._1.FlowRate	Fixed Pt	
Frz Volume Pumped	Flow.Pump._1.FrzVolumePumped	Fixed Pt	
Nominal Flow Rate	Flow.Pump._1.NominalFlowRate	Fp Attr	100
Running	Flow.Pump._1.Running	@ Digital	
Volume Pumped	Flow.Pump._1.VolumePumped	Fixed Pt	
Volume Today	Flow.Pump._1.VolumeToday	Fixed Pt	
Volume Yesterday	Flow.Pump._1.Volume Yesterday	Fixed Pt	

4.8.2.1 Alarm 1 – Pump 1 (6.2.1)

Tag Description	Tag Name	Type	Default
Active	Flow.Pump._1.Alarm._1.Active	Digital	
AlarmLevel	Flow.Pump._1.Alarm._1.AlarmLevel	FP Attr	150
Enabled	Flow.Pump._1.Alarm._1.Enabled	Bool Attr	0
HighLow	Flow.Pump._1.Alarm._1.HighLow	Bool Attr	1

4.8.2.2 Alarm 2 – Pump 1 (6.2.2)

Tag Description	Tag Name	Type	Default
Active	Flow.Pump._1.Alarm._2.Active	Digital	
AlarmLevel	Flow.Pump._1.Alarm._2.AlarmLevel	FP Attr	150
Enabled	Flow.Pump._1.Alarm._2.Enabled	Bool Attr	0
HighLow	Flow.Pump._1.Alarm._2.HighLow	Bool Attr	1

4.8.2.3 Alarm 3 – Pump 1 (6.2.3)

Tag Description	Tag Name	Type	Default
Active	Flow.Pump._1.Alarm._3.Active	Digital	
AlarmLevel	Flow.Pump._1.Alarm._3.AlarmLevel	FP Attr	150
Enabled	Flow.Pump._1.Alarm._3.Enabled	Bool Attr	0
HighLow	Flow.Pump._1.Alarm._3.HighLow	Bool Attr	1

4.8.2.4 Alarm 4 - Pump 1 (6.2.4)

Tag Description	Tag Name	Type	Default
Active	Flow.Pump._1.Alarm._4.Active	Digital	
AlarmLevel	Flow.Pump._1.Alarm._4.AlarmLevel	FP Attr	150
Enabled	Flow.Pump._1.Alarm._4.Enabled	Bool Attr	0

HighLow	Flow.Pump._1.Alarm._4.HighLow	Bool Attr	1
---------	-------------------------------	-----------	---

4.9 I/O (7)

4.9.1 General (7.1)

Tag Description	Tag Name	Type	Default
Value	IO.Unit._1.DcVolts.Input.Value		
Temp	IO.Unit._1.System.Temp		

4.9.2 Ain_1 – Top Board (7.2)

Tag Description	Tag Name	Type	Default
Value	IO.Unit._1.TopBoard.Ain._1.Value		

4.9.3 Aout_1 - Top Board (7.3)

Tag Description	Tag Name	Type	Default
RemoteSource	IO.Unit._1.TopBoard.Aout._1.RemoteSource		
Value	IO.Unit._1.TopBoard.Aout._1.Value		

4.9.4 Din_1 – Top Board (7.4)

Tag Description	Tag Name	Type	Default
CalibACA	IO.Unit._1.TopBoard.Din._1.CalibACA	Integer	
CalibACC	IO.Unit._1.TopBoard.Din._1.CalibACC	Integer	
CalibACM	IO.Unit._1.TopBoard.Din._1.CalibACM	Integer	
CalibDCA	IO.Unit._1.TopBoard.Din._1.CalibDCA	Integer	
CalibDCC	IO.Unit._1.TopBoard.Din._1.CalibDCC	Integer	
CalibDCM	IO.Unit._1.TopBoard.Din._1.CalibDCM	Integer	
CalibPTA	IO.Unit._1.TopBoard.Din._1.CalibPTA	Integer	
CalibPTC	IO.Unit._1.TopBoard.Din._1.CalibPTC	Integer	
CalibPTM	IO.Unit._1.TopBoard.Din._1.CalibPTM	Integer	
Delayms	IO.Unit._1.TopBoard.Din._1.Delayms	Int Attr	0
Description	IO.Unit._1.TopBoard.Din._1.Description	Str Attr	DIN.1
DinType	IO.Unit._1.TopBoard.Din._1.DinType	Int Attr	3
EdgeCount	IO.Unit._1.TopBoard.Din._1.EdgeCount	Digital	
EdgeMode	IO.Unit._1.TopBoard.Din._1.EdgeMode	Int Attr	1
FrzValueDigital	IO.Unit._1.TopBoard.Din._1.FrzValueDigital	Digital	
FSAActive	IO.Unit._1.TopBoard.Din._1.FSAActive	Dig Cntrl	0
Invert	IO.Unit._1.TopBoard.Din._1.Invert	Bool Attr	0
ModeFS	IO.Unit._1.TopBoard.Din._1.ModeFS	Int Attr	1
ScaleFactor	IO.Unit._1.TopBoard.Din._1.ScaleFactor	FP Attr	1.00
Sensitivity	IO.Unit._1.TopBoard.Din._1.Sensitivity	FP Attr	20000.00
UsedByProbe	IO.Unit._1.TopBoard.Din._1.UsedByProbe	Digital	
ValueDigital	IO.Unit._1.TopBoard.Din._1.ValueDigital	Digital	
ValueResistance	IO.Unit._1.TopBoard.Din._1.ValueResistance	Fixed Pt	
ValueScaled	IO.Unit._1.TopBoard.Din._1.ValueScaled	Fixed Pt	

4.9.5 Dout 1 – Top Board (7.5)

Tag Description	Tag Name	Type	Default
RemoteSource	IO.Unit._1.TopBoard.Dout._1.RemoteSource		
Value	IO.Unit._1.TopBoard.Dout._1.Value		

4.9.6 Vin 1 - Top Board (7.6)

Tag Description	Tag Name	Type	Default
Volts Ab	IO.Unit._1.TopBoard.Vin._1.VoltsAb		
Volts Bc	IO.Unit._1.TopBoard.Vin._1.VoltsBc		
Volts Ca	IO.Unit._1.TopBoard.Vin._1.VoltsCa		

4.9.7 Bottom Board (7.7)

Tag Description	Tag Name	Type	Default
Amps A	IO.Unit._1.BottomBoard.lin._1.AmpsA		
Amps B	IO.Unit._1.BottomBoard.lin._1.AmpsB		
Amps C	IO.Unit._1.BottomBoard.lin._1.AmpsC		
Energy kWh	IO.Unit._1.BottomBoard.Power._1.EnergykWh		
Irt._1	IO.Unit._1.BottomBoard.Irt._1.Value		
Irt._2	IO.Unit._1.BottomBoard.Irt._2.Value		
Irt._3	IO.Unit._1.BottomBoard.Irt._3.Value		
Power	IO.Unit._1.BottomBoard.Power._1.Power		
Power Factor	IO.Unit._1.BottomBoard.Power._1.PowerFactor		

