

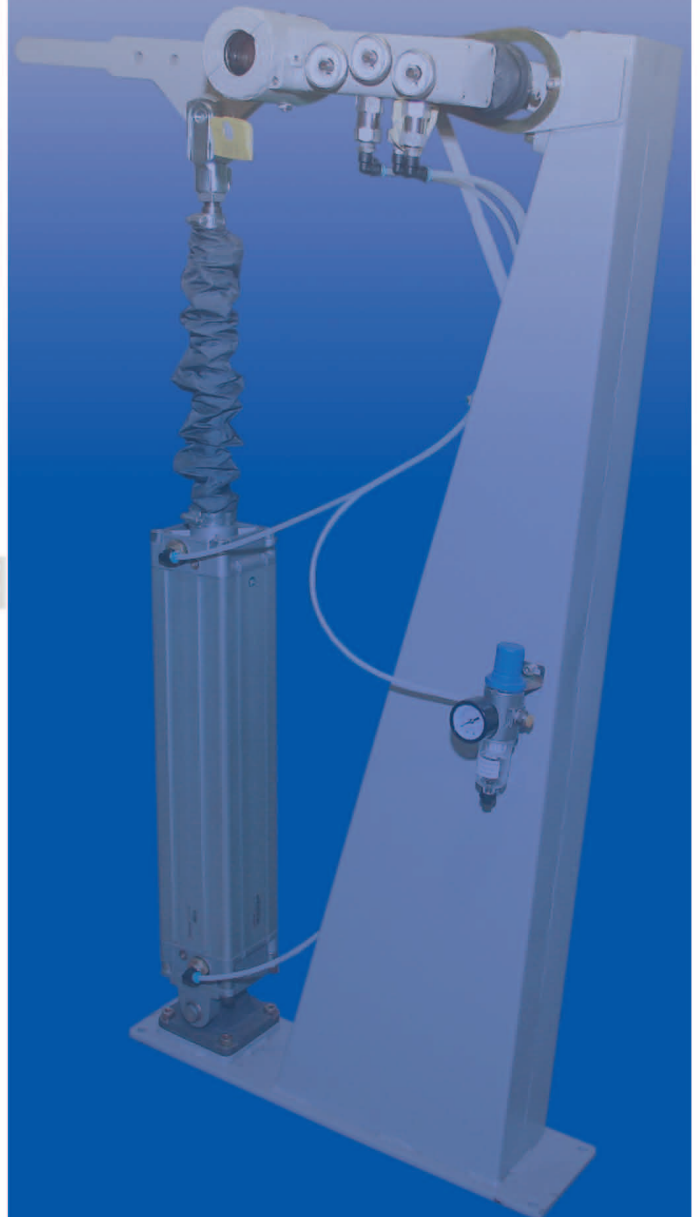
# ACP300 Series

301-302-303

## PNEUMATIC CYLINDRIC ACTUATOR

TO GIVE FREEDOM IN APPLICATIONS THAT REQUIRE MOVEMENT CONTROL AND EXACT POSITIONING OF THE FINAL CONTROL ELEMENTS

- Available for 4 to 20 mA, HART®, FOUNDATION™ fieldbus and PROFIBUS-PA communication protocols
- Compact and modular design
- Easy to install
- Automatic Setup
- Most usual Characteristic Curves and 16-point user defined
- Control valve diagnostics for maintenance
- Non-contact position measurement via Hall Effect sensor
- Position sensor available for remote mounting
- Applications in severe vibration and high temperatures
- Local adjustment without need to open the housing
- For linear and rotary applications
- Display rotation for easy reading in any position
- Supports DD and EDDL, suitable for FDT/DTM applications
- Built-in transient suppression
- For Single or Double Action pneumatic actuator
- Change of valve opening characteristic via software
- Auto lubrication, with no need for external lubricants
- Optional limit switch for pneumatic cylinder
- Integrated Pressure regulator and Filter
- Positioner: weather proof, explosion proof and intrinsically safe
- Hazardous Area Certification, including use in saline atmospheres



smar

The Pneumatic Cylindric Actuator - ACP300 Series Combines the power of pneumatic cylinders and the FY300 Series capabilities - smart microprocessed positioner that allows applications in modulating control.

More than taking the microprocessor to the actuator, the ACP300 Series is presented in linear and rotary versions, giving the user a wide choice of applications in the many final control elements such as dampers for furnace draft control, water gates, heavy valves and other applications requiring movement control.

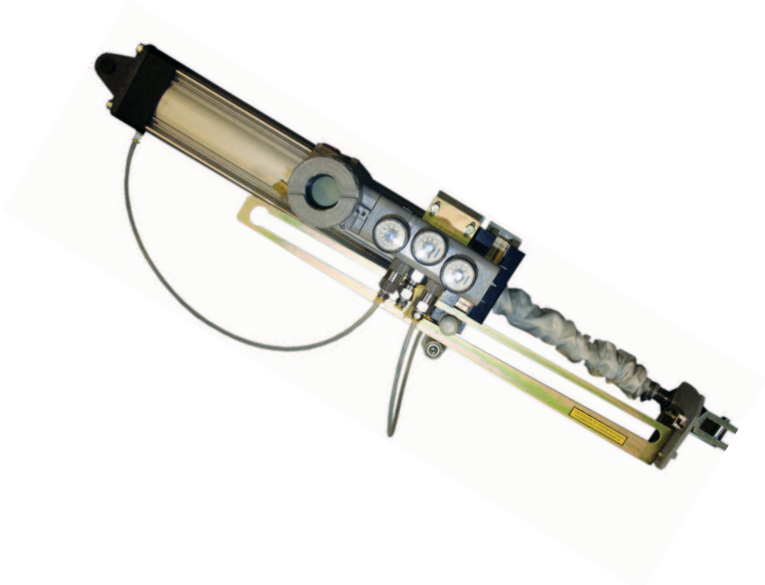
The ACP300 receives a control signal from the controller and moves the cylinder to the exact position of control according to the control strategy and loop tuning.

With the intelligence integration to the actuator, the ACP300 allows the user to configure the opening characteristic of the cylinder with the control of movement. In case the standard curves do not comply with the control requirements, it is possible to configure the ACP300 Series on a user-adjustable 16-point curve.



