

SYSMAC-XR014

Dimension Measurement Library



✓ Measure thickness, flatness, level difference, and other dimensions using displacement sensors.

Issue 1 Difficulty determining the arithmetic expression that should be used.

Issue 2 The more sensors that are used, the more complicated and time consuming the program will be.

Dimension Measurement Library offers the solution!

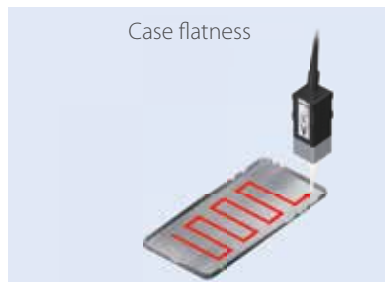
The Function Blocks in this library can be used to easily calculate the dimensions required for your application. The values obtained from displacement sensors significantly reduces programming time.

Program size reduced by
up to 85%*

Multipoint Measurement



2D Shape Measurement

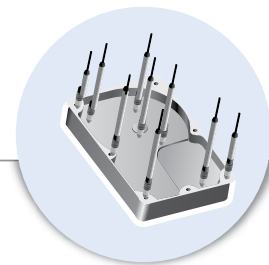


*Omron survey as of October 2016



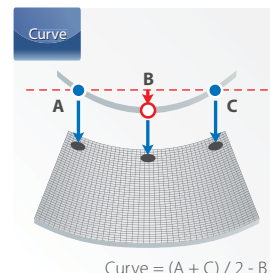
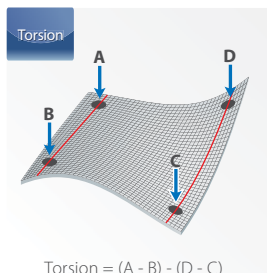
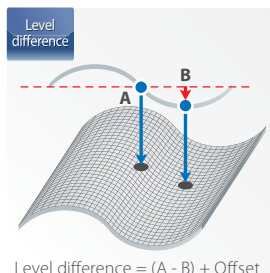
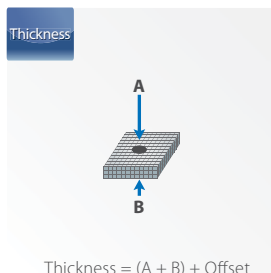
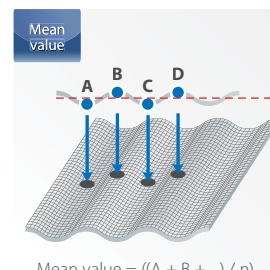
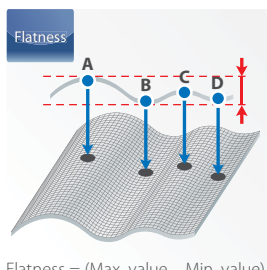
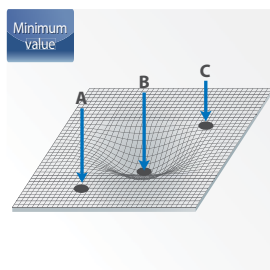
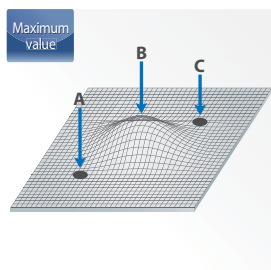
Multipoint Measurement

Function Blocks in this library can be used to calculate dimensions from measurement values obtained from two or more sensors.



Reduced work : No program required for calculation

To calculate the required dimension, just select the Function Block that is fit for your purpose, and then specify sensors for parameters.



