Advanced Technology for Butterfly Valves
Scope
What is the scope of the project?

Phase 1 – 2016

- PR On-Off & 3-Point actuator – 160 Nm 24-230V AC, 24-125DC
- Position indicator - thermal isolation (will be delivered as part of the BFV)
- New butterfly valve design 8” - 12” 2 & 3-way

Phase 2 – 2017

- PR MFT actuator – (BACnet) 24-230V AC, 24-125DC – 160 Nm
- PKR (SuperCap) actuator (On-Off, MFT & BACnet) 24-230V AC, 24-125DC – 160 Nm
Creating the Advanced Butterfly Offering
Innovation to improve customer experience
Innovation to improve customer experience
Product Range
# Product range

<table>
<thead>
<tr>
<th>Butterfly Valve</th>
<th>Valve Size</th>
<th>2-Way</th>
<th>3-Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6/F750HD</td>
<td>2&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6/F765HD</td>
<td>2.5&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6/F780HD</td>
<td>3&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6/F7100HD</td>
<td>4&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F6/F7125HD</td>
<td>5&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F6/F7150HD</td>
<td>6&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F6/F7200L</td>
<td>8&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F6/F7250L</td>
<td>10&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F6/F7300L</td>
<td>12&quot;</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Features & Benefits
Features & benefits
NEMA 4x Housing

NEMA 4X for outdoor usage

Note: Handle can be used for lifting of complete assemblies
Features & benefits
Simplified Valve / Actuator Connection

Easy actuator mounting
Exact positioning form fit
Above insulation
No adjusting needed
4 possible actuator orientations
Easy access to the 2 bolts
Position indicator clearly identifies valve position from above the floor
Features & benefits
Reduced Height & Weight

Over 40% reduced height & 60% reduced weight for optimized mechanical layout & easier installation

SY4: 12.5 in height, 48.5 lbs weight

PR: 6.6 in height, 16.5 lbs weight

PRK: 8.4 in height, 17.6 lbs weight

INNOVATIVE DESIGN
USER FRIENDLY
PROVEN RELIABILITY
Features & benefits
Easy Wiring

BACnet / MP-Bus Control
Power
Auxiliary Switches
S1 – S6
NL Y1 Y2 N
Features & benefits
Manual Settings & Operation
Features & benefits
NFC Diagnostics and App

Diagnose
Self Check
Analyse Data
Features & benefits
Electronic Fail-Safe Actuator

RUNNING TIME
Motor: 35s / 90° [30 – 120s adjustable]
Fail-Safe: 30s / 90°

POWER OFF POSITION (POP)
Factory Setting 0%
[0 – 100% field adjustable]
Features & benefits
Reduced Power Consumption

OVER 80%
Reduced VA for 120V*

OVER 90%
Reduced VA for 24V*

LESS OVERALL COST
Less room needed for transformers
Fewer transformers needed
Lower wire cost
## Features PR line of actuators
### Overview

<table>
<thead>
<tr>
<th></th>
<th>PR On-Off</th>
<th>PR MFT</th>
<th>PRK SuperCap</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control Type</strong></td>
<td>On-Off, Floating Point</td>
<td>On-Off, 3-point MFT BACnet MS / TP, 2 – 10V</td>
<td>On-Off, 3-Point MFT BACnet MS / TP, 2 – 10V</td>
</tr>
<tr>
<td><strong>Nominal Torque</strong></td>
<td>1400in-lbs</td>
<td>1400in-lbs</td>
<td>1400in-lbs</td>
</tr>
<tr>
<td><strong>Running Time</strong></td>
<td>35s, [30 – 120s adjustable]</td>
<td>35s, [30 – 120s adjustable]</td>
<td>35s / 30s (Fail-Safe), [30 – 120s adjustable]</td>
</tr>
<tr>
<td><strong>Auxiliary Switches</strong></td>
<td>1x10 / 1x85 [20 – 85 field programmable]</td>
<td>1x10 / 1x85 [20 – 85 field programmable]</td>
<td>1x10 / 1x85 [20 – 85 field programmable]</td>
</tr>
<tr>
<td><strong>Manual Override</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Position Indicator</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>NFC</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Fail-Safe</strong></td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>BACnet MS / TP &amp; Modbus</strong></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Sensor Inputs</strong></td>
<td>-</td>
<td>2 (PT1000) NTC1000</td>
<td>2 (PT1000) NTC1000</td>
</tr>
</tbody>
</table>
Summary of features

**Easy Installation** with accessible connection box for wiring access, along with two bolt actuator mounting enable the valve assembly to be installed quickly.

