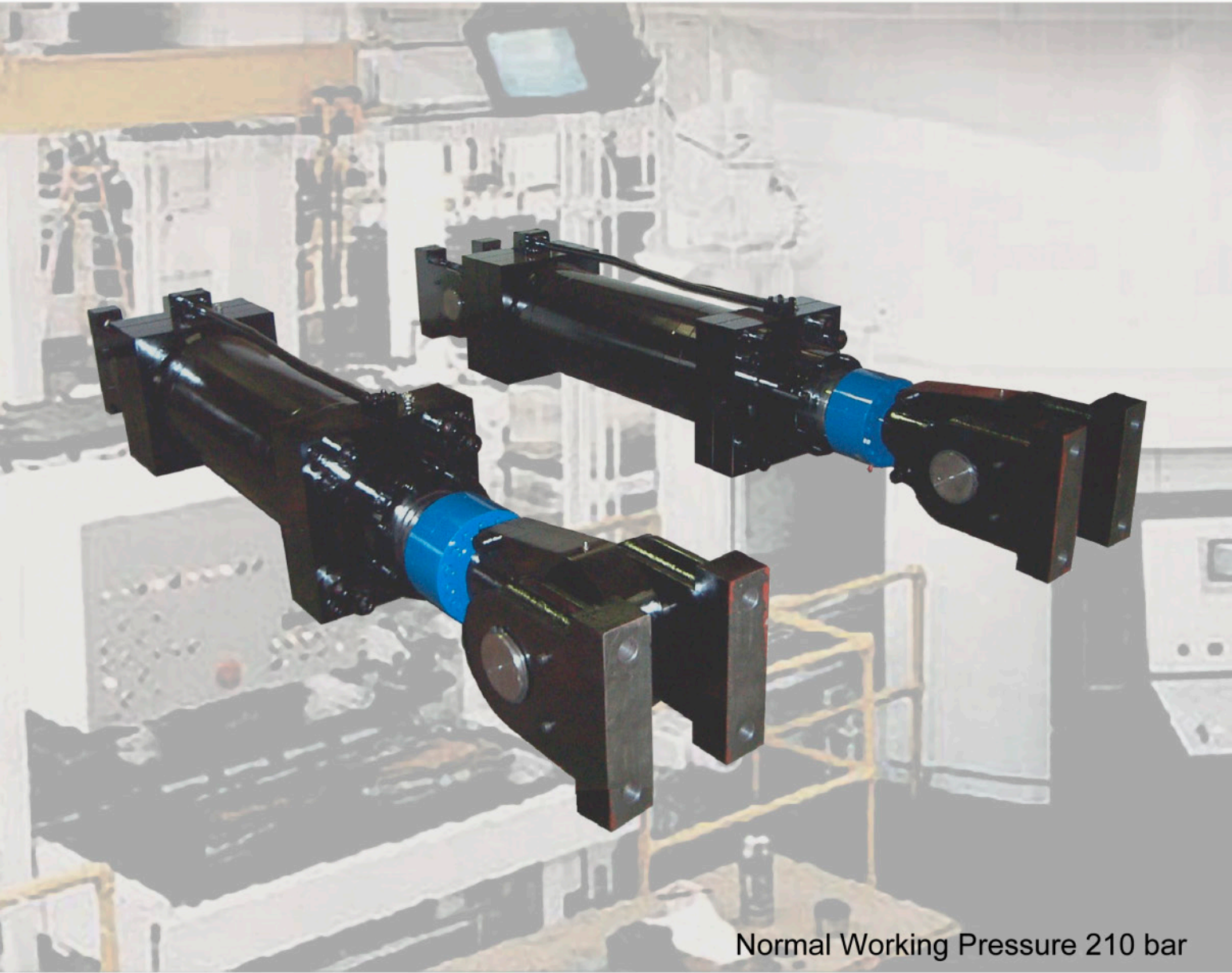


# *Hydraulic Cylinders*

## **Servo Cylinder**

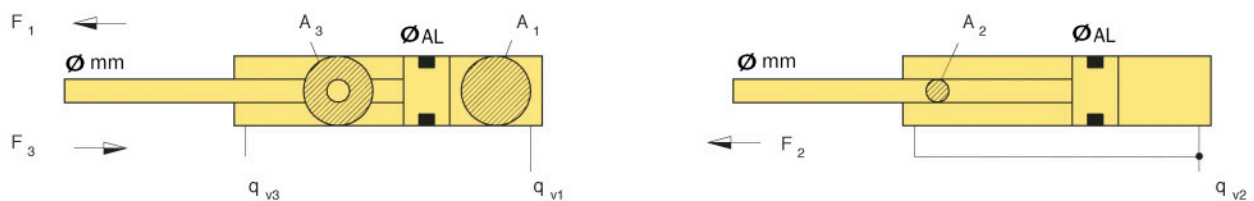


Normal Working Pressure 210 bar

**BRANT**  
**HYDRAULICS**

Parameter	Specification											
<b>Standard</b>												
Type	Tie Rods / Flange											
Working Pressure	Normal 210 bar											
Mounting Position	As desired											
Displacement Transducer	Internal MTS displacement transducer provides the signal for position feedback in a closed loop servo-control application.											
<b>Fluid</b>												
Fluid Style	Mineral oil or other fluids on request											
Fluid Viscosity	12 to 90 cSt											
Filtration	Oil contamination NAS 1638 class 9 ~10 to be met with filter $\beta_{25} = 75$											
<b>Dimension</b>												
Piston Dimension	<table border="1"> <tr> <td>63</td><td>80</td><td>100</td><td>125</td><td>150</td><td>180</td><td>200</td><td>250</td><td>300</td><td>350</td><td>400</td> </tr> </table>	63	80	100	125	150	180	200	250	300	350	400
63	80	100	125	150	180	200	250	300	350	400		
Rod Dimension	<table border="1"> <tr> <td>45</td><td>50</td><td>63</td><td>80</td><td>90</td><td>110</td><td>125</td><td>160</td><td>180</td><td>200</td><td>200</td> </tr> </table>	45	50	63	80	90	110	125	160	180	200	200
45	50	63	80	90	110	125	160	180	200	200		
Stroke tolerance	ISO 8135											
<b>Seal</b>												
Seal Type	-20°C to +160°C											
Frequency	Static or low frequency (3 to 4 Hz) testing of aero or civil engineering structures.											
<b>Optional Features</b>												
Load Cell	Interface, MTS, or other on request											
Double Rod Cylinder	Servo cylinders are available with the option of a double-ended piston rod. Please contact the factory for further details.											
Position Transducer	Internal Temposonic™ position transducer provides the signal for position feedback in a closed loop servo-control application.											
Swivels	MTS 249 swivels for easy mounting and to reduce the possibility of excessive side loads.											

Bore	Rod	Area ratio	Areas			Force at 200 bar			Flow at 0,1 m/s		
