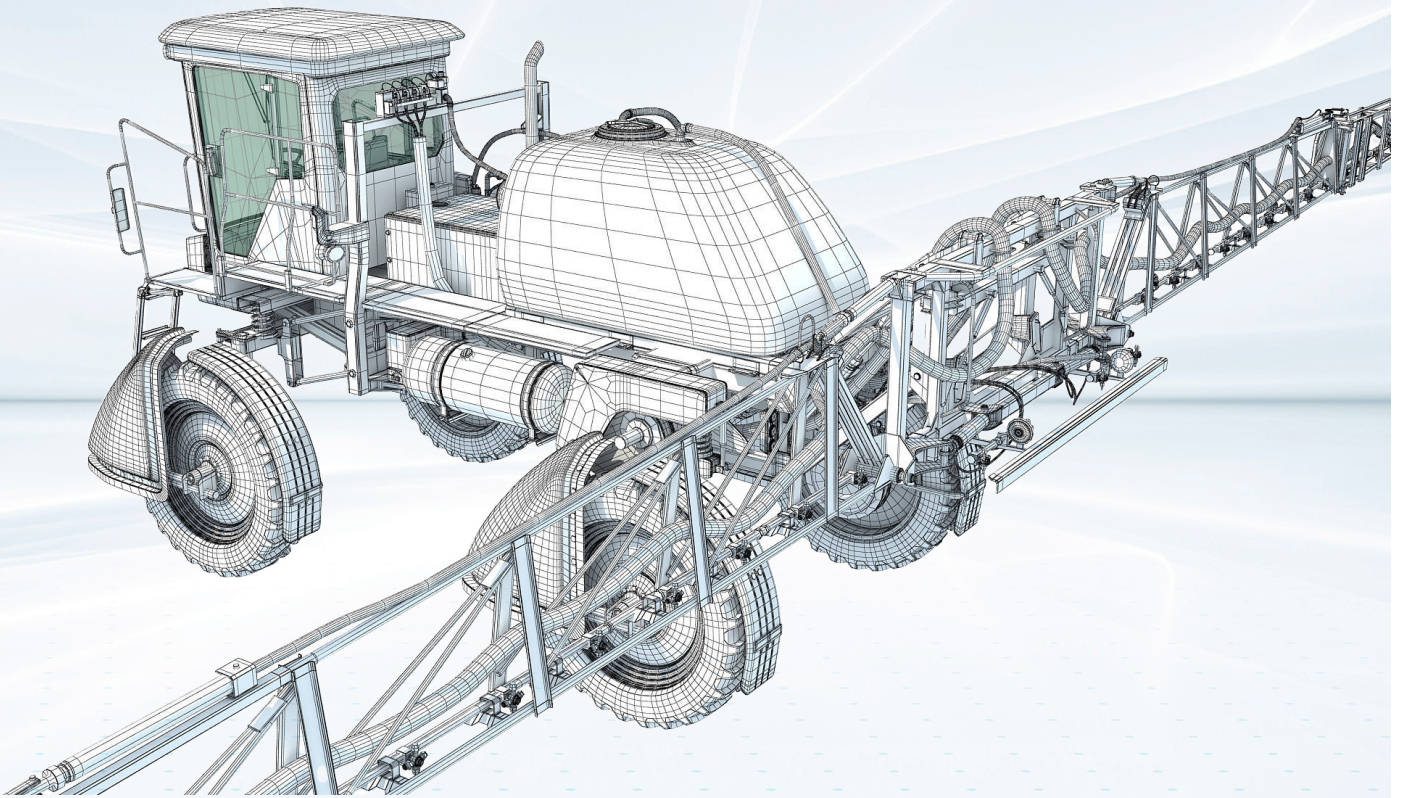


EVERYTHING HYDRAULIC
BEYOND EXPECTATIONS

ARGO
HYTOS
A Voith Company



SHC SPRAY HEIGHT CONTROL

REVOLUTIONARY SPRAYING TECHNOLOGY

This product is ideal for the following applications:



argo-hytos.com

“SIMPLIFIED SPRAY BOOM CONTROL – PROVEN TECHNOLOGY, RETHOUGHT”

