MS2011 with Profibus PA

Application Guide
P/N 1-0700-1021

Revision A

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

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Thermo SCIENTIFIC

Revision History

Revision Level	Date	Comments
A	08-2015	Initial release per ERO XXXX.

Contents

Chapter 1
Introduction

The Thermo Scientific MS2011 is designed to provide both reliable and accurate level and density measurements. With PROFIBUS PA, the gauge also provides users with access to control or program parameters via a host systems such as SIMATIC PDM.

The gauge consists of a source head containing the radioisotope source and the detector-transmitter. The radioisotope source emits gamma radiation that passes through the process material. The detector measures the energy of the radiation arriving at the detector after passing through the process material and vessel/pipeline walls. The gauge determines the level or density of the process material by measuring the amount of radiation arriving at the detector, which varies with the level or density of the process material.

Note This guide contains information specific to applications using the MS2011 with PROFIBUS PA protocol. For information on the standard MS2011, reference the MS2011 user guides listed in References. ▲

References

- DensityPRO NAI installation guide (P/N 1-0702-015)
- DensityPRO installation guide (P/N 1-0702-144)
- DensityPRO Measurement Systems user guide (P/N 1-0702-016)
- LevelPRO installation guide (P/N 1-0702-040)
- LevelPRO User Manual (P/N 1-0702-039)

Density Application

When configured for density applications, the MS2011 can measure the density of almost any liquid, slurry (solid material in a carrier fluid), emulsion (two different fluids), or solution (a solute material dissolved in a solvent fluid).

After the gauge calculates the process material density, it can convert the measurement into a number of forms.

For slurries, the gauge can provide measurements based on the ratio of solid to carrier. Similar measurements can be made for emulsions and solutions.

By inputting flow data, the gauge can generate mass flow measurements. It can also accept a 4–20 mA current output from a magnetic flow sensor. For applications that require temperature compensation, the gauge accepts a temperature input to compensate the density measurement for changes in process temperature.

The gauge consists of the source head, which contains the radioisotope source, and the detector-transmitter, which contains the scintillator detector and electronics. The radioisotope source emits gamma radiation that passes through the process material. The detector measures the energy of the radiation arriving at the detector after passing through the process material and vessel walls. The gauge determines the density of the process material by measuring the amount of radiation arriving at the detector, which varies with the density of the process material.

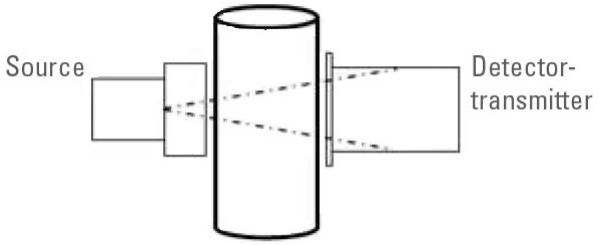

Figure 1-1. DensityPRO

Level Application

When configured for level applications, the MS2011 can measure the level of almost any liquid or solution. In this application the level gauge attaches to the outside of the process vessel or pipe and never contacts the process material.

The gauge can then convert the basic level measurement into a variety of output values as appropriate for specific applications.

The system consists of up to three basic elements: the source head, which contains the radioisotope source; the detector, which converts the incident radiation to a useable electronic signal; and the transmitter, which translates the detector's signal in to a Level value.

The radioisotope source emits gamma radiation, which passes through the vessel walls and the process material before arriving at the detector. The detector then measures the level of arriving radiation to determine the level of the process material. The amount of radiation that reaches the gauge varies inversely with the level of the process material.

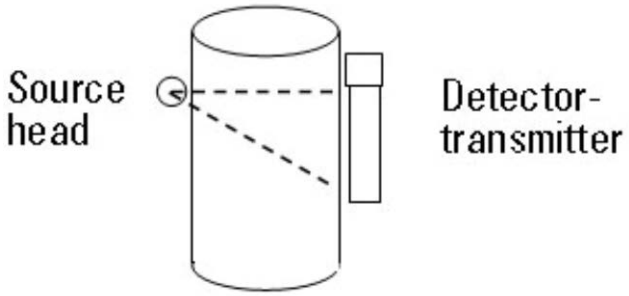

Figure 1-2. LevelPRO

Chapter 2
Profibus PA Overview

PROFIBUS PA is a widely used bi-directional digital communication protocol that enables the implementation of technologically advanced process control systems. The MS2011 PA Protocol interface meets the specification requirements of PROFIBUS Nutzerorganisation e.V. and is interoperable with devices of other manufacturers.

Blocks

The MS2011 contains the following blocks:

- One off Physical Block
  - Manages the Information, functionality and diagnostic status of the MS2011
- Eight off Analog Input Function Blocks
  - Selects channel to provide source for AI block sensor input
  - Outputs required measurement data
  - Provides alarm handling and indication for AI
- One off System Transducer Block
  - Configures system requirements for MS2011
  - Calibrates MS2011 Analog I/O
  - Provides MS2011 device specific system diagnostic information
- One off Aplication#1 Transducer Block
  - Provides up to 4 measurements for up to 4 AI blocks
  - Configures Application#1 of MS2011
  - Configures Detector#1 of MS2011
  - Configures additional requirements for Cascaded Level
  - Provides Application#1/Detector#1 diagnostic Information
- Three off Common Application Transducer Blocks
  - Provides up to 4 measurements for up to 4 AI blocks
  - Configures Application#2|3|4 of MS2011

- Configures Detector#2|3|4 of MS2011
- Provides Application#2|3|4/Detector#2|3|4 diagnostic Information

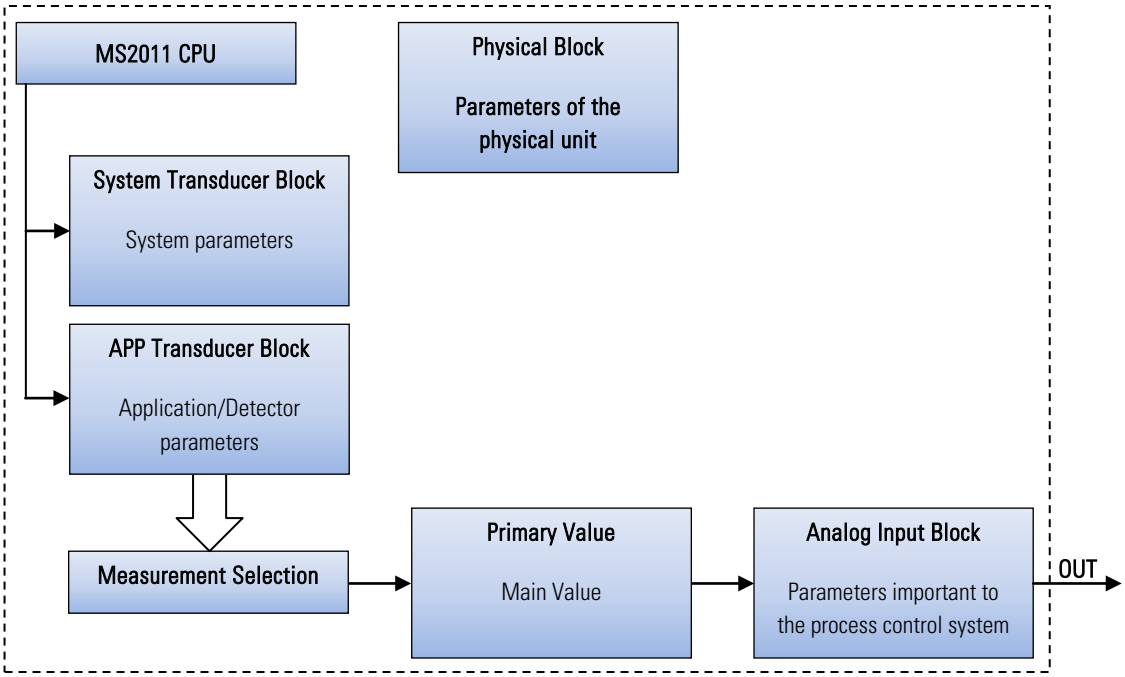

Figure 2-1. Block Interaction

Chapter 3
Wiring & Connections

Note This chapter provides wiring details for Profibus PA operation. It is assumed that the instrument has already been installed (refer to the MS2011 installation guide). ▲

The Profibus PA connector is accessible from the faceplate of the MS2011.

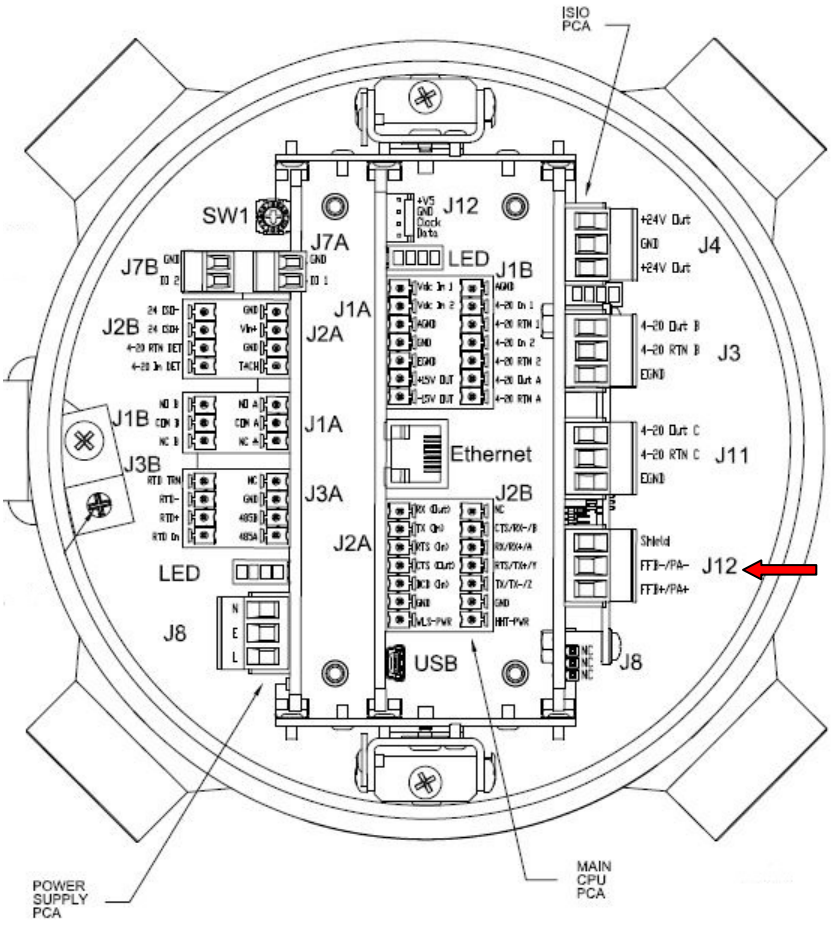

Figure 3-1. Signals on the MS2011 Profibus PA connector

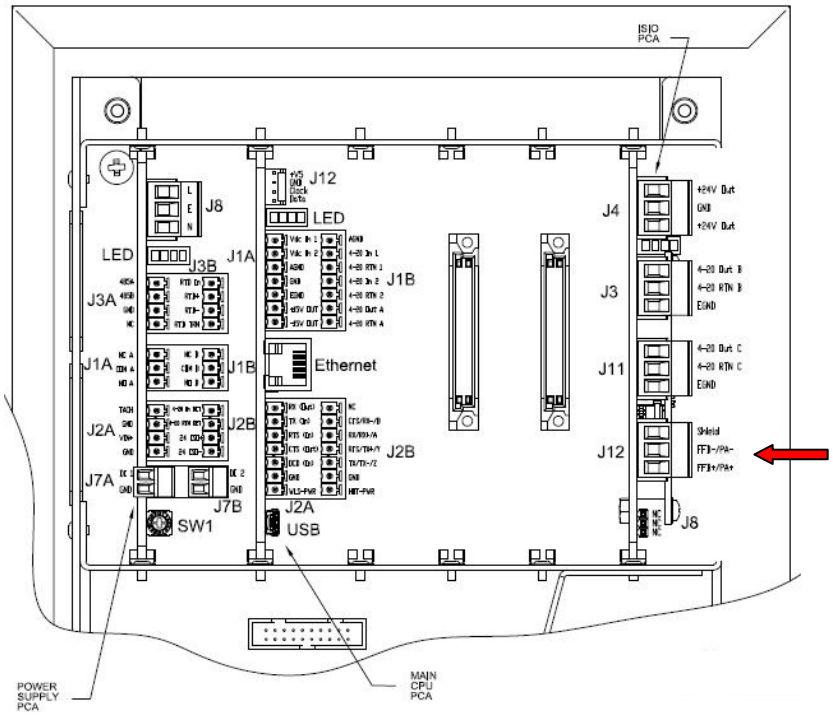

Figure 3-2. Remote Chassis Connections; MS2011T Profibus PA connector

Power Supply

The Profibus PA Interface requires a dedicated power supply. We recommend current capacity for the supply is well over the maximum current consumed by all devices.

Generally the supply for the MS011 PA Interface is provided by a DP/PA coupler.

- Terminators: Profibus PA requires two terminators, one at each end of the trunk cable.
- DP/PA Coupler: Profibus PA requires a DP/PA coupler to convert the DP RS-485 signals from the host to the IEC61158-2 signal level and power requirements of the MS2011.
- GSD File: The MS2011 requires a General Station Description (GSD) file to be installed on the host.

The following GSD files are available:

- Profile Identification Number: 0x9707
- Profile GSD File: PA139707.GSD (AIx8)
- Device-Specific Identification Number: 0x2011
- Device-Specific GSD File: TFS2011.GSD

Chapter 4
Profibus Masters

Configuration of the MS2011 can be accomplished using the following two host system types:

- FDT/DTM
  - Contact Thermo Scientific for information on downloading the DTM for the MS2011.
- SIMATIC PDM for EDDL
  - Contact Thermo Scientific for information on downloading the EDDL for the EDDL for the MS2011.

In both cases a DP/PA coupler, supplied by SEIMENS or P+F, will be required.

Chapter 5
Block Parameters

This chapter shows some of the basic parameters for the function blocks and an overview of the parameters in the transducer blocks.

Physical Block Parameters

The Physical Block parameters contain the characteristic data of the MS2011. Items for identification, diagnostics and control are all contained within this block.

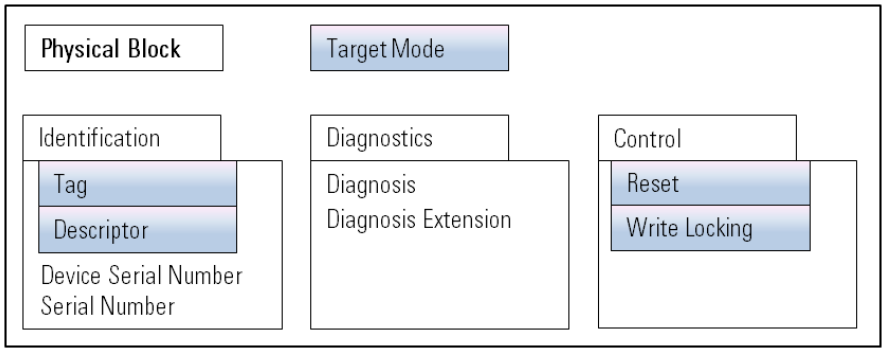

Figure 5-1. Physical block parameters

A full list of the physical block parameters are detailed in Chapter 8 of this document, however some of the basic parameters are described below.

Table 5-1. Basic parameters

Parameter	Description
Target Mode	This block parameter shows the current mode of the Physical block. In Out of Service (OOS) mode the block is not in operation, however under normal circumstances the Target Mode will be set to AUTO mode.
Tag	Tag description for the device is a 32-character text entry.
Descriptor	Descriptor is a user definable text string of 32 characters that should describe the MS2011 application.
Reset	Reset is used to perform the following operations on the MS2011: • No Function • Factory Reset • Warm Start • Reset Address to 126
Write Locking	Used to provide software write protection for the MS2011.

Analog Input Block Parameters

The AI block contains all the data for final processing of measured values prior to transmission to the master system. For a full list of the parameters see Chapter 9.

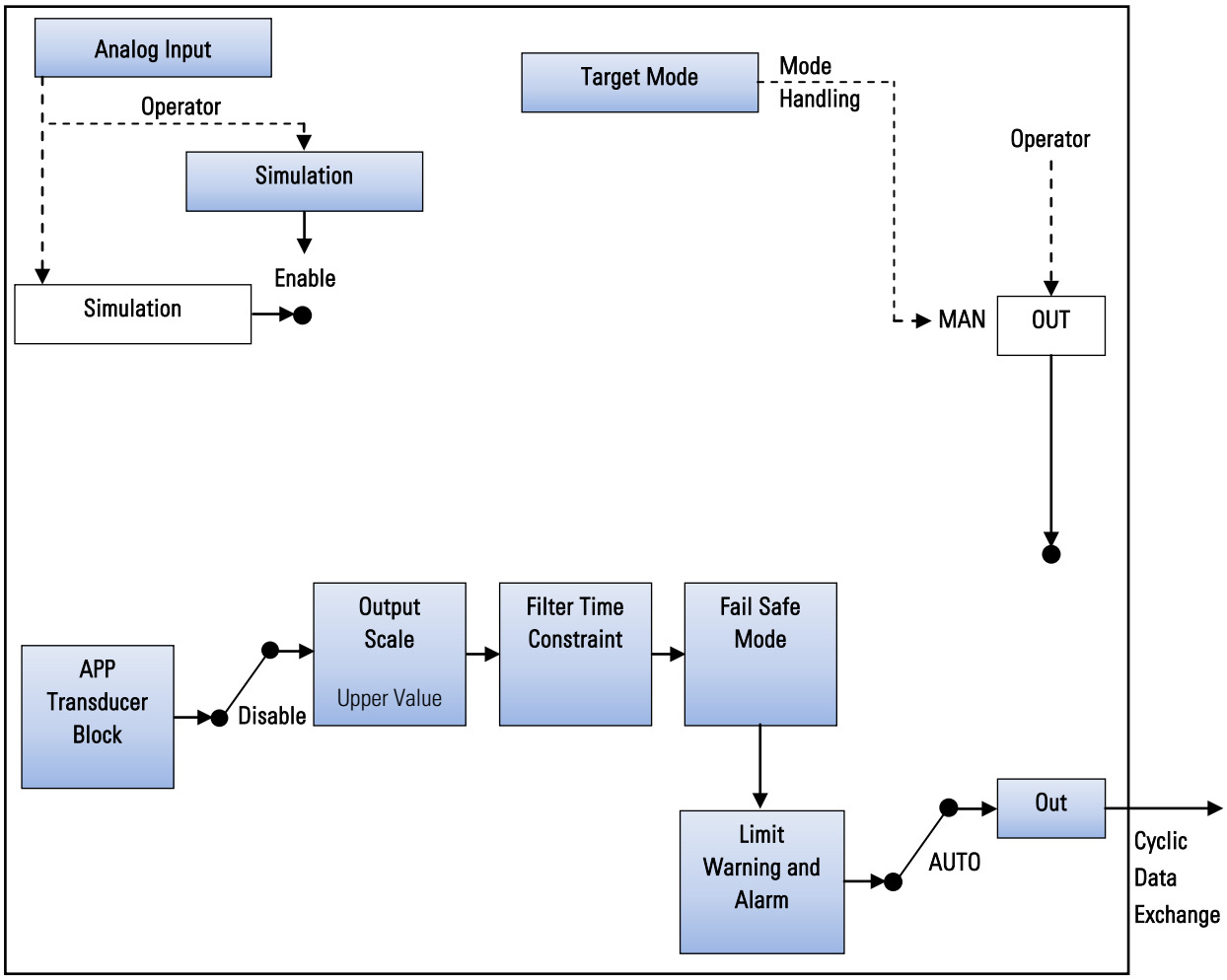

Figure 5-2. Analog input block parameters

The following table describe some of the basic parameters of the AI block.

Table 5-2. Basic parameters

Parameter	Description
Target Mode	Target Mode indicates what mode of operation is desired for the AI block: • In Out of Service (O/S) mode, the AI block does not operate. • Manual mode does not allow values to be updated. • AUTO mode causes the measured values to be updated. Under normal circumstance, set this to AUTO mode, which is the factory default.
Simulation	For commissioning and test purposes, the input value from the Transducer Block into the Analog Input Function Block AI-FB can be modified. That means that the Transducer and AI-FB will be disconnected.
Output Scale	Output scale is the scale of the process variable. The Function Block parameter Output Scale (OUT_SCALE) contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the required number of digits on the right hand side of the decimal point

System Transducer Block Parameters

The System transducer block provides information and configuration information for the MS2011 general purpose I/O and diagnostics. The system transducer block does not provide measurements for any AI-FB.

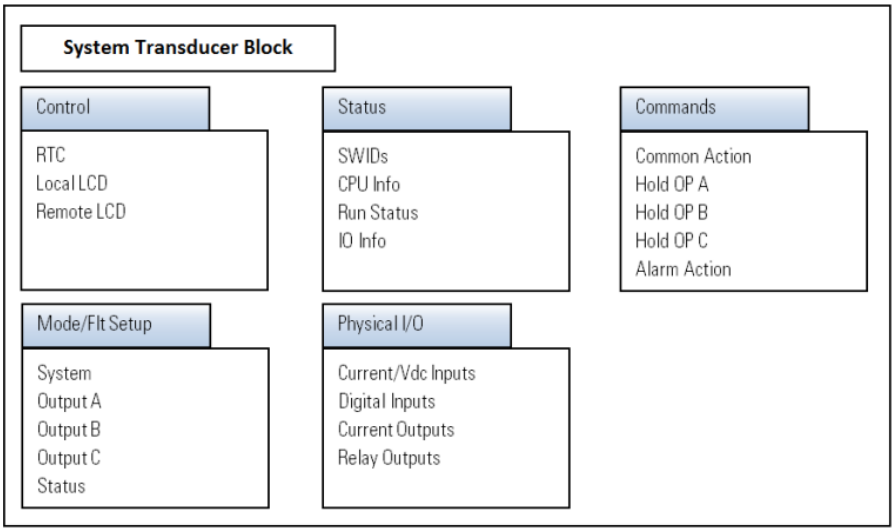

Figure 5-3. System transducer block parameters

For a full list of the parameters see Chapter 10.

Table 5-3. Basic parameters

Parameter	Description
Control	The Control parameters within the system transducer block are used to set up and configure the real time clock (RTC) and local/remote LCD displays that can be used with the MS2011.
Status	The Status parameters provide information on the general system status and hardware configuration of the MS2011. Version information, system status and I/O configuration of the MS2011 are all held within this parameter group.
Commands	The system transducer block allows a host to submit device-specific commands to the MS2011.
Mode/Flt Status	The Mode/Flt Status parameters allow for various alarms/actions to be set up for annunciation/indication for system I/O and fault conditions.
Physical I/O	Parameters within this section of the system transducer block allow the hardware physical system inputs/outputs of the MS2011 to be configured. Status information and results from each input and output are also contained within the block.

Application #1 Block Parameters

Level

The application #1 transducer block provides information/configuration for a single level application within the MS2011. The application block can provide up to four measurement variables that can be routed through to any one of the eight analog input function blocks.

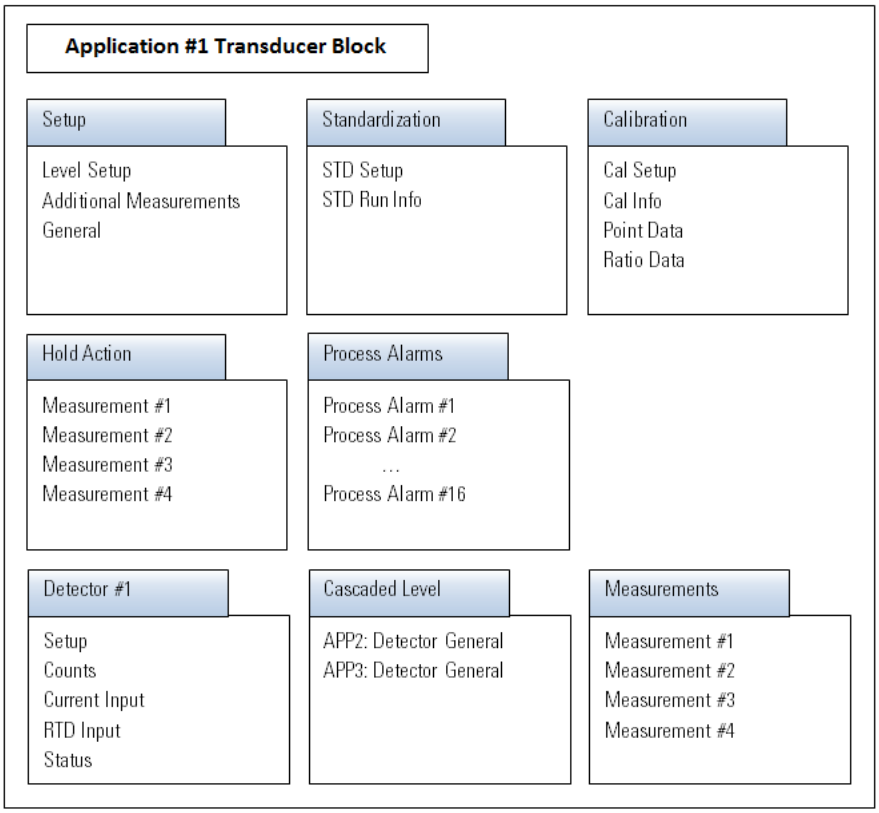

Figure 5-4. Application #1 transducer block

Application block #1 is unique, as it can be set up for cascaded level applications, whereby up to two additional detectors can be used to provide a wider span for the level measurement. In this case, detectors for Applications #2 and #3 are used to provide the additional range.

For a full list of the parameters for each block see Chapter 11.

Table 5-4. Basic parameters

Parameter	Description
Setup	Parameters for the complete setup of the primary level measurement are configured via this transducer block.
Standardization	Standardization of the measurement is performed within this block. Refer to "Level Standardization" for a full explanation of level standardization within the MS2011.
Calibration	Calibration of the measurement is performed within block. Refer to "Level Calibration" for a full explanation of Level calibration within the MS2011.
Hold Action	Any one of the four measurement variables can be set to Hold mode, whereby the measurement is held at a preset value. Hold mode can be activated/de-activated within this transducer block.
Process Alarms	Up to 16 process alarms can be set up within the transducer block. Each alarm can be configured for any of the four measurement variables. For each process alarm, the Set/Clear points and associated delay can be configured, along with the action to be taken upon the presence of the alarm.
Detector #1	The full configuration and status information for Detector #1 can be configured/viewed in the Application #1 transducer block.
Cascaded Level	Should the level application be set up for a cascaded application, the general detector configuration parameters for Applications #2 and #3 can be configured from within this transducer block.
Measurements	Up to four level measurement variables can be set up for this application transducer block. Generally the additional measurements are representations of the primary measurement variable in different units.

Density

The application #1 transducer block provides information and configuration information for a single density application within the MS2011. The application block can provide up to four measurement variables that can be routed through to any one of the eight analog input function blocks.

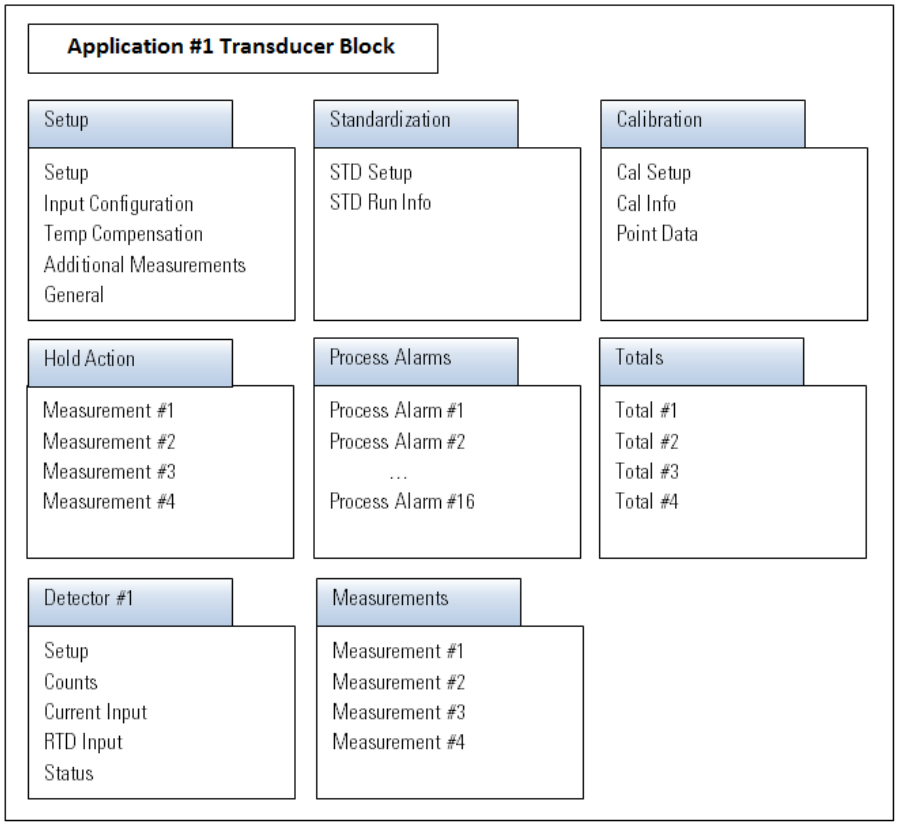

Figure 5-5. Application #1 transducer block

For a full list of the parameters for each block see Chapter 11.

Table 5-5. Basic parameters

Parameter	Description
Setup	Parameters for the complete setup for the primary density measurement are configured via this transducer block. Additional required inputs and measurement calculations can also be configured.
Standardization	Standardization of the measurement is performed within this block. Refer to "Density Standardization" for a full explanation of density standardization within the MS2011.
Calibration	Calibration of the measurement is performed within block. Refer to "Density Calibration" for a full explanation of density calibration within the MS2011.
Hold Action	Any one of the four measurement variables can be set to Hold mode, whereby the measurement is held at a preset value. Hold mode can be activated/de-activated within this transducer block.
Process Alarms	Up to 16 process alarms can be set up within the transducer block. Each alarm can be configured for any of the four measurement variables. For each process alarm, the Set/Clear points and associated delay can be configured, along with the action to be taken upon the presence of the alarm.
Detector #1	The full configuration and status information for Detector #1 can be configured/viewed in the Application #1 transducer block.
Totals	Up to four individual totalizers can be configured within the density application transducer block.
Measurements	Up to four density application measurement variables can be set up for this application transducer block. Measurements can be of various types (Density, Flow, Mass, %content per volume, etc.).

Applications #2, #3 and #4 Block Parameters

Application transducer blocks #2, #3 and #4 are identical to application transducer block #1, with the exception that cascaded level cannot be supported in these blocks.

For a full list of parameters within these transducer blocks, refer to Chapter 12.

Chapter 6
Diagnostic Information

Diagnostics for the MS2011 are provided via the parameter Diagnostics and Diagnosis Extension within the Physical Block.

Below are the available extended diagnostics for the MS2011:

Table 6-1. Extended diagnostics

Error Message	Description	Octet	Bit
Internal Comms Fault	Comm Failure between CPU and Profibus PA board	4	0
No IBP Communications	I2C fault between CPU and IBP controller board	4	1
I/O Input Scan Error	Analog input scan error	4	2
FLASH Update Required	MS2011 requires a FLASH Update operation	4	3
DET#1:Counts Under Range	Detector #1 counts lower than set threshold	4	4
DET#1:Counts Over Range	Detector #1 counts higher than set threshold	4	5
DET#1:HV Control Unstable	Detector #1 high voltage control is unstable	4	6
DET#2:Counts Under Range	Detector #2 counts lower than set threshold	4	7
DET#2:Counts Over Range	Detector #2 counts higher than set threshold	3	0
DET#2:HV Control Unstable	Detector #2 high voltage control is unstable	3	1
DET#3:Counts Under Range	Detector #3 counts lower than set threshold	3	2
DET#3:Counts Over Range	Detector #3 counts higher than set threshold	3	3
DET#3:HV Control Unstable	Detector #3 high voltage control is unstable	3	4
DET#4:Counts Under Range	Detector #4 counts lower than set threshold	3	5
DET#4:Counts Over Range	Detector #4 counts higher than set threshold	3	6
DET#4:HV Control Unstable	Detector #4 high voltage control is unstable	3	7

Chapter 7
MS2011 Specific Parameter Record Structures

System Information

Table 7-1. TFS-01: System information

Byte	Type	Description
0	UINT8	PSU Count
1	UINT8	ISIO Count
2	UINT8	Analog Input Count
3	UINT8	Digital Input Count
4	UINT8	Pulse Input Count
5	UINT8	Analog Output Count
6	UINT8	Relay Count
7	UINT8	Serial Port Count
8	UINT8	USB Count
9	UINT8	Detector Count
10	UINT8	Ethernet Count

General Configuration

Table 7-2. TFS-02: General configuration

Byte	Type	Descriptor
0	UINT8	Date Format
1	UINT8	RTC – Day
2	UINT8	RTC – Month
3	UINT8	RTC – Year
4	UINT8	RTC – Hour
5	UINT8	RTC – Minutes
6	UINT8	RTC – Seconds
7	UINT8	Integrated LCD Scroll Time
8	UINT8	Remote LCD Scroll Time
9	UINT8	Remote LCD Contrast

System Mode Action

Table 7-3. TFS-03: System mode action

Byte	Type	Descriptor
0	UINT8	Hold Active Enable
1	UINT8	Hold Action
2	UINT8	RBP Communications Fail Enabled
3	UINT8	RBP Communications Fail Action
4	UINT8	PROFIBUS Communications Fail Enabled
5	UINT8	PROFIBUS Communications Fail Action
6	UINT8	System Fault Alarm Enable
7	UINT8	System Fault Alarm Action

Analog Output Alarm/Mode Action

Table 7-4. TFS-04: Analog output alarm/mode action

Byte	Type	Descriptor
0	UINT8	Analog Output A Min Alarm Enabled
1	UINT8	Analog Output A Min Alarm Action
2	UINT8	Analog Output B Min Alarm Enabled
3	UINT8	Analog Output B Min Alarm Action
4	UINT8	Analog Output C Min Alarm Enabled
5	UINT8	Analog Output C Min Alarm Action
6	UINT8	Analog Output A Max Alarm Enabled
7	UINT8	Analog Output A Max Alarm Action
8	UINT8	Analog Output B Max Alarm Enabled
9	UINT8	Analog Output B Max Alarm Action
10	UINT8	Analog Output C Max Alarm Enabled
11	UINT8	Analog Output C Max Alarm Action
12	UINT8	Analog Output A Low Fault Enabled
13	UINT8	Analog Output A Low Fault Action
14	UINT8	Analog Output B Low Fault Enabled
15	UINT8	Analog Output B Low Fault Action
16	UINT8	Analog Output C Low Fault Enabled
17	UINT8	Analog Output C Low Fault Action
18	UINT8	Analog Output A High Fault Enabled
19	UINT8	Analog Output A High Fault Action
20	UINT8	Analog Output B High Fault Enabled
21	UINT8	Analog Output B High Fault Action
22	UINT8	Analog Output C High Fault Enabled
23	UINT8	Analog Output C High Fault Action

Force Output Information

Table 7-5. TFS-05: Fource output

Byte	Type	Descriptor
0	UINT8	Output Selection
1-4	FLOAT32	Required mA

Input Information

Table 7-6. TFS-06: Input configuration

Byte	Type	Descriptor
0	UINT8	Input Measurement Type
1	UINT8	Input Measurement Units
2	UINT8	Manual Input/Live Input Selection
3	UINT8	Calibration Mode
4	UINT8	No. Cal Points
5	UINT8	Flow Time Base
6-9	FLOAT32	Minimum mA | V | Deg C
10-13	FLOAT32	Maximum mA | V | Deg C
14-17	FLOAT32	EU Min Value
18-21	FLOAT32	EU Max Value
22-25	FLOAT32	EU Manual Value

Table 7-7. TFS-07: Input calibration table

Byte	Type	Descriptor
0-3	FLOAT32	Min Cal Value
4-7	FLOAT32	Min Raw Value
8-11	FLOAT32	Mid Cal Value
12-15	FLOAT32	Mid Raw Value
16-19	FLOAT32	Max Cal Value
20-23	FLOAT32	Max Raw Value

Table 7-8. TFS-08: Input live data

Byte	Type	Descriptor
0-3	FLOAT32	EU Live Value
4-7	FLOAT32	mA Input Value
8-11	FLOAT32	mA Raw Value
12-13	UINT16	Input Status

Table 7-9. TFS-09: Digital input configuration

Byte	Type	Descriptor
0	UINT8	Live/Manual Mode Selection
1	UINT8	Manual Value
2	UINT8	Input Signal is Inverted
3	UINT8	Action to be Performed when Contact Closed
4	UINT8	Action to be Performed when Contact Opened
5	UINT8	Detector Action to be Performed On

Table 7-10. TFS-10: Digital input status

Byte	Type	Descriptor
0	UINT8	Digital Input State
1	UINT8	Digital Input Alarm Status

Analog Output Information

Table 7-11. TFS-11: Analog output configuration

Byte	Type	Descriptor
0	UINT8	Detector Source
1	UINT8	Measurement Selection
2	UINT8	Reserved
3	UINT8	Live/Hold Output Selection
4	UINT8	Calibration Mode
5	UINT8	No. Calibration Points
6	UINT8	Normal/SIL Selection
7	UINT8	Alarm Action
8	UINT8	Output Type Modify Byte
9-12	FLOAT32	Minimum mA Value
13-16	FLOAT32	Maximum mA Value
17-20	FLOAT32	Zero Scale EU Value
21-24	FLOAT32	Full Scale EU Value
25-28	FLOAT32	Hold EU Value

Table 7-12. TFS-12: Analog output live information

Byte	Type	Descriptor
0-3	FLOAT32	EU Live Value
4-7	FLOAT32	mA Output Value
8-9	UINT16	EU Units
10-11	UINT16	Alarm Status

Relay Information

Table 7-13. TFS-13: Relay configuration

Byte	Type	Descriptor
0	UINT8	Hold/Live Mode Selection
1	UINT8	Hold Value
2	UINT8	Invert Output
3	UINT8	Pulse width in ms (0 or 20-200)
4	UINT8	Action Upon Alarm
5	UINT8	Function [Totalizer | Alarm]
6	UINT8	Alarm Annunciation Detector
7	UINT8	Totalizer Selection

Table 7-14. TFS-14: Relay status

Byte	Type	Descriptor
0	UINT8	State
1	UINT8	Alarm Status

System Floating Point Information

Table 7-15. TFS-15: System floating point information

Byte	Type	Descriptor
0-3	FLOAT32	Main Board CPU Temperature in °C
4-7	FLOAT32	Main Board 3.000v Rail
8-11	FLOAT32	Main Board 4.096v Rail

System Status Information

Table 7-16. TFS-16:System status

Byte	Type	Descriptor
0-3	UINT32	Main Board System Error Status
4-7	UINT32	Main Board System Initialization Error Status
8-11	UINT32	Main Board Runtime Error Status

Application Configuration Information

Table 7-17. TFS-17: Application configuration

Byte	Type	Descriptor
0	UINT8	Sensor Type
1	UINT8	Head Type
2	UINT8	Isotope
3	UINT8	Pipe Size Units
4	UINT8	Material Type
5	UINT8	Detector Length Units
6-7	UINT16	Source Serial Number
8-9	UINT16	Source Tag Number
10-11	UINT16	Source Assembly Date
12	UINT8	Detector Hold Mode
13-16	FLOAT32	Half Life
17-2	FLOAT32	Pipe Inside Diameter
21-24	FLOAT32	Detector Length
25-28	FLOAT32	Detector Activity
29-32	FLOAT32	Background Counts
33-36	FLOAT32	Detector Hold Value

Density Setup Information

Table 7-18. TFS-18: Density setup

Byte	Type	Descriptor
0	UINT8	Level/Density Application Type
1	UINT8	Oilfield Metric Imperial Selection