Furthermore, the HART®, FOUNDATION™ fieldbus or PROFIBUS-PA communication protocols allow easy interface between the field and the control room and several features that reduce installation, operation and maintenance costs.

**Main Characteristics**



- ✓ Compact and modular design;
- ✓ Easy to install;
- ✓ Non-contact position measurement via Hall Effect sensor
- ✓ Weather proof, explosion proof and intrinsically safe;
- ✓ Change of valve opening characteristic via software;
- ✓ Auto-configuration in a few minutes;
- ✓ Auto-lubrication, with no need for external lubricants;
- ✓ Optional limit switches;
- ✓ Integrated pressure regulator and filter.

### FY Positioner Specifications

#### Temperature Limits

Operation: -40 to 85 °C (-40 to 185 °F);  
 Storage: -40 to 90 °C (-40 to 194 °F);  
 Display: -10 to 60 °C ( 14 to 140 °F) operation;  
 -40 to 85 °C (-40 to 185 °F) without damage.

#### Humidity Limits

0 to 100% RH.

#### Position Feedback

Non-contact, via-Hall Effect Magnet sensor. Less wear, without need for frequent readjustments or lubrication.

#### Resolution

0.1% F.S.

#### Repeatability

0.1% F.S.

#### Hysteresis

0.1% F.S.

#### FY Positioner Air Consumption

0.35 Nm<sup>3</sup>/h (0.20 SCFM) at 1.4 bar (20 psi) supply.  
 1.10 Nm<sup>3</sup>/h (0.65 SCFM) at 5.6 bar (80 psi) supply.

#### Air Output Capacity

13.6 Nm<sup>3</sup>/h (8 SCFM) at 5.6 bar (80 psi) supply.

#### Ambient Temperature Effect

0.8% / 20 °C of span.

#### FY Positioner Pneumatic Connections

Supply and output: 1/4 - 18 NPT;  
 Pressure Gage: 1/8 - 27 NPT.

#### FY Positioner Material of Construction

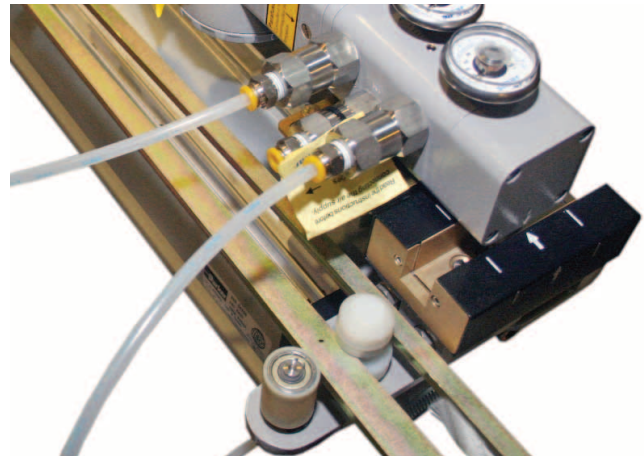
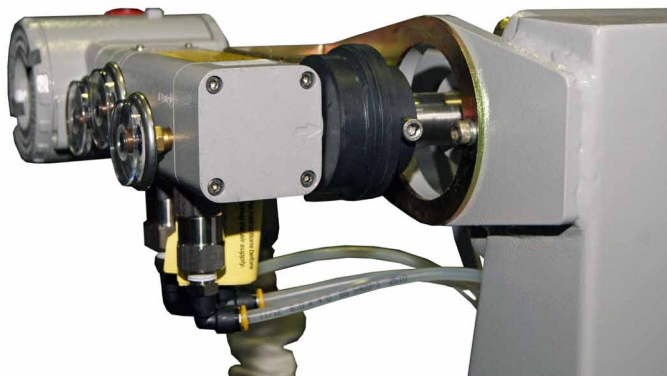
Injected low copper aluminum housing with polyester painting or 316 Stainless Steel, with Buna-N O-rings on covers (NEMA 4X, IP66).

#### Air pressure Supply

1.4 - 7 bar (20 - 100 psi).  
 Free from water, dust, oil and non corrosive as per ANSI/ISA S7.0.01-1996.

#### Maximum input pressure for pressure regulator filter

116 psi (8 kgf/cm<sup>2</sup>).



#### Pressure Regulator Filter

Minimum filtration degree: 40 µm.

### Pneumatic Cylinder Specifications

#### ISO Pneumatic Cylinder

- ISO 6431, VDMA 24562, NFE 49-003-1, BS and CETOP standards;
- Double action;
- Double shock absorption;
- Magnetic piston;
- Anodized Aluminum cover;
- Injected Aluminum heads;
- Polyurethane piston and rod sealing;
- Stainless Steel rod with rubber or polyester protection;
- Maximum work pressure of the cylinder: 10 bar (NOTE: The maximum operation pressure of the ACP300 positioner is 7 bar).;
- Operation temperature: -20 °C to 80 °C;
- Female back articulation;
- Male bracket for back articulation and pin;
- Rod fork with pin;
- Linear ACP;
  - Diameter: 63 to 160 mm;
  - Travel: 100 to 1000 mm.
- Rotary ACP:
  - Diameter: 100 mm;
  - Travel: 400 mm.

