

END-EFFECTORS

SC SERIES

STANDARD CERAMIC DESIGNS

FEATURES

- Reduction of back-side scratches to near zero levels
- Elimination of defusible contamination (no metal contaminants)
- Highest rigidity material for similar cross-sections
- Virtual elimination of thermal shock to the substrate handled (unheated)
- Elimination of thermal shock (heated)
- Ability to operate continuously at elevated temperatures without warpage
- No tape or epoxy and no out-gassing
- Infinite life without vacuum leakage
- Elimination of ESD damage
- Proprietary fabrication process

EEl has designed a line of *standard* ceramic end-effectors which provides the user with all the advantages of a custom design without the design cost or inventory requirements. With nearly a decade of fabricating custom ceramic end-effectors, a recurrent pattern of design features has evolved which dictated the design parameters for our standard ceramic end-effectors. The attributes of ceramic end-effectors have been well established and the superior performance of our 3 "G" design rules is unmatched in the world. Utilization of standard mounting hardware and standard design configurations delivered from stock, reduces cost and optimizes performance. Now any robot can be easily adapted to utilize standard ceramic end-effectors of any size, and custom ceramic end-effectors using the same mounting adapter.

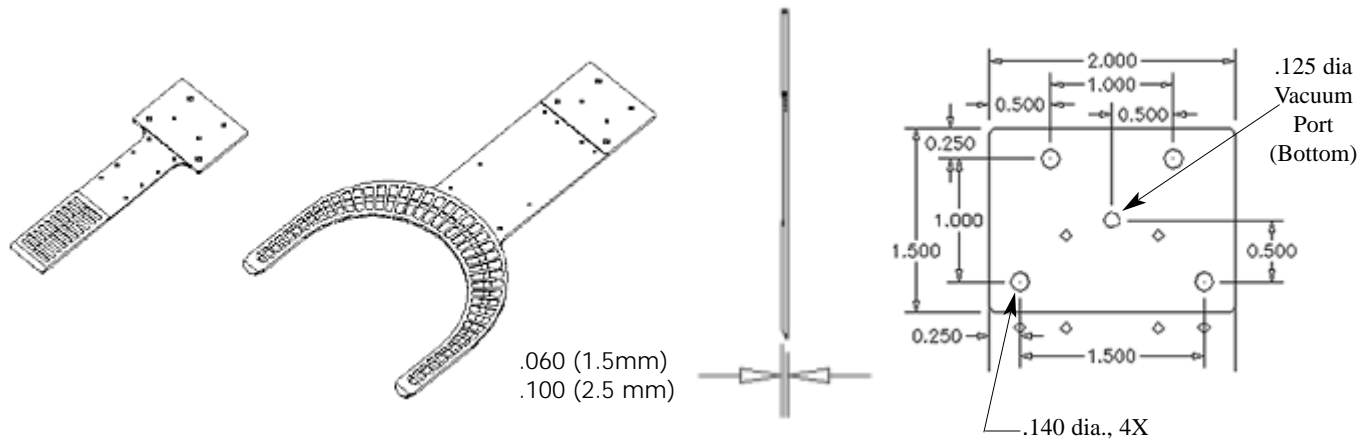
EEl END-EFFECTORS, INC.

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"Giving Robotics A Hand"