Level Information

Table 7-19. TFS-19: Level setup

Byte	Type	Descriptor
0	UINT8	Level Type
1	UINT8	Vapor Compensation
2	UINT8	Number of Detectors

Table 7-20. TFS-20: Level span

Byte	Type	Descriptor
0	UINT8	Level 1 Units Selection
1-4	FLOAT32	Level 1 Minimum Span
5-8	FLOAT32	Level 1 Maximum Span
9	UINT8	Level 2 Units Selection
10-13	FLOAT32	Level 2 Minimum Span
14-17	FLOAT32	Level 2 Maximum Span
18	UINT8	Level 3 Units Selection
19-22	FLOAT32	Level 3 Minimum Span
23-26	FLOAT32	Level 3 Maximum Span
27	UINT8	Level 4 Units Selection
28-31	FLOAT32	Level 4 Minimum Span
32-35	FLOAT32	Level 4 Maximum Span

Measurement Information

Table 7-21. TFS-21: Measurement setup

Byte	Type	Descriptor
0	UINT8	Meas#1 Type
1	UINT8	Meas#1 Decimal Places
2	UINT8	Meas#2 Type
3	UINT8	Meas#2 Decimal Places
4	UINT8	Meas#3 Type
5	UINT8	Meas#3 Decimal Places
6	UINT8	Meas#4 Type
7	UINT8	Meas#4 Decimal Places

Table 7-22. TFS-22: Measurement hold action

Byte	Type	Descriptor
0	UINT8	Hold Action For Measurement #1
1-4	FLOAT32	Measurement #1 Hold Value
5	UINT8	Hold Action For Measurement #2
6-9	FLOAT32	Measurement #2 Hold Value
10	UINT8	Hold Action For Measurement #3
11-14	FLOAT32	Measurement #3 Hold Value
15	UINT8	Hold Action For Measurement #4
16-19	FLOAT32	Measurement #4 Hold Value

Additional Input Information

Table 7-23. TFS-23: Additional inputs

Byte	Type	Descriptor
0	UINT8	Source of Density Input For Calculations
1	UINT8	Source of Temperature Input For Calculations
2	UINT8	Source of Pressure Input For Calculations
3	UINT8	Source of Flow Input For Calculations
4	UINT8	Units For Flow Volume
5	UINT8	Time Base For Volumetric Flow Rate
6	UINT8	Units For Mass
7	UINT8	Time Base For Mass Flow Rate
8	UINT8	Units For Temperature Measurement
9	UINT8	Density Unit Selection For Alternate Inputs
10	UINT8	Units For Pressure Measurement
11	UINT8	Units For Velocity
12	UINT8	Units For Bulk Solids Flow
13-16	FLOAT32	Bulk Density Value

Solution User-Defined Polynomial Information

Table 7-24. TFS-24: Solution user-defined polynomial

Byte	Type	Descriptor
0-3	FLOAT32	Solution Polynomial Coefficient A
4-7	FLOAT32	Solution Polynomial Coefficient B
8-11	FLOAT32	Solution Polynomial Coefficient C
12-15	FLOAT32	Solution Polynomial Coefficient D

Temperature Compensation Information

Table 7-25. TFS-25:Temperature compensation equation 1 coefficients

Byte	Type	Descriptor
0-3	FLOAT32	Temp Comp Coefficient A Eq1
4-7	FLOAT32	Temp Comp Coefficient B Eq1
8-11	FLOAT32	Temp Comp Coefficient C Eq1
12-15	FLOAT32	Temp Comp Coefficient D Eq1

Table 7-26. TFS-26: Temperature compensation equation 2 coefficients

Byte	Type	Descriptor
0-3	FLOAT32	Temp Comp Coefficient A Eq2
4-7	FLOAT32	Temp Comp Coefficient B Eq2
8-11	FLOAT32	Temp Comp Coefficient C Eq2

Application Information

Table 7-27. TFS-27: Application mode/fault setup

Byte	Type	Descriptor
0	UINT8	In Standardization Enabled
1	UINT8	In Standardization Action
2	UINT8	In Calibration Enabled
3	UINT8	In Calibration Action
4	UINT8	X-Ray Safeguard Mode Engaged Enabled
5	UINT8	X-Ray Safeguard Mode Engaged Action
6	UINT8	IBP Communications Failed Enabled
7	UINT8	IBP Communications Failed Action
8	UINT8	Totalizer Overrun Enabled
9	UINT8	Totalizer Overrun Action
10	UINT8	Calibration Aborted Enabled
11	UINT8	Calibration Aborted Action
12	UINT8	Sensor Over Range Enabled
13	UINT8	Sensor Over Range Action
14	UINT8	Sensor Under Range Enabled
15	UINT8	Sensor Under Range Action

Table 7-28. TFS-28:Application calibration setup

Byte	Type	Descriptor
0	UINT8	Calibration Method
1-2	UINT16	Calibration Cycle Time in Seconds

Table 7-29. TFS-29: Application calibration run information

Byte	Type	Descriptor
0-3	FLOAT32	Temperature during Cal Point #1
4-7	FLOAT32	Temperature during Cal Point #2
8-11	FLOAT32	Average Count
12-15	FLOAT32	CAL Ref Ratio

Table 7-30. TFS-30: Application polynomial calibration table

Byte	Type	Descriptor
0-3	FLOAT32	Density at Calibration Point #1
4-7	FLOAT32	CAL/Ref Ratio for Point #1
8-11	FLOAT32	Count Rate at Cal Point #1
12-15	FLOAT32	Density at Calibration Point #2
16-19	FLOAT32	CAL/Ref Ratio for Point #2
20-23	FLOAT32	Count Rate at Cal Point #2
24-27	FLOAT32	Density Slope

Table 7-31. TFS-31: Application breakpoint calibration table

Byte	Type	Descriptor
0-3	FLOAT32	Density at Calibration Point #1
4-7	FLOAT32	CAL/Ref Ratio for Point #1
8-11	FLOAT32	Density at Calibration Point #2
12-15	FLOAT32	CAL/Ref Ratio for Point #2
16-19	FLOAT32	Density at Calibration Point #3
20-23	FLOAT32	CAL/Ref Ratio for Point #3
24-27	FLOAT32	Density at Calibration Point #4
28-31	FLOAT32	CAL/Ref Ratio for Point #4
32-35	FLOAT32	Density at Calibration Point #5
36-39	FLOAT32	CAL/Ref Ratio for Point #5
40-43	FLOAT32	Density at Calibration Point #6
44-47	FLOAT32	CAL/Ref Ratio for Point #6
48-51	FLOAT32	Density at Calibration Point #7
52-55	FLOAT32	CAL/Ref Ratio for Point #7
56-59	FLOAT32	Density at Calibration Point #8
60-63	FLOAT32	CAL/Ref Ratio for Point #8
64-67	FLOAT32	Density at Calibration Point #9
68-71	FLOAT32	CAL/Ref Ratio for Point #9
72-75	FLOAT32	Density at Calibration Point #10
76-79	FLOAT32	CAL/Ref Ratio for Point #10

Table 7-32. TFS-32: Application calibration point info

Byte	Type	Descriptor
0-3	FLOAT32	Current Cal Point Density Value
4-7	FLOAT32	Calibration Counts

Table 7-33. TFS-33: Application calibration breakpoint table counts

Byte	Type	Descriptor
0-3	FLOAT32	Breakpoint Cal Table Count #1
4-7	FLOAT32	Breakpoint Cal Table Count #2
8-11	FLOAT32	Breakpoint Cal Table Count #3
12-15	FLOAT32	Breakpoint Cal Table Count #4
16-19	FLOAT32	Breakpoint Cal Table Count #5
20-23	FLOAT32	Breakpoint Cal Table Count #6
24-27	FLOAT32	Breakpoint Cal Table Count #7
28-31	FLOAT32	Breakpoint Cal Table Count #8
32-35	FLOAT32	Breakpoint Cal Table Count #9
36-39	FLOAT32	Breakpoint Cal Table Count #10

Table 7-34. TFS-34: Application totalizer configuration

Byte	Type	Descriptor
0	UINT8	Source for Totalizer
1	UINT8	Totalizer Units Config
2	UINT8	Enable/Disable Totalizer
3-6	FLOAT32	Threshold Below which Totalizer Stops Counting
7-10	FLOAT32	Scaling Factor to Get Pulses Per Unit Volume

Table 7-35. TFS-35: Application process alarm configuration

Byte	Type	Descriptor
0	UINT8	Source
1-2	UINT16	Delay
3	UINT8	Action
4	UINT8	Enable
5-8	FLOAT32	Set Point
9-12	FLOAT32	Clear Point

Table 7-36. TFS-36: Application cascaded level info

Byte	Type	Descriptor
0-3	FLOAT32	Total Raw Count
4-7	FLOAT32	Total Filtered Count

Detector Information

Table 7-37. TFS-37: Detector info #1

Byte	Type	Descriptor
0	UINT8	Power Supply Type
1	UINT8	Preamp Type
2	UINT8	CPLD Status

Table 7-38. TFS-38: Detector info #2

Byte	Type	Descriptor
0-3	UINT32	System Error Code #1
4-7	UINT32	System Error Code #2
8-11	UINT32	Software Error Code
12-15	UINT32	System Summary Code

Table 7-39. TFS-39: Detector info #3

Byte	Type	Descriptor
0-3	FLOAT32	DAC Output #0 Volts
4-7	FLOAT32	DAC Output #1 Volts
8-11	FLOAT32	Battery Volts

Dynamic Tracking Information

Table 7-40. TFS-40: Dynamic tracking

Byte	Type	Descriptor
0	UINT8	Enable
1-2	UINT16	Time Constant
3-6	FLOAT32	Threshold

X-Ray Safeguard Information

Table 7-41. TFS-41: X-ray safeguard

Byte	Type	Descriptor
0	UINT8	Enable
1-2	UINT16	Minimum Hold Time
3-4	UINT16	Maximum Hold Time
5-8	FLOAT32	Threshold

Time Constant Information

Table 7-42. TFS-42:Time constants

Byte	Type	Descriptor
0-1	UINT16	Density Time Constant Value (Seconds)
2-3	UINT16	Flow Time Constant Value (Seconds)

Diagnostic Information

Table 7-43. TFS-43: Diagnostics #1

Byte	Type	Descriptor
0-1	UINT16	High Voltage Control Time Constant in Seconds
2-3	UINT16	Last High Voltage Control Time Constant in Seconds

Table 7-44. TFS-44: Diagnostics #3

Byte	Type	Descriptor
0-3	UINT32	Base Count
4-7	UINT32	Top Count
8-11	UINT32	Data Count
12-15	UINT32	Center Count
16-19	UINT32	Top Count Stable
20-23	UINT32	Filtered Data Count

Table 7-45. TFS-45: Diagnostics #4

Byte	Type	Descriptor
0-3	FLOAT32	RTD Raw Temperature in Deg C
4-7	FLOAT32	DET ANIN Raw value
8-11	FLOAT32	IBP Board Temp
12-15	FLOAT32	HI Voltage Monitor 0
16-19	FLOAT32	HI Voltage Monitor 1

Table 7-46. TFS-46: Diagnostics #5

Byte	Type	Descriptor
0-3	FLOAT32	HV#0 Volt (Auto-Control)
4-7	FLOAT32	HV#1 Volt (Auto-Control)
8-11	FLOAT32	Stable HI Voltage #0 Step
12-15	FLOAT32	Stable IBP Board Temperature

Table 7-47. TFS-47: Diagnostics #6

Byte	Type	Descriptor
0-3	UINT32	Last CPLD Window Count
4-7	UINT32	Minimum CPLD Window Count
8-11	FLOAT32	Last HI Voltage 0 Control (Volts)

12-15	FLOAT32	Last HI Voltage 0 Step (Volts)
16-19	FLOAT32	Last Main Board Temperature

Chapter 8
Physical Block (PA Slot 0)

Physical Block (PA Slot 0)

Table 8-1. Parameter list

Parameter	Rel. Index	Object Type	Type	Size	R/W
Block Object	0	Record	DS-32	20	RO
Static Rev Number	1	Simple	UINT16	2	RO
TAG	2	Simple	OCTET_STRING	32	R/W
Strategy	3	Simple	UINT16	2	R/W
Alert Key	4	Simple	UINT8	1	R/W
Target Mode	5	Simple	UINT8	1	R/W
Mode Block	6	Record	DS-37	3	RO
Alarm Sum	7	Record	DS-42	8	RO
Software Revision	8	Simple	VISIBLE_STRING	16	RO
Hardware Revision	9	Simple	VISIBLE_STRING	16	RO
Manufacturer	10	Simple	UINT16	2	RO
Device ID	11	Simple	VISIBLE_STRING	16	RO
Device Serial Number	12	Simple	VISIBLE_STRING	16	RO
Diagnosis	13	Simple	OCTET_STRING	4	RO
Diagnosis Extension	14	Simple	OCTET_STRING	6	RO
Diagnosis Mask	15	Simple	OCTET_STRING	4	RO
Extended Diagnosis Mask	16	Simple	OCTET_STRING	6	RO
Device Certification	17	Simple	VISIBLE_STRING	32	RO
Write Locking	18	Simple	UINT16	2	R/W
Factory Reset	19	Simple	UINT16	2	R/W
Descriptor	20	Simple	OCTET_STRING	32	R/W
Message	21	Simple	OCTET_STRING	32	R/W
Installation Date	22	Simple	OCTET_STRING	16	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
PROFIBUS Ident Number	24	Simple	UINT8	1	R/W
HW Write Protection	25	Simple	UINT8	1	RO
Feature	26	Record	DS-68	8	R/W
Condensed Status Diagnostics	27	Simple	UINT8	1	R/W
Diagnostic Event Switch	28	Record	DIAG_EVENT_ SWITCH	50	R/W

Chapter 9
Analog Input Function Block (PA Slots 1-8)

Analog Input Function Block (PA Slots 1-8)

Table 9-1. Parameter list

Parameter	Rel. Index	Object Type	Type	Size	R/W
Block Object	0	Record	DS-32	20	RO
Static Rev Number	1	Simple	UINT16	2	RO
TAG	2	Simple	OCTET_STRING	32	R/W
Strategy	3	Simple	UINT16	2	R/W
Alert Key	4	Simple	UINT8	1	R/W
Target Mode	5	Simple	UINT8	1	R/W
Mode Block	6	Record	DS-37	3	RO
Alarm Sum	7	Record	DS-42	8	RO
Batch	8	Record	DS-67	10	RW
OUT	10	Record	101	5	R/W*
PV Scale	11	Array	FLOAT32	8	R/W
Out Scale	12	Record	DS-36	11	R/W
Linearization Type	13	Simple	USIGN8	1	R/W
Channel	14	Simple	USIGN16	2	R/W
PV Filter Time	16	Simple	FLOAT32	4	R/W
Fail Safe Type	17	Simple	USIGN8	1	R/W
Fail Safe Value	18	Simple	FLOAT32	4	R/W
Alarm Hysteresis	19	Simple	FLOAT32	4	R/W
HI HI Alarm Limit	21	Simple	FLOAT32	4	R/W
HI Alarm Limit	23	Simple	FLOAT32	4	R/W
LO Alarm Limit	25	Simple	FLOAT32	4	R/W
LO LO Alarm Limit	27	Simple	FLOAT32	4	R/W
HI HI Alarm	30	Record	DS-39	16	RO

Parameter	Rel. Index	Object Type	Type	Size	R/W
HI Alarm	31	Record	DS-39	16	RO
LO Alarm	32	Record	DS-39	16	RO
LO LO Alarm	33	Record	DS-39	16	RO
Simulate	34	Record	DS-50	6	R/W
OUT Units Text	35	Simple	OCTET_STRING	16	R/W

Default Analog Input Channel Settings

After a cold start, the analog input block channels will be set up as defined in the following table.

Table 9-2. Channel settings

Channel	Assignment
Analog Input #1 FB	APP1: Meas#1
Analog Input #2 FB	APP1: Meas#2
Analog Input #3 FB	APP1: Meas#3
Analog Input #4 FB	APP1: Meas#4
Analog Input #5 FB	APP2: Meas#1
Analog Input #6 FB	APP2: Meas#2
Analog Input #7 FB	APP3: Meas#1
Analog Input #8 FB	APP4: Meas#1

Chapter 10
System Transducer Block (PA Slot 9)

Parameters

Table 10-1. Parameter list

Parameter	Rel. Index	Object Type	Type	Size	R/W
Block Object	0	Record	DS-32	20	RO
Static Rev Number	1	Simple	UINT16	2	RO
TAG	2	Simple	OCTET_STRING	32	R/W
Strategy	3	Simple	UINT16	2	R/W
Alert Key	4	Simple	UINT8	1	R/W
Target Mode	5	Simple	UINT8	1	R/W
Mode Block	6	Record	DS-37	3	RO
Alarm Sum	7	Record	DS-42	8	RO
Modbus Result	8	Simple	UINT8	1	RO
Internal Modbus Comm Status	9	Simple	UINT8	1	RO
MS2011 System Information	10	Record	TFS-01	11	RO
CPU Version	11	Simple	VISIBLE_STRING	10	RO
CPU Compile Date	12	Simple	VISIBLE_STRING	20	RO
CPU CPLD Version	13	Simple	UINT8	1	RO
Boot Loader Version	14	Simple	VISIBLE_STRING	10	RO
RBP Version	15	Simple	VISIBLE_STRING	10	RO
RBP Compile Date	16	Simple	VISIBLE_STRING	20	RO
Profibus Firmware Version	17	Simple	VISIBLE_STRING	10	RO
Profibus Compile Date	18	Simple	VISIBLE_STRING	20	RO
Current Date/Time	19	Simple	VISIBLE_STRING	20	RO

Parameter	Rel. Index	Object Type	Type	Size	R/W
MS2011 Last Startup Time	20	Simple	VISIBLE_STRING	20	RO
General Config	21	Record	TFS-02	10	R/W
System Mode Action	22	Record	TFS-03	8	R/W
System Mode Fault Status	23	Simple	UINT8	1	RO
Analog Output Fault Action	24	Record	TFS-04	24	R/W
Analog Output Fault Status	25	Simple	UINT24	3	RO
Common Action Command	26	Simple	UINT8	1	R/W
Hold Output A Command	27	Simple	UINT8	1	R/W
Hold Output B Command	28	Simple	UINT8	1	R/W
Hold Output C Command	29	Simple	UINT8	1	R/W
Alarm Action Command	30	Simple	UINT8	1	R/W
WRITE FLASH Command	31	Simple	UINT16	2	R/W
Force Output	32	Record	TFS-05	5	R/W
mA#1 Config	33	Record	TFS-06	26	R/W
mA#1 Cal Table	34	Record	TFS-07	24	R/W
mA#1 Units Code	35	Simple	UINT16	2	RO
mA#1 Live Data	36	Record	TFS-08	14	RO
mA#2 Config	37	Record	TFS-06	26	R/W
mA#2 Cal Table	38	Record	TFS-07	24	R/W
mA#2 Units Code	39	Simple	UINT16	2	RO
mA#2 Live Data	40	Record	TFS-08	14	RO
VDC#1 Config	41	Record	TFS-06	26	R/W
VDC#1 Cal Table	42	Record	TFS-07	24	R/W
VDC#1 Units Code	43	Simple	UINT16	2	RO
VDC#1 Live Data	44	Record	TFS-08	14	RO

Parameter	Rel. Index	Object Type	Type	Size	R/W
VDC#2 Config	45	Record	TFS-06	26	R/W
VDC#2 Cal Table	46	Record	TFS-07	24	R/W
VDC#2 Units Code	47	Simple	UINT16	2	RO
VDC#2 Live Data	48	Record	TFS-08	14	RO
Digital Input #1 Config	49	Record	TFS-09	6	R/W
Digital Input #1 Status	50	Record	TFS-10	2	RO
Digital Input #2 Config	51	Record	TFS-09	6	R/W
Digital Input #2 Status	52	Record	TFS-10	2	RO
Anout A Config	53	Record	TFS-11	28	R/W
Anout A Cal Table	54	Record	TFS-07	24	R/W
Anout A Live Data	55	Record	TFS-12	10	RO
Anout B Config	56	Record	TFS-11	28	R/W
Anout B Cal Table	57	Record	TFS-07	24	R/W
Anout B Live Data	58	Record	TFS-12	10	RO
Anout C Config	59	Record	TFS-11	28	R/W
Anout C Cal Table	60	Record	TFS-07	24	R/W
Anout C Live Data	61	Record	TFS-12	10	RO
Relay A Config	62	Record	TFS-13	8	R/W
Relay A Status	63	Record	TFS-14	2	RO
Relay B Config	64	Record	TFS-13	8	R/W
Relay B Status	65	Record	TFS-14	2	RO
System Floating Point Info	66	Record	TFS-15	12	RO
System Status	67	Record	TFS-16	12	RO
Detector Map	68	Simple	UINT16	2	RO

Note After writing parameter(s), the Write FLASH command must be issued via System Transducer Block Index 31. ▲

Chapter 11
Application #1 Transducer Block (PA Slot 10)

Parameters

Table 11-1. Parameter list

Parameter	Rel. Index	Object Type	Type	Size	R/W
Block Object	0	Record	DS-32	20	RO
Static Rev Number	1	Simple	UINT16	2	RO
TAG	2	Simple	OCTET_STRING	32	R/W
Strategy	3	Simple	UINT16	2	R/W
Alert Key	4	Simple	UINT8	1	R/W
Target Mode	5	Simple	UINT8	1	R/W
Mode Block	6	Record	DS-37	3	RO
Alarm Sum	7	Record	DS-42	8	RO
Primary Variable	8	Record	DS_101	5	RO
Primary Variable Units	9	Simple	UINT16	2	RO
Secondary Variable	10	Record	DS_101	5	RO
Secondary Variable Units	11	Simple	UINT16	2	RO
Tertiary Variable	12	Record	DS_101	5	RO
Tertiary Variable Units	13	Simple	UINT16	2	RO
Quaternary Variable	14	Record	DS_101	5	RO
Quaternary Variable Units	15	Simple	UINT16	2	RO
Application Config	16	Record	TFS-17	37	R/W
Density Setup	17	Record	TFS-18	2	R/W
Level Setup	18	Record	TFS-19	3	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Level Span	19	Record	TFS-20	36	R/W
Measurement Setup	20	Record	TFS-21	8	R/W
Measurement Hold Action	21	Record	TFS-22	20	R/W
Density Units	22	Simple	UINT16	2	R/W
Additional Inputs	23	Record	TFS-23	17	R/W
Solution Poly Type	24	Simple	UINT8	1	R/W
Solution User-Defined Polynomial	25	Record	TFS-24	16	R/W
Carrier Gravity	26	Simple	FLOAT32	4	R/W
Solid Gravity	27	Simple	FLOAT32	4	R/W
Carrier Attenuation	28	Simple	FLOAT32	4	R/W
Solid Attenuation	29	Simple	FLOAT32	4	R/W
Temp Comp Input Source	30	Simple	UINT8	1	R/W
Temp Comp – Manual Temp	31	Simple	FLOAT32	4	R/W
Temp Comp – Reference Temp	32	Simple	FLOAT32	4	R/W
Temp Comp – Offset Correction	33	Simple	FLOAT32	4	R/W
Temp Comp – Poly Equation #1	34	Simple	UINT8	1	R/W
Temp Comp – Poly Equation #1 Coefficients	35	Record	TFS-25	16	R/W
Temp Comp – Poly Equation #2	36	Simple	UINT8	1	R/W
Temp Comp – Poly Equation #2 Coefficients	37	Record	TFS-26	16	R/W
Temp Comp – Use T/C during STD	38	Simple	UINT8	1	R/W
STD/CAL Command	39	Simple	UINT8	1	R/W
STD Pipe Condition	40	Simple	UINT8	1	R/W
Application Mode/Fault Setup	41	Record	TFS-27	16	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Application Mode/Fault Status	42	Simple	UINT8	1	RO
STD Sample Time	43	Simple	UINT16	2	R/W
STD Override Value	44	Simple	FLOAT32	4	R/W
STD Value	45	Simple	FLOAT32	4	R/W
Previous STD Pipe Condition	46	Simple	UINT8	1	R/W
Temp During STD Cycle	47	Simple	FLOAT32	4	R/W
Previous STD Count Rate	48	Simple	FLOAT32	4	R/W
STD Count Rate	49	Simple	FLOAT32	4	R/W
Previous STD Date/Time	50	Simple	VISIBLE_STRING	20	R/W
STD Time Remaining	51	Simple	UINT16	2	RO
STD Run Information	52	Simple	UINT8	1	RO
CAL Setup	53	Record	TFS-28	3	R/W
CAL Time Remaining	54	Simple	UINT16	2	RO
CAL Information	55	Record	TFS-29	16	RO
Polynomial CAL Table	56	Record	TFS-30	28	R/W
Breakpoint CAL Table	57	Record	TFS-31	80	R/W
CAL Point Information	58	Record	TFS-32	8	RO
Breakpoint Table CAL Counts	59	Record	TFS-33	40	R/W
Current CAL Point	60	Simple	UINT8	1	R/W
Remove CAL Point	61	Simple	UINT8	1	R/W
Number of CAL Points in Use	62	Simple	UINT8	1	R/W
Enable ALL Totalizers	63	Simple	UINT8	1	R/W
Totalizer #1 Configuration	64	Record	TFS-34	11	R/W
Totalizer #2 Configuration	65	Record	TFS-34	11	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Totalizer #3 Configuration	66	Record	TFS-34	11	R/W
Totalizer #4 Configuration	67	Record	TFS-34	11	R/W
Total #1	68	Simple	FLOAT32	4	RO
Total #2	69	Simple	FLOAT32	4	RO
Total #3	70	Simple	FLOAT32	4	RO
Total #4	71	Simple	FLOAT32	4	RO
Process Alarm #1 Configuration	72	Record	TFS-35	13	R/W
Process Alarm #2 Configuration	73	Record	TFS-35	13	R/W
Process Alarm #3 Configuration	74	Record	TFS-35	13	R/W
Process Alarm #4 Configuration	75	Record	TFS-35	13	R/W
Process Alarm #5 Configuration	76	Record	TFS-35	13	R/W
Process Alarm #6 Configuration	77	Record	TFS-35	13	R/W
Process Alarm #7 Configuration	78	Record	TFS-35	13	R/W
Process Alarm #8 Configuration	79	Record	TFS-35	13	R/W
Process Alarm #9 Configuration	80	Record	TFS-35	13	R/W
Process Alarm #10 Configuration	81	Record	TFS-35	13	R/W
Process Alarm #11 Configuration	82	Record	TFS-35	13	R/W
Process Alarm #12 Configuration	83	Record	TFS-35	13	R/W
Process Alarm #13 Configuration	84	Record	TFS-35	13	R/W
Process Alarm #14 Configuration	85	Record	TFS-35	13	R/W
Process Alarm #15 Configuration	86	Record	TFS-35	13	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Process Alarm #16 Configuration	87	Record	TFS-35	13	R/W
Process Alarm Status	88	Simple	UINT16	2	R/W
Cascaded Level Information	89	Record	TFS-36	8	RO
IBP Version	90	Simple	VISIBLE_STRING	10	RO
IBP Compile Date	91	Simple	VISIBLE_STRING	20	RO
IBP CPLD Version	92	Simple	UINT8	1	RO
Detector mA Config	93	Record	TFS-06	26	R/W
Detector mA CAL Table	94	Record	TFS-07	24	R/W
Detector mA Input Profibus Units Code	95	Simple	UINT16	2	RO
Detector mA Live Data	96	Record	TFS-08	14	RO
Detector RTD Config	97	Record	TFS-06	26	R/W
Detector RTD CAL Table	98	Record	TFS-07	24	R/W
Detector RTD Input Profibus Units Code	99	Simple	UINT16	2	RO
Detector RTD Live Data	100	Record	TFS-08	14	RO
Detector Info #1	101	Record	TFS-37	3	RO
Detector Info #2	102	Record	TFS-38	16	RO
Detector Info #3	103	Record	TFS-39	12	RO
Dynamic Tracking	104	Record	TFS-40	7	R/W
X-Ray Safeguard	105	Record	TFS-41	9	R/W
Time Constants	106	Record	TFS-42	4	R/W
Force HV#0 Control	107	Simple	UINT8	1	R/W
Force HV#0 Value	108	Simple	FLOAT32	4	R/W
Detector Under-Range Limit	109	Simple	UINT32	4	R/W
Detector Over-Range Limit	110	Simple	UINT32	4	R/W
Diagnostics #1	111	Record	TFS-43	4	RO

Parameter	Rel. Index	Object Type	Type	Size	R/W
Diagnostics #3	112	Record	TFS-44	24	RO
Diagnostics #4	113	Record	TFS-45	20	RO
Diagnostics #5	114	Record	TFS-46	16	RO
Diagnostics #6	115	Record	TFS-47	20	RO
Application #2 Config	116	Record	TFS-17	37	R/W
Application #3 Config	117	Record	TFS-17	37	R/W
Application #4 Config	118	Record	TFS-17	37	R/W

Note After writing parameter(s), the Write FLASH command must be issued via System Transducer Block Index 31. ▲

Chapter 12
Applications #2, #3 & #4 Transducer Block (PA Slots 11-13)

Parameters

Table 12-1. Parameter list

Parameter	Rel. Index	Object Type	Type	Size	R/W
Block Object	0	Record	DS-32	20	RO
Static Rev Number	1	Simple	UINT16	2	RO
TAG	2	Simple	OCTET_STRING	32	R/W
Strategy	3	Simple	UINT16	2	R/W
Alert Key	4	Simple	UINT8	1	R/W
Target Mode	5	Simple	UINT8	1	R/W
Mode Block	6	Record	DS-37	3	RO
Alarm Sum	7	Record	DS-42	8	RO
Primary Variable	8	Record	DS_101	5	RO
Primary Variable Units	9	Simple	UINT16	2	RO
Secondary Variable	10	Record	DS_101	5	RO
Secondary Variable Units	11	Simple	UINT16	2	RO
Tertiary Variable	12	Record	DS_101	5	RO
Tertiary Variable Units	13	Simple	UINT16	2	RO
Quaternary Variable	14	Record	DS_101	5	RO
Quaternary Variable Units	15	Simple	UINT16	2	RO
Application Config	16	Record	TFS-17	37	R/W
Density Setup	17	Record	TFS-18	2	R/W
Level Setup	18	Record	TFS-19	3	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Level Span	19	Record	TFS-20	36	R/W
Measurement Setup	20	Record	TFS-21	8	R/W
Measurement Hold Action	21	Record	TFS-22	20	R/W
Density Units	22	Simple	UINT16	2	R/W
Additional Inputs	23	Record	TFS-23	17	R/W
Solution Poly Type	24	Simple	UINT8	1	R/W
Solution User Defined Polynomial	25	Record	TFS-24	16	R/W
Carrier Gravity	26	Simple	FLOAT32	4	R/W
Solid Gravity	27	Simple	FLOAT32	4	R/W
Carrier Attenuation	28	Simple	FLOAT32	4	R/W
Solid Attenuation	29	Simple	FLOAT32	4	R/W
Temp Comp Input Source	30	Simple	UINT8	1	R/W
Temp Comp – Manual Temp	31	Simple	FLOAT32	4	R/W
Temp Comp – Reference Temp	32	Simple	FLOAT32	4	R/W
Temp Comp – Offset Correction	33	Simple	FLOAT32	4	R/W
Temp Comp – Poly Equation #1	34	Simple	UINT8	1	R/W
Temp Comp – Poly Equation #1 Coefficients	35	Record	TFS-25	16	R/W
Temp Comp – Poly Equation #2	36	Simple	UINT8	1	R/W
Temp Comp – Poly Equation #2 Coefficients	37	Record	TFS-26	16	R/W
Temp Comp – Use T/C during STD	38	Simple	UINT8	1	R/W
STD/CAL Command	39	Simple	UINT8	1	R/W
STD Pipe Condition	40	Simple	UINT8	1	R/W
Application Mode/Fault Setup	41	Record	TFS-27	16	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Application Mode/Fault Status	42	Simple	UINT8	1	RO
STD Sample Time	43	Simple	UINT16	2	R/W
STD Override Value	44	Simple	FLOAT32	4	R/W
STD Value	45	Simple	FLOAT32	4	R/W
Previous STD Pipe Condition	46	Simple	UINT8	1	RO
Temp During STD Cycle	47	Simple	FLOAT32	4	RO
Previous STD Count Rate	48	Simple	FLOAT32	4	R/W
STD Count Rate	49	Simple	FLOAT32	4	RO
Previous STD Date/Time	50	Simple	VISIBLE_STRING	20	R/W
STD Time Remaining	51	Simple	UINT16	2	RO
STD Run Information	52	Simple	UINT8	1	RO
CAL Setup	53	Record	TFS-28	3	R/W
CAL Time Remaining	54	Simple	UINT16	2	RO
CAL Information	55	Record	TFS-29	16	RO
Polynomial CAL Table	56	Record	TFS-30	28	R/W
Breakpoint CAL Table	57	Record	TFS-31	80	R/W
CAL Point Information	58	Record	TFS-32	8	RO
Breakpoint Table CAL Counts	59	Record	TFS-33	40	R/W
Current CAL Point	60	Simple	UINT8	1	R/W
Remove CAL Point	61	Simple	UINT8	1	R/W
Number of CAL Points in Use	62	Simple	UINT8	1	R/W
Enable ALL Totalizers	63	Simple	UINT8	1	R/W
Totalizer #1 Configuration	64	Record	TFS-34	11	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Totalizer #2 Configuration	65	Record	TFS-34	11	R/W
Totalizer #3 Configuration	66	Record	TFS-34	11	R/W
Totalizer #4 Configuration	67	Record	TFS-34	11	R/W
Total #1	68	Simple	FLOAT32	4	RO
Total #2	69	Simple	FLOAT32	4	RO
Total #3	70	Simple	FLOAT32	4	RO
Total #4	71	Simple	FLOAT32	4	RO
Process Alarm #1 Configuration	72	Record	TFS-35	13	R/W
Process Alarm #2 Configuration	73	Record	TFS-35	13	R/W
Process Alarm #3 Configuration	74	Record	TFS-35	13	R/W
Process Alarm #4 Configuration	75	Record	TFS-35	13	R/W
Process Alarm #5 Configuration	76	Record	TFS-35	13	R/W
Process Alarm #6 Configuration	77	Record	TFS-35	13	R/W
Process Alarm #7 Configuration	78	Record	TFS-35	13	R/W
Process Alarm #8 Configuration	79	Record	TFS-35	13	R/W
Process Alarm #9 Configuration	80	Record	TFS-35	13	R/W
Process Alarm #10 Configuration	81	Record	TFS-35	13	R/W
Process Alarm #11 Configuration	82	Record	TFS-35	13	R/W
Process Alarm #12 Configuration	83	Record	TFS-35	13	R/W
Process Alarm #13 Configuration	84	Record	TFS-35	13	R/W
Process Alarm #14 Configuration	85	Record	TFS-35	13	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Process Alarm #15 Configuration	86	Record	TFS-35	13	R/W
Process Alarm #16 Configuration	87	Record	TFS-35	13	R/W
Process Alarm Status	88	Simple	UINT16	2	R/W
Cascaded Level Information	89	Record	TFS-36	8	RO
IBP Version	90	Simple	VISIBLE_STRING	10	RO
IBP Compile Date	91	Simple	VISIBLE_STRING	20	RO
IBP CPLD Version	92	Simple	UINT8	1	RO
Detector mA Config	93	Record	TFS-06	26	R/W
Detector mA CAL Table	94	Record	TFS-07	24	R/W
Detector mA Input Profibus Units Code	95	Simple	UINT16	2	RO
Detector mA Live Data	96	Record	TFS-08	14	RO
Detector RTD Config	97	Record	TFS-06	26	R/W
Detector RTD CAL Table	98	Record	TFS-07	24	R/W
Detector RTD Input Profibus Units Code	99	Simple	UINT16	2	RO
Detector RTD Live Data	100	Record	TFS-08	14	RO
Detector Info #1	101	Record	TFS-37	3	RO
Detector Info #2	102	Record	TFS-38	16	RO
Detector Info #3	103	Record	TFS-39	12	RO
Dynamic Tracking	104	Record	TFS-40	7	R/W
X-Ray Safeguard	105	Record	TFS-41	9	R/W
Time Constants	106	Record	TFS-42	4	R/W
Force HV#0 Control	107	Simple	UINT8	1	R/W
Force HV#0 Value	108	Simple	FLOAT32	4	R/W
Detector Under-Range Limit	109	Simple	UINT32	4	R/W

Parameter	Rel. Index	Object Type	Type	Size	R/W
Detector Over-Range Limit	110	Simple	UINT32	4	R/W
Diagnostics #1	111	Record	TFS-43	4	RO
Diagnostics #3	112	Record	TFS-44	24	RO
Diagnostics #4	113	Record	TFS-45	20	RO
Diagnostics #5	114	Record	TFS-46	16	RO
Diagnostics #6	115	Record	TFS-47	20	RO

Note After writing parameter(s), the Write FLASH command must be issued via System Transducer Block Index 31. ▲

Chapter 13
SIMATIC PDM: Device Online Menu for Specialist Users

This chapter describes how to use SIMATIC PDM with the MS2011 via the Device online menu as a specialist user.

It is assumed that you have installed the instrument and the required GSD/EDD application software and that all necessary connections have been made.

Device Menu

The Device menu allows a user to configure/calibrate the MS2011 while connected to the device. Below is a copy of the pull-down menu taken from SIMATIC PDM.

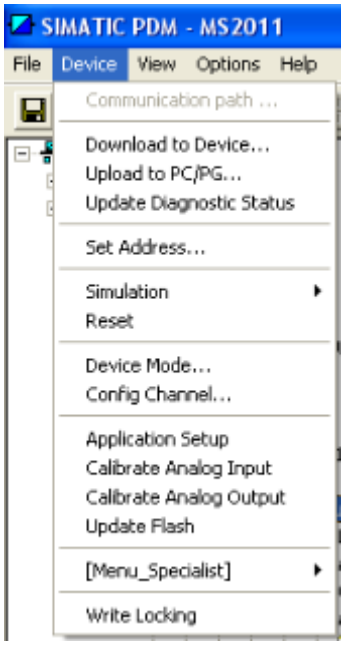

Figure 13-1. Device menu

Standard PDM Menu options are available:

- Download to Device: Full configuration is sent to the MS2011
- Upload to PC/PG: Full configuration is read from the MS2011

- Update Diagnostic Status: Diagnostic Status updated in PDM from MS2011

Set Address

Selecting **Set Address** from the Device menu allows a user to set the node address for the MS2011 on the Profibus PA network.

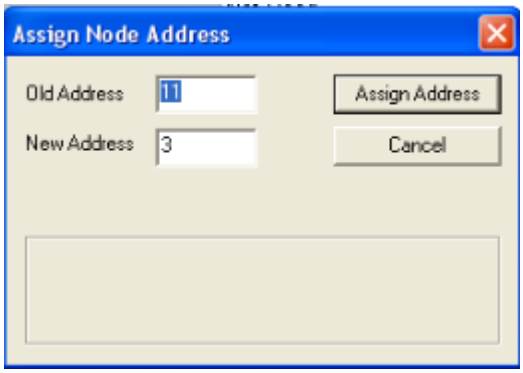

Figure 13-2. Assign node address

Note When shipped, the MS2011 will have a node address of 126. ▲

Simulation

Using the Simulation menu allows a user to select one of the eight analog input function blocks and configure the block for simulation mode.

