SECTION M
ANALOG LEVEL METER ALM1

Description

The Analog Level Meter ALM1 takes the value of Analog Input AIX1, in its unscaled form, and scales it into feet using the Level Input Span (Parameter P.24) and makes it available for Pump Control, Level Alarms and for SCADA.

The value of the Analog Level Meter ALM1, is always available to SCADA as Parameter ALd.1 at Modbus Register 42141, even if it is not selected on the Level Input Select (Parameter P.22).

When the Analog Level Meter ALM1 is selected as the Level Input (Parameter P.22 = 1), the level from the Analog Level Meter will be shown on the Numerical Display on the front of the Controller and it will be used for all Pump Control and Level Alarms. The value of Parameter ALd.1 will also be copied into Parameter Ld.11 and made available to SCADA at Modbus Register 40011.

Both Parameters ALd.1 and Ld.11 show the simulated value for level while Level Simulation is being performed.

Also, the analog value of Input AIX1, in its unscaled form, may be viewed in the Menu as Parameter A.100 and is available to SCADA at Modbus Register 40061.

The **Level Input Span** (Parameter P.24) must be set to the calibrated span of the device (Pressure Transducer) providing the Level Input. This is the liquid level in feet that corresponds to a 20mA output from the Level Input device.

The **Level Input Zero** (Parameter P.25) is set at the factory so that with a 4.0mA Level Input the Level Meter displays 0.0 feet, with no negative sign. However, since Pressure Transducers and other Level Input devices are often not perfectly zeroed, the UP and Down pushbuttons allow an operator to make minor adjustments in the field to zero the Level Meter display. Before attempting to adjust the Level Input Zero, first pull the Submersible Pressure Transducer out of the liquid, or apply a 4.0mA signal to the Level Input, and then set the Zero. When properly zeroed the Level Meter display should read 0.0 feet, with no negative sign.

The Signal Conditioning Control Parameter (Parameter P.26) determines the speed at which the value displayed on Level Meter ALM1 may change in response to a change in the Analog Level Input signal. This is used to filter out sudden changes in the Analog Level Input signal.

Parameter	Default Value	Current Value	Register Address	Description of Parameters and SCADA Notes
User / Operator Info.			**SCADA**	
Analog Level Meter ALM1 - Setup Parameters				
P.24	23.10 feet		40124	Analog Level Meter ALM1 - Level Input Span Range: 1.00 - 231.00 feet Note: Parameter P.24 must be set to the calibrated span of the device providing the Level.
P.25	-		40125	Analog Level Meter ALM1 - Level Input Zero Note: The UP and Down pushbuttons allow an operator to make minor adjustments in the field to Parameter P.25 while observing the Level shown on Parameter P.25.
P.26	240		40126	Analog Level Meter ALM1 - Signal Conditioning Control Range: 1 - 254 100 = Slow 240 = Normal 250 = Fast Note: This parameter controls the signal conditioning of Analog Level Meter ALM1
Analog Level Meter ALM1 - Data				
ALd.1	-	-	42141	Analog Level Meter ALM1 - Scaled into feet. Note: For Parameter ALd.1 to read correctly Parameter P.24 must be set to the calibrated span of the device providing the Level Input.
Ld.11	-	-	40011	Wet Well Level - Scaled into feet. Note: With the Level Input Select (Parameter P.22) set on "1", Parameter Ld.11 will be a copy of Parameter ALd.1 from the Analog Level Meter ALM1.

LEVEL INPUT (4-20mA Input - AIX1) – CALIBRATION PROCEDURE

LEVEL INPUT SPAN - Parameter   P.24

Parameter P.24 is used to enter the Transducer's Calibrated Span in feet.

Calibration Procedure:

1. A 20mA signal **does not** need to be applied to the Level Input while Setting the Span.

2. Scroll in the menu to Parameter P.24 and press push-button PB-M to view the Parameter's current value.

3. Press and hold down the "UP" or "DOWN" push-buttons as needed to make the display read the Transducer's Calibrated Span.

LEVEL INPUT ZERO - Parameter   P.25

Parameter P.25 is used to make small changes to the Level Display Calibration to make the display read zero.

