FLOWSERVE™

Valtek StarPac II

Intelligent Control System

Valtek StarPac II Intelligent Control System

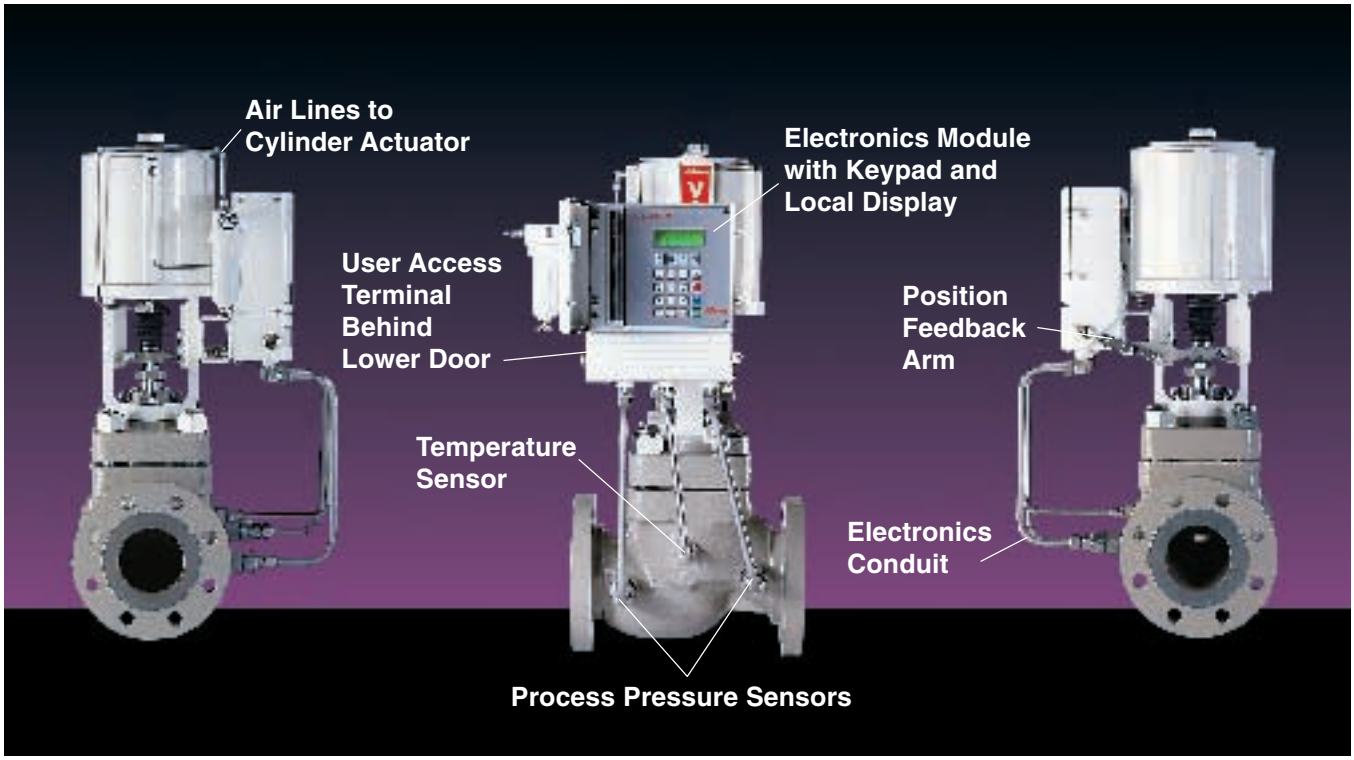


Figure 1: Valtek StarPac® II Intelligent Control System Components

Introduction

The Valtek® StarPac® II Intelligent system includes process sensors, a microprocessor-based controller, and a high-accuracy digital positioner mounted on a control valve. The system provides single-loop measurement and control of flow, pressure, or temperature. Data acquisition necessary for valve or process diagnostics is accessible as well. Behind the front door is a membrane keypad that can be used to set all the tuning and operating parameters without the use of any external configuration device.

Intelligent systems can improve plant operation at a lower installed cost than conventional control systems. Installation of a total control loop is simplified by mounting the microprocessor directly on the valve with the pressure, temperature and flow sensors, thereby eliminating separate line taps.