4.10 LCD (8)

Tag Description	Tag Name	Type	Default
Advanced	Lcd.Advanced	Bool Attr	1
Back Light Timeout	Lcd.BackLightTimeout	Int Attr	3600
Contrast	Lcd.Contrast	Integer	14
Demo Case	Lcd.DemoCase	Bool Attr	0
Freeze Invalid Pin	Lcd.FrzInvalidPin	Integer	0
Invalid Admin Pin Count	Lcd.InvalidAdmin	Integer	0
Invalid Pin Count	Lcd.InvalidPin	Integer	0
Last Login ID	Lcd.LastLoginId	Integer	0
Last Login Name	Lcd.LastLoginName	String	0
Main Timeout	Lcd.MainTimeout	Int Attr	900
Screen Saver Timeout	Lcd.ScreenSaverTimeout	Int Attr	1200
Security Din	Lcd.SecurityDin	@Digital	0
Security Din Enabled	Lcd.SecurityDinEnabled	Bool Attr	0

4.11 Logic (9)

For the Tag names refer to the DBViewer.

4.12 ModBus (10)

4.12.1 Session – Slave 1 (10.1)

Tag Description	Tag Name	Type	Default
Active	ModbusSlave.Slave._1.Session.Active	Bool Attr	1
Comms Channel	ModbusSlave.Slave._1.Session.CommsChannel	Int Attr	1
Max Appl Msgs	ModbusSlave.Slave._1.Session.MaxApplMsgs	Int Attr	10
Max Channels	ModbusSlave.Slave._1.Session.MaxChannels	Int Attr	10
Max Sessions	ModbusSlave.Slave._1.Session.MaxSessions	Int Attr	10
Slave Address	ModbusSlave.Slave._1.Session.SlaveAddress	Int Attr	1

4.12.2 Link – Slave 1 (10.2)

Tag Description	Tag Name	Type	Default
MaxQueueSize	ModbusSlave.Slave._1.Link.MaxQueueSize	Int Attr	2000
RxTimeout	ModbusSlave.Slave._1.Link.RxTimeout	Int Attr	15000
Type	ModbusSlave.Slave._1.Link.Type	Int Attr	1

4.12.3 Comms – Slave 1 (10.3)

Tag Description	Tag Name	Type	Default
Coil Outputs	ModbusSlave.Slave._1.Comms.CoilOutputs	Integer	
Coil Scans	ModbusSlave.Slave._1.Comms.CoilScans	Integer	
Comms Fail	ModbusSlave.Slave._1.Comms.CommsFail	Digital	
Comms Fail Time	ModbusSlave.Slave._1.Comms.CommsFailTime	Int Attr	
Disc Input Scans	ModbusSlave.Slave._1.Comms.DiscInputScans	Integer	
Errors	ModbusSlave.Slave._1.Comms.Errors	Integer	
Holding Reg Outputs	ModbusSlave.Slave._1.Comms.HoldingRegOutputs	Integer	
Holding Reg Scans	ModbusSlave.Slave._1.Comms.HoldingRegScans	Integer	
Input Reg Scans	ModbusSlave.Slave._1.Comms.InputRegScans	Integer	
Online	ModbusSlave.Slave._1.Comms.Online	Digital	
Overflows	ModbusSlave.Slave._1.Comms.Overflows	Integer	
Received	ModbusSlave.Slave._1.Comms.Received	Integer	
Request Timeouts	ModbusSlave.Slave._1.Comms.RequestTimeouts	Integer	
Restarts	ModbusSlave.Slave._1.Comms.Restarts	Integer	
Transmitted	ModbusSlave.Slave._1.Comms.Transmitted	Integer	

4.12.4 Discrete Input Registers – Slave 1 (Range: 0 - 257) (10.4)

Tag Description	Tag Name	Type	Default
Point Number	ModbusSlave.Slave._1.discininputs._0.PointNumber	Int Attr	0
Tag	ModbusSlave.Slave._1.discininputs._0.Tag	*	
...
Point Number	ModbusSlave.Slave._1.discininputs._257.PointNumber	Int Attr	0
Tag	ModbusSlave.Slave._1.discininputs._257.Tag	*	

* Tag type is register dependent

4.12.5 Coils - Slave 1 (Range: 0 - 42) (10.5)

Tag Description	Tag Name	Type	Default
PointNumber	ModbusSlave.Slave._1.coils._0.PointNumber	Int Attr	
Tag	ModbusSlave.Slave._1.coils._0.Tag	*	
WriteValue	ModbusSlave.Slave._1.coils._0.WriteValue	Bool Attr	
...
PointNumber	ModbusSlave.Slave._1.coils._42.PointNumber	Int Attr	
Tag	ModbusSlave.Slave._1.coils._42.Tag	*	
WriteValue	ModbusSlave.Slave._1.coils._42.WriteValue	Bool Attr	

* Tag type is register dependent

4.12.6 Input Registers - Slave 1 (Range 0 - 148) (10.6)

Tag Description	Tag Name	Type	Default
DivideBy	ModbusSlave.Slave._1.inputregs._0.DivideBy	Int Attr	1
DoublePoint	ModbusSlave.Slave._1.inputregs._0.DoublePoint	Bool Attr	0
PointNumber	ModbusSlave.Slave._1.inputregs._0.PointNumber	Int Attr	0
Tag	ModbusSlave.Slave._1.inputregs._0.Tag	*	0
...
DivideBy	ModbusSlave.Slave._1.inputregs._148.DivideBy	Int Attr	1
DoublePoint	ModbusSlave.Slave._1.inputregs._148.DoublePoint	Bool Attr	0
PointNumber	ModbusSlave.Slave._1.inputregs._148.PointNumber	Int Attr	0
Tag	ModbusSlave.Slave._1.inputregs._148.Tag	*	0

* Tag type is register dependent

4.12.7 Holding Registers - Slave 1 (Range 0 -121) (10.7)

Tag Description	Tag Name	Type	Default
DivideBy	ModbusSlave.Slave._1.holdingregs._0.DivideBy	Int Attr	1
DoublePoint	ModbusSlave.Slave._1.holdingregs._0.DoublePoint	Bool Attr	0
PointNumber	ModbusSlave.Slave._1.holdingregs._0.PointNumber	Int Attr	0
Tag	ModbusSlave.Slave._1.holdingregs._0.Tag	*	
WriteValue	ModbusSlave.Slave._1.holdingregs._0.WriteValue	Bool Attr	0
...
DivideBy	ModbusSlave.Slave._1.holdingregs._121.DivideBy	Int Attr	1
DoublePoint	ModbusSlave.Slave._1.holdingregs._121.DoublePoint	Bool Attr	0
PointNumber	ModbusSlave.Slave._1.holdingregs._121.PointNumber	Int Attr	0
Tag	ModbusSlave.Slave._1.holdingregs._121.Tag	*	
WriteValue	ModbusSlave.Slave._1.holdingregs._121.WriteValue	Bool Attr	0