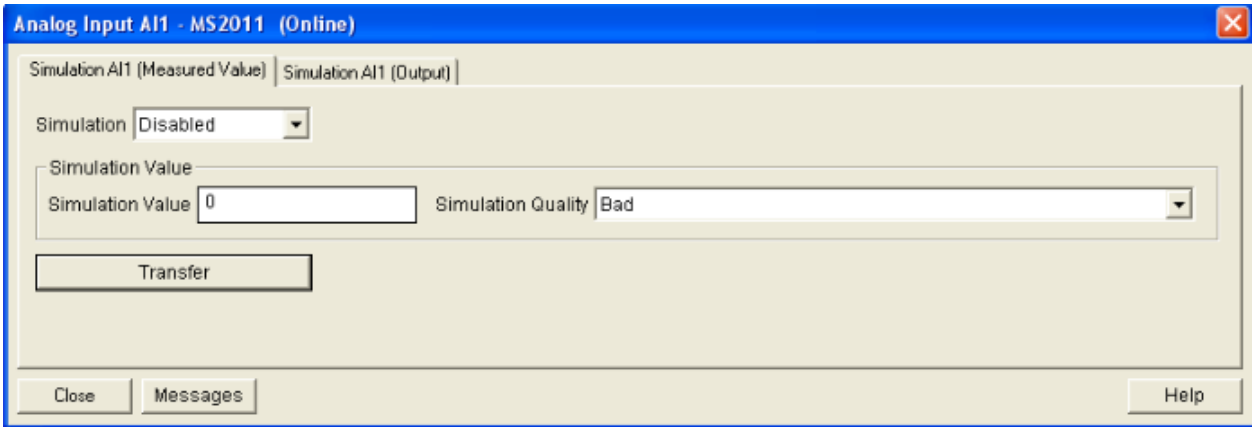

Figure 13-3. Simulation AI1 (measured value)

This screen allows the user to enable or disable simulation mode and to set a simulated value and status.

Note To be able to enter simulation mode, the target mode for the analog input block must not be AUTO. ▲

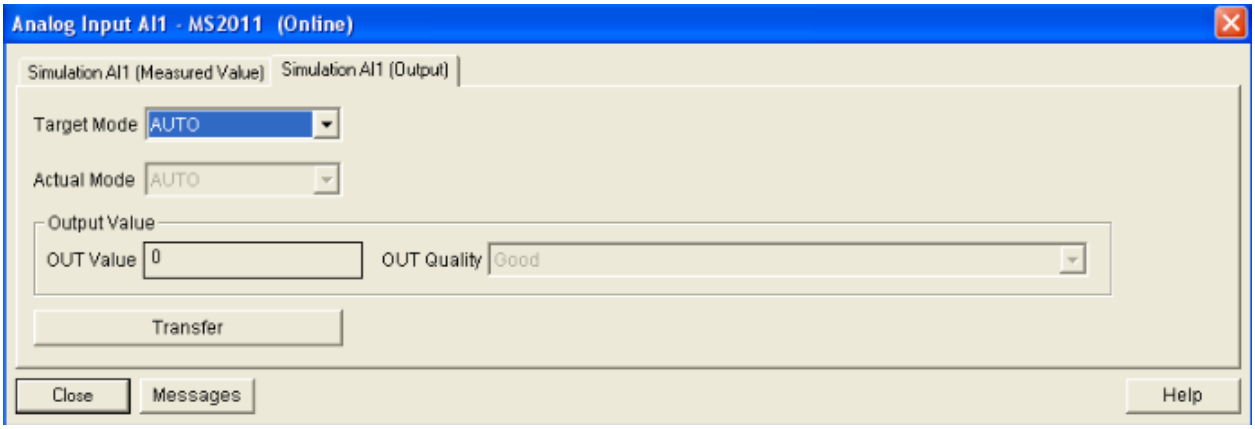

Figure 13-4. Simulation AI1 (output)

This menu shows the current output value and status for the analog input block.

Here the user can set the target mode for the AI block to AUTO, MAN, or Out of Service (OOS)

Reset

The Reset Menu allows a user to perform various reset functions on the MS2011.

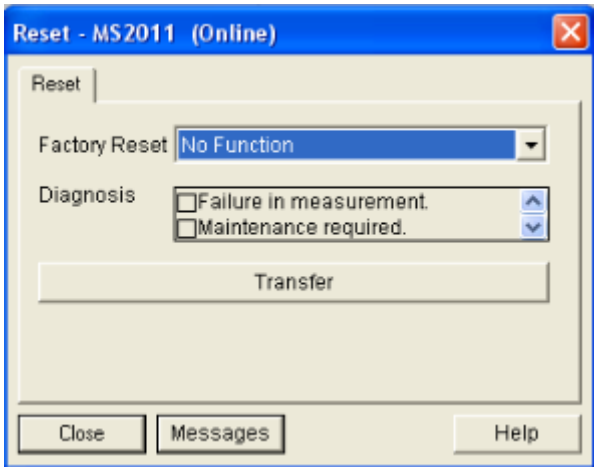

Figure 13-5. Reset menu

The operator can perform the following actions:

- No Function : No action performed
- Factory Reset : Performs a COLD Start of the MS2011
- Warm Start: Performs WARM Start of the MS2011
- Reset Address to 126: Resets the node address to 126

Device Mode

This menu allows an operator to set the target modes for each of the eight analog input function blocks.

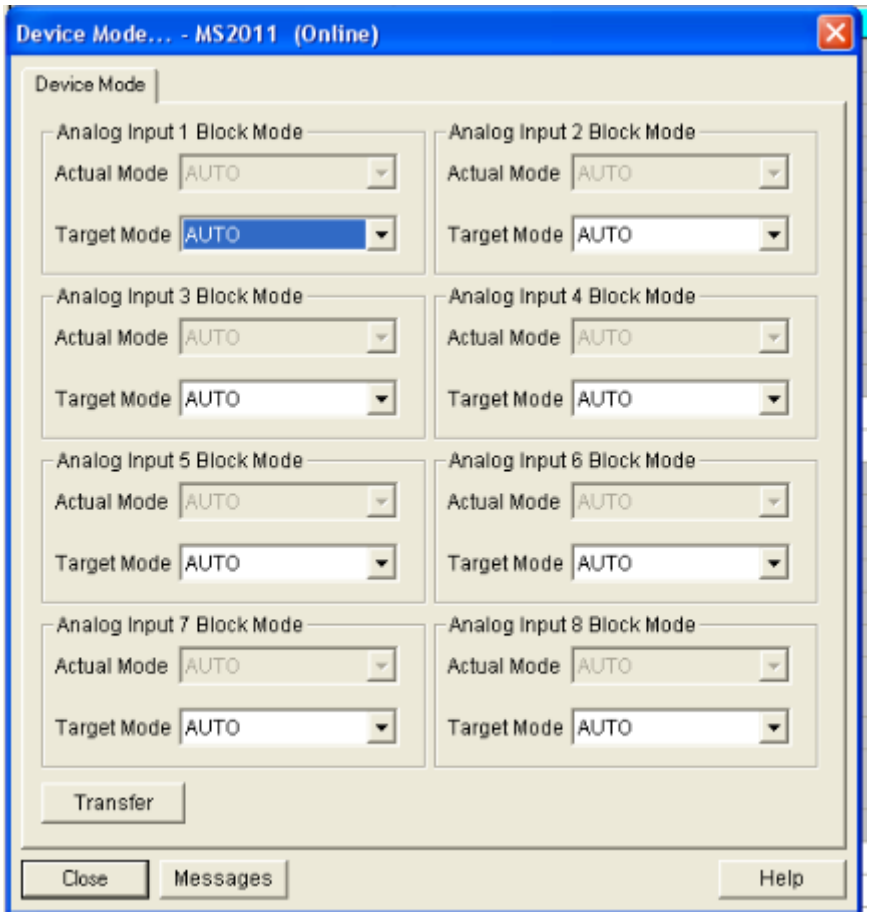

Figure 13-6. Device Mode menu

Configure Channel

Using this menu, a specialist user can set up the channels for each of the analog input function blocks.

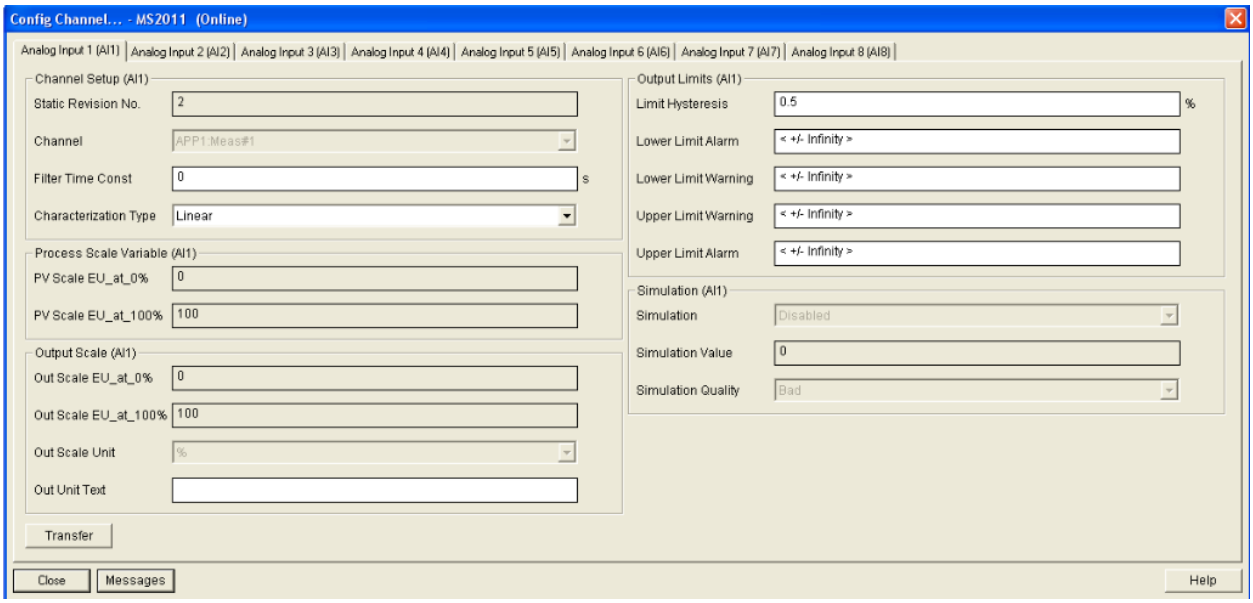

Figure 13-7. Configure channels menu

Note Channel Setup and Output Scale can only be configured if the analog input block is set to OOS mode. ▲

Application Setup

This menu allows selection of level or density application types for each of the four applications of the MS2011 to be set up. Any combination of both level and density applications can be configured.

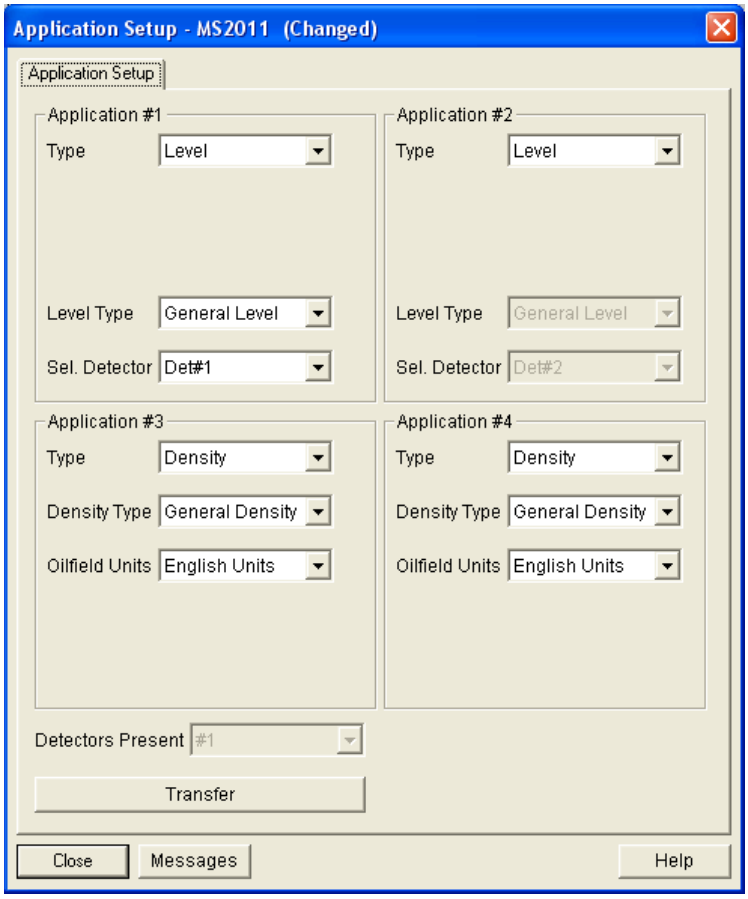

Figure 13-8. Configure channels menu

Note On Application #1, a level setup can be configured to be cascaded, whereby up to three detectors can be used to cover a wider span. In this case, Applications #2 and #3 are set to Not Used. ▲

Calibrate Analog Input

A Specialist user can calibrate any one of the available physical analog inputs on the MS2011. A simple method is performed to guide a user through the calibration process as follows:

1. Select the physical analog input to calibrate.

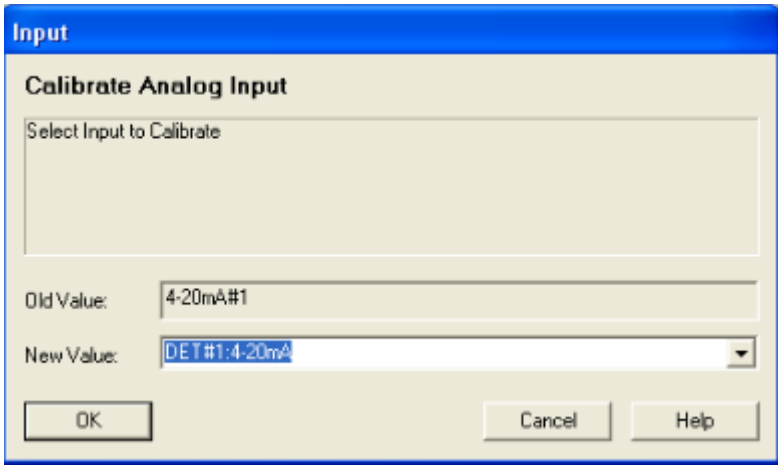

Figure 13-9. Calibrating an analog input

2. Accept the warning by pressing **OK**.

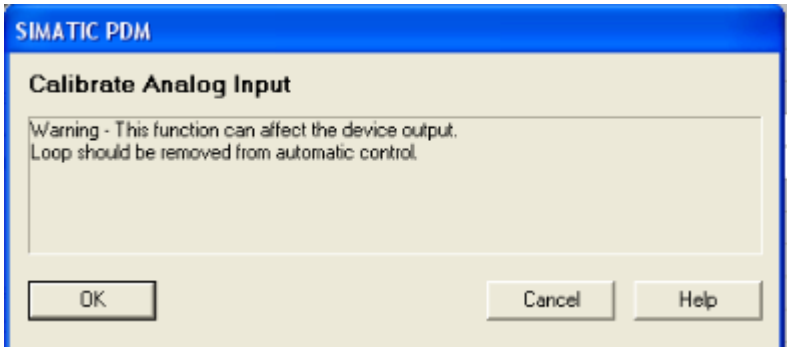

Figure 13-10.

3. Select the number of calibration points.

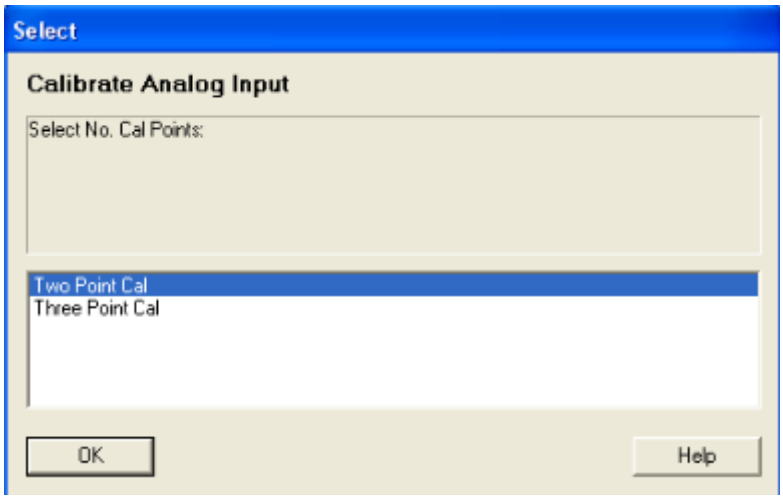

Figure 13-11.

4. Apply the minimum mA (V or °C) to the physical input. Press **OK** when the input is present.

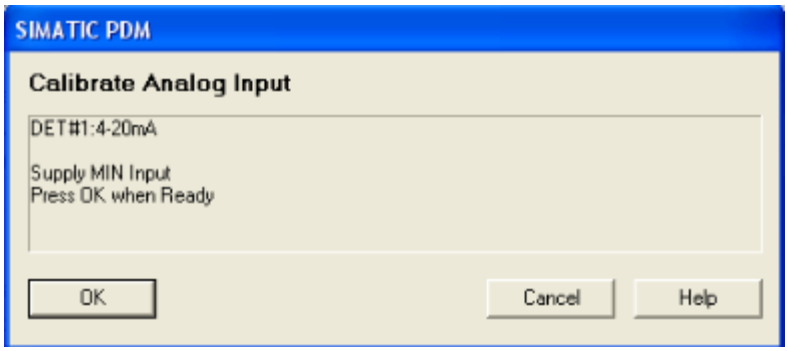

Figure 13-12.

5. Press **EXIT** when the input is stable.

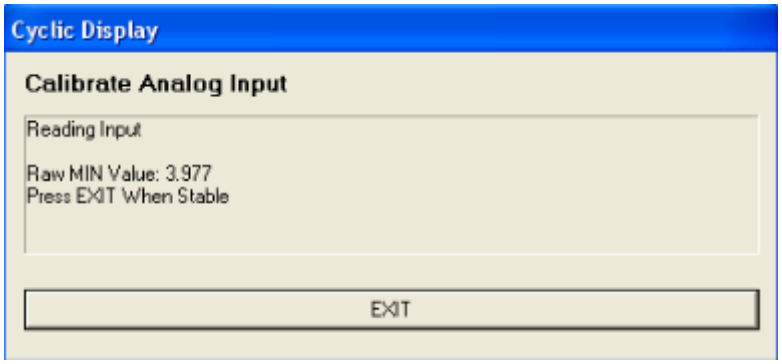

Figure 13-13.

6. Enter the supplied mA (V or °C) input, then press **OK**.

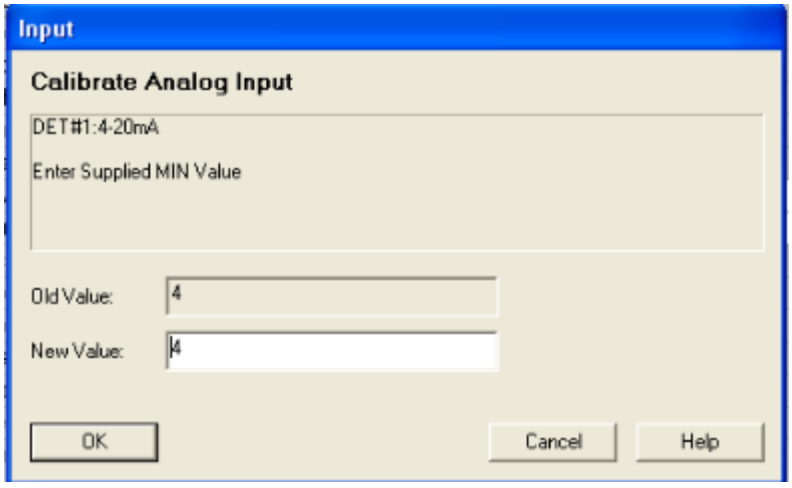

Figure 13-14.

7. Repeat steps 4, 5 and 6 for MID and MAX input values.

Note If two point calibration is chosen, the midpoint calibration is not performed. ▲

8. After entry of the MAX mA value, the new calibration will be written to the Input Cal Table. Press **OK**.

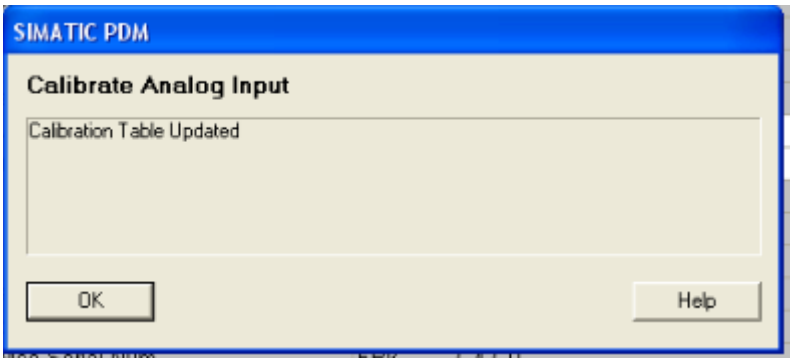

Figure 13-15.

9. The calibration table is automatically written to FLASH memory.

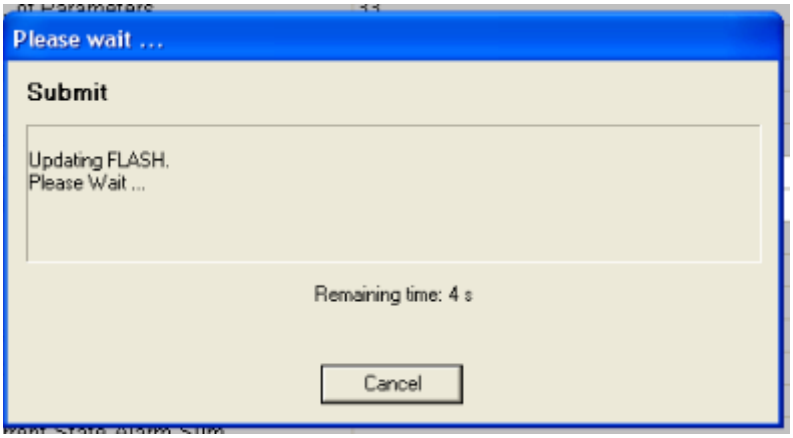

Figure 13-16.

10. Calibration is complete.

Calibrate Analog Output

A Specialist user can calibrate any one of the three available physical analog outputs on the MS2011. A simple method is performed to guide a user through the calibration process as follows:

1. Select the physical analog output to calibrate.

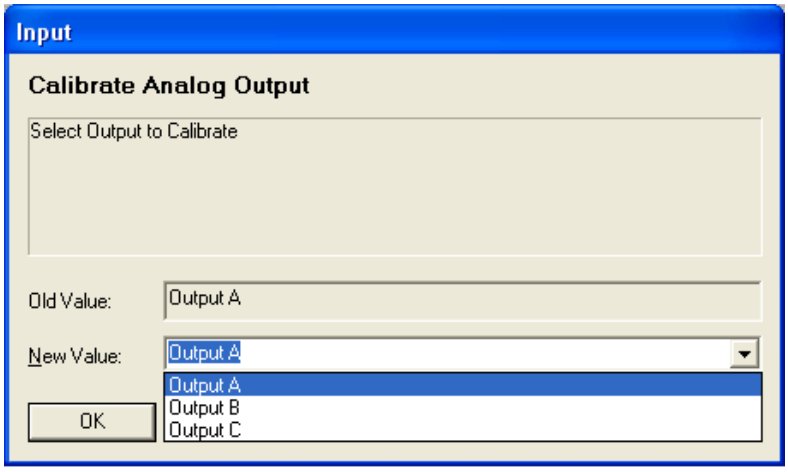

Figure 13-17. Calibrating an analog output

2. Accept the warning by pressing **OK**.

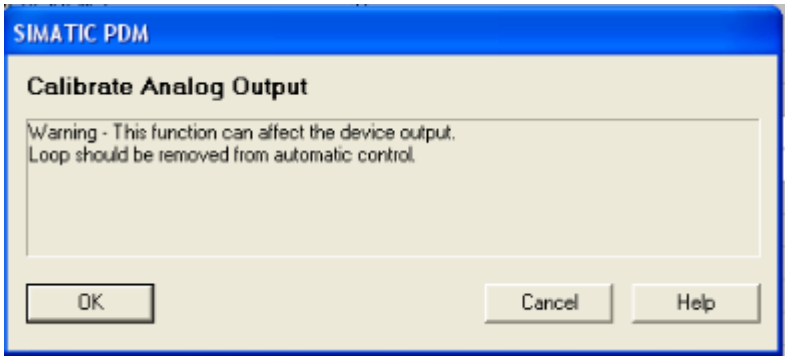

Figure 13-18.

3. Select the number of calibration points.

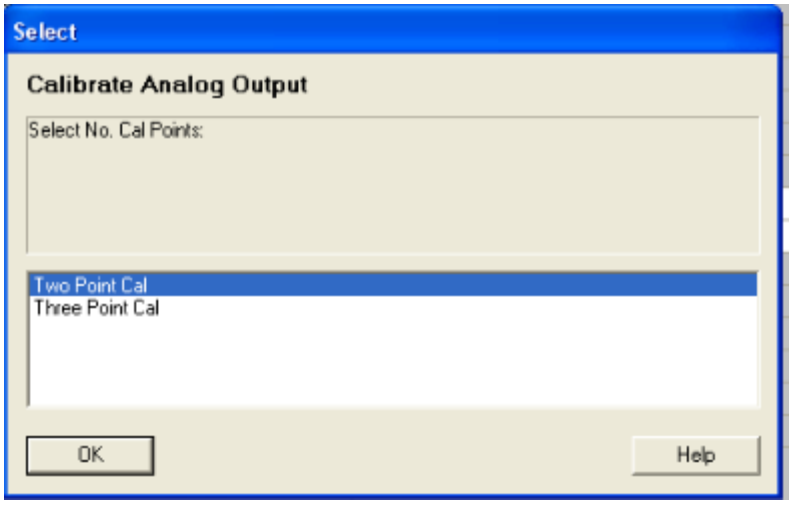

Figure 13-19.

4. Enter the minimum mA to force on the selected output.

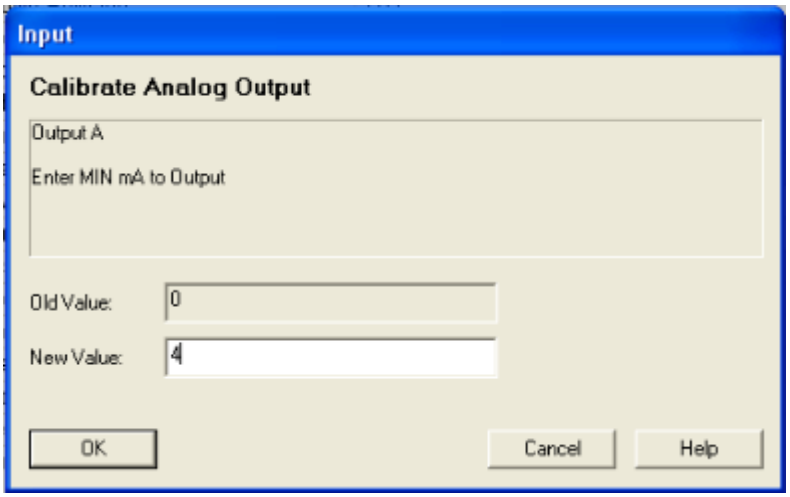

Figure 13-20.

5. Enter the value measured at the output using a multi-meter.

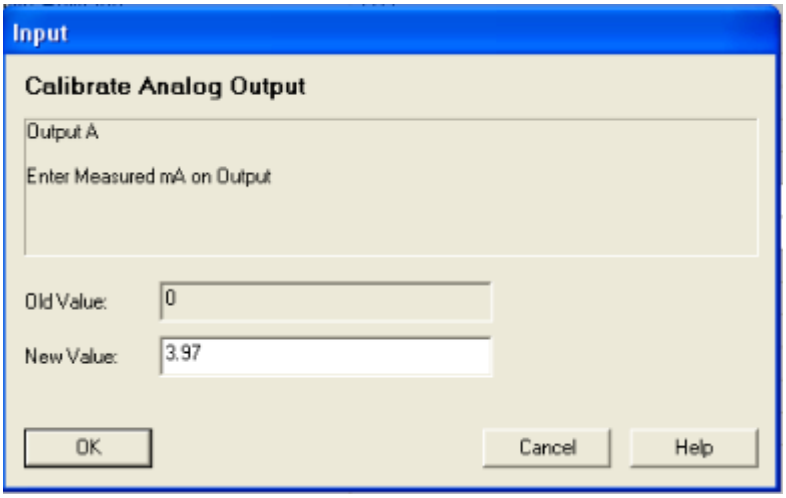

Figure 13-21.

6. Repeat steps 4 and 5 for the MID and MAX calibration points.

Note If two point calibration is chosen, the midpoint calibration is not performed. ▲

7. After the MAX calibration point value is entered, the calibration table is written to FLASH.

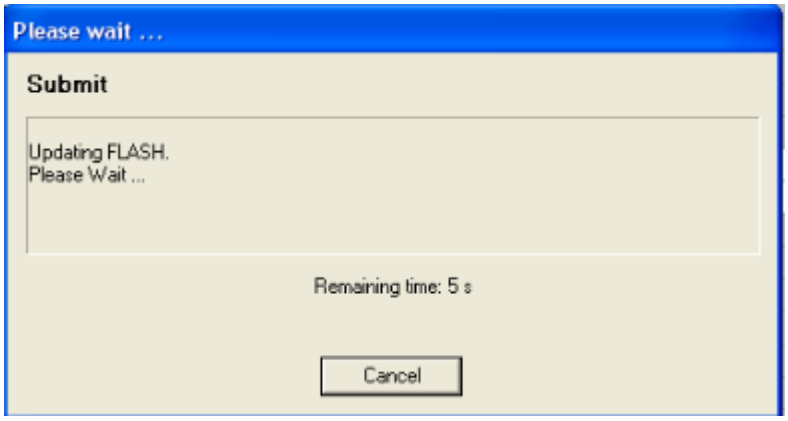

Figure 13-22.

8. Calibration is complete

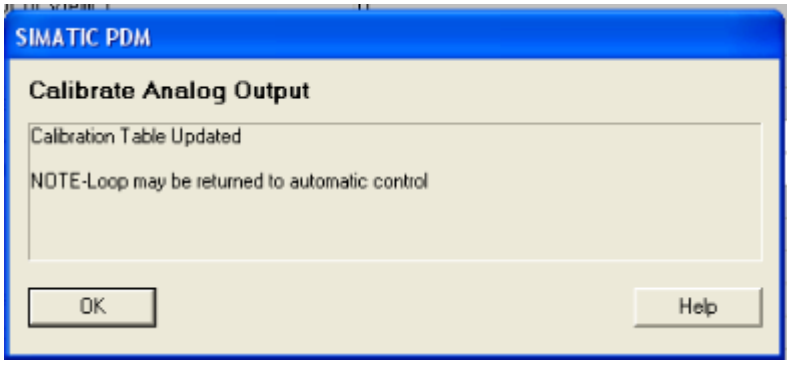

Figure 13-23. Completed calibration

Update Flash

Non-volatile configuration manufacturer parameters within the MS2011 database are permanently held in FLASH memory. After a power cycle, the FLASH memory contents are transferred to RAM within the MS2011 for normal operation.

When a user modifies a parameter within the transducer blocks, the parameter is updated in RAM within the MS2011. Therefore when a parameter is written to one of the transducer blocks (Slots 9 - 13), the Write FLASH command **must** be performed to update the FLASH memory within the device.

If this does not occur, the parameter will return to its previous value after the next power cycle.

Multiple parameters can be written before the Write FLASH command is sent, as the entire database is transferred to FLASH memory on receipt of the command.

Note During online configuration with the Specialist menu, the FLASH command is automatically issued after the **Transfer** button has been pressed on a dialog box. ▲

In the event a user desires a FLASH update, or if the extended diagnostics indicate a FLASH update is required, selecting **Update Flash** from the Device menu allows the Write Flash command to be issued as a standalone command.

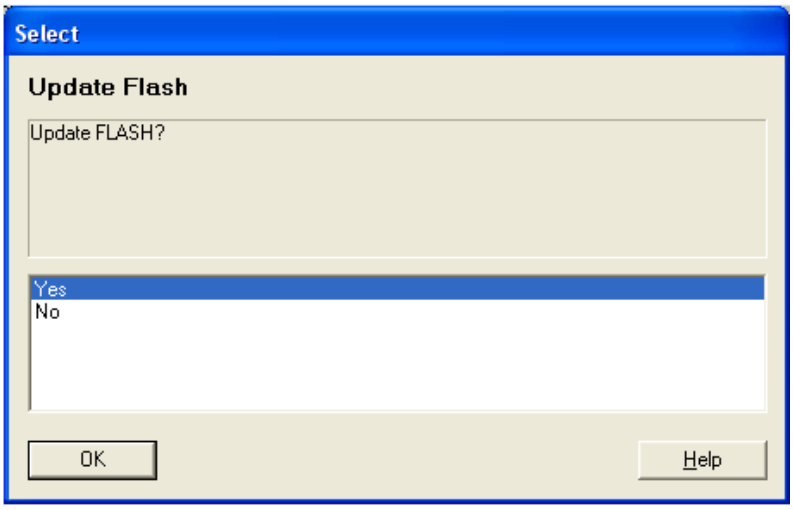

Figure 13-24. Update Flash selected

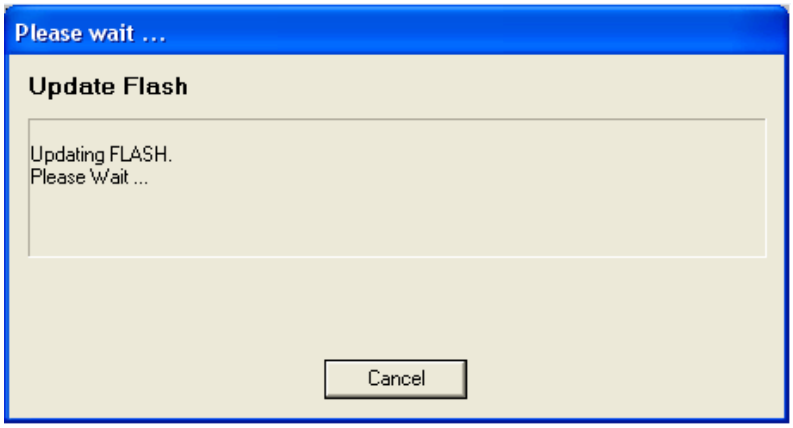

Figure 13-25. Updating Flash

Note This operation will take approximately 5 seconds to complete. ▲

Write Locking

Using the Device menu, the MS2011 can set Write Locking on or off. When Write Locking is set to On, no writing is allowed to the MS2011 database. When Write Locking is set to Off, writing to the MS2011 database is allowed.

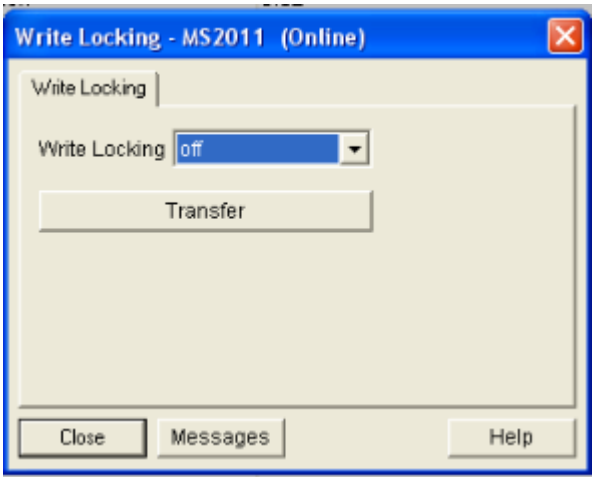

Figure 13-26.

Note If Write Locking is set to ON, write locking can be written to turn Write Locking OFF. ▲

Chapter 14
The Specialist Menu

Menu_Specialist

The Specialist Menu allows an online user to fully configure the MS2011 using a set of submenus and dialog boxes in a similar way to the EZ CAL II PC application.

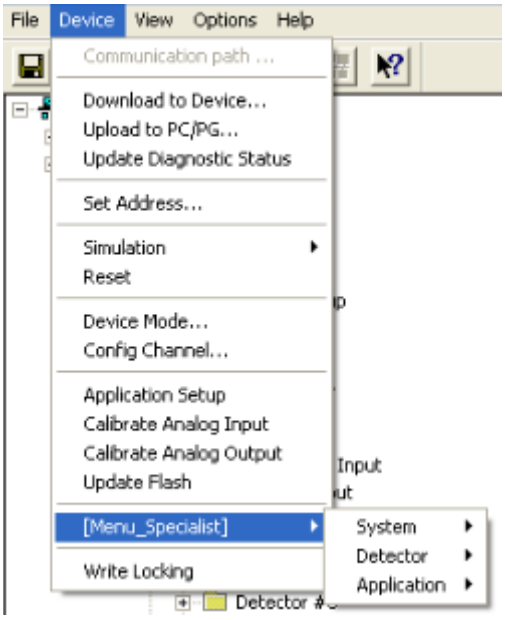

Figure 14-1. Specialist menu

Submenus for System, Detector and Application allow for the complete MS2011 database to be configured using the PA Interface.

System Submenu Structure

The system submenu structure for the specialist user follows closely that of the EZ Cal II PC configuration package used with the MS2011.

For a more detailed explanation of each of the screens in this chapter, refer to Chapter 4 the following documents:

- LevelPRO User Manual (P/N 1-0702-039)
- DensityPRO User Manual (P/N 1-0702-016)

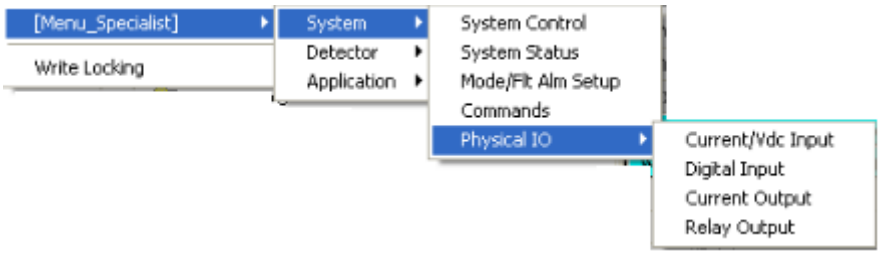

Figure 14-2. System submenu

System Control

The System Control Configuration screen provides the user with the ability to set up system parameters related to items such as the system clock and the LCD screen. The gauge should be able to read and write any of these parameters as requested by the user.

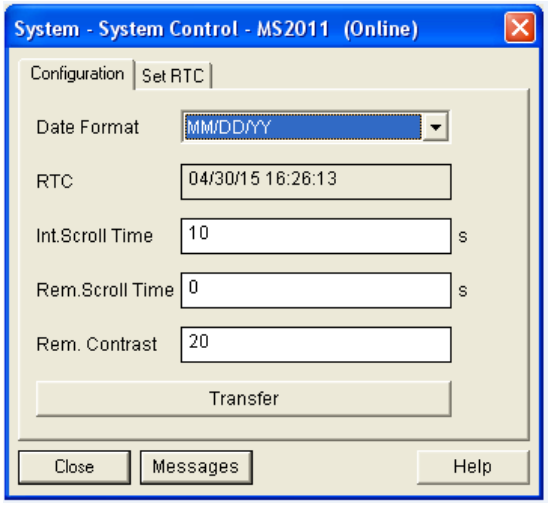

Figure 14-3. Configuration tab

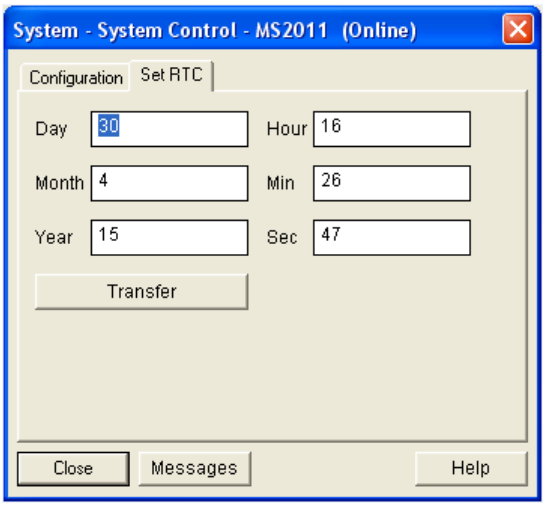

Figure 14-4. Set RTC tab

System Status

The System Status screen auto-populates with information about the system status, detector and diagnostics.