Calibration Procedure:

1. Apply a 4.0mA signal to the Analog Level Input.

    (Alternate Procedure - Raise the pressure transducer up out of the liquid.)

2. Scroll in the menu to Parameter P.25 and press push-button PB-M to view the Level.

3. Press and hold down the "UP" or "DOWN" push-buttons as need to make the display read zero with no negative sign.   Note: It is slow to change at first.

Note:

Do not attempt to change the Zero calibration using parameter P.25 without first applying a 4 mA signal to the Analog Level Input, or having a functioning Pressure Transducer (raised above the surface of the liquid) connected to the Level Input.

LEVEL INPUT SPAN in Feet Of Water   Versus   TRANSDUCER CALIBRATION in PSI

|	Transducer Calibration						
	5.0psi @ 20mA	10psi @ 20mA	15psi @ 20mA	30psi @ 20mA	60psi @ 20mA	100psi @ 20mA	
Level Input Span	-	-	-	-	139 feet	231 feet	**P.29 = 0**
	11.5 feet	23.1 feet	34.6 feet	69.3 feet	139.0 feet	231.0 feet	**P.29 = 1**
	11.50 feet	23.10 feet	-	-	-	-	**P.29 = 2**

Notes:
1. Parameter P.29 is used to set the decimal point position.
2. To find the Span Setting for other transducers use the following equation:

$$Pressure\ (psi) \ \times \ 2.309 \ = \ Level\ (feet\ of\ water)$$
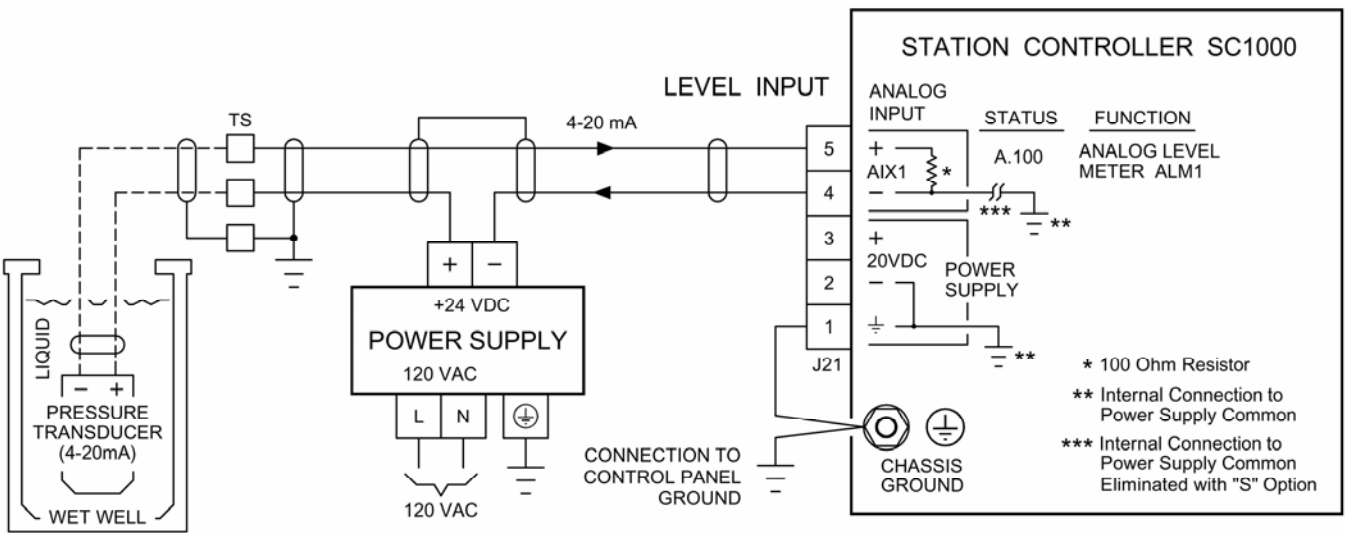
ANALOG LEVEL INPUT EXAMPLES

