



UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN
FACULTAD DE INGENIERÍA MECÁNICA Y ELÉCTRICA
CENTRO DE INGENIERÍA Y DESARROLLO INDUSTRIAL



ESPECIALIDAD
“TECNÓLOGO EN MECATRÓNICA”

PROYECTO INDUSTRIAL / ACADÉMICO

**Modelado y simulación de movimientos de una línea de
embalaje de productos alimenticios.**



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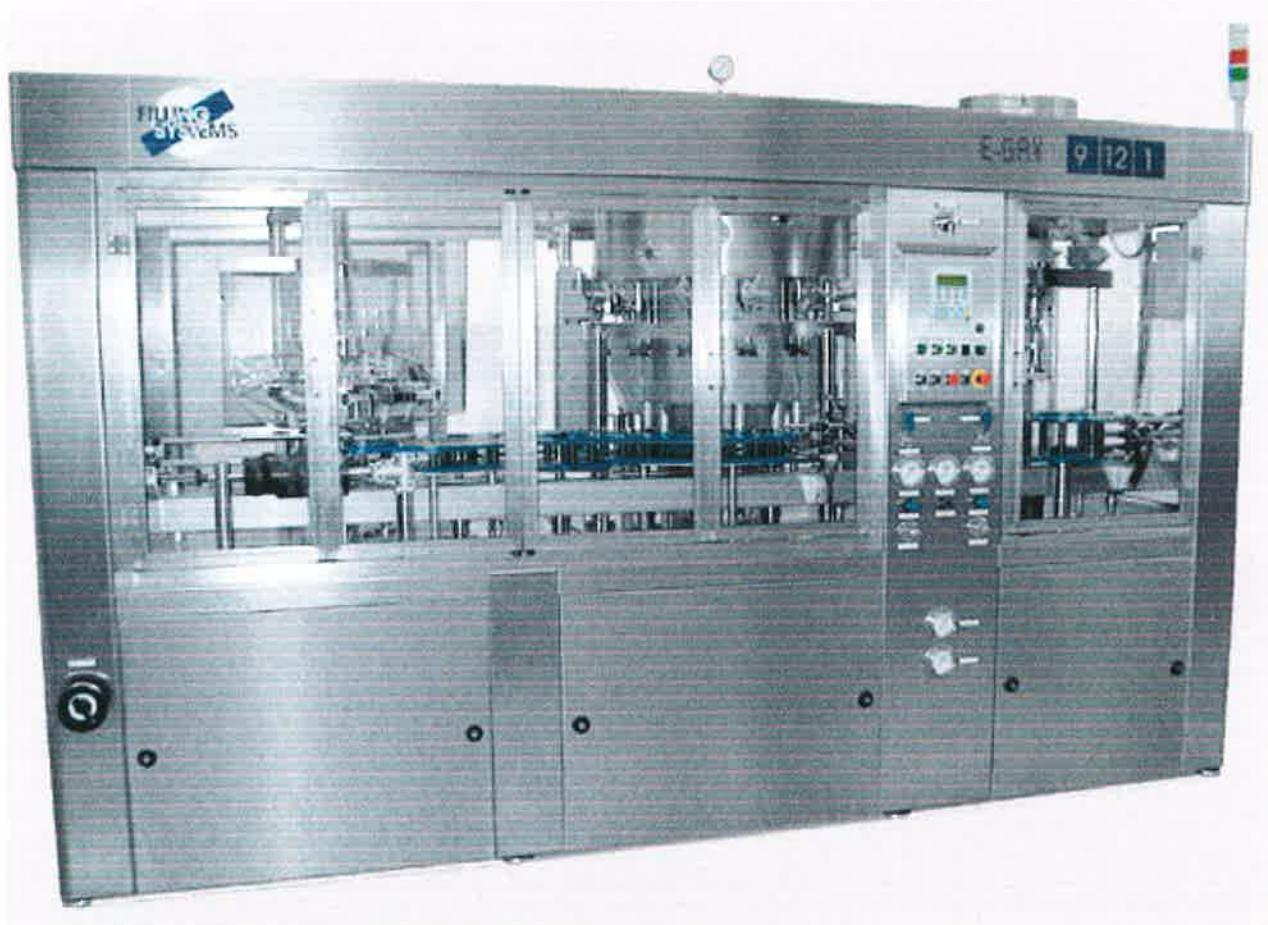


005398

Cd. Universitaria. San Nicolás De Los Garza, N.L., 4 de Julio de 2006

En el presente proyecto se describió y diseñó, la optimización de una línea de producción para el proceso de embalaje alimenticio de cueritos de puerco, realizando la modelación en CAD y simulación de los movimientos del proceso; son descritas cada una de las operaciones o estaciones de trabajo con lo cual tendrá lugar la optimización del embalaje. Actualmente se realiza de forma manual demandando tiempo de proceso, siendo envolvente para problemas de entrega de producción por falta de capacidad en la línea; por tal motivo se justifica la viabilidad del proyecto.

Además se efectúa un estudio de diagrama de tiempos y movimientos, indicando la descripción y selección del control adecuado (plc, pics, componentes) de cada estación.



Introducción.

Una empresa del ramo alimenticio se tiene problema en una de sus líneas de producción, específicamente productos curtidos de tenería (cueritos de puerco) en su proceso de embalaje, debido a las altas demandas de volumen de producción de este producto y a la falta de capacidad de la línea.

Antecedentes.

Una fabrica dedicada a la producción y envasado de productos del ramo alimenticio, se enfrenta a las necesidades de cumplir con los estándares que el mercado impone a velocidades vertiginosas, tanto en su producción como en su control de procesos y calidad. De manera interna se busca una mejor condición de trabajo en la empresa, esta necesidad se presenta a raíz de las recomendaciones que organizaciones encargadas de supervisar las condiciones en las que se realiza las actividades dentro de la industria así como la seguridad dentro del área.

Los estudios de tiempos y movimientos realizados en la empresa reflejan que el proceso de producción tiene muchas áreas de oportunidad para optimizar sus recursos tanto humanos como de infraestructura. Otro aspecto importante a considerar es la forma de evaluar sus productos contra estándares de calidad, los cuales deben ser competitivos en la rama que se desarrolla.

Los productos que Empacadora Don Chema maneja en el mercado son: chorizo de puerco y curtidos de tenería.

Basado en lo anterior es prioritario presentar un proyecto de mejora en esta área con lo cual se pretendería mejorar la línea de producción por medio de la automatización e implementación de estándares que ayuden a la empresa a exceder las normas o estándares del mercado alimenticio. Por esta razón la Facultad de Ingeniería Mecánica y Eléctrica continuando la visión de la universidad en el desarrollo de la industria estatal participara con el desarrollo de este proyecto brindando el soporte y asesoría técnica para proveer las bases necesarias para el desenvolvimiento de este proyecto.

La FIME aportara sus conocimientos en las áreas de ingeniería tales como Diseño Mecánico, Automatización y Control, Administración de Proyectos y Calidad. Dentro del Diseño Mecánico se pretende desarrollar la tecnología necesaria acorde a las necesidades para la optimización en las operaciones de esta línea de producción, en Automatización y Control se contempla el estudio y control de las variables involucradas en el proceso productivo.

Objetivos y metas.

Debido a la demanda que se ha generado del producto cueritos en vinagre, se busca automatizar la línea de envasado de este, para poder cubrir de manera satisfactoria las necesidades provocadas por el mercado alimenticio. Con el objetivo de eficientizar la producción y permitir la optimización de la línea de producción para cumplir con las demandas en el mercado a corto y a largo plazo, así como satisfacer las necesidades del cliente tanto en calidad como en precio del producto.

Automatización de la línea de producción así como el mejoramiento de sus procesos productivos.

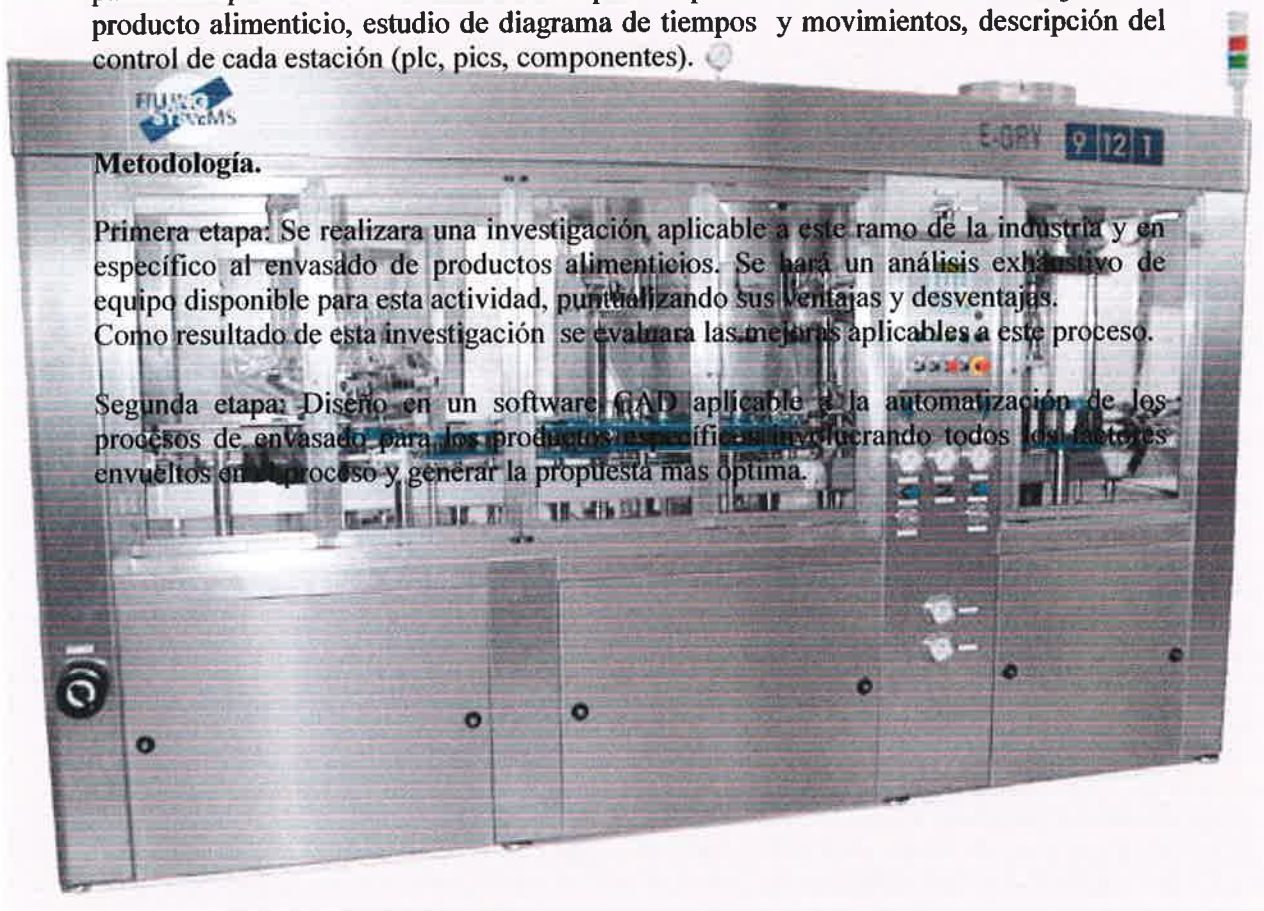
Limitación.