* Tag type is register dependent

4.13 Point to Point Protocol Manager (pppm) (12)

Tag Description	Tag Name	Type	Default
Enabled	pppm.ModemHardReset.Enabled	Bool Attr	0
Reset_DOUT_Command	pppm.ModemHardReset.Reset_DOUT_Command	@Alias Tag	
Connect_Counter_Reset	pppm.ModemHardReset.Connect_Counter_Reset	Bool Attr	0
Max_Failed_Connections	pppm.ModemHardReset.Max_Failed_Connections	Int Attr	3
DOUT_Reset_Method	pppm.ModemHardReset.DOUT_Reset_Method	Int Attr	0

4.14 Pump Control (13)

Summary of Main Nodes in Pump Control

#	Tag Description	Tag Name	Tags / Node
13.1	Behaviour	Behaviour	
13.2	Delay Fault	DelayFault	
13.3	Desired Pump Starts	DesiredStarts	
13.4	Fault Input	FaultInput	
13.5	Fault Statistics	FaultStatistics	
13.6	Group	Group	
13.7	Maximum Groups Running	MaxGroupsRunning	
13.8	Maximum Off Time	MaxOffTime	
13.9	Maximum On Time	MaxOnTime	
13.10	Maximum Pumps Running	MaxPumpsRunning	
13.11	Maximum Starts	MaxStarts	
13.12	Profile	Profile	
13.13	Pulse Start	PulseStart	
13.14	Pulse Stop	PulseStop	
13.15	Pump	Pump	
13.16	Pumps Summary	PumpsSummary	
13.17	Statistics	Statistics	
13.18	Statistics Window	StatisticsWindow	
13.19	VFD (Variable Frequency Drive)	VFD	
13.20	Well	Well	
13.21	Well Clean Out	WellCleanOut	

4.14.1 Behaviour (13.1)

Tag Description	Tag Name	Type	Default
Activation SetPoint 1	PumpControl.Behaviour._1.ActSetPoint		
Activation SetPoint 2	PumpControl.Behaviour._2.ActSetPoint		
Activation SetPoint 3	PumpControl.Behaviour._3.ActSetPoint		
Activation SetPoint 4	PumpControl.Behaviour._4.ActSetPoint		
Deactivation SetPoint 1	PumpControl.Behaviour._1.DeactSetPoint		
Deactivation SetPoint 2	PumpControl.Behaviour._2.DeactSetPoint		
Deactivation SetPoint 3	PumpControl.Behaviour._3.DeactSetPoint		
Deactivation SetPoint 4	PumpControl.Behaviour._4.DeactSetPoint		

4.14.2 Delay Fault (13.2)

Tag Description	Tag Name	Type	Default
All Pumps	PumpControl.DelayFault._1.AllPumps	Bool Attr	0
Complete Fault	PumpControl.DelayFault._1.CompleteFault	Digital	0
Delay	PumpControl.DelayFault._1.Delay	FP Attr	2.000
Invert Source	PumpControl.DelayFault._1.InvertSource	Bool Attr	1
Retries Allowed	PumpControl.DelayFault._1.RetriesAllowed	Int Attr	0
Retries Remaining	PumpControl.DelayFault._1.RetriesRemaining	Integer	0
Retry Fault	PumpControl.DelayFault._1.RetryFault	Digital	0
Source	PumpControl.DelayFault._1.Source	@Alias Tag	

4.14.3 Desired Pump Starts (13.3)

Tag Description	Tag Name	Type	Default
Current Adj	PumpControl.DesiredStarts.CurrentAdj	Fixed Pt	0.0000
Enabled	PumpControl.DesiredStarts.Enabled	Bool Attr	0
Level Adj	PumpControl.DesiredStarts.LevelAdj	FP Attr	10.0000
Override Level	PumpControl.DesiredStarts.OverrideLevel	FP Attr	90.0000
Reset Adj	PumpControl.DesiredStarts.ResetAdj	Dig Cntrl	0
Target Period	PumpControl.DesiredStarts.TargetPeriod	FP Attr	300.000
Target Window	PumpControl.DesiredStarts.TargetWindow	FP Attr	30.000

4.14.4 Fault Input (13.4)

Tag Description	Tag Name	Type	Default
Any Fault Active	PumpControl.FaultInput.AnyFaultActive	@Digital	0
Fault Status	PumpControl.FaultInput.FaultStatus	Integer	0
Holdout Active	PumpControl.FaultInput.HoldoutActive	Digital	0
Ignore Delay	PumpControl.FaultInput.IgnoreDelay	Digital	0
No Manual Override	PumpControl.FaultInput.NoManualOverride	Digital	0
No Semi-Auto Override	PumpControl.FaultInput.NoSemiAutoOverride	Digital	0
Status Summary	PumpControl.FaultInput.StatusSummary	Integer	0
Unacknowledged	PumpControl.FaultInput.Unacknowledged	Digital	0
Unavailable Active	PumpControl.FaultInput.UnavailableActive	Digital	0

4.14.5 Fault Statistics (13.5)

Tag Description	Tag Name	Type	Default
Faults Last Week	PumpControl.FaultStatistics.FaultsLastWeek	Integer	0
Faults This Week	PumpControl.FaultStatistics.FaultsThisWeek	Integer	1
Faults Today	PumpControl.FaultStatistics.FaultsToday	Integer	1
Faults Yesterday	PumpControl.FaultStatistics.FaultsYesterday	Integer	0
Frz Total Fault Count	PumpControl.FaultStatistics.FrzTotalFaultCount	Integer	0
Frz Total Fault Time	PumpControl.FaultStatistics.FrzTotalFaultTime	Fixed Pt	0.0
Holdout Fault Count	PumpControl.FaultStatistics.HoldoutFaultCount	Integer	0
Holdout Fault Time	PumpControl.FaultStatistics.HoldoutFaultTime	Fixed Pt	0.0
Total Fault Count	PumpControl.FaultStatistics.TotalFaultCount	Integer	1
Total Fault Time	PumpControl.FaultStatistics.TotalFaultTime	Fixed Pt	47.0
Unavail Fault Count	PumpControl.FaultStatistics.UnavailFaultCount	Integer	0
Unavail Fault Time	PumpControl.FaultStatistics.UnavailFaultTime	Fixed Pt	0.0

4.14.6 Group 1 (13.6)

Tag Description	Tag Name	Type	Default
AlternationMode	PumpControl.Group._1.AlternationMode		

4.14.6.1 Maximum Pumps Running (13.6.1)

Tag Description	Tag Name	Type	Default
Limit Reached	PumpControl.Group._1.MaxPumpsRunning.LimitReached	Int Attr	1
Mode	PumpControl.Group._1.MaxPumpsRunning.Mode	Int Attr	2
Quantity	PumpControl.Group._1.MaxPumpsRunning.Quantity	Digital	1