Thickness = (A + B) + Offset

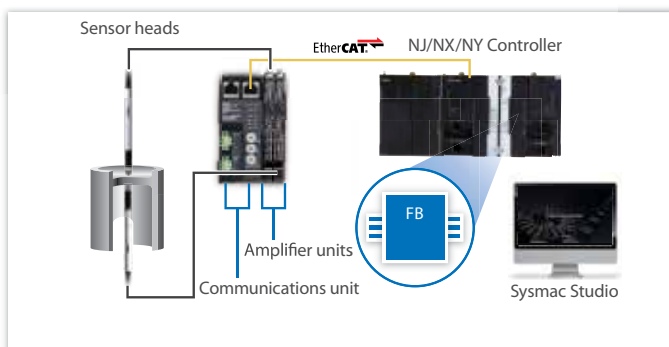
Level difference = (A - B) + Offset

Torsion = (A - B) - (D - C)

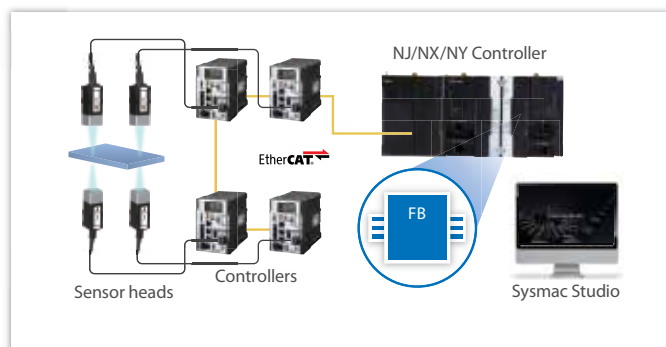
Curve = (A + C) / 2 - B

System Configurations

E9NC for contact sensing



ZW-7000/5000 for non-contact sensing



Compatible Models

Name	Model	Version
Machine Automation Controller NJ/NX CPU Unit	NX701-□□□□	Version 1.10 or later
	NJ101-□□□□	Version 1.08 or later
	NJ501-□□□□	Version 1.08 or later
	NJ301-□□□□	Version 1.08 or later
	NX1P2-□□□□□□ (1)	Version 1.13 or later
Industrial PC Platform NY IPC Machine Controller	NY5□□ -1	Version 1.12 or later
Automation Software Sysmac Studio	SYSMAC-SE2□□□□	Version 1.15 or higher
Sensor Head	E9NC-TH□□□□ 2M	—
Amplifier Unit	E9NC-TA0	—
Sensor Communications Unit (EtherCAT)	E3NW-ECT	Version 1.03 or later

Compatible Models

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Machine Automation Controller NJ/NX CPU Unit	NX701-□□□□	Version 1.10 or later
	NJ101-□□□□	Version 1.08 or later
	NJ501-□□□□	Version 1.08 or later
	NJ301-□□□□	Version 1.08 or later
	NX1P2-□□□□□□ (1)	Version 1.13 or later
Industrial PC Platform NY IPC Machine Controller	NY5□□ -1	Version 1.12 or later
Automation Software Sysmac Studio	SYSMAC-SE2□□□□	Version 1.15 or higher *
Sensor Head	ZW-70□0/50□0 □M	—
Controller	ZW-7000□/5000□	—

* When you use ZW-5000, Sysmac studio is supported for Ver. 1.18 or higher.



2D Shape Measurement

The Function Blocks can be used to measure while moving a sensor and calculate dimensions. Shapes can be measured easily by linking movement data (X/Y) of the stage or robot with measurement data (Z) from the sensor in the controller, without any complicated programming.

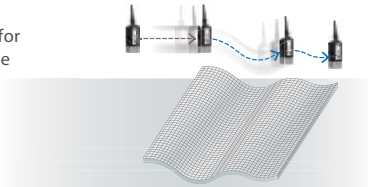


Reduced work : Function Blocks prevent an out of measurement range error

Function Blocks can adjust the height of a sensor to follow along a curved or stepped surface. You can select from the following two control methods to suit your application.

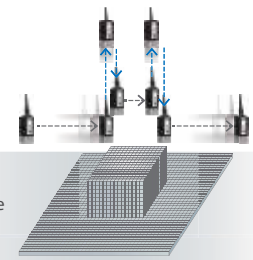
Tracer Control

This method is suitable for measuring shapes whose height varies gradually.



