

L&S-400 Hydro Governor Distributing Valve

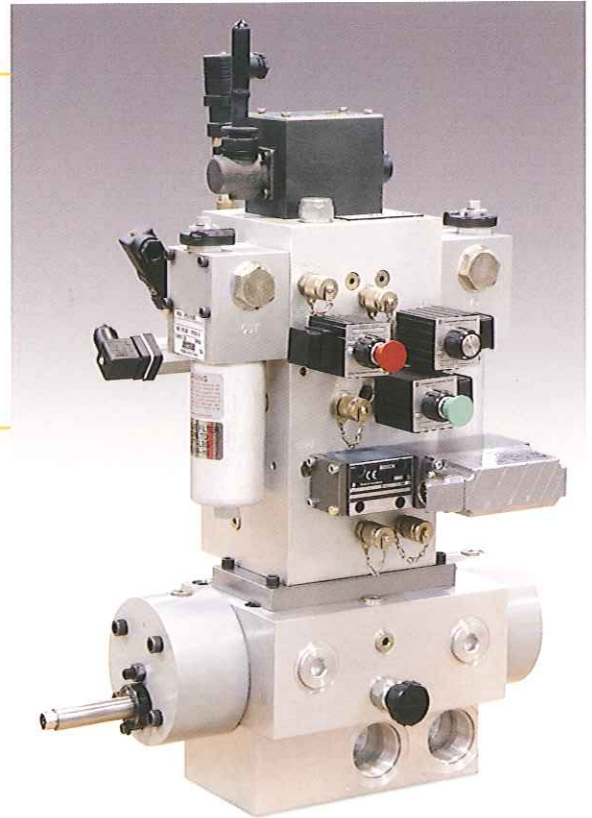
The L&S-400 Distributing Valve is a high pressure, low volume valve for hydroelectric turbine governors.

Advantages

- Higher performance than mass produced two stage valves
- Cost effective spare parts
- Digital driver/diagnostics system with digital communications
- Design allows for the mounting of valve assembly near or at servos for best valve/hydraulic stability, and for most cost effective piping arrangements

Features

- Frequency response 4-5 times faster than old mechanical and analog governor systems
- Maximum flow adjustment via solid locking nuts
- Valve porting can be specified to accommodate pressure and flow needs
- "A" and "B" ports (open and close control ports) can be reversed in the field if necessary
- No external pinch points
- SAE outlet ports
- Duplex pilot valve filtration with dirty filter indication (visual and electrical)
- "O" ring sealing for leak free operation
- Shutdown verification contact
- Clean oil pressure source for auxiliary use
- Pressure supply "OK" contact
- Safety shutdown systems:
 - Local, manual shutdown valve
 - Proportional valve shutdown upon power loss
 - Fail-safe deenergize to shutdown solenoid valve
 - Energize to shutdown solenoid valve
 - Pilot-operated latching hydraulic circuit



Specifications

- Flow ratings:

40 gpm	@ 150 psi	(150 lpm	@ 10.3 bar)
50 gpm	@ 250 psi	(190 lpm	@ 17.3 bar)
75 gpm	@ 500 psi	(285 lpm	@ 34.5 bar)
90 gpm	@ 750 psi	(340 lpm	@ 51.7 bar)
105 gpm	@ 1000 psi	(400 lpm	@ 70 bar)
115 gpm	@ 1250 psi	(435 lpm	@ 86.2 bar)
125 gpm	@ 1500 psi	(490 lpm	@ 103.4 bar)
145 gpm	@ 2000 psi	(550 lpm	@ 138 bar)
- Pressure range:
150 to 3000 psi (10 to 207 bar)



Engineering Division
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Proven Solutions for the Hydroelectric Industry.

Excitation, Switchgear & Protection Systems

L&S Electric provides integrated generator excitation, switchgear and protection systems for both new and retrofit applications.

