

Thickness Function Block

8/1/2019

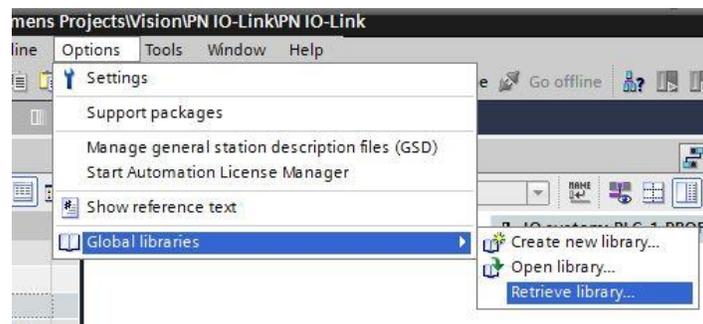
This document covers the installation and use of a function block for Siemens's TIA Portal software package. The function block uses readings from two sensors to determine the thickness of an object. Each sensor could be an IO-Link version with Process Data In measurement value or an analog version with counter, voltage, or current value.

Components

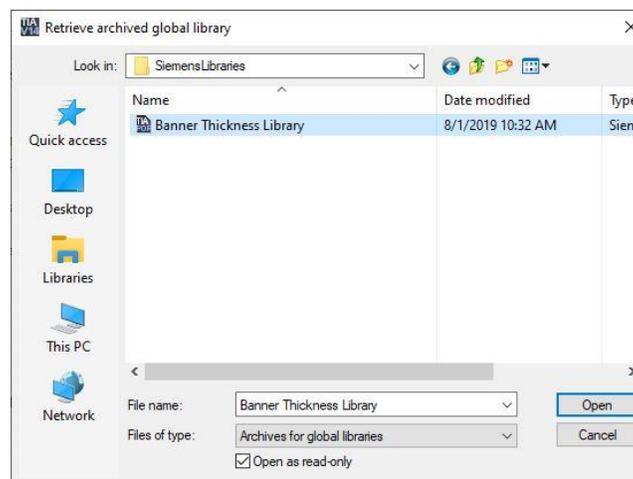
Banner Thickness Library.zal14

Installation Instructions

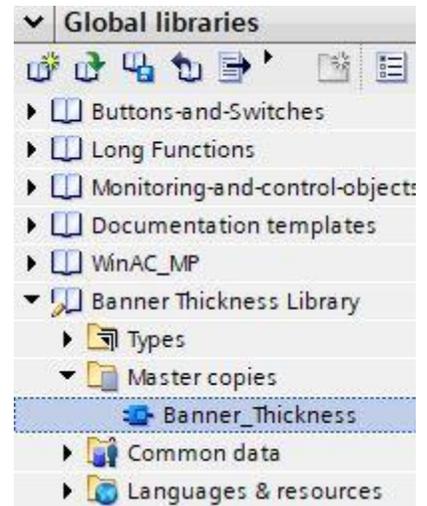
1. Open a project.
2. Go to Options > Global Libraries > Retrieve Library.



3. Select the Banner IO-Link Library. Click Open.



- The Banner Thickness Library will now be in the Global Library List. Expand the Master copies section.
- Drag Banner_Thickness to the Program Blocks area under your PLC.



- Add the "Banner_Thickness" function block to an OB ladder. Sensor1 and Sensor2 are linked to either IO-Link Process Data In measurements or the analog values from analog measurement sensors. The example below uses two IO-Link sensors. All other links are optional.