### Options

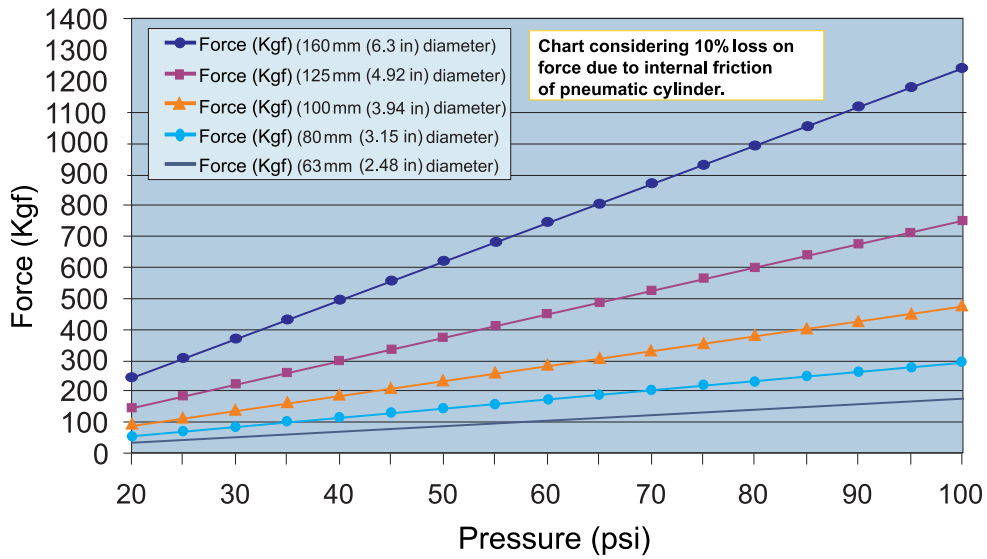
#### Limit Switch

- Magnetic sensor:
  - Voltage: 10 to 220 Vac/dc;
  - Current: 100 mA (maximum).
- External fixing through appropriate bracket;
- Sensor Protection grade: IP65 (not suitable for hazardous areas applications);
- Not dependent of the FY300 operation, must be used only as an indicative system of actuator position at end of travels.

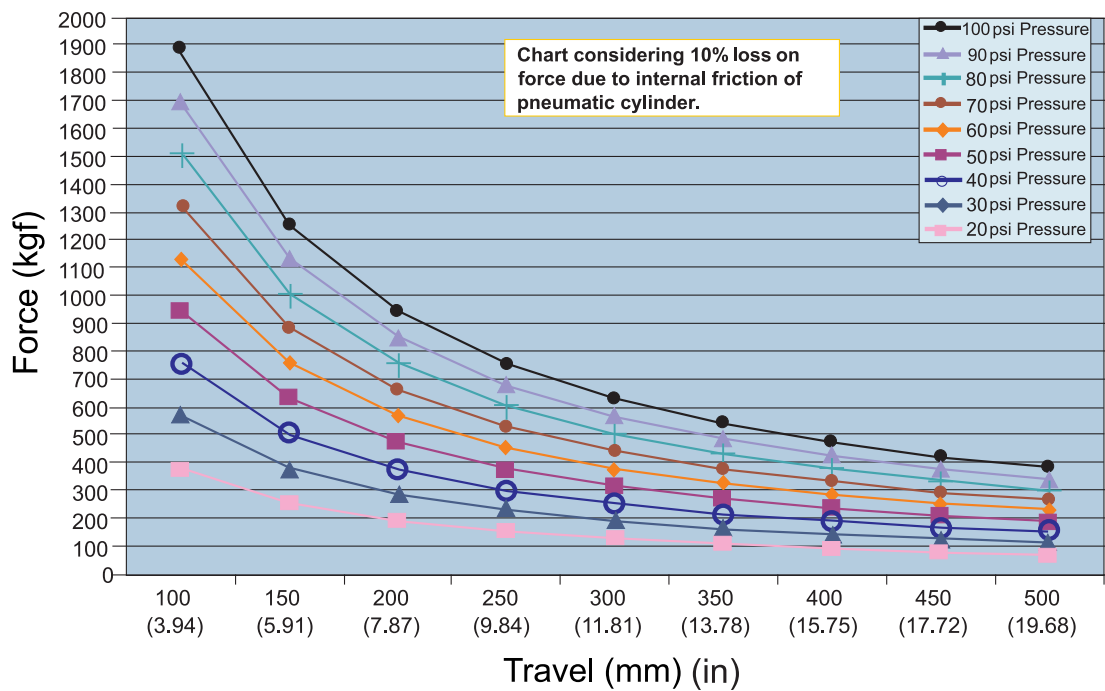
#### Mounting Bracket

- The bracket complies with the diameters of ISO6431 cylinders series;
- Materials: Cast Aluminum with low magnesium contents, Stainless Steel, Carbon Steel with superficial treatment, Bronze and Technyl.

LINEAR ACP - Extend Force x Pressure Chart



ROTARY ACP - Return Force x Travel Chart



MODEL	LINEAR PNEUMATIC CYLINDRIC ACTUATOR									
ACP301L	4 to 20 mA & HART®									
ACP302L	FOUNDATION™ fieldbus									
ACP303L	PROFIBUS-PA									
<b>COD. Cylinder Diameter</b>										
1	63 mm (2.48 in)									
2	80 mm (3.15 in)									
3	100 mm (3.94 in)									
4	125 mm (4.92 in)									
5	160 mm (6.3 in)									
<b>COD. Cylinder and Ruler Travel</b>										
1	100 mm (3.94 in)			7	400 mm (15.75 in)					
2	125 mm (4.92 in)			8	500 mm (19.68 in)					
3	160 mm (6.30 in)			9	630 mm (24.80 in)					
4	200 mm (7.87 in)			A	800 mm (31.50 in)					
5	250 mm (9.84 in)			B	1000 mm (39.37 in)					
6	320 mm (12.60 in)									
<b>COD. Bracket Material</b>										
C	Carbon Steel									
<b>COD. Magnetic Limit Switch (**)</b>										
0	Without Limit Switch									
1	One Limit Switch									
2	Two Magnetic Limit Switch									
<b>COD. Local Indicator</b>										
0	Without Local Indicator									
1	With Local Indicator									
<b>COD. Electrical Connection</b>										
0	½ – 14 NPT									
A	M20 X 1.5									
B	PG 13.5 DIN									
<b>SPECIAL OPTIONS (Leave it blank for no optional items)</b>										
<b>COD. Identification Plate</b>										
I1	FM: XP, IS, NI, DI									
I3	CSA: XP, IS, NI, DI									
I4	EXAM (DMT): Ex-ia; NEMKO: Ex-d									
I5	CEPEL: Ex-d, Ex-ia									
I6	Sem Certificação									
ID	NEPSI: Ex-ia, Ex-d (PROFIBUS PA)									
IJ	NEMKO - Ex-d									
<b>COD. TAG Plate</b>										
J0	With TAG									
J1	Blank									
J2	According to user's notes									
ZZ	Leave it blank for no optional items									
<b>COD. Housing</b>										
H0	Aluminum (IP/TYPE)									

ACP301L	1	1	C	1	0	0	*	*	*
ACP302L	1	1	C	1	0	0	*	*	*
ACP303L	1	1	C	1	0	0	*	*	*

← TYPICAL MODEL

\* Leave it blank for no optional items.