Tiempo para el desarrollo completo de las metas y concertación de objetivo final de Descripción del proceso, modelación en CAD y simulación de los movimientos de las partes componentes en las diferentes etapas del proceso de la línea de embalaje de un producto alimenticio, estudio de diagrama de tiempos y movimientos, descripción del control de cada estación (plc, pics, componentes).

Metodología.

Primera etapa: Se realizara una investigación aplicable a este ramo de la industria y en específico al envasado de productos alimenticios. Se hará un análisis exhaustivo de equipo disponible para esta actividad, puntualizando sus ventajas y desventajas. Como resultado de esta investigación se evaluará las mejoras aplicables a este proceso.

Segunda etapa: Diseño en un software CAD aplicable a la automatización de los procesos de envasado para los productos específicos involucrando todos los factores envueltos en el proceso y generar la propuesta más óptima.

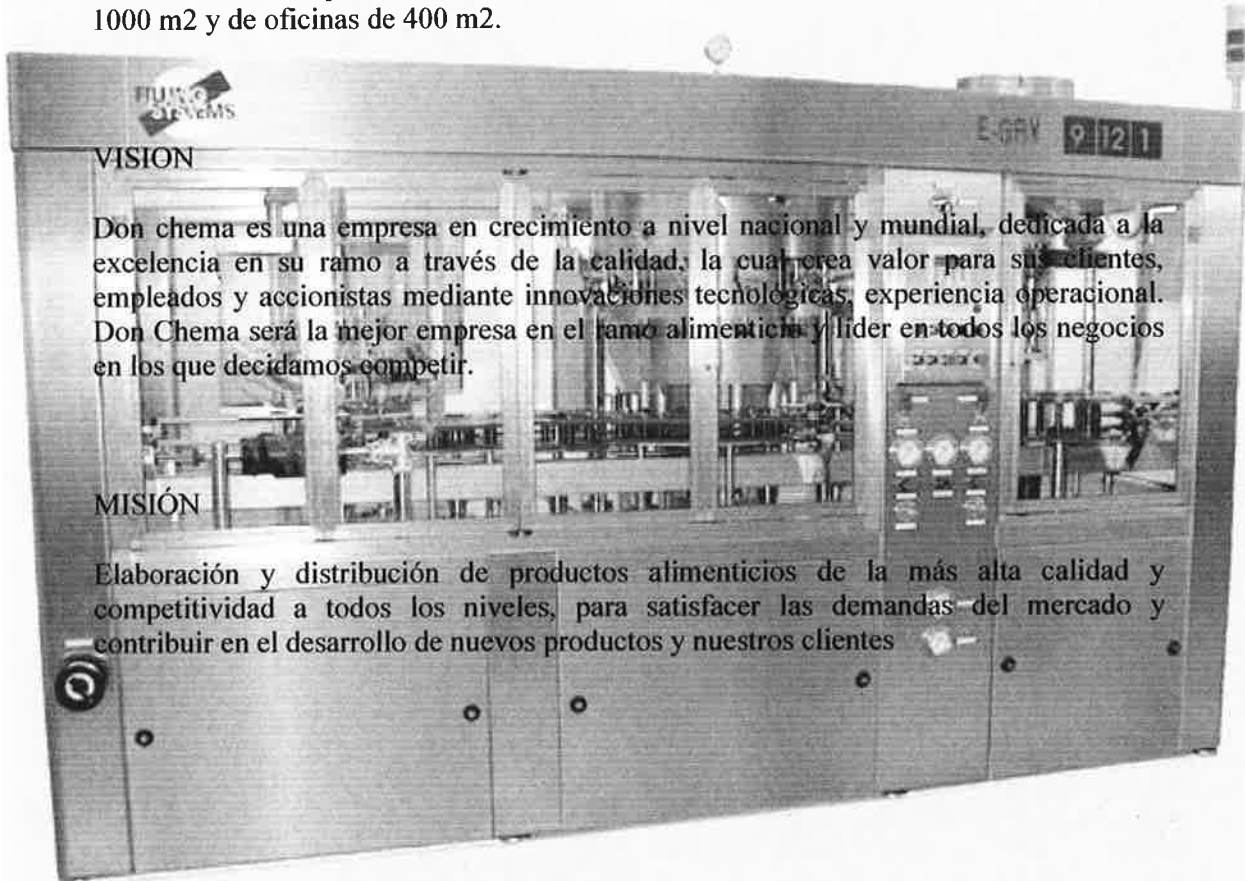


HISTORIA

Empacadora "Don Chema" S.A. de C.V. fue fundada por Don José María Cienfuegos Casanova y su esposa Doña Amelia Garza de Cienfuegos. Con más de 49 años de vida comercial, Empacadora "Don Chema" mantiene el compromiso de servicio y calidad que la ha caracterizado durante todos estos años en la elaboración de: embutidos, como Chorizo 100% de Cerdo, Chorizo de Soya, Chorizo de Pavo y Chorizo Popular.

Así mismo tenemos el área de encurtidos en donde se elaboran productos tales como: Cueritos de cerdo, Manitas de cerdo, Chile Jalapeño, Zanahoria, Papas en Vinagre, Pepinillos, Verdura en Vinagre, Champiñones en Escabeche, Chile Güero, Chile Serrano, Chile Jalapeño en Rodajas.

Como una empresa en constante crecimiento, estamos en proyecto de la nueva planta tipo TIF, que estará ubicada en Golfo de México # 798 Col. La Fe, San Nicolás de los Garza N.L.. Dicha planta esta en un terreno de 5,000 m² y su área de producción es de 1000 m² y de oficinas de 400 m².



VISION

Don chema es una empresa en crecimiento a nivel nacional y mundial, dedicada a la excelencia en su ramo a través de la calidad, la cual crea valor para sus clientes, empleados y accionistas mediante innovaciones tecnológicas, experiencia operacional. Don Chema será la mejor empresa en el ramo alimenticio y lider en todos los negocios en los que decidamos competir.

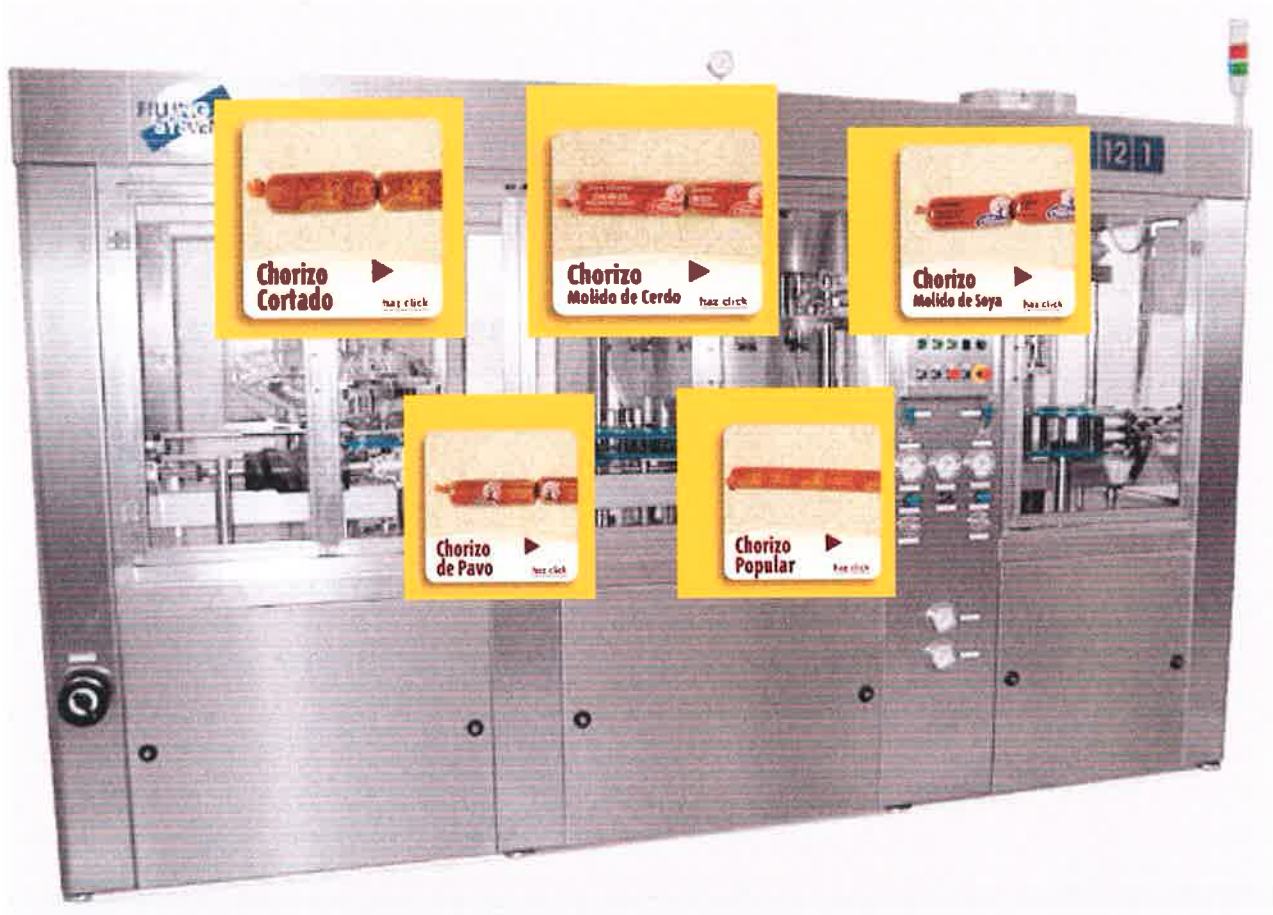
MISION

Elaboración y distribución de productos alimenticios de la más alta calidad y competitividad a todos los niveles, para satisfacer las demandas del mercado y contribuir en el desarrollo de nuevos productos y nuestros clientes