Advantages

- Equipment provided is widely accepted
- Value added engineering provides for a complete and coordinated design for all major electrical systems
- Experienced engineering and design staff
- Field Services
- Turnkey installation services



Excitation Systems

- Digital technology
- Generator main field applications
- Replacement applications for existing rotating pilot excitors
- Black-start applications



Switchgear Systems

- Metal clad and metal enclosed equipment
- Low and medium voltage applications
- Synchronous and asynchronous generator applications
- Can accommodate many breaker selections and bus requirements
- Neutral grounding systems

Protection Systems

- Digital technology
- Generator protection
- Auxiliary electrical distribution protection
- Transformer protection
- Bus protection
- Line protection
- Protective relay coordination
- Protective relay functional testing



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Automation & SCADA Systems

L&S Electric provides state-of-the-art automation and SCADA systems for both new and retrofit applications.

Advantages

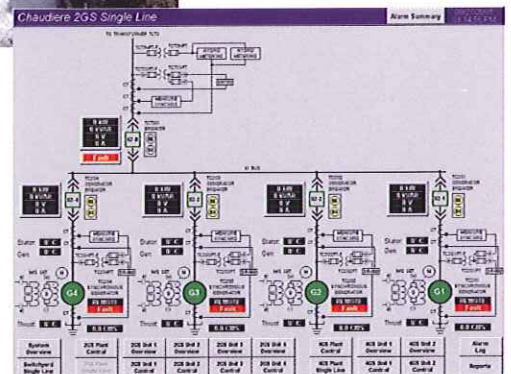
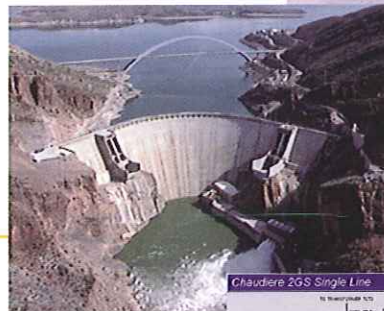
- Improved generating efficiencies
- Reduced operating costs
- Reduced downtime
- Reduced maintenance costs
- Increased safety of personnel and equipment
- Remote control and monitoring capabilities
- Accurate and efficient data acquisition and report generation

Features

- Unattended monitoring of system conditions
- Automatic reporting of system faults and power production information
- Remote control and monitoring from multiple locations
- High system integrity through redundant system architectures
- Eliminated downtime providing continuous generation
- Non-proprietary hardware and software

Unit Automation

- Governing (frequency control)
- Black start
- Start and stop sequencing
- Synchronizing
- Efficiency control
- Power control
- Flow control
- Voltage control
- Kaplan 3D Cam control
- Pump storage control
- Synchronous condensing control
- Pelton needle sequencing control



Plant Automation

- Water level control
- Flow control
- Optimization control
- Peaking control
- Distributive power control
- Priority based unit start and stop sequencing
- Voltage control
- Cascaded plant control
- Isochronous load sharing
- Substation control



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Hydroelectric Turbine Governor Systems

Advantages

- Standard off-the-shelf, widely available components, ensure our customers cost-effective spare parts
- Experience includes hundreds of new, replaced or retrofitted hydroelectric turbine governors since the early 1980s
- Full compliance with IEEE and IEC standards for hydroelectric turbine governing
- Fast system response time and high bandwidth
- Extensive system documentation and training for easy maintenance
- Experienced hydro governor engineers are available 24 hours a day to provide service



Digital Governor Controller

- PLC based regulating system with software containing the governor algorithm
- Hardware and software are expandable to perform additional control functions
- Digital communications to plant IED's, control and SCADA systems
- Maximizes unit efficiency via Kaplan 3D CAM and Pelton needle/deflector coordination and sequencing
- Interfaces with either a low pressure hydraulic retrofit system or a new high pressure hydraulic system