The StarPac II unit can be programmed to operate as a traditional control valve (responding to a 4-20 mA controller) or as a stand-alone controller or transmitter requiring only a 24 VDC power source and air supply. In the stand alone (controller) configuration, StarPac II responds with PID action to: a 4-20 mA analog control signal, a digital signal through either of the serial data ports, a set point from the local keypad, or a pre-programmed set point that is held with no external communication. A DCS or personal computer can also be used to set operating and tuning parameters or reading diagnostics, but it is not needed for ongoing StarPac II operation.

Maintenance procedures are improved with StarPac II's ability to record and report on valve or process equipment performance. For example, a signature of the valve or process (using StarPac II sensors) can be recorded by a PC upon installation of the StarPac II system. Later, using this signature, the user can determine whether the valve or other process equipment needs servicing. In addition, the StarPac II system provides self diagnostics with easy field replacement of modular parts.

The use of intelligent systems in hazardous application start-ups and shutdowns provides process insight and control – previously only available with expensive, complicated equipment installations. StarPac II's "intelligent" reaction to system failure can give the user that extra safety edge over conventional control-loop systems.

Valtek StarPac II Intelligent Control System Benefits and Advantages

Enhanced Performance

Better Process Operation	Mounting the process sensors close to the final control element reduces lag and dead time, enabling much faster response. The high turndown results in a better process control over the operating range. The digital positioner improves hysteresis, repeatability, and linearity by an order of magnitude over analog pneumatic positioners.
Real-time System Analysis	StarPac II's ability to gather and send flow and process data allows up-to-the-minute engineering analysis, aiding in reducing production costs and enhancing the process.
Wide Versatility	Multiple control modes – including fluid flow, upstream pressure, downstream pressure, differential pressure, and temperature – permit StarPac II systems to be used in a wide variety of process applications. Remote sensors can be tied into the StarPac II unit for control of other process parameters. Cascade action and ratio control are also supported.
Simple System Configuration	The system can be fully configured from the membrane keypad on the front of the electronics unit. In addition, a simple Windows-based configuration program is available for remote configuration. The configuration registers are also available to a DCS over the Modbus link.
True Distributed Process	The StarPac II unit can take load off a DCS by distributing measurement and control to the field. This allows the DCS to function as a process supervisor acting on information from the whole system.

Maintenance

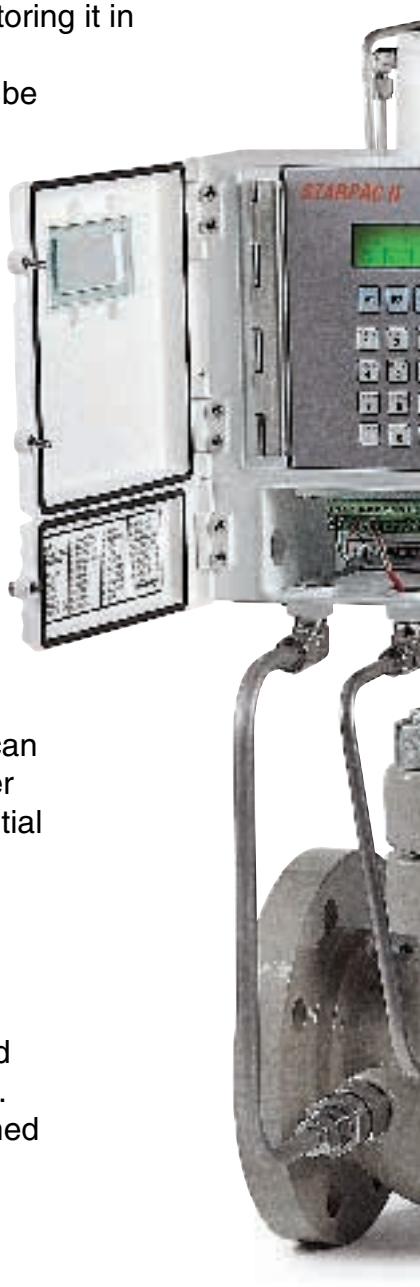
Predictive Maintenance	StarPac II software allows the intelligent system to be used to diagnose valve operation as well as upstream and downstream equipment (such as pumps, reactors, heat exchangers, etc.) while in operation to predict an acceptable performance or potential failure. Maintenance can then be performed before process failure occurs.
Reduced Complexity	With all functions located in one package, complexity of the total control system is reduced. Locating and troubleshooting the problem is easier.
Remote Service	StarPac II's modem capability means low cost and remote factory service is available through telecommunication technology.