\*\* Limit Switches are for general use, non-hazardous locations; They are not certified for hazardous areas.

### NOTE

All the options for the actuator are only for cylinder in compliance to ISO standard. In case the cylinder is not standardized (ISO Cylinder) the special cylinder should necessarily be assembled in Smar. (Note: the cylinder assembly, freight and other costs are customer's responsibility).

MODEL	ROTARY PNEUMATIC CYLINDRIC ACTUATOR						
ACP301R	4 to 20 mA & HART®						
ACP302R	FOUNDATION™ fieldbus						
ACP303R	PROFIBUS PA						
<b>COD. Cylinder Diameter</b>							
1	100 mm (3.94 in)						
<b>COD. Bracket Material</b>							
C	Carbon Steel						
<b>COD. Magnetic Limit Switch</b>							
0	Without Magnetic Limit Switch						
1	One Magnetic Limit Switch						
2	Two Magnetic Limit Switches						
<b>COD. Local Indicator</b>							
0	Without Local Indicator						
1	With Local Indicator						
<b>COD. Electrical Connection</b>							
0	½" - 14 NPT						
A	M20 X 1.5						
B	PG 13.5 DIN						
<b>SPECIAL OPTIONS (Leave it blank for no optional items)</b>							
<b>COD. Identification Plate</b>							
I1	FM: XP, IS, NI, DI						
I3	CSA: XP, IS, NI, DI						
I4	EXAM (DMT): Ex-ia; NEMKO: Ex-d						
I5	CEPEL: Ex-d, Ex-ia						
I6	Sem Certificação						
ID	NEPSI: Ex-ia, Ex-d (PROFIBUS PA)						
IJ	NEMKO: Ex-d						
<b>COD. TAG Plate</b>							
J0	With TAG						
J1	Blank						
J2	According to user's notes						
ZZ	Leave it blank for no optional items						
<b>COD. Housing</b>							
H0	Aluminum (IP/TYPE)						

ACP301R	1	C	0	1	0	*	*	*
ACP302R	1	C	0	1	0	*	*	*
ACP303R	1	C	0	1	0	*	*	*

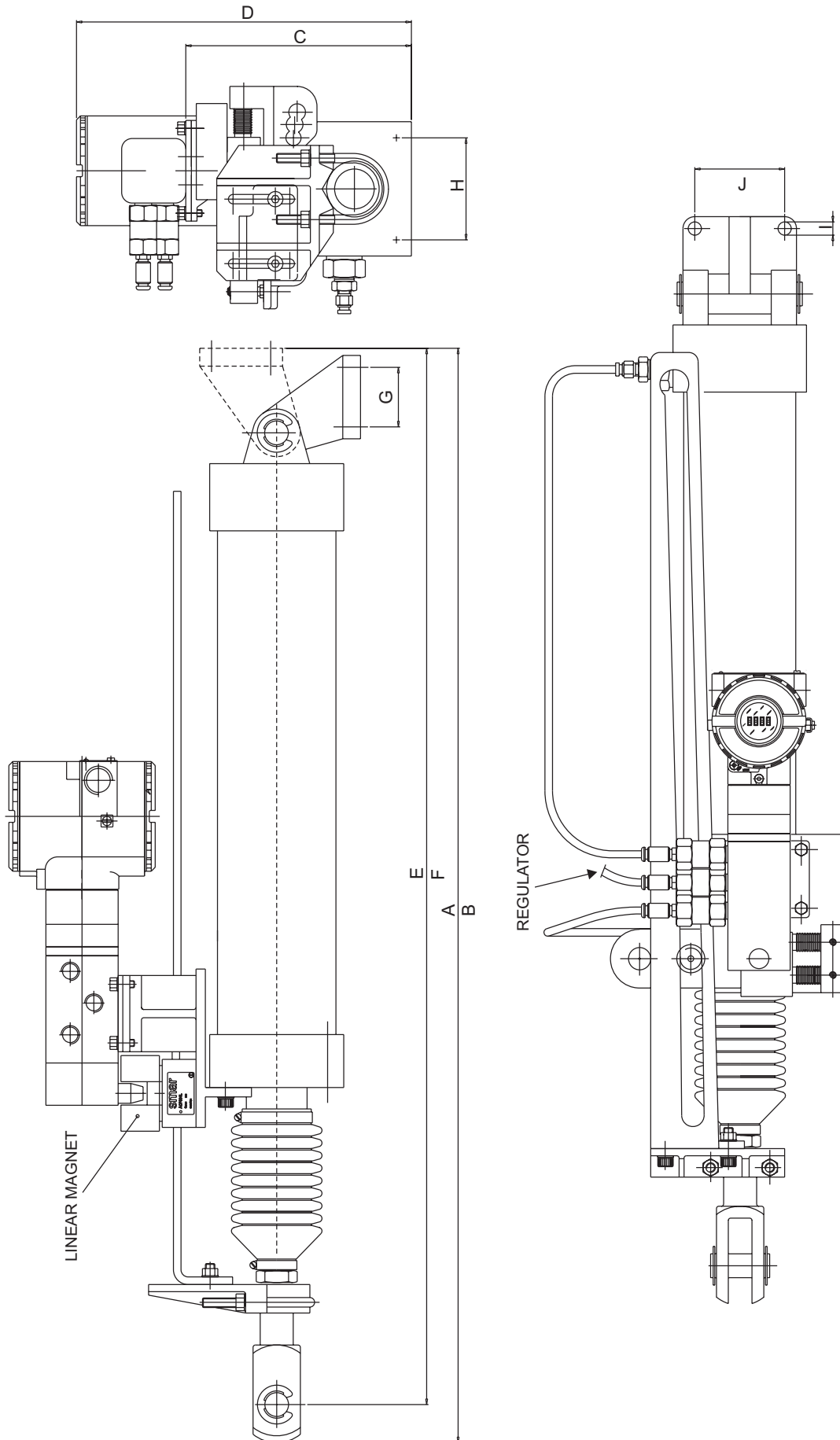
← TYPICAL MODEL

\* Leave it blank for no optional items.

\*\* Limit Switches are for general use, non-hazardous locations; They are not certified for hazardous areas.

LINEAR ACP

Dimensions in mm (in).