			Bore	Rod	Annulus	Push	Regen.	Pull	Out	Regen.	in
<b>AL</b> Ø mm	<b>MM</b> Ø mm	<b>Ø</b> A1/A3	<b>A<sub>1</sub></b> cm <sup>2</sup>	<b>A<sub>2</sub></b> cm <sup>2</sup>	<b>A<sub>3</sub></b> cm <sup>2</sup>	<b>F<sub>1</sub></b> kN	<b>F<sub>2</sub></b> kN	<b>F<sub>3</sub></b> kN	<b>q<sub>V1</sub></b> l/min	<b>q<sub>V2</sub></b> l/min	<b>q<sub>V3</sub></b> l/min
63	45	2.04	31.17	15.90	15.27	62.34	30.54	31.81	18.7	9.5	9.2
80	50	1.64	50.27	19.63	30.63	100.5	61.26	39.27	30.2	11.7	18.5
100	63	1.66	78.54	31.17	47.37	157.0	94.73	62.34	47.1	18.7	28.4
125	80	1.69	122.7	50.27	72.45	245.4	144.9	100.5	73.6	30.2	43.4
150	90	1.56	176.7	63.62	113.1	353.4	226.2	127.2	106.0	38.2	67.8
180	110	1.60	254.5	95.03	159.4	508.9	318.9	190.1	152.6	57.0	95.6
200	125	1.64	314.2	122.7	191.4	628.3	382.9	245.4	188.5	73.6	114.9
250	160	1.69	490.9	201.1	289.8	981.8	579.6	402.1	294.5	120.6	173.9
300	180	1.56	706.9	254.5	452.4	1413.7	904.8	508.9	424.1	152.7	271.4
350	200	1.48	962.1	314.2	648.0	1924.2	1295.9	628.3	577.3	188.5	388.8
400	200	1.33	1256.6	314.2	942.5	2513.3	1884.9	628.3	754.0	188.5	565.5



**Notes:**

- 1- Theoretical force (without con-sideration of efficiency).
- 2- Stroke velocity.
- 1MPa = 10 bar
- 1kN = 102 kp

The permissible stroke length with a flexibly guided load and a 3.5 safety factor against buckling can be obtained from the appropriate table. With a deviating cylinder installation, the permissible stroke length has to be interpolated. Permissible stroke lengths for non-guided loads are available on request. The calculation for buckling are carried out as follows:

1. Calculation according to Euler  $F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2}$  if  $\lambda > \lambda_g$
2. Calculation according to Tetmajer  $F = \frac{d^2 \cdot \pi (335 - 0.62 \cdot \lambda)}{4 \cdot v}$  if  $\lambda \leq \lambda_g$

Explanation:

E = Modulus of elasticity in N/mm<sup>2</sup> = 2.1 x 10<sup>5</sup> for steel

I = Moment of inertia in mm<sup>4</sup> for a circular cross-section area =  $\frac{d^4 \cdot \pi}{64} = 0.0491 \cdot d^4$

v = 3.5 (safety factor)