Increased Safety

Fewer Line Penetrations	Single-point installation limits line penetrations for sensors and reduces potential leaks to the environment, reducing EPA reporting requirements.
Continuous Monitoring	The StarPac II system continuously monitors the valve position and the operation of several critical internal parameters, notifying the user when improper operation occurs, before upsetting the process.
System Warnings	Programmable settings permit the user to set process system parameters and to be notified when those limits are violated.

Valtek StarPac II Intelligent Control System Features

Process Diagnostics – Evaluation of process equipment is possible with the StarPac II intelligent system. By generating an initial signature of the process (and storing it in a computer file) and identifying a standard process signature, a piece of upstream or downstream equipment (pump, heat exchanger, etc.) can then be shown to have changed since start-up, and service on it can be scheduled.



Data Logger – The StarPac II system can record 300 lines of process conditions at user-specified intervals (1 to 9999 seconds) and store them in its memory for later retrieval to aid in diagnosing process upsets. A flow totalizer is also available with reset action. One discrete output generates a pulse signal proportional to the total flow.

Process Transmitters – Sensors in the valve body measure process conditions: upstream pressure, downstream pressure, and temperature. Other sensors measure valve stem position and cylinder pressures. Locating pressure and temperature sensors in the valve body eliminates several process connections and shortens the straight-run piping requirements for the flow meter. All sensors have at least two seals to reduce the possibility of leaks to the atmosphere. Remote-mounted pressure sensors can be fitted with isolation and/or purge valves. A differential pressure transmitter can be mounted between the sensing lines for applications with low differential pressure (less than 10 percent of P_1). Flush mounted sensors are available for fluids that could plug the pressure sensor ports.

Connections to Operator Interface – The StarPac II can be connected to an operator interface (personal computer, DCS I/O card, or hand station and recorder) through four 4-20 mA analog channels and four discrete channels. Supervisory digital communications with control equipment can be established through gateways to the two Modbus ports. All process and configuration information is available through the digital channels.

Multiple Failure Modes – StarPac II technology allows multiple failure modes to be set, including: loss of power, air supply, command signal or process failure. This ensures greater reliability and consistency of the process in case of emergency shutdowns, protecting the process and people.

Figure 2: Valtek StarPac II Intel

High Interchangeability – Since the Valtek Mark One™, ShearStream™, and MaxFlo™ control valves are the basis of the StarPac II system, most valve parts are interchangeable with other Valtek valves, thereby reducing parts inventory.

Local Display and Keypad – Visible through a window in the front of the electronics box is a four-line, backlit display that can be configured to show valve and process conditions and to guide the user through a menu tree to configure the system in the field. The keypad consists of four context-sensitive function keys, numeric keys, and shift keys that allow the user to enter any numeric or alpha character, as well as “slew keys” for those steps when the user may want to change the value slightly without typing in a new value.

PID Controller – Systems are equipped with a self-contained PID controller that can use internal process parameters (or a value from an external transmitter) as the control variable. The PID parameters can be tuned for tight process control. The ability to control flow, pressure or temperature makes StarPac intelligent systems appropriate for numerous process applications in diverse industries.

User Friendly Software – When the user is not connecting the StarPac II unit to a DCS, StarTalk for Windows software can configure and diagnose the StarPac II unit through a personal computer and can be used to change the operating and tuning constants in the StarPac II device as well. The extensive use of context-sensitive aids allows most users to operate the StarPac II systems with minimal training. The local keypad and display mimic all the commands of the StarTalk software at the device so that a user with the appropriate security clearance can configure the system directly with no external communications device.

ligent Control System Features

Valtek StarPac II Intelligent Control System Piping Schematic, Ordering Information

