



Automotive Applications:

Error-proof Engine Valve Spring assembly in the cylinder head to assure 100% quality before workpieces move to the next station.



Problem:

Engine valve springs are assembled in the cylinder head using a two-piece "key". This key must be installed properly to avoid warranty costs to the powertrain plant. Various defects can occur during assembly and all must be identified at production speed to reduce waste and rework:

- High keys
- Low keys
- Missing keys
- Upside down springs
- Wrong valve stem length



Omron "FACTS" Advantage

Two Z500-SW17R Sensors
Two Z500-MC10E-001 Controllers

Omron's Z500 offers a unique combination of a wide-beam laser and two-dimensional CCD receiver that allows the sensor to make extremely accurate 2D profile measurements in a single pass without moving either the valve spring or the sensor. This approach eliminates accuracy problems and excessive installation costs typical of inspecting with a conventional point beam displacement sensor. The Z500 delivers multiple inspection capabilities to handle the range of potential problems in this and other automotive assembly applications.

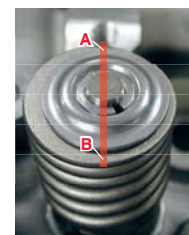


Application Example



GOOD profile measurement

Proper valve spring installation



BAD profile measurement

Spring installed upside down



BAD profile measurement

Missing spring key

Valve Assembly Application Details

Issue

- Defects in assembly, if not found quickly during in-line quality inspections, cause high repair costs to assembled engines.
- High production speeds increase the number of affected products if defects are not detected quickly.
- Output from all tier suppliers must work toward 100% quality inspection as part of continuous improvement programs.

Cause

- Automation machinery is out of adjustment causing incorrect assembly
- Out of tolerance parts
- Machine is loaded with the wrong parts
- Manual assembly error (when automated machinery is down)
- Parts can be inserted in the wrong position (upside down spring)

Omron's Unique Solution

Omron's Z500 profile sensor solution updated and expanded the inspection capabilities to meet the customer's current needs:

- Detect five types of defects during assembly: high keys, low keys, missing keys, upside down springs and wrong valve stem lengths.
- Improve usability and support of the inspection process by replacing an existing system that runs on DOS, uses special software and offers no visual images of measurement.
- Replace laser sensors in existing tooling with minimal mechanical changes.

Omron's Z500 profile sensor offers these advantages:

- Detection of all defect conditions listed by the customer.
- Fast 0.5-second inspection time to meet production speeds.
- Identification of each defect condition for root cause analysis and repair by customer.
- Easy integration with existing controls.
- Worldwide service, training and product availability because this is an off-the-shelf product.
- Live visual monitor screen images of actual results for easy repair and setup.
- Safe, Class 2 laser provides easy-to-see visible line to show inspection area.

Results

Customer Benefits:

- Faster and smaller than existing system.
- Detects five (5) defect types. Old system only detected three (3).
- No PC or special software required.
- No proprietary training or components required. Off-the-shelf worldwide components by OMRON.
- Increased operational stability—Class 2 lasers are less affected by oil mist and ambient light and easy to deploy in plant and require no special installation or warnings.
- Easy I/O integration.

