

## Sprayer Height Control System



### Technical Features

- › Automatic height control of the spray boom
- › Usable at mechanical or hydropneumatic suspended sprayers
- › Less damage to the plants and the boom (ground contact!)
- › Less driver attention to the boom positioning needed
- › More accurate and economical spraying of agent
- › Boom protection due to suspension
- › Different working modes
- › Simple to integrate into machine control
- › Adjustable spring rate and damping settings

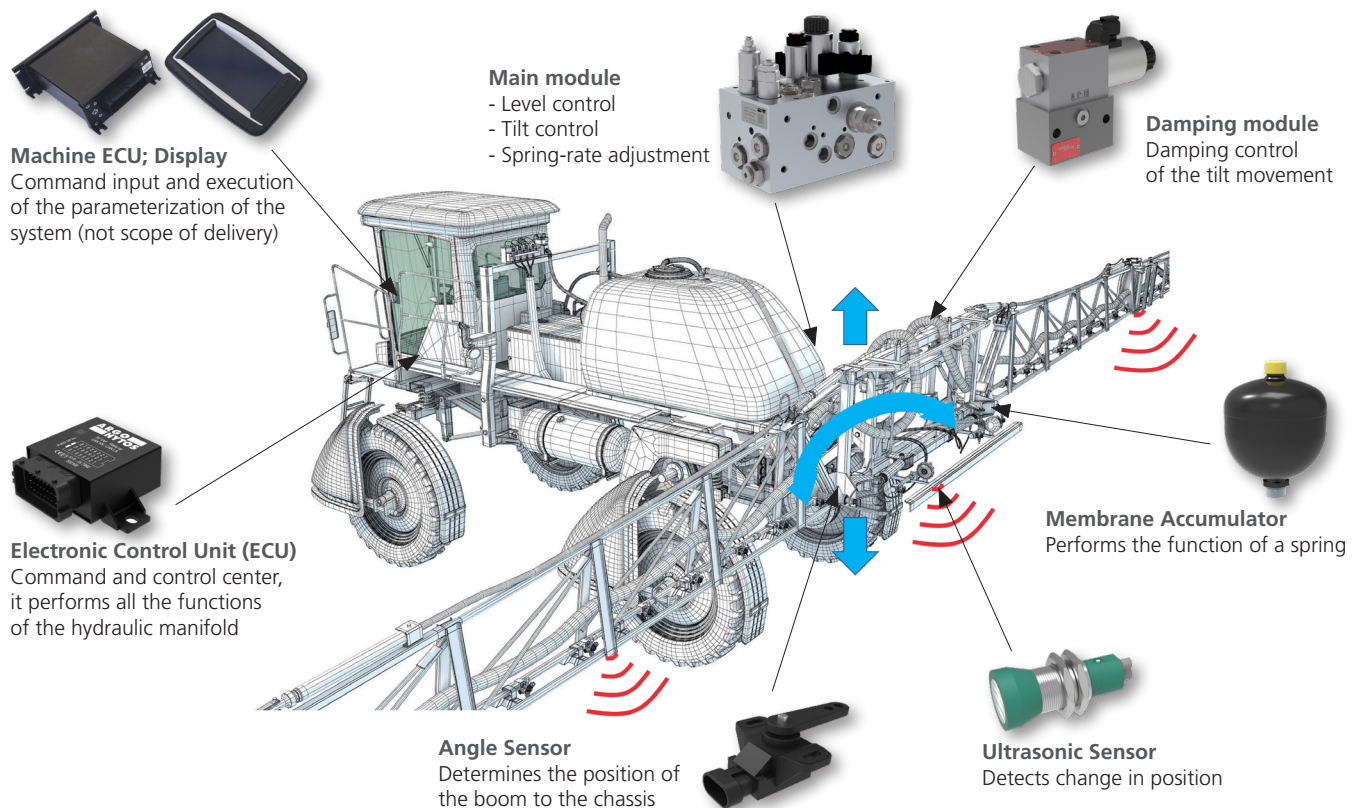
### General description

Sprayer Height Control (SHC) system represents an assistance system for automatic control of the distance between the sprayer boom and the plants to be treated on agricultural field sprayers. Providing more accurate positioning of spray nozzles to canopy of the plant allows to apply the spray agent more accurately and economically. It also relieves the driver, which is particularly advantageous in view of the increasing area output.

### System integration

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, as well as adjusting the spring rate. Damping module can also be optionally installed to regulate the tilt damping depending on the operating mode of the sprayer. The membrane accumulator performs the function of a spring, in order to ensure smooth movement of the boom.