Example Using the 20 VDC Power Supply on the SC1000
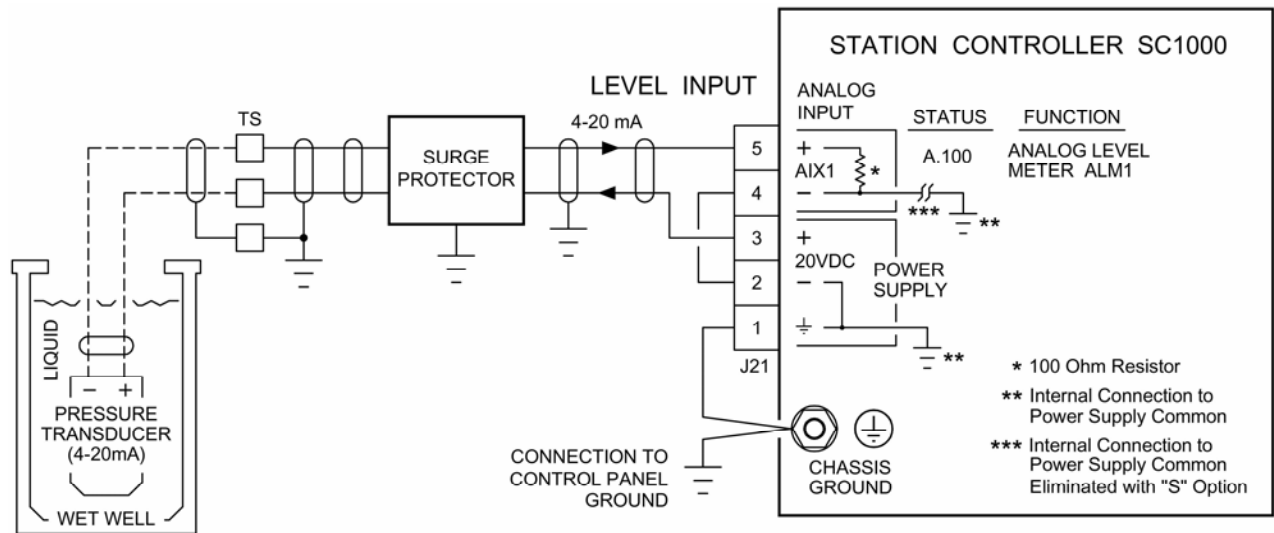
Analog Input AIX1 in this example does not need to be Isolated, so the Controller does not need the "S" Option.
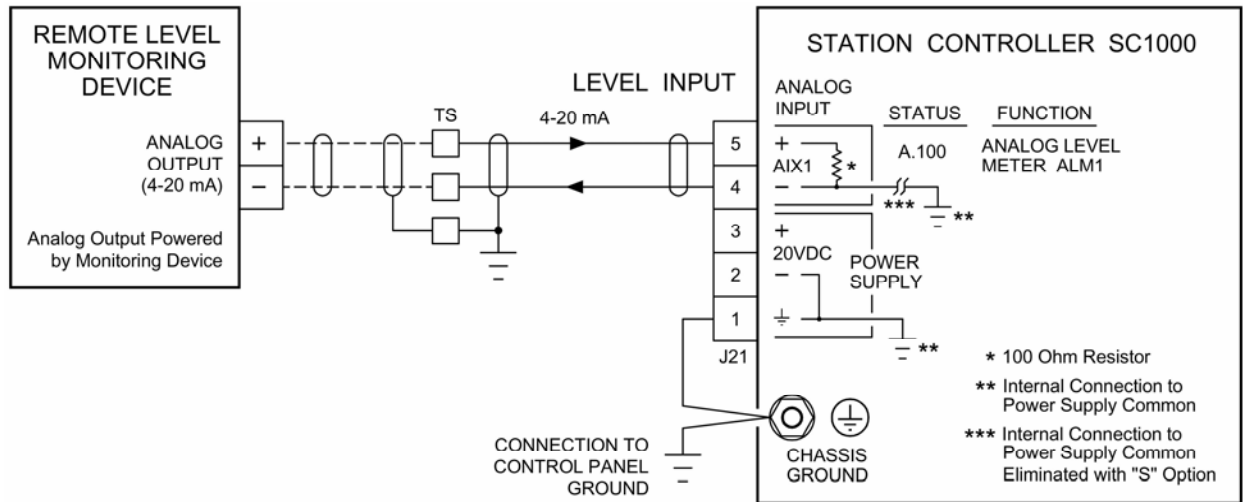
Example Using an External 24 VDC Power Supply

Analog Input AIX1 in this example does not need to be Isolated, so the Controller does not need the "S" Option.