Revolutionary spraying technology

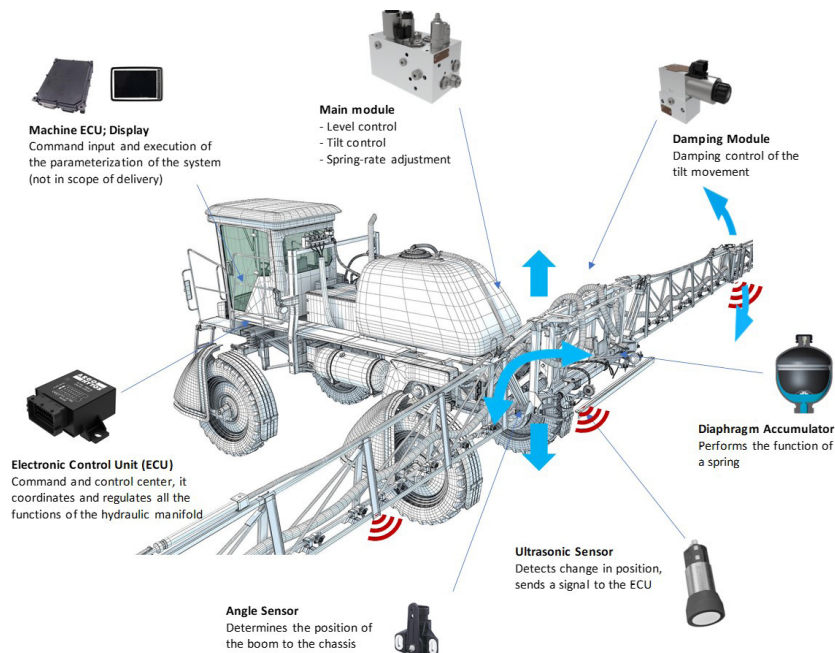
The Spray Height Control (SHC) system is an assistance system for agricultural sprayers used to automatically regulate the distance between the sprayer boom and the plants to be treated. The ARGO-HYTOS approach significantly simplifies the kinematic design of the machine through the use of hydropneumatic suspension technology.



ASSISTANCE
SYSTEM FOR
SPRAY BOOM

System Overview

The SHC system consists of hydraulic and electronic components. The main hydraulic module is connected to the cylinders to control the movement of the boom: lifting/lowering and tilting. By extending the basic setup, the angle of the boom wing can be controlled as well. A damping module can be installed optionally to adjust the tilt damping depending on the operating mode of the sprayer.



System Benefits

- Significant simplification of the middle section design by removing the subframe
- Adaptable to different boom widths thanks to easily changeable spring rate of the tilt movement
- Adjustable damping ratio: Easy adaptation to different operating conditions and, if necessary, automatic reduction of the pendulum movement at the headland
- Volume flow can be adjusted to different boom widths and cylinders due to proportional valves



