

# SECTION C

## ANALOG INPUTS

Revision Date: 12-30-22

### DESCRIPTION OF OPERATION

#### Introduction

Analog Inputs AIX1, AIX2 & A1 - A8 are provided to allow for the connection of 4-20mA Analog Input signals to the Analog Meters on the Controller, or to provide the Analog Input data to SCADA or to do both.

The Analog Inputs are Isolated and Transient Protected. They have a 100Ω input load resistor and use a 12-bit Analog to Digital Converter to measure the input signal.

The Analog Inputs are factory calibrated to have the following Analog Input Status values:

819 @ 4.0mA      4095 @ 20mA

For Terminal Block numbers see page C-6.

#### Functions

The Analog Inputs may be assigned the Function of collecting Analog Input data and sending it to one of the many Analog Meters on the Controller, or only to make the data available to be read by SCADA.

See the "ANALOG INPUT FUNCTIONS" below for a description of each of the Functions. Also see Parameters F.299 - F.308 on page C-3.

#### Status

The Analog Input Status values may be read from Parameters A.299 - A.308. See page C-3.

#### Calibration

The Analog Inputs may be re-calibrated in the field using Parameters C.301 - C.320. See pages C-4 & 5.

### ANALOG INPUT FUNCTIONS

#### Collect Analog Data for SCADA - Function 0

Analog Inputs that are assigned the Function of "Collect Analog Data for SCADA" (Function 0), only collect data for SCADA and do not perform any other Function in the Controller.

#### Analog Level Meter ALM1 - Function 1

An Analog Input assigned the Function of "Analog Level Meter ALM1" (Function 1) collects analog data and sends it to the "Analog Level Meter ALM1" for display or for use by the Controller to perform Level Control.

See Section M.

#### Analog Level Meter ALM2 - Function 2

An Analog Input assigned the Function of "Analog Level Meter ALM2" (Function 2) collects analog data and sends it to the "Analog Level Meter ALM2" for display or for use by the Controller to perform Level Control.

See Section M.

#### Analog Flow Meter AFM1 - Function 3

An Analog Input assigned the Function of "Analog Flow Meter AFM1" (Function 3) collects analog data and sends it to the "Analog Flow Meter AFM1" for display or for use by the Controller to perform Flow Control.

See Section K.

## **ANALOG INPUT FUNCTIONS**

### **Analog Flow Meter AFM2 - Function 4**

An Analog Input assigned the Function of “Analog Flow Meter AFM2” (Function 4) collects analog data and sends it to the “Analog Flow Meter AFM2” for display or for use by the Controller to perform Flow Control.

See Section K.

### **Analog Flow Meter AFM3 - Function 5**

An Analog Input assigned the Function of “Analog Flow Meter AFM3” (Function 5) collects analog data and sends it to the “Analog Flow Meter AFM3” for display or for use by the Controller to perform Flow Control.

See Section K.

### **Analog Pressure Meter APM1 - Function 6**

An Analog Input assigned the Function of “Analog Pressure Meter APM1” (Function 6) collects analog data and sends it to the “Analog Pressure Meter APM1” for display or for use by the Controller to perform Pressure Control or Booster Control.

See Section N.

### **Analog Pressure Meter APM2 - Function 7**

An Analog Input assigned the Function of “Analog Pressure Meter APM2” (Function 7) collects analog data and sends it to the “Analog Pressure Meter APM2” for display or for use by the Controller to perform Pressure Control or Booster Control.

See Section N.

### **Analog Current Meter (Phase A) ACMA - Function 8**

An Analog Input assigned the Function of “Analog Current Meter (Phase A) ACMA” (Function 8) collects analog data and sends it to the “Analog Current Meter (Phase A) ACMA” for display.

See Section O.

### **Analog Current Meter (Phase B) ACMB - Function 9**

An Analog Input assigned the Function of “Analog Current Meter (Phase B) ACMB” (Function 9) collects analog data and sends it to the “Analog Current Meter (Phase B) ACMB” for display.

See Section O.

### **Analog Current Meter (Phase C) ACMC - Function 10**

An Analog Input assigned the Function of “Analog Current Meter (Phase C) ACMC” (Function 10) collects analog data and sends it to the “Analog Current Meter (Phase C) ACMC” for display.

See Section O.

