Actuators with Smart or Intelligent Controls

This is the most advanced generation of actuators. This is fast becoming the most acceptable & adopted technology in the demanding world of sophisticated controls.

The advantages of smart or intelligent actuators are:

- These actuators provide the most important advantage of "non-intrusive" settings of parameters i.e. the limit & torque switch settings can be done without opening the actuator covers. This can be simply done with a digital (LCD) display cum electronic name-plate is provided in actuator with a scrolling menu options. This feature enables to read the status or fault in actuator or do parameterization of actuators at local / field level.
- Since actuators can be directly connected to a laptop through an RS-232 cable & software, the operational parameters such as running time, number of switching / starts-stops, number of faults (torque & motor thermo-switch) etc. can be easily retrieved from the actuator. Similarly the parameters can also be uploaded to actuator.
- The output speeds of the actuator can be varied depending on process requirement.
- This actuator moves away from the conventional technology of mechanical limit & torque sensing. The number of turns & mechanical overloads are electronically sensed. Certain actuators provide the special feature such as "automatic commissioning" of MOV.
- The actuators can also be supplied with "Integrated Process Controller" which reads the signal of a process sensor as actual value of process and then positions the actuator according to either a modulating process value or a programmed fixed value.
- The actuators have the option of communicating via Bluetooth or Internet, thereby offering the advantages of wireless communication.

PSM Multi-turn Actuator:

1. Pad-lockable Local Control Unit for Parameterisation and Diagnostics
   The large-size LCD display shows all important parameters and diagnostic data in a self-explanatory and easily understandable way using symbols and/or plain text. The actuator status is also indicated remotely by 3 bright LEDs.
2. Automatic Commissioning
   A clear configuration menu allows easy adjustment of the PSM to a valve and its travelling range. During normal operation, the smart electronic control unit monitors end positions and torque, and controls the actuation speed.
3. Mechanical Position Monitoring
   The 25-bit position sensor is absolute encoded and independent of any back-
up battery, ensuring precise and permanent position monitoring even at loss of supply power. It works independently of the mechanical position indicator and does not need any adjustment over the full possible travel range.

4. Communication Plug for Parameterisation via Web Interface Alternatively to using the local control unit, adjustment of parameters and read-out of diagnostics data can be done with a common internet browser reading from the IP address of the PSM. Required is just a standard network cable, but no specific software. An integrated memory card stores status and working data of the PSM permanently.

5. Mechanical Position Indicator Adjustment of the position indicating device is done non-intrusively at the communication port. The housing does not need to be opened.

6. Brushless DC Motor with Electronic Commutation The smart control enables the DC motor to provide the full nominal torque at the first turn of the motor. This avoids current peaks in the power supply line. To prevent the PSM from overheating, the electronic unit reduces the output speed if appropriate.

7. Variable-Speed Actuator Different rotation speeds of the output are configurable for various ranges of the travel and the set value. To protect both gear and motor, and to reduce wear of the valve, the end stops can be approached with reduced speed. This feature also helps to avoid pressure blows in the pipe line.

8. Highly efficient Combination of Motor and Gears The overall efficiency factor of the PSM is optimised with specific components to reduce operating cost over the life cycle to about 60% of the cost of conventional actuators. The high mechanical efficiency of the planetary gear allows high duty cycles, as the motor produces only low dissipation energy.

9. Mounting Flange as per ISO Standard Direct mounting of the PSM to valves with standard flange is possible due to its ISO flange, with connection bores for various counter flanges.

Energy Balance:
The electric energy consumed in a conventional electric multi-turn actuator with asynchronous motor and spur/worm gear is about three times the mechanical output energy.
For providing the same mechanical output energy, the PSM needs electric energy of less than double the output energy, resulting in energy and cost savings of about 40% over the whole working time.

Optional Accessories:

Integrated Process Controller PSIC

Externally mounted Local Control Box
The local control box is available for remote mounting as an option. Easy manual operation of the valve as well as adjustment of all values is given even in case the actuator itself is mounted inaccessibly.

Fieldbus Interface
Interface modules for various field bus protocols are available.

ATEX Conformity
Special versions as per ATEX standards permit installation of the PSM in hazardous areas.
The optional process controller PSIC reads the signal of a sensor as actual process value, and positions the valve in accordance to a modulating or a programmable fixed set value.

