

# ZAYTRAN SIGMA® Grippers

**“Sigma” - The mathematical term that defines the distance from the norm.  
SIGMA Grippers - The grippers that serve “Beyond Normal” applications.**

## Linear Bearing Rail - The SIGMA Difference

The SIGMA concept was developed for applications that impart high acceleration to heavy objects or require extremely long, precisely positioned jaws. These applications put extreme stress on the gripper. SIGMA grippers use a linear bearing system, the same system that is used in modern machine tools, to isolate the precision jaw positioning system from jaw torque and force. The

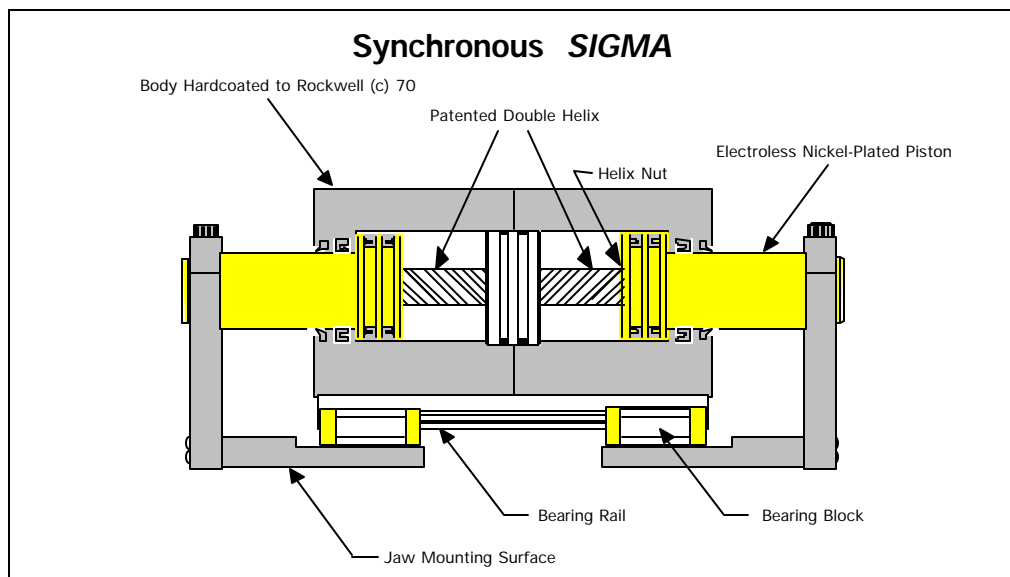
linear bearing rail allows the grippers to be small and light weight while delivering gripping force in excess of 700 pounds (@ 100 psi) and to tolerate jaw torque of 1,000 foot pounds. SIGMA grippers truly deliver:

**“TWICE THE FORCE...HALF THE SIZE”.**

## Patented Synchronous Technology - Extended Life

The synchronous SIGMA utilizes ZAYTRAN US patent number 4591199. The force and synchronizing double helix are independent systems. The double helix works only to center the part to  $\pm 0.001$  inches. All of the gripping

force is provided by two pistons that are driven either pneumatically or hydraulically. The independence of the force and synchronization systems provides precision over the typical 10,000,000+ cycle life of the unit.



## Material and Process Selection - Machine Tool Quality

Hundreds of SIGMA grippers have demonstrated ZAYTRAN machine tool quality in die casting, forging, and other torturous environments. SIGMA bodies are hardcoated to a Rockwell(c) 70

hardness. All cylinder bores are roller burnished and Teflon® impregnated to improve seal life and minimize friction. The pistons are ground and

# Application Flexibility

## *Four Styles of Gripper*

### **SYNCHRONOUS - Moves parts from a poorly defined to a well defined position.**

The synchronized *SIGMA* uses the patented ZAYTRAN double helix technology to implement the classic gripper style. This style centers parts to  $\pm 0.0010$ ". The long stroke offered by all of the

*SIGMA* grippers allows an entire family of parts to be assembled, picked and placed, or held for machining operations without changing the gripper or the tooling.

### **NON-SYNCHRONOUS - Moves parts from a well defined to a poorly defined position.**

In many applications the part is being withdrawn from a well defined position. The part is captured by a holding device like a chuck, nest or mold. In these cases, the holding device determines the centerline of the part. If a synchronous gripper is used it will also dictate a centerline that will be different by the error in the positioning system. Two different centerlines means that the part will be

"racked" or "dinged" when it is removed from the holding device.

