CS26/27/28-HF

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CONTACTLESS SYSTEM FOR THE DIMENSIONAL CONTROL OF MACHINE TOOLS

The CS26/27/28-HF systems are compact and reliable devices for controlling dimensional variations of the machine tool during set up and operation.

The CS26/27/28-HF systems perform a contactless measurement with inductive sensors. The inductive sensors are able to measure the position of any electrically conductive object with extreme precision. This type of measurement is by its nature non linear and it is influenced by the chemical composition and by any heat treatments of the material used as target.

To overcome these issues, the CS-I and CS-IS sensors of the product are fitted with a memory chip (located in the connector) that can contain the mapping curves to linearize the response in relation to 5 different possible targets.

Therefore the system output is directly proportional to the target distance.

Typical applications

Machine set-up:
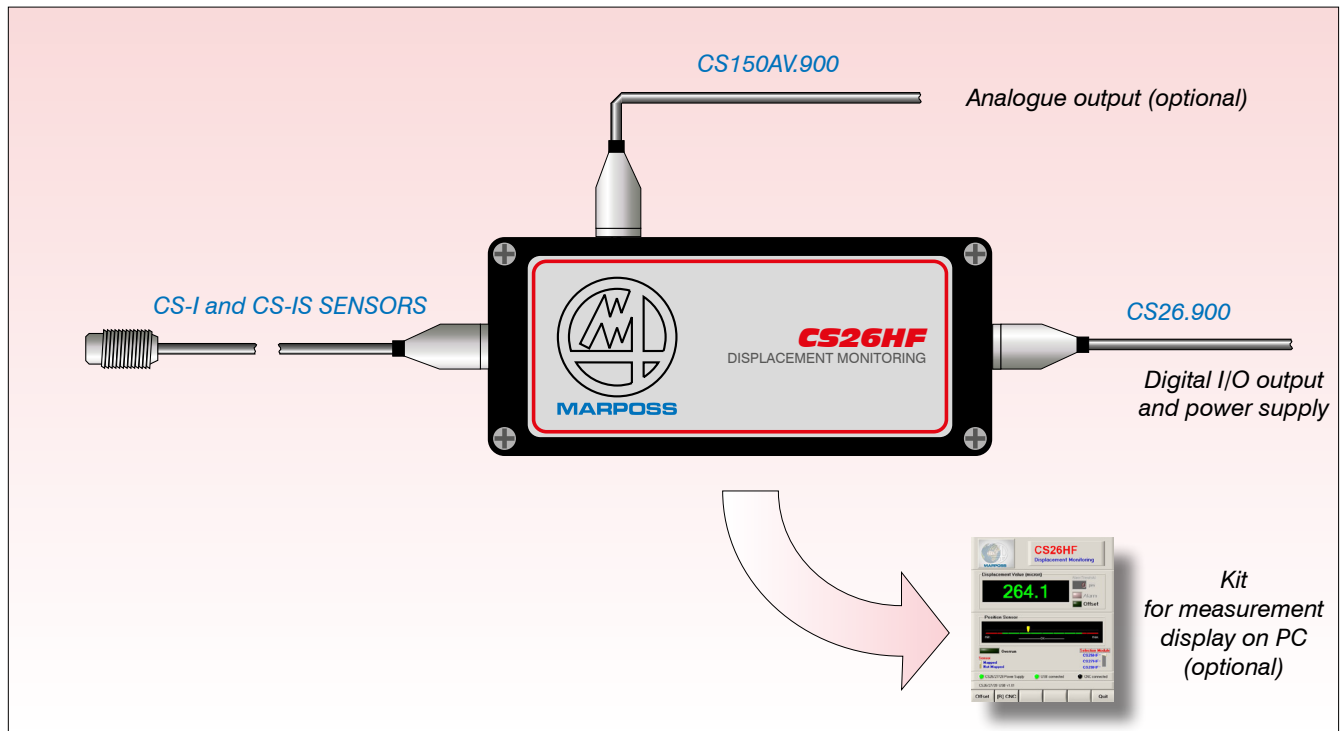- Tool run-out control
- Part positioning control

Mechanical part machining:
- Worm screw expansion control
- Hydrostatic guides thickness control
- Spindle growth control

Benefits

- No wear
- Solid measurements even in hostile environments

The system

CS150AV.900

Analogue output (optional)

CS-I and CS-IS SENSORS

CS26HF
DISPLACEMENT MONITORING

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CS26.900

Digital I/O output
and power supply

Kit
for measurement
display on PC
(optional)

The small size of the sensors allows them to be installed in particularly cramped zones. Moreover each sensor can be supplied with the connector separated to facilitate the wiring operations in machine.