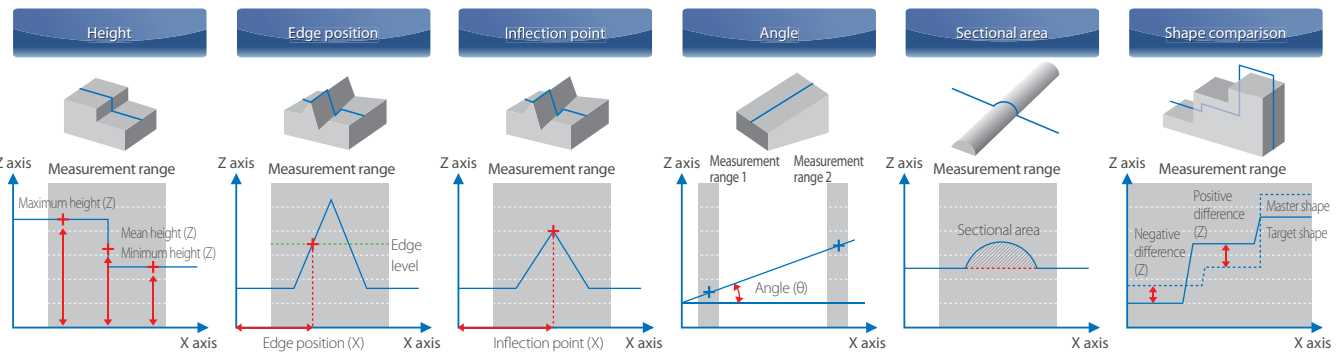
Surface Search

This method is suitable for measuring shapes whose height varies greatly and sharply. When the height of the measurement surface changes and it goes outside the measurement range of the displacement sensor, the height of the displacement sensor is readjusted and the measurement is continued.



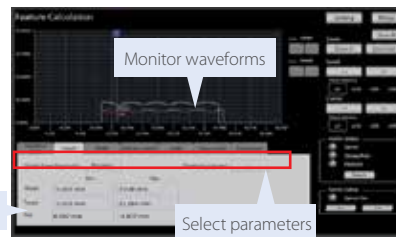
Reduced work : Function Blocks easily create 2D shape data

2D shape data can easily be created from measurement data acquired while moving to calculate the dimension of the characteristic. To calculate the required dimension, just select the Function Block that meets your requirements, and then specify the measurement range.



Reduced work : No need to design screens for setting and measurement

Omron provides HMI templates that include functionality for various applications as well as basic setting(sensor and servo system).

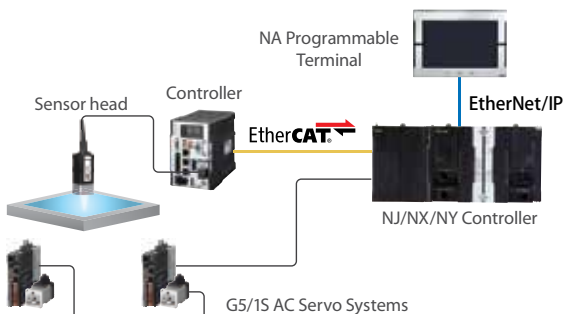


Built-in functions:
Waveform display of line measurement data, characteristic point calculation, comparison calculation, etc.

* Ask your Omron sales representative for details.

System Configuration

ZW-7000/5000
for non-contact sensing



Compatible Models

Name	Model	Version
Machine Automation Controller NJ/NX CPU Unit	NX701-□□□□ NJ101-□□□□ *1	Version 1.10 or later
	NJ501-□□□□ NJ301-□□□□	Version 1.08 or later
	NX1P2-□□□□□□(1)	Version 1.13 or later
Industrial PC Platform NY IPC Machine Controller	NY5□□-1	Version 1.12 or later
Automation Software Sysmac Studio	SYSMAC-SE2□□□□	Version 1.15 or higher *2
Sensor Head	ZW-70□0/50□0 □M	—
Controller	ZW-7000□/5000□	—
Programmable Terminal	NA5-□W	Runtime version 1.07 or higher
		OS version 5.1.5 or higher
AC Servo Drive	R88D-KN□-ECT	Version 2.1 or later
	R88D-1SN□-ECT	Version 1.0 or later

*1. This Library is not available for NJ101-90□□ CPU Units.