The non-synchronous *SIGMA* complies to the position of the part, it does not dictate a centerline but "honors" the existing centerline. This avoids the problems induced by errors in the positioning system.

### **SEQUENCED - References an edge or surface of the part rather than the center.**

When the application requires a family of parts be presented with reference to an edge or surface, a sequenced gripper is required. The sequenced *SIGMA* first closes jaw 1 to a final position (this references the surface or edge), then jaw 2 complies

with the other side of the part. In welding, riveting and other "surface sensitive" operations, the sequenced *SIGMA* will present the surface to the process regardless of the thickness of the material.

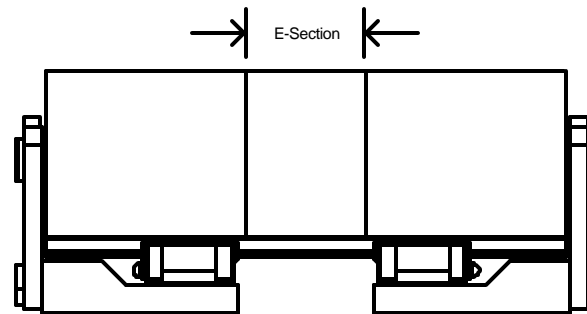
### **QUAD-PORTED - Used when complete system control of each jaw is required.**

In some sequenced or compliant applications, the timing and force exerted by each jaw is critical to the success of the process. In these cases, the Quad-Ported *SIGMA* provides the user with the ultimate

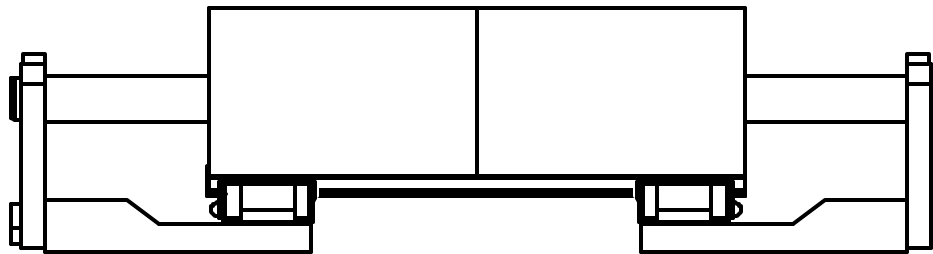
in flexibility. Each jaw is independently ported both open and closed. This porting provides for the ultimate in control. Each jaw can be timed, run at a unique pressure, and driven at a unique speed.

# ZAYTRAN SIGMA™ Grippers

## Special Capabilities

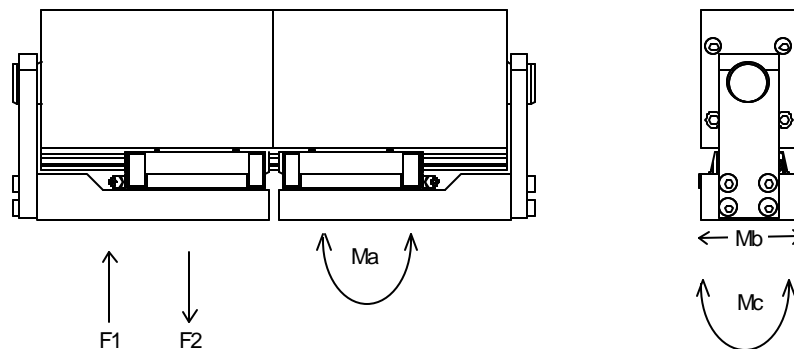


E-Sections can be added to increase the "reach" so that long parts may be picked up by the ends.



Custom, ultra long stroke capability is available to handle a very wide range of part sizes.