In the spindle growth control system the sensor is usually installed on a front part opposite a flange integral with the shaft in rotation.

During machining the shaft growth due to thermal effects results in the flange moving with respect to the sensor. The system signals the variation to the numeric control that can perform the required compensations on the machine axes.

In the hydrostatic guides control the sensor is usually installed on the supporting fixed part and opposite the slide/table in movement. The system signals if the two parts move closer due to a reduction of the fluid in between, in order to restore the correct thickness.

In both cases the measurement can be performed continuatively or, alternatively, it can be performed at a precise point, synchronising it with the rotation speed / absolute position of the target, with a signal.

Furthermore the measurement can be performed "statically", that is by filtering all fast phenomena (less than a second) to focus the analysis on the drifts (that typically last various minutes), or "dynamically" by tracking fast variations linked to flutters/eccentricity/misalignments.

The CS28HF system uses the "dynamic" measurement mode to analyse the run-out of the tool holder. In machines fitted with automatic tool changer machining residue can often deposit itself on the shank and compromise the correct alignment of the tool with the machine axis.

With our system the extent of the misalignment can be measured within a few hundreds of a millisecond from the start of the tool rotation, blocking the machine and saving the part from an incorrect machining.

The electronic units

The **CS26HF** and **CS27HF** electronic units can have three different operating modes:

- **Static mode:**
  - Analogue output: indicates an average value of the target distance
  - Digital output (16 bit): indicates the value of the analogue output from the trigger signal from the PLC

- **Dynamic mode:**
  - Analogue output: indicates the value of the target distance
  - Digital output (16 bit): indicates the value of the analogue output from the trigger signal from the PLC

In this configuration you can choose between a slow dynamic (up to 20Hz) and a fast dynamic (up to 1800 Hz) to minimise the measurement noise

- **Peak-peak mode (incremental):**
  - Analogue output: indicates the maximum value of the oscillation in relation to a zeroing point
  - Digital output (16 bit): indicates the value of the analogue output from the trigger signal from the PLC

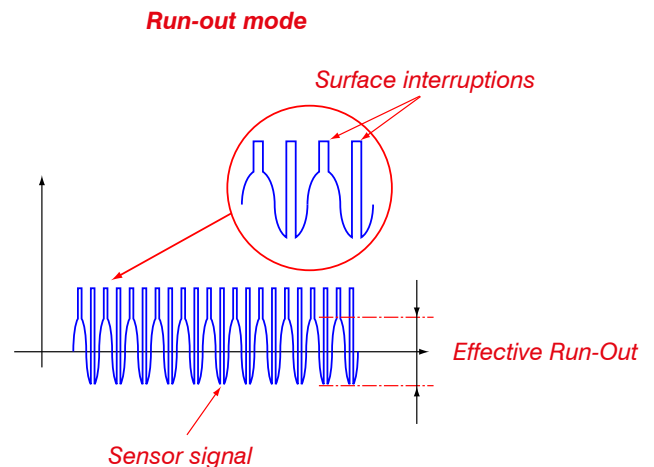In this configuration the oscillation must have a slow dynamic (up to 20Hz)
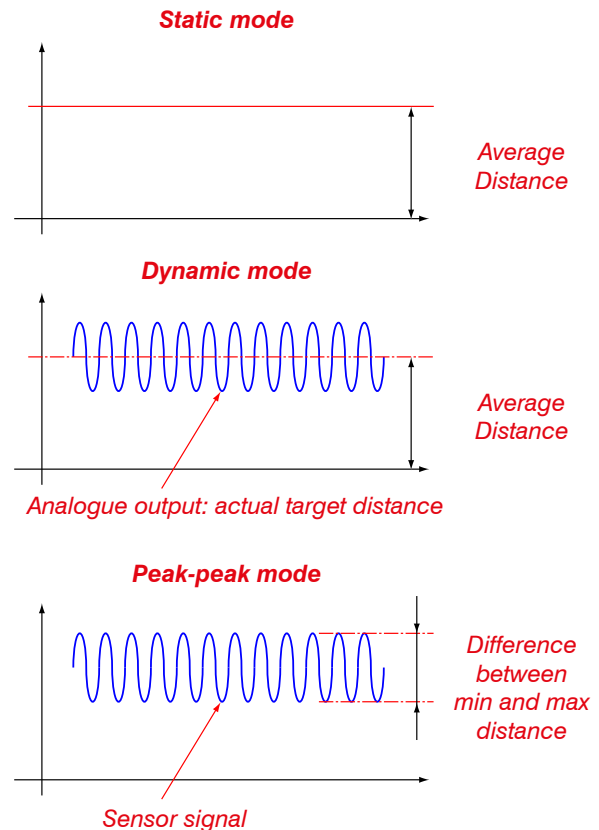
The **CS28HF** electronic unit has a single operating mode to control the run-out of the tool holder. Compared to the CS26/27-HF electronic units that measure the punctual distance of the target, the CS28HF software is designed to examine surfaces with interruptions (typical of the tool holder shanks profile) and is able to extrapolate the actual run-out values.