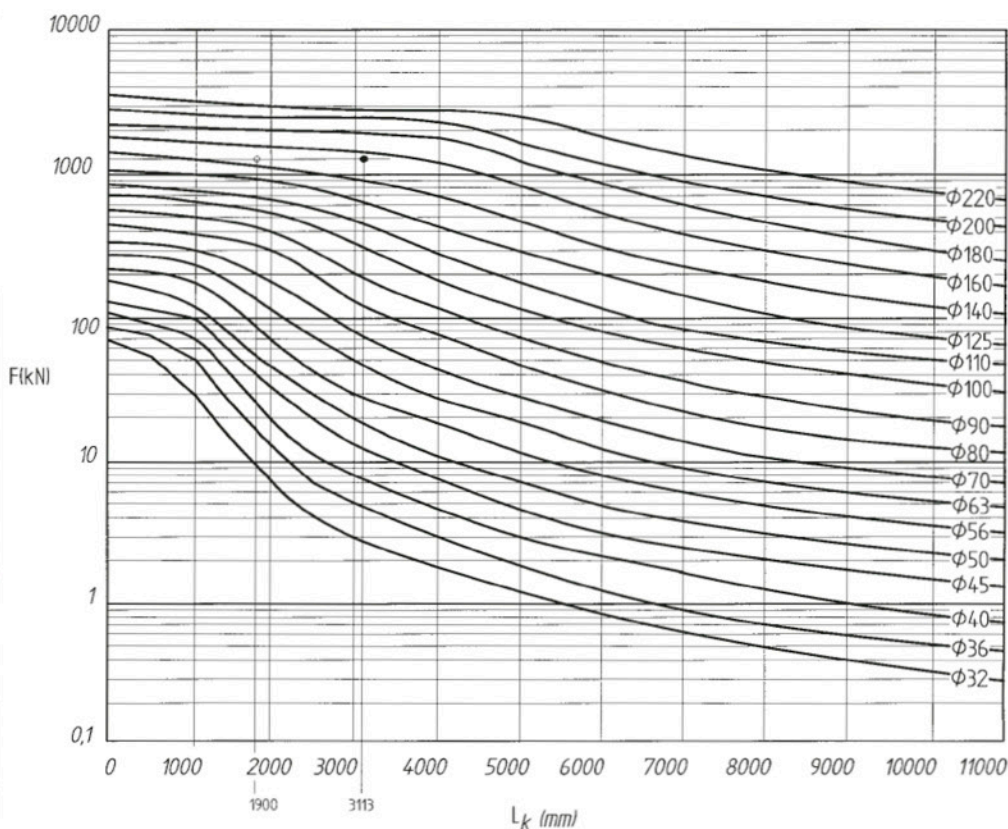
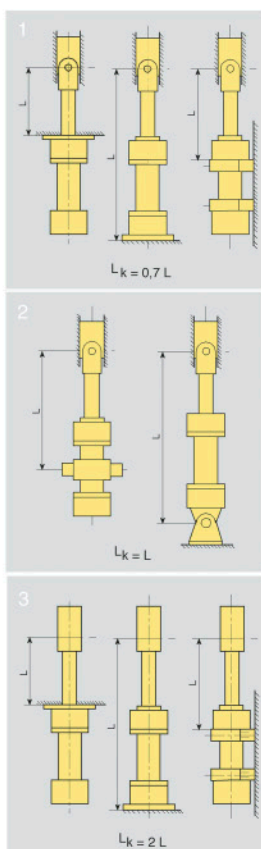
L<sub>K</sub> = Free buckling length in mm (dependent on the mounting style, see sketches A, B, C)

d = Piston rod Ø in mm

$\lambda$  = Slenderness ratio =  $\frac{4 \cdot L_K}{d}$        $\lambda_g = \pi \sqrt{\frac{E}{0.8 \cdot R_e}}$

R<sub>e</sub> = Yield strength of the piston rod material

Influence of the mounting type on the buckling length:



# Model Code

1 2 3 4 5 6  
BS R1 - 250 / 160 x 500 - T

**Serious**

BS = Servo cylinder

**Type**

R1 = Single rod cylinder

R2 = Double rod cylinder

**Piston Diameter**

63 to 400 mm

**Rod Diameter**

40 to 200 mm

**Stroke Length in mm**

**Design principle**

T = Tie Rod Type

M = Mill Type

**Option**

**Mounting Style**

(1) MP5 (Standard)