STANDARD CERAMIC END-EFFECTOR DETAILS

STANDARD TYPES: ALL DESIGNS ARE “3G” Minimum Vacuum Clamping Force



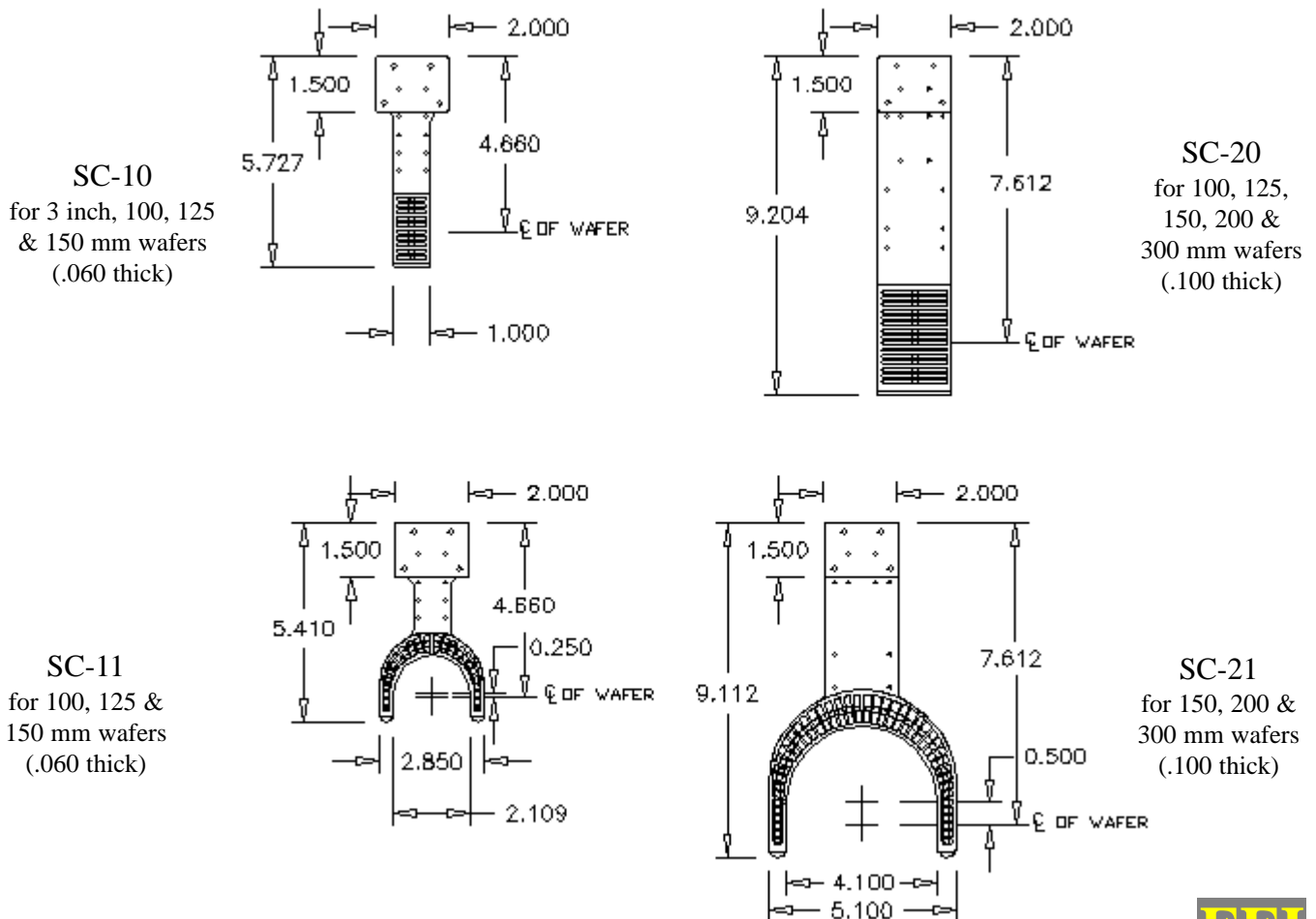
Straight Type
SC-10 Series

Fork Type
SC-20 Series

Two thickness¹
for series

Universal Mounting
Hole Layout

STANDARD SIZES: Two sizes (-10 for 1 inch wide body and -20 for 2 inch wide body) and two styles for each size cover the entire range from 3 inch to 300 mm diameter or square.