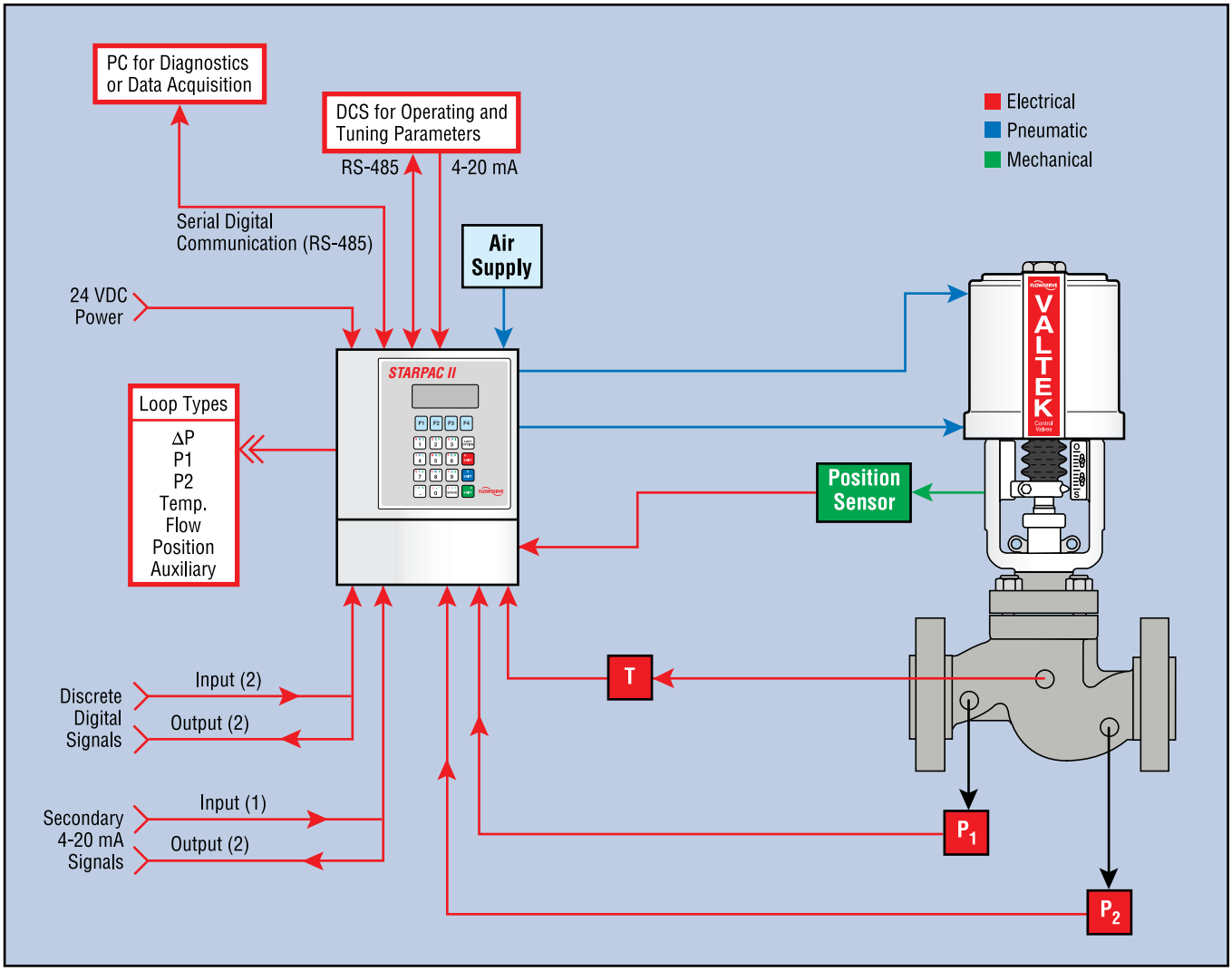


Figure 3: StarPac II Intelligent Control System Schematic

Ordering Information

The following information must be provided when ordering a StarPac II Intelligent system:

1. Control valve specifications: size, body pressure rating and material.
2. Start-up, maximum, and operating conditions: inlet/outlet pressures, temperatures, flow rate, fluid physical properties
3. Maximum operating temperatures and pressures
4. Electrical classification requirements
5. Process control parameters and special software required
6. Pressure sensor material and configuration required; pressure sensor mounting: close to valve body (std.), remote-mounted or flush-mounted
7. Piping installation at StarPac system
8. Valve accessories and options required: hand-wheel, certified drawings, power supplies, and protocol converters.