(2) Others



**Position Sensor**

(1) Tempsonics

(2) LVDT

(3) Others

Code: \_\_\_\_\_

**Servo Valve**

(1) MTS  (2) MOOG

Code: \_\_\_\_\_ Quantity: \_\_\_\_\_ Flow Rate: \_\_\_\_\_

Port:  (1) 4 port  (2) 5 port

With manifold

**Load Cell**

(1) Interface Model 1200 Series code: \_\_\_\_\_

(2) MTS part 100-090-xxx Series code: \_\_\_\_\_

(3) other

Load Cell Thread  Metric  Imperial

**Delta P Cell**

Area Ratio: \_\_\_\_\_

**Swivels**

Base  (1) Basic BSB Serious Swivels  (2) MTS Series 249 Swivels  (3) No

Head  (1) Basic BSB Serious Swivels  (2) MTS Series 249 Swivels  (3) No

Tile Angle: \_\_\_\_\_ Swivel Angle: \_\_\_\_\_

**Rod End Thread**

(1) Female thread

(2) Male thread

**Seal Version**

(1) Reduced friction

(2) High temperature with reduced friction

**End Position Cushioning**

(1) Without

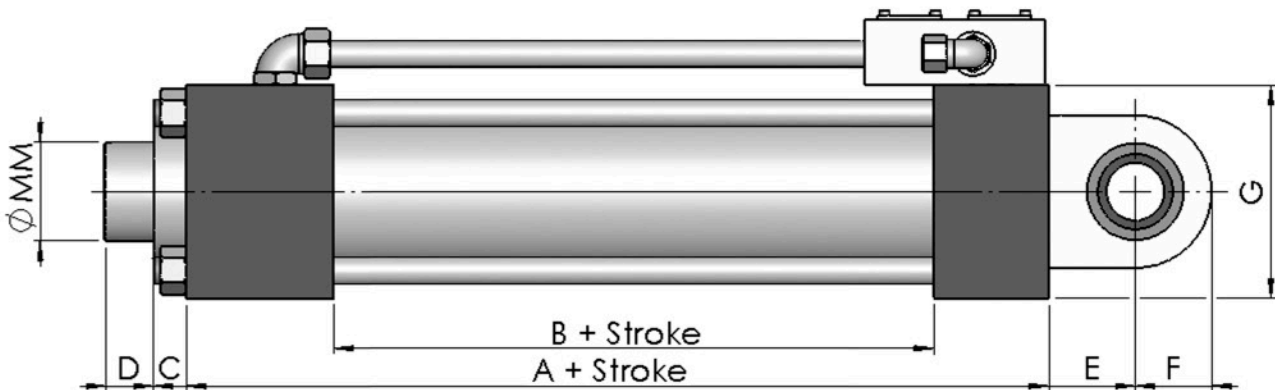
(2) Both End

Fittings Size: \_\_\_\_\_

Oil Port Size: \_\_\_\_\_

**MP5** Spherical eye  
mounting  
*Servo Cylinder*

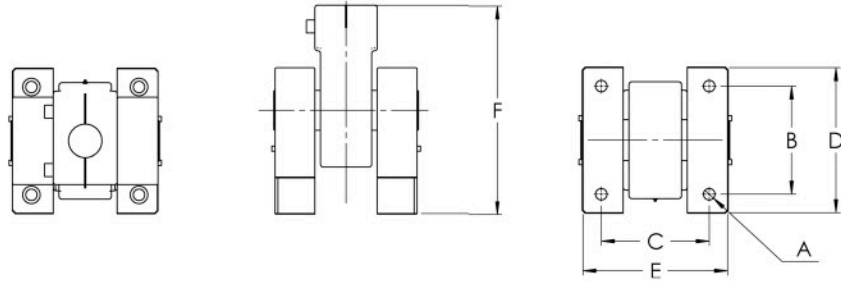
Nominal pressure **210 bar**



Bore	63	80	100	125	150	180	200	250	300	350	400
MM	45	50	63	80	90	110	125	160	180	200	200
A	120	139	146	175	191	234	242	311	374	405	536
B	37	44	51	59	75	82	90	121	148	157	176
C	18	18	18	22	22	22	22	24	24	24	24
D	32	32	32	40	40	40	40	52	52	52	52
E	38	48	58	72	86	106	116	145	175	205	240
F	32	50	63	71	80	95	112	140	165	190	220
G	90	115	130	165	195	225	245	310	360	420	500
Swivel Model	.20	.23	.23	.23	.32	.32	.41	.42	.51	.80	.90

## Base Swivel

BSB.XX  
Rod End Swivel

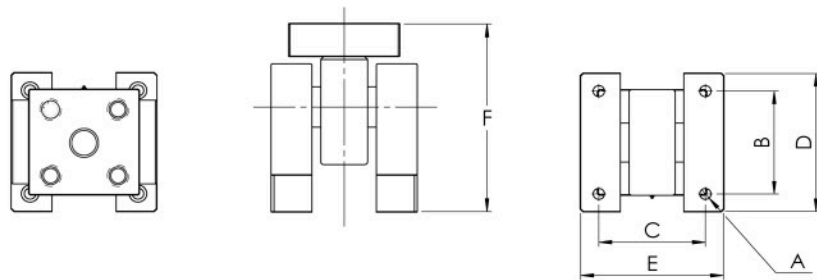


**Base Swivel External Mounting Dimensions**

Model	A		B		C		D		E		F	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
.12	10.7	.422	63.5	2.5	63.5	2.5	85.9	3.38	83.6	3.29	127	5.0
.20	17.5	.688	114.3	4.5	114.3	4.5	142.7	5.62	142.7	5.62	180.8	7.12
.23	17.5	.688	146.1	5.75	146.1	5.75	187.5	7.38	196.9	7.75	238.3	9.38
.32	26.9	1.06	184.2	7.25	184.2	7.25	231.6	9.12	238	9.37	317.5	12.5
.41	33.5	1.32	241.3	9.5	241.3	9.5	317.5	12.5	314.5	12.38	406.4	16.0
.51	43.7	1.72	298.5	11.75	298.5	11.75	406.4	16.0	406.4	16.0	546.1	21.5