**LINEAR ACP MAIN DIMENSIONS TABLE**  
(63, 80, 100, 125 and 160 mm Diameters)

A Dimension = Backwarded cylinder					
CYLINDER TRAVEL/ RULE (mm)	CYLINDER DIAMETER (mm)				
	63	80	100	125	160
	A (mm)				
100	466	530.8	558.8	679	797
125	491	562.05	590.05	709	827
160	526	605.8	633.8	751	869
200	566	655.8	683.8	799	917
250	616	718.3	746.3	859	977
320	686	805.8	833.8	943	1061
400	766	905.8	933.8	1039	1157
500	866	1030.8	1058.8	1159	1277
630	996	1193.3	1221.3	1315	1433
800	1166	1405.8	1433.8	1519	1637
1000	1366	1655.8	1683.8	1759	1877

F Dimension = Advanced cylinder until the center of the pin hole (of clevis)					
CYLINDER TRAVEL/ RULE (mm)	CYLINDER DIAMETER (mm)				
	63	80	100	125	160
	B (mm)				
100	543.4	603.6	631.6	733.4	839.6
125	593.4	659.85	687.85	788.4	894.6
160	663.4	738.6	766.6	865.4	971.6
200	743.4	828.6	856.6	953.4	1059.6
250	843.4	941.1	969.1	1063.4	1169.6
320	983.4	1098.6	1126.6	1217.4	1323.6
400	1143.4	1278.6	1306.6	1393.4	1499.6
500	1343.4	1503.6	1531.6	1613.4	1719.6
630	1603.4	1796.1	1824.1	1899.4	2005.6
800	1943.4	2178.6	2206.6	2273.4	2379.6
1000	2343.4	2628.6	2656.6	2713.4	2819.6

B Dimension = Advanced cylinder					
CYLINDER TRAVEL/ RULE (mm)	CYLINDER DIAMETER (mm)				
	63	80	100	125	160
	B (mm)				
100	566	630.8	658.8	779	897
125	616	687.05	715.05	834	952
160	686	765.8	793.8	911	1029
200	766	855.8	883.8	999	1117
250	866	968.3	996.3	1109	1227
320	1006	1125.8	1153.8	1263	1381
400	1166	1305.8	1333.8	1439	1557
500	1366	1530.8	1558.8	1659	1777
630	1626	1823.3	1851.3	1945	2063
800	1966	2205.8	2233.8	2319	2437
1000	2366	2655.8	2683.8	2759	2877

DIMENSION	DIMENSIONAL - FEMAL E BACK JOINT BRACKET (mm)				
	63	80	100	125	160
G (mm)	35	40	50	60	88
J (mm)	52	66	76	94	118
I (mm)	9	11	11	12	14

DIMENSION	CENTER OF THE CYLINDER HOLES (mm)				
	63	80	100	125	160
H (mm)	56.5	72	89	110	140

Reference values for pneumatic cylinders from usual manufacturers line, ISO series.  
The values for A, B, E, F were considered with clevis totally threaded.

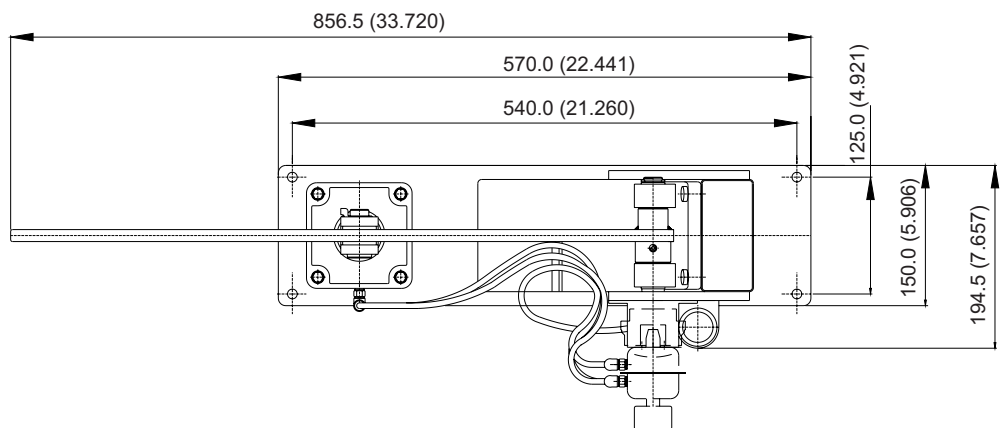
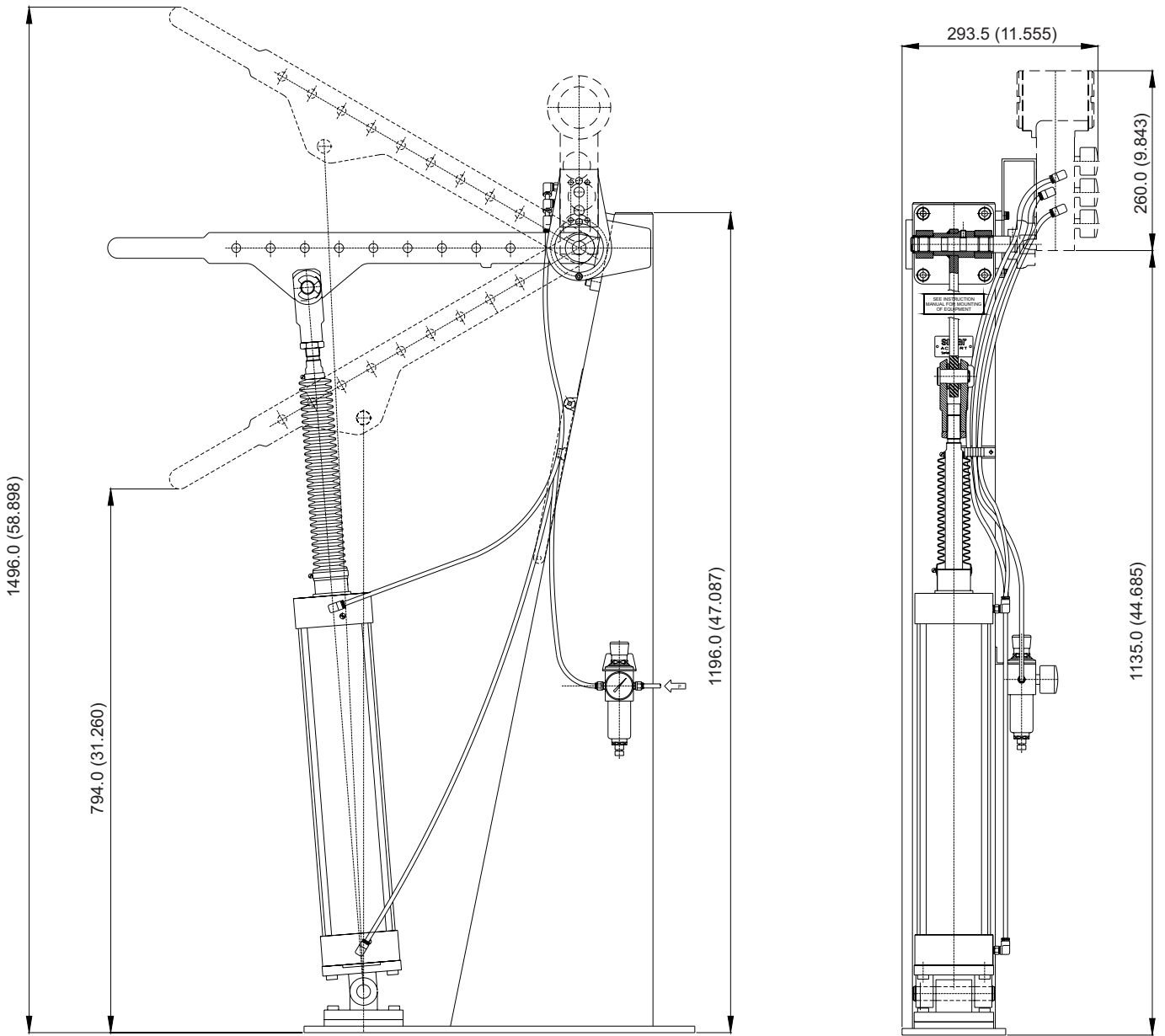
C Dimension = Cylinder header height until the FY fixation plate D Dimension = Cylinder header height until the FY					
DIMENSION	CYLINDER DIAMETER (mm)				
	63	80	100	125	160
C (mm)	162.75	183	200	228.5	265
D (mm)	243.75	264	281	309.5	346

