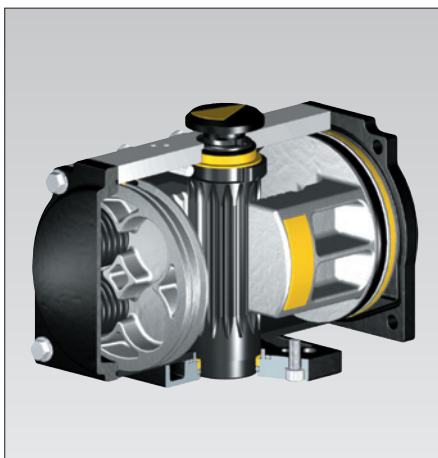


# KEYSTONE

**A comprehensive range of pneumatic actuators, providing compact, reliable and economical powered operation for all types of quarter-turn valves.**

## Features

- Direct mounting to all Keystone Butterfly Valves.
- Double Rack & Pinion design nullifies side loads on the pinion shaft, minimizing bearing wear and extending life.
- Double Acting or Spring Return models utilize the same compact body design.
- Aluminum body, hard anodized externally and internally, for corrosion and wear resistance.
- Electrostatic powder coating (ESPC) finish, external on body, internal and external on end caps, protects against corrosive environments.
- Adjustable travel stops.
- Safe end cover bolting requiring no special tools.
- Anti-blowout drive pinion.
- Over travel adjustment (at each end) +5°.
- Under travel adjustment (at each end) -10°.
- Easy field conversion between DA and SR models.



## Technical Data

Torque output range:  
 Double Acting 238 - 18180 lbs in  
 Spring Return 132 - 12515 lbs in

Operating medium:  
 Air (dry or lubricated)

Travel adjustment:  
 Over travel (at each end) +5°.  
 Under travel (at each end) -10°.  
 Increased under travel is available, on request.

Temperature range: -20°F to 210°F

Air supply pressure: 120 psi maximum

## Mounting Specifications

Actuator to valve:  
 Keystone standard

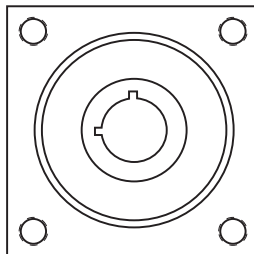
Accessories:  
 NAMUR VDI/VDE 3845 or Keystone standard

### Operation

#### Double and Single Acting Actuators

Both the double acting and spring return MRP actuators feature a compact design with the same envelope dimensions. This flexible unit can be converted from double acting to single acting in the field without special charts to decipher color codes on which springs to use. The spring return actuator is available with spring sets from 40 pounds to 100 pounds in 10 pound increments. The springs are manufactured from heavy gauge wire to assure long life and corrosion resistance.

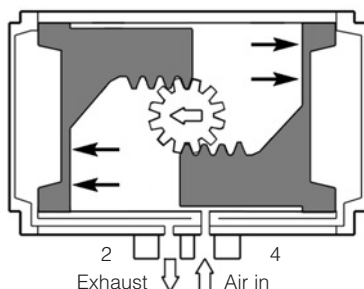
Actuator Mounting pad of the Keystone MRP: The dual-keyed input shaft allows parallel or perpendicular mounting to the valve flow.



#### Standard Double Acting

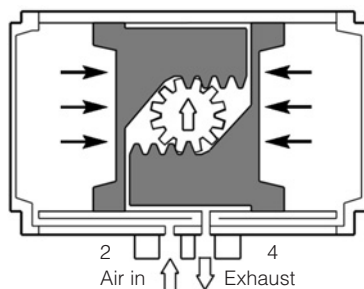
##### To OPEN Valve

In a double acting application, air pressure is introduced to Port 4, pressurizing the space between the pistons and driving the pistons out towards the actuator ends. The volume of air above the piston heads is exhausted to atmosphere. This causes the piston racks to drive the pinion in a counterclockwise direction, resulting in a quarter-turn rotation. This rotation is transferred to the valve shaft, opening the valve.



##### To CLOSE Valve

Air pressure introduced to Port 2, pressurizing the spaces above each piston head and driving the pistons inward. The volume of air between the pistons is exhausted to atmosphere. This causes the piston racks to drive the pinion in a clockwise direction, resulting in a quarter-turn rotation. This rotation is transferred to the valve shaft, closing the valve.