## Head Base

BSBN.XX  
Base End Swivel



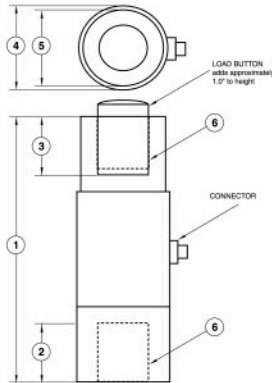
**Rod End Swivel External Mounting Dimensions**

Model	A		B		C		D		E		F	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
.12	10.7	.422	63.5	2.5	63.5	2.5	85.9	3.38	83.6	3.29	120.7	4.75
.20	17.5	.688	114.3	4.5	114.3	4.5	142.7	5.62	142.7	5.62	198.2	7.80
.23	17.5	.688	146.1	5.75	146.1	5.75	187.5	7.38	196.9	7.75	263.7	10.38
.32	26.9	1.06	184.2	7.25	184.2	7.25	231.6	9.12	238	9.37	355.6	14.0
.41	33.5	1.32	241.3	9.5	241.3	9.5	317.5	12.5	314.5	12.38	406.4	16.0
.51	43.7	1.72	298.5	11.75	298.5	11.75	406.4	16.0	406.4	16.0	546.1	21.5

## Interface Model 2100 High Capacity Column Load Cells

### INTERFACE 2100 series load cells are best in class:

- Capacities to 1000K lbf or 4450 kN
- Accurate to  $\pm 0.15\%$  FS
- Compact Size
- Metric and English Models



		<b>DIMENSIONS</b>											
		<b>MODEL 2160</b>											
		<b>CAPACITY (lbf/kN)</b>											
See Drawing		300K	1335 kN	400K	1780 kN	500K	2225 kN	600K	2670 kN	700K	3115 kN	1000K	4450 kN
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①		16.50	419.1	19.00	482.6	21.26	540.0	23.25	590.6	25.50	647.7	27.80	706.1
②		3.75	95.3	4.00	101.6	4.50	114.3	5.00	127.0	5.50	139.7	6.50	165.1
③		3.75	95.5	4.00	101.6	4.50	114.3	5.00	127.0	5.50	139.7	6.50	165.1
④		5.50	139.7	5.50	139.7	6.00	152.4	7.00	177.8	7.50	190.5	9.50	241.3
⑤		5.00	127.0	5.00	127.0	5.50	139.7	6.50	165.1	7.00	177.8	9.00	228.6
⑥		3 1/2-12	M76x2	3 1/2-12	M90x2	4-12	M100x2	4 1/2-8	M100x2	5-8	M125x4	6-8	M125x4

## MTS Model 661 Axial Load Cells

### Typical Applications

Static and dynamic axial force measurements applied with linear actuators.

### Standard Features

- Axially stiff design for small transmissibility errors and increased dynamic performance.
- A one piece construction with aircraft quality materials for a fatigue rated life.
- Proprietary wiring technique reduces electrical noise and sensitivity to moments and side loads.
- Temperature compensated for long term stability.
- High static overload capacity of 150% of the rated load.



Models 661.18-20



Models 661.22-31

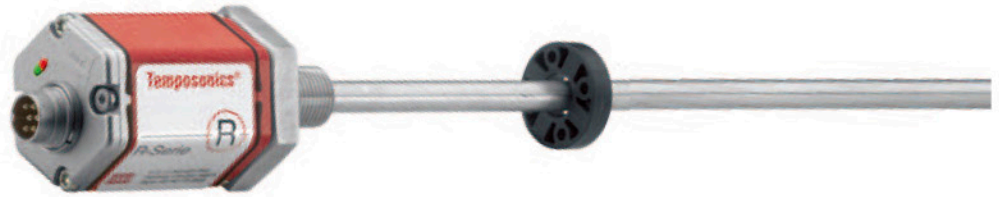
### Model 661 Axial Load Cell Specifications