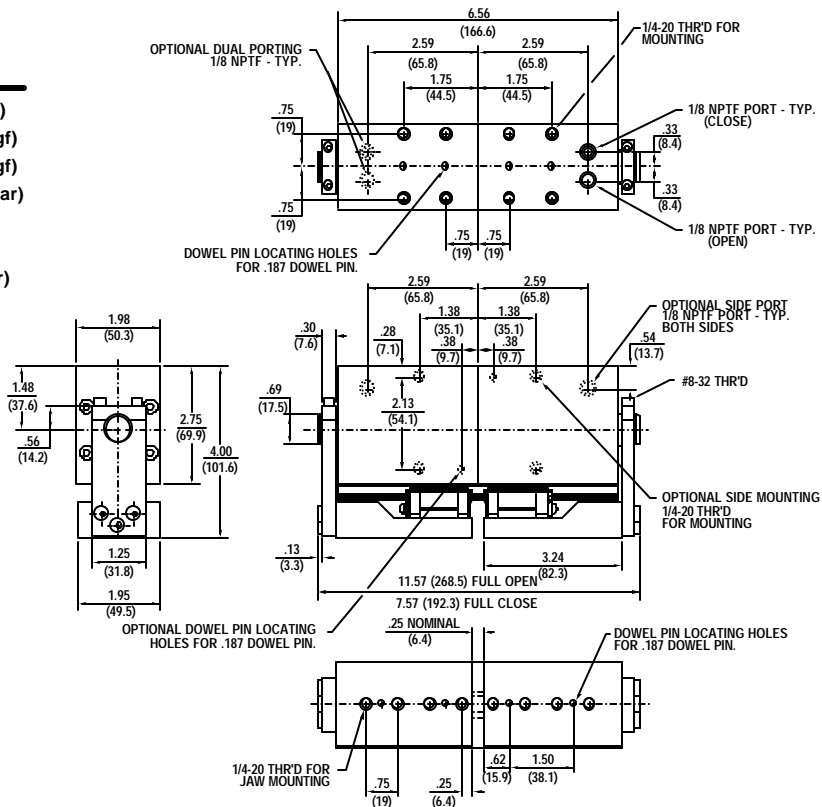
## SIGMA™ JAW TORQUE & FORCE



Model	Ma Ft-Lbs (kgf-M)	Mb Ft-Lbs (kgf-M)	Mc Ft-Lbs (kgf-M)	F1 Lbs (kgf)	F2 Lbs (kgf)
<b>SIGMA 40</b>	91 (13)	80 (12)	56 (8)	123 (56)	76 (34)
<b>SIGMA 1</b>	200 (28)	200 (28)	228 (32)	492 (224)	305 (136)
<b>SIGMA 2</b>	338 (47)	338 (47)	374 (52)	1500 (670)	1000 (450)
<b>SIGMA 4</b>	538 (75)	538 (75)	634 (89)	2000 (895)	1670 (725)
<b>SIGMA 6</b>	803 (103)	883 (111)	1011 (140)	2500 (1110)	1670 (725)