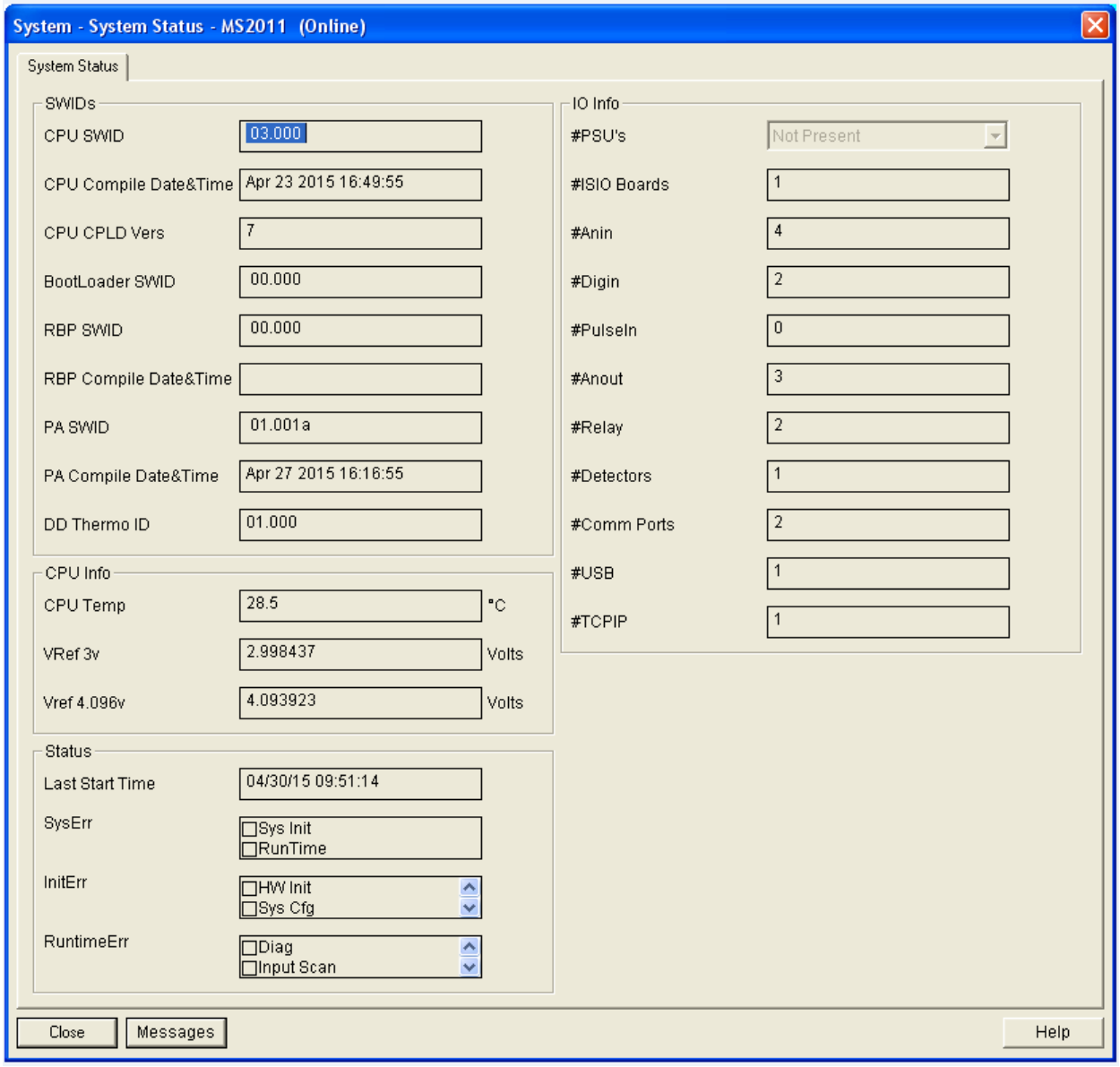

Figure 14-5. System Status screen

Mode/Fault Alarm Setup

The purpose of the mode/fault alarms is to detect changes in the alarm status and drive the selected current or relay outputs based on the selected alarm action.

There are five Mode/Fault Alarm tabs.

- System: Configures System based Mode/Fault Alarms
- Output A: Configures Analog Output A based Mode/Fault Alarms
- Output B: Configures Analog Output B based Mode/Fault Alarms
- Output C: Configures Analog Output C based Mode/Fault Alarms
- Status: View current Alarm Fault Status

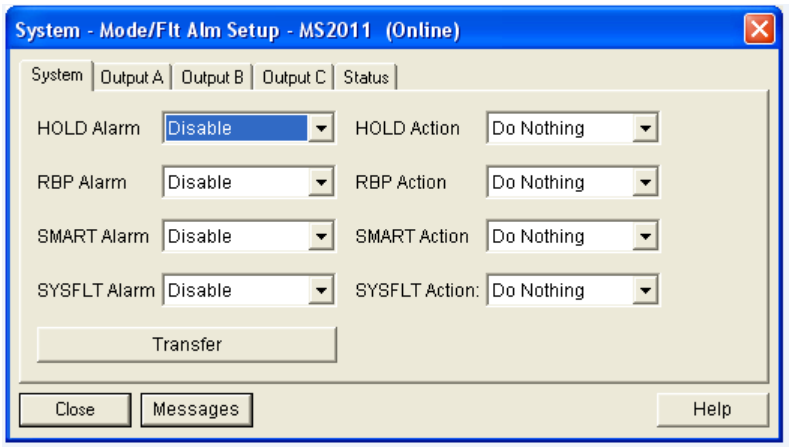

Figure 14-6. Mode/fault alarm setup tabs

Commands

The system commands provide the user with the ability to directly control various functions of the gauge.

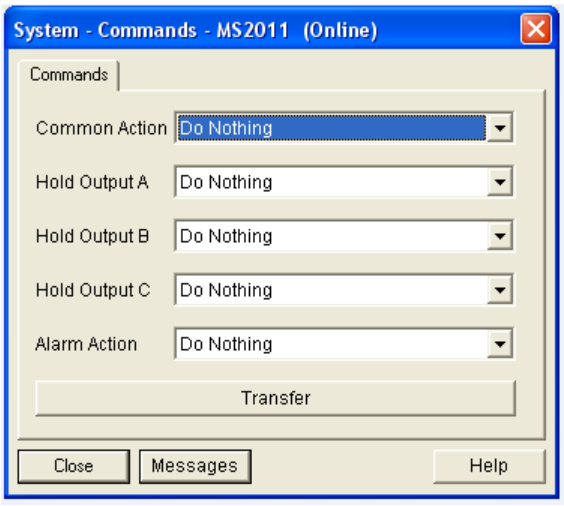

Figure 14-7. Commands screen

Physical I/O

Current/Vdc Input

There are four additional analog inputs on the MS2011 that can be configured and monitored using the below screen. The four tabs available allow the user to configure any one of the current or voltage inputs on the MS2011.

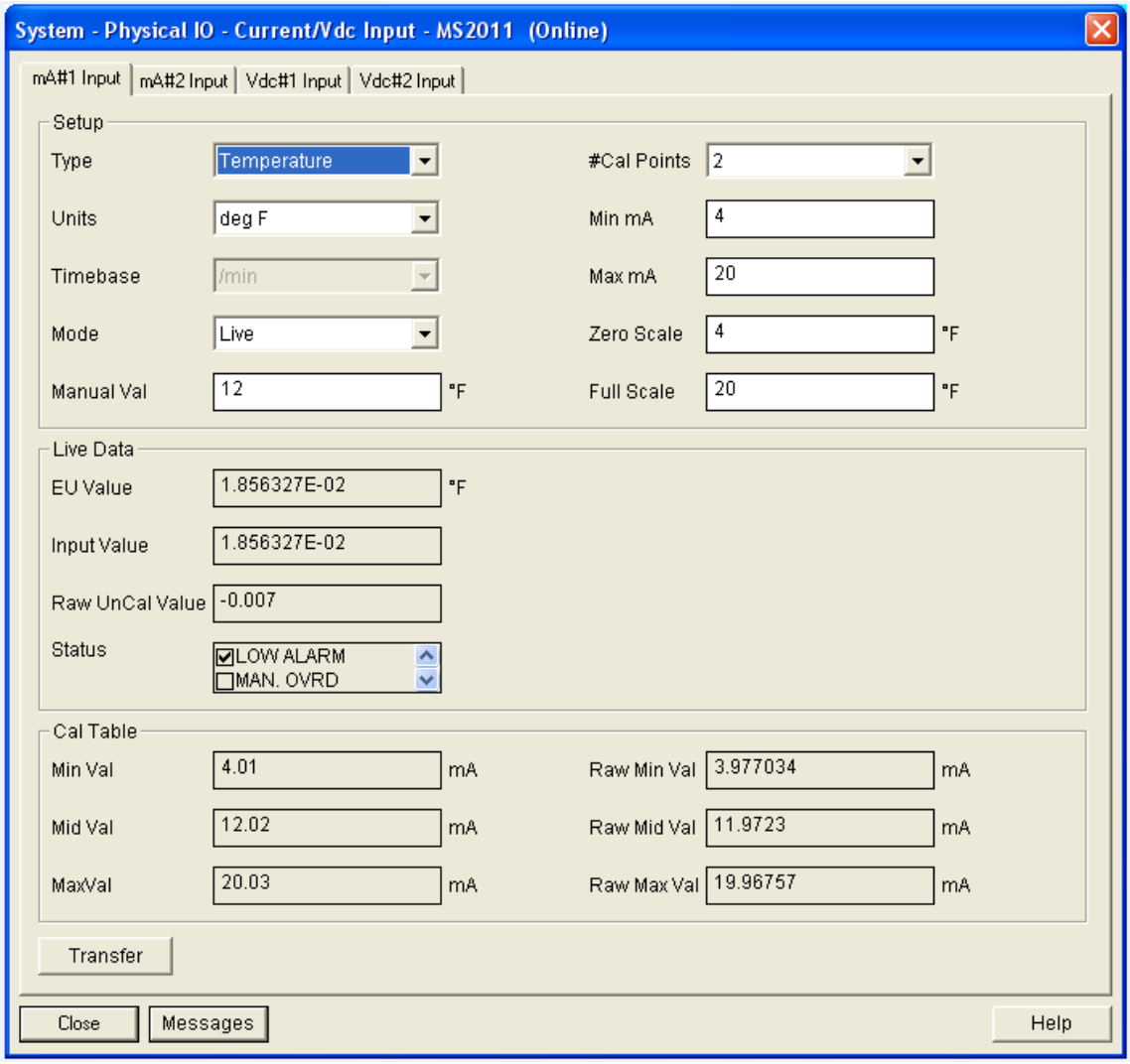

Figure 14-8. Current/Vdc input tabs

- Setup: Allows the input type to be configured
- Live Data: Shows the current input information
- Cal Table: Shows the current calibration point settings for the input

Digital Input

There are two additional digital inputs on the MS2011 that can be configured and monitored using the below screen. The two tabs available allow the user to configure either of the two inputs on the MS2011.

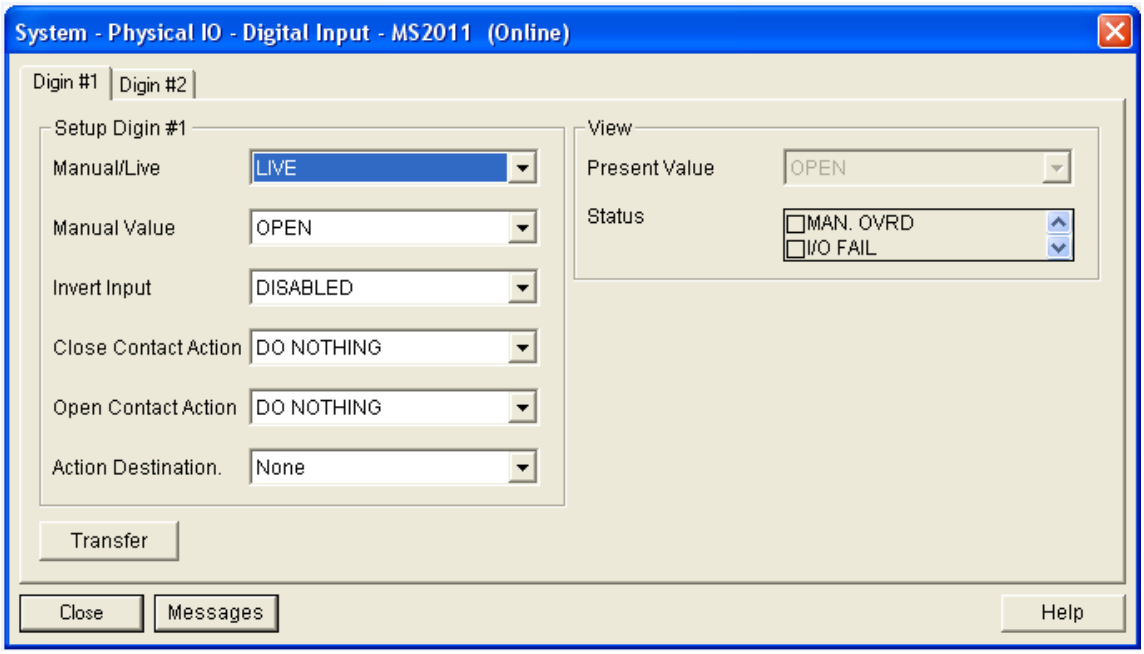

Figure 14-9. Digital input tabs

- Setup Digin #n: Used to configure the input
- View: Shows the present value and status of the input

Current Output

There are three analog outputs on the MS2011 that can be configured and monitored using the below screen. The three tabs available allow the user to configure the three outputs on the MS2011.

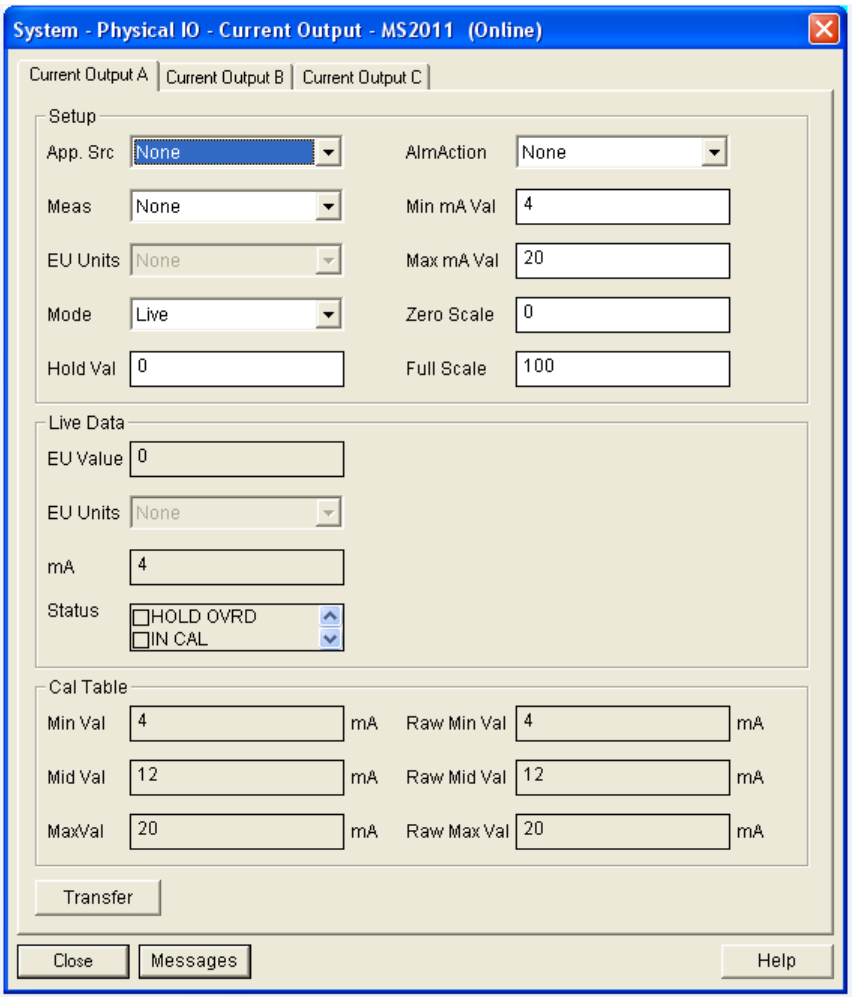

Figure 14-10. Current output tabs

- Setup: Allows the output source and range information to be configured
- Live Data: Shows the current output information
- Cal Table: Shows the current calibration point settings for the output

Relay Output

There are two additional relay outputs on the MS2011 that can be configured and monitored using the below screen. The two tabs available allow the user to configure either of the two relays on the MS2011.

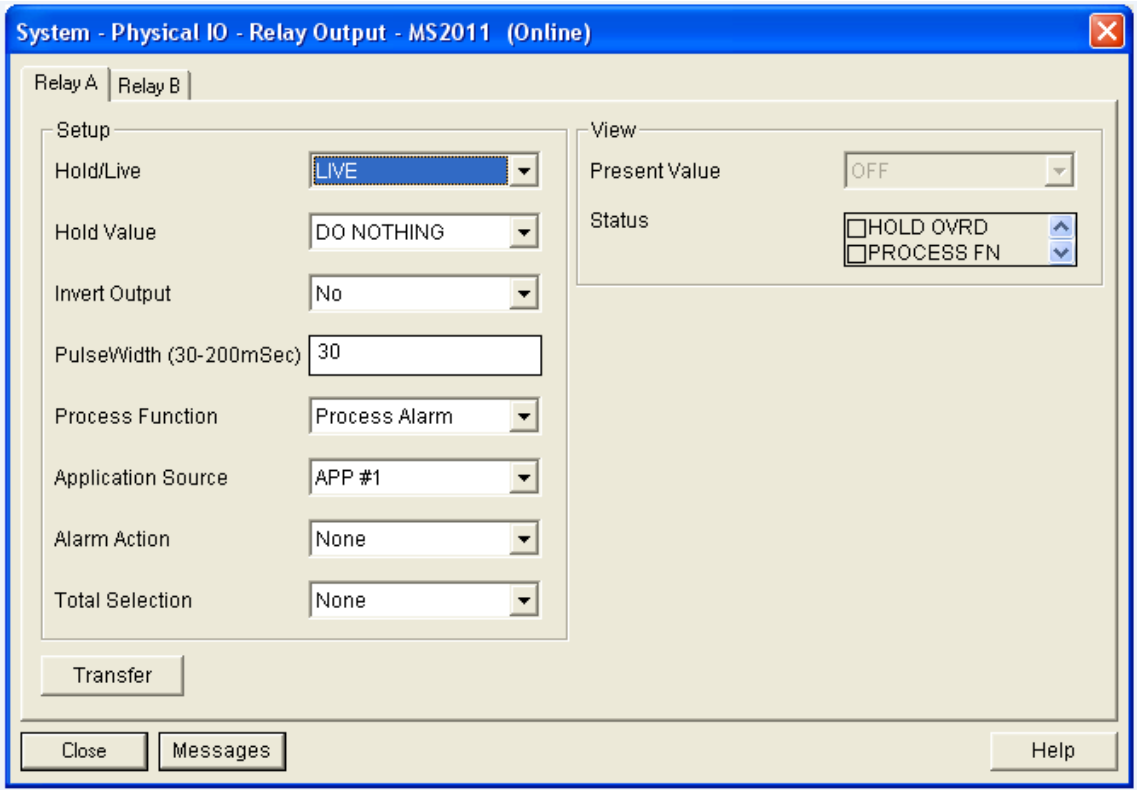

Figure 14-11. Relay output tabs

- Setup: Configures the type of relay output
- View: Displays the present value and status of the output

Detector Submenu Structure

The detector submenu structure used for the specialist user follows closely that of the EZ Cal II PC configuration package used with the MS2011.

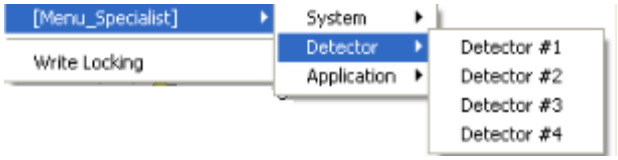

Figure 14-12. Detector submenu

For a more detailed explanation of each of the screens in this chapter, refer to Chapter 4 the following documents:

- LevelPRO User Manual (P/N 1-0702-039)
- DensityPRO User Manual (P/N 1-0702-016)

Detector #1

Setup Tab

Many of the fields on the Detector Setup tab provide the user with the ability to set up the detector parameters based on application-specific requirements.

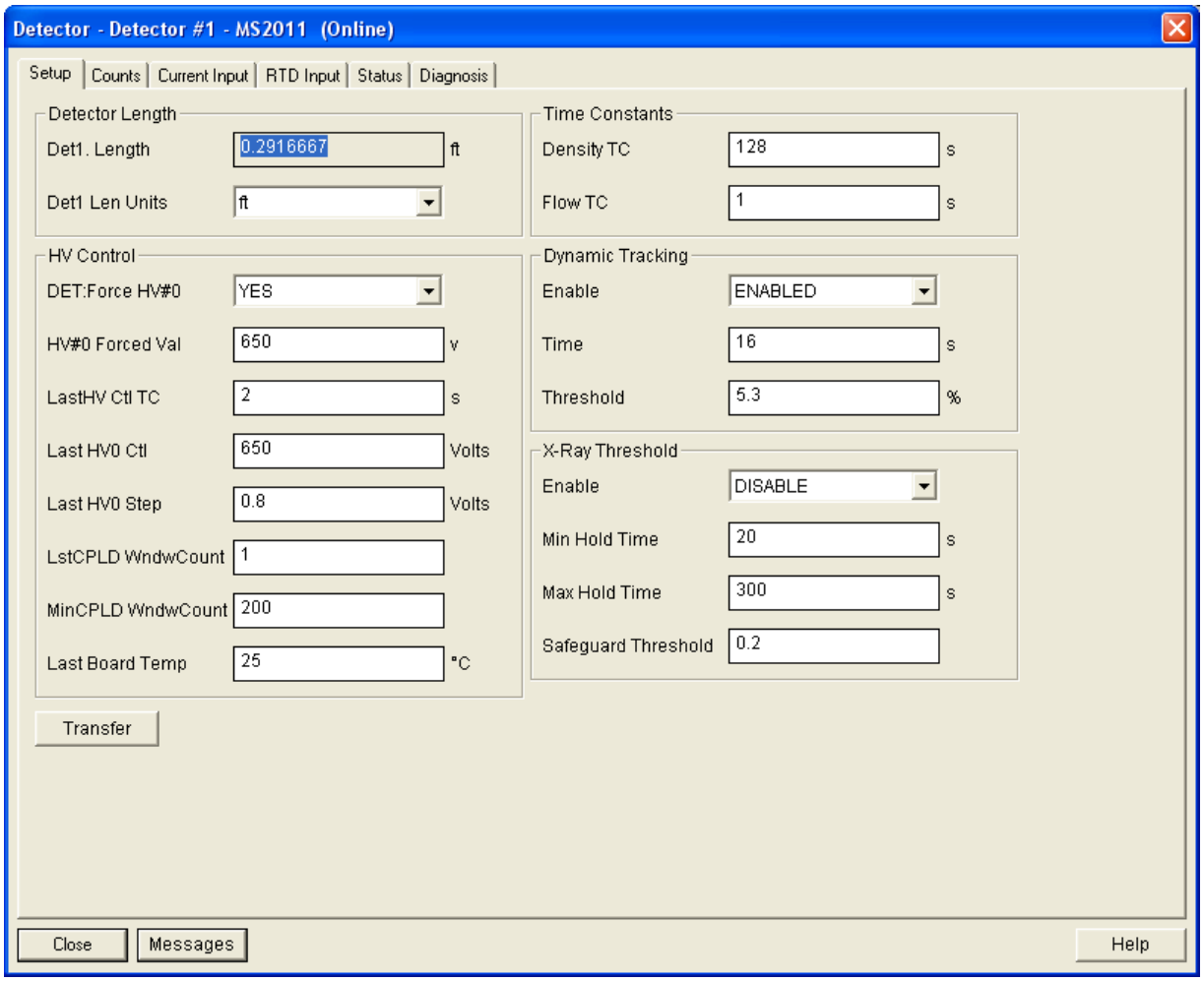

Figure 14-13. Setup tab

- Detector Length: Configures the units used for the detector length
- HV Control: Sets up detector High Voltage control parameters
- Time Constants: Configures internal flow/density filter time constants
- Dynamic Tracking: Configures dynamic tracking filter setup
- X-Ray Threshold: Configures X-ray threshold settings

Counts Tab

At present, this screen simply displays the current filtered counts for the detector. In future revisions the screen will be modified to display a chart showing the historical counts over time.

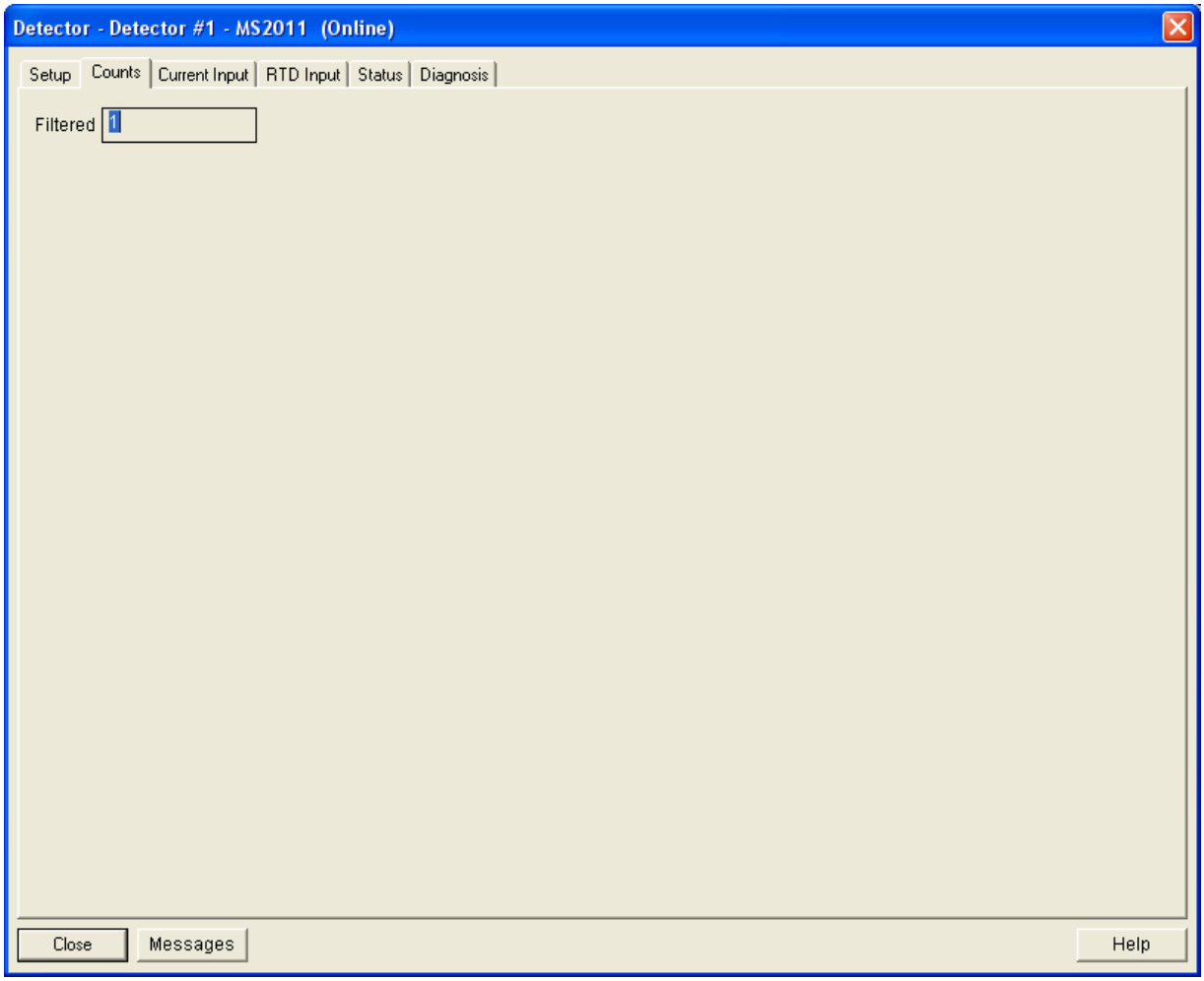

Figure 14-14. Counts tab

Current Input Tab

This screen allows a user to configure the 4-20 mA input on the detector for the inputs on the MS2011 application.

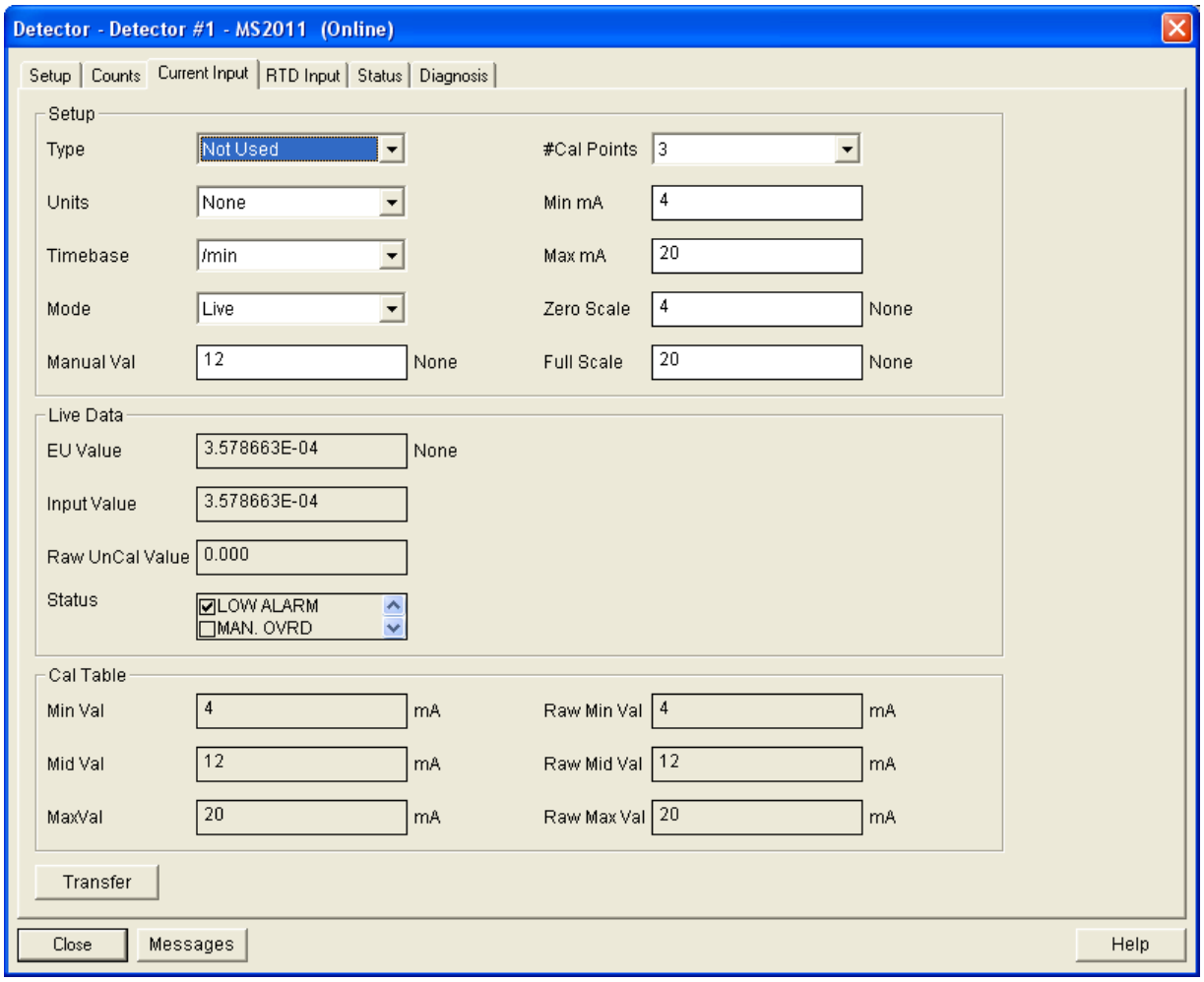

Figure 14-15. Current Input tab

- Setup: Allows the input type to be configured
- Live Data: Shows the current input information
- Cal Table: Shows the current calibration point settings for the input

RTD Input Tab

This screen allows a user to configure the RTD input on the detector for the inputs on the MS2011 application.

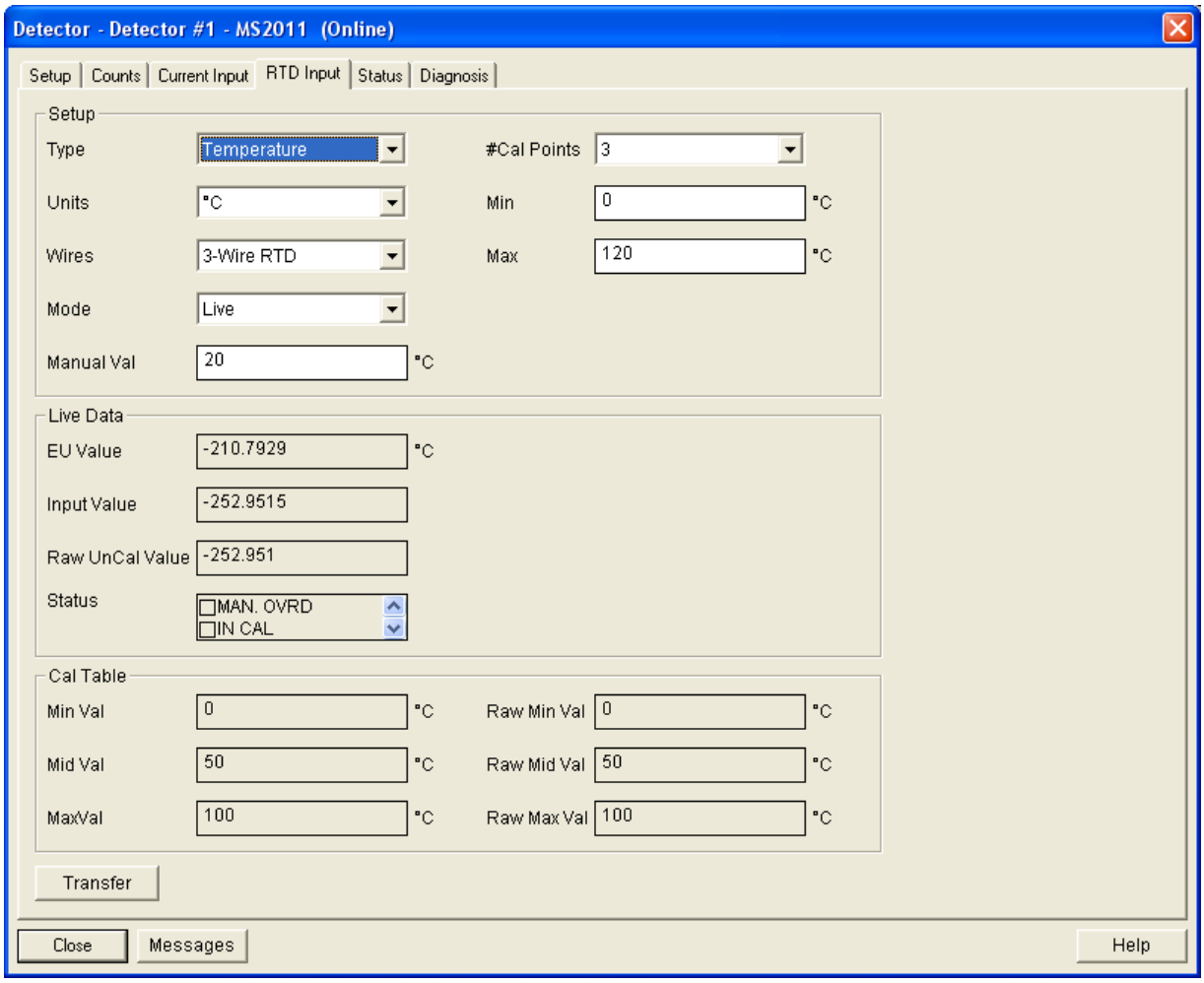

Figure 14-16. RTD Input tab

- Setup: Allows the input type to be configured
- Live Data: Shows the current input information
- Cal Table: Shows the current calibration point settings for the input

Status Tab

The detector Status screen shows the current status and various information items for the detector.

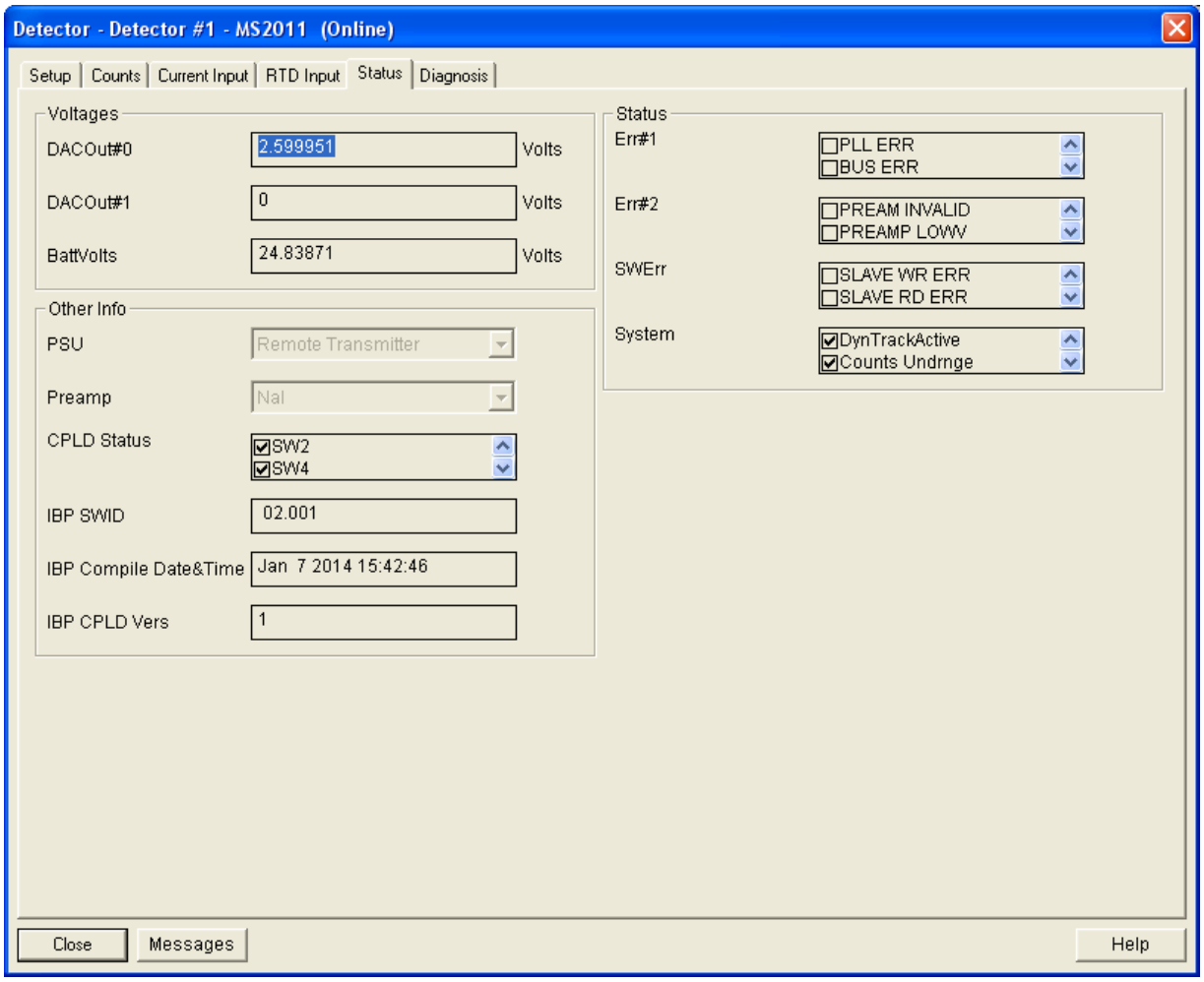

Figure 14-17. Status tab

- Voltages: Displays various measured voltages for the detector
- Other Info: Displays miscellaneous information and revision information for the detector
- Status: Shows the current status of the detector

Diagnosis Tab

This screen shows diagnostic information for the current operation of the detector.