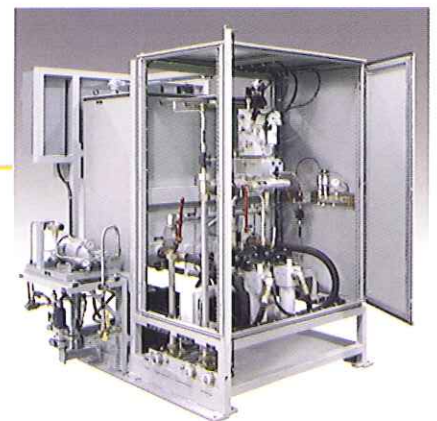


Low Pressure Hydraulic Retrofit System

- Allows for upgrading to a digital governor while maintaining the existing low-pressure hydraulic system
- Replaces mechanical fly-ball governor head and pilot valve on mechanical units, or the electric pilot control assembly and pilot valve on electric units
- Available low-pressure governor components:
 - High flow main distribution valves
 - Distribution valve bushings & plungers
 - Pump unloader valves
 - Accumulator unclosing float valves
 - Kidney loop filtration systems

High Pressure Hydraulic System

- For new installations or replacement of existing low-pressure systems
- Includes hydraulic power unit, servomotor(s), custom designed adapter plate(s) and linkage assemblies
- Low volume design greatly reduces the physical size and cost of the system



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L&S-7500 Hydro Governor Distributing Valve

The L&S-7500 Distributing Valve is a high-flow valve designed for optimum performance of new and existing hydroelectric turbine governors.

Advantages

- Additional flow capacity
- Cost effective spare parts
- Digital driver / diagnostics system with digital communications
- Installation simplified by a single outlet drain connection and standard SAE type adapter flanges
- Design allows for the mounting of valve assembly near or at servos for best valve/hydraulic stability, and for most cost effective piping arrangements

Features

- Frequency response 4-5 times faster than old mechanical and analog governor systems
- Maximum flow adjustment via solid locking nuts
- Valve porting can be specified to accommodate pressure and flow needs
- "A" and "B" ports (open and close control ports) can be reversed in the field if necessary
- No external pinch points
- Oil consumption and leakage reduced by 50% vs. existing distributing valves
- Duplex pilot valve filtration with dirty filter indication (visual and electrical)
- "O" ring sealing for leak free operation
- Shutdown verification contact
- Clean oil pressure source for auxiliary use
- Pressure supply "OK" contact
- Safety shutdown systems:
 - Local, manual shutdown valve
 - Proportional valve shutdown upon power loss
 - Fail-safe deenergize to shutdown solenoid valve
 - Energize to shutdown solenoid valve
 - Pilot-operated latching hydraulic circuit

Options

- Main inlet pressure supply shutoff piston
- Hydraulic opening and closing rate limiters



Specifications

- Flow ratings:
 - 735 gpm @150 psi (2780 lpm @ 10.3 bar)
 - 950 gpm @250 psi (3600 lpm @ 17.3 bar)
 - 1340 gpm @500 psi (5070 lpm @ 34.5 bar)
 - 1645 gpm @750 psi (6230 lpm @ 51.7 bar)
 - 1900 gpm @1000 psi (7190 lpm @ 70 bar)
 - 2125 gpm @1250 psi (8040 lpm @ 86.2 bar)
 - 2330 gpm @1500 psi (8820 lpm @ 103.4 bar)
- Pressure range:
 - 150 to 1650 psi (10 to 115 bar)



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L&S-15000 Hydro Governor Distributing Valve

The L&S-15000 Distributing Valve is a high-flow valve designed for optimum performance of new and existing hydroelectric turbine governors.

Advantages

- Additional flow capacity
- Cost effective spare parts
- Digital driver / diagnostics system with digital communications
- Installation simplified by a single outlet drain connection and standard SAE type adapter flanges
- Design allows for the mounting of valve assembly near or at servos for best valve/hydraulic stability, and for most cost effective piping arrangements

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 - Pilot-operated latching hydraulic circuit



Specifications

- Flow ratings:
 - 1700 gpm @150 psi (6450 lpm @10.3 bar)
 - 2200 gpm @250 psi (8330 lpm @17.3 bar)
 - 3100 gpm @500 psi (11,750 lpm @34.5 bar)
 - 3800 gpm @750 psi (14,400 lpm @51.7 bar)
 - 4400 gpm @1000 psi (16,600 lpm @70 bar)
- Pressure range:
 - 150 to 1100 psi (10 to 76 bar)

Options

- Main inlet pressure supply shutoff piston
- Hydraulic opening and closing rate limiters



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