**PS-AMS All-In-One Actuators:**

PS-AMS is the patented smart actuator solution of PS Automation GmbH for linear actuators up to 25 kN thrust and quarter-turn actuators up to 1000 Nm torque. The new generation PSAMS11/12/13 was developed from the proven PS-AMS01/02/03, is available for various voltages, and mechanical adaptation to most types of valves can be done.

**Speed-controlled Actuation**
The output is generated by a 24 VDC motor, which is controlled by the electronics via pulse width modulation (PWM), i.e. it is operated at variable speed. Absolute-coded feedback is done with a precision potentiometer. PS-AMS standard equipment comprises positioner and active feedback function, automatic commissioning as well as comprehensive diagnostics functions.

**Mechanical Design**
The mechanical part of the PS-AMS actuator consists of the components of PS Automation's standard actuators with their well-proven components, namely a robust spur gear with trapezoidal thread in PSL-AMS, and a high-reduction planetary differential gearbox with a handwheel permanently engaged via a worm gear in PSQ-AMS. All PS actuators are lubricated for life and therefore maintenance-free.

**Electrical Connection**
The electrical wiring of PSL-AMS is done directly to terminal blocks in the integrated terminal box. PSQ-AMS uses a plug-and-socket system with robust screw clamps in a separately attached housing. The plug can be removed without interfering with any existing cables, e.g. for maintenance or exchange of the actuator.

PS-AMS actuators include enhanced electronics with an embedded micro-controller with flash memory that controls and monitors the entire actuator function. Summarizing all functions on a single circuit board makes the PS-AMS actuators extremely safe in operation and easy to assemble. As a result, production costs are low and the value for money is outstanding.

**Parameterisation by Software**
Our concept of monitoring current and voltage permits adaptation of the actuator functions to the process conditions in many ways. Via our communication software
PSCS it is possible to adjust valve-specific details, actuation thrust/torque and speed, to configure alerts, and to do a freely programmable valve curve correction.

**Diagnostics function**
The diagnostics function of the communication software PSCS allows to retrieve counting values (such as operating hours, number of start-ups and running time of motor) and sets of running parameters (such as the analogue set value input, actual position value, currently required motor torque and inside temperature of the actuator). The actual values can be graphically displayed and analysed using the monitor function. Thus the PS-AMS concept allows pro-active maintenance and as a result an increase in process safety. We are currently preparing a combined monitoring system which will also give a trend prognosis of the wear situation of the PS-AMS actuator.

**Wireless communication**
Due to the continual further development and optimising of the electronics and the communication protocol, the signal processing inside the actuator and the communication to the outside are now designed to work even faster and more reliably. Communication is feasible via special communication software PSCS from the PC or wireless via Bluetooth protocol from PC or PDA.

**Status indication & Automatic commissioning**
The permanent optical status signalled by two LEDs was revised in order to make the indicated messages even clearer. All operating conditions or fault functions are now uniquely signalled by specific optical sequences. Automatic adjustment is started in a user-friendly way by a pushbutton.

**Optional Accessories:**

**Local control PSC.2**

The optionally available lockable local control box PSC.2 allows onsite operation and can also be used to set most of the actuator-specific values. The display of actual position, messages and parameters of the actuator is in full text.

**Integrated process controller PSIC**

The integrated process controller PSIC, available as optional accessory, reads the signal of a process sensor as actual value of the process and then positions the actuator according to either a modulating process set value, or a programmed fixed value. The concept of PS-AMS using an electric motor with 24 VDC supply voltage facilitates a simple power supply to the actuator via photovoltaic cells, allowing to install a full control loop at remote locations independently of supply and signal lines which may be difficult to lay.

**Fieldbus / Bluetooth interfaces**

The main board is prepared for the optional installation of modules for all common field bus interfaces or Bluetooth protocol, which enables wireless parameterisation and read-out of diagnostics of the actuator at distances of up to 10 m.

**Fail-safe unit PSEP**

The fail-safe device PSEP is based on an accumulator with controlled charger, so that a safety position in case of loss of power supply can be freely defined without any mechanical alterations to the actuator.