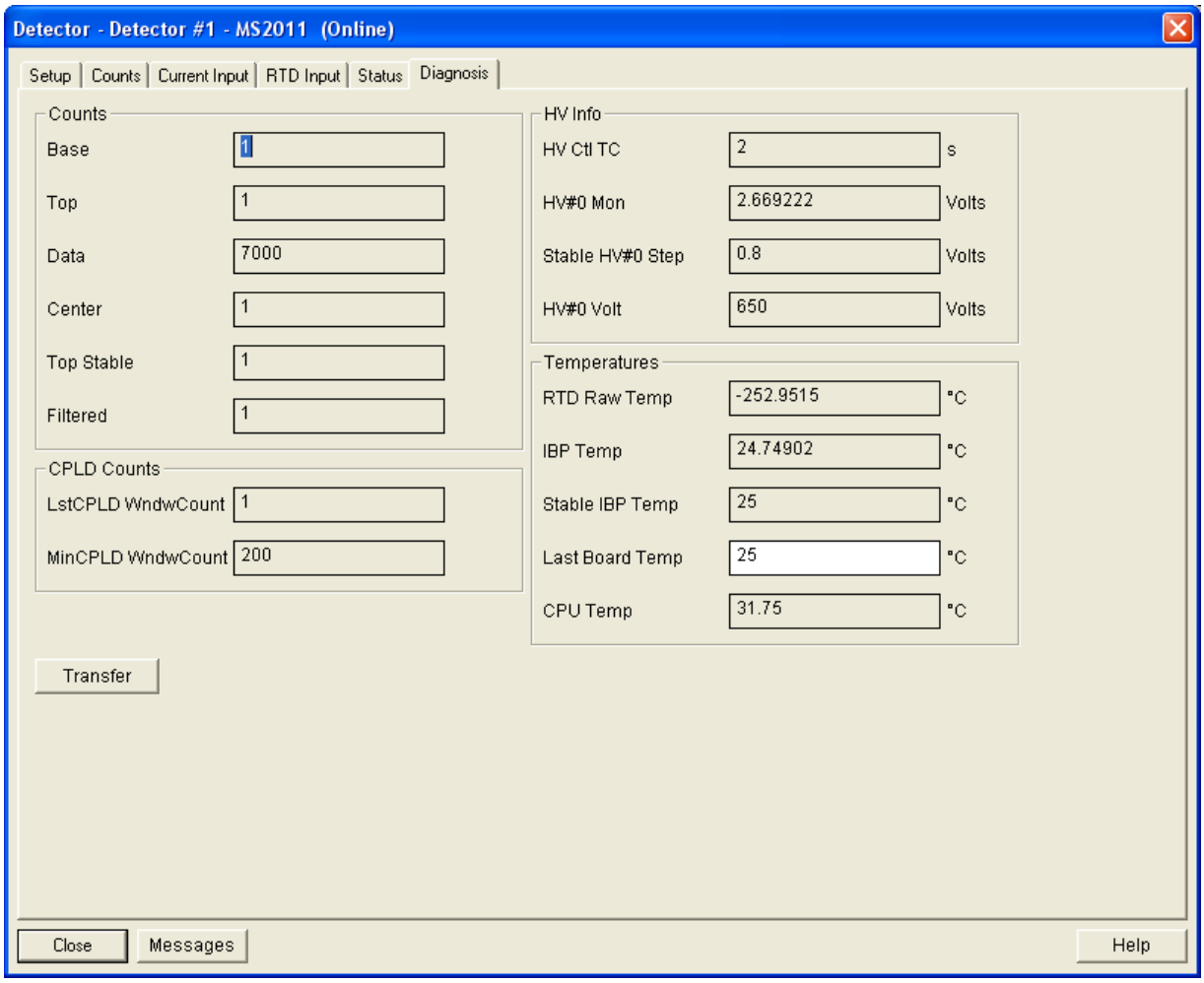

Figure 14-18. Diagnosis tab

- Counts: Shows various counter information for the detector
- CPLD Counts: Shows internal CPLD counter information
- HV Info: Shows the current status of High Voltage control for the detector
- Temperatures: Shows temperature measurements for the detector electronics

Application Submenu Structure for Level Applications

The level application menu structure used for the specialist user follows closely that of the EZ Cal II PC configuration package used with the MS2011.

For a more detailed explanation of each of the screens in this chapter the user should refer to Chapter 4 the following document:

- LevelPRO User Manual (P/N 1-0702-039)

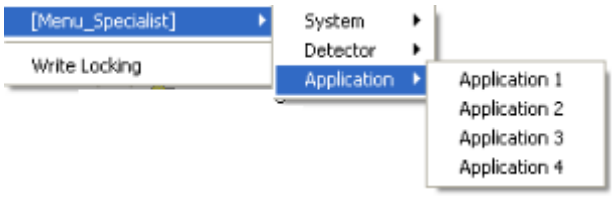

Figure 14-19. Application submenu

Application #1

Application 1 Tab

This screen is used to set the detector length for the level application and to select whether the level measurement is to use Vapor Density Compensation. With Vapor Density Compensation, application/detector #4 is used to provide the required density input for the calculations.

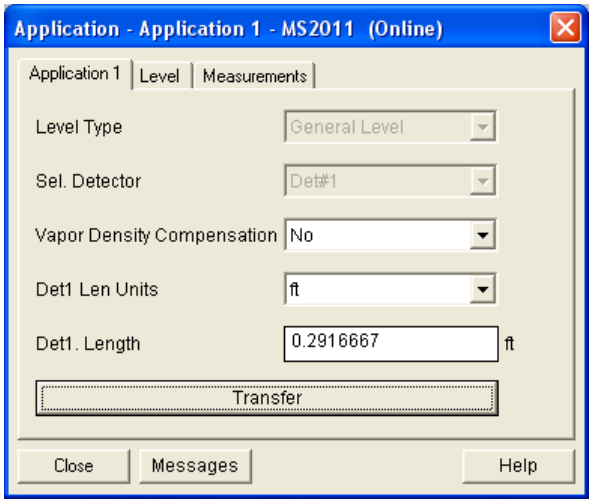

Figure 14-20. Application 1 tab

Level Tab

When the Level tab of the Application screen is displayed, a full configuration and setup of the application can be performed.

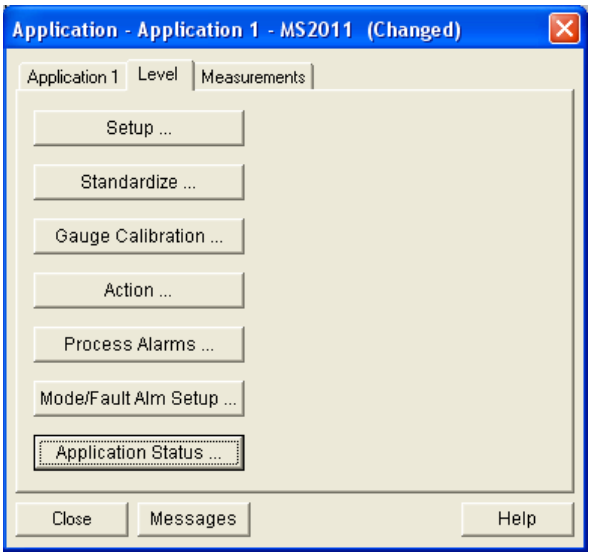

Figure 14-21. Level tab

Setup

Level Setup Tab

The Level Setup screen of the application setup is used to configure the primary level measurement for the application.

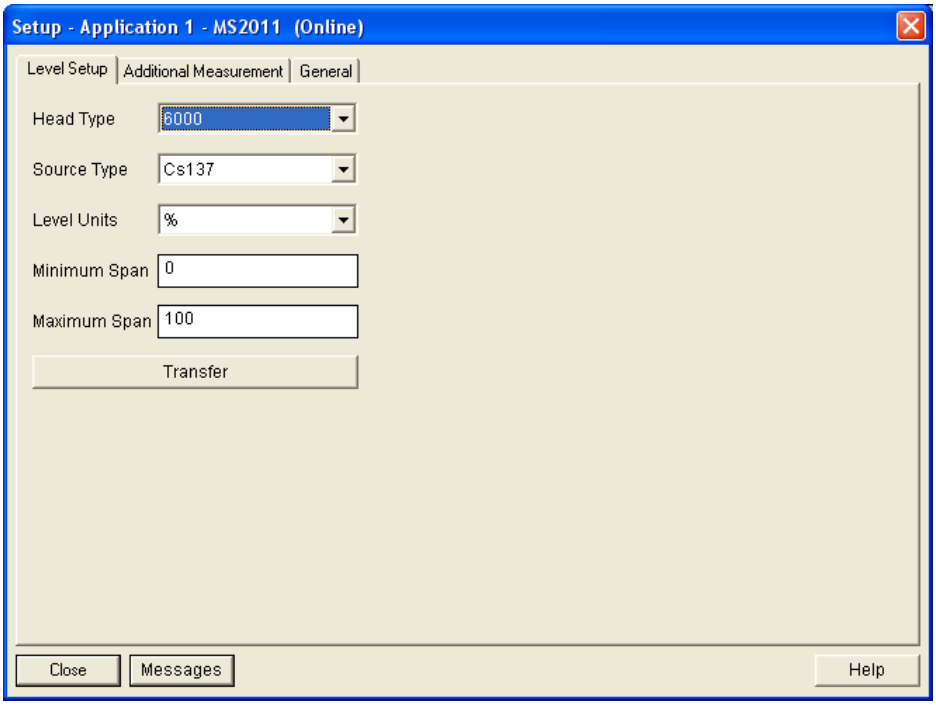

Figure 14-22. Level Setup tab

Additional Measurement Tab

This screen allows three additional measurements to be configured for the application. As well as setting up the units and range value for each measurement, the number of decimal places used to display each of the four application measurements can be configured.

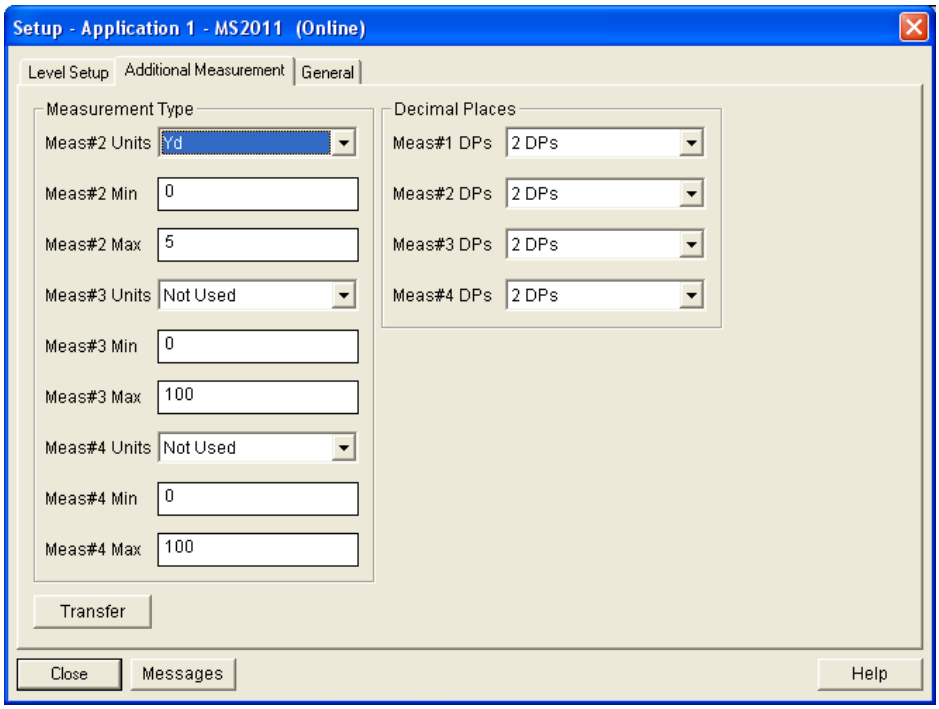

Figure 14-23. Additional Measurements tab

General Tab

The General setup screen allows the user to read and modify parameters associated with the system.

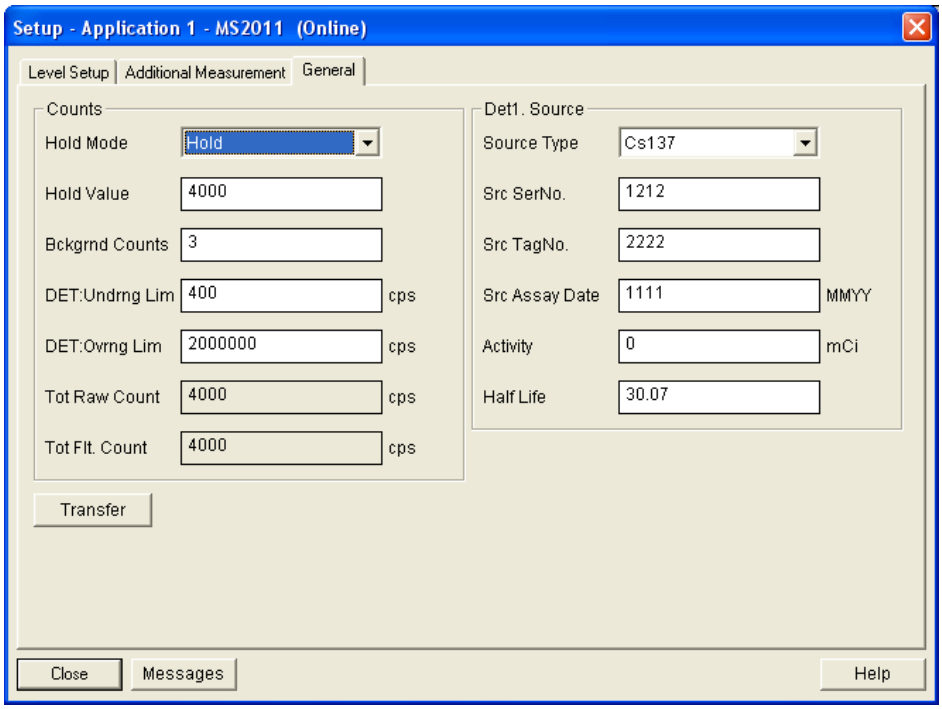

Figure 14-24. General tab

- Counts: Configures background, count range and hold count mode
- Det. Source: Configures detector source information

Standardize

This screen is used to both display and control standardization on the MS2011. For a detailed explanation of standardization for a level application, refer to "Level Standardization."

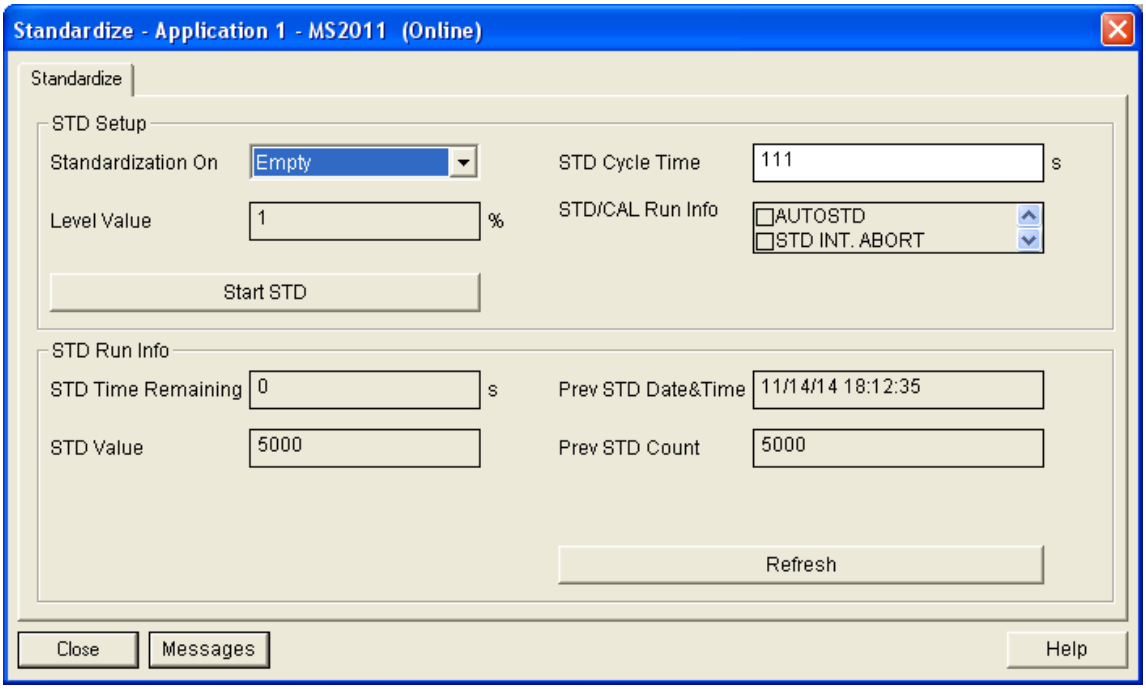

Figure 14-25. Standardize screen

Gauge Calibration CAL Data Tab

This screen is used to both display and control calibration on the MS2011. For a detailed explanation of calibration for a level application, refer to "Level Calibration."

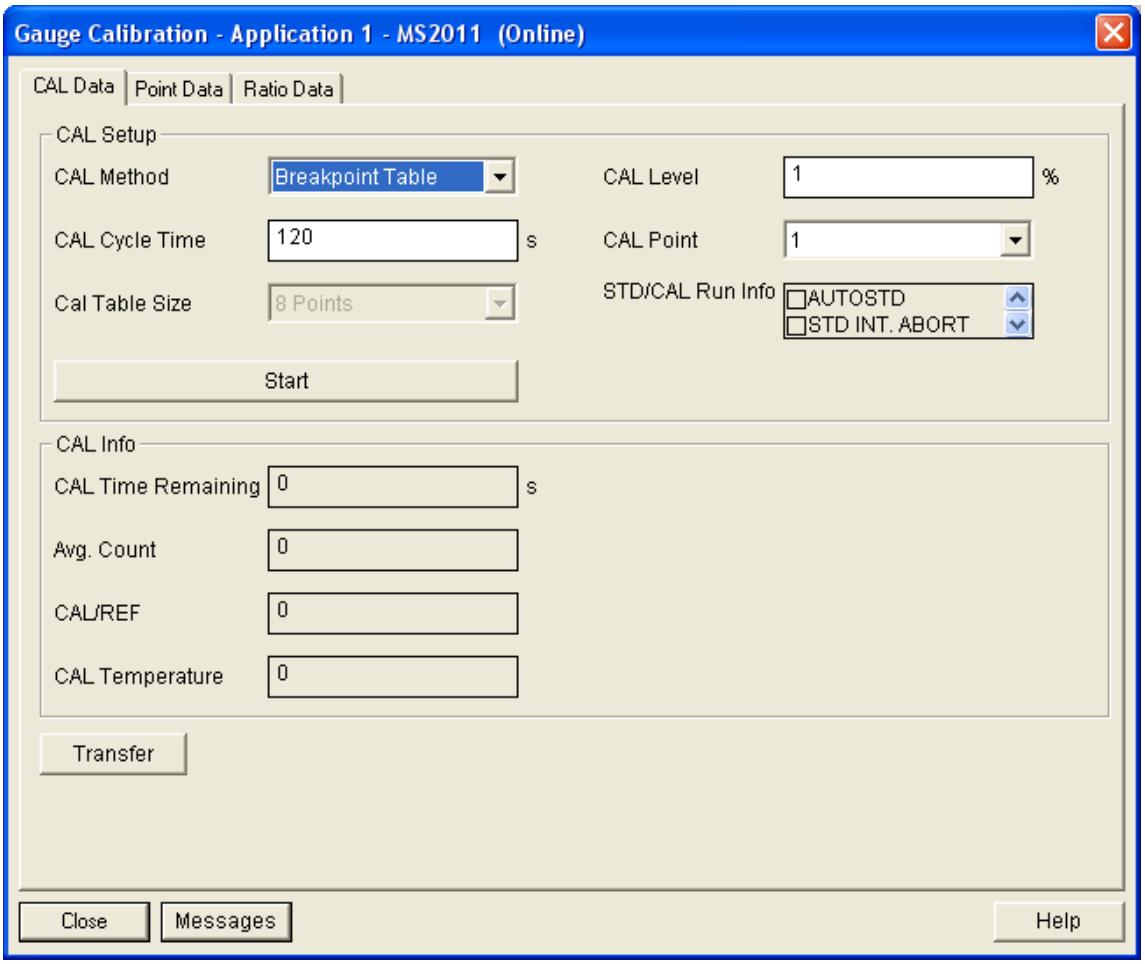

Figure 14-26. CAL Data tab

Point Data Tab

This screen shows the level calibration breakpoint table point data for the application. Here, the level point and counts obtained for each calibration point are displayed.

Up to 10 calibration points are displayed on this table.

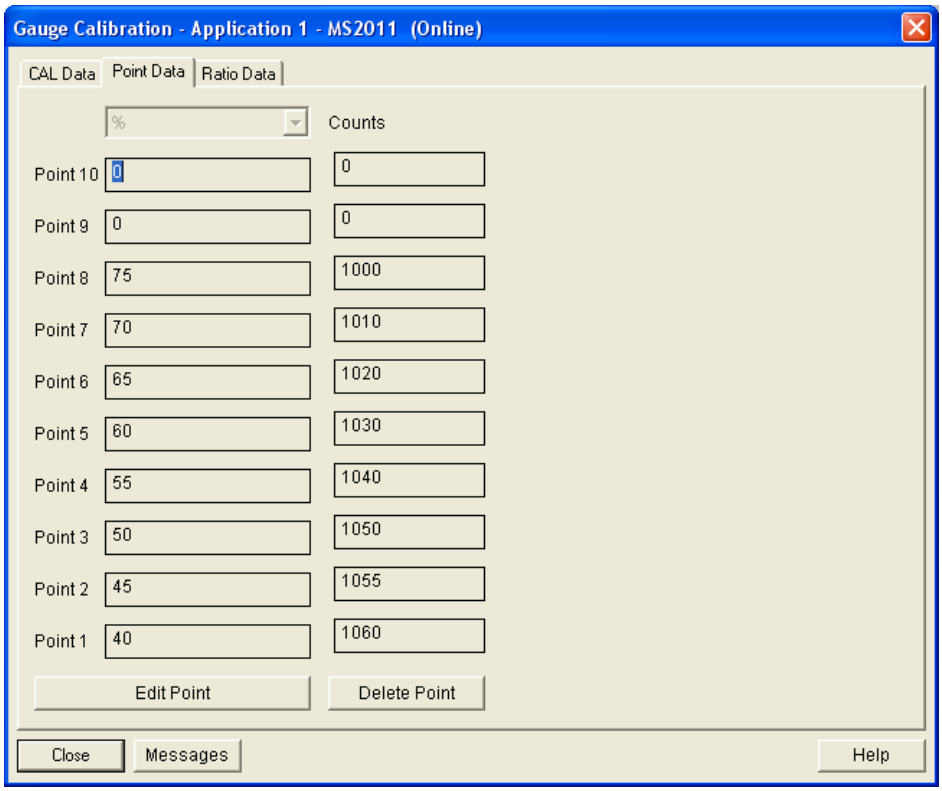

Figure 14-27. Point Data tab

Ratio Data Tab

This screen shows the level calibration breakpoint table ratio data for the application. Here, the level point and count to standardization ratio values obtained for each calibration point are displayed.

Up to 10 calibration points are displayed on this table.

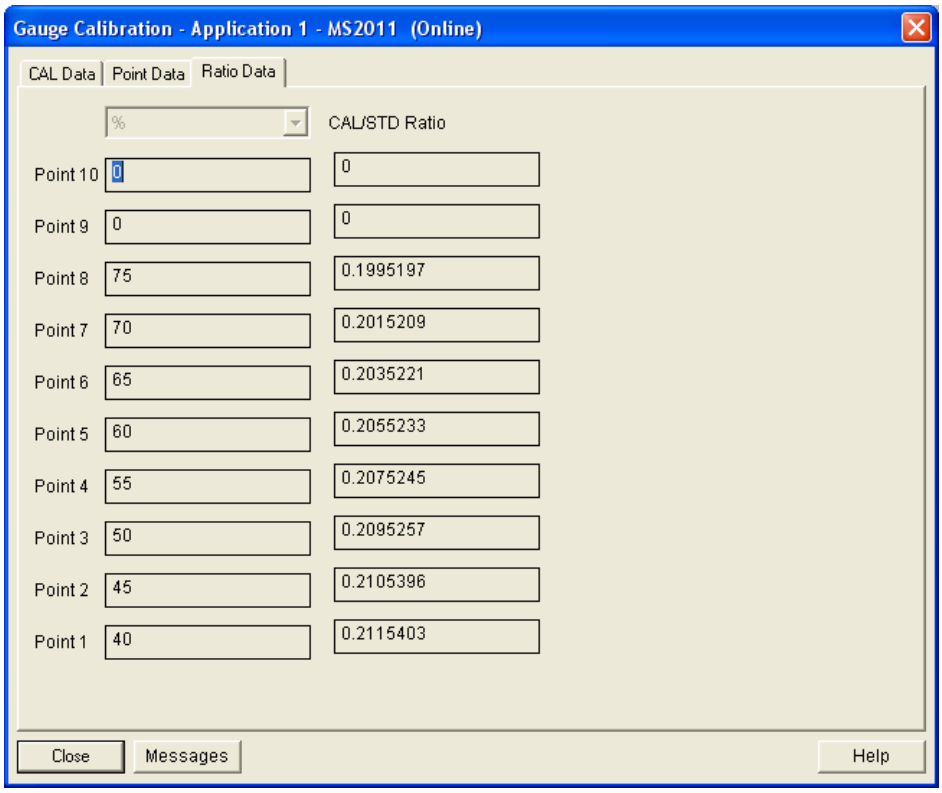

Figure 14-28. Ratio Data tab

Action

The Action screen provides the user the ability to hold the four measurements configured for the application.

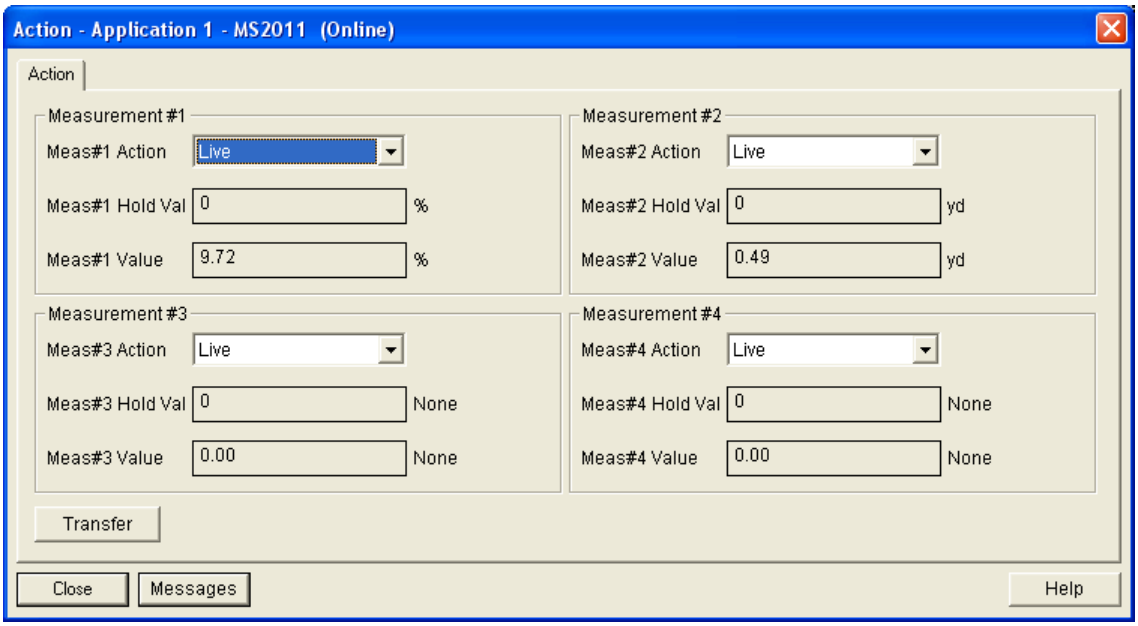

Figure 14-29. Action screen

- Measurement #1: Set Hold/Live mode for the primary measurement
- Measurement #2: Set Hold/Live mode for the 1st additional measurement
- Measurement #3: Set Hold/Live mode for the 2nd additional measurement
- Measurement #4: Set Hold/Live mode for the 3rd additional measurement

Process Alarms

This screen shows the configuration of up to 16 process alarms within the MS2011. Process alarms can provide a signal to the external device when the process value goes above or below a set point value.

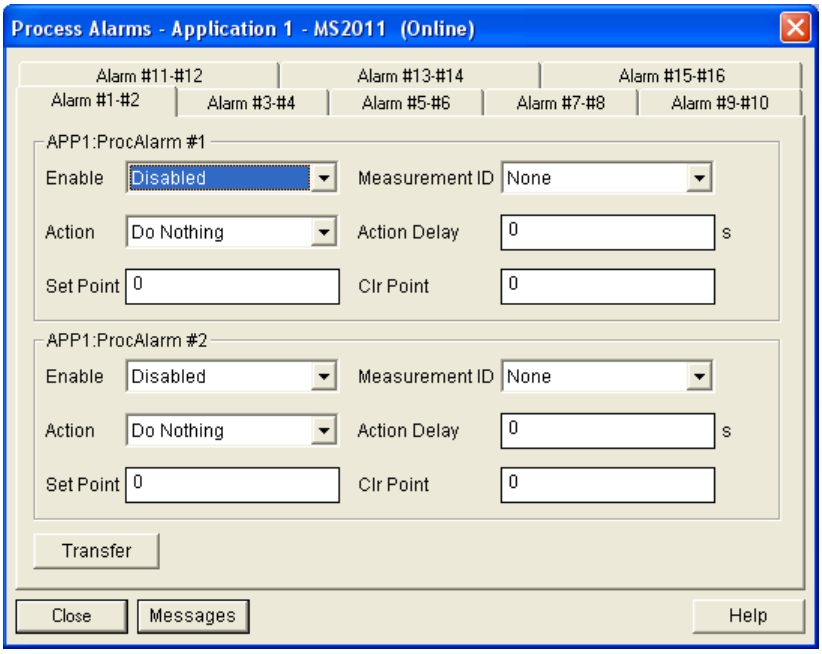

Figure 14-30. Process Alarms tabs

Eight tabs are available for the selection and configuration of up to 16 process alarms, with two alarms displayed per tab.

Mode/Fault Alarm Setup

This screen shows the configuration of the Mode/Fault alarms for the application.

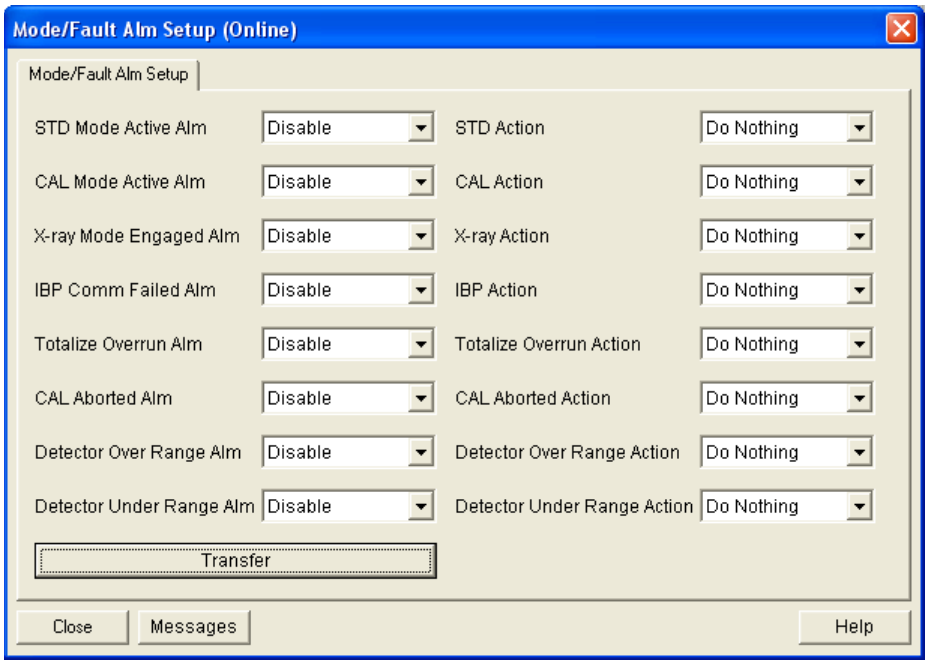

Figure 14-31. Mode/Fault Alarm screen

Application Status

This screen shows the current process alarms and Mode/Fault status of the level application.

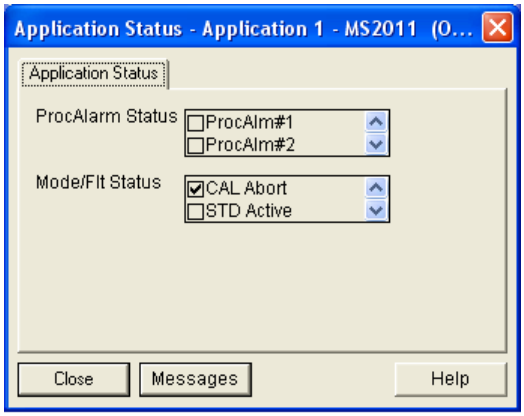

Figure 14-32. Application Status screen

Measurements Tab

This screen shows the current live values for each of the four measurement variables available in the application.

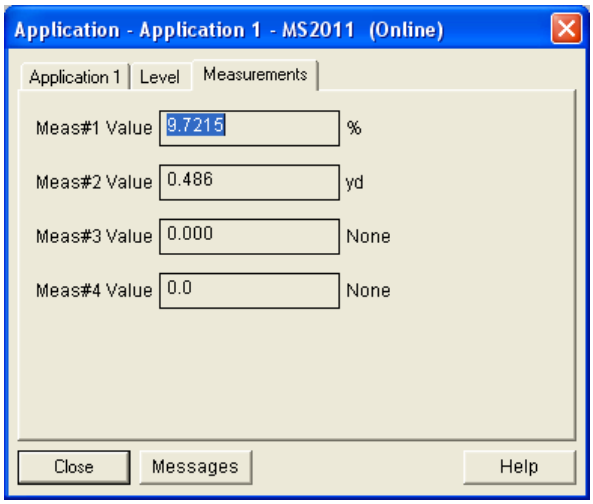

Figure 14-33. Measurements tab

Application Submenu Structure, Density Applications

The density application menu structure used for the specialist user follows closely that of the EZ Cal II PC configuration package used with the MS2011.

Figure 14-34.

For a more detailed explanation of each of the screens in this chapter the user should refer to Chapter 4 the following document:

- DensityPRO User Manual (P/N 1-0702-016)

Application 1

Application 1 Tab

This screen is used to show the current configuration setup of the density application. The screen is for information only.

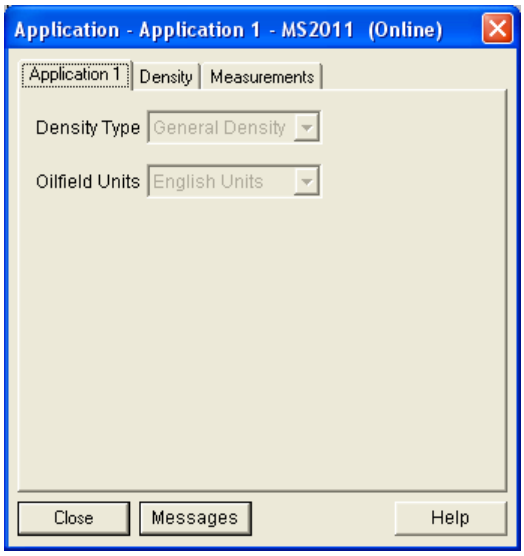

Figure 14-35. Application 1 tab

Density Tab

When the Density tab of the Application screen is displayed, a full configuration setup of the application can be performed.

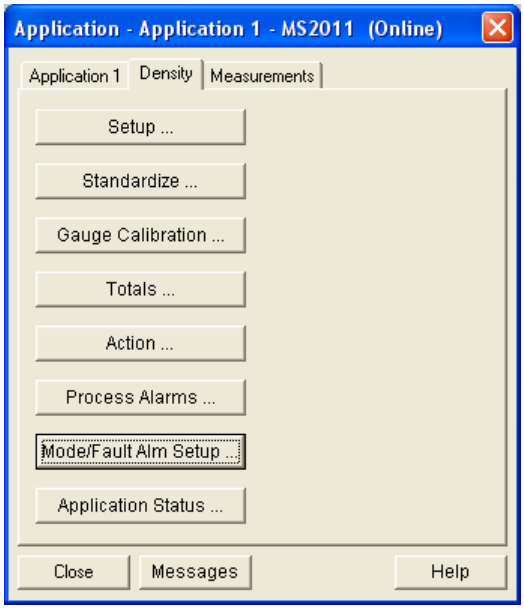

Figure 14-36. Density tab

Setup Setup Tab

The Density Setup screen of the application setup is used to configure the primary density measurement for the application.

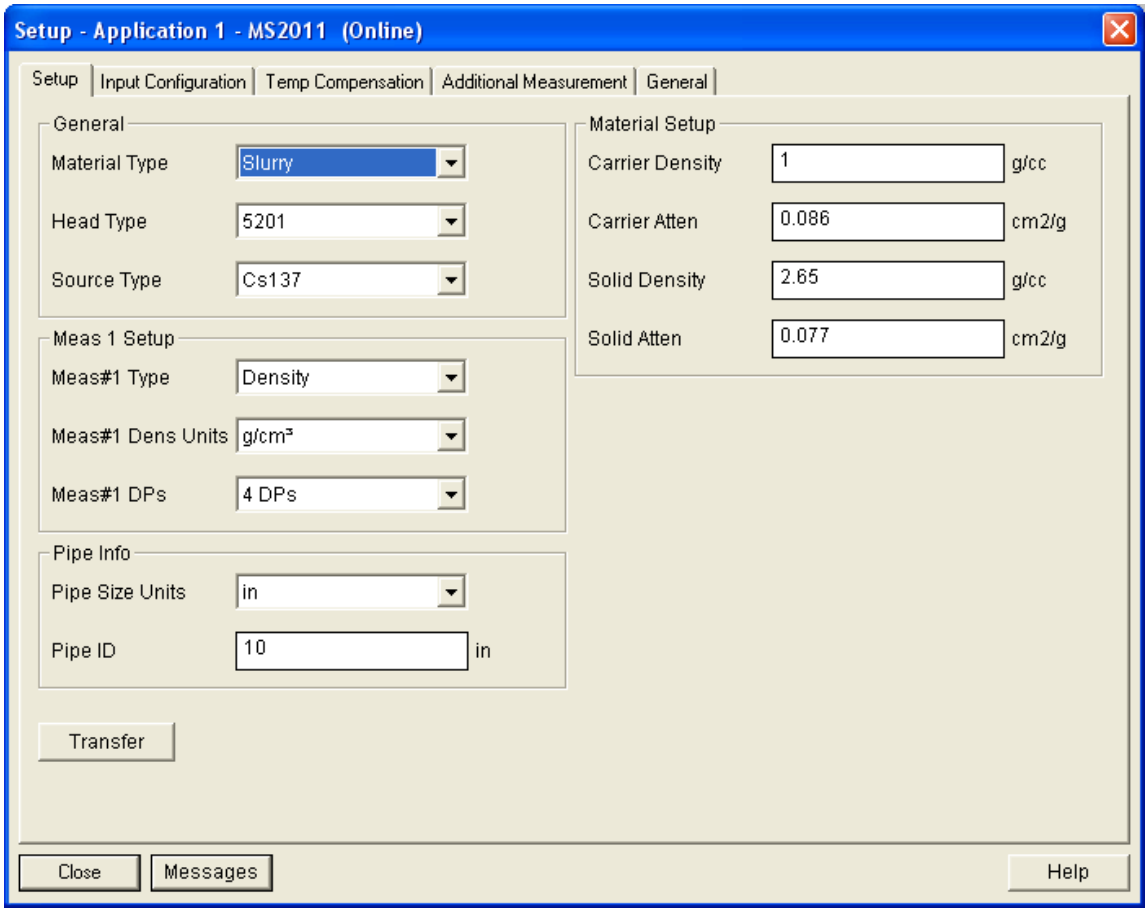

Figure 14-37. Setup tab

- General: Configures the material type and detector source type
- Meas 1 Setup: Configures the source and the primary measurement
- Pipe Info: Configures the application Pipe ID and units
- Material Setup: Configures the density properties of the material

Input Configuration Tab

The Input Configuration tab allows the user to assign the type of additional inputs connected to the MS2011 gauge and to set the input source and units for the application.