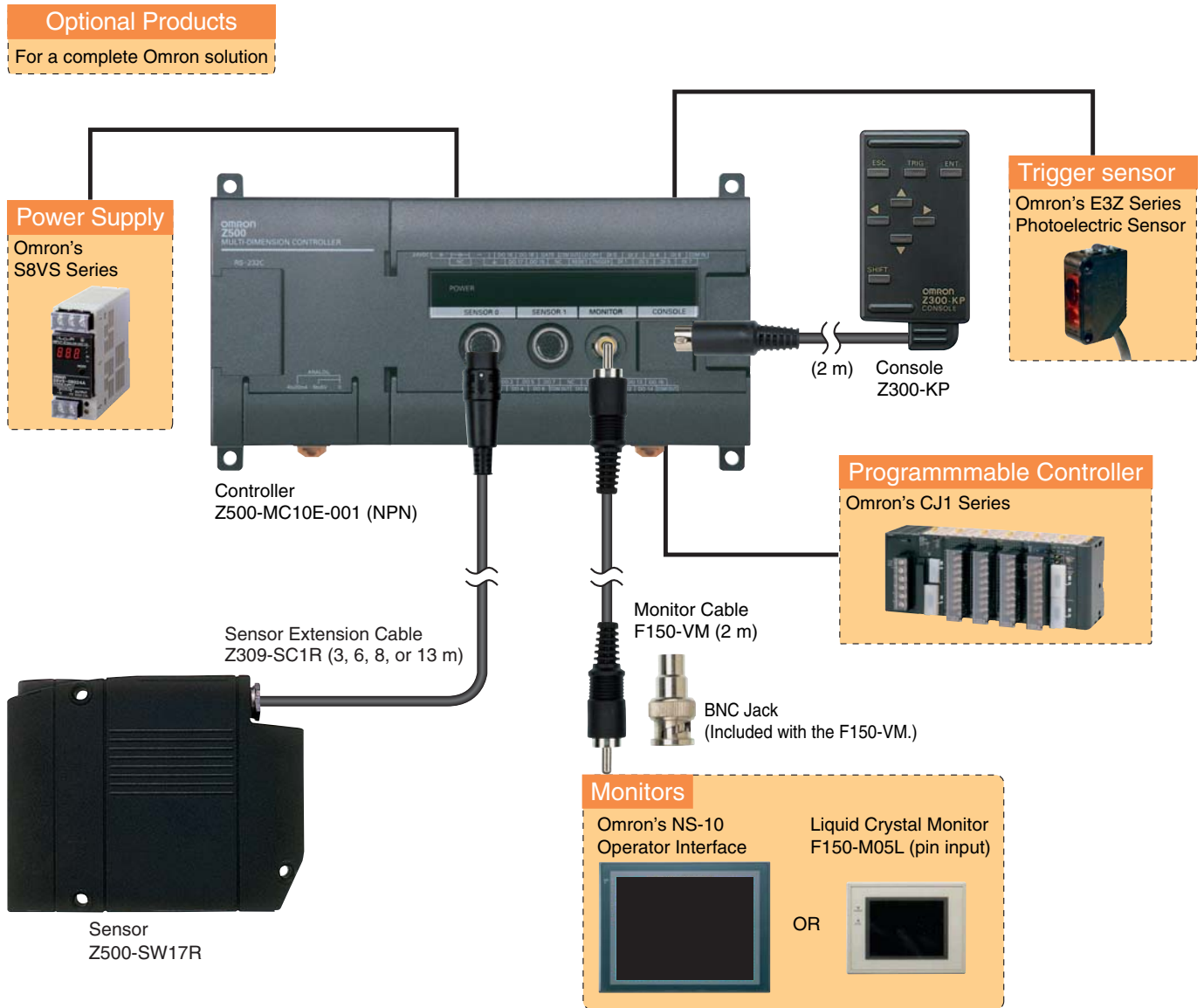
Bill of Materials

This application uses **two** of each item except the Console.

Description	Part Number
Laser Sensor	Z500-SW17R
Controller	Z500-MC10E-001
Monitor	NS10-TV01BV1 + NS-CA002 or F150-M05L
Monitor Cable	F150-VM
Sensor Extension Cable	Z309-SC1R (specify 3m, 6m, 8m or 13m length)
Console	Z300-KP
Power Supply	S8VS-06024A/B

System Configuration

The configuration described here is one of many ways to solve similar inspection problems. Let an Omron specialist propose the best system for your application.



Specifications

Sensor	Z500-SW17R
Measurement range	±20 mm (diffuse reflection) at 100 mm measurement distance ±16 mm (mirror reflection) at 94 mm measurement distance
Light source	Visible-light semiconductor laser, Class 2, 650 nm wavelength
Linearity	±0.1% F.S.
Resolution	1 µm
Cable length	2 m

Controller	
Input/Output type	NPN (Z500-MC10E-001)
Number of sensors	2 sensors can be mounted
Measurement functions	Height, Step (2 points), Step (3 points), Edge position, Width, Edge center, Peak/bottom, Define
Area of interest	Region specification of line beam and displacement direction is possible
Trigger functions	Free, External 1, External 2, Auto
Results output	Judgment output via RS-232C output and terminal block Measurement value output via RS-232C and analog (4-20 mA) output
Data displays	Profile monitor: Data on cross section height can be checked on a 3D gray scale image Image monitor: Both measurement data and profile image can be checked at the same time Digital monitor: Two or more measurement data can be checked at the same time Trend monitor: Time-series change of measurement data can be checked

Monitor	NS10-TV01BV1* + NS-CA001	F150-M05L
Screen size	10.4 inches	5.5 inches
Display type	TFT color liquid crystal	TFT color liquid crystal
Resolution	640 x 480 dots	320 x 240 dots
Input signal	NTSC composite video	NTSC composite video

*Also available in 8" and 12" screens



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