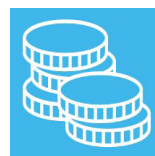
USER-FRIENDLY



QUALITY



INNOVATIVE



COST-EFFECTIVE

Suitable solution for every sprayer

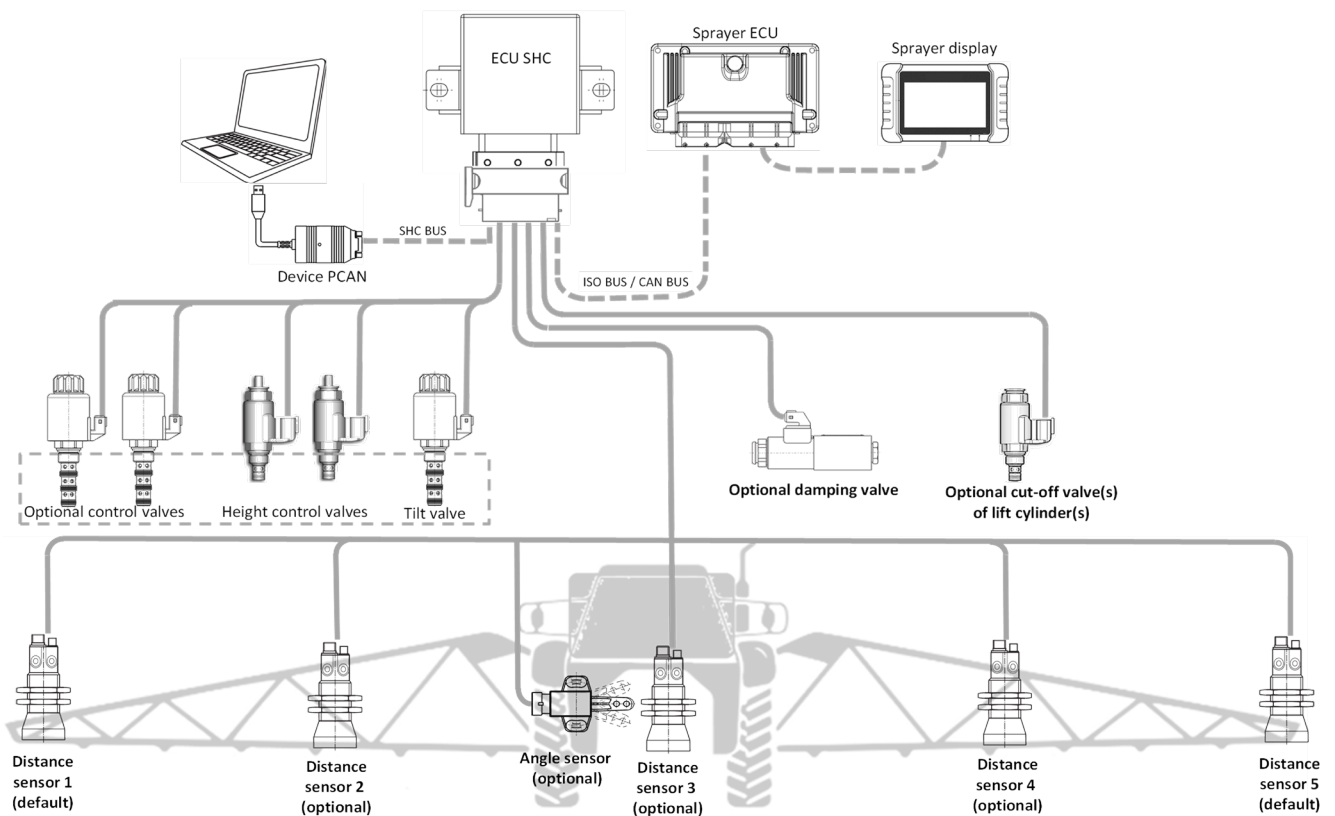
The assistance system can be used in mechanically suspended as well as hydropneumatically suspended sprayers. The hydropneumatic approach comes with several advantages. Only the setting of one valve needs to be adjusted in order to change the spring rate.

Easy servicing and commissioning

ARGO-HYTOS is delivering a service software running on Windows. In this software, system parameters, i.e. cylinder speed, can be changed easily. To meet customer's requirements, the control parameters can be changed, too. The software allows to monitor system signals in order to support easy servicing.

System Layout

The basic setup of the system includes the hydraulic manifold assembly, two ultrasonic sensors and one ECU with software. The basic system can be extended with accumulators for hydropneumatic suspension, simplifying the boom design. For an individual damping adjustment, a damping module is available, as well. An angle sensor can be equipped optionally to automatically move the boom into a position horizontal to the chassis. This setup can be extended further to additionally control two cylinders – one located at each boom wing – in order to even better follow the contour of the field. For this upgrade, an extra ultrasonic sensor at the middle section is necessary.