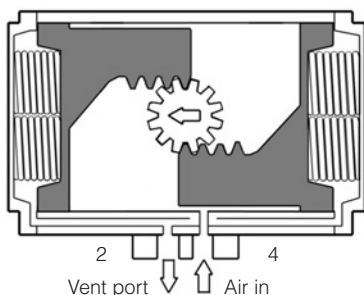


#### Spring Return

##### To OPEN Valve

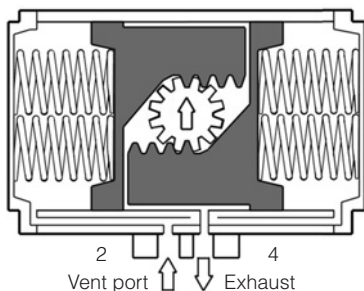
In a single acting application, air pressure is introduced to Port 4, pressurizing the space between the pistons and driving the pistons out towards the actuator ends while at the same time compressing the springs.

This causes the piston racks to drive the pinion in a counterclockwise direction, resulting in a quarter-turn rotation. This rotation is transferred to the valve shaft, opening the valve.



##### To CLOSE Valve

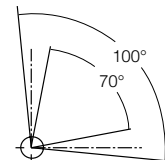
When the air pressure is relieved, the spring tension moves the pistons inward and exhausts the air through Port 4. This causes the piston racks to drive the pinion in a clockwise direction, resulting in a quarter-turn rotation. This rotation is transferred to the valve shaft, closing the valve.



### Travel Adjustments

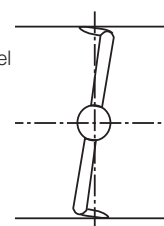
Within the mechanical connections of the drive between the valve and the MRP actuator there are several points of manufacturing tolerance, including valve disc or ball to stem, stem to adapter and adapter to actuator that must be compensated for in the operation of the assembly. Therefore, adjustment is necessary to ensure that valve operation is as precise as required. With the MRP, Dual travel stops allow adjustment at both ends of the stroke. Maximum adjustment range of 70° to 100° rotation, including an over travel of 5° and an under travel of 10°.

The standard travel stops also provide the desired adjustment necessary for proper operation of various valve types, as detailed.



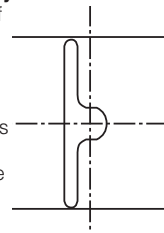
#### Resilient seated butterfly valves

Shut-off occurs before the disc has rotated a full 90° from the open position. Travel adjustment is therefore desirable to prevent over travel, which would result in unnecessary operating torque and premature deterioration of seat life. In the open position, adjustment is necessary to ensure maximum flow through the valve and minimum dynamic forces acting on the disc.



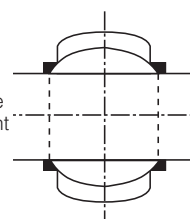
#### High performance butterfly valves

The double offset design of high performance butterfly valves results in the disc moving into the seat with a camming action. It is important that the disc does not travel beyond the seat position, otherwise damage to the seat will occur.



#### Ball and plug valves

The ball or plug must be precisely in line with the valve port to prevent damage to the seat in the open position. Adjustment at the closed position is necessary to ensure that complete shut-off is achieved.



## MRA Rack & Pinion Actuator



The MRA version of the popular Keystone MRP rack & pinion actuator offers increased resistance to caustic wash down utilized in many food and beverage applications. This version has all of the features enjoyed by users of the MRP – a hard anodized body that enhances outside environmental protection plus provides a hard, corrosion resistant internal surface for the bearings and pistons. This results in a longer life span with less downtime.

The end caps are coated with chromate plus E.S.P.C. inside and out, thus keeping this rack & pinion working long and hard for the customer. The E.S.P.C. treatment for the body and end caps plus SNP\* protection for the pinion offers that next step required for harsh indoor environments such as caustic wash down areas.