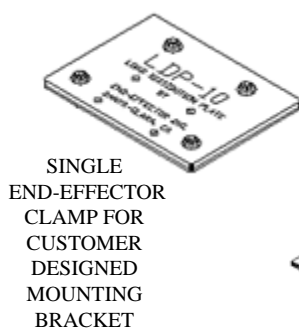
OPTIONAL ACCESSORIES

Standard off-the-shelf and customer installed:

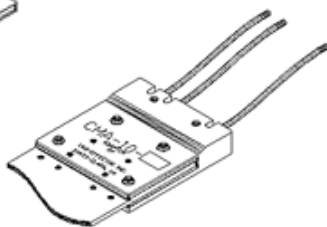
LOAD DISTRIBUTION PLATE — LDP-10 (Compatible with FSC-10): The load distribution plate is provided for those customers who wish to design a custom mounting device. The LDP-10 is used to provide a distributed clamping load and prevent damage to the end-effector. See separate data sheet for details.

CERAMIC (END-EFFECTOR) MOUNTING ADAPTER — CMA-10 SERIES: While the standard ceramic end-effectors of the SC series can be used as supplied, we have provided a mounting adapter for easy utilization. The CMA-10 series provides for utility hook-up by simply inserting the end-effector (any of the standard series) into the Mounting Adapter and fastening. Use of the standard mounting adapter prevents damage to the ceramic end-effector from improper mounting. The mounting adapter can be fastened to any robot. See separate data sheet for product details.

MOUNTING ADAPTERS PROVIDE AUTO HOOK-UP FOR:

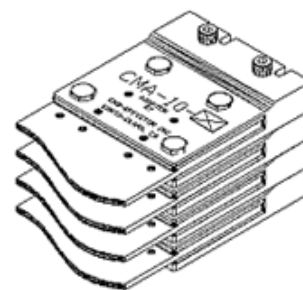


SINGLE
END-EFFECTOR
CLAMP FOR
CUSTOMER
DESIGNED
MOUNTING
BRACKET



SINGLE
END-EFFECTOR

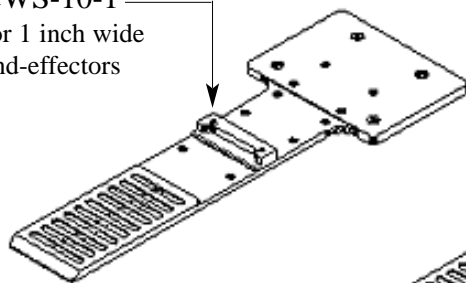
1. Vacuum Line
2. Static Electric Wick
3. Electrical Sense
4. Electrical Heater



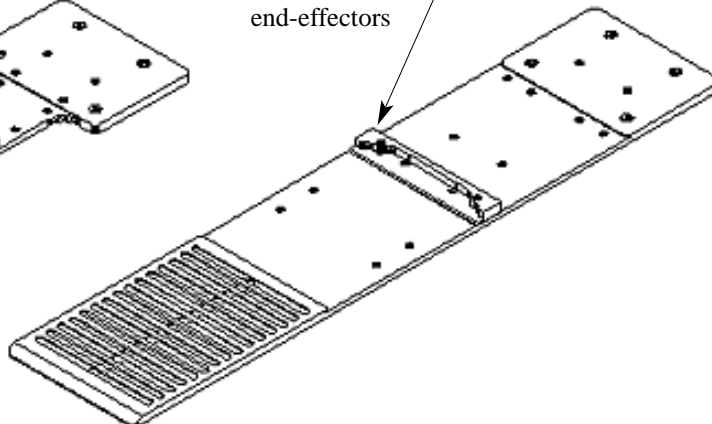
STACKABLE
END-EFFECTORS

CIRCULAR WAFER STOPS (continuous periphery) CWS-10 and -20 SERIES: When the specific application is one in which the wafer flat can be positioned away from the stop or there is no discontinuity on the substrate (continuous round periphery), then a standard wafer stop can be used. The standard stop comes in two sizes. One size for the one inch wide body and another for the two inch wide end-effector body. In each case we have designed the stop to permit its use for all wafer sizes handled by the end-effector selected. Simply move the stop to the appropriately marked location and the wafer will be positioned over the center of the vacuum clamping area. Diameter compensation has been designed into the parts.