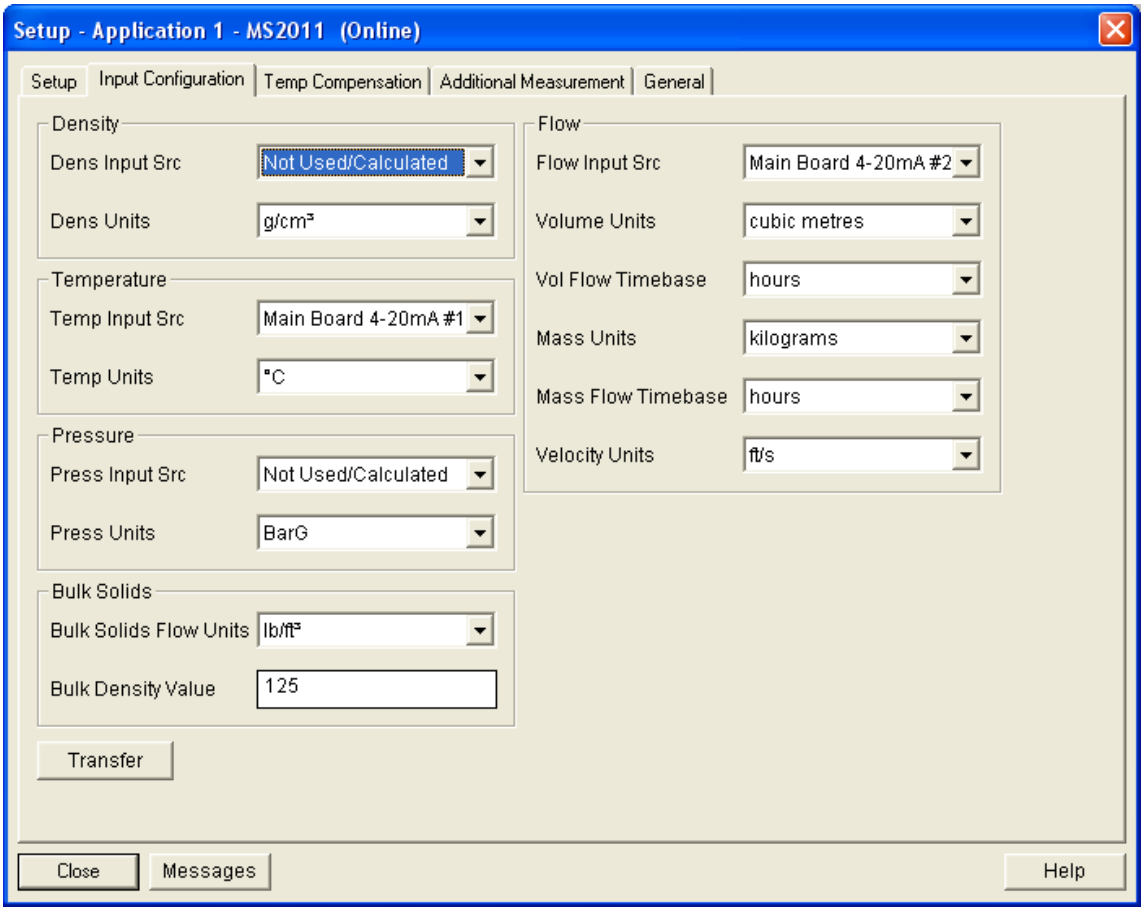

Figure 14-38. Input Configuration tab

Temperature Compensation Tab

The Temperature Compensation tab allows the user to configure how the process temperature input is used in the density application.

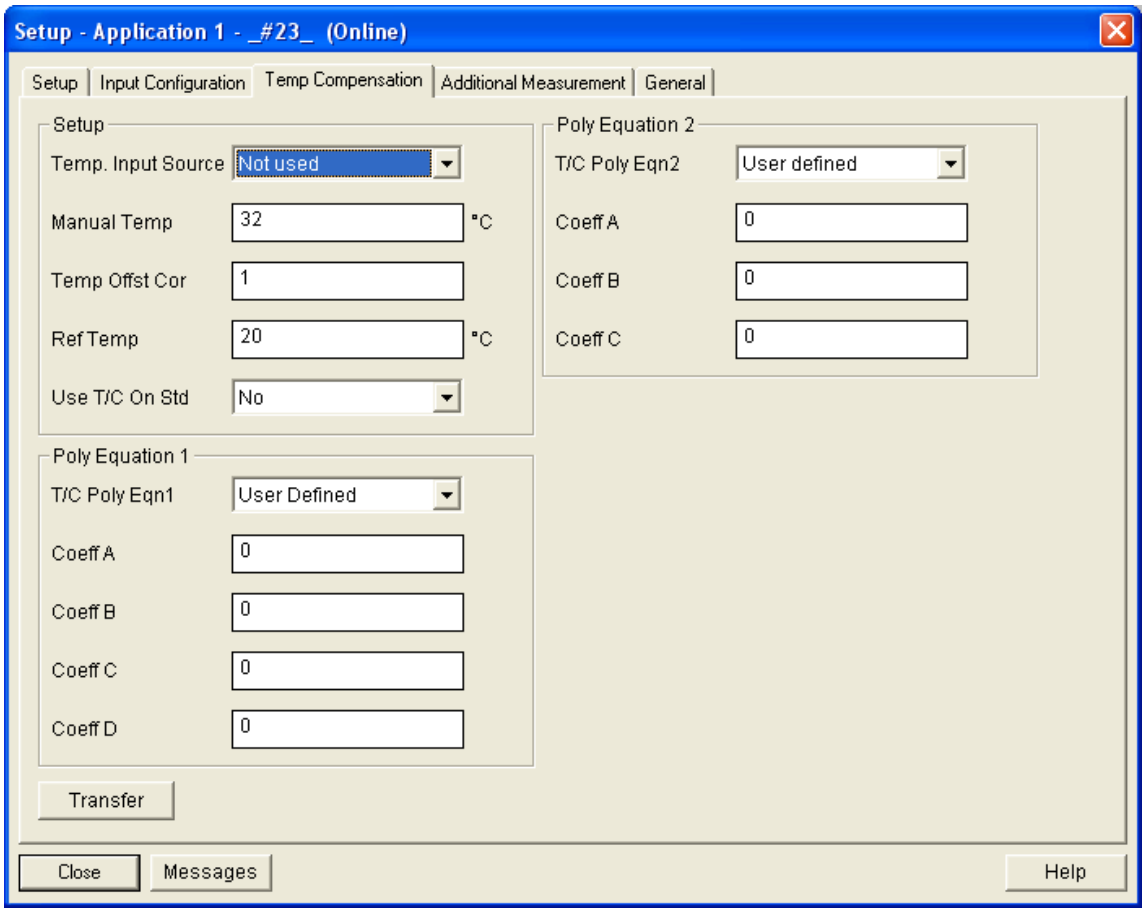

Figure 14-39. Temperature Compensation tab

Additional Measurement Tab

This screen allows three additional measurements to be configured for the application. As well a setting up the units and range value for each measurement, the number of decimal places used to display each of the four application measurements can be configured.

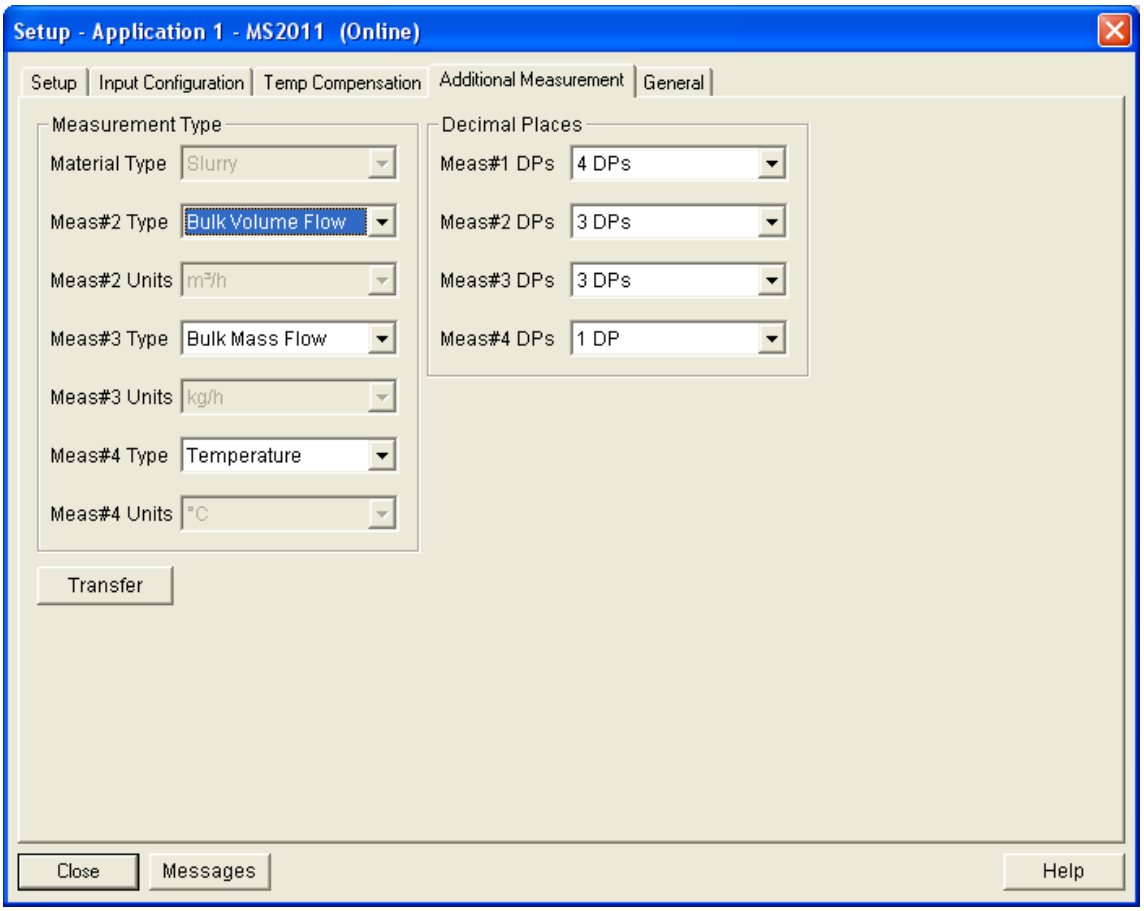

Figure 14-40.

General Tab

The General setup screen allows the user to read and modify parameters associated with the system.

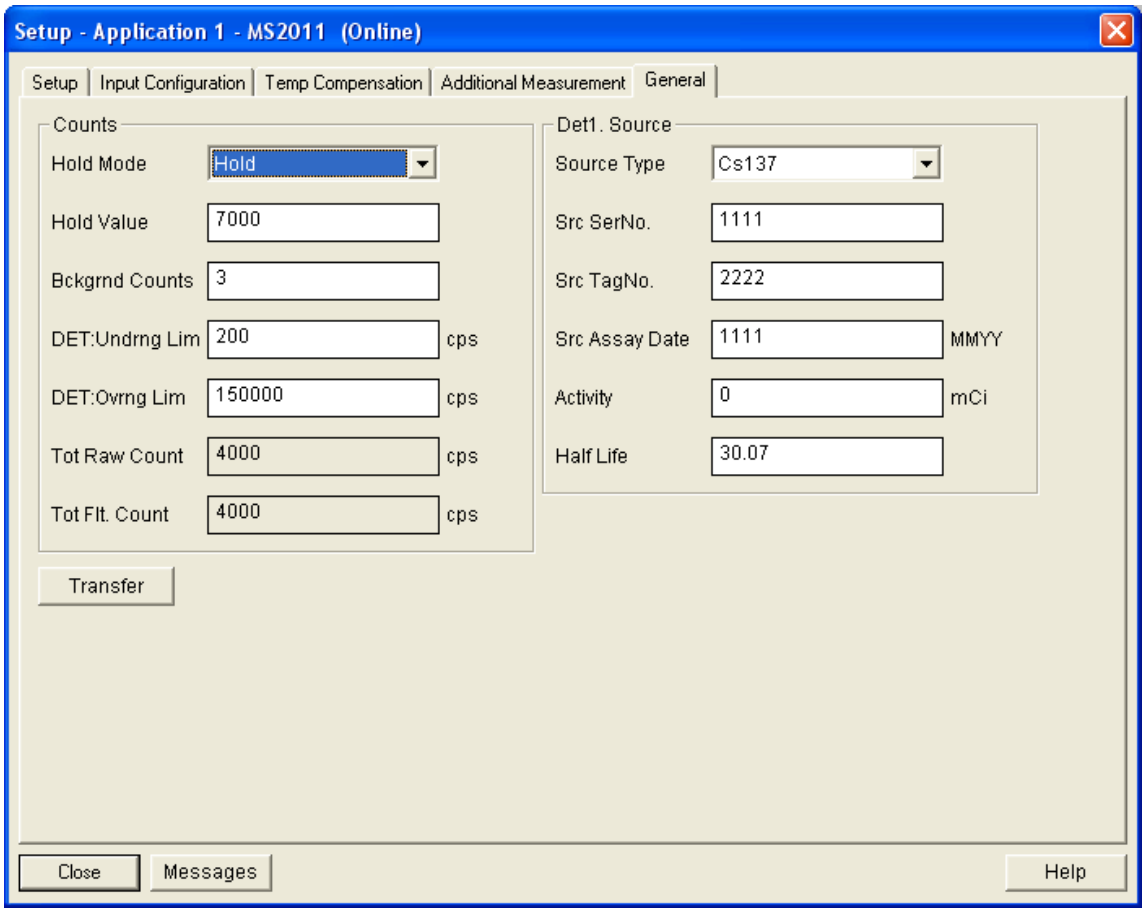

Figure 14-41.

- Counts: Configures background, count range and hold count mode
- Det. Source: Configures detector source information

Standardize

This screen is used to both display and control standardization on the MS2011.

For a detailed explanation of standardization for a density application refer to "Density Standardization."

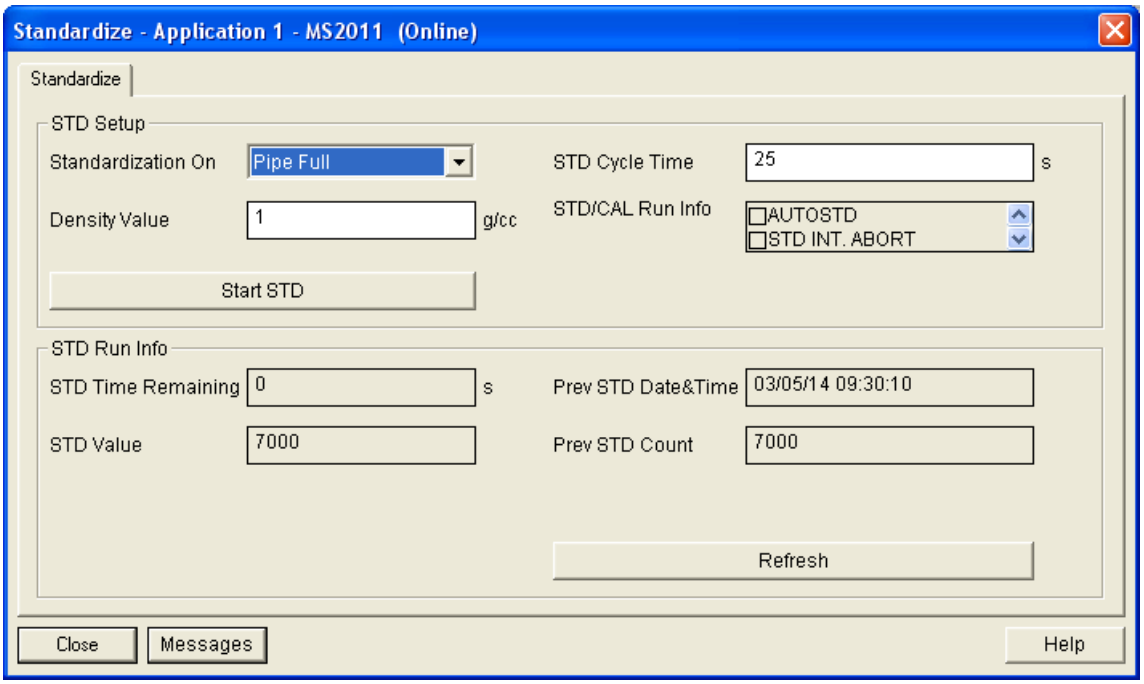

Figure 14-42. Standardization screen

Gauge Calibration CAL Data Tab

This screen is used to both display and control calibration on the MS2011.

For a detailed explanation of calibration for a density application, refer to "Density Calibration."

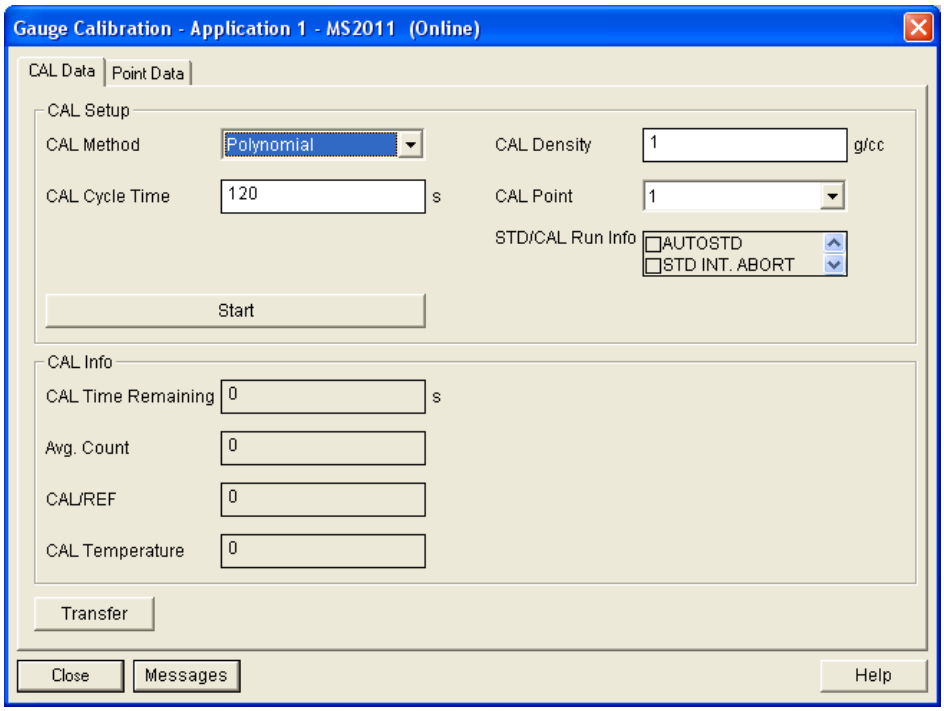

Figure 14-43. CAL Data tab

Point Data Tab

This screen shows the density calibration polynomial table point data for the application. Here the density point, counts and STD ratio obtained for each calibration point are displayed.

Up to two calibration points are displayed in this table.

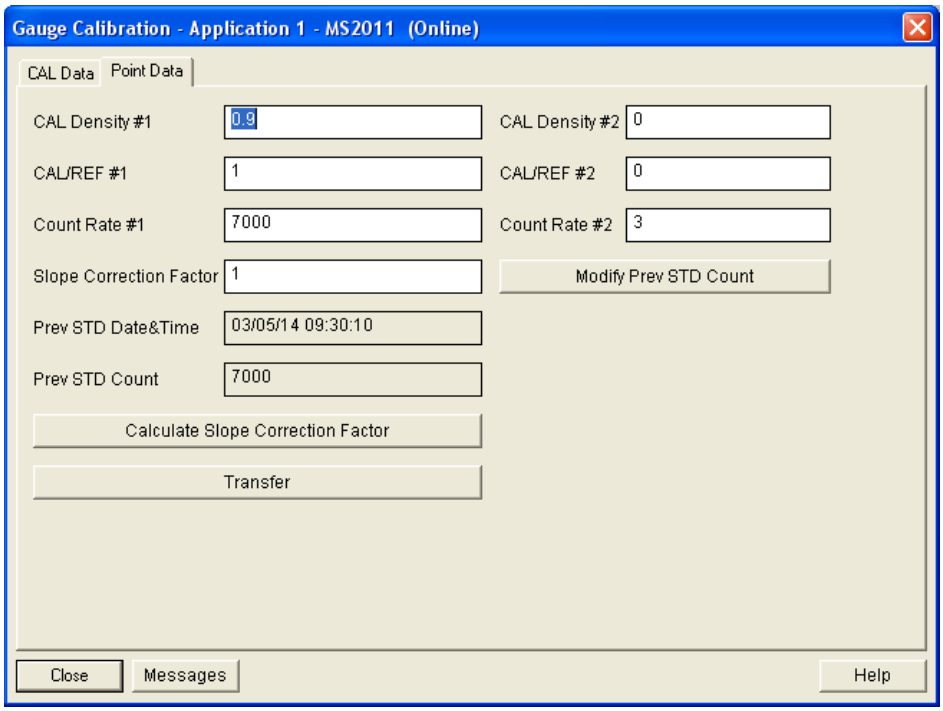

Figure 14-44. Point Data tab

Totals

This screen shows the configuration for the four totalizers available in the application block. The purpose of the totalizers is to calculate the amount of mass or volume flow measured by the MS2011 over a period of time. There are four totalizers available for each detector, and each totalizer can be configured to totalize mass or volume flow.

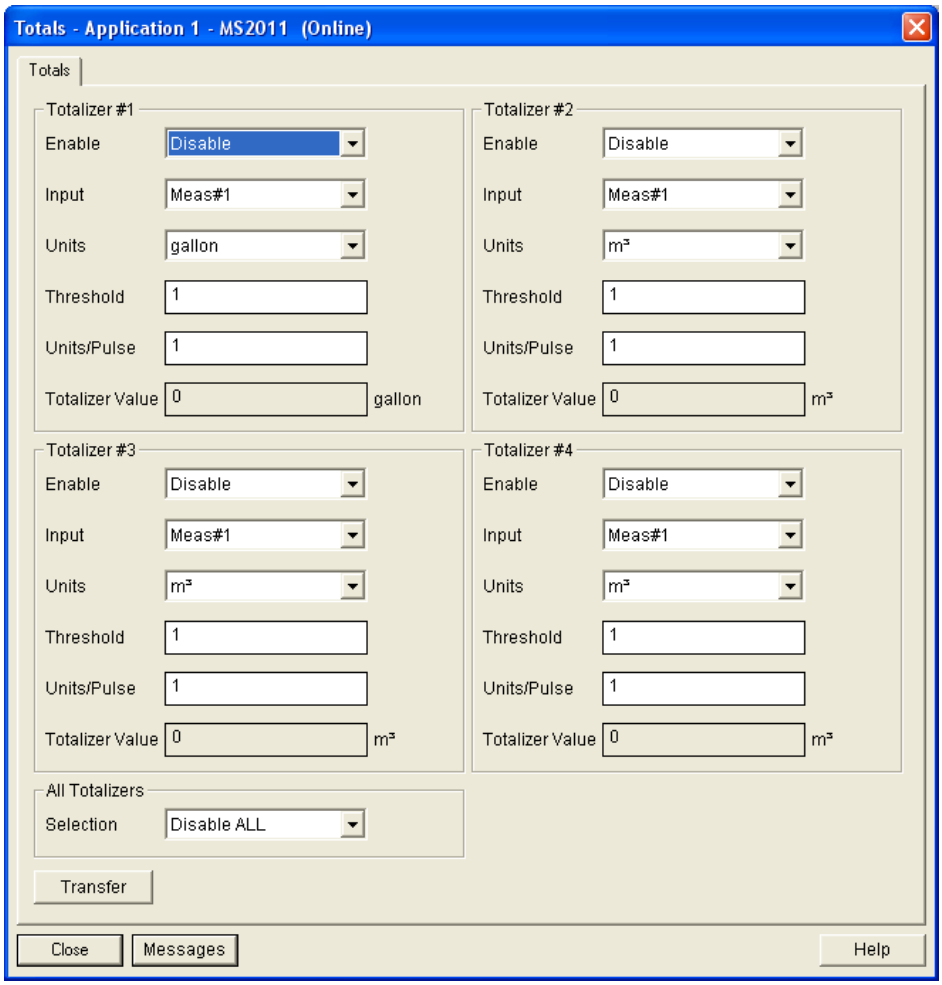

Figure 14-45. Totals screen

Action

The Application Action screen provides the user the ability to hold the four measurements configured for the application.

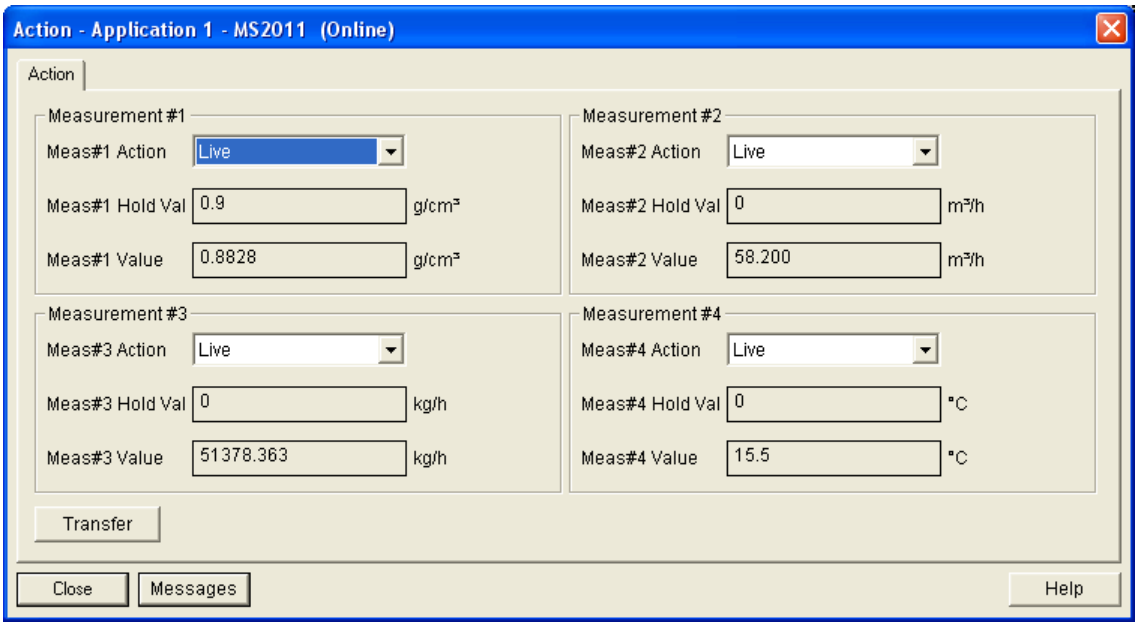

Figure 14-46. Action screen

- Measurement #1: Set Hold/Live mode for the primary measurement
- Measurement #2: Set Hold/Live mode for the 1st additional measurement
- Measurement #3: Set Hold/Live mode for the 2nd additional measurement
- Measurement #4: Set Hold/Live mode for the 3rd additional measurement

Process Alarms

This screen shows the configuration of up to 16 process alarms within the application block of the MS2011.

Process alarms can provide a signal to the external device when the process value goes above or below a set point value.

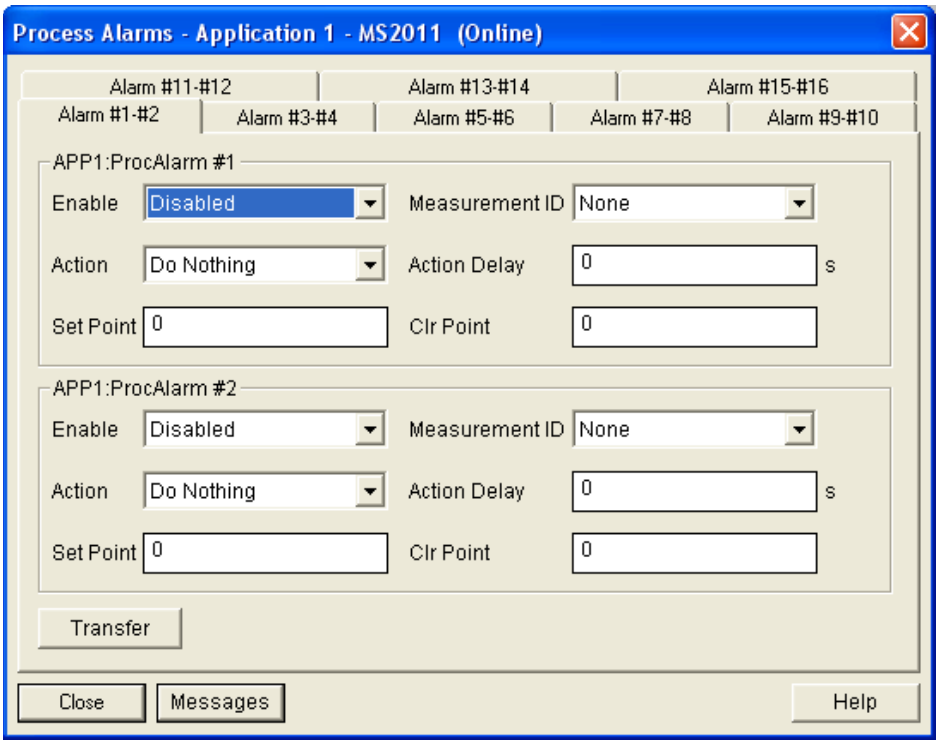

Figure 14-47. Process Alarms tabs

Eight tabs are available for the selection and configuration of up to 16 process alarms, with two alarms displayed per tab.

Mode/Fault Alarm Setup

This screen shows the configuration of the Mode/Fault alarms for the application.

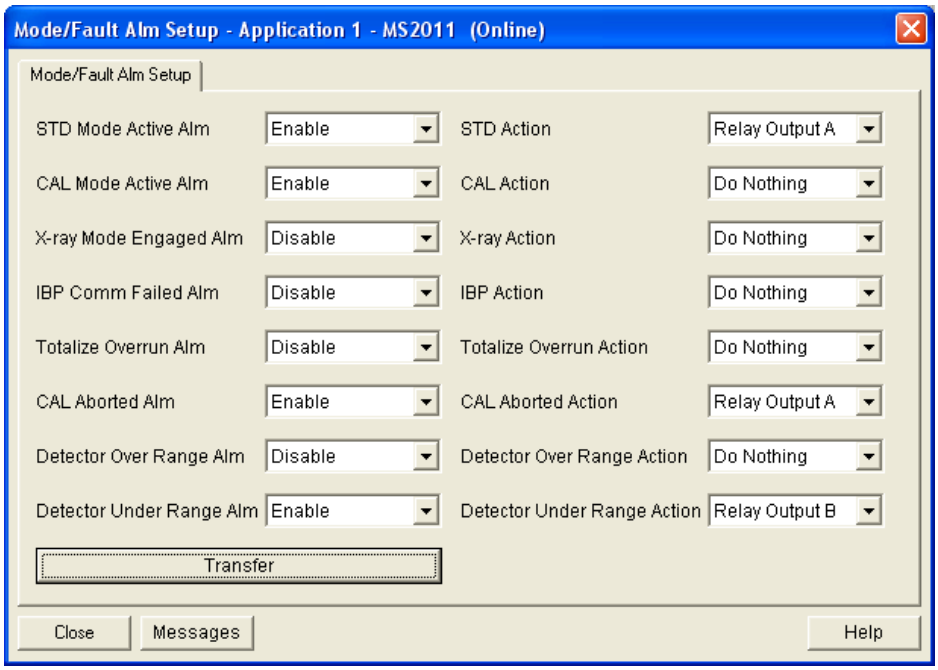

Figure 14-48. Mode/Fault Alarm screen

Application Status

This screen shows the current process alarms and Mode/Fault status of the density application.

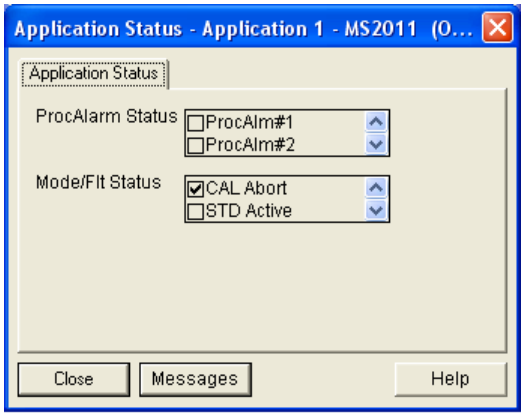

Figure 14-49. Application Status screen

Measurements Tab

This screen shows the current live/used values for each of the four measurement variables available in the application.

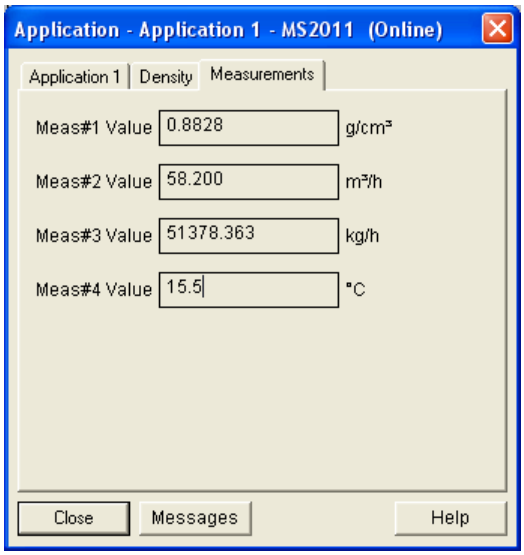

Figure 14-50. Measurements tab

Chapter 15
SIMATIC PDM: Device Online Menu for Maintenance Users

This chapter describes how to use SIMATIC PDM with the MS2011 via the Device online menu as a maintenance user.

Device Menu

The Device dropdown menu for maintenance operator is limited in its functionality. Apart from the standard menu items, a user can only configure/view a very small subset of the MS2011 database.

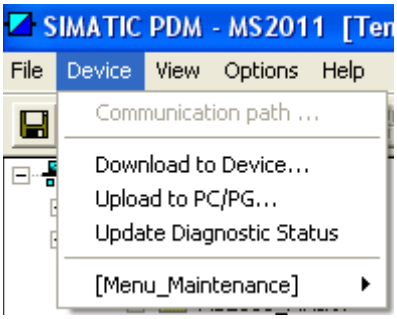

Figure 15-1.

Standard PDM Menu options are available:

- Download to Device: Full configuration is sent to the MS2011
- Upload to PC/PG: Full configuration is read from the MS2011
- Update Diagnostic Status: Diagnostic Status is updated in PDM from MS2011

Chapter 16
The Maintenance Menu

Menu_Maintenance

The Maintenance Menu allows the user to configure a very small section of the MS2011 using the below dropdown menu.

Figure 16-1. Maintenance menu

Device Information

The Device Info screen allows a maintenance user to view the Profibus device information for the MS2011.

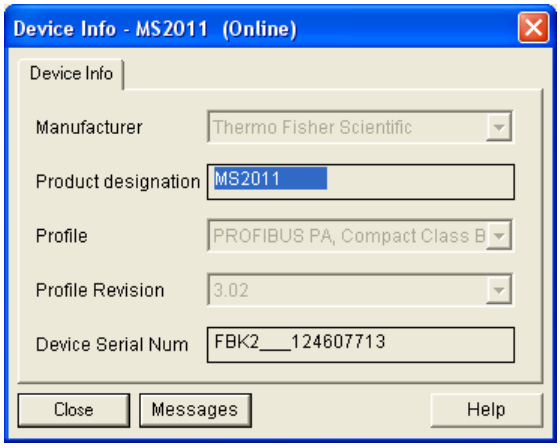

Figure 16-2. Device Info screen

Physical Block

The physical block screen allows a maintenance user to configure the installation details of the MS2011.

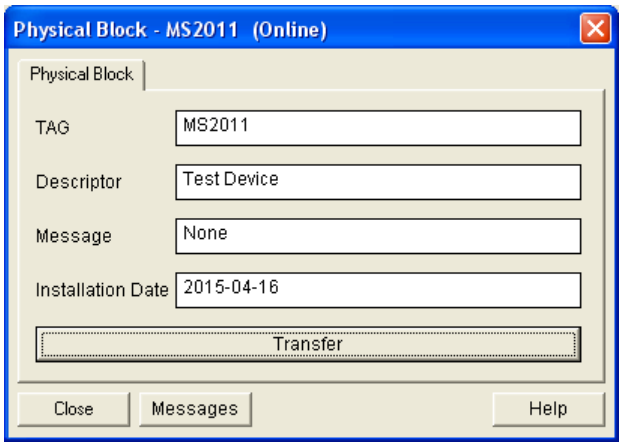

Figure 16-3. Physical Block screen

Configurable details on this screen include:

- Tag
- Descriptor
- Message
- Installation Date

Chapter 17
SIMATIC PDM: Standardization & Calibration

Level Standardization

Standardization is defined as a process to correct minor errors caused by material build up or wearing of the vessel walls. This process also ensures confidence in the accuracy of the calibration curve. The process must represent a reproducible condition, and therefore is generally performed either with the vessel empty or not empty. The standardization measurement provides the detector with a standard configuration reference point. During the standardization cycle, the detector averages the detector signal. The default cycle time lasts about two minutes. This averaged detector signal provides a repeatable measurement of the signal produced in the standard configuration.

Once the standardization measurement is completed, it can be repeated later to compensate for any changes, such as increased attenuation due to process material build up on the vessel walls. The detector can then adjust the calibration values based on the new standardization value. The calibration values are adjusted automatically whenever a new standardization is performed. Thus, it is not necessary to repeat the calibration measurements.

Standardization for a Level application is handled via the below on-line dialog box.