\* Special Nickel Protection

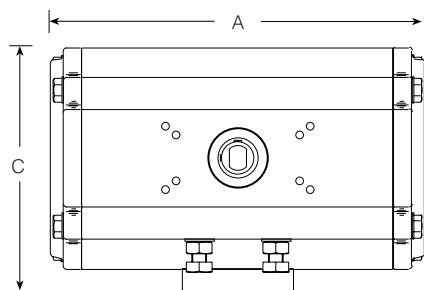
## Ordering Guide

Example	MRP	-	004	U	-	K	-	D	000	-	_____
<b>Actuator Coating</b>											
P – Black Powder Coat											
A – Grey Epoxy Coating											
<b>Actuator Size</b>											
004 009											
014 025											
037 045											
070 088											
180* 181*											
<b>Mounting Base Threads</b>											
U – UNC											
<b>Mounting Base Drilling</b>											
K – Keystone Direct Mount											
<b>Actuator Configuration</b>											
D – Double Acting											
S – Spring Return											
<b>Spring Range</b>											
000 – None											
040 – 40 psi											
060 – 60 psi											
080 – 80 psi											
100 – 100 psi											
<b>Seal Options</b>											
Blank – Std Nitrile											
VT – Viton®											
LT – Low Temp											

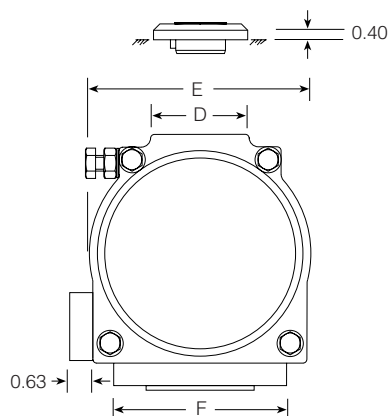
\* Models 180 and 181 only available as MRP

## Dimensions (inches)

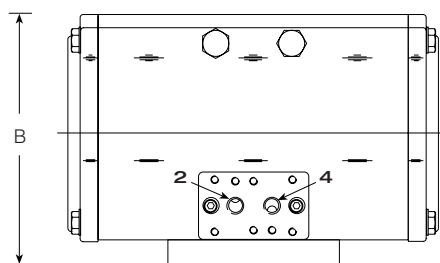
### Top View



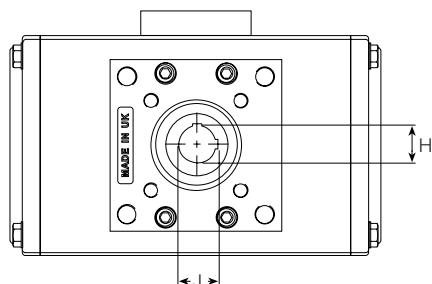
### Front View



### Side View



### Bottom View



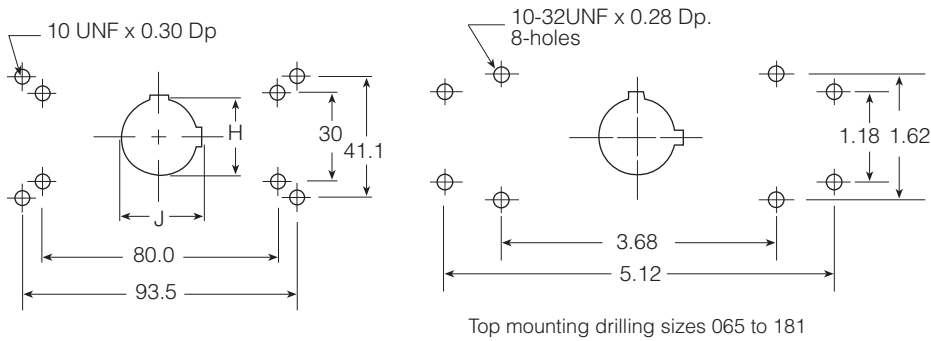
#### Note:

1. For size 180 only, spring return model has an extended body, due to the addition of spring packs. Dimension "A" is then 27.32".