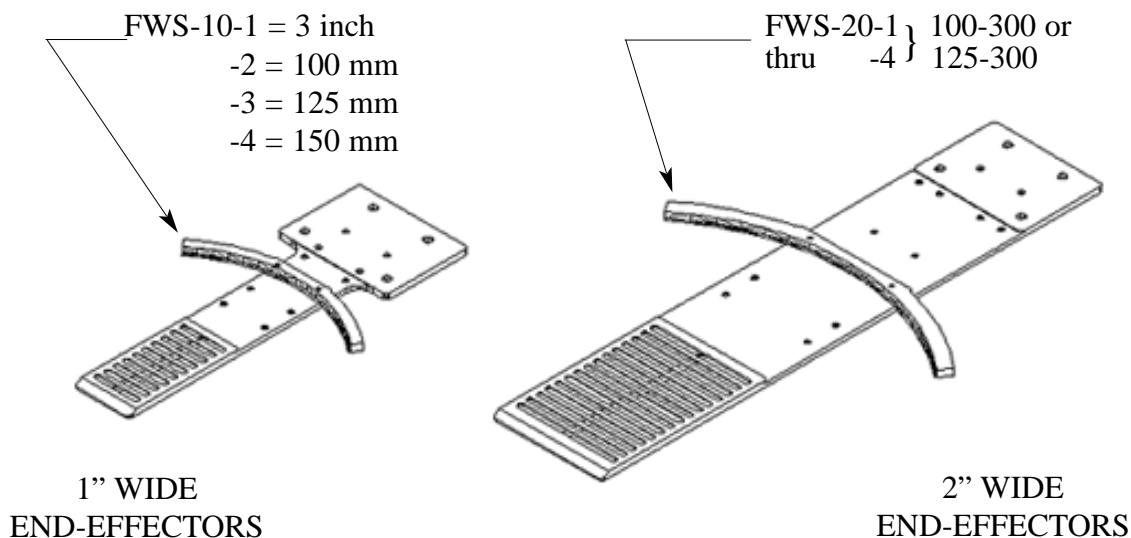
CWS-10-1
for 1 inch wide
end-effectors



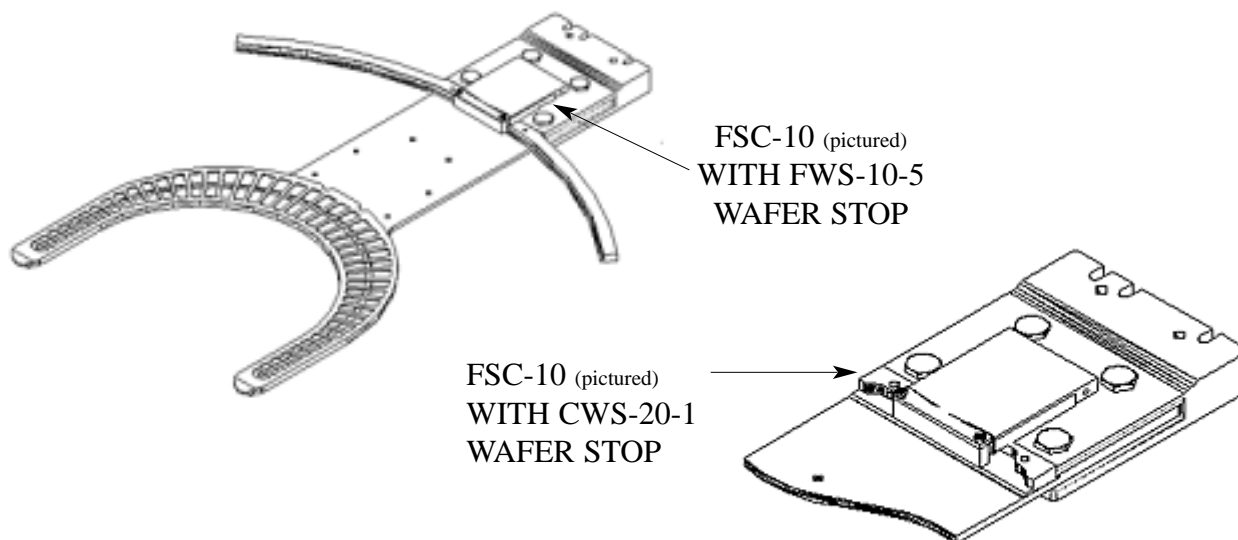
CWS-20-1
for 2 inch wide
end-effectors



FLATTED WAFER STOPS (discontinuous periphery) — FWS-10 and -20 SERIES: When wafer flats or substrate features are random, the user can mount a large contact area wafer stop. This design permits the accurate positioning of the substrate when peripheral conditions vary randomly. In addition to positioning accuracy this wafer stop design also enhances substrate stability. There is a wafer stop designed for each specific location, since wafer diameter varies and the stop contour