4.14.7 Maximum Groups Running (13.7)

Tag Description	Tag Name	Type	Default
Limit Reached	PumpControl.MaxGroupsRunning.LimitReached	Digital	1
Mode	PumpControl.MaxGroupsRunning.Mode	Int Attr	2
Quantity	PumpControl.MaxGroupsRunning.Quantity	Int Attr	1

4.14.8 Maximum Off Time (13.8)

Tag Description	Tag Name	Type	Default
Duration	PumpControl.MaxOffTime.Duration	FP Attr	21600.000
Enabled	PumpControl.MaxOffTime.Enabled	Bool Attr	0
Fault Tag	PumpControl.MaxOffTime.FaultTag	Digital	0
Is Fault	PumpControl.MaxOffTime.IsFault	Bool Attr	0
Quantity	PumpControl.MaxOffTime.Quantity	Int Attr	1

4.14.9 Maximum On Time (13.9)

Tag Description	Tag Name	Type	Default
Duration	PumpControl.MaxOnTime.Duration	FP Attr	1800.000
Enabled	PumpControl.MaxOnTime.Enabled	Bool Attr	0
Fault Tag	PumpControl.MaxOnTime.FaultTag	Digital	0
Is Fault	PumpControl.MaxOnTime.IsFault	Bool Attr	0

4.14.10 Maximum Pumps Running (13.10)

Tag Description	Tag Name	Type	Default
Limit Reached	PumpControl.MaxPumpsRunning.LimitReached	Digital	0
Mode	PumpControl.MaxPumpsRunning.Mode	Int Attr	0
Quantity	PumpControl.MaxPumpsRunning.Quantity	Int Attr	2

4.14.11 Maximum Starts (13.11)

Tag Description	Tag Name	Type	Default
OverrideLevel	PumpControl.MaxStarts.OverrideLevel	FP Attr	90.0000

4.14.12 Profile (13.12)

Tag Description	Tag Name	Type	Default
Name	PumpControl.Profile._0.Name		

4.14.13 Pulse Start 1 (13.13)

Tag Description	Tag Name	Type	Default
ActivationDelay	PumpControl.PulseStart._1.ActivationDelay	FP Attr	0.000
FaultTag	PumpControl.PulseStart._1.FaultTag	Digital	
IgnoreDelays	PumpControl.PulseStart._1.IgnoreDelays	Bool Attr	0
InvertSource	PumpControl.PulseStart._1.InvertSource	Bool Attr	0
IsFault	PumpControl.PulseStart._1.IsFault	Bool Attr	0
Quantity	PumpControl.PulseStart._1.Quantity	Int Attr	1
Source	PumpControl.PulseStart._1.Source	@Alias Tag	

4.14.14 Pulse Stop 1 (13.14)

Tag Description	Tag Name	Type	Default
ActivationDelay	PumpControl.PulseStop._1.ActivationDelay	FP Attr	0.000
FaultTag	PumpControl.PulseStop._1.FaultTag	Digital	
IgnoreDelays	PumpControl.PulseStop._1.IgnoreDelays	Bool Attr	0
InvertSource	PumpControl.PulseStop._1.InvertSource	Bool Attr	0
IsFault	PumpControl.PulseStop._1.IsFault	Bool Attr	0
Source	PumpControl.PulseStop._1.Source	@Alias Tag	

4.14.15 Pump 1 (13.15)

Tag Description	Tag Name	Type	Default
Current Priority	PumpControl.Pump._1.CurrentPriority	Integer	
Decommissioned	PumpControl.Pump._1.Decommissioned	Bool Attr	0
Manual Mode	PumpControl.Pump._1.ManualMode	Digital	
Manual Stop Time	PumpControl.Pump._1.ManualStopTime	FP Attr	0.000
Name	PumpControl.Pump._1.Name	Str Attr	Pump 1
Pump Mode	PumpControl.Pump._1.PumpMode	Alg Cntrl	0
Pump Status	PumpControl.Pump._1.PumpStatus	Integer	
Running	PumpControl.Pump._1.Running	Digital	
Start Timer	PumpControl.Pump._1.StartTimer	Fixed Pt	
Starting	PumpControl.Pump._1.Starting	Digital	
Stop Timer	PumpControl.Pump._1.StopTimer	Fixed Pt	
Stopping	PumpControl.Pump._1.Stopping	Digital	
VFD Current Speed	PumpControl.Pump._1.VFDCurrentSpeed	Fixed Pt	
Well Blocked	PumpControl.Pump._1.WellBlocked	Digital	

4.14.15.1 Delay Faults 1 - Pump 1 (13.15.1)

Tag Description	Tag Name	Type	Default
All Pumps	PumpControl.Pump._1.DelayFault._1.AllPumps	Bool Attr	0
CompleteFault	CompleteFault	Digital	0
Delay	PumpControl.Pump._1.DelayFault._1.Delay	FP Attr	10.000
Invert Source	PumpControl.Pump._1.DelayFault._1.InvertSource	Bool Attr	1
Retries Allowed	PumpControl.Pump._1.DelayFault._1.RetriesAllowed	Int Attr	0
Retries Remaining	PumpControl.Pump._1.DelayFault._1.RetriesRemaining	Integer	0
RetryFault	RetryFault	Digital	0
Source	PumpControl.Pump._1.DelayFault._1.Source	@Alias Tag	

4.14.15.2 Fault Input - Pump 1 (13.15.2)

Tag Description	Tag Name	Type	Default
Any Fault Active	PumpControl.Pump._1.FaultInput.AnyFaultActive	@Digital	
Fault Status	PumpControl.Pump._1.FaultInput.FaultStatus	Integer	
Holdout Active	PumpControl.Pump._1.FaultInput.HoldoutActive	Digital	
Ignore Delay	PumpControl.Pump._1.FaultInput.IgnoreDelay	Digital	
No Manual Override	PumpControl.Pump._1.FaultInput.NoManualOverride	Digital	
NoSemiAutoOverride	PumpControl.Pump._1.FaultInput.NoSemiAutoOverride	Digital	
Status Summary	PumpControl.Pump._1.FaultInput.StatusSummary	Integer	
Unacknowledged	PumpControl.Pump._1.FaultInput.Unacknowledged	Digital	
Unavailable Active	PumpControl.Pump._1.FaultInput.UnavailableActive	Digital	

4.14.15.3 Fault Statistics - Pump 1 (13.15.3)

Tag Description	Tag Name	Type	Default
FrzTotalFaultCount	PumpControl.Pump._1.FaultStatistics.FrzTotalFaultCount		
FrzTotalFaultTime	PumpControl.Pump._1.FaultStatistics.FrzTotalFaultTime		
TotalFaultCount	PumpControl.Pump._1.FaultStatistics.TotalFaultCount		
TotalFaultTime	PumpControl.Pump._1.FaultStatistics.TotalFaultTime		