**80% less power consumption** saves energy and reduces transformers and wiring costs.

**Intelligent self-adjusting end stops** requires less commissioning effort and an intelligent adaptation over the lifespan of valve.

**Reduced height and weight** of PR actuator allow for an optimized mechanical layout and easy installation.

**Adjustable motor running time** from 30 to 120 seconds to satisfy application needs and avoid water hammer.

**0% leakage rate** at 200 psi close-off pressure with the self-adjusting end stop alghoritm ensure reliable operation troughout the life of the valve.

5-year warranty
Near Field Communication (NFC) allows fast programming, commissioning and troubleshooting.

Universal power supply 24 – 240 VAC / 24 – 125 VDC requires only one actuator, facilitates planning and increases flexibility for all applications.

Electronic Fail-Safe actuator provides security for safety sequences upon a loss of power.

Smart heating logic uses on-board temperature and humidity sensors and logic within the actuator activate heating elements when needed to prevent condensation within the housing and improve actuator operating performance and longevity.

BACnet communication protocol provides useful data for advanced BMS control sequences

Flexible position indicator is viewable from long distances and any angle for easy troubleshooting.

Summary of features
Design Process & Testing
# Outstanding technical design features

## Low torque design feature ideas

<table>
<thead>
<tr>
<th>Disc: Sealing Material</th>
<th>Rubber</th>
<th>Rubber with PTFE Coating</th>
<th>Metal combined with elastic material (rubber, spring)</th>
<th>Plastics combined with elastic material (rubber, spring)</th>
<th>Plastic with elastic design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc: Sealing Generally</td>
<td>Liner radial</td>
<td>Liner axial</td>
<td>Combined</td>
<td>Liner axial with chock effect</td>
<td>Liner radial with cosine design</td>
</tr>
<tr>
<td>Disc: Sealing Pole Area</td>
<td>Pole area sealed direct with the liner</td>
<td>Flat pole area sealed with small contact surface</td>
<td>Avoid pole area by moving the disc away from the stem</td>
<td>Avoid the pole area by moving the sealing away from the stem</td>
<td></td>
</tr>
<tr>
<td>Disc: Movement</td>
<td>Rotational 90°</td>
<td>Rotational 90° and linear longitudinal by linkage</td>
<td>Rotational 90° and linear transversal</td>
<td>Rotational 90° and linear longitudinal by excenter</td>
<td>Rotational 90° and rotational</td>
</tr>
</tbody>
</table>
Outstanding technical design features
Typical torques of resilient seat butterfly valves

![Graph showing standard torque torsion in Nm after 1000 cycles for models A and B.]
Outstanding technical design features
Typical torque curves over cycling

Standard Torque Torsion in Nm

New low torque BFV (F6..L)

Liner ramp and disc edge

Liner
Disc
Outstanding technical design features
Valve + actuator

OPTIMIZATION OF VALVE AND INTELLIGENT ACTUATOR

Combined system works so that Actuator drives to
1. Torque
2. Position

Benefits
Self-adjusting, including over its life
No end stops to adjust

BUTTERFLY VALVE
Reduced contact area between Liner and Disc

- Less contact area
- Less friction
- Lower torque

[Diagram of butterfly valve with labels for Liner and Disc]
Outstanding technical design features
Self-adjusting end stops

- Torque end stop at 160 Nm = Valve is closed
- Torque end stop at 160 Nm = Valve is not closed. MFT failure
- Potentiometer end stop at 0° = Valve is closed
Patents
BFV + ACTUATOR COMBO

System logic: the new BFV design works in combination with the new, intelligent BFV Actuator – which stops based on torque or position.

ACTUATOR
Hand crank detection
Smart heater

BUTTERFLY VALVE
Adapter with Position Indicator
Liner and Disc hub areas
Liner ramp shape
Disc edge shape
Thank you