must match the substrate diameter or shape. There are several standard sizes and custom shapes can be fabricated.



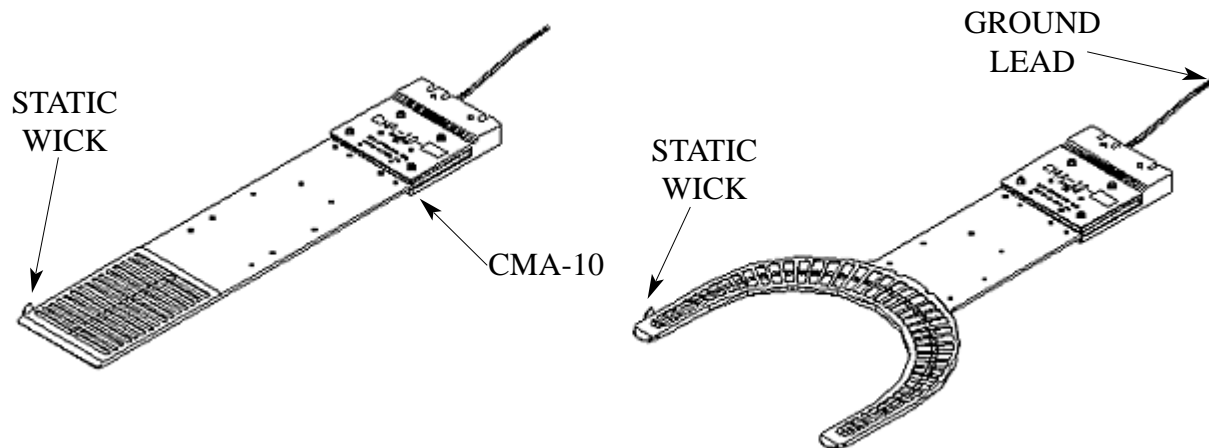
FAIL-SAFE CLAMP — FSC-10 SERIES: To protect valuable wafers from damage due to system failures, EEI has provided a fail-safe system option. The FSC-10 can be fitted to any of the four standard ceramic end-effectors and can be used for all wafer sizes. The FSC-10 Fail-Safe Clamp will retain a wafer on the end-effector when a system failure occurs (no vacuum). A wafer stop and spacer of the proper size (1 inch or 2 inches wide) are required for employment of the Fail-safe Clamp.