PRODUCTOS

CHORIZO

1. Chorizo popular
2. Chorizo de pavo
3. Chorizo molido de soya
4. Chorizo cortado
5. Chorizo molido de cerdo



ENCURTIDOS

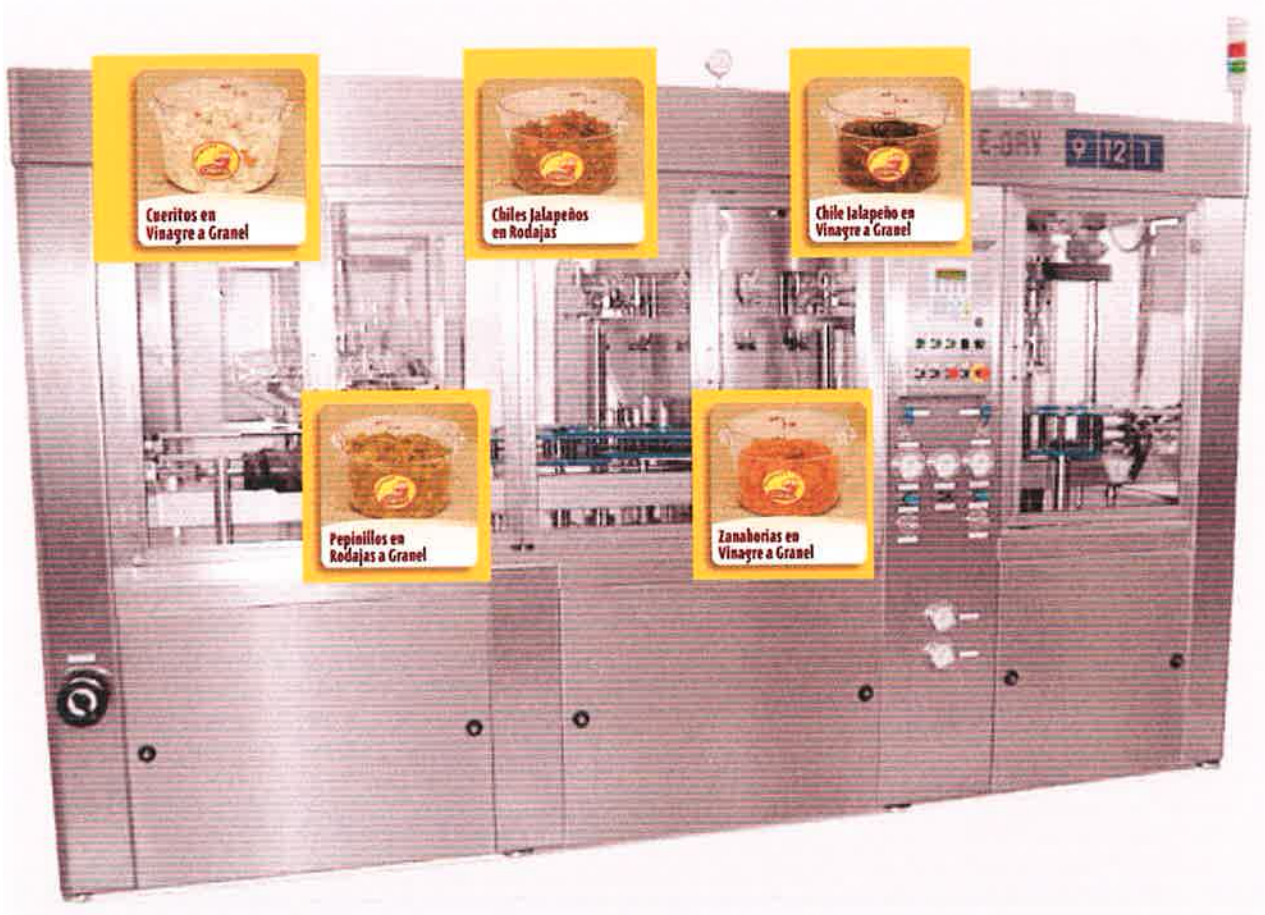
1. Chile Güero
2. Chile Jalapeño
3. Papitas en vinagre
4. Pepinillos en vinagre
5. Chile jalapeño en rodajas
6. Cueritos en vinagre
7. Verduras en vinagre
8. Zanahorias en vinagre

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ENCURTIDOS A GRANEL

1. Chile Güero en vinagre a granel
2. Chiles jalapeños en rodajas
3. Chiles jalapeños en vinagre a granel
4. Cueritos en vinagre a granel
5. Pepinillos en rodajas a granel
6. Zanahorias en vinagre a granel



Clientes

1. Soriana
2. Gigante
3. HEB
4. Wal Mart de México
5. Bodega Aurrera
6. Tiendas Gran'D
7. Arteli
8. Operadora Reynosa
9. Oxxo
10. Leal
11. Super Mode
12. Las Argentinas
13. Otras



Cobertura actual es Nuevo León, Coahuila, Tamaulipas, San Luis Potosí,
Aguascalientes, Zacatecas, Durango, León, Querétaro y Guanajuato.

Dirección.

Platón Sánchez 2032 Nte.

Col. Terminal Monterrey N. L.

C. P. 64580

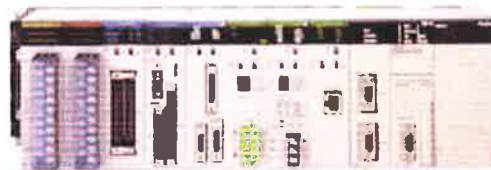
ESPECIFICACIONES:
PLC
CS1-H (OMRON)



CS1-H Controller

Next Generation CS1 Controller

Omron has analyzed applications using the CS1 controllers to better understand what customers require for improved performance. The CS1-H increased the power of high-speed control and added a broad range of functionality to the current CS1 controllers. Compatibility has been maintained with all current CS1 hardware, software, program data and more. The proud results are revealed in the new CS1-H controllers.



- Increased speed for an overall faster system
- Powerful instructions to improve applications
- Improved memory performance for greater information handling capabilities
- Evolved high-speed structured programming
- Enhanced compatibility with other Omron controllers

Features and Functions

■ **Increased Speed for an Overall Faster System**

Item	Previous Model (CS1-EV1)	New Model (CS1-H)
Common Processing	0.6ms	0.3ms
Cycle time (at 128 inputs and 128 outputs)	8 Ksteps/ms	Basic instructions only: 38 Ksteps in 1 ms With application instructions: 22 Ksteps in 1 ms or more
Peripheral response performance	Taken as "1"	In parallel processing mode: 2x
Instruction processing speed	LJ instructions	40 ns
	UJ instructions	170 ns
	Block transfer	833 µs
	Block data setting	278 µs
	BCD arithmetic operations	1.1 µs
	BCD arithmetic operations	0.2 µs
Floating-point decimal operations	Multiplication	10 µs/min
	Division	8 µs/min
	Subroutine	37 µs
		2.1 µs

■ **System Bus Speed Doubled**

The data transfer rate between the CPU and specific units has been doubled to further improve the total system performance.

■ **Fast Execution of Frequently Used Special Instructions**

The instruction performance has been improved (by as much as 20 times) in approximately 20 frequently used special instructions such as:

- CPS (Signed Binary Compare)
- JMP (Jump)
- CPSEL (Double Signed Binary Compare)
- CJP (Conditional Jump)
- XFER (Block Transfer)
- BCNT (Bit Counter)
- MOVB (Move Bit)
- MLPX (4 → 16/8 → 256 Multiplex)
- MOVD (Move Digit)
- BCD (Binary to BCD)
- BSL (Block Set)
- SBS/RET (Subroutine Call/Subroutine Return)

Specifications

Item	Specifications									
Model	OS1H-CPU67H	OS1H-CPU66H	OS1H-CPU65H	OS1H-CPU64H	OS1H-CPU63H	OS1G-CPU45H	OS1G-CPU44H	OS1G-CPU43H	OS1G-CPU42H	
No. of I/O points	5,120 (Number of expansion racks: 7)						1,280 (No. of expansion racks: 3)	960 (No. of expansion racks: 2)		
Program capacity	250K steps	120K steps	60K steps	30K steps	20K steps	60K steps	30K steps	20K steps	10K steps	
DM area	32 kW									
EM area	32kW x 13 banks	32kW x 7 banks	32kW x 3 banks	32kW x 1 bank	32kW x 1 bank	32kW x 3 banks	32kW x 1 bank	32kW x 1 bank	32kW x 1 bank	
LD instruction time	0.02 μ s					0.04 μ s				
Control	Stored Program Memory									
I/O control	Both Cycle Scan Method and On-Demand Mode can be used									
Programming languages	Ladder									
Instruction length	1 to 7 steps/instruction									
No. of instructions	Approx. 400									
No. of tasks	288 (256 shared with interrupt tasks)									
Interrupt types	Scheduled interrupts, I/O interrupts, power OFF interrupt, and external I/O interrupts (interrupts from Inner Boards and CPU Bus Units)									
Internal communications port	1 peripheral port and 1 RS-232C port									
Mountable optional products	Memory Cards, Inner Boards (e.g., Serial Communications Boards)									
Standards	UL, CSA, cULus, cUL, NK and/or Lloyd's Register, EC Directives, EM Standard (EN50081-2) and EMS Standard (EN6131-2)									
Main functions	Peripheral service parallel processing, constant (minimum) cycle time, cycle time monitoring, input time constant settings, debugging (online edit, virtual error generation, forced set and reset, data trace, differential monitoring, etc.), drum protection, diagnostic check, error history clock, power OFF detection delay time, remote programming and monitoring, three-level communications, etc.									
Software	CX-Programmer V2.1 CX-Protocol V1.2 CX-Simulator V1.2									

MODULOS DE EXPANSION
SERIE CS1

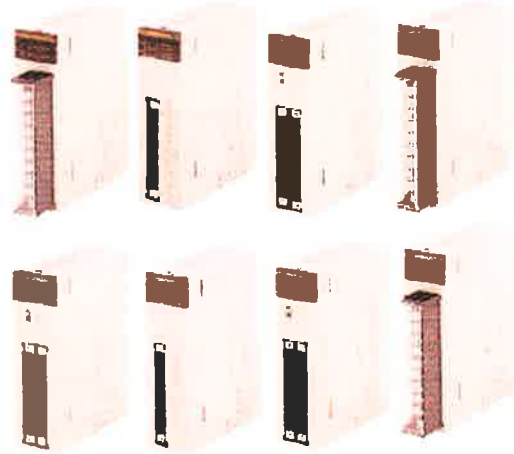


PRODUCT OVERVIEW

CS1 Series

CS1 Basic I/O Modules

Omron expands the CS1 series with the release of the new CS1 Basic I/O modules. The new additions include DC inputs/outputs, an interrupt input module, and a high speed input module. The new modules add faster I/O refresh times, faster interrupt response times, and greatly improved switching capacities.



- ◆ **Faster I/O Refresh Times with CS1 Bus Compatibility**

Reduced cycle time. Example:
C200H-ID217 = 0.20ms
CS1W-ID26 = 0.014ms

- ◆ **Input Modules – Variable Input Response Time**

Speed up or slow down input responses, eliminates chattering or external noise in the signal.

