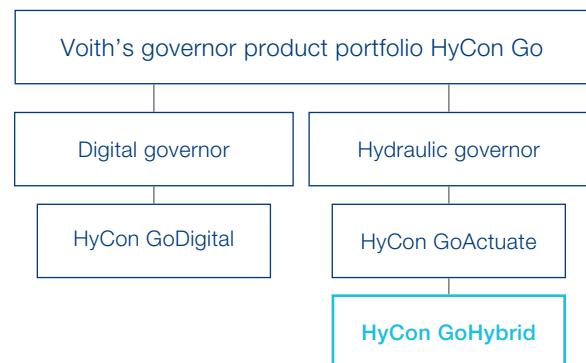


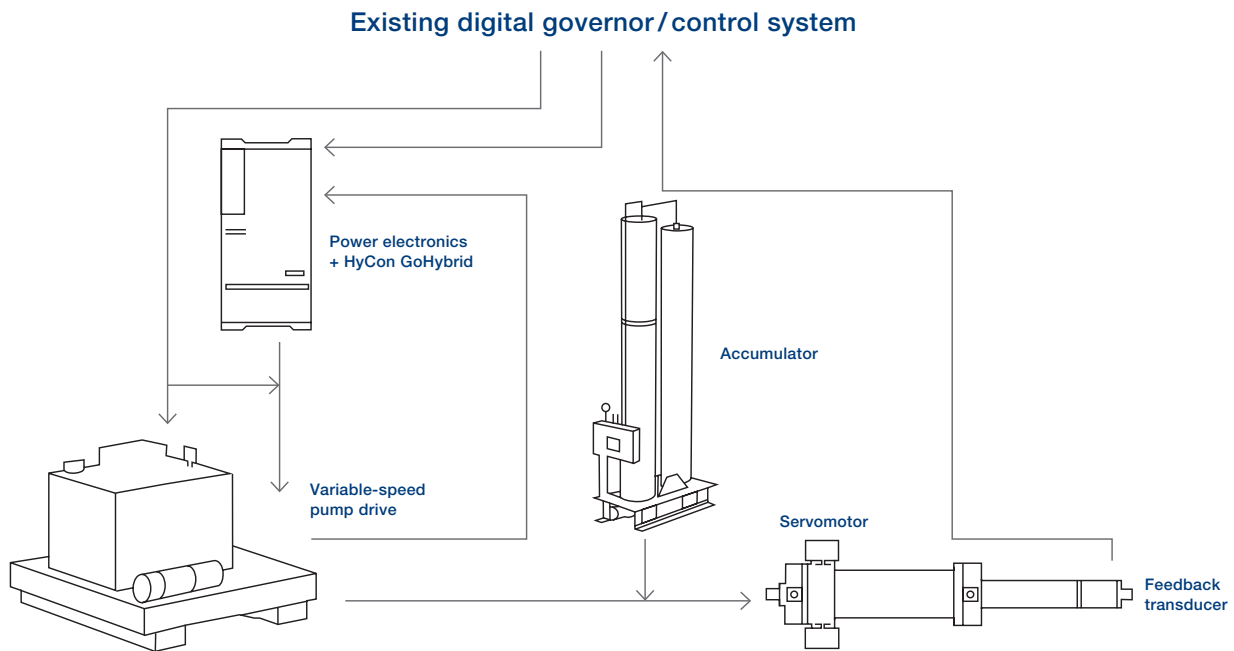
Voith's next-generation hydraulic turbine governor system HyCon GoHybrid

The HyCon GoHybrid is a pioneer in the natural evolution of hydraulic governor systems, as it is smaller and more power dense.

The name of the product alludes to the step-change in the technology deployed, which leverages the safety of a conventional accumulator-based emergency shutdown system, and the drastic oil reduction engendered through the use of closed-loop displacement control rather than open-loop throttle control.



HyCon GoHybrid functional principle



Combining modern power and reliable oil hydraulics

The oil system is less complex than conventional systems, resulting in a system with fewer and more reliable standard components. HyCon GoHybrid is completely compatible with pre-existing digital governors and other unit control systems or can be installed with Voith Hydro's own digital governor, the HyCon GoDigital.