## Actuator Dimensions (inches)

Size	A	B	C	D	E	F	Bottom of Shaft			Top of Shaft			Mounting Holes	
							H	J	Key	H	J	Key	No x Size	PCD
004	6.77	3.66	3.66	2.5	3.03	2.95	0.81	0.85	0.19	0.81	0.85	0.19	4 x 1/4-20UNC x 0.38 Dp	1.75
													4 x 3/8-16UNC x 0.56 Dp	3.25
009	7.67	4.8	4.8	2.5	4.17	3.15	1	1.06	0.25	1	1.06	0.25	4 x 3/8-16UNC x 0.56 Dp	3.25
014	8.11	5.43	5.22	2.5	4.59	3.15	1	1.06	0.25	1	1.06	0.25	4 x 3/8-16UNC x 0.56 Dp	3.25
025	9.53	6.42	6.1	2.5	5.64	4.4	1.12	1.25	0.25	1.12	1.25	0.25	4 x 3/8-16UNC x 0.56 Dp	3.25
													4 x 1/2-13UNC x 0.63 Dp	5
037	11.22	7.26	6.59	2.85	6.44	4.57	1.12	1.25	0.25	1.12	1.25	0.25	4 x 3/8-16UNC x 0.56 Dp	3.25
													4 x 1/2-13UNC x 0.63 Dp	5
045	13.13	7.87	7.12	2.95	6.87	4.57	1.12	1.25	0.25	1.12	1.25	0.25	4 x 3/8-16UNC x 0.56 Dp	3.25
													4 x 1/2-13UNC x 0.63 Dp	5
070	15.51	9.05	8.35	3.5	8.07	5	1.62	1.81	0.37	1.12	1.25	0.25	4 x 1/2-13UNC x 0.63 Dp	5
088	16.44	10	9.13	3.86	8.72	5.9	1.88	2.06	0.5	1.12	1.25	0.25	4 x 1/2-13UNC x 0.63 Dp	5
													4 x 3/4-10UNC x 0.63 Dp	6.5
180	18.93 <sup>(1)</sup>	11.10	10.47	5.12	9.84	7.48	1.88	2.06	0.5	1.12	1.25	0.25	4 x 3/4-10UNC x 1.0 Dp	6.5
181	18.93	11.10	10.47	5.12	9.84	7.48	2.25	2.43	0.5	1.12	1.25	0.25	4 x 3/4-10UNC x 1.0 Dp	6.5

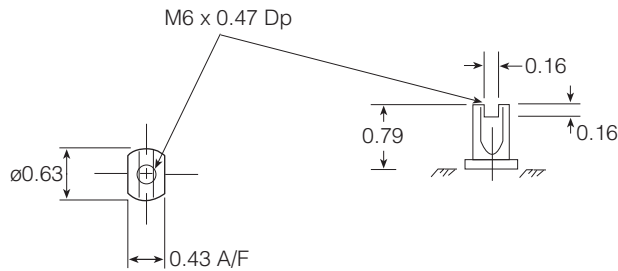
## Top Mount Drilling (Note 1) inches



### Note:

1. 8 x 10 UNF x 0.30 Dp  
Size 002 provides mounting holes at 3 x 1<sup>1</sup>/<sub>4</sub>" [80 x 30 mm] only.

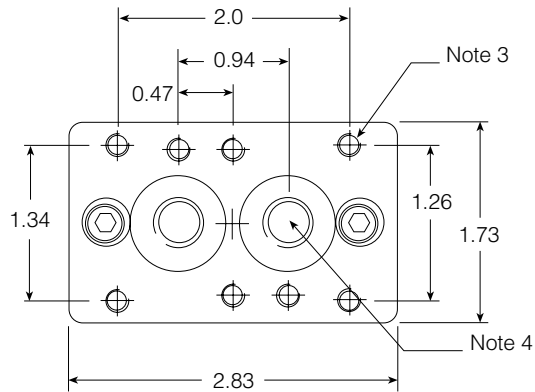
## VDI/VDE 3845 Mounting (Note 2) inches



### Note:

2. Full compliance to this specification is achieved with the addition of an optional male insert fitted to the top drive.

## Air Connection (Solenoid) Plate ins



### Notes...

3. 8 x 10 UNF x 0.30 Dp
4. 2 x 1<sup>1</sup>/<sub>4</sub>" NPT x 0.45 Dp

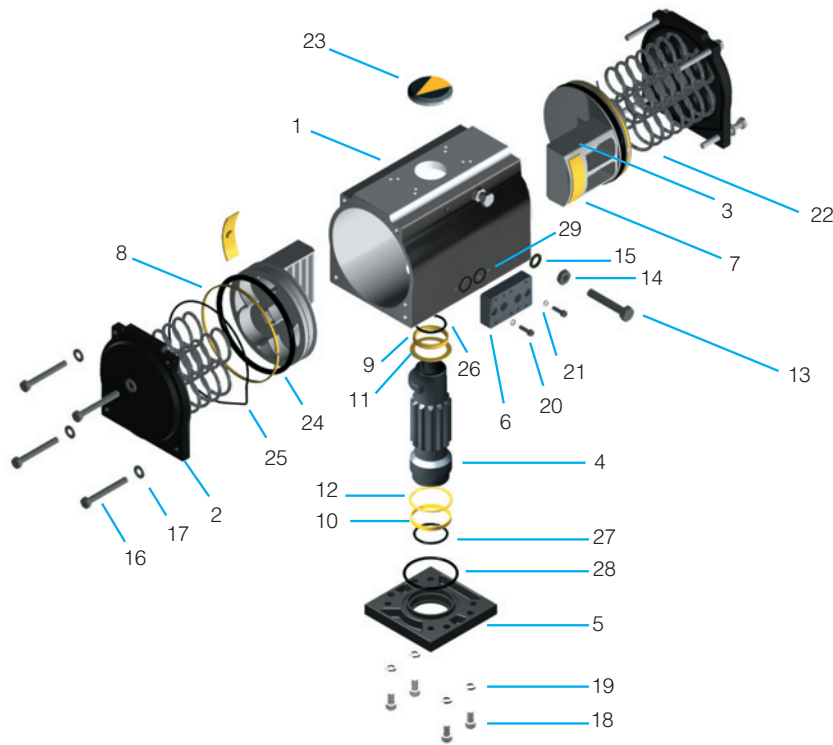
## Air Consumption Volumes (at specified pressure)