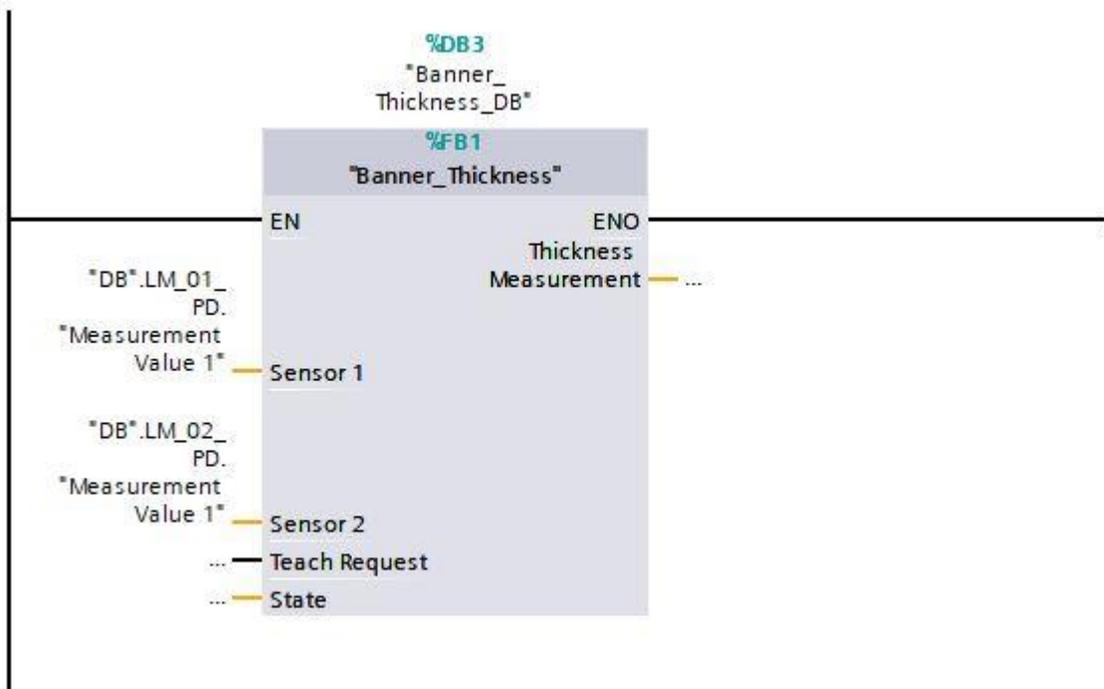


Figure 1: Linking Sensor 1 and Sensor 2 parameters

- Function block setup is complete.

8. Open the “Banner_Thickness_DB” data block. Set the Nominal Value to the width of the test piece used to calibrate the system. In this example the test piece is 3.05 mm.

Banner_Thickness_DB					
	Name	Data type	Start value	Monito...	Comment
1	▼ Input				
2	■ Sensor 1	Real	0.0		Sensor 1 reading
3	■ Sensor 2	Real	0.0		Sensor 2 reading
4	▼ Output				
5	■ Thickness Measuremen	Real	0.0		Current thickness of the target
6	▼ InOut				
7	■ Teach Request	Bool	false		Request the current traget to be taught
8	■ State	USInt	0		0 - System has yet to be taught, 1 = System taught
9	▼ Static				
10	■ CF1	Real	1.0		Conversion Factor for Sensor 1
11	■ CF2	Real	1.0		Conversion Factor for Sensor 2
12	■ Zero1	Real	0.0		Calibrated zero value for target for Sensor 1
13	■ Zero2	Real	0.0		Calibrated zero value for target for Sensor 2
14	■ Nominal Value	Real	3.05		Nominal value of taught target in real units (mm or inches)

9. Enter CF1 and CF2. CF Stands for Conversion Factor. CF1 and CF2 are used, if necessary, to convert sensor readings into engineering units. Analog signals come to the PLC in unitless values (like counts) or in voltage (V) or current readings (mA). The CF1 and CF2 conversion factors are multipliers that convert these analog inputs into measurement readings of mm or inches. CF1 and CF2 are chosen based on the specific sensors used and have units of “mm/count” or inches/volt”, for example. In the example above CF1 and CF2 are set to 1.0 , as the IO-Link sensors in this example already export measurement values in mm.
10. Compile and download the configuration to the PLC, then go online. Open the “Banner_Thickness_DB” data block and click Monitor all.
11. Now place the test piece between the sensors. Activate the Teach process by setting the Teach Request parameter to “true”. After the function block teach is complete Zero1 and Zero2 will have values in them. The State parameter will change from 0 to 1 to indicate the teach process has been completed.

12. "Banner_Thickness_DB" will now look like the below example at this point.

Banner_Thickness_DB					
	Name	Data type	Start value	Monito...	Comment
1	▼ Input				
2	■ Sensor 1	Real	0.0	65.906	Sensor 1 reading
3	■ Sensor 2	Real	0.0	75.88	Sensor 2 reading
4	▼ Output				
5	■ Thickness Measuremen	Real	0.0	3.0460...	Current thickness of the target
6	▼ InOut				
7	■ Teach Request	Bool	false	FALSE	Request the current traget to be taught
8	■ State	USInt	0	1	0 - System has yet to be taught, 1 = System taught
9	▼ Static				
10	■ CF1	Real	1.0	1.0	Conversion Factor for Sensor 1
11	■ CF2	Real	1.0	1.0	Conversion Factor for Sensor 2
12	■ Zero1	Real	0.0	65.905	Calibrated zero value for target for Sensor 1
13	■ Zero2	Real	0.0	75.877	Calibrated zero value for target for Sensor 2
14	■ Nominal Value	Real	3.05	3.05	Nominal value of taught target in real units (mm or inches)

13. Thickness Measurement now updates with the thickness of the part in ether mm or inches.

Appendix A

Sensor Placement

The picture below shows the correct placement of the two sensors used in the Thickness setup. The edge of the test piece used for calibration is ideally placed at the midpoint of each sensor's measuring range.