Valtek StarPac II Intelligent Control System Specifications

Performance Specifications

Flow Accuracy

The accuracy of the Standard StarPac II model is ±2 percent of full scale flow over the turndown of the control valve, normally 30:1 for a globe valve. This can be improved by using characterized trim or reducing the turndown of the high accuracy range.

Measurement Repeatability

Flow	0.25% full scale
Pressure (max.)	0.1% full scale
Temperature	1° C body temperature measured by Type K thermocouple
Drift	1% full scale/6 months
Calibration	Independent zero and span adjustment for all sensors

Operating Temperature Range

Ambient	-40 to 170° F (-40 to 76° C)
Process Media	-320 to 1500° F (-195 to 815° C)
Temperature Effect	-40 to -10° F (-40 to 23° C): (0.07% ° F) -10 to 150° F (-23 to 66° C): (0.02% ° F) 150 to 185° F (66 to 88° C): (0.07% ° F)

Other Features

Totalizer	Totalizes mass flow until reset; available through digital link; variable width pulse from discrete output.
Data Logger	300 most recent samples at user-defined intervals from 1 second (5 minutes total) to 3 hours (34 days total).

Software Specifications

Computer	Windows 3.x or higher, 80486 processor running 33 MHz, 8 MB RAM
Drive Required	Hard Disk (10 MB)
StarPacs per link	Up to 31

Digital Positioner Specifications

Dead band	<0.03% full scale
Hysteresis	<0.10% full scale
Repeatability	<0.035% full scale
Linearity	<0.5% full scale

Physical Specifications

Pressure	316L stainless steel, Viton O-ring seal (standard); Hastelloy C optional; other alloys on request
Housing	Cast, powder-coated aluminum
Tubing	316 stainless steel with Swagelok® fittings
Environmental Vibration	NEMA 3 Up to 2 G's - 30 to 500 Hz, measured at electronics
Pressure Sensor Over-range	Two times maximum operating pressure with negligible change in output

Electrical Specifications

Power Supply	Nominal 24 VDC (18 to 64 VDC allowable) providing 300 mA
Analog Inputs	Isolation protection to 1000 V
Command Auxiliary Input	13-bit resolution, 16 Hz sampling rate
Analog Outputs	Two (2) 4-20 mA that will each drive up to 750 Ω
Discrete Inputs (2 channels)	Jumper selectable input voltages of 120 and 24 V accept either AC or DC signals, pulse width >1/16 sec.
Discrete Output No. 1: Alarm relay	Jumper selectable NO or contacts; maximum relay contact rating: 24 VDC resistive. Groups A & B - 230 mA, Group C - 590 mA, Group D - 800 mA
Discrete Output No. 2: Pulse relay	24 VAC or VDC operation, max. output switching frequency of 256 Hz
Non-incendive	Class I, Division II, Groups B,C,D
Overload protection	Minimum 500 volt isolation; 24V power fuse protected
Serial Interface	Dual RS-485 ports; Modbus Protocol

Valve Specifications

Body Size	Mark One: ½ to 16-inch ShearStream: 2 to 12-inch MaxFlo: 2 to 12-inch
Pressure Classes	Compatible with Mark One, ShearStream, or MaxFlo bodies

Valtek StarPac II Intelligent Control System

Nonincendive Class I, Division 2, Group A-D

Class I, Division 2, Group A-D

Listing Pending

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.
While the information and specifications presented in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any of its worldwide operations or offices.

For more information, contact:

For more information about Flowserve and its products, contact www.flowserve.com or call USA 972 443 6500

Regional Headquarters

1350 N. Mt. Springs Prkwy.
Springville, UT 84663
Phone 801 489 8611
Facsimile 801 489 3719

12 Tuas Avenue 20
Republic of Signapore 638824
Phone (65) 862 3332
Facsimile (65) 862 4940

12, av. du Québec, B.P. 645
91965, Courtaboeuf Cedex, France
Phone (33 1) 60 92 32 51
Facsimile (33 1) 60 92 32 99

Quick Response Centers

5114 Railroad Street
Deer Park, TX 77536 USA
Phone 281 479 9500
Facsimile 281 479 8511

104 Chelsea Parkway
Boothwyn, PA 19061 USA
Phone 610 497 8600
Facsimile 610 497 6680

1300 Parkway View Drive
Pittsburgh, PA 15205 USA
Phone 412 787 8803
Facsimile 412 787 1944