4.14.15.4 Fault Status - Pump 1 (13.15.4)

Tag Description	Tag Name	Type	Default
Any Fault Active	PumpControl.Pump._1.FaultStatus.AnyFaultActive	@Alias Tag	
Fault Status	PumpControl.Pump._1.FaultStatus.FaultStatus	Integer	
Holdout Active	PumpControl.Pump._1.FaultStatus.HoldoutActive	Digital	
Ignore Delay	PumpControl.Pump._1.FaultStatus.IgnoreDelay	Digital	
NoManualOverride	PumpControl.Pump._1.FaultStatus.NoManualOverride	Digital	
NoSemiAutoOverride	PumpControl.Pump._1.FaultStatus.NoSemiAutoOverride	Digital	
Status Summary	PumpControl.Pump._1.FaultStatus.StatusSummary	Integer	
Unacknowledged	PumpControl.Pump._1.FaultStatus.Unacknowledged	Digital	
Unavailable Active	PumpControl.Pump._1.FaultStatus.UnavailableActive	Digital	

4.14.15.5 Maximum Off Time - Pump 1 (13.15.5)

Tag Description	Tag Name	Type	Default
Duration	PumpControl.Pump._1.MaxOffTime.Duration	FP Attr	21600.000
Enabled	PumpControl.Pump._1.MaxOffTime.Enabled	Bool Attr	0
Fault Tag	PumpControl.Pump._1.MaxOffTime.FaultTag	Digital	
Is Fault	PumpControl.Pump._1.MaxOffTime.IsFault	Bool Attr	0

4.14.15.6 Maximum On Time - Pump 1 (13.15.6)

Tag Description	Tag Name	Type	Default
Duration	PumpControl.Pump._1.MaxOnTime.Duration	FP Attr	1800.000
Enabled	PumpControl.Pump._1.MaxOnTime.Enabled	Bool Attr	0
Fault Tag	PumpControl.Pump._1.MaxOnTime.FaultTag	Digital	
Is Fault	PumpControl.Pump._1.MaxOnTime.IsFault	Bool Attr	0

4.14.15.7 Maximum Starts – Pump 1 (13.15.7)

Tag Description	Tag Name	Type	Default
Enabled	PumpControl.Pump._1.MaxStarts.Enabled	Bool Attr	0
Fault	PumpControl.Pump._1.MaxStarts.Fault	Digital	
Quantity	PumpControl.Pump._1.MaxStarts.Quantity	Int Attr	0

4.14.15.8 Pulse Start – Pump 1 (13.15.8)

Tag Description	Tag Name	Type	Default
ActivationDelay	PumpControl.Pump._1.PulseStart.ActivationDelay	FP Attr	0.000
FaultTag	PumpControl.Pump._1.PulseStart.FaultTag	Digital	
IgnoreDelays	PumpControl.Pump._1.PulseStart.IgnoreDelays	Bool Attr	0
InvertSource	PumpControl.Pump._1.PulseStart.InvertSource	Bool Attr	0
IsFault	PumpControl.Pump._1.PulseStart.IsFault	Bool Attr	0
Source	PumpControl.Pump._1.PulseStart.Source	@Alias Tag	

4.14.15.9 Pulse Stop – Pump 1 (13.15.9)

Tag Description	Tag Name	Type	Default
ActivationDelay	PumpControl.Pump._1.PulseStop.ActivationDelay	FP Attr	0.000
FaultTag	PumpControl.Pump._1.PulseStop.FaultTag	Digital	
IgnoreDelays	PumpControl.Pump._1.PulseStop.IgnoreDelays	Bool Attr	0
IsFault	PumpControl.Pump._1.PulseStop.IsFault	Bool Attr	0
InvertSource	PumpControl.Pump._1.PulseStop.InvertSource	Bool Attr	0
Source	PumpControl.Pump._1.PulseStop.Source	@Alias Tag	

4.14.15.10 Pump Summary – Pump 1 (13.15.10)

Tag Description	Tag Name	Type	Default
Pump Off	PumpControl.Pump._1.PumpSummary.PumpOff	Digital	
Pump Off Or Unavailable	PumpControl.Pump._1.PumpSummary.PumpOffOrUnavailable	Digital	

4.14.15.11 Statistics – Pump 1 (13.15.11)

Tag Description	Tag Name	Type	Default
FrzRunTime	PumpControl.Pump._1.Statistics.FrzRunTime	Fixed Pt	0.0
FrzTotalStarts	PumpControl.Pump._1.Statistics.FrzTotalStarts	Integer	0
LastRunTime	PumpControl.Pump._1.Statistics.LastRunTime	Fixed Pt	
MultipleRunTime	PumpControl.Pump._1.Statistics.MultipleRunTime	Fixed Pt	
PercentRunTime	PumpControl.Pump._1.Statistics.PercentRunTime	Fixed Pt	
RunTime	PumpControl.Pump._1.Statistics.RunTime	Fixed Pt	
RunTimeLastHour	PumpControl.Pump._1.Statistics.RunTimeLastHour	Fixed Pt	
RunTimeLastWeek	PumpControl.Pump._1.Statistics.RunTimeLastWeek	Fixed Pt	
RunTimeThisHour	PumpControl.Pump._1.Statistics.RunTimeThisHour	Fixed Pt	
RunTimeToday	PumpControl.Pump._1.Statistics.RunTimeToday	Fixed Pt	
RunTimeThisWeek	PumpControl.Pump._1.Statistics.RunTimeThisWeek	Fixed Pt	
RunTimeYesterday	PumpControl.Pump._1.Statistics.RunTimeYesterday	Fixed Pt	
StartsLastHour	PumpControl.Pump._1.Statistics.StartsLastHour	Integer	
StartsLastWeek	PumpControl.Pump._1.Statistics.StartsLastWeek	Integer	
StartsPerHour	PumpControl.Pump._1.Statistics.StartsPerHour	Fixed Pt	
StartsThisHour	PumpControl.Pump._1.Statistics.StartsThisHour	Integer	
StartsThisWeek	PumpControl.Pump._1.Statistics.StartsThisWeek	Integer	8
StartsToday	PumpControl.Pump._1.Statistics.StartsToday	Integer	
StartsYesterday	PumpControl.Pump._1.Statistics.StartsYesterday	Integer	
TotalStarts	PumpControl.Pump._1.Statistics.TotalStarts	Integer	
FrzVolumePumped	PumpControl.Pump._1.Statistics.FrzVolumePumped		