Functional principle

The solution is based on a variable-speed pump drive. The force for positioning of the corresponding wicket gate or runner servomotor is still generated out of hydraulic energy, but in a different way to a conventional hydraulic system. Instead of proportional valves connected to hydraulic pressure that is normally taken out of a pump-loaded hydraulic accumulator, HyCon GoHybrid directly acts on the corresponding servomotor via a frequency-converter-controlled variable-speed pump. Nevertheless a small accumulator is passively integrated into the system and still ensures the reliable safety feature for emergency closing. Owing to the modular design approach, the HyCon GoHybrid covers the entire range of hydropower plant applications.

Your benefits with the HyCon GoHybrid

- + Significant lower oil amount more than 60 % compared to conventional high-pressure HPUs and up to 90 % when measured against low-pressure units
- + Lower maintenance costs and increased system availability through simpler components and minimized service elements
- + Improved energy efficiency up to 90 % energy consumption reduction compared to conventional systems
- + Compact and less complex design through reduced footprint with smaller outer dimensions, reduced size of components and weight
- + Reduced installation complexity with only a few interfaces, simplifying connection to existing digital governor control systems
- + Transient simulation of the complete hydraulic system is available and already validated with real-life data

Taking into account the easier maintenance and reduced power consumption, the above advantages bring about operational savings – up to 30 % per year compared to conventional high pressure systems (according to Voith Hydro lifecycle cost analysis).

HyCon GoHybrid – Technical data

General system data

Nominal operating pressure [bar]*	(120) – 160
Minimal operating pressure [bar]*	(90) – 110
Hydraulic fluids (examples, other fluids may be used after confirmation)	VG 46, other on request
Supply voltage [V]	400/440/480
Supply type (AC/DC) – no. phases	AC – 3 phase
Voltage range of frequency converter [V]	209 – 529
Frequency range of frequency converter [Hz]**	47 – 63
Maximum frequency variation rate [Hz/s]**	1
DC power supply (valves, control) [V]	24, 110, 220

Hydraulic Power Unit (HPU)

HyCon GoHybrid main size	1	2	3	4
Accumulator mounted on oil pan	yes – up to 40 litres above accumulator on separate installation rack			
Main dimensions (Length x Width x Depth) [mm x mm x mm]	1 105 x 905 x 1 500	1 400 x 1 105 x 1 850	2 000 x 1 800 x 2 500	in development
Maximum oil volume in tank [l]	60	120	500	> 750
Pump type	Inner gear pump			
Displacement per rotation [cm ³]	3.5 – 8	8 – 32	32 – 125	125 – 251
Maximum speed [rpm]	3 600	3 600	2 600 – 3 000	2 500
Maximum flow [l/min]	28.5	100	320	600
Maximum required power (rated/peak) [kW]	adjusted to pump			
Sensors	– Pressure (redundant) – Oil level – Oil temperature			

Accumulator – will be adjusted to individual requirements

Available accumulator volumes [l]	20 – 1 000
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Electrical cabinet

Main dimensions (Length x Width x Depth) [mm x mm x mm]	2 000 x 1 200 x 600			
Maximum electrical current (rated/peak) [A]	60/90	130/170	390/450	390/450
Electrical choke [kΩ]	Individually adjusted			
HMI type	Siemens TP xxx			
PLC type	Siemens S1500			
Frequency converter type and manufacturer	bmaXX Baumüller			
Cables and tray halogen free	Yes			
Interface to unit control system	– Minimum 5 (five) hard-wired binary signals – Bus connection (Profinet) for alarm and message handling			
Interface to digital governor	Minimum 2 (two) analogue signals and 1 binary signal			
Servomotor (hydraulic cylinder)				
Type of servomotor and arrangement	Boxer (1 or 2 pairs): Differential or synchronous Single: Synchronous with single or double rod			
Number of servomotors	1 – 4			
Operating pressure [bar]	(120) – 160			

*) Recommended value. Other pressure levels on request.

**) Standard – other options possible on request.

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