Communication with machine ECU

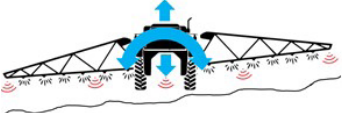




Via proprietary CAN or J1939 (ISOBUS on request) the SHC ECU can communicate with the main machine controller. This offers the advantage that changes of the customer's user interface aren't necessary: The SHC ECU gets control commands via CAN and controls the valves automatically in order to bring the boom into the desired position.

Ultrasonic sensors

Ultrasonic sensors at the boom are measuring the distance between spray nozzles and plant canopy. If needed the ECU is calculating the control commands for the valves in order to bring the spray boom into the desired position.

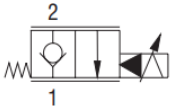


Software functioning

The SHC system provides various operational modes, which can be selected depending on the given operating conditions. In each mode, different functions run automatically, relieving the operator and improving results.

Operational mode	Basic functions	Optional functions with additional components
<p>Working mode</p> <p>➤ Regular mode during spraying</p> 	<ul style="list-style-type: none"> • Boom height is adjustable by the operator • Height and tilt of the overall boom is automatically controlled 	<ul style="list-style-type: none"> • Damping control of tilt movements (damping module is required) • Automatic control of boom wings for even better adaptation to the contour of the field
<p>Fold in/out mode</p> <p>➤ Before starting work</p> <p>➤ After work</p> 	<ul style="list-style-type: none"> • Adjusting the position of the boom when folding • System is remotely controlled • Boom height adjustment is manual • Movement speed adjustable 	<ul style="list-style-type: none"> • Automatic control of the boom's tilt position to achieve horizontal position to chassis (angle sensor must be installed) • Automatic control of the fold position of both boom wings
<p>Headland mode</p> <p>➤ To turn around the machine at headland</p> 	<ul style="list-style-type: none"> • Boom is lifted up to certain position 	<ul style="list-style-type: none"> • Damping will increase to prevent the boom from oscillating too much (if damping module is installed)
<p>Laid crops mode</p> <p>➤ If there are too many laid crop</p> 	<ul style="list-style-type: none"> • Automatic distance control is off • Collision control is active • Mode is activated for a short time • Tilt control is deactivated, only the lift valve is active 	
<p>Manual mode</p> <p>➤ Manual boom control</p> 	<ul style="list-style-type: none"> • Manual height and tilt control • Setting speed of the boom wing movement • Damping settings 	<ul style="list-style-type: none"> • Manual control of the boom wing angle

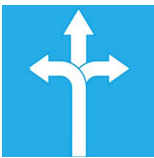
Adaptable for different boom widths

To control the height, tilt position, as well as the angular position of the boom wings, electro-proportional valves are used in the hydraulic manifold assembly. By using them the operator can adjust the speed of the boom movements to his needs – allowing the machine manufacturer to use the same equipment for different boom widths and cylinder dimensions.

Valve	Function	Flow rate
	Lift/Lower overall boom	Up to 50 lpm
	Tilt overall boom Angling boom wings up/down	Up to 2 (5) lpm
	Optional damping adjustment	PRM2-063: Nominal flow 5 lpm

Benefits

- Adaptable speed of movement for different boom types and operating conditions
- Both fast reaction of the boom and precise positioning thanks to proportional valves
- Better performance due to electronically adjustable damping ratio
- Reduction of customers warehousing



UNIVERSAL



ACCURATE



QUALITY

Additional degree of freedom

By using electro-hydraulic proportional valves for controlling the boom movements the customer gets additional degrees of freedom with one hydraulic manifold. Different boom widths and designs demand different flow rates to the cylinders. This can be easily changed by the control signal to the valves. Different speeds for different operation modes can be realized.