4.14.16 Pumps Summary (13.16)

Tag Description	Tag Name	Default
All Pumps Available	PumpControl.PumpsSummary.AllPumpsAvailable	1
All Pumps Faulted	PumpControl.PumpsSummary.AllPumpsFaulted	0
All Pumps Off	PumpControl.PumpsSummary.AllPumpsOff	0
All Pumps Off Or Unavailable	PumpControl.PumpsSummary.AllPumpsOffOrUnavailable	0
All Pumps Running	PumpControl.PumpsSummary.AllPumpsRunning	0
All Pumps Unavailable	PumpControl.PumpsSummary.AllPumpsUnavailable	0
Any Pumps Faulted	PumpControl.PumpsSummary.AnyPumpsFaulted	0
Any Pumps Off	PumpControl.PumpsSummary.AnyPumpsOff	0
Any Pumps Off Or Unavailable	PumpControl.PumpsSummary.AnyPumpsOffOrUnavailable	0
Any Pumps Running	PumpControl.PumpsSummary.AnyPumpsRunning	1
Any Pumps Unavailable	PumpControl.PumpsSummary.AnyPumpsUnavailable	0
No Pumps Running	PumpControl.PumpsSummary.NoPumpsRunning	2

* All Tags are Type Digital

4.14.17 Statistics (13.17)

Tag Description	Tag Name	Type	Default
FrzRunTime	PumpControl.Statistics.FrzRunTime	Fixed Pt	0.0
FrzTotalStarts	PumpControl.Statistics.FrzTotalStarts	Integer	0
Last Run Time	PumpControl.Statistics.LastRunTime	Fixed Pt	6459.5
Multiple Run Time	PumpControl.Statistics.MultipleRunTime	Fixed Pt	6575.5
Percent Run Time	PumpControl.Statistics.PercentRunTime	Fixed Pt	0.979
Run Time	PumpControl.Statistics.RunTime	Fixed Pt	6596.5
Run Time Last Hour	PumpControl.Statistics.RunTimeLastHour	Fixed Pt	3527.0
Run Time Last Week	PumpControl.Statistics.RunTimeLastWeek	Fixed Pt	0.0
Run Time This Hour	PumpControl.Statistics.RunTimeThisHour	Fixed Pt	902.0
Run Time Today	PumpControl.Statistics.RunTimeToday	Fixed Pt	6596.0
Run Time Yesterday	PumpControl.Statistics.RunTimeYesterday	Fixed Pt	0.0
Run TimeThis Week	PumpControl.Statistics.RunTimeThisWeek	Fixed Pt	6596.0
Starts Last Hour	PumpControl.Statistics.StartsLastHour	Integer	0
Starts Per Hour	PumpControl.Statistics.StartsPerHour	Fixed Pt	0.0000
StartsLastWeek	PumpControl.Statistics.StartsLastWeek	Integer	0
StartsThisHour	PumpControl.Statistics.StartsThisHour	Integer	0
StartsThisWeek	PumpControl.Statistics.StartsThisWeek	Integer	8
StartsToday	PumpControl.Statistics.StartsToday	Integer	8
StartsYesterday	PumpControl.Statistics.StartsYesterday	Integer	0
Total Starts	PumpControl.Statistics.TotalStarts	Integer	8

4.14.18 Statistics Window (13.18)

Tag Description	Tag Name	Type	Default
NumElements	PumpControl.StatisticsWindow.NumElements	Int Attr	30
Period	PumpControl.StatisticsWindow.Period	Int Attr	3600

4.14.19 VFD (13.19)

Tag Description	Tag Name	Type	Default
Compensation	PumpControl.VFD.Compensation	FP Attr	0.0000
Fixed Spd Man Enabled	PumpControl.VFD.FixedSpdManEnabled	Bool Attr	1
Fixed Spd Man Spd	PumpControl.VFD.FixedSpdManSpd	FP Attr	100.0000
Fixed Spd Start Dur	PumpControl.VFD.FixedSpdStartDur	FP Attr	10.000
Fixed Spd Start Enabled	PumpControl.VFD.FixedSpdStartEnabled	Bool Attr	0
Fixed Spd Start Spd	PumpControl.VFD.FixedSpdStartSpd	FP Attr	100.0000
Mode	PumpControl.VFD.Mode	Int Attr	0
VFD Current Speed	PumpControl.VFD.VFDCurrentSpeed	Fixed Pt	

For deeper level tags refer the DBViewer.

4.14.20 Well Clean Out (13.21)

Tag Description	Tag Name	Type	Default
Active	PumpControl.WellCleanOut.Active	Digital	0
Delay Adj	PumpControl.WellCleanOut.DelayAdj	FP Attr	30.000
Last Time	PumpControl.WellCleanOut.LastTime	Date	0
Level Adj	PumpControl.WellCleanOut.LevelAdj	FP Attr	10.0000
Mode	PumpControl.WellCleanOut.Mode	Int Attr	0
No Cycles	PumpControl.WellCleanOut.NoCycles	Int Attr	100

4.14.20.1 Well Clean Out Timer 1 (13.21.1)

Tag Description	Tag Name	Type	Default
Active	PumpControl.WellCleanOut.Timer._1.Active	Digital	
Days	PumpControl.WellCleanOut.Timer._1.Days	Int Attr	1
Enabled	PumpControl.WellCleanOut.Timer._1.Enabled	Bool Attr	0
Period	PumpControl.WellCleanOut.Timer._1.Period	Int Attr	1
Start Date	PumpControl.WellCleanOut.Timer._1.Start Date	Date Attr	01/01/2000
Start Time	PumpControl.WellCleanOut.Timer._1.Start Time	Int Attr	43200
Stop Time	PumpControl.WellCleanOut.Timer._1.Stop Time	Int Attr	43200

4.15 Snap Shot (14)

Tag Description	Tag Name	Type	Default
EEPROM File Name	SnapShot.EEPROMFileName	Str Attr	/var/lib/snap
Init File Name	SnapShot.InitFileName	Str Attr	/var/lib/snap
Log File Name	SnapShot.LogFileName	Str Attr	/var/log/snap
Maximum Log File Size	SnapShot.MaxLogFileSize	Int Attr	20000
Number Generations	SnapShot.NumGenerations	Int Attr	3
NVRAM File Name	SnapShot.NVRAMFileName	Str Attr	/var/lib/snap
Save Init Freq	SnapShot.SavelInitFreq	Int Attr	2
Save Period	SnapShot.SavePeriod	FP Attr	1800.000
Sleep Period	SnapShot.SleepPeriod	FP Attr	5.000
Started	SnapShot.Started	@Digital	-
Trigger	SnapShot.Trigger	Dig Cntrl	0

4.15.1 Tags

Tag Description	Tag Name	Type	Default
_1	SnapShot.Tags._1	@Fixed Pt	
_2	SnapShot.Tags._1	@Fixed Pt	

4.15.2 Init

Tag Description	Tag Name	Type	Default
_1	SnapShot.Init._1	*	
...
112T	SnapShot.Init._112	*	

4.15.3 NVRAM

Tag Description	Tag Name	Type	Default
_1	SnapShot.NVRAM._1	*	
...
_29T	SnapShot.NVRAM._2	*	

* The tag type varies from tag to tag.