*2. The NA5-□W with unit version 1.17 or later can be used for the 2D shape measurement application. When you use ZW-5000, Sysmac studio is supported for Ver. 1.18 or higher.

Function Block (FB) Specifications

Multipoint Measurement

Name	FB name	Description
Point Measurement Calculation (Maximum Value, Minimum Value, Flatness and Mean Value)	CalcPointMeasurement	Utilizes the measurement data obtained from 1 to 16 measurement sensors to perform the calculation of maximum value, minimum value, flatness, and mean value.
Deviation Calculation	PointMeasure_Deviation	Outputs the difference of measurement values (Input1 and Input2) obtained from two measurement sensors on the calculation result.
Torsion Calculation	PointMeasure_Torsion	Calculates the degree of torsion from the measurement values (Input1, Input2, Input3, and Input4) obtained from four measurement sensors and outputs it on the calculation result.
Curve Calculation	PointMeasure_Curve	Calculates the degree of curve from the measurement values (Input1, Input2, and Input3) obtained from three measurement sensors and outputs it on the calculation result.
Thickness Calculation	PointMeasure_Thickness	Calculates the thickness from the measurement values (Input1 and Input2) obtained from two measurement sensors and outputs it on the calculation result.

2D Shape Measurement

Name	FB name	Description
Line Measurement with Cartesian Coordinate System (Surface Search/Tracer Control)	LineMeasure_Cartesian	Measures the height of measurement surfaces while moving a single axis with a displacement sensor in X and Z directions. From the measurement result, this Function Block creates the line measurement data (sLineMeasurementData). You can select from the following two methods to control the single axis during measurement: Surface Search and Tracer Control.
Master 2D Shape Data Creation	LineMeasure_CreateShape2D_Master	Converts from the line measurement data to the 2D shape data and registers it as master data.
2D Shape Data Creation	LineMeasure_CreateShape2D	Converts from the line measurement data to the 2D shape data. Correction is performed so that the target data has the same slope, height and position as the master 2D shape data.
2D Shape Height Measurement	Shape2D_Height	Measures heights in a specified measurement range of the 2D shape data.
2D Shape Edge Position Measurement	Shape2D_Edge	Measures the position (X coordinate) at which a height in the specified measurement range of the 2D shape data passes the edge level.
2D Shape Inflection Point Measurement	Shape2D_InflectionPoint	Measures the position at which the shape line is bent (inflection point) in the specified measurement range of the 2D shape data. If there are multiple inflection points in the measurement range, the position (inflection point) with the largest amount (sensitivity) of bend is output.
2D Shape Angle Measurement	Shape2D_Angle	Draws a straight line between heights within in the two calculation measurement ranges of the 2D shape data. Then, the Function Block calculates the angle θ of the straight line to the horizontal surface. This Function Block also outputs slope a and intercept b of the straight line relative to the horizontal axis X and vertical axis Z (height).
2D Shape Sectional Area Measurement	Shape2D_Area	Calculates the area in the specified integral range of the 2D shape data.
2D Shape Comparison Measurement	Shape2D_Compare	Compares the master 2D shape data and target 2D shape data in the specified measurement range and detects the difference in height (Z direction).

Common (ZW Operation Control)

Name	FB name	Description
ZW Zero Reset Control	ZW_ZeroResetControl	Performs the Zero Reset and Clear Zero Reset functions for the specified task of the ZW-7000 Confocal Fiber Displacement Sensor through EtherCAT communications.
ZW Command Control	ZW_CmdControl	Controls the commands for the ZW-7000 Confocal Fiber Displacement Sensor that communicates with the NJ/NX/NY Controller via EtherCAT.

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Note: Do not use this document to operate the Unit.

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