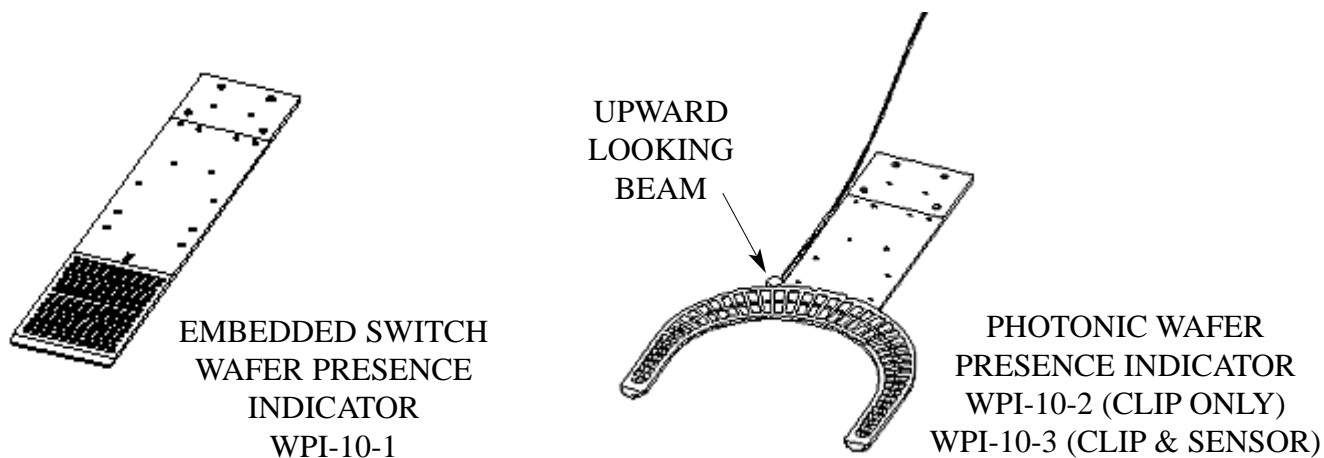
CUSTOMIZED OPTIONS

Factory Installed:

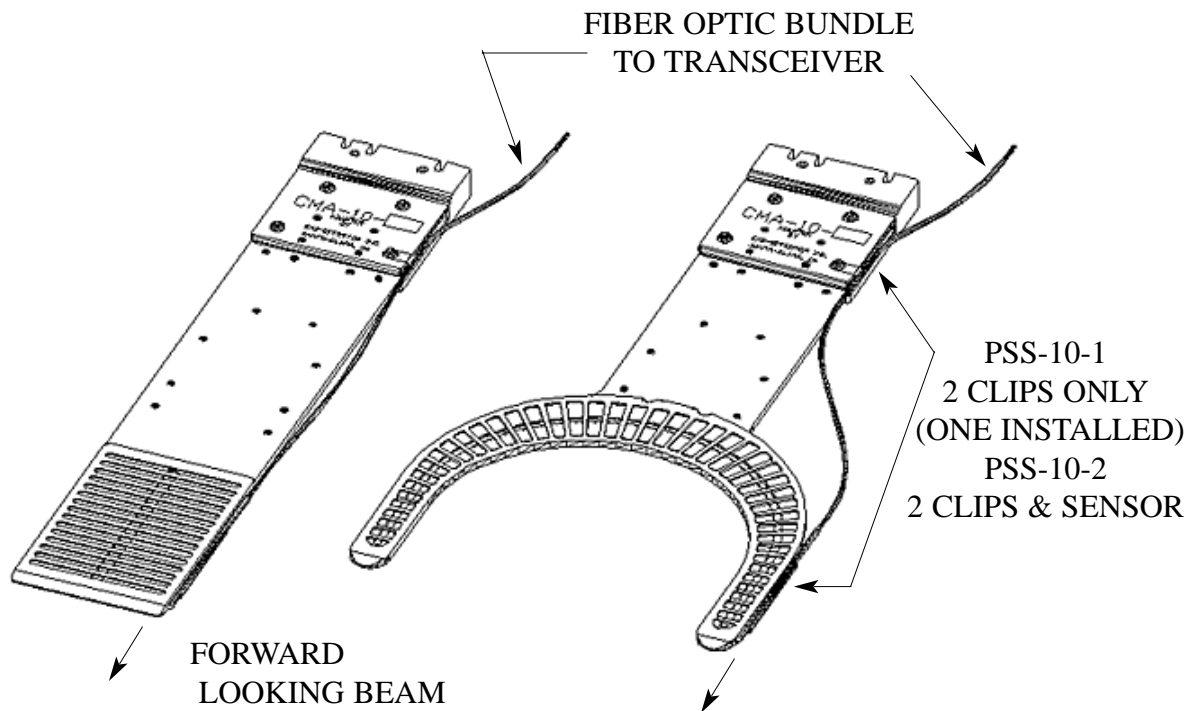
ELECTRO-STATIC DISSIPATION SYSTEM — ESD-10 SERIES: In situations where the substrate being handled can be damaged by ESD, the SC series of end-effectors can be fitted with ESD dissipation wicks. The stainless steel wicks direct the electro-static discharge through a dropping resistor to ground. Each end-effector in the SC series can be so fitted. The CMA-10 adapter with dropping resistor is recommended. (See separate flysheet).