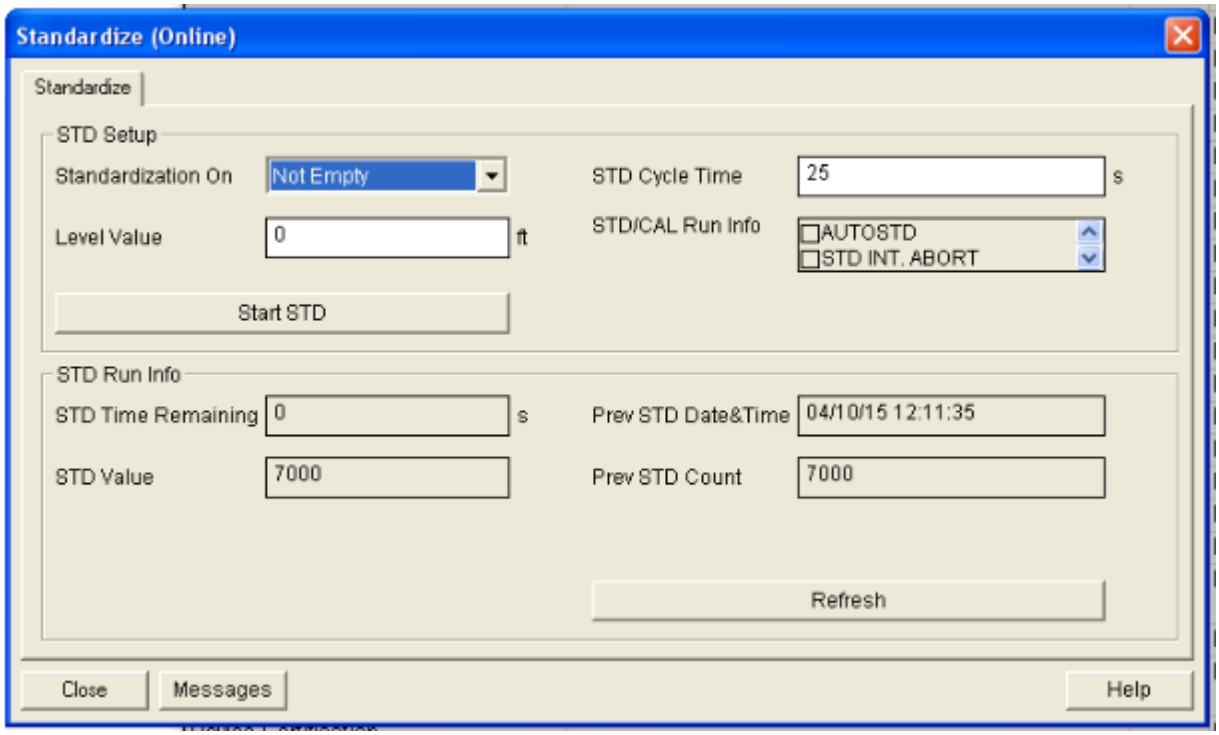

Figure 17-1. Level standardization

1. Select Empty or Not Empty as the condition from the **Standardization On** dropdown.

2. Enter the **STD Cycle Time** in seconds.

3. If Not Empty is selected for "Standardization On," enter the STD **Level Value.**

4. Press the **Start STD** button to begin Standardization Cycle.

Note Standardization will not begin unless High Voltage Control is stable for the detector. Should this not be the case, standardization will be automatically be aborted. ▲

During the standardization run the following dialog box should be displayed:

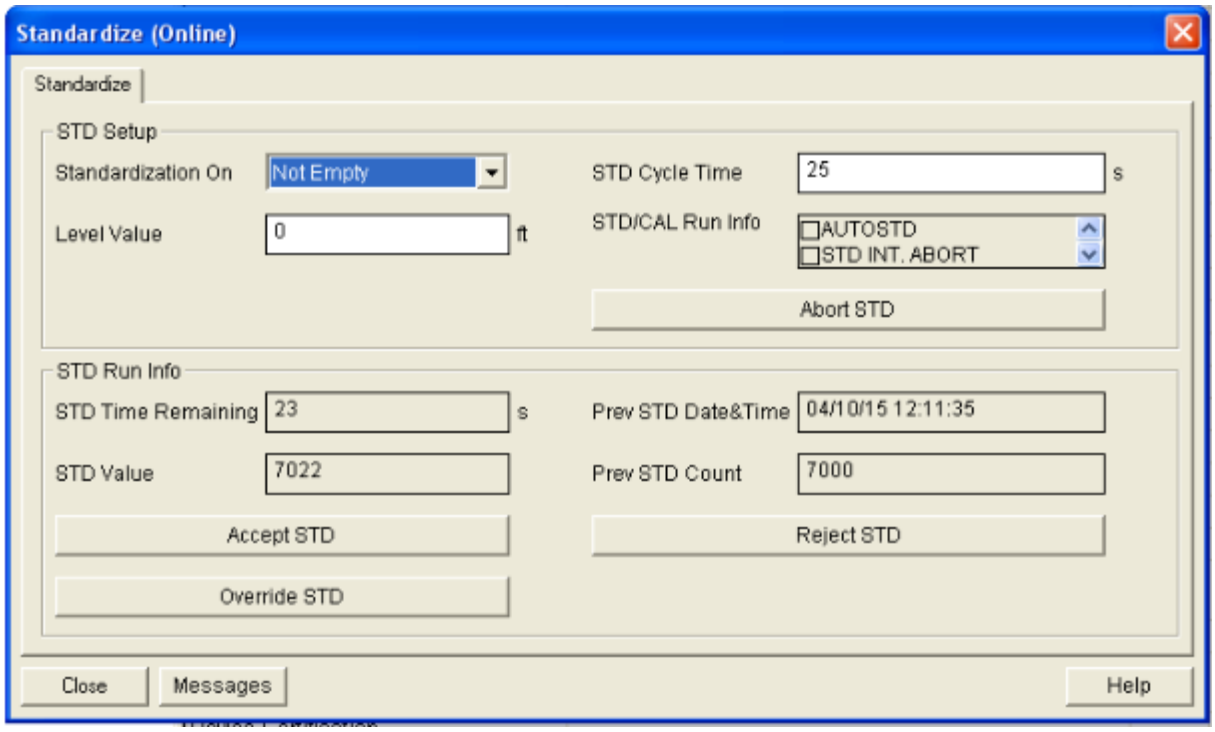

Figure 17-2. Begin standardization

- **STD Time Remaining** will decrement to indicate how much longer is left before standardization is complete.
- Current **STD Value** is displayed, showing the average count during the standardization cycle.

The following commands are available during standardization:

- **Abort STD** – Abort or reject the standardization cycle before cycle completion. When the user terminates the standardization cycle, the value of the standardization counts and the standardization date and time stored in the detector remain unchanged.
- **Accept STD** – Accept the standardization value after the cycle completes. When the user accepts the standardization value, the date, time and value of the standardization counts at the time of acceptance are stored in the detector.
- **Reject STD** – Reject the standardization value after completion of the standardization cycle. If the user rejects the standardization, the value of the standardization counts and the standardization date and time stored in the detector are unchanged.
- **Override STD** – Override the standardization value after the cycle completes. When the user enters the new standardization value, the

date, time and value of the standardization counts at the time of acceptance are stored in the detector.

After the Standardization is accepted or overridden, the **Prev STD Date & Time** is updated, along with the **Prev STD Count**.

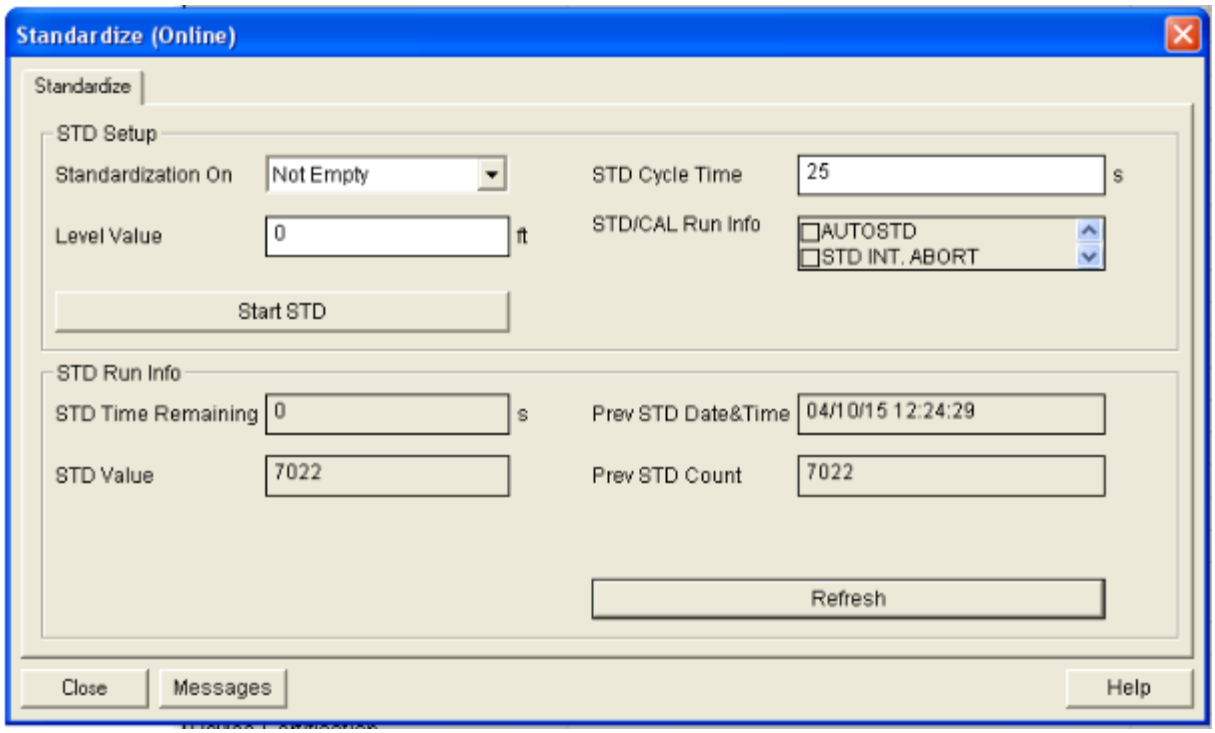

Figure 17-3. Complete standardization

Level Calibration

CAL Data Tab

Gauge calibration is used to linearize a non-linearized vessel for level accuracy.

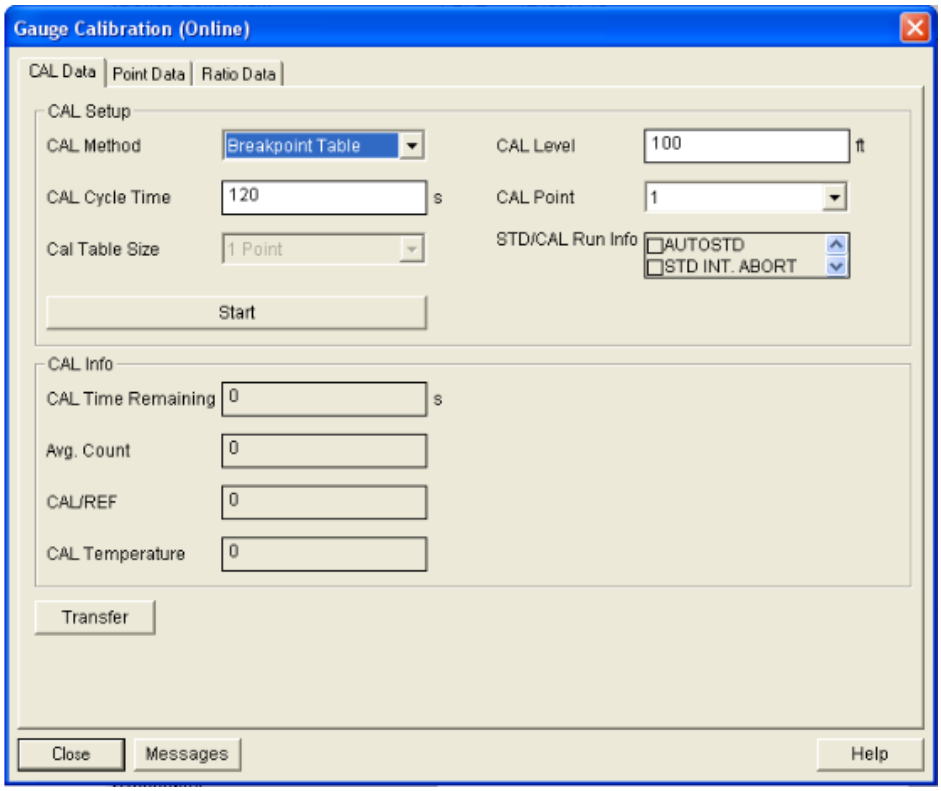

Figure 17-4. Begin calibration

In a level application, the only **CAL Method** available is Breakpoint Table.

1. Choose the point to be calibrated using the **CAL Point** field. Initially, the only selection available is 1. Once Point 1 has been calibrated and accepted, Point 2 will become available for selection from the dropdown.

   The CAL Point field will allow the user to calibrate up to 10 points.

Note When a standardization cycle is run and accepted on a vessel that is not empty, the system uses this data as Point 1 for calibration purposes. The user will then have the option of recalibrating Point 1 or calibrating Point 2. ▲

2. Calibration counts are averaged over a user-defined period of time. Enter a time period, in seconds, in the **CAL Sample Time** textbox. The time can range from 1 to 65,535 seconds.

3. Enter a calibration level value in **CAL Level**.

   The units displayed are those associated with the primary level measurement in CAL level.

4. Press **Start** to begin the calibration cycle.

Once started, the following screen is displayed and updated during the calibration cycle.

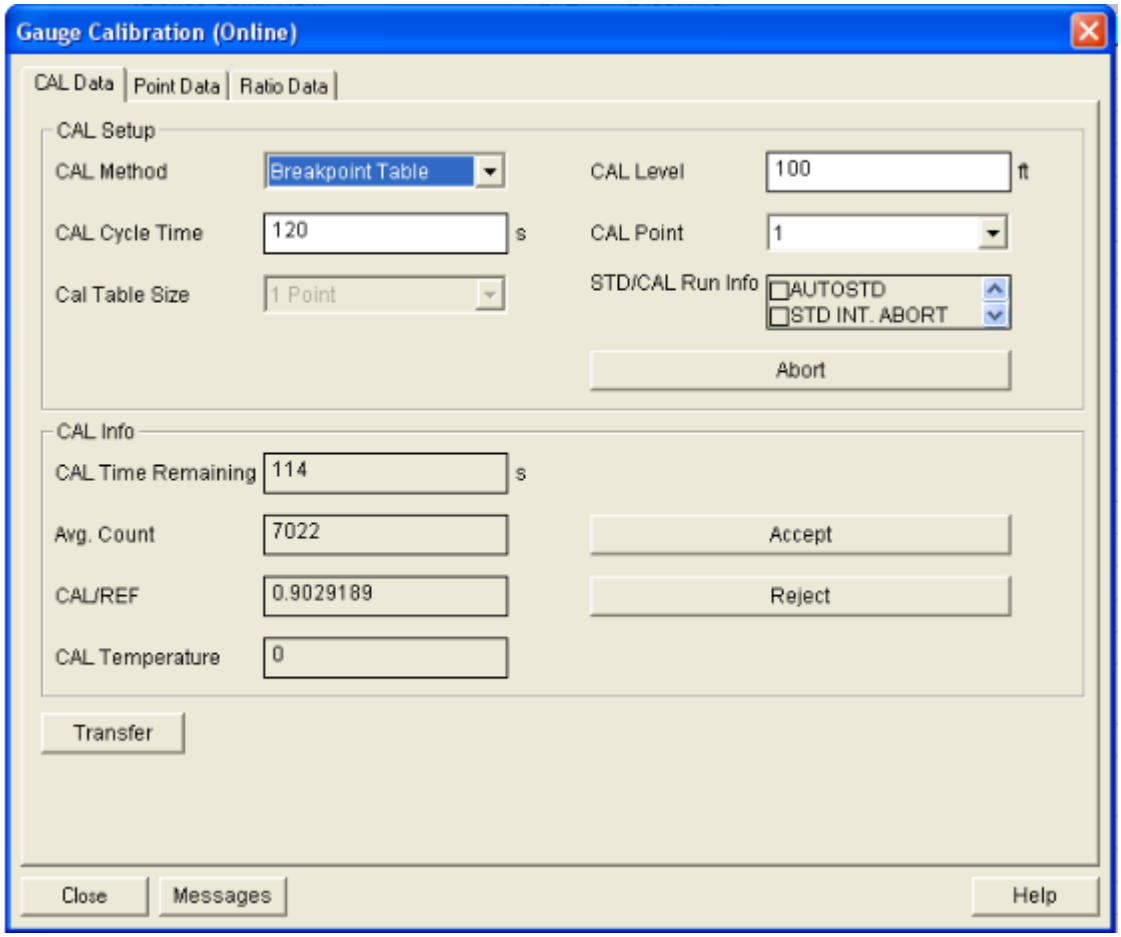

Figure 17-5. Calibration cycle

The following actions are available during a calibration cycle:

- **Abort** – Abort or reject the calibration cycle before cycle completion. When the user terminates the calibration cycle, the value of the calibration counts and the level stored in the detector remain unchanged.
- **Accept** – Accept the calibration value once the cycle completes. When the user accepts the calibration value, the values of the

calibration counts and the density at the time of acceptance are stored in the detector.

- **Reject** – Reject the calibration value after completion of the calibration cycle. If the user rejects the calibration, the value of the calibration counts and the level stored in the detector are unchanged.

The fields listed below are for display purposes only and are not configurable by the user.

- Calibration Time Remaining – **CAL Time Remaining**
- Detector Average Count – **Avg. Count**
- Calibration/Reference Latest – **CAL/REF**
- Calibration Temperature – **CAL Temperature**

Point Data Tab

Selecting the Point Data tab on the Gauge Calibration screen displays a table showing the count rate against level calibration points for up to 10 entries.

A user can edit a point entry by pressing the **Edit Point** button or Delete a point by pressing the **Delete Point** button.

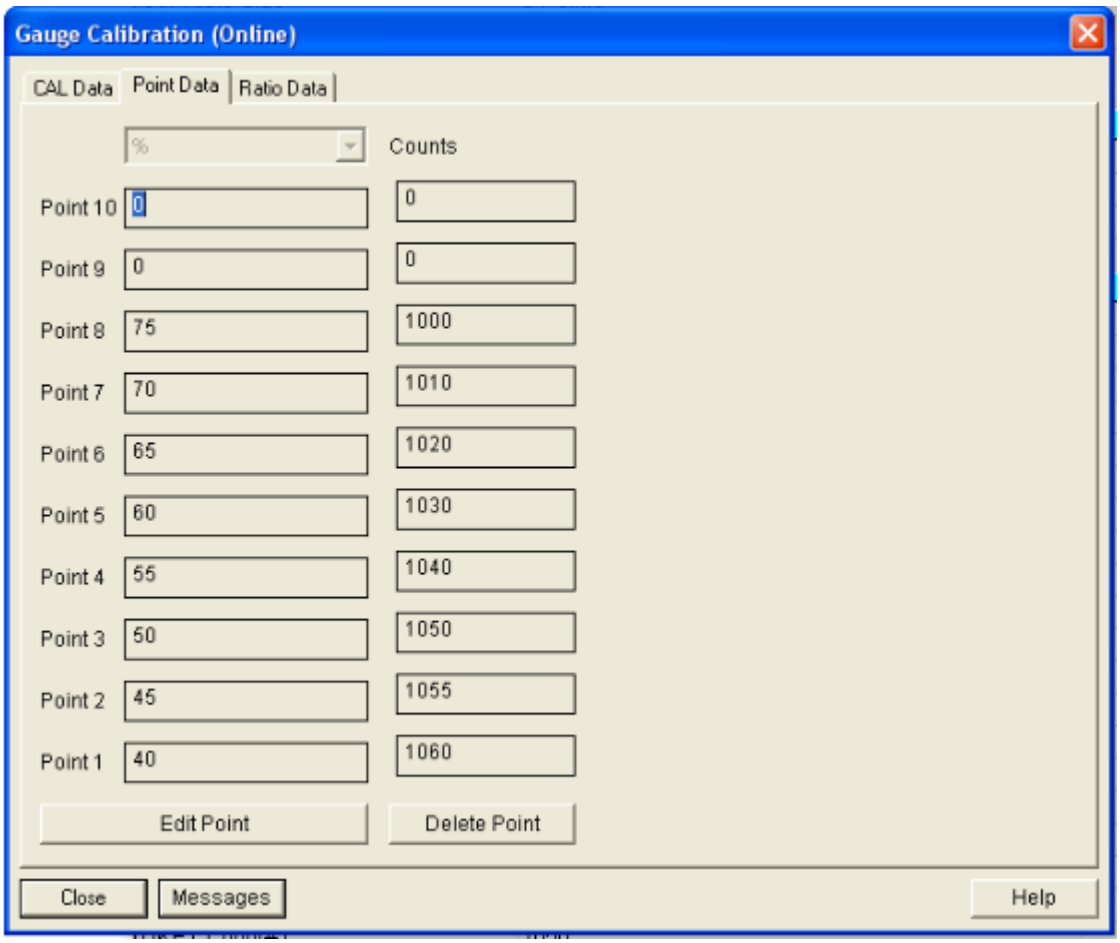

Figure 17-6. Point Data tab

Edit Point

1. Select **Edit Point** and then accept the warning by pressing **OK**.

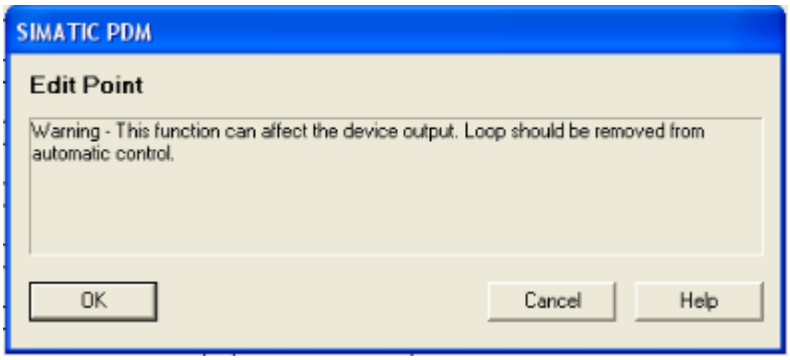

Figure 17-7. Editing a point

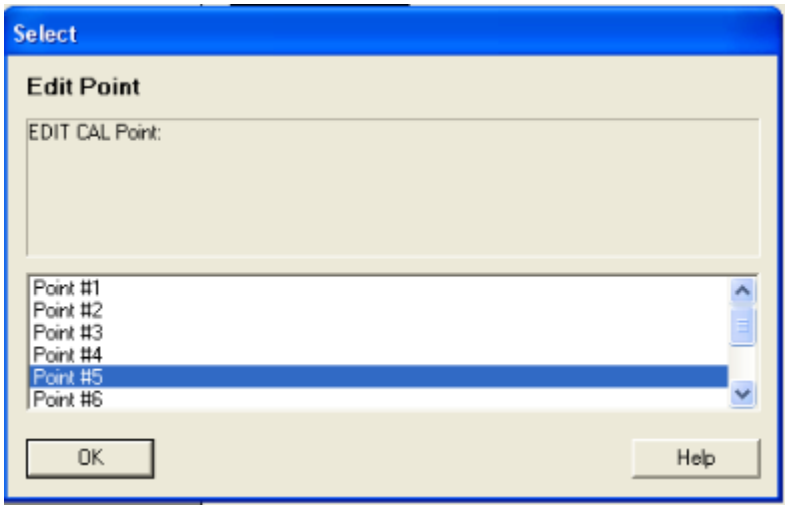

Figure 17-8. Point selection

2. Enter the new calibration point and count values.

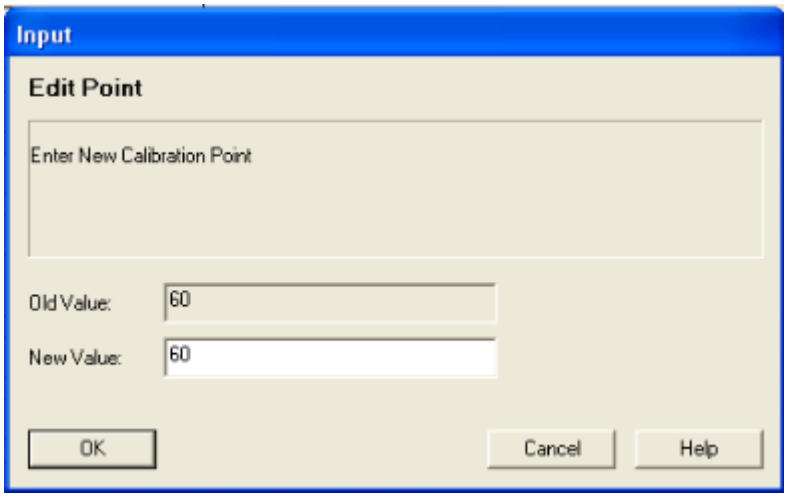

Figure 17-9. New calibration point

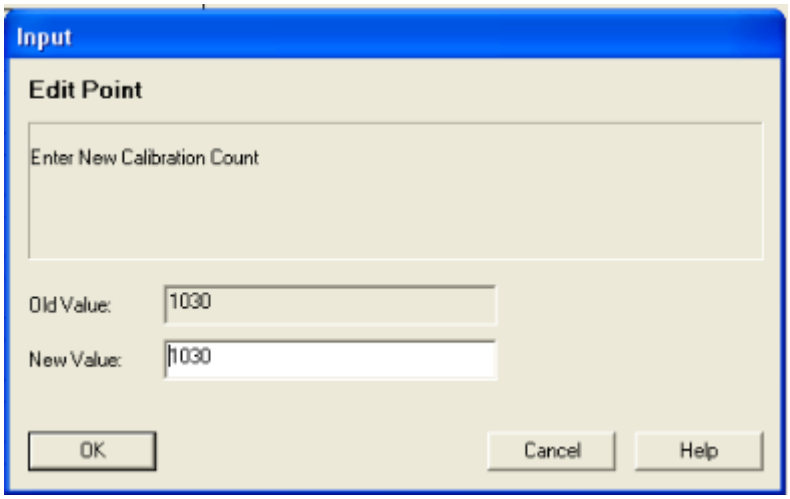

Figure 17-10. New calibration counts

3. Once entered, the calibration table is update and new configuration is written to FLASH memory.

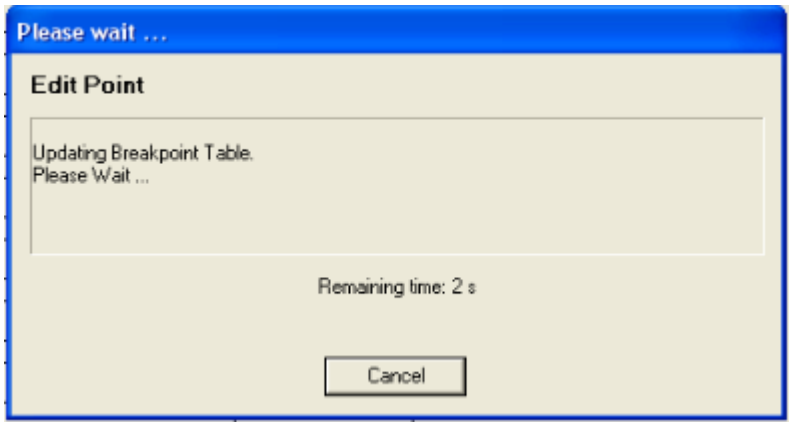

Figure 17-11. Updating breakpoint table

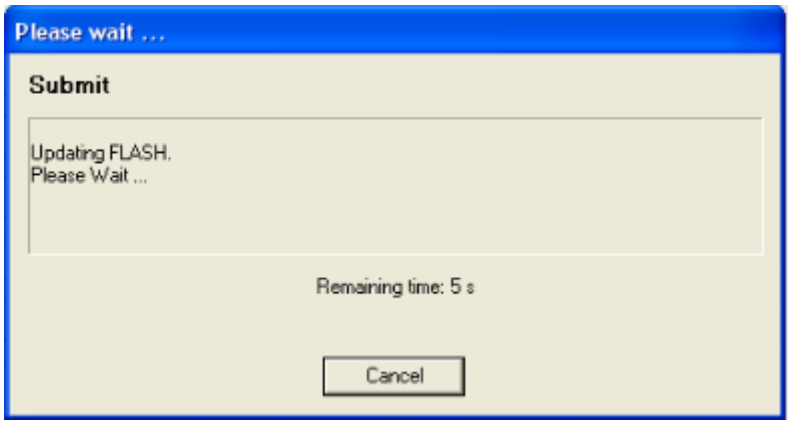

Figure 17-12. Updating FLASH memory

Delete Point

1. Press **Delete Point** and select the point to be deleted.

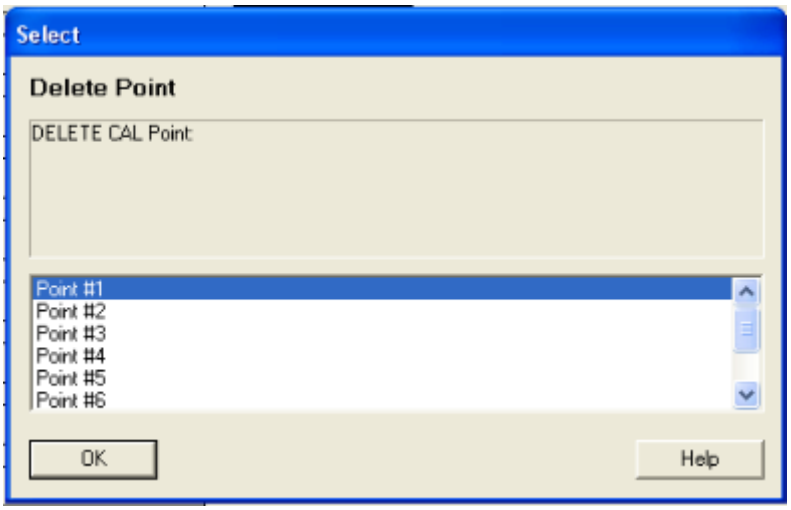

Figure 17-13. Select point for deletion

2. After selection of the point, the entry will be deleted and the table updated.

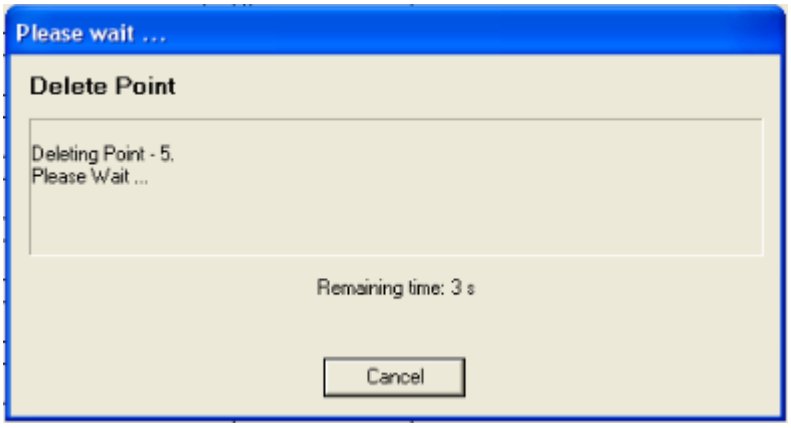

Figure 17-14. Deleting point

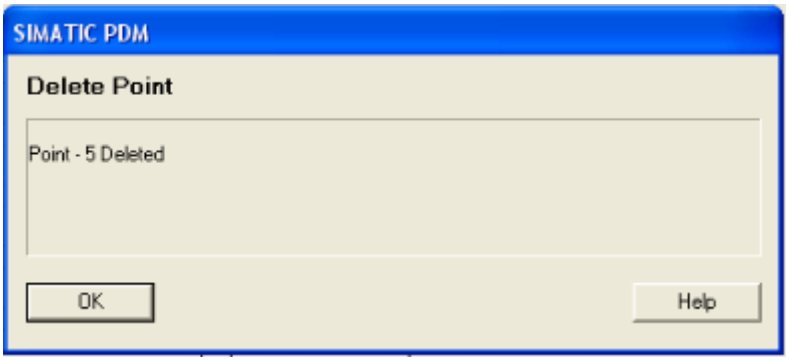

Figure 17-15. Deletion complete

Ratio Data Tab

Selecting the Ratio Data tab on the Gauge Calibration screen displays a table showing the CAL/STD Ratio against level calibration points for up to 10 entries.

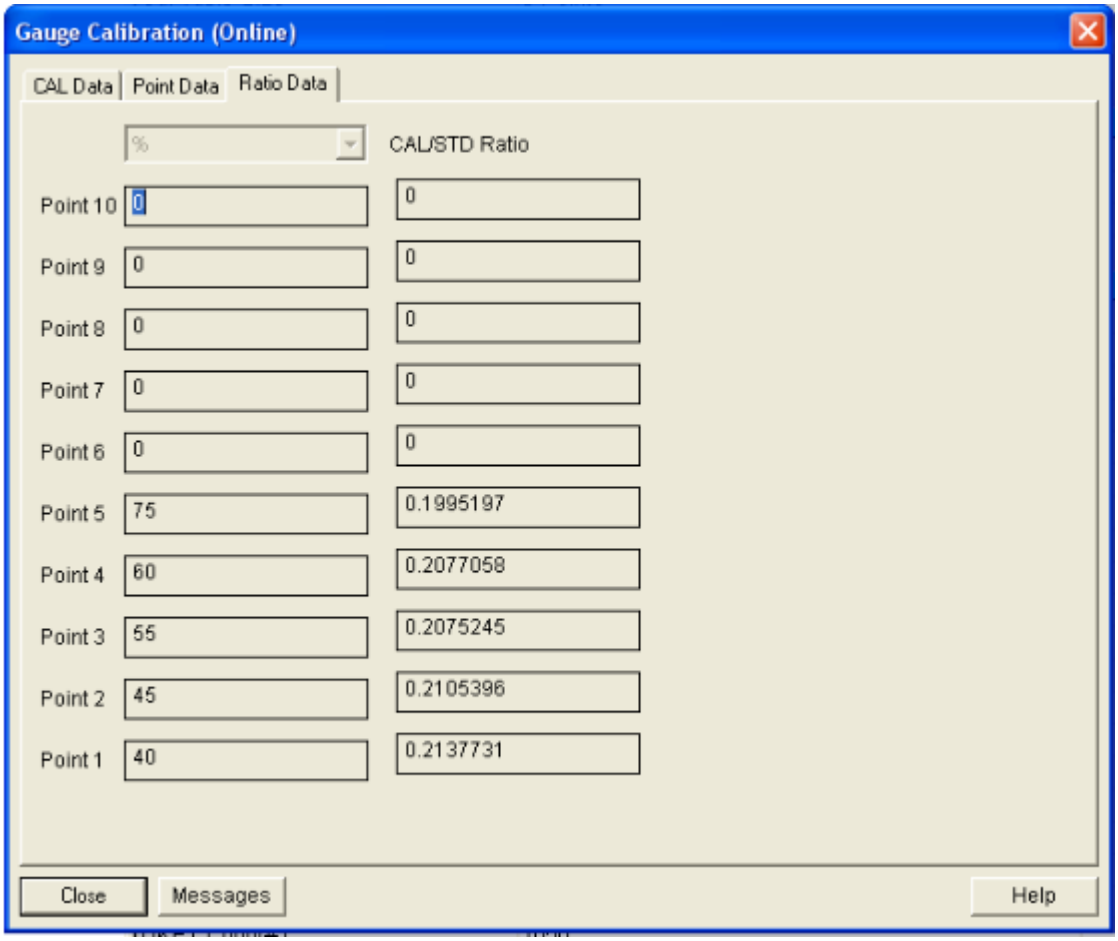

Figure 17-16. Ratio Data tab

Density Standardization

Standardization is defined as a process that takes a radiation measurement for a standard process configuration to establish a reference point for the gauge. This process also ensures confidence in the accuracy of the calibration curve. The procedure requires the measurement section to be either pipe empty or full. When full is selected, the pipe should be filled with carrier or be in some other repeatable condition. The standardization measurement provides the gauge with a standard configuration reference point. During the standardization cycle, the gauge averages the detector signal. The default cycle time lasts about two minutes. This averaged detector signal provides a repeatable measurement of the signal produced in the standard configuration.

Once the standardization measurement is completed, it can be repeated later to compensate for any changes, such as increased attenuation due to

process material build up on the pipe walls. The gauge can then adjust the calibration values based on the new standardization value. The calibration values are adjusted automatically whenever a new standardization is performed. Thus, it is not necessary to repeat the calibration measurements.

By default, the gauge uses carrier density as the calibration (CAL) point. For some applications, this default CAL point may provide adequate measurement accuracy without performing any additional calibration measurements. For example, if the standardization is performed on a pipe full of clean carrier (for a slurry material type) and solids concentration is selected as the primary measurement, the measurement readout should be reasonably accurate.

Standardization for a density application is handled via the screen below.

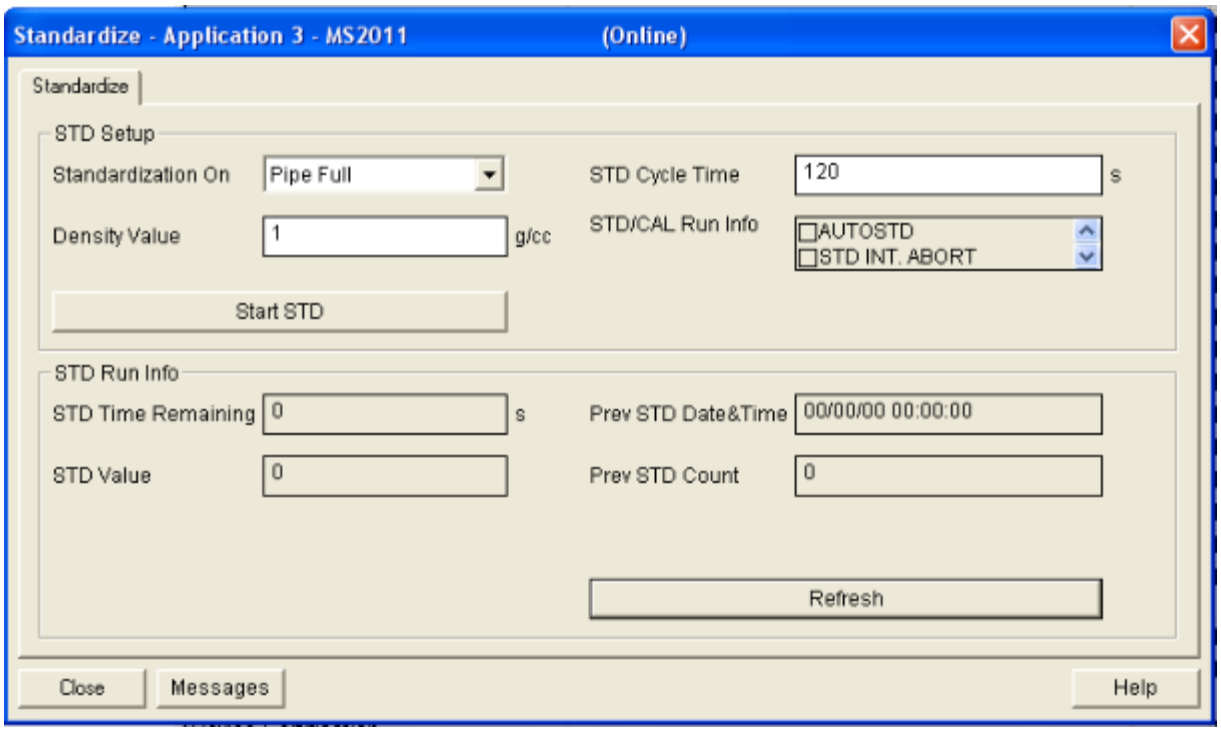

Figure 17-17. Standardization screen

1. Select a condition from the **Standardization On** dropdown. The available selections are None, Pipe Empty, Pipe Full and Bypassed.

2. Enter the **STD Cycle Time** in Seconds

3. If Pipe Full is selected for Standardization On, enter the STD **Density Value** in g/cc.

4. Press the **Start STD** button to begin the standardization cycle.

Note Standardization will not begin unless High Voltage Control is stable for the detector. Should this not be the case, standardization will be automatically be aborted. ▲

During standardization, the following screen should be displayed.