Model	Rated Force		Thread		Height	Diameter	Output mV/V	Non Linearity
	kN	lbs	C	D				
661.18E/F-01	1.0	220	1/2"-20	M12x1.25	67mm(2.62")	105mm(4.12")	1	0.08%
661.18E/F-02	2.5	550	1/2"-20	M12x1.25	67mm(2.62")	105mm(4.12")	1	0.08%
661.19E/F-01	5.0	1,100	1/2"-20	M12x1.25	67mm(2.62")	105mm(4.12")	1	0.08%
661.19E/F-02	10	2,200	1/2"-20	M12x1.25	67mm(2.62")	105mm(4.12")	2	0.08%
661.19E/F-03	15	3,300	1/2"-20	M12x1.25	67mm(2.62")	105mm(4.12")	1	0.08%
661.19E/F-04	25	5,500	1/2"-20	M12x1.25	67mm(2.62")	105mm(4.12")	2	0.08%
661.20E/F-02	50	11,000	1"-14	M27x2	95mm(3.75")	154mm(6.06")	2	0.08%
661.20E/F-03	100	22,000	1"-14	M27x2	95mm(3.75")	154mm(6.06")	2	0.08%
661.22C/D-01	250	55,000	1"-12	M36x2	203mm(8.00")	127mm(5.00")	2	0.15%
661.23E/F-01	500	110,000	2"-12	M52x2	203mm(8.00")	152mm(6.00")	2	0.15%
661.31E/F-01	1000	220,000	3"-12	M76x2	305mm(12.00")	222mm(8.75")	2	0.15%

\* E and C in the model numbers designate English threads while F and D designate metric threads.  
Specifications subject to change without notice. Please contact MTS for specifications critical to your application.



# MTS Magnetostrictive Linear-Position Sensors



Parameter	Specification
<b>Measured variables:</b>	Displacement, speed (magnitude), or velocity (with direction) for single or dual magnets
<b>Resolution:</b>	Position measurement: 16 bit; 0.0015% (minimum 1 µm) Speed measurement: 0.1 mm/s
<b>Non-linearity:</b>	< ± 0.01% full stroke (minimum ± 50 µm)
<b>Repeatability:</b>	< ± 0.001% full stroke (minimum ± 2.5 µm) Hysteresis: < 4 µm
<b>Outputs:</b>	Voltage: 0 to 10, 10 to 0, -10 to +10, +10 to -10 Vdc (minimum controller load >5k ohms) Current: 4(0) to 20 mA, 20 to 4(0) mA, (min./max. load 0/500 ohms)
<b>Position measurement:</b>	Range: Profile style 50 to 5080 mm (2 to 200 in.) Rod style 50 to 7620 mm (2 to 300 in.) Update time: 0.5 ms up to 1200 mm, 1.0 ms up to 2400 mm, 2.0 ms up to 4800 mm, 5.0 ms up to 7620 mm stroke length.
<b>Speed measurement:</b>	Range: 0.025 - 10 m/s (1.0 - 400.0 in./s) Deviation: < 0.5% Resolution: 0.1 mm/s (0.004 in./s) Update time: See position measurement
<b>Operating voltage:</b>	+24 Vdc nominal (-15 or +20%) Polarity protection: up to -30 Vdc Overvoltage protection: up to 36 Vdc Current drain: 100 mA typical Dielectric withstand voltage: 500 V (DC ground to machine ground)
<b>Operating conditions:</b>	Temperature: - 40 to +75 °C Relative humidity: 90% no condensation Temperature coefficient: < 30 ppm / °C Setpoint adjustment, (Null/Span): 100% of electrical stroke length. Min. 25 mm distance between setpoints. For dual magnet outputs: Min 76 mm distance between magnets.
<b>EMC test:</b>	Emissions IEC/EN 50081-1, Immunity IEC/EN 50082-2, IEC/EN 61000-4-2/3/4/6, level 3/4 criterion A, CE qualified
<b>Shock rating:</b>	100 g (single hit)/IEC standard 68-2-27 (survivability)
<b>Vibration rating:</b>	15 g/10-2000 Hz/IEC standard 68-2-6
<b>Connection type:</b>	6-pin male D60 connector or integral cable

## PROFILE STYLE (RP MODEL)

<b>Electronic head:</b>	Aluminum housing Diagnostic display (LED's beside connector/cable exit)
<b>Sealing:</b>	IP 65
<b>Sensor extrusion:</b>	Aluminum (Temposonics profile style)
<b>Mounting:</b>	Adjustable mounting feet or T-slot nut (M5 threads) in base channel
<b>Magnet type:</b>	Captive-sliding magnet or floating (open ring) magnet

## ROD STYLE (RH MODEL)

<b>Electronic head:</b>	Aluminum housing Diagnostic display (LED's beside connector/cable exit)
<b>Sealing:</b>	IP 67 or IP 68 for integral cable model
<b>Sensor rod:</b>	304L Stainless steel
<b>Operating pressure:</b>	350 bar static, 690 bar peak (5000 psi static, 10,000 psi peak)
<b>Mounting:</b>	Any orientation, threaded flange M18 x 1.5 or 3/4-16 UNF-3A
<b>Typical mounting torque:</b>	45 N-m (33 ft. - lbs.)
<b>Magnet type:</b>	Ring, floating (open ring) magnet, or magnet float