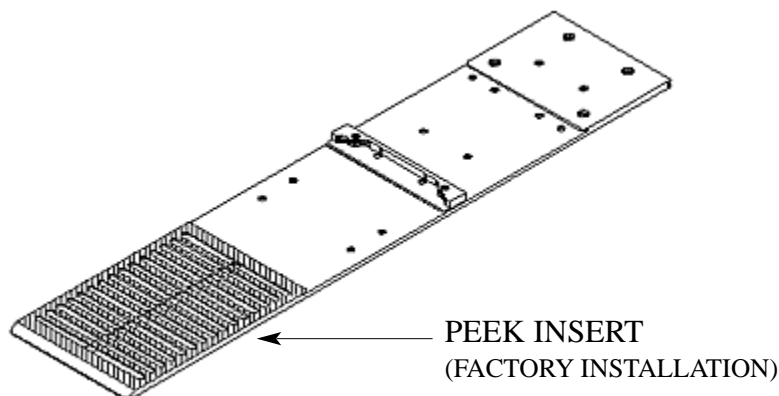
WAFER PRESENCE INDICATORS — WPI-10 SERIES: In order to determine the presence of the substrate on the end-effector, EEI has provided several options. The option most often used and *not* provided by EEI is the reading of a vacuum actuated switch. When vacuum is high in the vacuum line the switch will close, since vacuum will be high when a wafer is clamped to the end-effector it infers that a wafer is present. However it is possible for a clogged vacuum line to give the same but false indication. Therefore EEI provides end-effector mounted indicators for positively sensing the substrates presence. The sensors are of two types - optical and electrical. The optical sense requires a coaxial fiber optic bundle and the electrical sense switch requires substrate contact to trip the switch. All end-effectors in this series can be fitted with these substrate presence indicators.



PHOTONIC SENSING SYSTEM — PSS-10 SERIES: The PSS options permit the user to read wafer locations without contacting the substrate. The user can then count, locate vacancies in a wafer stack or holder and define precise location of the intended target. Target information need not be a wafer or data disk; the sensor can be used as a safety device to prevent collisions or to profile an object. All end-effectors can be fitted with a forward looking photonic sensing system regardless of shape or size selected. The user must write software routines to utilize this option.



SUBSTRATE CONTACT MATERIAL – Contact material options are part of the customized modification of the SC Series of end-effectors. EEI offers its products in ceramic as standard but can replace the ceramic contacting surface with peek or other materials. See “Creating A Part Number” instructions for details.



**CREATING A PART NUMBER
FOR FACTORY CUSTOMIZED SC SERIES END-EFFECTORS**

SELECT BASIC TYPE AND SIZE:

There are only four (4 choices) in the SC series. Each of the four available parts are capable of handling multiple wafer sizes. The four standard end-effectors can be enhanced by customer installation of the available standard options or factory installation of customized features. When specifying customized options the data below is required in the form of a part number. Customized options will be fitted at the factory while standard options are installed by the user. The use of customized options adds one (1) week to delivery time.