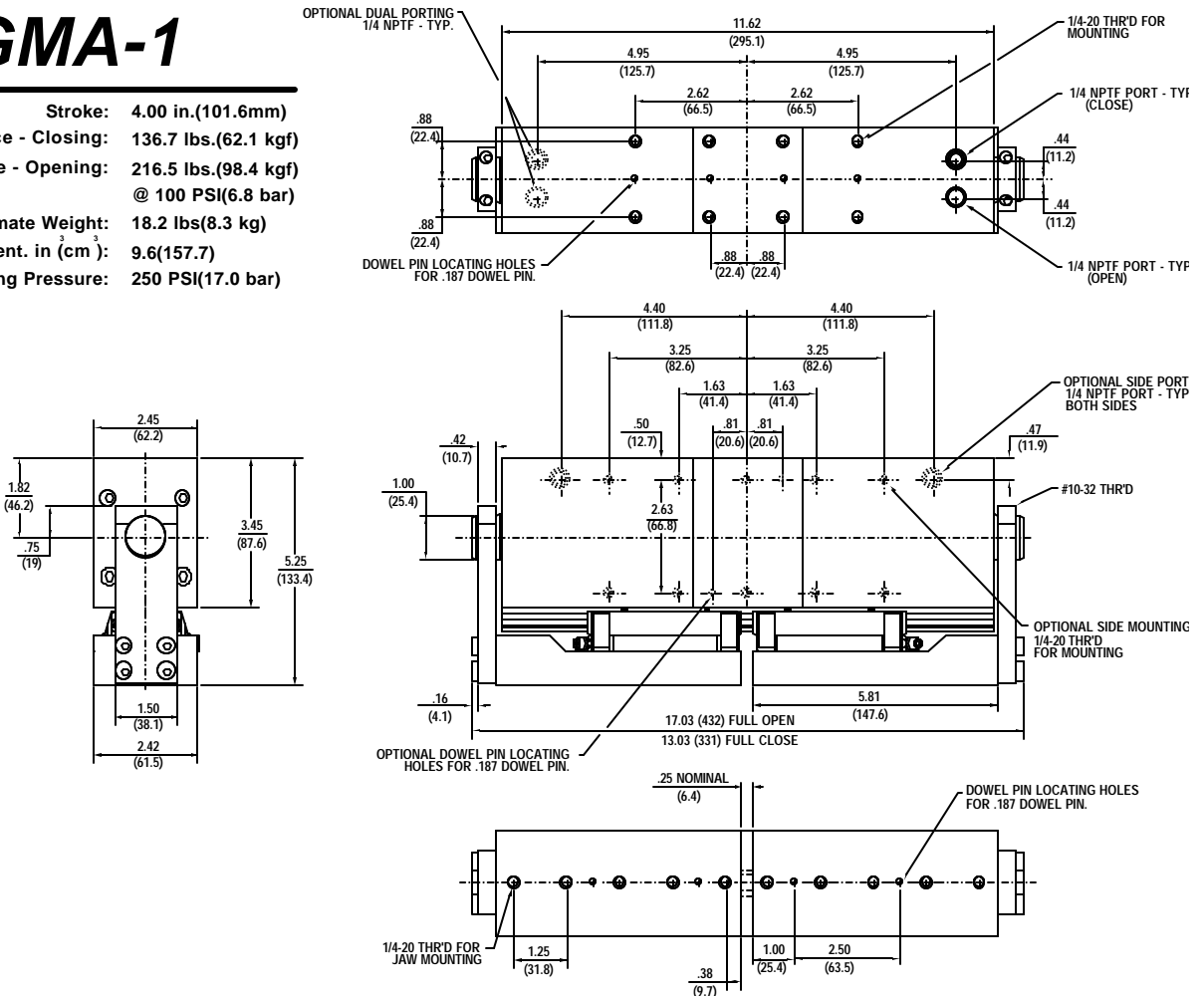
# SIGMA-40

**Stroke:** 3.00 in.(76.2mm)  
**Gripping Force - Closing:** 58.2 lbs.(26.4 kgf)  
**Gripping Force - Opening:** 97.9 lbs.(44.5 kgf)  
 @ 100 PSI(6.8 bar)  
**Approximate Weight:** 6.5 lbs(2.9 kg)  
**Operating displacement, in (cm):** 3.276(53.7)  
**Maximum Operating Pressure:** 250 PSI(17.0 bar)



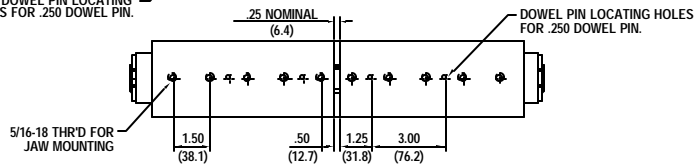
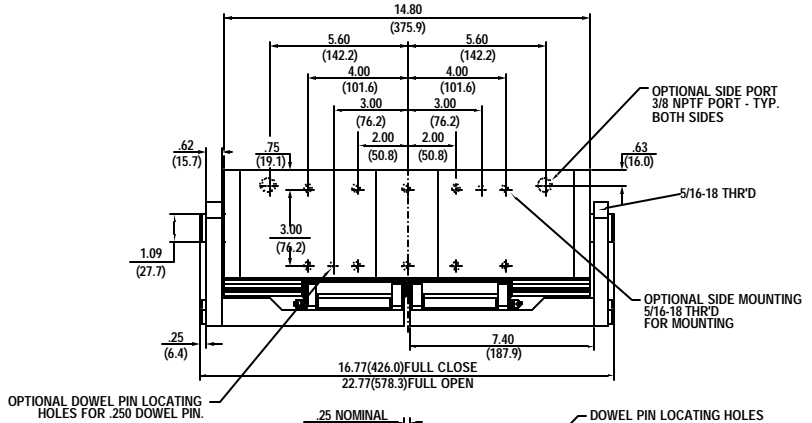
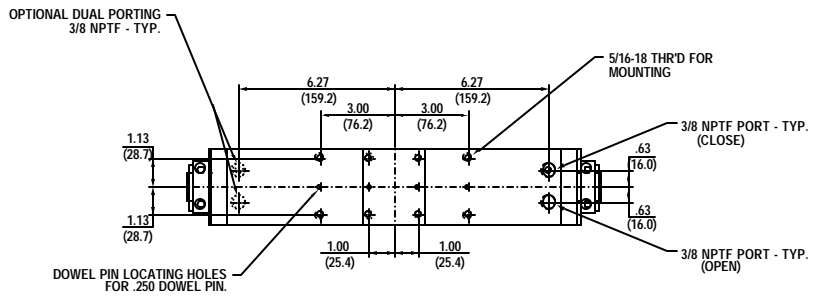
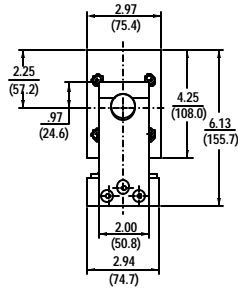
# SIGMA-1