## Sensor integral connector (D60 Male)

Male Integral D6 connector pin-out as viewed from the end of the sensor



Pin no.	Wire color	Function
<b>Analog outputs</b>		
1	Gray	Output 1/Position #1: 0 to 10, 10 to 0, -10 to +10, +10 to -10V 4 to 20, 20 to 4, 0 to 20, 20 to 0 mA
2	Pink	Return for pin 1
3	Yellow	Output 2/Position #2 or Speed: 0 to 10, 10 to 0, -10 to +10, +10 to -10V 4 to 20, 20 to 4, 0 to 20, 20 to 0 mA
4	Green	Return for pin 3
5	Red or Brown	+24 Vdc (-15 / +20%)
6	White	DC Ground (for supply)

### Note:

When using the single channel output (pins 1 and 2), the unused pins for output 2 (pins 3 and 4) should be left floating (unconnected), unless sensor programming is being used.

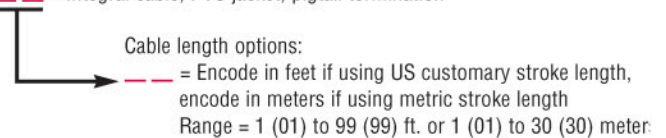
## CONNECTION TYPE

Integral connector

**D60** = 6-pin DIN, male, standard

Integral cables

**R** \_\_\_ = Integral cable, PVC jacket, pigtail termination



## INPUT VOLTAGE

**1** = +24 Vdc (+20% - 15%)

**OUTPUT** (13 - 19) 3 to 7 digit code depending on output selected

## 1 output channel with 1 magnet (3 digit code)

Output #1 = magnet position

<b>V01</b> = 0 to +10 Vdc	<b>A01</b> = 4 to 20 mA
<b>V11</b> = +10 to 0 Vdc	<b>A11</b> = 20 to 4 mA
<b>V21</b> = -10 to +10 Vdc	<b>A21</b> = 0 to 20 mA
<b>V31</b> = +10 to -10 Vdc	<b>A31</b> = 20 to 0 mA

## 2 output channels with 2 magnets \* (3 digit code)

Output #1 = magnet #1 position

Output #2 = magnet #2 position

<b>V02</b> = 0 to +10 Vdc	0 to +10 Vdc
<b>V12</b> = +10 to 0 Vdc	+10 to 0 Vdc
<b>V22</b> = -10 to +10 Vdc	-10 to +10 Vdc
<b>V32</b> = +10 to -10 Vdc	+10 to -10 Vdc
<b>A02</b> = 4 to 20 mA	4 to 20 mA
<b>A12</b> = 20 to 4 mA	20 to 4 mA
<b>A22</b> = 0 to 20 mA	0 to 20 mA
<b>A32</b> = 20 to 0 mA	20 to 0 mA



**Series 252 Servovalves**

**Features**

- Nozzle-flapper design with mechanical feedback from the spool to provide positive internal closed-loop flow control.
- Internal filtration to protect nozzle orifices from contamination. Standard mounting configuration for all 252.2X and 252.4X models makes it simple to change flow ratings. Mounting configuration within the 252.3X models are also interchangeable.
- Unpeaked response over servo-system frequency range.
- 3000 psi (21 MPa) operating pressure for optimum system performance and reliability; operating pressures up to 5000 psi (34.5 MPa) available on special request
- High spool-driving forces (over 100 poundsforce) provide low contamination sensitivity.
- Fifth port on some servovalves for separating pilot pressure from system pressure.



Table 1. Performance Characteristics

Model	Full-Flow Rating*		90° point at 10% command	Null Flow†	
	gpm	L/min		gpm	L/min
252.21C	1.0	4.0	240 Hz	0.29	1.10
252.22C	2.5	9.5	240 Hz	0.38	1.44
252.23C	5.0	19.0	240 Hz	0.60	2.27
252.24C	10.0	37.0	200 Hz	0.60	2.27
252.25C	15.0	56.0	170 Hz	0.60	2.27
252.31A‡	25.0	93.0	80 Hz	1.47	5.56
252.32A‡	40.0	151.0	60 Hz	1.47	5.56
252.33A‡	60.0	227.0	50 Hz	2.20	8.33
252.41A	1.0	4.0	300 Hz	0.29	1.10
252.42A	2.5	9.5	280 Hz	0.38	1.44
252.43A	5.0	19.0	280 Hz	0.60	2.27

\* Flow ratings are for 1000 psi (7 MPa) pressure drop across the servovalve. Higher flows are available at higher pressure drops.

† The maximum internal null flow is specified at 3000 psi (21 MPa). The null flow at the first stage is 0.20 gpm (0.76 L/min) for all Series 252 Servovalves.