## ANALOG INPUT SETUP & STATUS

User / Operator Info.			SCADA		
Parameter	Default Value	Current Value	Register Address	<b>Description of Parameters and SCADA Notes</b>	
<b>Analog Input Setup</b>					
<b>Setup</b>				<b>Analog Input</b>	
<b>F.299</b>	1		40669	Analog Input - AIX1	<p><b>Function of Input:</b></p> <ul style="list-style-type: none"> <li>0 = Collect Analog Data for SCADA</li> <li>1 = Analog Level Meter ALM1</li> <li>2 = Analog Level Meter ALM2</li> <li>3 = Analog Flow Meter AFM1</li> <li>4 = Analog Flow Meter AFM2</li> <li>5 = Analog Flow Meter AFM3</li> <li>6 = Analog Pressure Meter APM1</li> <li>7 = Analog Pressure Meter APM2</li> <li>8 = Analog Current Meter (Phase A) ACMA</li> <li>9 = Analog Current Meter (Phase B) ACMB</li> <li>10 = Analog Current Meter (Phase C) ACMC</li> </ul> <p>Notes:</p> <ol style="list-style-type: none"> <li>1. Any Analog Input may be set for Function "0" when the input is used only to collect data for SCADA and no other Function is desired.</li> <li>2. In addition to collecting data for SCAD, Functions 1 - 10 also send the analog data to one of the Analog Meters on the Controller.</li> </ol>
<b>F.300</b>	2		40670	Analog Input - AIX2	
<b>F.301</b>	0		40671	Analog Input - A1	
<b>F.302</b>	0		40672	Analog Input - A2	
<b>F.303</b>	0		40673	Analog Input - A3	
<b>F.304</b>	0		40674	Analog Input - A4	
<b>F.305</b>	0		40675	Analog Input - A5	
<b>F.306</b>	0		40676	Analog Input - A6	
<b>F.307</b>	0		40677	Analog Input - A7	
<b>F.308</b>	0		40678	Analog Input - A8	
<b>Analog Input Status</b>					
<b>Status</b>				<b>Analog Input</b>	
<b>A.299</b>	-	-	41849	Analog Input - AIX1	<p>Note:</p> <p>Parameters A.299 - A.308 are 12-bit Analog to Digital Converter input values that are conditioned and factory calibrated to the following values:</p> <p style="padding-left: 40px;">819 @ 4.0mA    4095 @ 20mA</p>
<b>A.300</b>	-	-	41850	Analog Input - AIX2	
<b>A.301</b>	-	-	41851	Analog Input - A1	
<b>A.302</b>	-	-	41852	Analog Input - A2	
<b>A.303</b>	-	-	41853	Analog Input - A3	
<b>A.304</b>	-	-	41854	Analog Input - A4	
<b>A.305</b>	-	-	41855	Analog Input - A5	
<b>A.306</b>	-	-	41856	Analog Input - A6	
<b>A.307</b>	-	-	41857	Analog Input - A7	
<b>A.308</b>	-	-	41858	Analog Input - A8	

## ANALOG INPUT CALIBRATION

User / Operator Info.	SCADA	Description of Register Contents		
Parameter	Register Address			
<b>Analog Input Calibration</b>				
<b>C.301</b>	<b>40031</b>	Analog Input (AIX1)	Zero Calibration	Also see the Analog Input - AIX1 Status Parameter A.299.
<b>C.302</b>	<b>40032</b>		Span Calibration	
<b>C.303</b>	<b>40033</b>	Analog Input (AIX2)	Zero Calibration	Also see the Analog Input - AIX2 Status Parameter A.300.
<b>C.304</b>	<b>40034</b>		Span Calibration	
<b>C.305</b>	<b>40035</b>	Analog Input (A1)	Zero Calibration	Also see the Analog Input - A1 Status Parameter A.301.
<b>C.306</b>	<b>40036</b>		Span Calibration	
<b>C.307</b>	<b>40037</b>	Analog Input (A2)	Zero Calibration	Also see the Analog Input - A2 Status Parameter A.302.
<b>C.308</b>	<b>40038</b>		Span Calibration	
<b>C.309</b>	<b>40039</b>	Analog Input (A3)	Zero Calibration	Also see the Analog Input - A3 Status Parameter A.303.
<b>C.310</b>	<b>40040</b>		Span Calibration	
<b>C.311</b>	<b>40041</b>	Analog Input (A4)	Zero Calibration	Also see the Analog Input - A4 Status Parameter A.304.
<b>C.312</b>	<b>40042</b>		Span Calibration	
<b>C.313</b>	<b>40043</b>	Analog Input (A5)	Zero Calibration	Also see the Analog Input - A5 Status Parameter A.305.
<b>C.314</b>	<b>40044</b>		Span Calibration	
<b>C.315</b>	<b>40045</b>	Analog Input (A6)	Zero Calibration	Also see the Analog Input - A6 Status Parameter A.306.
<b>C.316</b>	<b>40046</b>		Span Calibration	
<b>C.317</b>	<b>40047</b>	Analog Input (A7)	Zero Calibration	Also see the Analog Input - A7 Status Parameter A.307.
<b>C.318</b>	<b>40048</b>		Span Calibration	
<b>C.319</b>	<b>40049</b>	Analog Input (A8)	Zero Calibration	Also see the Analog Input - A8 Status Parameter A.308.
<b>C.320</b>	<b>40050</b>		Span Calibration	

See page C-5 for Calibration Procedures.