**Stroke:** 4.00 in.(101.6mm)  
**Gripping Force - Closing:** 136.7 lbs.(62.1 kgf)  
**Gripping Force - Opening:** 216.5 lbs.(98.4 kgf)  
 @ 100 PSI(6.8 bar)  
**Approximate Weight:** 18.2 lbs(8.3 kg)  
**Operating displacement, in (cm):** 9.6(157.7)  
**Maximum Operating Pressure:** 250 PSI(17.0 bar)



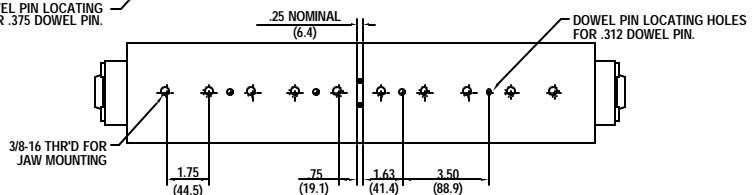
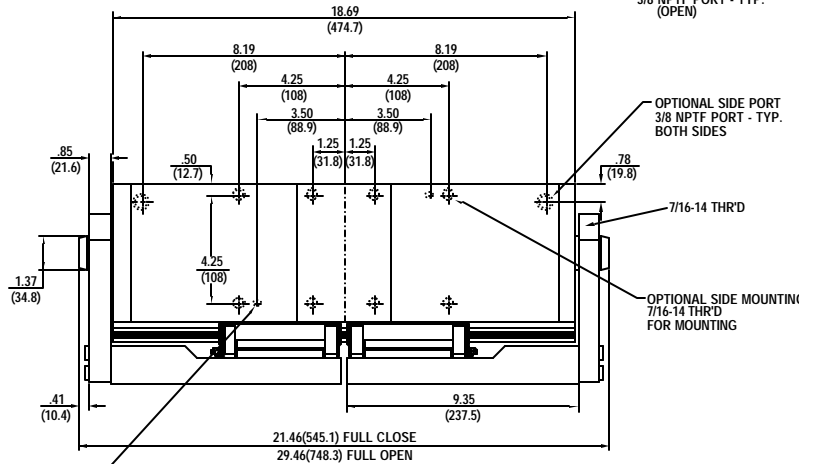
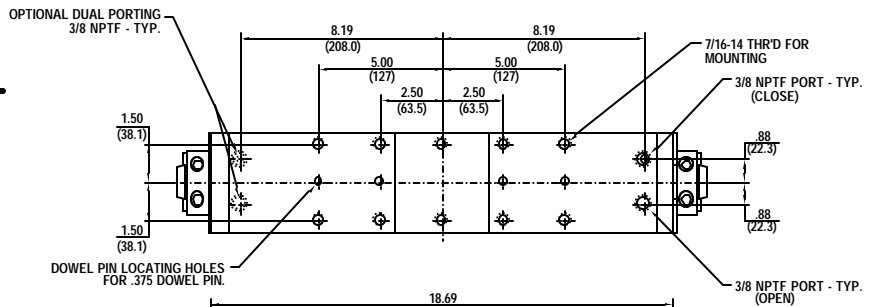
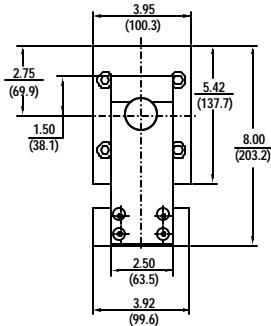
# SIGMA-2