Benefits with adjustable damping

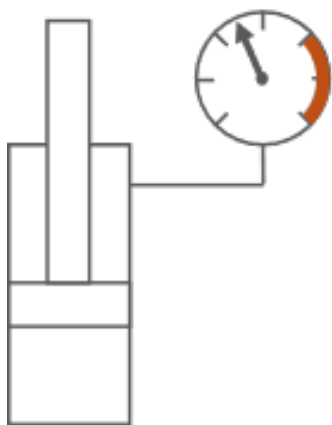
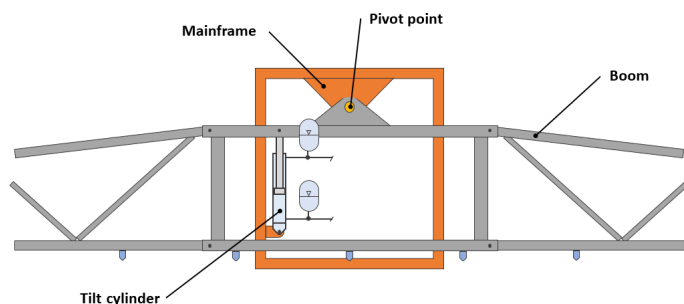
Using hydropneumatic tilt suspension offers the possibility to adjust the damping ratio of the tilt movement easily via an electro-hydraulic proportional valve. With that, the damping ratio can be adjusted to fit to different boom dynamics. Furthermore, it can be adjusted during operation in order to make the tilt movement stiff at headland and soft when spraying.

Main features in detail

This innovative approach for a sprayer boom guiding system offers several advantages. Along with a simpler boom design, hydropneumatic suspension technology offers additional functionality.

Simplification of boom design

The SHC system is compatible with conventional spring-suspended sprayer designs. However, for optimal performance it is recommended to integrate the system with hydropneumatic suspension for tilt movement. With this approach the design of the middle section looks much slimmer due to the tilt cylinder that can be connected directly between main frame and boom without the need of an additional subframe.



Easy adjustment of spring rate

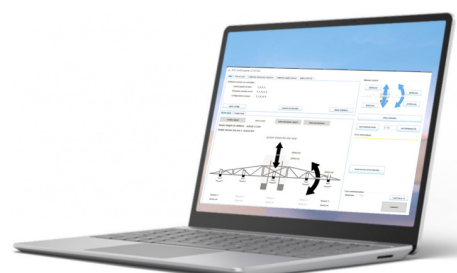
Different boom widths require different spring rates for the tilt movement in order to achieve a good decoupling of the boom from the chassis. The hydropneumatic solution from ARGO-HYTOS makes this very easy.

By changing the preload pressure in the rod side of the tilt cylinder the spring rate of the hydropneumatic suspension can be adapted. Therefore, only the setting of one valve included in the main hydraulic manifold needs to be changed.

Servicing and commissioning tool

The ARGO-HYTOS service tool provides the following key features:

- Parametrization of ECU without any programming knowledge
- Monitoring and diagnostic functions
- Connection through CAN Bus interface
- Save/store ECU configuration parameters to/from file and graphical view of the measured variables



ARGO-HYTOS
EVERYTHING
BEYOND EXPECTATIONS



TECHNOLOGY
BEYOND EXPECTATIONS

We are experts in all types of mobile hydraulics. We understand our customers' machines precisely and know what is important. With pioneering, innovative technologies, we set standards far beyond expectations.

QUALITY
BEYOND EXPECTATIONS

We create quality with our thoughts and actions. Our aim is to be one of the best suppliers and to consistently exceed our customers' expectations.

SOCIETY
BEYOND EXPECTATIONS

We connect people and their skills. In sensor technology, fluid & motion control and filter technology, we exchange knowledge worldwide and transfer experience! The results always exceed our customers' expectations.

SUSTAINABILITY
BEYOND EXPECTATIONS

Our hydraulic systems make applications more efficient, actively reduce fuel consumption and extend service intervals. We reduce our CO₂ footprint and that of our customers beyond expectations.

You can find more information at
www.argo-hytos.com
or contact our ARGO-HYTOS team of experts.