E Dimension = Backwarded cylinder until the center of the pin hole (of clevis)					
CYLINDER TRAVEL/ RULE (mm)	CYLINDER DIAMETER (mm)				
	63	80	100	125	160
	A (mm)				
100	443.4	503.6	531.6	633.4	739.6
125	468.4	534.85	562.85	663.4	769.6
160	503.4	578.6	606.6	705.4	811.6
200	543.4	628.6	656.6	753.4	859.6
250	593.4	691.1	719.1	813.4	919.6
320	663.4	778.6	806.6	897.4	1003.6
400	743.4	878.6	906.6	993.4	1099.6
500	843.4	1003.6	1031.6	1113.4	1219.6
630	973.4	1166.1	1194.1	1269.4	1375.6
800	1143.4	1378.6	1406.6	1473.4	1579.6
1000	1343.4	1628.6	1656.6	1713.4	1819.6



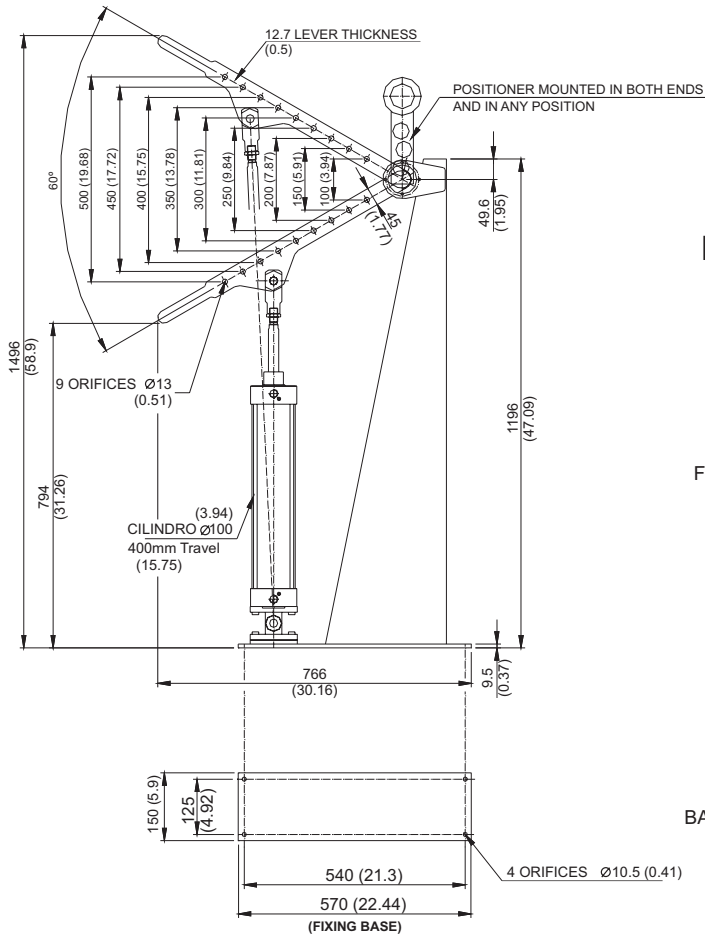
ROTARY ACP

Dimensions in mm (in).