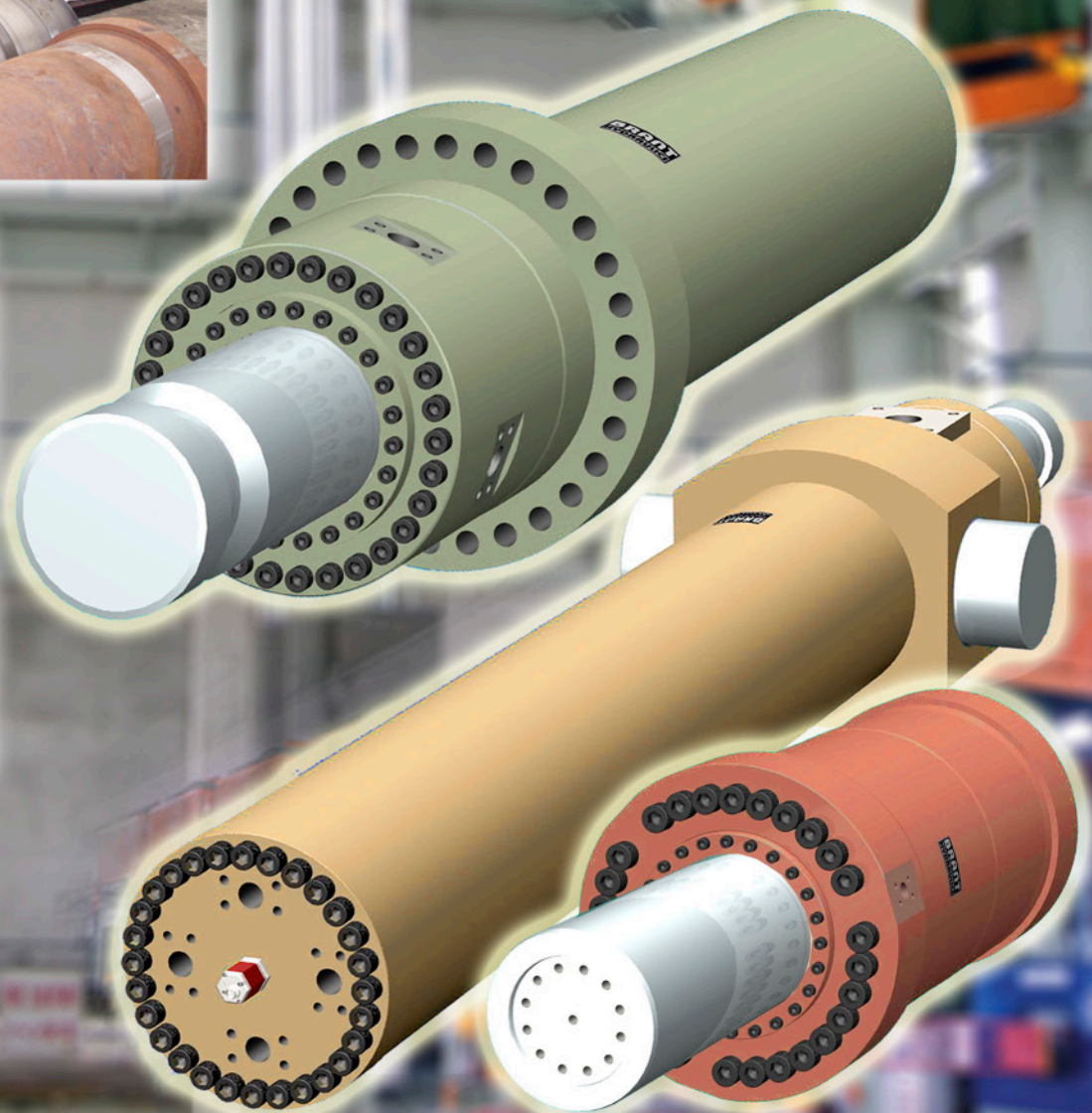
‡ This servovalve can be converted to external pilot pressure in the field (with auxiliary port). The 90° point is at 40% command.

Specifications are subject to change without notice. Contact MTS for verification of specifications critical to your needs.

# Large Cylinders for Material Test Equipment & Hydraulic Press



*We offer a variety of high-quality hydraulic press cylinders up to 6000 tons and servo motion cylinder for test bench.*





Long Stroke Cylinder



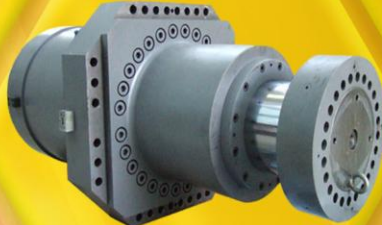
Rotary Cylinder



Ceramic Cylinder



AGC Cylinder



Large Cylinder



ISO Mill Type Cylinder

We design and manufacture top quality hydraulic cylinders.

With **BRANT**, you have more competitiveness.



Servo Cylinder



Damper



Cylinder with Linear Transducer



Swivel Cylinder



JOHS 110 Mill Type Cylinder



Press Cylinder



Custom Design Cylinder



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**WE ARE THE RIGHT SUPPLIER FOR YOU !**