Stroke: 6.00 in.(152.4mm)  
 Gripping Force - Closing: 223.0 lbs.(101.4 kgf)  
 Gripping Force - Opening: 311.7 lbs.(141.7 kgf)  
 @ 100 PSI(6.8 bar)  
 Approximate Weight: 29 lbs(13 kg)  
 Operating displacement. in (cm ): 20.86(341.9)  
 Maximum Operating Pressure: 250 PSI(17.0 bar)



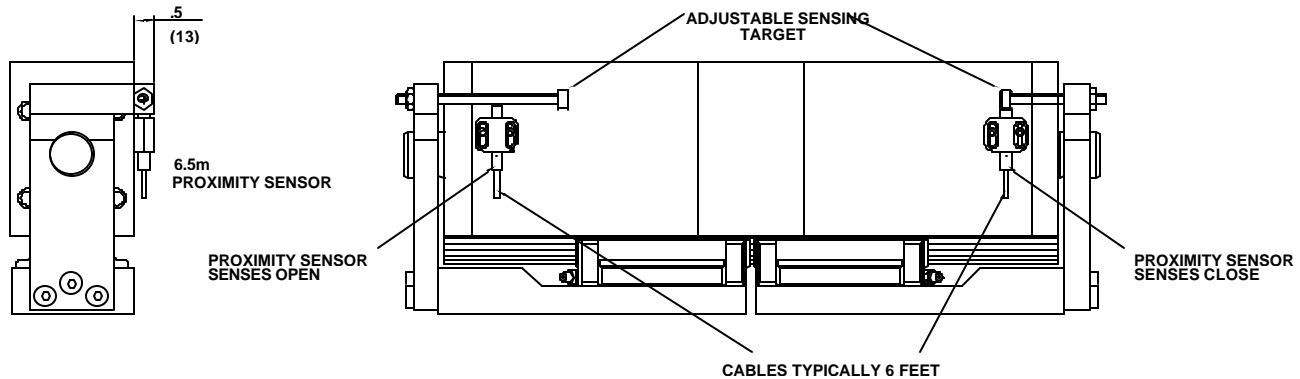
# SIGMA-4

Stroke: 8.00 in.(203.2mm)  
 Gripping Force - Closing: 503.5 lbs.(228.9 kgf)  
 Gripping Force - Opening: 636.2 lbs.(289.2 kgf)  
 @ 100 PSI(6.8 bar)  
 Approximate Weight: 62 lbs(28 kg)  
 Operating displacement. in (cm ): 56.5(926.8)  
 Maximum Operating Pressure: 250 PSI(17.0 bar)





# Open and Closed Sensors



## High Efficiency Seals & Lubricants

### Seal Composition

Three types of seals are available:

Standard -	Buna-N;	-40 to 180°F
High Temp-	Viton;	-40 to 300°F
Non-Lube-	Nitroxile;	-40 to 180 °F

### Lubricants

All grippers are pre-lubricated with a "lifetime" lubricant. This lubricant is designed to last approximately 10,000,000 cycles in typical applications.

## ORDERING INFORMATION

### Format: SIGMA-2, A, B, XC

#### A=Gripper Style

Blank:	Synchronous
NON:	Non-Synchronous
SEQ:	Sequenced
QUAD:	Quad-Ported

#### B=Seal Requirement

Blank:	Buna-N
N:	Nitroxile
V:	Viton

#### XC=Sensor Requirement

X=1:	One Sensor
X=2:	Two Sensors

C=DCSINK:	DC Sinking
C=DCSOUR:	DC Sourcing
C=ACNO:	AC Normally Open
C=ACNC:	AC Normally Closed

### Example: SIGMA-2, V, 2DCSINK

Sigma-2, Synchronous, Viton Seals, two position DC proximity sensors-sinking

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