- ◆ **Input Modules – Improved Sensor Connectivity**

An input current of 7mA with a 16 point module and 6mA with 32 or 64 point modules will improve connectivity with 2 wire proximity sensors and cylinder sensors.

- ◆ **Output Modules – Improved Switching Capacity**

Able to connect to more output devices with 16 and 32 point modules (0.5A per point) and 64 point modules (0.3A per point).

- ◆ **Output Modules – Sourcing Outputs with Built-in Load Short Circuit Protection**

Protection from damage due to incorrect wiring or external device breakdown.

- ◆ **Interrupt Input Modules – Faster Response Time**

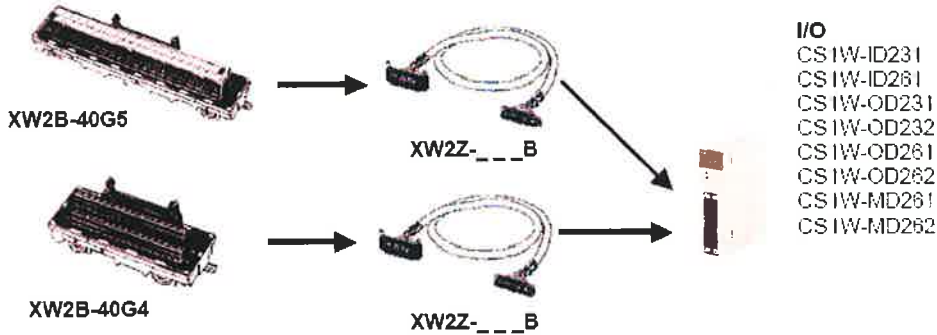
Response time has been improved (0.42ms OFF to ON and 1ms ON to OFF), detects rising or falling edges, supports 16 interrupt inputs.

CONFIGURATIONS

CS1 Basic I/O Modules

NOTE: Cable options and lengths are described in GC RIO-1

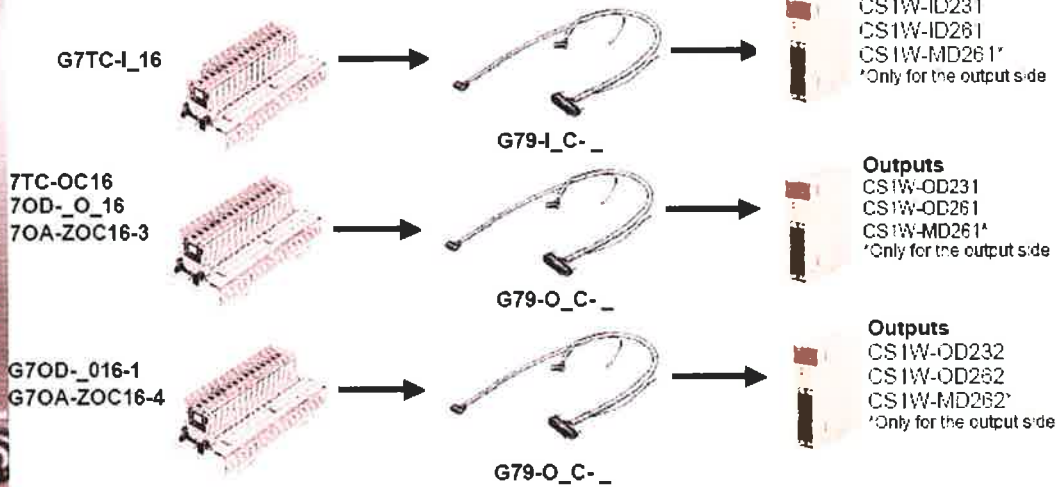
Connections to Terminal Blocks



- I/O**
- CS1W-ID231
 - CS1W-ID261
 - CS1W-OD231
 - CS1W-OD232
 - CS1W-OD261
 - CS1W-OD262
 - CS1W-MD261
 - CS1W-MD262

- Inputs**
- CS1W-ID231
 - CS1W-ID261
 - CS1W-MD261*
 - CS1W-MD262*
- *Only for the input side*

Connections to Relay Terminals



- Inputs**
- CS1W-ID231
 - CS1W-ID261
 - CS1W-MD261*
- *Only for the output side

- Outputs**
- CS1W-OD231
 - CS1W-OD261
 - CS1W-MD261*
- *Only for the output side

- Outputs**
- CS1W-OD232
 - CS1W-OD262
 - CS1W-MD262*
- *Only for the output side

SPECIFICATIONS

CS1 Basic I/O Modules

Part Number	Description	Rated Voltage	Input Current	Maximum Load Current	Leakage Current	ON/OFF Voltage Current	Response Time ON/OFF	Internal Current Consumption
CS1W-0201	DC Input (16 pins)	12 to 24 VDC +10%/-5%	7mA typical at 24 VDC	—	—	14.4VDC min/5mA min(OH) 5VDC max/1mA max(OFF)	50ms max(OH) 50ms max(OFF) *See Note	100 mA max
CS1W-0201	DC Input (32 pins)	24 VDC +10%/-5%	5mA typical at 24 VDC	—	0.1 mA	15.4VDC min/5mA min(OH) 5VDC max/1mA max(OFF)	50ms max(OH) 50ms max(OFF) *See Note	150 mA max
CS1W-0201	DC Input (64 pins)	24 VDC +10%/-5%	5mA typical at 24 VDC	—	0.1 mA	15.4VDC min/5mA min(OH) 5VDC max/1mA max(OFF)	50ms max(OH) 50ms max(OFF) *See Note	150 mA max
CS1W-0201	Transistor Output (16 pins NPN Sinking)	12 to 24 VDC	—	5A typ. 4A Common, 8A module	max	—	50ms max(OH) 1ms max(OFF)	5 VDC, 170 mA max
CS1W-0201	Transistor Output (16 pins PNP Sourcing)	12 to 24 VDC	—	5A typ. 2.5A Common, 5A module	1.5V max	—	50ms max(OH) 1ms max(OFF)	5 VDC, 170 mA max
CS1W-0201	Transistor Output (32 pins NPN Sinking)	12 to 24 VDC	—	5A typ. 2.5A Common, 5A module	0.1 mA	—	50ms max(OH) 1ms max(OFF)	5 VDC, 270 mA max
CS1W-0201	Transistor Output (32 pins PNP Sourcing)	12 to 24 VDC	—	5A typ. 2.5A Common, 5A module	Max	—	50ms max(OH) 1ms max(OFF)	5 VDC, 270 mA max
CS1W-0201	Transistor Output (64 pins NPN Sinking)	12 to 24 VDC	—	5A typ. 2.5A Common, 5A module	Max	—	50ms max(OH) 1ms max(OFF)	5 VDC, 390 mA max
CS1W-0201	Transistor Output (64 pins PNP Sourcing)	12 to 24 VDC	—	5A typ. 2.5A Common, 5A module	max	—	50ms max(OH) 1ms max(OFF)	5 VDC, 390 mA max
CS1W-ND201	DC Input (32 pins)	24 VDC +10%/-5%	5mA typical at 24 VDC	—	—	15.4VDC min/5mA min(OH) 5VDC max/1mA max(OFF)	50ms max *See Note	5 VDC, 270 mA max
CS1W-ND201	Transistor Output (32 pins NPN Sinking)	12 to 24 VDC	—	3A typ. 1.5A common, 2.5A module	0.1 mA	—	50ms max(OH) 1ms max(OFF)	5 VDC, 270 mA max
CS1W-ND201	DC Input (64 pins)	24 VDC +10%/-5%	5mA typical at 24 VDC	—	—	15.4VDC min/5mA min(OH) 5VDC max/1mA max(OFF)	50ms max(OH) 50ms max(OFF) *See Note	5 VDC, 270 mA max
CS1W-ND201	Transistor Output (64 pins NPN Sinking)	12 to 24 VDC	—	3A typ. 1.5A common, 2.5A module	0.1 mA	—	50ms max(OH) 1ms max(OFF)	5 VDC, 270 mA max
CS1W-DF01	High Speed Input (16 pins)	24 VDC +10%/-5%	7mA typical at 24 VDC	—	—	14.4VDC min/5mA min(OH) 5VDC max/1mA max(OFF)	7ms max(OH) 50ms max(OFF)	100 mA max

Note: Possible to select one from 0 to 32 ms in the PC Setup.

SENSORES

E4B

OMRON

Ultrasonic Sensor With Zone Sensing

E4B

Through-beam, Reflective and
 Zone Models

- 1 m through-beam for long range applications
- Narrow beam angle of 8° detects objects as small as 2 x 2 cm
- Zone models detect objects smoothly while suppressing interference from background objects
- 200 kHz provides high immunity from environmental noise
- User-selectable normally open and normally closed operation



Ordering Information

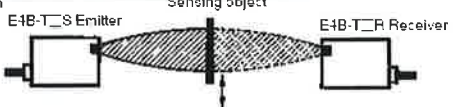
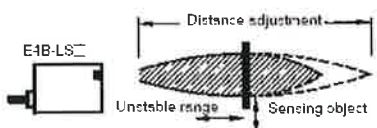
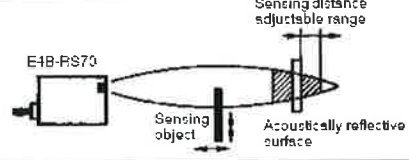
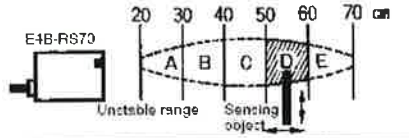
Supply voltage	Sensing type	Sensing distance	Cable length	Part number		
				NPN output	PNP output	
12 to 24 VDC	Through-beam	1 m	2 m	E4B-T1E4 2M	E4B-T1F4 2M	
			5 m	E4B-T1E4 5M	E4B-T1F4 5M	
		50 cm	2 m	E4B-TS50E4 2M	E4B-TS50F4 2M	
			5 m	E4B-TS50E4 5M	E4B-TS50F4 5M	
		Zone setting	20 to 70 cm	2 m	E4B-RS70E4 2M	E4B-RS70F4 2M
				5 m	E4B-RS70E4 5M	E4B-RS70F4 5M
	Distance setting	20 to 70 cm	2 m	E4B-LS70E4 2M	E4B-LS70F4 2M	
			5 m	E4B-LS70E4 5M	E4B-LS70F4 5M	
		5 to 20 cm	2 m	E4B-LS20E4 2M	E4B-LS20F4 2M	
			5 m	E4B-LS20E4 5M	E4B-LS20F4 5M	