ANALOG LEVEL INPUT EXAMPLES

Example of where the Analog Signal is Powered by a Remote Device

The 4-20 mA signal in this example **must be Isolated from ground**. This is required to ensure that the Remote Device's Control Panel ground is not connected to the Local Control Panel's ground through the 4-20 mA signal wiring. When this is the case it greatly affects the signal's integrity.

The **Controller should be ordered with the "S" Option**, unless it is known that the Analog Output from the Remote Device is Isolated from ground. The Level Input signal must be Isolated from ground at one end or the other or at both ends.

Example using an Intrinsically Safe Barrier
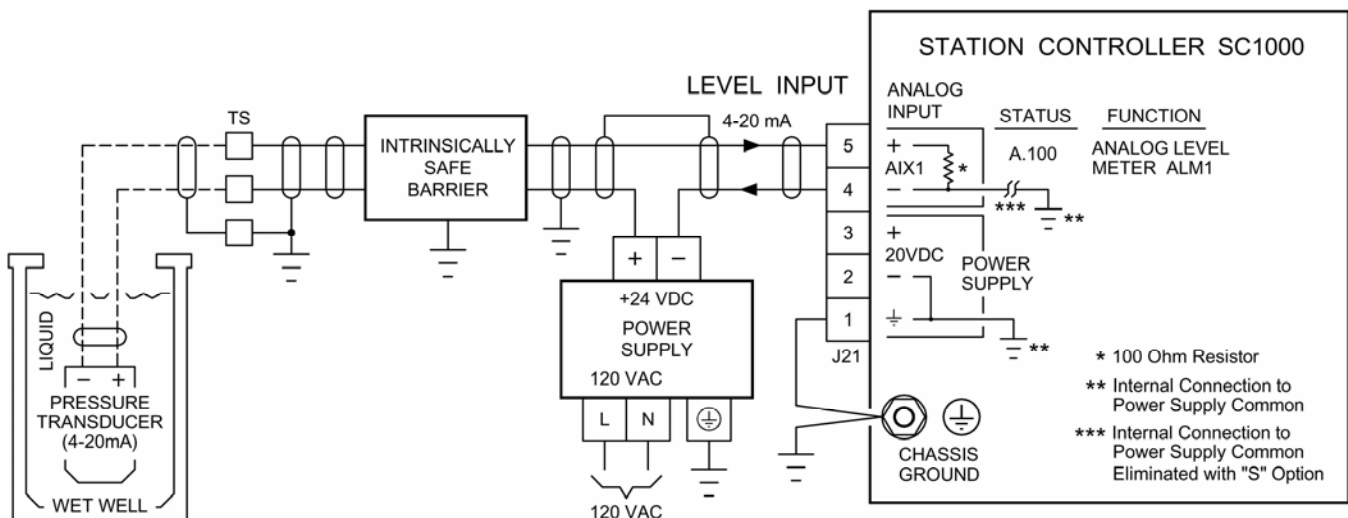
An external +24 VDC Power Supply is required when using an Intrinsically Safe Barrier.

Some Intrinsically Safe Barriers (due to how they are made internally and how they are connected in the circuit) can loose part of the analog signal to ground through their internal circuits. When this is the case it greatly affects the analog signal's integrity. In some cases having the "S" Option (where AIX1 is Isolated from the Controller's ground) may correct the problem.

For properly selected Intrinsically Safe Barriers that are connected correctly it is not necessary for the Analog Input AIX1 to be Isolated, so the Controller does not need the "S" Option.