Compared to the CS26/27-HF electronic units that are pure gauges, the CS28HF can be programmed to set up to 7 alarm generation thresholds, and it is fitted with an additional analogue output used to monitor the distance of the object and its run-out at the same time

- **Run-out mode:**

In this configuration the oscillation must have a slow dynamic (up to 20Hz)

- Analogue output 1: indicates the run-out value extrapolated by the firmware
- Analogue output 2: indicates the average value of the target distance

- Digital output (32bit): 16 bit indicate the average value of the target distance

  16 bit indicate the run-out value, the alarm threshold set and any alarm

Static mode

Average Distance

Dynamic mode

Analogue output: actual target distance

Average Distance

Peak-peak mode

Difference between min and max distance

Sensor signal

Run-out mode

Surface interruptions

Effective Run-Out

Sensor signal

The sensors

The CS-I and CS-IS series sensors are extremely miniaturized and offer:
- contactless measurement
- high levels of measurement accuracy
- all the calibration specifications inserted inside the sensor
- interchangeability between CS26HF module and CS-IS sensors
- interchangeability between CS27HF module and CS-I sensors

CS5I-IS	20 Ø4.2 M5×0.5
CS6I-IS	12 4.5 10
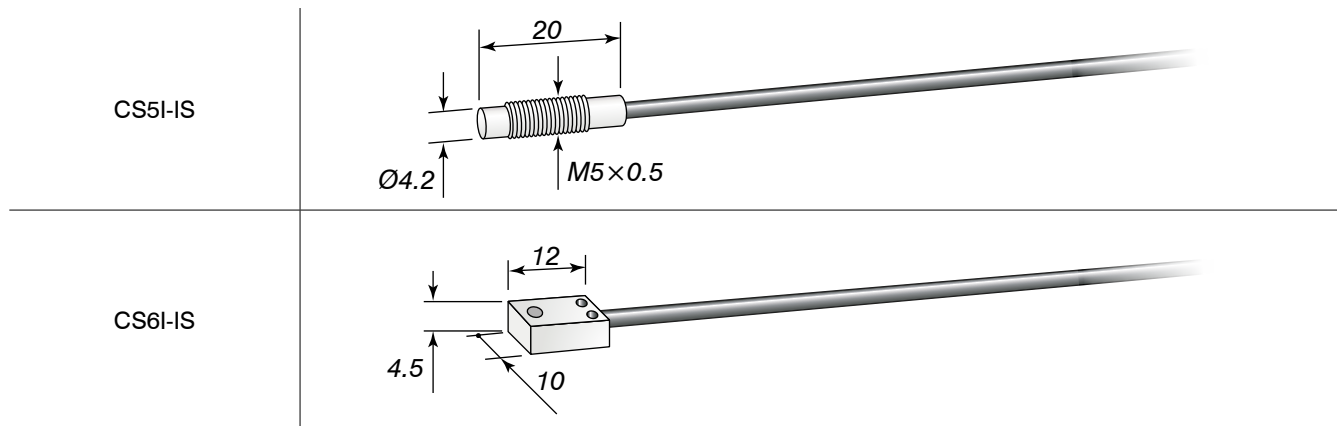
Technical specifications

Technical specifications

		CS26HF	CS27HF	CS28HF
Meas. Range *wih C40 target*		600 µm		
Minimum gap *wih C40 target*		50 µm		
Accuracy	0.05÷0.15 mm	± 0,2 µm	± 1,0 µm	± 2,0 µm
	0.05÷0.3 mm	± 0,5 µm	± 1,0 µm	
	0.05÷0.6 mm	± 1,0 µm		
Measurement resolution		0.1 µm	0.8 µm	1 µm
Number of applicable sensors		1		
Number of selectable mappings		5		3
Outputs	digital	16 bit *serial on 3 conductors*		32/16 bit
	analog	10 mV/µm		
Power supply		24 VDC (18÷30 V)		

Dimensions	150×64×34 mm
Electronic unit protection degree *(IEC 60529)*	IP65
Sensors protection degree *(IEC 60529)*	IP67
I/O galvanically isolated with sink or source type setting	

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