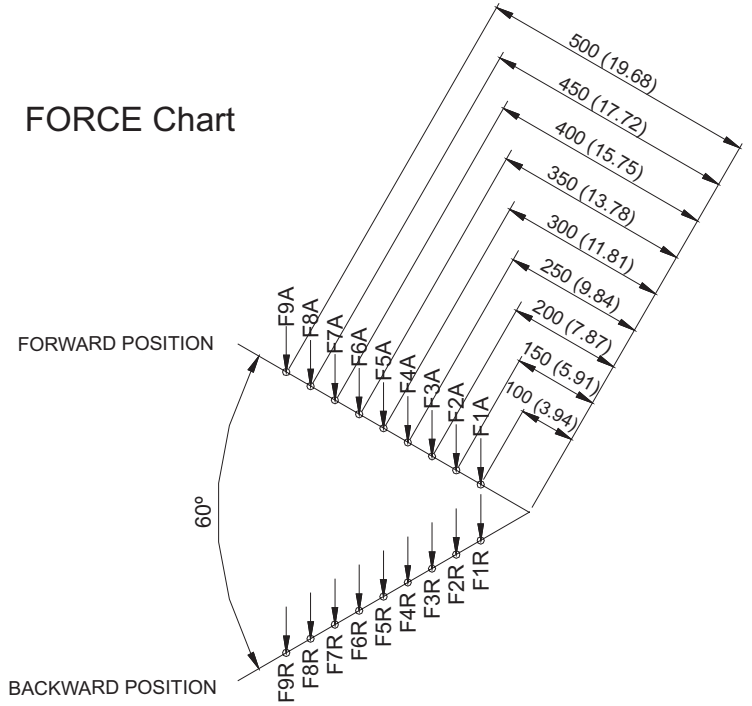


FORCES TABLE – ROTARY ACP

Dimensions in mm (in).



FORCE Chart



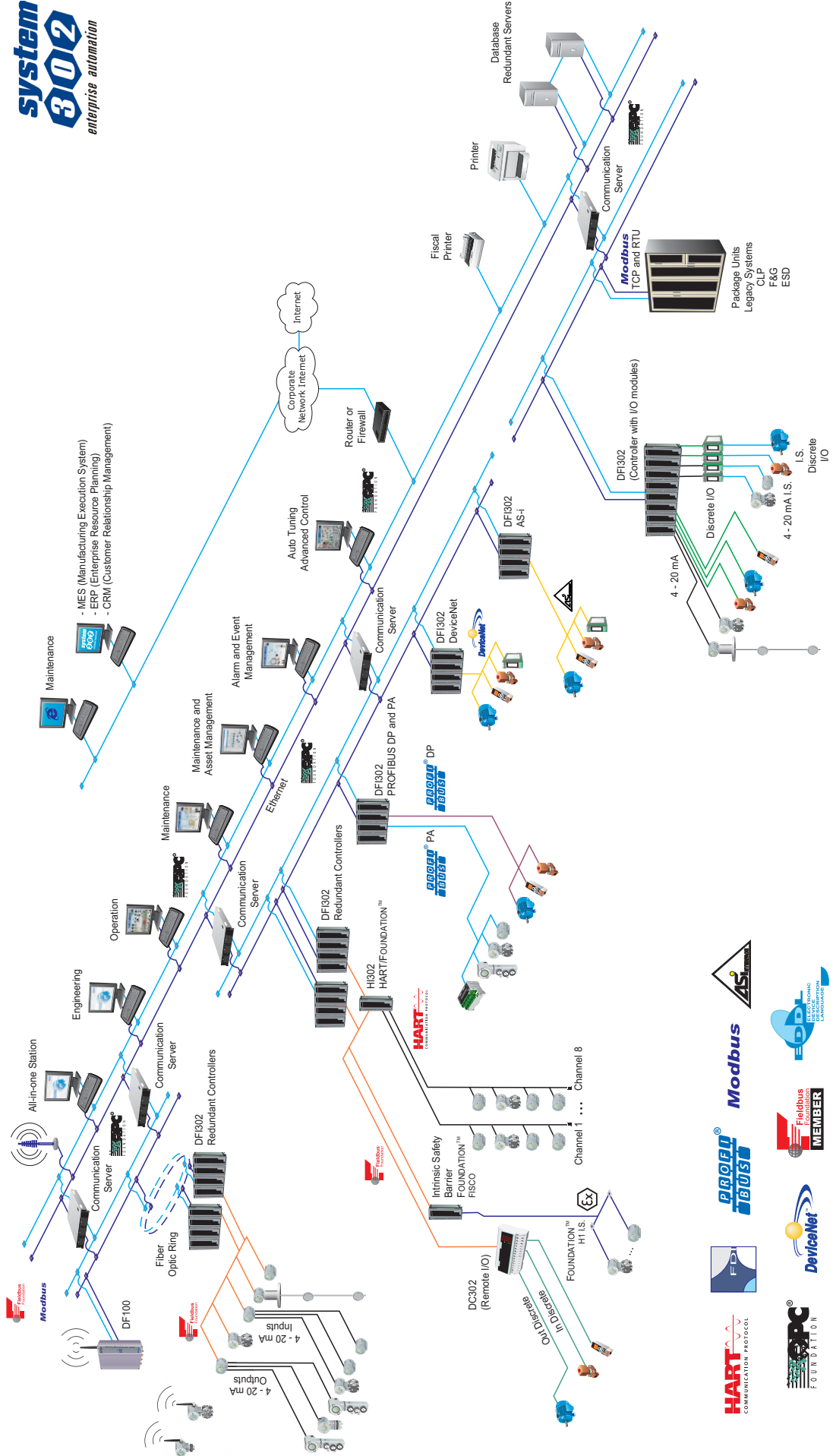
RESULTING FORCES IN (Kgf)

FORCES - BACKWARD POSITION (R)















	20 psi (1.4 Kg/ cm <sup>2</sup> )	100 psi (7.0 Kg/ cm <sup>2</sup> )
F1R	377	1888
F2R	251	1259
F3R	188	944
F4R	151	755
F5R	125	629
F6R	107	539
F7R	94	472
F8R	83	419
F9R	75	377

FORCES - FORWARD POSITION (A)










	20 psi (1.4 Kg/ cm <sup>2</sup> )	100 psi (7.0 Kg/ cm <sup>2</sup> )
F1A	397	1987
F2A	265	1325
F3A	198	993
F4A	159	795
F5A	132	662
F6A	113	568
F7A	99	497
F8A	88	441
F9A	79	397







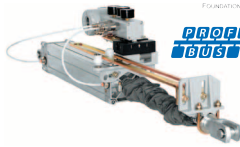











**Pressure      Pressure and Level      Pressure, Level and Flow**

<p>4-20 mA LD290</p>  <p>HART LD291</p>  <p>LD292</p>  <p>PROFIBUS LD293</p>	<p>4-20 mA LD290</p>  <p>HART LD291</p>  <p>LD292</p>  <p>PROFIBUS LD293</p>	<p>4-20 mA LD290</p>  <p>HART LD291</p>  <p>LD292</p>  <p>PROFIBUS LD293</p>	<p>HART LD400</p>  <p>LD301</p>  <p>LD302</p>  <p>PROFIBUS LD303</p> 	<p>WirelessHART LD400</p> 		
Pressure Transmitter "In Line"	Gauge Economic Capacitive Pressure Transmitter	Flanged Transmitter	Pressure Transmitter with Extended Probe	Pressure Transmitter	Pressure Transmitter with High Performance	WirelessHART Pressure Transmitter