# ANALOG INPUT CALIBRATION PROCEDURE

## Zero Calibration

1. First apply 4.0 mA to the respective Analog Input.
2. Then while monitoring the respective Analog Input's Status Parameter make it read 819.

### Using the SC5000-CTS-HMI

When using the SC5000-CTS-HMI, while on the HMI screen for calibration of the input, while monitoring the respective Analog Input's Status Parameter (A.299 - A.308), increase or decrease the Zero Calibration Parameter (C.301, C.303, C.305, C.307, C.309, C.311, C.313, C.315, C.317 or C.319) using the "+" or "-" buttons, until the Analog Input's Status Parameter reads 819.

See example HMI screen on page C-8.

### Using the SC5000-LED-HMI

When using the SC5000-LED-HMI, while displaying (in the menu) the Zero Calibration Parameter (C.301, C.303, C.305, C.307, C.309, C.311, C.313, C.315, C.317 or C.319) press the Up or Down push-buttons, until it reads 819.

Note: While viewing the Zero Calibration Parameter, the Analog Input's Status Parameter (A.299 - A.308) is actually being viewed.

See page X-24.

## Span Calibration

1. First apply 20 mA to the respective Analog Input.
2. Then while monitoring the respective Analog Input's Status Parameter make it read 4095.

### Using the SC5000-CTS-HMI

When using the SC5000-CTS-HMI, while on the HMI screen for calibration of the input, while monitoring the respective Analog Input's Status Parameter (A.299 - A.308), increase or decrease the Span Calibration Parameter (C.302, C.304, C.306, C.308, C.310, C.312, C.314, C.316, C.318 or C.320) using the "+" or "-" buttons, until the Analog Input's Status Parameter reads 4095.

See example HMI screen on page C-8.

### Using the SC5000-LED-HMI

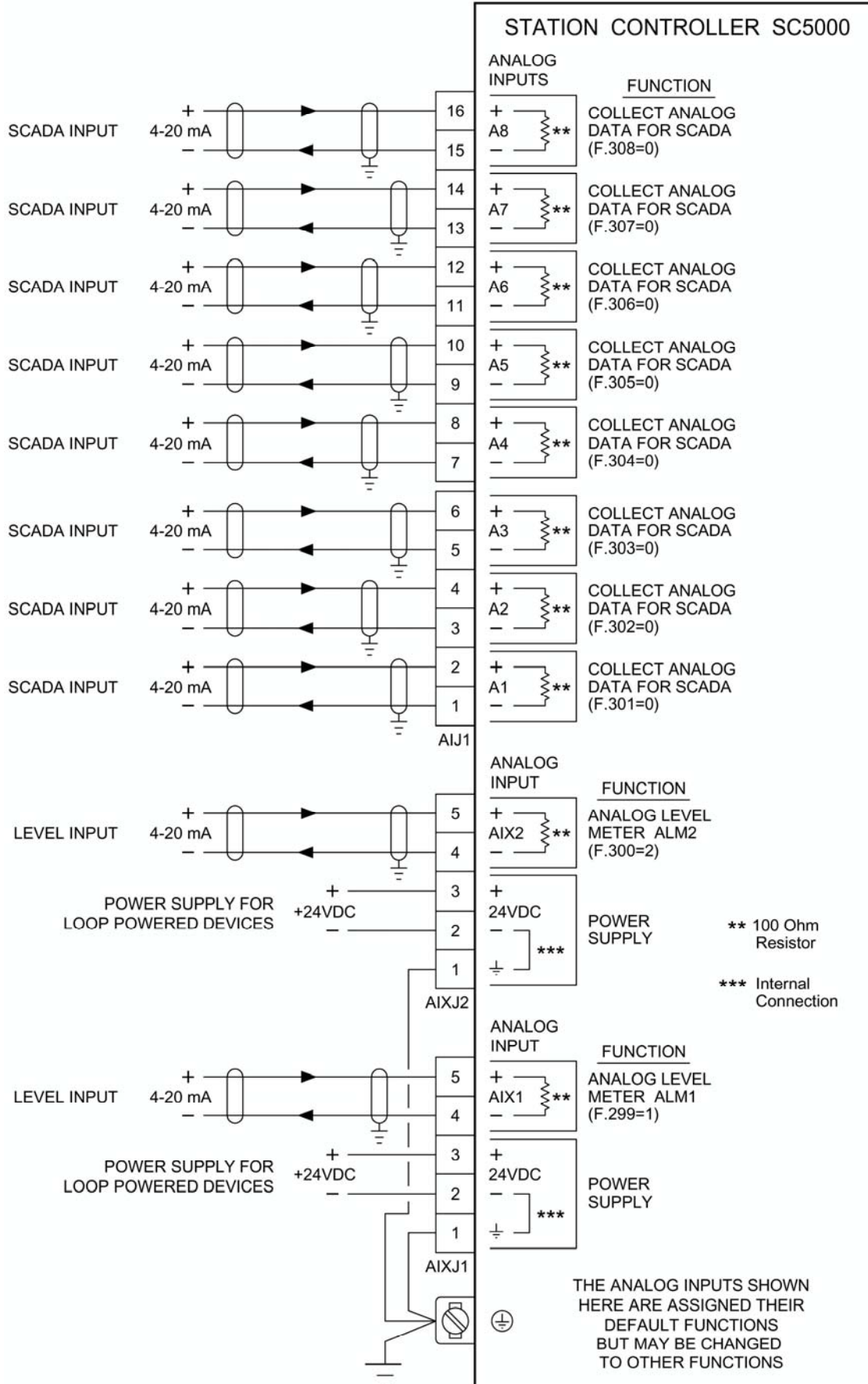
When using the SC5000-LED-HMI, while displaying (in the menu) the Span Calibration Parameter (C.302, C.304, C.306, C.308, C.310, C.312, C.314, C.316, C.318 or C.320) press the Up or Down push-buttons, until it reads 4095.