E4B

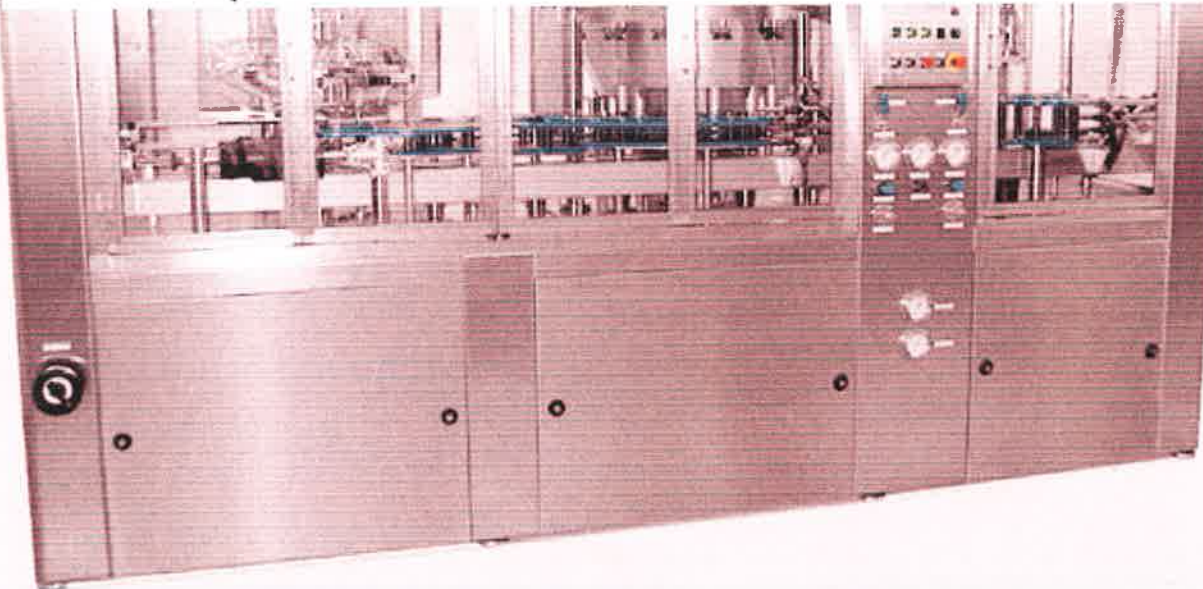
OMRON

E4B

■ SENSING TYPE

Through-beam		<p>Detects the attenuation or interrupted condition of the ultrasonic beam caused by the object passing between the Emitter and Receiver.</p> 
Reflective	Setting distance	<p>Detects only the beam reflected from the object existing within the sensing distance range set with the distance adjuster.</p> 
	Setting zone	<p>Detects the object with the interruption of the normal beam reflected from the acoustically reflective surface.</p> 
	Sensing target	<p>Detects only the beam reflected from the object existing in the sensing range set with the distance selector.</p> 

Note: An object may be detected due to multiple reflection if the object is in the unstable range where the distance adjuster is ineffective, in which case however, the detection of the object will not be stable. Therefore, do not attempt to use the E4B to detect an object in the unstable range.

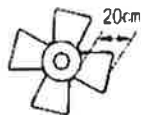


Specifications

■ RATINGS/CHARACTERISTICS

Part number		E4B-TS50E4	E4B-T1E4	E4B-LS20E4	E4B-LS70E4	E4B-RS70E4
Sensing method		Through-beam		Distance setting		Zone setting
Supply voltage		12 to 24 VDC \pm 10% (10.8 to 26.4 VDC) with a max. ripple \pm 10% (p-p)				
Current consumption	12 VDC	Emitter: 155 mA max. Receiver: 30 mA max.	Emitter: 70 mA max. Receiver: 30 mA max.	100 mA max.		
	24 VDC	Emitter: 80 mA max. Receiver: 30 mA max.	Emitter: 50 mA max. Receiver: 30 mA max.	50 mA max.		
Sensing distance		50 cm (19.69 in)	1 m (3.28 ft)	5 to 20 cm (1.97 to 7.87 in)	20 to 60 cm (20 to 70 cm) (See Note 1.) (7.87 in to 23.62 in)	20 to 60 cm (20 to 70 cm) (See Note 1.) (in 10-cm divisions) (7.87 to 23.62 in)
Standard sensing object		10 x 10 cm flat plate		4 x 4 cm flat plate		
Differential travel		—		20% max. of sensing distance		3 cm max.
Directional angle (See Note 2.)		$\pm 8^\circ$ max.				
Ultrasonic oscillation frequency		200 kHz				
Switching frequency (See Note 3.)		50 Hz	10 Hz	50 Hz	20 Hz	
Response time		10 ms	50 ms	10 ms	25 ms	
Operating mode		N.O. or N.C. selectable				
Control output	NPN PNP	100 mA at 30 VDC (with a residual voltage of 1.5 V max.) and an output resistance of 4.7 k Ω				
Residual voltage		1.5 V max. under a load current of 100 mA				
Indicators		SENSING indicator (red LED) and STABILITY indicator (green LED)				
Ultrasonic speed compensation		No				Yes
Ambient operating temperature		-10°C to 55°C (14°F to 131°F)				
Relative humidity		35% to 95%				
Temperature influence		$\pm 10\%$ max. of sensing distance at 20°C (68°F) in the temperature range of -10°C and 55°C (14°F to 131°F)				
Voltage influence		$\pm 5\%$ max. of sensing distance at a voltage between 90% and 110% of the rated power supply voltage				
Insulation resistance		20 M Ω min. at 500 VDC between current carry parts and case				
Dielectric strength		1,000 V (50/60 Hz) for 1 min between current carry parts and case				
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z axes				
Shock resistance		500 m/s ² (approx. 50G) 3 times each in X, Y, and Z axes				
Enclosure rating		IEC IP66 (water resistant)				
Approvals	UL, cUL	Recognized. File No. E41515 when used with a Class 2 power source				
Weight (with 2-m-long cord and Mounting Bracket)		Approx. 600 g (21 oz) with Emitter and Receiver		Approx. 300 g (10.6 oz)		

- Note: 1. These are the available sensing distances at an ambient temperature range between 0°C and 45°C (32°F to 113°F)
 2. Signal attenuation of -6 dB.
 3. The switching frequencies are values obtained with the E4B used for detecting a rotating propeller-shaped disc as shown below.



Space:Blade = 1:1

CORTINAS DE SEGURIDAD F3SN-A25
RANGO DE OPERACIÓN 10m.
CAPACIDAD DE DETECCION 25mm DE DIAMETRO
CON UN ESPACIO DE 15mm ENTRE RAYOS.

OMRON

Safety Light Curtain & Multiple-beam Safety Sensor
F3SN-A & F3SH-A

The Ideal Safety Sensor for Every Application

OMRON provides safety two ways:
The Safety Light Curtain
and the Multiple-beam
Safety Sensor



Finger Protection

Safety Light Curtain
F3SN-A□□□□P14

- Operating range: 7 m
- Detection capability: 14 mm dia. (Beam gap: 9 mm)
- Protective height: 189 to 1125 mm



Hand Protection

Safety Light Curtain
F3SN-A□□□□P25

- Operating range: 10 m
- Detection capability: 25 mm dia. (Beam gap: 15 mm)
- Protective height: 217 to 1822 mm



Presence Detection in Danger Zone
(Horizontal Installation)

Safety Light Curtain
F3SN-A□□□□P40/P70

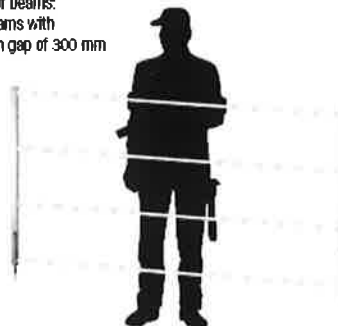
- Operating range: 10 m
- Detection capability: 40 mm dia. (Beam gap: 30 mm)
70 mm dia. (Beam gap: 60 mm)
- Protective height:
F3SH-A: 217 to 1822 mm



Body Protection

Multiple-beam Safety Sensor
F3SH-A09P03

- Operating range: 10 m
- No. of beams: 4 beams with beam gap of 300 mm



Safety Light Curtain
F3SN-A & F3SH-A

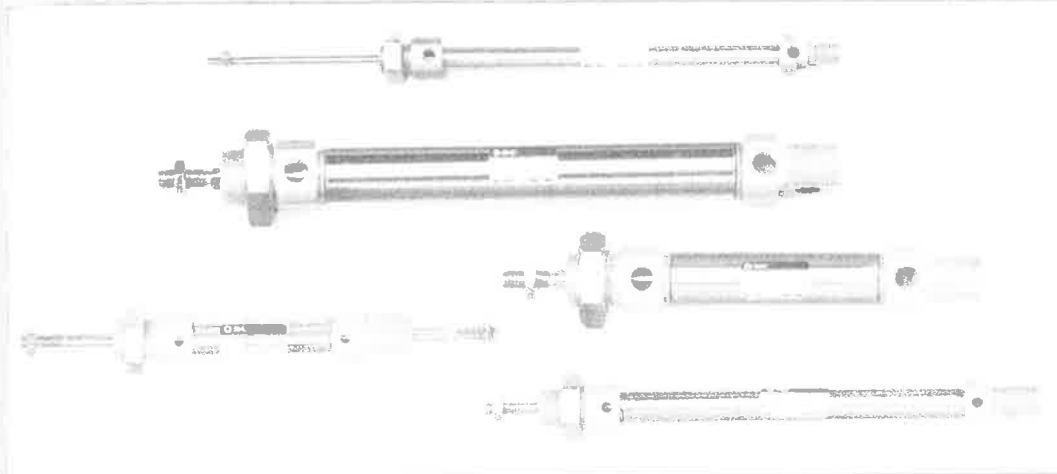
Titulo de proyecto: MODELACION Y SIMULACION DE
MOVIMIENTOS DE UNA LINEA DE EMBALAJE DE PRODUCTOS
ALIMENTICIOS