Actuator Size	On opening		On closing (Double Acting models)	
	cu. in.	litres	cu. in.	litres
004	15.1	0.25	9.4	0.15
009	31.9	0.52	21.2	0.35
014	45.5	0.75	31	0.51
025	78.5	1.29	55	0.9
037	115.6	1.9	79.9	1.31
045	156.1	2.56	105.8	1.74
070	245.2	4.02	165.9	2.72
088	292.5	4.8	196.7	3.23
180/181	590.7	9.7	408	6.7

## Weight lbs

Actuator Size	Double Acting	Spring Return
004	4.2	4.4
009	7.5	8.4
014	9.7	10.8
025	16.0	18.0
037	23.3	25.3
045	33.0	35.2
070	42.0	48.0
088	77.0	88.0
180/181	99.0	158.4

## Materials of Construction



### Notes:

- \* ESPC = Electrostatic Powder Coating
- \*\* Nitrotech™ = Proprietary corrosion resistant finish

## Materials of Construction

No.	Item	Material	US Material Std.	DIN/BS Material Std.	Finish
1	Body	Extruded aluminum	ASTM B221	BS 1474 6000 T5/6	Hard Anodize + ESPC*
2	End Cap	Die cast aluminum	ASTM B85	DIN 1725-231	Chromate + ESPC*
3	Piston	Die cast aluminum	ASTM B85	DIN 1725-231	Anodize
4	Pinion shaft	Carbon steel	ASTM A108	BS 970: 1983 212A42	Nitrotech™**
5	Base plate	Die cast aluminum	ASTM B85	DIN 1725-231	Chromate + ESPC*
6	Air connection plate	Die cast aluminum	ASTM B85	DIN 1725-231	Chromate + ESPC*
7	Piston backing pad	Devlon-V™			Natural
8	Piston support ring	Devlon-V™			Natural
9	Top bearing	Devlon-V™			Natural
10	Bottom bearing	Devlon-V™			Natural
11	Top spacer	Devlon-V™			Natural
12	Bottom spacer	Devlon-V™			Natural
13	Stop bolt	304 Stainless steel	ASTM A193	BS 3692-A2-304	Natural
14	Lock nut	304 Stainless steel	ASTM A193	BS 3692-A2-304	Natural
15	Sealing washer	304 Stainless steel	ASTM A193	BS 4320-A2-304	Natural
16	End cap bolt	304 Stainless steel	ASTM A193	BS 3692-A2-304	Natural
17	End cap washer	304 Stainless steel	ASTM A193	BS 4320-A2-304	Natural
18	Base plate bolt	304 Stainless steel	ASTM A193	BS 3692-A2-304	Natural
19	Base plate washer	304 Stainless steel	ASTM A193	BS 4320-A2-304	Natural
20	Air connection plate bolt	304 Stainless steel	ASTM A193	BS 3692-A2-304	Natural
21	Air connection plate washer	304 Stainless steel	ASTM A193	BS 4320-A2-304	Natural
22	Spring	Spring steel	ASTM A877	BS 2806 685 A55 HDR3	Oil Dip
23	Indicator	ABS			Natural
24	Piston O-ring	Rubber-NBR or FPM			Natural
25	End cap O-ring	Rubber-NBR or FPM			Natural
26	Shaft top O-ring	Rubber-NBR or FPM			Natural
27	Shaft bottom O-ring	Rubber-NBR or FPM			Natural
28	Base plate O-ring	Rubber-NBR or FPM			Natural
29	Air connection plate O-ring	Rubber-NBR or FPM			Natural