BASIC PART NUMBERS: SC-10 SC-11 SC-20 SC-21

ESD DISSIPATION: None employed.....Option = 0
 Stainless steel wick contact.....Option = 1

WAFER PRESENCE INDICATORS:
 Vacuum Switch (standard user supplied).....Option = 0
 Electrical Switch (PEEK contact switch).....Option = 1
 Optical Switch (fiber bundle).....Option = 2

PHOTONIC SENSE SYSTEM: None employed.....Option = 0
 Optical Sensor Installation.....Option = 1

SUBSTRATE CONTACTING MATERIAL: Ceramic (standard).....Option = 0
 PEEK (plastic).....Option = 1*
 Special Order.....Option = S*

*NOTE: When materials other than our standard ceramic are used, the operating temperature of the end-effector may be lowered.

ORDERING INFORMATION:

Part Number Construction =	<u>SC-20</u>		<u>-1</u>		<u>-1</u>		<u>-0</u>		<u>-0</u>
(Read vertically)	Basic	+	ESD	+	Presence	+	Photonic	+	Contact
	Part No.		Dissipation		Options		Sense		Material
	SC-		ESD-10-		WPI-10-		PPS-10-		SCM-
	10		0		0		0		0
	11		1		1		1		1
	20				2				S
	21				3				

(Choose one available option from each column)

EXAMPLES: SC-21-0-3-0-5 Note: Each position must be used to the last desired
 SC-10-1

STANDARD CERAMIC END-EFFECTORS AND ACCESSORY

Parts List

SC SERIES CERAMIC END-EFFECTORS

- Basic End-Effectors:**
- SC-10: Straight type, 3 inch to 150 mm wafers
 - SC-11: Straight type, 150 mm to 300 mm wafers
 - SC-20: Fork type, 100 mm to 150 mm wafers
 - SC-21: Fork type, 150 mm to 300 mm wafers



OPTIONAL ACCESSORIES - Customer Installed:

- Circular Wafer Stops:**
- CWS-10-1: continuous wafer periphery, all sizes
 - CWS-20-1: continuous wafer periphery, all sizes

- Flatted Wafer Stops:**
- FWS-10-1: 3 inch flatted wafer
 - FWS-10-2: 100 mm flatted wafer
 - FWS-10-3: 125 mm flatted wafer
 - FWS-10-4: 150 mm flatted wafer
 - FWS-20-1:
 - FWS-20-2: 100 mm flatted wafer
 - FWS-20-3: 125 mm flatted wafer
 - FWS-20-4: 150 mm flatted wafer
 - FWS-20-5: 200 mm flatted wafer
 - FWS-20-6: 300 mm flatted wafer



- Fail Safe Clamp:**
- FSC-10: (fits all standard ceramic end-effectors in the SC series: requires a wafer stop/spacer for implementation)



- Load Distribution Plate:**
- LDP-10 (compatible with FSC-10, see separate data sheet)



- Mounting Adapters:**
- CMA-10 (see separate data sheet)



CUSTOMIZED OPTIONS – Factory Installed:

- Electro-Static Dissipation:**
- ESD-10-1 Stainless Steel Wick (installed)

- Photonic Sensing System:**
- PSS-10-1 Mounting Clip (installed)
 - PSS-10-2 Photonic Sensor Cable (only)
(Keyence Model #FU-49X)
 - PSS-10-3 Transceiver with read-out
(Keyence Model #FS-V11)

- Wafer Presence Indicators:**
- WPI-10-1 Embedded Switch Sense (installed)
 - WPI-10-2 Mounting Clip (installed)
 - WPI-10-3 Photonic Sensor Cable (only)
(Keyence Model #FU-49X, modified)

- Substrate Contact Material:**
- SCM-0 Standard Ceramic Contact
 - SCM-1 Peek (Plastic) Contact
 - SCM-S Special Order - quoted
- } Min. purchase
} 5 ea. pieces