Responsable: M.C. Bernardo González Ortiz
Tutor: Dr. Luis Del Llano Vizcaya

Model	Stand-alone	F3SN-A P14 (see note 1)	F3SN-A P25 (see note 1)	F3SN-A P40 (see note 1)	F3SN-A P70 (see note 1)	F3SH-A09P03
Item	Series connection	F3SN-A P14-01 (see notes 1 and 2)	F3SN-A P25-01 (see note 1)	F3SN-A P40-01 (see note 1)	F3SN-A P70-01 (see note 1)	F3SH-A09P03-01
Sensor type						
Type 4 Safety Light Curtain						
Applicable safety category						
4, 3, 2, 1, B						
Operating range						
0.2 to 7 m						
Beam gap (P)						
9 mm						
Number of beams (n)						
21 to 125 (odd numbers only)						
Protective height (PH)						
189 to 1125 mm PH = n × P						
Outermost beam gap						
900 mm						
Detection capability						
Non-transparent: 14 mm in diameter Non-transparent: 25 mm in diameter Non-transparent: 40 mm in diameter Non-transparent: 70 mm in diameter						
Effective aperture angle (EAA)						
Within ±2.5° for the emitter and receiver at a detection distance of at least 3 m according to IEC 61496-2						
Light source (luminous wavelength)						
Infrared LED (870 nm)						
Supply voltage (Vs)						
24 VDC ±10% (ripple p-p 10% max.)						
Current consumption (under no-load conditions)						
Emitter						
Up to 50 beams: 140 mA max., 51 to 85 beams: 155 mA max., 86 beams and more: 170 mA max.						
Receiver						
Up to 50 beams: 100 mA max., 51 to 85 beams: 110 mA max., 86 beams and more: 120 mA max.						
OSSD						
Two PNP transistor outputs, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)						
Auxiliary output (non-safety output)						
One PNP transistor output, load current 50 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)						
External indicator output (non-safety output) (see note 3)						
One PNP transistor output, load current 40 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension)						
Output operation mode						
OSSD output: Light-ON Auxiliary output: Dark-ON (can be changed by the F39-MC11) External indicator output: Light-ON (can be changed by the F39-MC11) (see note 3)						
Input voltage						
For test input, interlock selection input, reset input, and external relay monitor input voltages; ON voltage: 9 to 24 V (with a sink current of 3 mA max.), OFF voltage: 0 to 1.5 V or open						
Test functions						
<ul style="list-style-type: none"> Self-test (after power ON, and during operation, one cycle during response time) External test (light emission stop function by test input) 						
Mutual interference prevention function (see note 3)						
<ul style="list-style-type: none"> Time-shared beam projection system by series connection Number of series connected light curtains: Up to 3 sets Number of beams: Up to 240 beams Length of the series connection cable: 3 m max. 						
Safety-related functions						
<ul style="list-style-type: none"> Auto reset/manual reset (interlock) (see note 4) EDM (External Device Monitoring) Fixed blanking (see note 5) Floating blanking (see note 5) 						
Protection						
Output short-circuit protection, reverse polarity protection						
Response time (under stable light incident condition)						
ON to OFF: 10 to 15.5 ms max. OFF to ON: 40 to 62 ms max. Refer to page 28 for details						
Startup waiting time						
1 s max.						
Ambient light intensity						
Incandescent lamp: 3000 lx max. (light intensity on the receiver surface) Sunlight: 10000 lx max. (light intensity on the receiver surface)						
Ambient temperature						
Operating: -10 to +55 °C, storage: -30 to +70 °C (with no icing or condensation)						
Ambient humidity						
Operating/storage: 35 to 95% RH (with no condensation)						
Insulation resistance						
20 MΩ min. (at 500 VDC)						
Dielectric strength voltage						
1000 VAC 50/60 Hz 1 min						
Vibration resistance (malfunction)						
10 to 55 Hz, double amplitude: 0.7 mm, X, Y and Z directions: 20 sweeps						
Shock resistance (malfunction)						
100 m/s ² , X, Y and Z directions: 1000 times						
Degree of protection						
IP65 (IEC60529)						
Connection method						
M12 connector (8 pins)						
Weight (In packaging)						
Calculate with the following equation: Weight of light curtain with protective height of 189 mm to 738 mm: (g) = (Protective height + 100) × 2 + 1300 Weight of light curtain with protective height of 747 mm to 1402 mm: (g) = (Protective height + 100) × 2 + 1700 Weight of light curtain with protective height of 1417 mm to 1822 mm: (g) = (Protective height + 100) × 2 + 2100						
Materials						
Case: Aluminum, cap: Zinc die-cast, optical cover: PMMA (acrylic resin)						
Accessories						
Test rod (see note 6), instruction manual, error mode label, mounting brackets (top and bottom), mounting brackets (intermediate) (see note 7)						
Applicable standard						
IEC61496-1, EN61496-1 Type 4 ESPE (Electro-Sensitive Protective Equipment) IEC61496-2 Type 4 AOPD (Active Opto-electronic Protective Devices)						

ACTUADORES

Conforms to ISO 6432 and CETOP RP52P



Variations

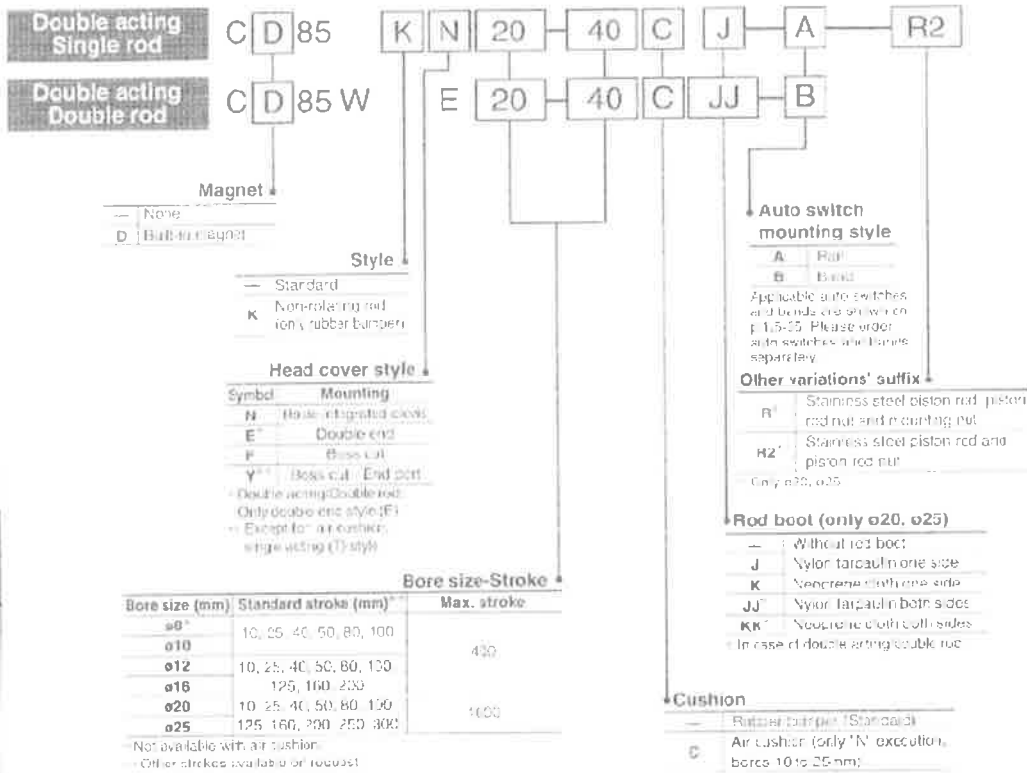
Series	Action	Rod style	Cushion	Head cover style				Switch mount		Rod boot (ø20, 25)	Bore (mm)	Page
				N	E	F	Y	Rail	Band			
Standard Series CR5 	Double acting	Single	Rubber	•	•	•	•	•	•	•	15-2	
		Double	Rubber	•	•	•	•	•	•	•		
	Single acting (SR, SE)	Single	Rubber	•	•	•	•	•	•	•		15-16
		Double	Rubber	•	•	•	•	•	•	•		
Non-rotating rod 	Double acting	Single	Rubber	•	•	•	•	•	•	•	15-2	
	Single acting (SR, SE)	Single	Rubber	•	•	•	•	•	•	•	15-16	
Direct mount 	Base Front	Double acting	Single	Rubber	•	•	•	•	•	•	15-30	
		Double acting	Single	Rubber	•	•	•	•	•	•		

SR=Spring return
SE=Spring extend



Responsible: M.C. Bernardo Gonzalez Ortiz
 Title: Full time from 1998 to present

How to Order



Mounting Bracket Part No

Bracket	Bore (mm)					
	8	10	12	16	20	25
Foot (1 pc.)	C85L10A	C85L12A	C85L16A	C85L20A	C85L25A	
Foot (2 pcs. with mounting nut: 1 pc.)	C85L10B	C85L12B	C85L16B	C85L20B	C85L25B	
Flange	C85F10	C85F12	C85F16	C85F20	C85F25	
Trunnion	C85T10	C85T12	C85T16	C85T20	C85T25	
Clevis	C85C10	C85C12	C85C16	C85C20	C85C25	
Single knuckle joint	KJ40	KJ50	KJ60	KJ80	KJ100	
Double knuckle joint	GKM4-8	GKM5-10	GKM6-12	GKM8-16	GKM10-20	
Floating joint	JA10-4-070	JA15-6-100		JA20-10-125	JA25-10-125	

Note) Please order mounting brackets separately

Replacement Parts

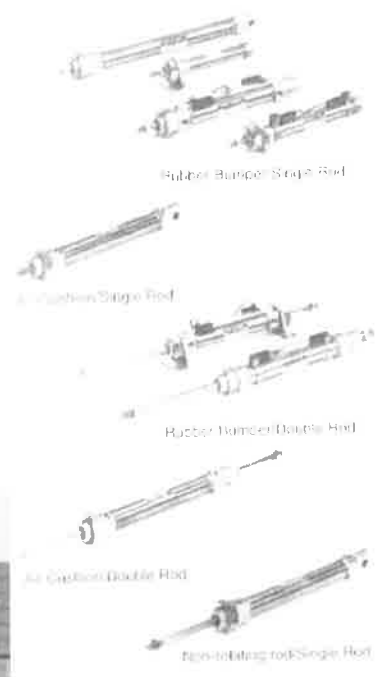
For Standard Cylinders

Bore (mm)	Kit No.	Note
20	C85-20FS	Every set includes: 1 rod seal 1 packing retaining washer retaining ring
25	C85-25FS	

For Non-rotating Cylinders ("K")

Bore (mm)	Kit No.	Note
20	C85K-20PS	Every set includes: 1 rod seal 1 packing retaining washer retaining ring
25	C85K-25PS	

Responsable: M.C. Bernardo Gonzalez Ortiz
Tutor: Dr. Luis Del Llano vizcava



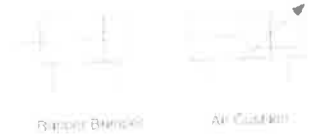
Specifications

Bores size (mm)	8	10	12	16	20	25
Extended size (mm)	4	4	5	6	6	10
Piston diameter	M4 X 0.7	M4 X 0.7	M6 X 1	M6 X 1	M8 X 1.25	M8 X 1.25
Pins	M5	M5	M5	M5	G1/8	G1/8
Action	Double acting single or Double rod					
Fluid	Air					
Fluid pressure	15MPa					
Max operating pressure	10MPa					
Min operating pressure	0.1MPa	0.2MPa	0.05MPa			
Allowed fluid temperature	-20 to 62°C (Rubber bumper) 10 to 100°C					
Condition	Rubber bumper: Air cushion (except for air cushioning only rubber bumper)					
Lubrication	Not required. If necessary for use in air, ISO VG 32 is recommended					
Material	Nylon Aluminum				Max ambient temperature 60°C	
Head end	Nodular cast iron				Max ambient temperature 110°C	
Piston speed	50 to 1500mm/s					
Allowable kinetic energy	Rubber bumper	0.02J	0.03J	0.04J	0.1J	0.4J
	Air cushion	-	0.1J	0.1J	0.1J	0.6J
Non-rotating accuracy**	±1-30	±1-30	±1	±1	10-42	±0-42
Stroke tolerance	0.1			0.1-1.4		