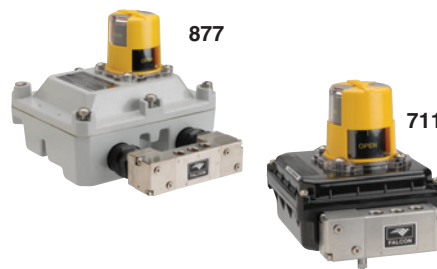


## Westlock Controls - Accessories

### Quantum Rotary Control Monitors\*

**764/784/864**, Weathertight  
**765/789/865**, Non-incendive  
**711/722/811**, Intrinsically Safe  
**777/877/360**, Explosionproof

Quantum products offer a fully integrated solution for the monitoring and control of process valves. Combining sensors, Falcon low-powered solenoids, junction housings and a local visual position indicator in one compact unit suitable for weatherproof and hazardous location service, Westlock offers an extremely efficient and cost effective method for the monitoring and controlling of rotary valves.



### AccuTrak™ Rotary Position Monitors\*

**1040/2004 and 9358/9044**, Rotary Position Monitors, Weathertight  
**K-Switch, 9468**, Rotary Position Monitor, Non-incendive  
**5004/5044 and 5050**, Rotary Position Monitors, Intrinsically Safe  
**360, 2007 and 9479**, Rotary Position Monitors, Explosionproof

The AccuTrak™ family of products offers an integrated solution for the monitoring of process valves. By combining sensors, junction housings and local visual position indication in one compact unit suitable for weatherproof and hazardous location service, Westlock offers an extremely efficient and cost effective method of both monitoring and controlling linear and rotary valves.



### Positioners\*

**ICoT 5200/5300**, Intelligent SmartCal Positioners  
**ICoT 5400**, FOUNDATION Fieldbus™ Positioner  
**EaziCal**, Electro-Pneumatic Positioner  
**793**, Pneumatic Positioners

Westlock Controls offers a variety of solutions for the precise positioning of rotary and linear pneumatic actuators. These positioners are suitable for use with either double acting or spring return actuators. Mounting options include the ModMount®, NAMUR standards (VDI/VDE 3845) or actuator special kits. These units also provide the simplest form of installation and calibration as standard, without the requirement for additional equipment. Positioners are available with both HART® and Foundation Fieldbus™ digital communication protocols.



### Network Solutions\*

#### Intellis Network Solutions, Control Monitors; Network Accessories

Intellis is a family of industrial control field Network Control Monitors which use embedded control systems to automate valves and link field I/O to the host PLC or DCS. Each monitor is assigned a unique address and accepts input/output signals from valve position sensors, solenoids and external alarm and control devices. Hall Effect sensors are utilized for valve position monitoring. Low-power Falcon solenoid valve provide integrated actuation control. Network interface modules Pacts allow communication via a protocol of choice. Westlock Intellis Network Control Monitors are available for linear or rotary applications in all area classifications.



### ModMount Mounting Kit (not pictured)

Mounting system designed to allow direct mounting of many Westlock Controls products to MRP and MRA actuators. The system allows for a low profile and strong mounting using the NAMUR mounting feature available on most Westlock models. ModMount system available on most Monitors and positioners.

\* **AccuTrak, Quantum, Intellis Network Solutions and Positioners** - please consult your sales representative for the availability of global certifications such as ATEX, IEC, GOST, CSA and InMetro for specific configurations in these product lines, as approvals may vary.

Tyco Flow Control (TFC) provides the information herein in good faith but makes no representation as to its comprehensiveness or accuracy. This data sheet is intended only as a guide to TFC products and services. Individuals using this data sheet must exercise their independent judgment in evaluating product selection and determining product appropriateness for their particular purpose and system requirements. TFC MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT(S) TO WHICH THE INFORMATION REFERS. ACCORDINGLY, TFC WILL NOT BE RESPONSIBLE FOR DAMAGES (OF ANY KIND OR NATURE, INCLUDING INCIDENTAL, DIRECT, INDIRECT, OR CONSEQUENTIAL DAMAGES) RESULTING FROM THE USE OF OR RELIANCE UPON THIS INFORMATION. Patents and Patents Pending in the U.S. and foreign countries. Tyco reserves the right to change product designs and specifications without notice. All registered trademarks are the property of their respective owners. Printed in the USA.