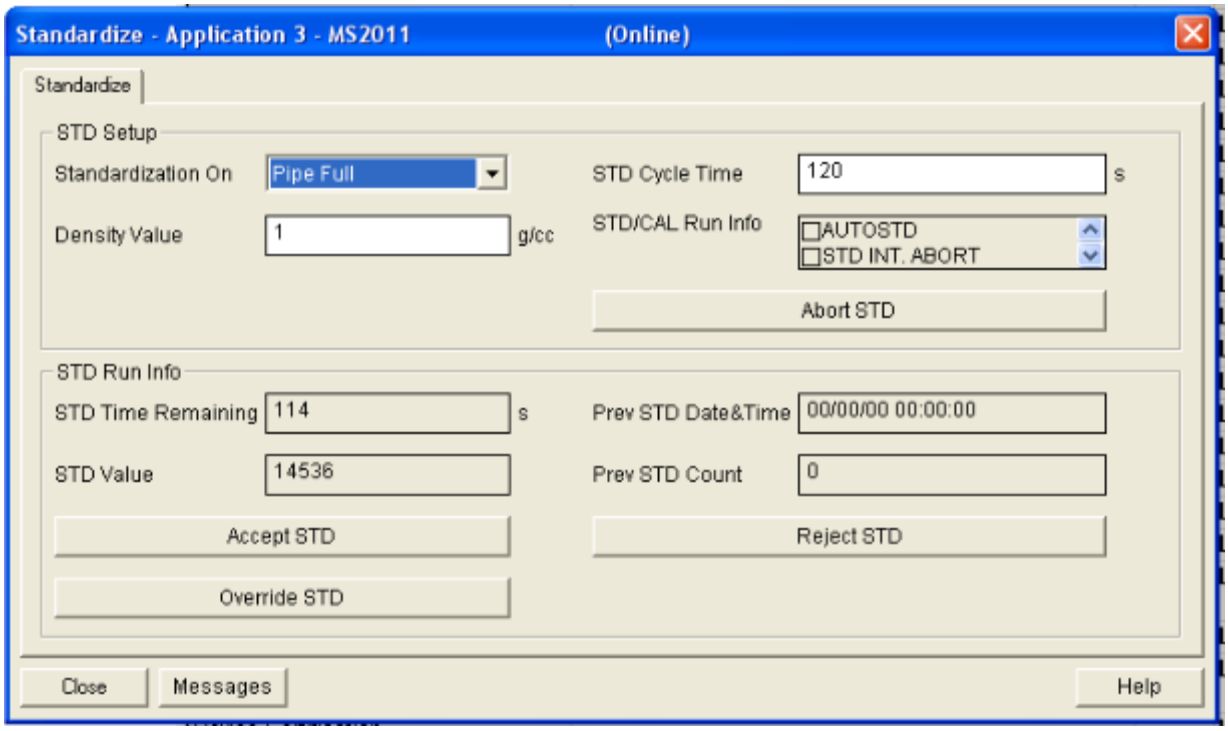

Figure 17-18. Begin standardization

- **STD Time Remaining** will decrement to indicate how much longer is left before Standardization is completed.
- Current **STD Value** is displayed showing the average count during the standardization cycle.

The following commands are available for the standardization:

- **Abort STD** – Abort or reject the standardization cycle before cycle completion. When the user terminates the standardization cycle, the value of the standardization counts and the standardization date and time stored in the detector remain unchanged.
- **Accept STD** – Accept the standardization value after the cycle completes. When the user accepts the standardization value, the date, time and value of the standardization counts at the time of acceptance are stored in the detector.

- **Reject STD** – Reject the standardization value after completion of the standardization cycle. If the user rejects the standardization, the value of the standardization counts and the standardization date and time stored in the detector are unchanged.
- **Override STD** – Override the standardization value after the cycle completes. When the user enters the new standardization value, the date, time and value of the standardization counts at the time of acceptance are stored in the detector.

After the Standardization is accepted or overridden, the **Prev STD Date & Time** is updated, along with the **Prev STD Count**.

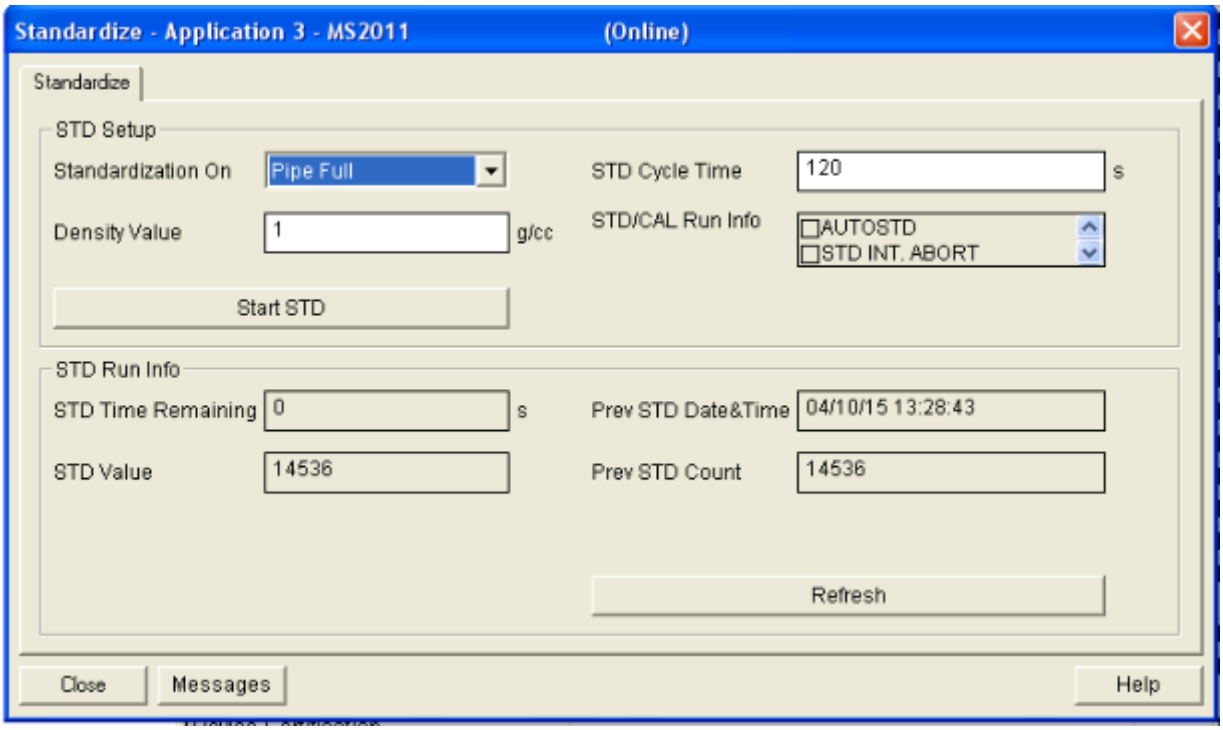

Figure 17-19. Standardization complete

Density Calibration

When a calibration is required, a one point calibration provides a reference measurement at one density in the range of interest. This form of calibration is sufficient in most instances. If greater measurement accuracy is required, two-point calibration can be performed.

The calibration density value is currently entered only in g/cc. In future software releases the user will be able to select the calibration density units.

CAL Data Tab

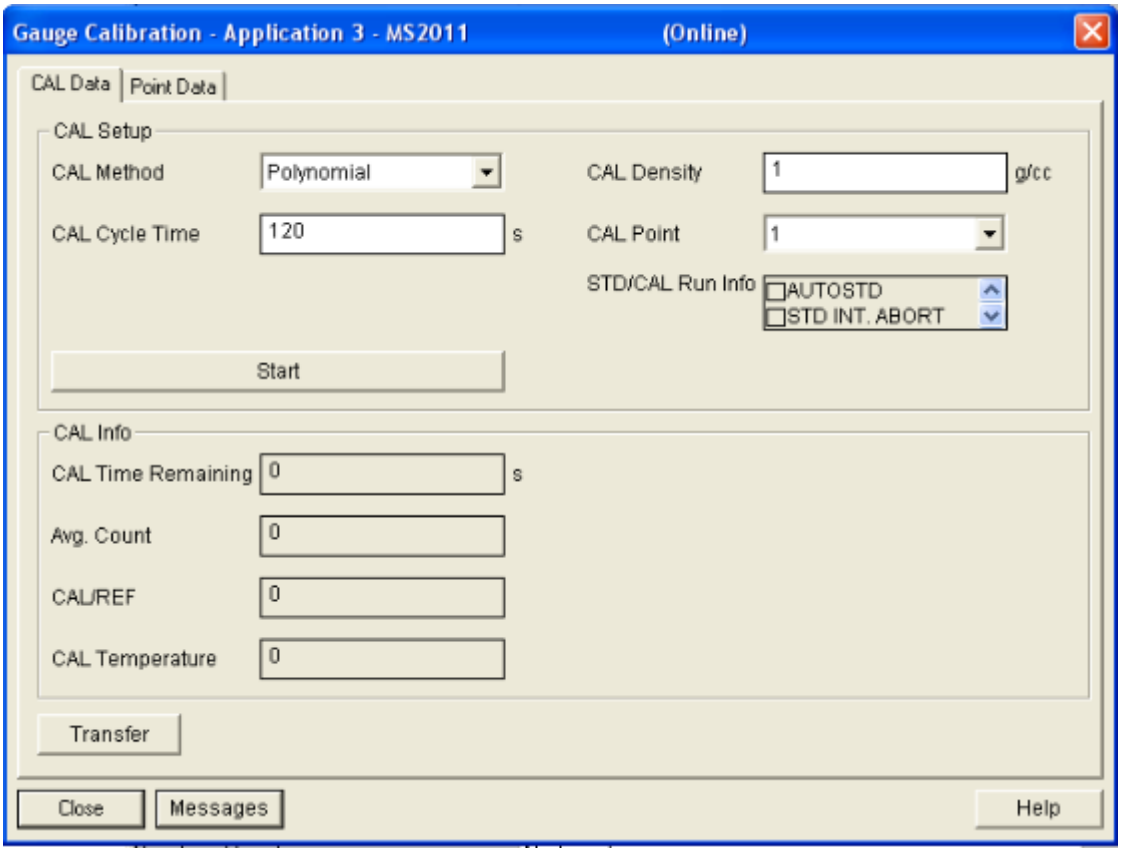

Figure 17-20. CAL Data tab

1. Select a method of density calibration from the CAL Method dropdown.
   - Polynomial

2. Choose the point to be calibrated using the **CAL Point** field. Initially, the only selection available is 1. Once Point 1 has been calibrated and accepted, Point 2 will become available for selection from the dropdown. The CAL Point field will allow the user to calibrate up to two points for a polynomial calibration method.

Note When a standardization cycle is run and accepted on a full pipe, the MS2011 uses this data as Point 1 for calibration purposes. The user will then have the option of recalibrating Point 1 or calibrating Point 2. ▲

3. Calibration counts are averaged over a user-defined period of time. Enter a time period, in seconds, in the **CAL Cycle Time** textbox. The time can range from 1 to 65,535 seconds.

4. Enter a calibration density value in g/cc.

5. Pressing **Start** to begin the calibration cycle.

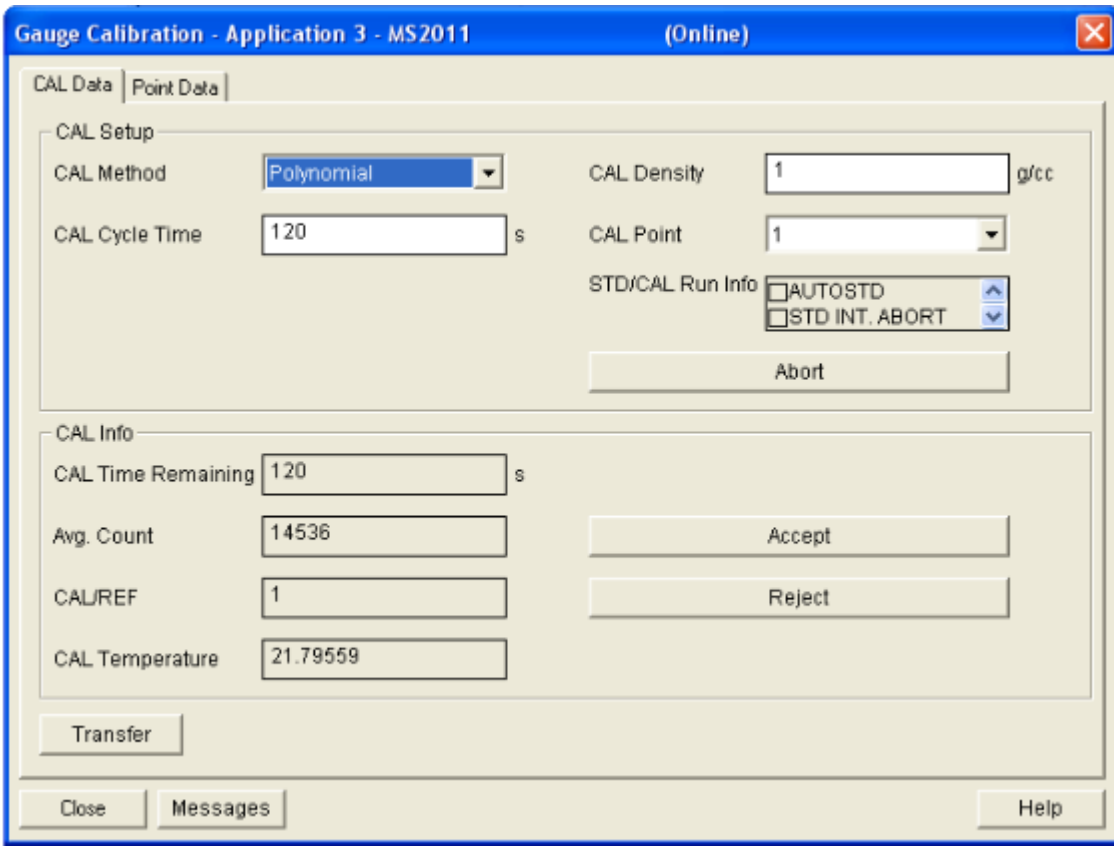

Figure 17-21.

The following commands are available for the gauge calibration process:

- **Abort** – Abort or reject the calibration cycle before cycle completion. When the user terminates the calibration cycle, the value of the calibration counts and the density stored in the gauge remain unchanged.
- **Accept CAL** – Accept the calibration value before or after the cycle completes. When the user accepts the calibration value before the cycle completes, the values of the calibration counts and the density at the time of acceptance are stored in the gauge.
- **Reject CAL** – Reject the calibration value after completion of the calibration cycle. If the user rejects the calibration, the value of the

calibration counts and the density stored in the gauge are unchanged.

The fields listed below are for display purposes only and are not configurable by the user.

- Calibration Time Remaining – **CAL Time Remaining**
- Detector Average Count – **Avg. Count**
- Calibration/Reference Latest – **CAL/REF**
- Calibration Temperature – **CAL Temperature**

Point Data Tab

Selecting **Polynomial** as the density calibration method on the CAL Data tab introduces a distinct set of fields on the Point Data tab of the Gauge Calibration screen.

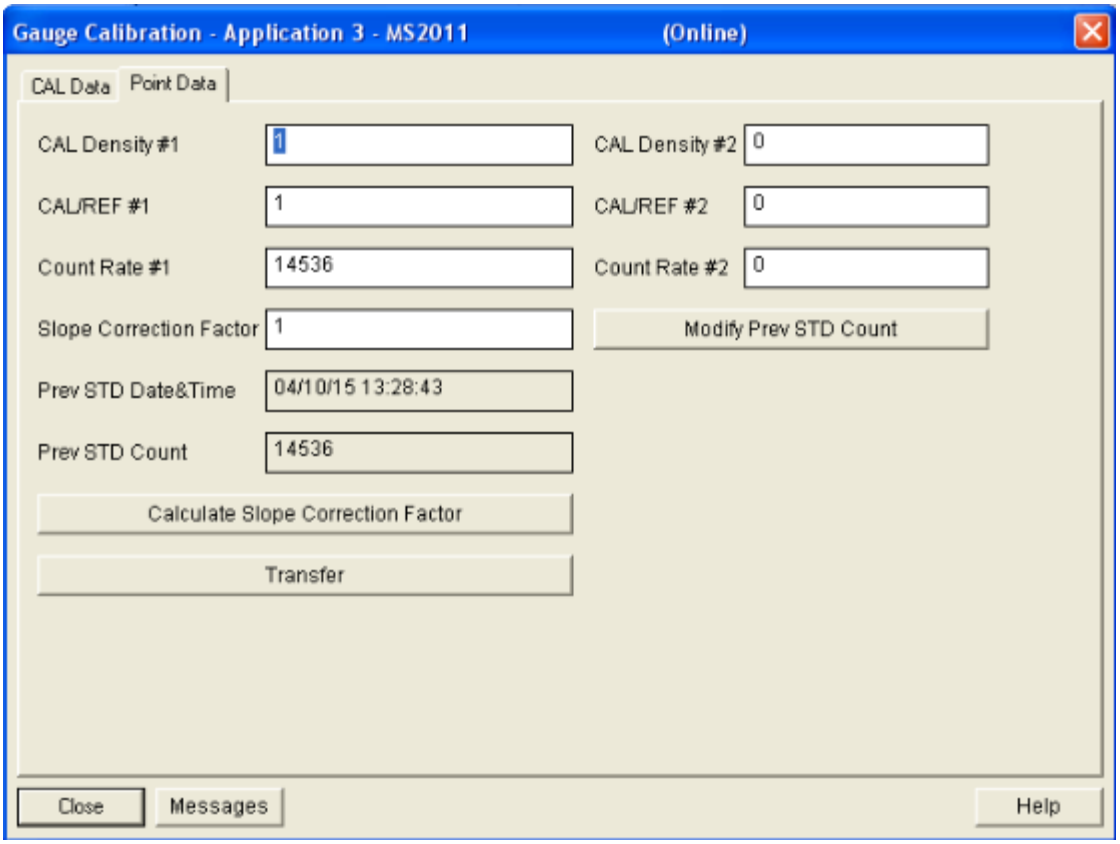

Figure 17-22. Point Data tab

The accepted calibration values calculated on the CAL Data tab will auto-populate the fields listed below on the Point Data tab. The user may also manually change these values by entering new data into the textboxes.

- Cal Density #1
- Cal/Ref #1

- Count Rate #1
- Cal Density#2 (If Point 2 is calibrated)
- Cal/Ref #2 (If Point 2 is calibrated)
- Count Rate #2 (If Point 2 is calibrated)
- Slope Correction factor

The slope correction factor is automatically calculated by the gauge using the calibration points accepted by the user. However, changes to data fields, both on the Point Data tab and Density Setup tab, will affect the slope correction factor.

If any of the fields listed below are changed, clicking the **Calculate Slope Correction Factor** button will recalculate the slope correction factor based on the current data. The result of this calculation will then be displayed in the Slope Correction Factor textbox.

Chapter 18
SIMATIC PDM: Table Menu Structure

MS2011 Specialist Table Items

Table 18-1. Specialist Table Items

MS200 Specialist Table	
	Device Info
	Physical Block
	Application Setup
	System
	Detector
	Application
	Output

Device Info Table

Table 18-2. Device Info

Device Info	
	Manufacturer
	Product Designation
	Profile
	Profile Revision
	Device Serial Number

Physical Block Table

Table 18-3. Physical Block

Physical Block		
	TAG	
	Descriptor	
	Message	
	Installation Date	
	Diagnosis Switch Event	
		Internal Comms Fault
		Status-Internal Comms Fault
		No IBP Communications
		Status-No IBP Communications
		IO Input Scan Error
		Status - IO Input Scan Error
		FLASH Update Required
		Status - FLASH Update Required
		DET#1 Counts Under Range
		Status – DET#1 Counts Under Range
		DET#1 Counts Over Range
		Status – DET#1 Counts Over Range
		DET#1 HV Control Unstable
		Status – DET#1 HV Control Unstable
		DET#1 Counts Under Range
		Status – DET#1 Counts Under Range
		DET#1 Counts Over Range
		Status – DET#1 Counts Over Range

Physical Block		
	Diagnosis Switch Event	
		DET#1 HV Control Unstable
		Status – DET#1 HV Control Unstable
		..
		DET#4 Counts Under Range
		Status – DET#4 Counts Under Range
		DET#4 Counts Over Range
		Status – DET#4 Counts Over Range
		DET#4 HV Control Unstable
		Status – DET#4 HV Control Unstable

Application Setup Table

Table 18-4. Application Setup

Application Setup		
	Application #1 (Level)	
		Type [Level]
		Level Type
		Sel. Detector
	Application #2 (Density)	
		Type [Density]
		Density Type
		Oilfield Units
	Application #3 (Level)	
		Type [Level]
		Level Type
		Sel. Detector
	Application #4 (None)	
		Type [None]

Note Applications #1 - #4 can be set for either level or density. The above menu table shows the menu options for applications where both level and density have been selected. The user could have four level or four density applications, if required. ▲

System Table

Table 18-5. System

System			
	System Control		
		Configuration	
			Date Format
			RTC
			Internal Scroll Time
			Remote Scroll Time
			Remote Contrast
		Set RTC	
			Day
			Month
			Year
			Hour
			Min
			Sec
	System Status		
		SWIDs	
			CPU SWID
			CPU Compile Date & Time
			CPU CPLD Version
			Boot Loader SWID
			RBP SWID
			RBP Compile Date & Time
			PA SWID
			PA Compile Date & Time
			DD Thermo ID
		CPU Info	
			CPU Temp
			VRef 3v
			VRef 4.096v

System			
	System Status		
		Status	
			Last Start Time
			Sys Err
			Init Err
			Runtime Err
		I/O Info	
			#PSU
			#ISIO Boards
			#Anin
			#Digin
			#Pulsein
			#Anout
			#Relay
			#Detectors
			#Comm Ports
			#USB
			#TCPIP
	Mode/Fault Alarm Setup		
		System	
			Hold Alarm
			RBP Alarm
			SMART Alarm
			SYSFLT Alarm
			Hold Action
			RBP Action
			SMART Action
			SYSFLT Action

System			
	Mode/Fault Alarm Setup		
		Output A	
			AOUT#A MIN Alarm
			AOUT#A MAX Alarm
			AOUT#A LOFLT Alarm
			AOUT#A HIFLT Alarm
			AOUT#A MIN
			AOUT#A MAX
			AOUT#A LOFLT
			AOUT#A HIFLT
		Output B	
			AOUT#B MIN Alarm
			AOUT#B MAX Alarm
			AOUT#B LOFLT Alarm
			AOUT#B HIFLT Alarm
			AOUT#B MIN
			AOUT#B MAX
			AOUT#B LOFLT
			AOUT#B HIFLT
		Output C	
			AOUT#C MIN Alarm
			AOUT#C MAX Alarm
			AOUT#C LOFLT Alarm
			AOUT#C HIFLT Alarm
			AOUT#C MIN
			AOUT#C MAX
			AOUT#C LOFLT
			AOUT#C HIFLT
		Status	
			Sys Fault Status
			Anout Status

System					
	Commands				
		Common Action			
		Hold Output A			
		Hold Output B			
		Hold Output C			
		Alarm Action			
	Physical I/O				
		Current/Vdc Input			
			mA #1 Input		
				Setup	
					Type
					Units
					Timebase
					Mode
					Manual Val
					#Cal Points
					Min mA
					Max mA
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					Input Value
					Raw UnCal Value
					Status
				CAL Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System					
	Physical I/O				
		Current/Vdc Input			
			mA #2 Input		
				Setup	
					Type
					Units
					Timebase
					Mode
					Manual Val
					#Cal Points
					Min mA
					Max mA
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					Input Value
					Raw UnCal Value
					Status
				CAL Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System					
	Physical I/O				
		Current/Vdc Input			
			Vdc #1 Input		
				Setup	
					Type
					Units
					Timebase
					Mode
					Manual Val
					#Cal Points
					Min mA
					Max mA
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					Input Value
					Raw UnCal Value
					Status
				CAL Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System					
	Physical I/O				
		Current/Vdc Input			
			Vdc #2 Input		
				Setup	
					Type
					Units
					Timebase
					Mode
					Manual Val
					#Cal Points
					Min mA
					Max mA
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					Input Value
					Raw UnCal Value
					Status
				CAL Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System						
	Physical I/O					
		Digital Input				
			Digin #1			
				Setup Digin #1		
					Manual/Live	
					Manual Value	
					Invert Input	
					Close Contact Action	
					Open Contact Action	
					Action Destination	
					View	
						Present Value
						Status
			Digin #2			
				Setup Digin #2		
					Manual/Live	
					Manual Value	
					Invert Input	
					Close Contact Action	
					Open Contact Action	
					Action Destination	
					View	
						Present Value
						Status

System					
	Physical I/O				
		Current Output			
			Current Output A		
				Setup	
					App. Src
					Meas
					EU Units
					Mode
					Hold Val
					Alm Action
					Min mA Val
					Max mA Val
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					EU Units
					mA
					Status
				Cal Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System					
	Physical I/O				
		Current Output			
			Current Output B		
				Setup	
					App. Src
					Meas
					EU Units
					Mode
					Hold Val
					Alm Action
					Min mA Val
					Max mA Val
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					EU Units
					mA
					Status
				Cal Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System					
	Physical I/O				
		Current Output			
			Current Output C		
				Setup	
					App. Src
					Meas
					EU Units
					Mode
					Hold Val
					Alm Action
					Min mA Val
					Max mA Val
					Zero Scale
					Full Scale
				Live Data	
					EU Value
					EU Units
					mA
					Status
				Cal Table	
					Min Val
					Mid Val
					Max Val
					Raw Min Val
					Raw Mid Val
					Raw Max Val

System					
	Physical I/O				
		Relay Output			
			Relay A		
				Setup	
					Hold/Live
					Hold Value
					Invert Output
					Pulse Width (30-200mS)
					Process Function
					Application Source
					Alarm Action
					Total Selection
				View	
					Present Value
					Status
			Relay B		
				Setup	
					Hold/Live
					Hold Value
					Invert Output
					Pulse Width (30-200mS)
					Process Function
					Application Source
					Alarm Action
					Total Selection
				View	
					Present Value
					Status

Detector Table

Table 18-6. Detector

Detector			
	Setup		
		Detector Length	
			Detn. Length
			Detn. Len Units
		HV Control	
			DET:Force HV#0
			HV#0 Forced Val
			Last HV Ctl TC
			Last HV0 Ctl
			Last HV0 Step
			LstCPLD WndwCount
			MinCPLD WndwCount
			Lst Board Temp
		Time Constants	
			Density TC
			Flow TC
		Dynamic Tracking	
			Enable
			Time
			Threshold
		X-Ray Threshold	
			Enable
			Min Hold Time
			Max Hold Time
			Safeguard Threshold
	Counts		
		Filtered	

Detector			
	Current Input		
		Setup	
			Type
			Units
			Timebase
			Mode
			Manual Val
			#Cal Points
			Min mA
			Max mA
			Zero Scale
			Full Scale
		Live Data	
			EU Value
			Input Value
			Raw UnCal Value
			Status
		Cal Table	
			Min Val
			Mid Val
			Max Val
			Raw Min Val
			Raw Mid Val
			Raw Max Val
	RTD Input		
		Setup	
			Type
			Units
			Wires
			Mode
			Manual Val
			#Cal Points
			Min
			Max

Detector			
	RTD Input		
		Live Data	
			EU Value
			Input Value
			Raw UnCal Value
			Status
		Cal Table	
			Min Val
			Mid Val
			Max Val
			Raw Min Val
			Raw Mid Val
			Raw Max Val
	Status		
		Voltages	
			DACOut#0
			DACOut#1
			BattVolts
		Other Info	
			PSU
			Preamp
			CPLD Status
			IBP SWID
			IBP Compile Date
			IBP CPLD Vers
		Status	
			Err#1
			Err#2
			SWErr
			System

Detector			
	Diagnosis		
		Counts	
			Base
			Top
			Data
			Center
			Top Stable
			Filtered
		CPLD Counts	
			LstCPLD WndwCount
			MinCPLD WndwCount
		HV Info	
			HV Ctl TC
			HV#0 Mon
			Stable HV#0 Step
			HV#0 Volt
		Temperatures	
			RTD Raw Temp
			IBP Temp
			Stable IBP Temp
			Last Board Temp
			CPU Temp

Application Tables

Level Application

When an application is set for standard level, the menu structure below is used.

Table 18-7. Level Application

Application						
	Application #n [Level]					
		Application #n				
			Level Type			
			Sel. Detector			
			Vapor Density Compensation			
			Det#n Lens Units			
			Det#n Length			
		Level				
			Setup			
				Level Setup		
					Head Type	
					Source Type	
					Level Units	
					Minimum Span	
					Maximum Span	
				Additional Measurement		
					Measurement Type	
						Meas#2 Units
						Meas#2 Min
						Meas#2 Max
						Meas#3 Units
						Meas#3 Min
						Meas#3 Max
						Meas#4 Units
						Meas#4 Min
						Meas#4 Max

Application						
	Application #n [Level]					
		Level				
			Setup			
				Additional Measurement		
					Decimal Places	
						Meas#1 DPs
						Meas#2 DPs
						Meas#3 DPs
						Meas#4 DPs
				General		
					Counts	
						Hold Mode
						Hold Value
						Bckgrnd Counts
						DET: Undrng Lim
						DET: Ovrrng Lim
						Tot Raw Count
						Tot Flt Count
					Det#n Source	
						Source Type
						Src SerNo
						Src TagNo
						Src Assay Date
						Activity
						Half Life
				App2 Det General [1]		
					Counts	
						Hold Mode
						Hold Value
						Bckgrnd Counts
						Det. Undrng Lim
						Det. Ovrrng Lim

Application						
	Application #n [Level]					
		Level				
			Setup			
				App2 Det General [1]		
					Det2 Source	
						Source Type
						Src SerNo
						Src TagNo
						Src Assay Date
						Activity
						Half Life
				App3 Det General [1]		
					Counts	
						Hold Mode
						Hold Value
						Bckgrnd Counts
						Det. Undrng Lim
						Det. Ovrrng Lim
					Det3 Source	
						Source Type
						Src SerNo
						Src TagNo
						Src Assay Date
						Activity
						Half Life

[1] Additional menu item displayed when cascaded level is selected.

Note Should Vapor Density Correction be required, Detector 4 information will also be displayed in the Setup menu. ▲

Application						
	Application #n [Level]					
		Level				
			Setup			
				General		
					Det#n Source	
						Source Type
						Src SerNo
						Src TagNo
						Src Assay Date
						Activity
						Half Life
			Standardize			
				STD Setup		
					Standardization On	
					Level Value	
					STD Cycle Time	
					STD/CAL Run Info	
				STD Run Info		
					STD Time Remaining	
					STD Value	
					Prev STD Date & Time	
					Prev STD Count	
			Gauge Calibration			
				CAL Data		
					CAL Setup	
						CAL Method
						CAL Cycle Time
						CAL Table Size
						CAL Level
						CAL Point
						STD/CAL Run Info

Application						
	Application #n [Level]					
		Level				
			Gauge Calibration			
				CAL Data		
					CAL Info	
						CAL Time Remaining
						Avg. Count
						CAL/REF
						CAL Temperature
				Point Data		
					Counts	
					Point 10	
					Point 9	
					Point 8	
					Point 7	
					Point 6	
					Point 5	
					Point 4	
					Point 3	
					Point 2	
					Point 1	
				Ratio Data		
					CAL/STD Ratio	
					Point 10	
					Point 9	
					Point 8	
					Point 7	
					Point 6	
					Point 5	
					Point 4	
					Point 3	
					Point 2	
					Point 1	

Application						
	Application #n [Level]					
		Level				
			Action			
				Action		
					Measurement #1	
						Meas#1 Action
						Meas#1 Hold Value
						Meas#1 Value
					Measurement #2	
						Meas#2 Action
						Meas#2 Hold Value
						Meas#2 Value
					Measurement #3	
						Meas#3 Action
						Meas#3 Hold Value
						Meas#3 Value
					Measurement #4	
						Meas#4 Action
						Meas#4 Hold Value
						Meas#4 Value
			Process Alarms			
				Alarm #1-#2		
					APP1: ProcAlarm#1	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point

Application						
	Application #n [Level]					
		Level				
			Process Alarms			
				Alarm #1-#2		
					APP1: ProcAlarm#2	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point
				Alarm #3-#4		
				Alarm #5-#6		
				Alarm #7-#8		
				Alarm #9-#10		
				Alarm #11-#12		
				Alarm #13-#14		
				Alarm #15-#16		
					APP1: ProcAlarm#15	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point
					APP1: ProcAlarm#16	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point

Application					
	Application #n [Level]				
		Level			
			Mode/Fault Alm Setup		
				Mode/Fault Alm Setup	
					STD Mode Active Alm
					CAL Mode Active Alm
					X-ray Mode Engaged Alm
					IBP Comm Failed Alm
					Totalize Overrun Alm
					CAL Aborted Alm
					Detector Over Range Alm
					Detector Under Range Alm
					STD Action
					CAL Action
					X-ray Action
					IBP Action
					Totalize Overrun Action
					CAL Aborted Action
					Detector Over Range Action
					Detector Under Range Action
			Application Status		
				ProcAlarm Status	
				Mode/Flt Status	
		Measurements			
			Meas #1 Value		
			Meas #2 Value		
			Meas #3 Value		
			Meas #4 Value		

Density Application

Table 18-8. Density Application

Application						
	Application #n [Density]					
		Application #n				
			Density Type			
			Oilfield Units			
		Density				
			Setup			
				Setup		
					General	
						Material Type
						Head Type
						Source Type
					Meas#1 Setup	
						Meas#1 Type
						Meas#1 Density Units
						Meas#1 DPs
					Pipe Info	
						Pipe Size Units
						Pipe ID
					Material Setup (Slurry)	
						Carrier Density
						Carrier Atten
						Solid Density
						Solid Atten
					Material Setup (Solution)	
						Solvent Density
						Solvent Atten
						Solute Density
						Solute Atten
					Material Setup (Single Phase)	
						Solid Density
						Solid Atten

Application						
	Application #n [Density]					
		Density				
			Setup			
				Setup		
					Material Setup (Emulsion)	
						Fluid#1 Density
						Fluid#1 Atten
						Fluid#2 Density
						Fluid#2 Atten
					Solution Polynomial (Solution Only)	
						Preset Poly Type
						CoefA
						CoefB
						CoefC
						CoefD
				Input Configuration		
					Density	
						Dens Input Src
						Dens Units
					Temperature	
						Temp Input Src
						Temp Units
					Pressure	
						Press Input Src
						Press Units
					Bulk Solids	
						Bulk Solids Flow Units
						Bulk Density Value

Application						
	Application #n [Density]					
		Density				
			Setup			
				Input Configuration		
					Flow	
						Flow Input Src
						Volume Units
						Vol Flow Timebase
						Mass Units
						Mass Flow Timebase
						Velocity Units
				Temp Compensation		
					Setup	
						Temp Input Source
						Manual Temp
						Temp Offset Corr
						Ref Temp
						Use T/C On Std
					Poly Equation 1	
						T/C Poly Eqn1
						CoeffA
						CoeffB
						CoeffC
						CoeffD
					Poly Equation 2	
						T/C Poly Eqn2
						CoeffA
						CoeffB
						CoeffC
						CoeffD

Application						
	Application #n [Density]					
		Density				
			Setup			
				Additional Measurement		
					Measurement Type	
						Material Type
						Meas#2 Type
						Meas#2 Units
						Meas#3 Type
						Meas#3 Units
						Meas#4 Type
						Meas#4 Units
					Decimal Places	
						Meas#1 DPs
						Meas#2 DPs
						Meas#3 DPs
						Meas#4 DPs
				General		
					Counts	
						Hold Mode
						Hold Value
						Bckgrnd Counts
						DET Undrng Lim
						DET Ovrrng Lim
						Tot Raw Count
						Tot Flt Count
					Det#n Source	
						Source Type
						Src SerNo
						Src TagNo
						Src Assay Date
						Activity
						Half Life

Application						
	Application #n [Density]					
		Density				
			Standardize			
				STD Setup		
					Standardization On	
					Density Value	
					STD Cycle Time	
					STD/CAL Run Info	
				STD Run Info		
					STD Time Remaining	
					STD Value	
					Prev STD Date & Time	
					Prev STD Count	
			Gauge Calibration			
				CAL Data		
					CAL Setup	
						CAL Method
						CAL Cycle Time
						CAL Density
						CAL Point
						STD/CAL Run Info
					CAL Info	
						CAL Time Remaining
						Avg. Count
						CAL/REF
						CAL Temperature

Application						
	Application #n [Density]					
		Density				
			Gauge Calibration			
				Point Data		
					CAL Density #1	
					CAL/REF #1	
					Count Rate #1	
					Slope Correction Factor	
					Prev STD Date & Time	
					Prev STD Count	
					CAL Density #2	
					CAL/REF #2	
					Count Rate #2	
			Totals			
				Totals		
					Totalizer #1	
						Enable
						Input
						Units
						Threshold
						Units/Pulse
						Totalizer Value
					Totalizer #2	
						Enable
						Input
						Units
						Threshold
						Units/Pulse
						Totalizer Value

Application						
	Application #n [Density]					
		Density				
			Totals			
				Totals		
					Totalizer #3	
						Enable
						Input
						Units
						Threshold
						Units/Pulse
						Totalizer Value
					Totalizer #4	
						Enable
						Input
						Units
						Threshold
						Units/Pulse
						Totalizer Value
					All Totalizers	
						Selection
			Action			
				Action		
					Measurement #1	
						Meas#1 Action
						Meas#1 Hold Value
						Meas#1 Value
					Measurement #2	
						Meas#2 Action
						Meas#2 Hold Value
						Meas#2 Value

Application						
	Application #n [Density]					
		Density				
			Action			
				Action		
					Measurement #3	
						Meas#3 Action
						Meas#3 Hold Value
						Meas#3 Value
					Measurement #4	
						Meas#4 Action
						Meas#4 Hold Value
						Meas#4 Value
			Process Alarms			
				Alarm #1-#2		
					APP1: ProcAlarm#1	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point
					APP1: ProcAlarm#2	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point
				Alarm #3-#4		
				Alarm #5-#6		
				Alarm #7-#8		
				Alarm #9-#10		

Application						
	Application #n [Density]					
		Density				
			Process Alarms			
				Alarm #11-#12		
				Alarm #13-#14		
				Alarm #15-#16		
					APP1: ProcAlarm#15	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point
					APP1: ProcAlarm#16	
						Enable
						Action
						Set Point
						Measurement ID
						Action Delay
						Clr Point

Application					
	Application #n [Density]				
		Density			
			Mode/Fault Alm Setup		
				Mode/Fault Alm Setup	
					STD Mode Active Alm
					CAL Mode Active Alm
					X-ray Mode Engaged Alm
					IBP Comm Failed Alm
					Totalize Overrun Alm
					CAL Aborted Alm
					Detector Over Range Alm
					Detector Under Range Alm
					STD Action
					CAL Action
					X-ray Action
					IBP Action
					Totalize Overrun Action
					CAL Aborted Action
					Detector Over Range Action
					Detector Under Range Action
			Application Status		
				ProcAlarm Status	
				Mode/Flt Status	
		Measurements			
			Meas #1 Value		
			Meas #2 Value		
			Meas #3 Value		
			Meas #4 Value		

Output Table

Table 18-9. Output

Output			
	Analog Input n (AIn)		
		Channel Setup (AIn)	
			Static Revision No.
			Channel
			Filter Time Constant
			Characterization Type
		Process Scale Variable (AIn)	
			PV Scale EU_at_0%
			PV Scale EU_at_100%
		Output Scale (AIn)	
			Out Scale EU_at_0%
			Out Scale EU_at_100%
			Out Scale Unit
			Out Unit Text
		Output Limits (AIn)	
			Limit Hysteresis
			Lower Limit Alarm
			Lower Limit Warning
			Upper Limit Warning
			Upper Limit Alarm
		Simulation (AIn)	
			Simulation
			Simulation Value
			Simulation Quality

MS2011 Maintenance Table Items

Table 18-10. Maintenance Table

MS2011 Maintenance Table	
	Device Info
	Physical Block

Device Info Table

Table 18-11. Device Info

Device Info	
	Manufacturer
	Product Designation
	Profile
	Profile Revision
	Device Serial Number

Physical Block Table

Table 18-12. Physical Block

Physical Block	
	TAG
	Descriptor
	Message
	Installation Date

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