* Maximal ambient temperature of gas 110MPa
** Approximate surface fitting irregularity

Symbol

Double Acting/Single Rod



Double Acting/Double Rod



Non-rotating rod Double Acting/Single Rod



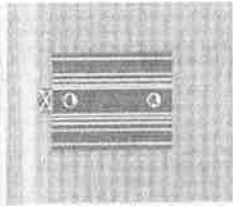
Weight (Standard, Non-rotating rod)

Bores size (mm)	8	10	12	16	20	25
Double action	Basic weight					
Double rod	Additional weight for each 10mm of stroke					
Mounting bracket	CBSL-A	25	40	65	105	150
	CBSL-B	35	55	85	135	195
	CBSFL	15	25	45	75	115
	CBSF	20	35	55	95	145
	CBSCF	20	35	55	95	145
Accessories	Single knuckle joint	KJCD	17	25	45	70
	Double knuckle joint	GKM	10	20	35	60
	Floating joint	JAF	10	20	35	60

Calculation Example CBSL10-50, CBSF10
Basic weight 40 (p.15)
Additional weight 32 (10mm x 3.2mm)
Cylinder weight 107mm
Mounting bracket 17
40+32+107+17=196

1: 1/2 case of air cushion

Responsable: M.C. Bernardo Gonzalez Ortiz
 Tutor: Dr. Luis Del Llano Vizcaya



Compact Cylinder Series CQS

ø12, ø16, ø20, ø25

Ideal for machine designs with small space requirements

The "D-AB" and "D-AB 1" auto switches will not protrude from switch mounting groove.

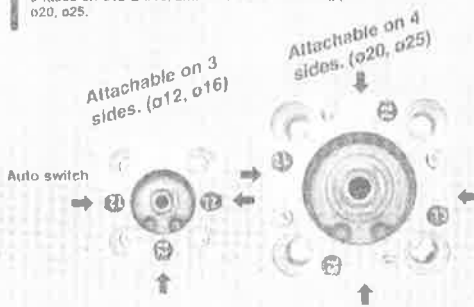
Square body shape gives you flexibility for machine design

Auto switch mounting allows for flexible designing requirements

3 faces on ø12 & ø16, and all 4 faces including port side on ø20, ø25.

2 way basic mounting: Through-hole or both ends tapped

Basic mounting is 2 way. You can choose either through-hole or both ends tapped mounting.



**Non-rotating piston rod model
 Superior non-rotating accuracy**

Hexagonal cross sectional shape piston rod for high non-rotation accuracy.
 ø12, ø16 — ±1°
 ø20, ø25 — ±0.7°

CU
 CQS
 CQ2
 MU

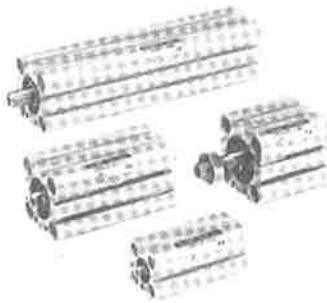
Variations

Basic model	Variations (Standard)	Applicable auto switch	Bore size (mm)	Stroke (mm)	Page
Basic	Series CQS	Reed switch D-A90, A90V D-A93, A93V D-A96, A96V	12, 16, 20, 25	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	2.2-2
	Series CQSW				
Non-rotating rod	Series CQS	Solid state switch D-F5N, F5NV D-F9P, F9PV D-F9B, F9BV D-F9W, F9WV D-F9W, F9WV	12, 16, 20, 25	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	2.2-16
	Series CQSK				
Anti-lateral Load	Series CQS-S				2.2-30

1 Non-rotating rod/Double acting double rod can be reverse
 2 Available only for standard stroke model

Responsable: M.C. Bernardo Gonzalez Uriz
Tutor: Dr. Luis Del Llano Vizcava

Compact Cylinder/Standard: Double Acting Single Rod **Series CQS**



Specifications

Style	Pneumatic (Non-lube)
Action	Double acting, single rod
Fluid	Air
Proof pressure	1.5MPa
Max. operating pressure	1.0MPa
Ambient & fluid temperature	Without auto switch -10°C to 70°C (No freezing) With auto switch -10°C to 60°C (No freezing)
Rubber bumper	Standard stroke: None Long stroke: Standard equipment
Rod end thread	Female
Rod end thread tolerance	JIS class 2
Stroke length tolerance	Standard stroke: ± 0.1 Long stroke: ± 0.2
Basic mounting	Through-hole/Both ends tapped
Operating piston speed	50 to 500 mm/s

Minimum Strokes for Auto Switch Mounting

No. of auto switches	D-A9LJ, D-F9CJV	D-A9CJV	D-F9N	D-F9F, D-F9CJW	D-F9CIV	D-F9BA
2	10	10	15*	20*	5	25*
1	10*	5	15*	20*	5	25*

* Consult SMC for shorter stroke lengths than indicated in the table.

JIS symbol



Theoretical Force

Bore size (mm)	Rod diameter (mm)	Operation	Piston area (mm ²)	Operating pressure (MPa)		
				0.3	0.5	0.7
12	5	IN	84.8	25	42	59
		OUT	113	34	57	79
16	8	IN	151	45	75	106
		OUT	201	60	101	141
20	10	IN	236	71	118	165
		OUT	314	94	157	220
25	12	IN	378	113	189	264
		OUT	491	147	245	344

CU
CQS
CQ2
MU

Intermediate Strokes

Method	Spacer is attached on standard stroke body.		Exclusive body (-XB10)															
Model no.	Refer to "How to Order" for standard model no.		Specify "-XB10" at the end of standard model number.															
Standard stroke	Method	Intermediate strokes at 1mm intervals are available by using spacers with standard stroke cylinders.	Intermediate strokes at 1mm intervals are available by using exclusive body with required stroke.															
	Stroke range	<table border="1"> <thead> <tr> <th>Bore size</th> <th>Stroke range</th> </tr> </thead> <tbody> <tr> <td>12, 16</td> <td>1 to 30</td> </tr> <tr> <td>20, 25</td> <td>1 to 50</td> </tr> </tbody> </table>	Bore size	Stroke range	12, 16	1 to 30	20, 25	1 to 50	<table border="1"> <thead> <tr> <th>Bore size</th> <th>Stroke range</th> </tr> </thead> <tbody> <tr> <td>12, 16</td> <td>6 to 30</td> </tr> <tr> <td>20, 25</td> <td>6 to 50</td> </tr> </tbody> </table>	Bore size	Stroke range	12, 16	6 to 30	20, 25	6 to 50			
Bore size	Stroke range																	
12, 16	1 to 30																	
20, 25	1 to 50																	
Bore size	Stroke range																	
12, 16	6 to 30																	
20, 25	6 to 50																	
Long stroke	Method	Intermediate strokes at 5mm intervals are available by using spacers with standard stroke cylinders.	Intermediate strokes at 1mm intervals are available by using exclusive body with required stroke.															
	Stroke range	<table border="1"> <thead> <tr> <th>Bore size</th> <th>Stroke range</th> </tr> </thead> <tbody> <tr> <td>12, 16</td> <td>35 to 100</td> </tr> <tr> <td>20</td> <td>55 to 200</td> </tr> <tr> <td>25</td> <td>55 to 300</td> </tr> </tbody> </table>	Bore size	Stroke range	12, 16	35 to 100	20	55 to 200	25	55 to 300	<table border="1"> <thead> <tr> <th>Bore size</th> <th>Stroke range</th> </tr> </thead> <tbody> <tr> <td>12, 16</td> <td>31 to 100</td> </tr> <tr> <td>20</td> <td>31 to 200</td> </tr> <tr> <td>25</td> <td>31 to 300</td> </tr> </tbody> </table>	Bore size	Stroke range	12, 16	31 to 100	20	31 to 200	25
Bore size	Stroke range																	
12, 16	35 to 100																	
20	55 to 200																	
25	55 to 300																	
Bore size	Stroke range																	
12, 16	31 to 100																	
20	31 to 200																	
25	31 to 300																	
Example	Model no.: CQSB25-47D CQSB25-50D with 3mm width spacer inside. B dimension is 72.5mm.		Model no.: CQSB25-47D -XB10 Makes 47stroke tube. B dimension is 69.5mm															



Made to Order

Refer to p.5.4-3 and 5.4-79 for made to order products of CQS series

Allowable Kinetic Energy

Bore size (mm)	12	16	20	25
Standard	0.022	0.038	0.055	0.09
With rubber bumper	0.043	0.075	0.11	0.16

Minimum Operating Pressure

Bore size (mm)	12	16	20	25
Mn. operating pressure (MPa)	0.07	0.07	0.05	0.05

Option

Option	Availability
Rod end thread	Available for all standard models of double acting single rod
Rubber bumper ¹⁾	Standard equipment for long stroke models

¹⁾ Rubber bumper is a standard equipment for long stroke models.



Compact Cylinder

Series CQS

ø12, ø16, ø20, ø25

Ideal for machine designs with small space requirements

The "D-A9 1" and "D-F9 1" auto switches will not protrude from switch mounting groove.

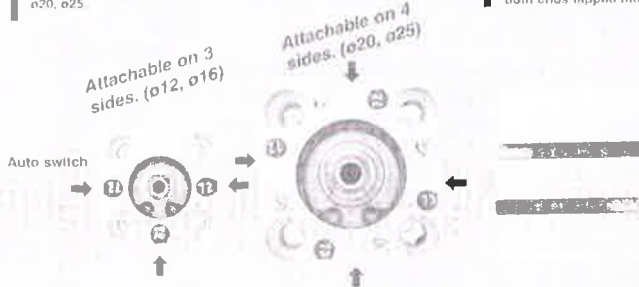
Square body shape gives you flexibility for machine design

Auto switch mounting allows for flexible designing requirements

3 faces on ø12 & ø16, and all 4 faces including port side on ø20, ø25.

2 way basic mounting: Through-hole or both ends tapped

Basic mounting is 2 way. You can choose either through-hole or both ends tapped mounting.