^T The total number of tags is dependent on the station configuration.

4.16 Supply Protection (15)

Tag Description	Tag Name	Type	Default
PPV	SupplyProt.Station.PPV	FP Attr	480.00

4.16.1 Over Voltage 1 (15.1)

Tag Description	Tag Name	Type	Default
Enabled	SupplyProt.Station.OverVoltage._1.Enabled	Bool Attr	0
Fault Tag	SupplyProt.Station.OverVoltage._1.Fault Tag	Digital	
Threshold	SupplyProt.Station.OverVoltage._1.Threshold	Fp Attr	110.00

4.16.2 Under Voltage 1 (15.2)

Tag Description	Tag Name	Type	Default
Enabled	SupplyProt.Station.UnderVoltage._1.Enabled	Bool Attr	0
Fault Tag	SupplyProt.Station.UnderVoltage._1.Fault Tag	Digital	
Threshold	SupplyProt.Station.UnderVoltage._1.Threshold	Fp Attr	90.00

4.16.3 VIN (15.3)

Tag Description	Tag Name	Type	Default
CalibVoltsABC	SupplyProt.Station.VIN.CalibVoltsABC	Integer	
CalibVoltsABM	SupplyProt.Station.VIN.CalibVoltsABM	Integer	
CalibVoltsABTrim	SupplyProt.Station.VIN.CalibVoltsABTrim	Integer	
CalibVoltsBCC	SupplyProt.Station.VIN.CalibVoltsBCC	Integer	
CalibVoltsBCM	SupplyProt.Station.VIN.CalibVoltsBCM	Integer	
CalibVoltsBCTrim	SupplyProt.Station.VIN.CalibVoltsBCTrim	Integer	
CalibVoltsCAC	SupplyProt.Station.VIN.CalibVoltsCAC	Integer	
CalibVoltsCAM	SupplyProt.Station.VIN.CalibVoltsCAM	Integer	
CalibVoltsCATrim	SupplyProt.Station.VIN.CalibVoltsCATrim	Integer	
Description	SupplyProt.Station.VIN.Description	Str Attr	VIN.1
FreqAb	SupplyProt.Station.VIN.FreqAb	Fixed Pt	
FreqBc	SupplyProt.Station.VIN.FreqBc	Fixed Pt	
FreqCa	SupplyProt.Station.VIN.FreqCa	Fixed Pt	
PhaseAngleAbtoBc	SupplyProt.Station.VIN.PhaseAngleAbtoBc	Fixed Pt	
PhaseAngleAbtoCa	SupplyProt.Station.VIN.PhaseAngleAbtoCa	Fixed Pt	100.00
Primary Range	SupplyProt.Station.VIN.Primary Range	FP Attr	100.00
Secondary Range	SupplyProt.Station.VIN.Secondary Range	FP Attr	
VoltsAb	SupplyProt.Station.VIN.VoltsAb	Fixed Pt	
VoltsBc	SupplyProt.Station.VIN.VoltsBc	Fixed Pt	
VoltsCa	SupplyProt.Station.VIN.VoltsCa	Fixed Pt	

4.16.4 Volts Phase Imbalance 1 (15.4)

Tag Description	Tag Name	Type	Default
Enabled	SupplyProt.Station.VoltsPhaseImbalance._1.UnderVoltage._1.Enabled	Bool Attr	0
Fault Tag	SupplyProt.Station.VoltsPhaseImbalance._1.Fault Tag	Digital	
Threshold	SupplyProt.Station.VoltsPhaseImbalance._1.Threshold	FP Attr	20.00

4.16.5 Volts Phase Rotation 1 (15.5)

Tag Description	Tag Name	Type	Default
Enabled	SupplyProt.Station.VoltsPhaseRotation._1.Enabled	Bool Attr	0
Fault Tag	SupplyProt.Station.VoltsPhaseRotation._1.Fault Tag	Digital	

4.17 T3000 PumpView Modem Manager [t3pm] (16)

Tag Description	Tag Name	Type	Default
Comms_Channel	Comms_Channel		
Config_ID	Config_ID		
DeviceSiteId	DeviceSiteId		
Device_ID	Device_ID		
MultiSmartUnit	MultiSmartUnit		
PowerFail	PowerFail		
PvFwVer	PvFwVer		

4.17.1 Power Fail – Accumulator (16.1)

Tag Description	Tag Name	Type	Default
AccumType	t3pm.Accumulator.PowerFail.AccumType		
Accumulator	t3pm.Accumulator.PowerFail.Accumulator		
Enabled	t3pm.Accumulator.PowerFail.Enabled		
Increment	t3pm.Accumulator.PowerFail.Increment		
Index	t3pm.Accumulator.PowerFail.Index		
Initial Value	t3pm.Accumulator.PowerFail.InitialValue		
Trigger Op	t3pm.Accumulator.PowerFail.TriggerOp		
Trigger Set Point	t3pm.Accumulator.PowerFail.TriggerSetPoint		
Trigger Tag	t3pm.Accumulator.PowerFail.TriggerTag		

4.17.2 C1OAckFlt (16.2)

Tag Description	Tag Name	Type	Default
Command	Command	Alias tag	
Event Trig	EventTrig	Intgerger	

4.17.3 C1OResetAlm (16.3)

Tag Description	Tag Name	Type	Default
Command	Command	Alias tag	
Event Trig	EventTrig	Intger	

4.17.4 P1NOOverride (16.4)

Tag Description	Tag Name	Type	Default
Command	Command	Alias tag	
Event Trig	EventTrig	Intger	

4.17.5 P1OAckFlt (16.5)

Tag Description	Tag Name	Type	Default
Command	Command	Alias tag	
Event Trig	EventTrig	Intger	

4.17.6 P2NOOverride (16.6)

Tag Description	Tag Name	Type	Default
Command	Command	Alias tag	
Event Trig	EventTrig	Intger	

4.17.7 P2OAckFlt (16.7)

Tag Description	Tag Name	Type	Default
Command	Command	Alias tag	
Event Trig	EventTrig	Intger	

4.17.8 Event (16.8)

For the Event Tag names refer to the DBViewer.