**Level      Density/Concentration      Position**

 <p>RD400</p> 	 <p>HART DT301</p>  <p>DT302</p>  <p>PROFIBUS DT303</p>	 <p>HART FY301</p>  <p>FY302</p>  <p>PROFIBUS FY303</p>	 <p>HART FY400</p>
Guided Wave Level Transmitter	Intelligent Density / Concentration Transmitter	Valve Positioner	Valve Positioner with Auto Tuning

**Position**

 <p>HART FY400</p>  <p>FY301</p>  <p>FY302</p>  <p>PROFIBUS FY303</p>	 <p>HART ACP400</p>  <p>ACP301</p>  <p>ACP302</p>  <p>PROFIBUS ACP303</p>	 <p>HART ACP400</p>  <p>ACP301</p>  <p>ACP302</p>  <p>PROFIBUS ACP303</p>	 <p>4-20 mA TP290</p>  <p>HART TP301</p>  <p>TP302</p>  <p>PROFIBUS TP303</p>
Valve Positioner with Remote Sensor	Pneumatic Linear Cylindric Actuator	Pneumatic Rotary Cylindric Actuator	Position Transmitter

**Temperature**

 <p>HART TT301</p>  <p>TT302</p>  <p>PROFIBUS TT303</p>	 <p>PROFIBUS TT383</p>	 <p>HART TT400 HART® SIS</p>	 <p>WirelessHART TT400</p>	 <p>HART TT411</p>	 <p>HART TT421</p>
Temperature Transmitter	Eight Input Temperature Transmitter	Smart Temperature Transmitter	WirelessHART Temperature Transmitter	Panel Mounting Temperature Transmitter	Head Mounting Temperature Transmitter

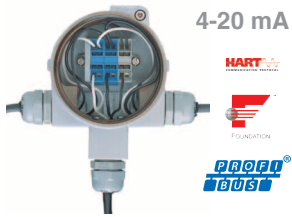
Junction Box

Didactic Products

JM1

JM400

PD3



3 Ways Junction Box

4 Ways Junction Box

Didactic Plant

Didactical Kits

Configurators

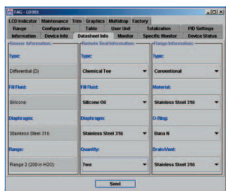
Interfaces

HART<sup>®</sup> CONF401

HART<sup>®</sup> DDCON 100

HART<sup>®</sup> HI311/HI321

PBI-PLUS



HART<sup>®</sup> Configurator Interface

HART<sup>®</sup> Configurator Interface

HART<sup>®</sup> Configurator

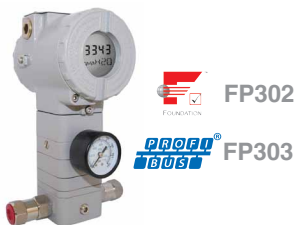
HART-USB Interface for PC

Advanced PROFIBUS PA Interface

Converters

HI302

HART<sup>®</sup> HCC301



FOUNDATION™ / PROFIBUS PA to Pneumatic Signal Converter

Triple Channel Current to FOUNDATION™ / PROFIBUS PA Converters

Triple Channel FOUNDATION™ / PROFIBUS PA to Current Converters

FOUNDATION™ / PROFIBUS PA Relay and Digital Input

HART<sup>®</sup> / Fieldbus Interface

HART<sup>®</sup> / Current Converter

Controllers

DFI302

LC700

CD600Plus



Interface Universal Fieldbus

Programmable Logical Controller

Digital Controller

Controllers - Remote Input and Output

WirelessHART DF100



HSE Controller and WirelessHART Gateway

DC303



FOUNDATION™ fieldbus / PROFIBUS PA Remote Input and Output

DC302



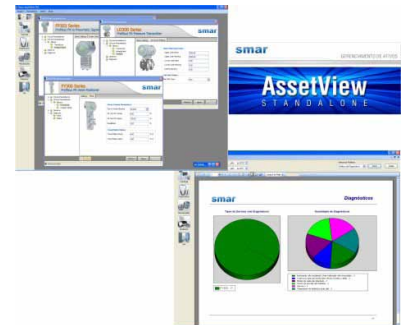
SYSTEM302



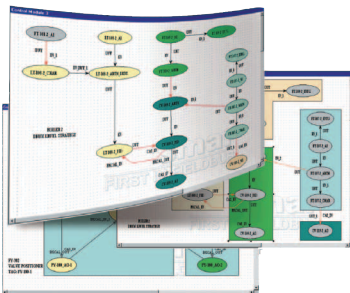
ProcessView Supervision / Operation System



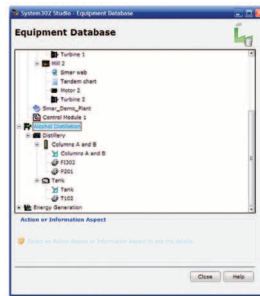
SimulationView Control Strategy Simulator



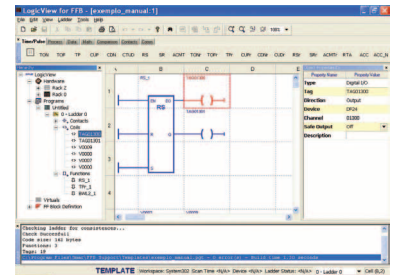
AssetView STANDALONE Asset Management System



Syscon Control Strategy and Industrial Network Configurator



Process Equipment Database Plant Information Management



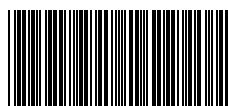
LogicView for FFB IEC61131 Programming Tool



**smar**  
www.smar.com

Specifications and information are subject to change without notice.  
Up-to-date address information is available on our website.

web: [www.smar.com/contactus.asp](http://www.smar.com/contactus.asp)



ACP300CE