Non-rotating piston rod model
Superior non-rotating accuracy

Hexagonal cross sectional shape piston rod for high non-rotation accuracy.
ø12, ø16 — ±1°
ø20, ø25 — ±0.7°

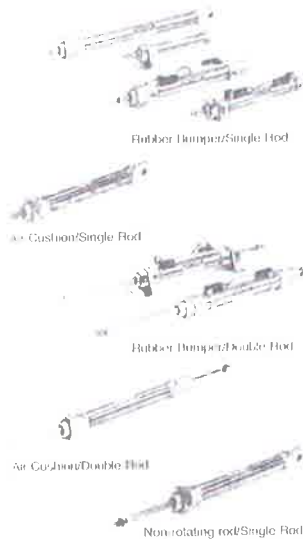
CU
CQS
CQ2
MU

Variations

		Basic model	Variations (Standard)	Applicable auto switch	Bore size (mm)	Stroke (mm)	Page
Basic	Series COS	Double Acting	Single Rod	Reed switch D-A90, A90V D-A93, A93V D-A96, A96V	ø12, 16, 20, 25	12, 16, 20, 25 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475, 480, 485, 490, 495, 500, 505, 510, 515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570, 575, 580, 585, 590, 595, 600, 605, 610, 615, 620, 625, 630, 635, 640, 645, 650, 655, 660, 665, 670, 675, 680, 685, 690, 695, 700, 705, 710, 715, 720, 725, 730, 735, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785, 790, 795, 800, 805, 810, 815, 820, 825, 830, 835, 840, 845, 850, 855, 860, 865, 870, 875, 880, 885, 890, 895, 900, 905, 910, 915, 920, 925, 930, 935, 940, 945, 950, 955, 960, 965, 970, 975, 980, 985, 990, 995, 1000	2-2-7
	Series CQSW	Double Acting	Double Rod				2-2-10
Non-rotating rod	Series COS	Single Acting	Returns/Extend	Solid state switch D-F90, F90V D-F93, F93V D-F96, F96V D-F99, F99V	ø12, 16, 20, 25	12, 16, 20, 25 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475, 480, 485, 490, 495, 500, 505, 510, 515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570, 575, 580, 585, 590, 595, 600, 605, 610, 615, 620, 625, 630, 635, 640, 645, 650, 655, 660, 665, 670, 675, 680, 685, 690, 695, 700, 705, 710, 715, 720, 725, 730, 735, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785, 790, 795, 800, 805, 810, 815, 820, 825, 830, 835, 840, 845, 850, 855, 860, 865, 870, 875, 880, 885, 890, 895, 900, 905, 910, 915, 920, 925, 930, 935, 940, 945, 950, 955, 960, 965, 970, 975, 980, 985, 990, 995, 1000	2-2-16
	Series CQSK	Double Acting	Single Rod				2-2-24
Anti-lateral load	Series CQS-S	Double Acting	Single Rod	1 Standard equipment on long stroke model/anti-lateral load model 2 Available only for standard stroke model	ø12, 16, 20, 25	12, 16, 20, 25 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475, 480, 485, 490, 495, 500, 505, 510, 515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570, 575, 580, 585, 590, 595, 600, 605, 610, 615, 620, 625, 630, 635, 640, 645, 650, 655, 660, 665, 670, 675, 680, 685, 690, 695, 700, 705, 710, 715, 720, 725, 730, 735, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785, 790, 795, 800, 805, 810, 815, 820, 825, 830, 835, 840, 845, 850, 855, 860, 865, 870, 875, 880, 885, 890, 895, 900, 905, 910, 915, 920, 925, 930, 935, 940, 945, 950, 955, 960, 965, 970, 975, 980, 985, 990, 995, 1000	2-2-30

Responsable: M.C. Bernardo González Ortiz
 Tutor: Dr. Luis Del Llano Vizcava

ISO Cylinder/Standard, Non-rotating Rod: Double Acting *Series C85*



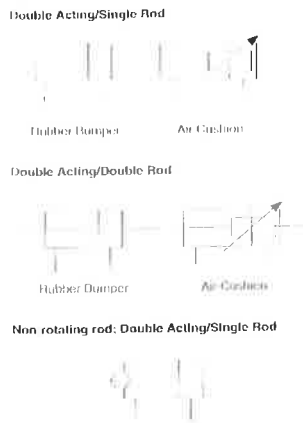
Specifications

	8	10	12	16	20	25
Bore size (mm)	8	10	12	16	20	25
Stroke (mm)	3	4	5	6	8	10
Port thread	M3 X 0.2	M4 X 0.7	M5 X 1	M6 X 1	M8 X 1.25	M10 X 1.25
Ports	M3	M5	M5	M5	G1/8	G1/8
Action	Double acting/Single or Double rod					
Fluid	Air					
Port pressure	1.5MPa					
Max. operating pressure	1.0MPa					
Min. operating pressure	0.1MPa	0.08MPa			0.05MPa	
Ambient and fluid temperature	-20 to 80 °C (Built-in magnet: 10 to 60 °C)					
Cushion	Rubber bumper, Air cushion (except for 8/5) (Non-rotating only rubber bumper)					
Lubrication	Not required. If necessary, lubricant of no. 1 ISOVG32 is recommended.					
Fluid seal	Nylon 50/50000			Nylon 50/50000		
	Nylon 50/50000			Nylon 50/50000		
Stroke speed	50 to 1500mm/s					
Allowable kinetic energy	Rubber bumper	0.02J	0.03J	0.04J	0.09J	0.4J
	Air cushion		0.12J	0.19J	0.4J	0.6J
	Air cushion				0.6J	0.9J
Non-rotating accuracy	±1.30°	±1.30°	±1°	±1°	±0.42°	±0.42°
Stroke tolerance	0/+1					

- CJ1
- CJP
- CJ2
- CM2
- C85
- CG1
- MB
- C95
- CA1
- CS1

* Maximum ambient temperature of gaskets only
 ** Applicable to non-rotating models only

Symbol

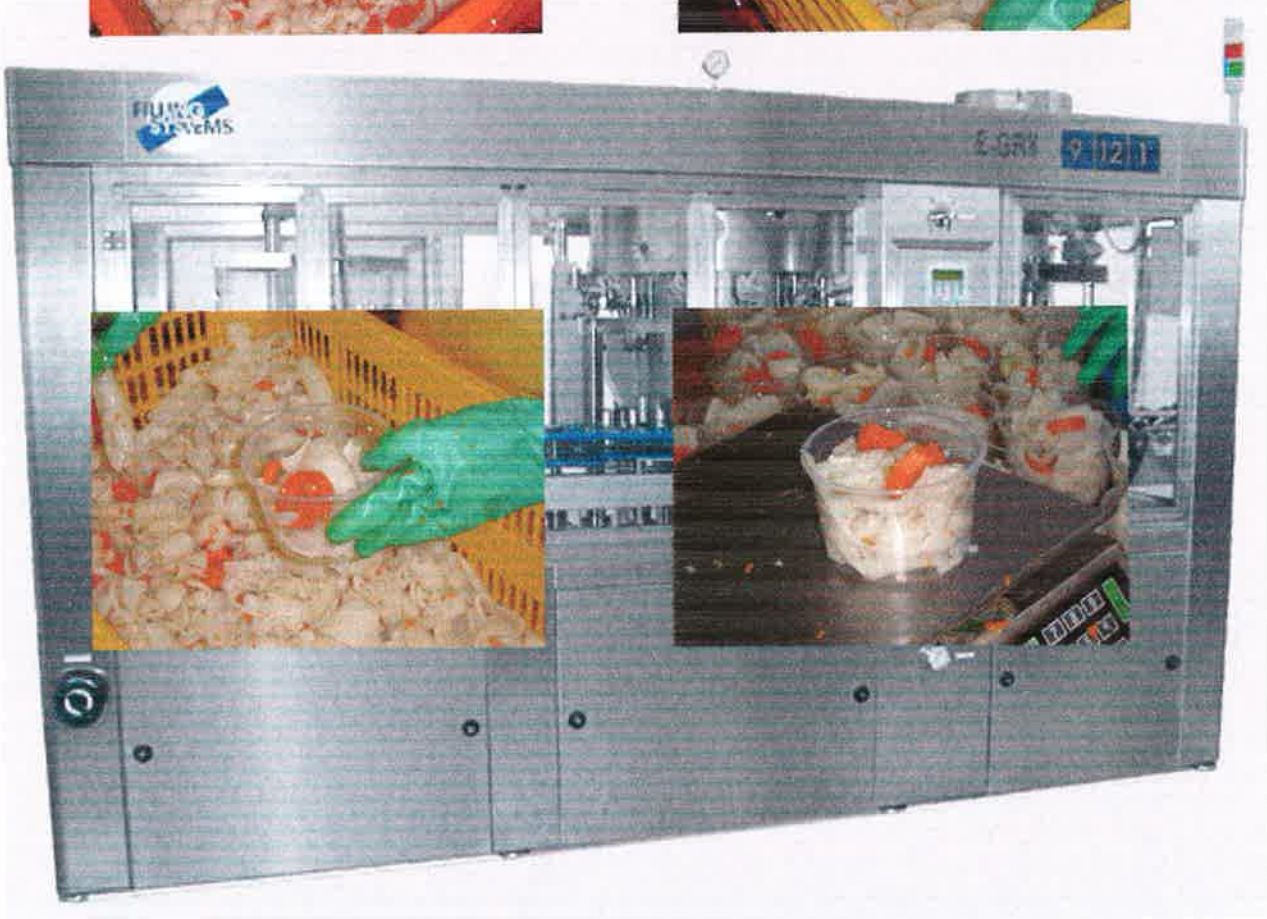


Weight (Standard, Non-rotating rod)

Bore size (mm)		8	10	12	16	20	25
Double action	Basic weight	35	49	95	109	183/200	250/280
Double rod	Additional weight for each 100mm of stroke	3	3.2	6.2	7.2	11.8	18.4
Mounting bracket	C85L-1A	20		40		95	
	C85L-1B	55		105		210	
	C85F-1	12		25		90	
	C85F-1	20		50		75	
C85C-1		20		40		85	
	Single knuckle joint	KJ-10	17	25		45	70
	Double knuckle joint	GKMI-11	10	20		50	100
Floating joint	JAI-114	10	20		50	70	

Calculation Example: C85N10-50, C85F10
 Basic weight: 49 (ø10)
 Additional weight: 3.2/10mm of stroke
 Cylinder stroke: 50mm
 Mounting bracket: 12
 49 + 3.2 X 50/10 + 12 = 65.12 = 67

PROCESO ACTUAL



Título de proyecto: MODELACION Y SIMULACION DE
MOVIMIENTOS DE UNA LINEA DE EMBALAJE DE PRODUCTOS
ALIMENTICIOS

Responsable: M.C. Bernardo González Ortiz
Tutor: Dr. Luis Del Llano Vízcaya



PROPIESTA DE SOLUCIÓN