4.18 Telemetry (17)

4.18.1 RS232 – Channel 1 (17.1)

Tag Description	Tag Name	Type	Default
Baud Rate	Telemetry.Channel._1.Rs232.Baud	Int Attr	9600
Comms Port	Telemetry.Channel._1.Rs232.CommsPort	Str Attr	/dev/ttyS1
First Char Timeout	Telemetry.Channel._1.Rs232.FirstCharTimeout	Int Attr	1000
Hw Flow Control	Telemetry.Channel._1.Rs232.HwFlowControl	Bool Attr	0
Multitrode RTU	Telemetry.Channel._1.Rs232.MultitrodeRTU	Bool Attr	0
Number Data Bits	Telemetry.Channel._1.Rs232.NumDataBits	Int Attr	8
Number of Wakeups	Telemetry.Channel._1.Rs232.NumOfWakeups	Int Attr	60
Number Stop Bits	Telemetry.Channel._1.Rs232.NumStopBits	Int Attr	1
Parity	Telemetry.Channel._1.Rs232.Parity	Int Attr	0
Radio Off Time	Telemetry.Channel._1.Rs232.RadioOffTime	Int Attr	0
Radio On Time	Telemetry.Channel._1.Rs232.RadioOnTime	Int Attr	0

4.18.2 RS232 – Channel 2 (17.2)

Tag Description	Tag Name	Type	Default
Baud Rate	Telemetry.Channel._2.Rs232.Baud	Int Attr	9600
Comms Port	Telemetry.Channel._2.Rs232.CommsPort	Str Attr	/dev/ttyS1
First Char Timeout	Telemetry.Channel._2.Rs232.FirstCharTimeout	Int Attr	1000
Hw Flow Control	Telemetry.Channel._2.Rs232.HwFlowControl	Bool Attr	0
Multitrode RTU	Telemetry.Channel._2.Rs232.MultitrodeRTU	Bool Attr	0
Num Data Bits	Telemetry.Channel._2.Rs232.NumDataBits	Int Attr	8
Number of Wakeups	Telemetry.Channel._2.Rs232.NumOfWakeups	Int Attr	60
Number Stop Bits	Telemetry.Channel._2.Rs232.NumStopBits	Int Attr	1
Parity	Telemetry.Channel._2.Rs232.Parity	Int Attr	0
Radio Off Time	Telemetry.Channel._2.Rs232.RadioOffTime	Int Attr	0
Radio On Time	Telemetry.Channel._2.Rs232.RadioOnTime	Int Attr	0

4.18.3 T3pudp – Channel 3 (17.3)

Tag Description	Tag Name	Type	Default
First Char Timeout	Telemetry.Channel._3.T3pudp.FirstCharTimeout	Int Attr	1000
IP Connect Timeout	Telemetry.Channel._3.T3pudp.IpConnectTimeout	Int Attr	1000
Local IP Address	Telemetry.Channel._3.T3pudp.LocalIPAddress	Str Attr	0.0.0.0
Local IP Port	Telemetry.Channel._3.T3pudp.LocalIPPort	Int Attr	25000
Mode	Telemetry.Channel._3.T3pudp.Mode	Int Attr	1
Remote IP Address	Telemetry.Channel._3.T3pudp.RemoteIPAddress	Str Attr	0.0.0.0
Remote IP Port	Telemetry.Channel._3.T3pudp.RemoteIPPort	Int Attr	1500

4.18.4 TCP / IP (Transmission Control Protocol / Internet protocol) – Channel 4 (17.4)

Tag Description	Tag Name	Type	Default
DisconnectOnNewSyn	Telemetry.Channel._4.Tcpip.DisconnectOnNewSyn	Bool Attr	0
Idle Timeout	Telemetry.Channel._4.Tcpip.IdleTimeout	Int Attr	1200
Keep Alive Timeout	Telemetry.Channel._4.Tcpip.KeepAliveTimeout	Int Attr	600
Mode	Telemetry.Channel._4.Tcpip.Mode	Int Attr	1
Protocol	Telemetry.Channel._4.Tcpip.Protocol	Int Attr	0
UDP Port Mode	Telemetry.Channel._4.Tcpip.UDPPortMode	Int Attr	1

4.18.4.1 TCP / IP Address 1 – Channel 4 (17.4.1)

Tag Description	Tag Name	Type	Def.
Dest UDP Port	Telemetry.Channel._4.Tcpip.Address._1.DestUDPPort	Int Attr	20000
Dual End Point IP Port	Telemetry.Channel._4.Tcpip.Address._1.DualEndPointIPPort	Int Attr	20000
IP Address	Telemetry.Channel._4.Tcpip.Address._1.IPAddress	Str Attr	0.0.0.0
Local UDP Port	Telemetry.Channel._4.Tcpip.Address._1.LocalUDPPort	Int Attr	20000
Port	Telemetry.Channel._4.Tcpip.Address._1.Port	Int Attr	20000

4.18.5 Modem – Channel 5 (17.5)

Tag Description	Tag Name	Type	Default
Baud	Telemetry.Channel._5.Modem.Baud	Int Attr	38400
CommsPort	Telemetry.Channel._5.Modem.CommsPort	Str Attr	
ConnectTimeout	Telemetry.Channel._5.Modem.ConnectTimeout	Int Attr	45
DialingMode	Telemetry.Channel._5.Modem.DialingMode	Int Attr	0
HangupString	Telemetry.Channel._5.Modem.HangupString	Str Attr	ATH
IdleTimeout	Telemetry.Channel._5.Modem.IdleTimeout	Int Attr	60
InitString1	Telemetry.Channel._5.Modem.InitString1	Int Attr	ATZ
InitString2	Telemetry.Channel._5.Modem.InitString2	Int Attr	AT&FE0Q1M0VIS
InitString3	Telemetry.Channel._5.Modem.InitString3	Int Attr	
NumDataBits	Telemetry.Channel._5.Modem.NumDataBits	Int Attr	8
NumStopBits	Telemetry.Channel._5.Modem.NumStopBits	Int Attr	1
Parity	Telemetry.Channel._5.Modem.Parity	Int Attr	0
RetryDelay	Telemetry.Channel._5.Modem.RetryDelay	Int Attr	120
WriteTimeout	Telemetry.Channel._5.Modem.WriteTimeout	Int Attr	5

4.18.5.1 Modem – Phone 1 Channel 5 (17.5.1)

Tag Description	Tag Name	Type	Default
Phone Number	Telemetry.Channel._5.Modem.Phone._1.PhoneNumber	Str Attr	

4.19 Watch Dog (18)

Tag Description	Tag Name	Type	Default
Action Upon Failure	WatchDog.ActionUponFailure	Int Attr	3
Failure Count	WatchDog.FailureCount	Integer	
Hardware Heartbeat	WatchDog.HardwareHeartbeat	Int Attr	30
Heartbeat Period	WatchDog.HeartbeatPeriod	Int Attr	30
Log File Name	WatchDog.LogFileName	Str Attr	/var/log/Fail
Power Count	WatchDog.PowerCount	Integer	
Snapshot	WatchDog.Snapshot	@Dig Cntrl	0



MultiTrode Pty Ltd—UK Operations

Ph: +44 1173 660156
 Fx: +44 1794 518810

E-mail: UKsales@multitrode.com

MultiTrode Pty Ltd—Head Office

Ph: +61 7 3340 7000
 Fx: +61 7 3340 7077

E-mail: AUsales@multitrode.com

MultiTrode Inc—USA

Ph: +1 561 994 8090
 Fx: +1 561 994 6282

E-mail: USsales@multitrode.net

Visit www.multitrode.com for the latest information