Note: While viewing the Span Calibration Parameter, the Analog Input's Status Parameter (A.299 - A.308) is actually being viewed.

See page X-24.

# ANALOG INPUTS

## Connection Diagram



## ANALOG INPUT SETUP & STATUS

[Previous Screen](#)

ANALOG INPUT	SETUP	STATUS	CALIBRATION	
AIX1 - F.299 -	12	12345	Next Screen	<p>MAIN CONTROL BOARD</p> <div style="background-color: #8e94b8; color: white; padding: 5px; display: inline-block; margin-bottom: 5px;">12345</div> Operating Program Revision Number Parameter: d.101
AIX2 - F.300 - Parameters:	12	12345	Next Screen	
		Parameters: A.299 - A.300		

Analog Inputs are Calibrated for: 819 @ 4.00mA    4095 @ 20mA

[Next Screen](#)

[Previous Screen](#)

ANALOG INPUT	SETUP	STATUS	CALIBRATION	
A1 - F.301 -	12	1234	Next Screen	<p>ANALOG INPUT BOARD</p> <div style="background-color: #8e94b8; color: white; padding: 5px; display: inline-block; margin-bottom: 5px;">12345</div> Operating Program Revision Number Parameter: d.104  <div style="background-color: #ff9999; color: white; padding: 5px; display: inline-block; margin-bottom: 5px;">12345</div> Polling Counter Parameter: d.105  Analog Inputs are Calibrated for: 819 @ 4.00mA    4095 @ 20mA
A2 - F.302 -	12	1234	Next Screen	
A3 - F.303 -	12	1234	Next Screen	
A4 - F.304 -	12	1234	Next Screen	
A5 - F.305 -	12	1234	Next Screen	
A6 - F.306 -	12	1234	Next Screen	
A7 - F.307 -	12	1234	Next Screen	
A8 - F.308 - Parameters:	12	1234	Next Screen	
		Parameters: A.301 - A.308		

## ANALOG INPUT SETUP & STATUS

# ANALOG INPUTS - Touchscreen HMI SCREENS

## Analog Input Calibration - Typical of Analog Inputs A1X1 - A1X2 and A1 - A8

ANALOG INPUT CALIBRATION - AIX1

Previous Screen

ZERO - CAL.

SPAN - CAL.

ANALOG INPUT AIX1

12345

Parameter: A.299

+	+	+	+	+
1	2	3	4	5
-	-	-	-	-

Parameter: C.301

+	+	+	+	+
1	2	3	4	5
-	-	-	-	-

Parameter: C.302

A.299 - Must be Calibrated to:

819 @ 4.0mA    4095 @ 20mA