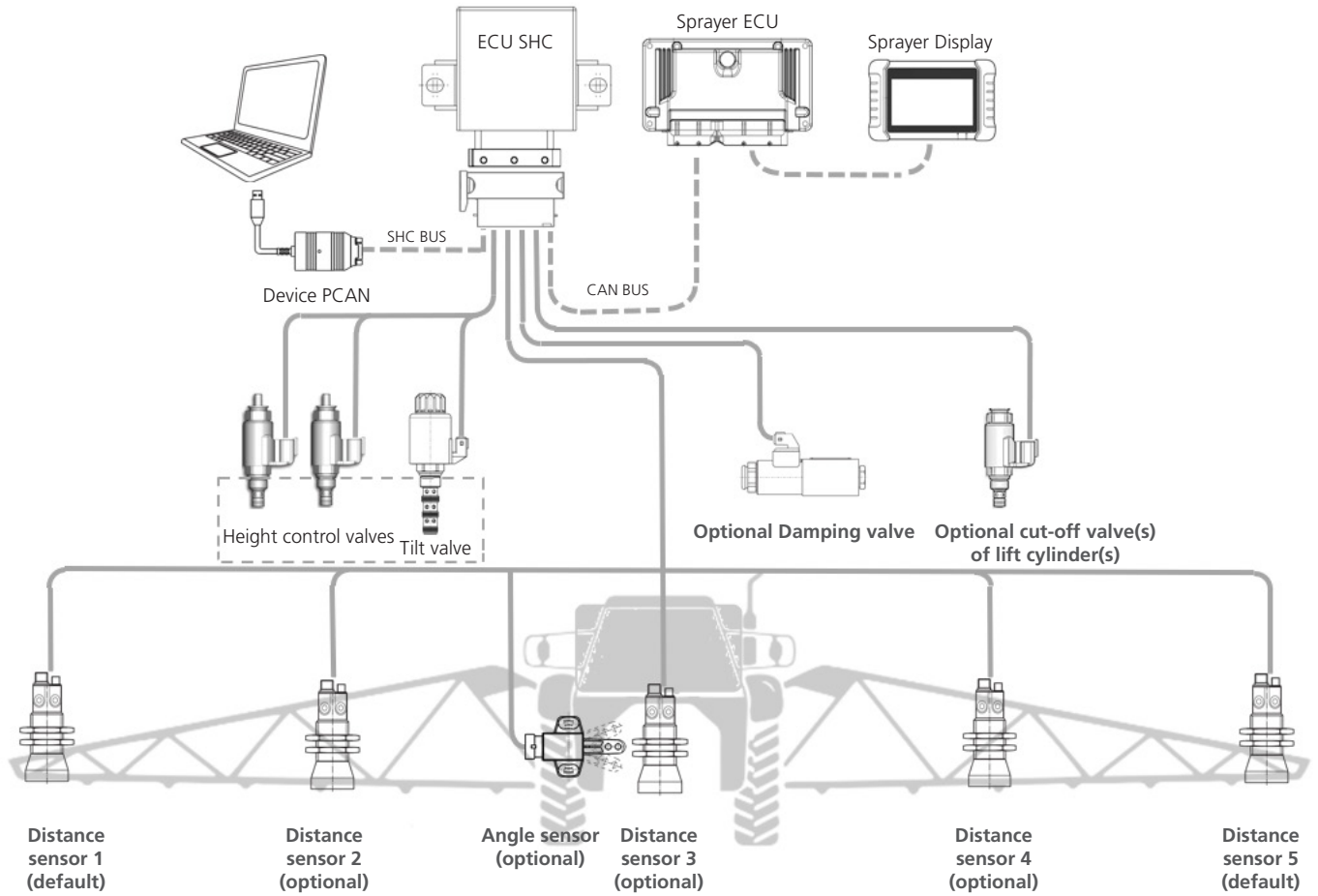
The Electronic Control Unit (ECU) with software controls the boom by means of signals sent to hydraulic valves mounted in the blocks, guided by measurement signals from ultrasonic position sensors and the angle sensor. To control the system there is a CAN BUS interface which allows to send and receive the necessary signals from/to main machine controller.



**System structure**

The system components are configured based on required functionality. The basic setup includes a controller with software, a hydraulic block with valves, and two distance sensors.

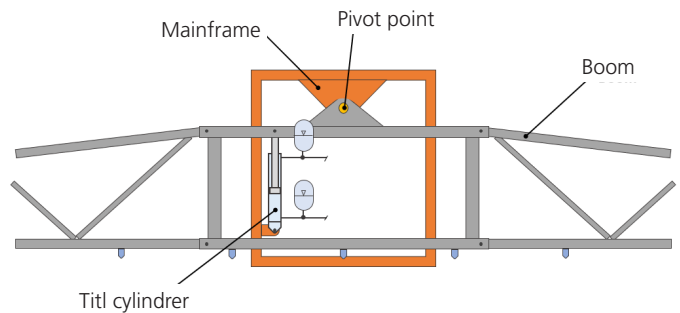
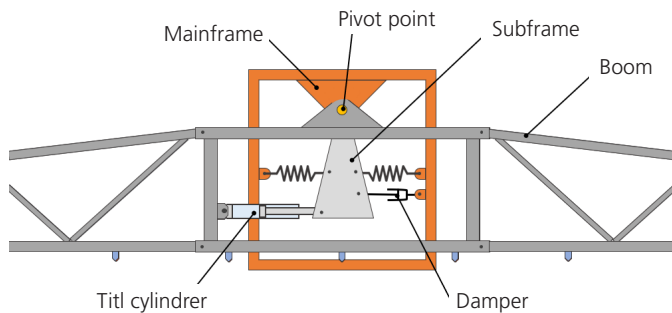
There is also provided an optional equipment to the basic system for set up the sprayer with hydropneumatic suspension (lift and/or tilt). Therefore, accumulators are used. An optional damping module for advanced damping of the tilt movement in combination with hydropneumatic suspension is available, too. This allows to set up the damping ratio for tilt movement.



The SHC system is compatible with conventional spring-suspended sprayers. However, for optimal benefits, it is recommended to integrate the system with hydropneumatic springs. In this configuration, hydraulic accumulators are linked to position-controlling cylinders, simplifying the middle section design, eliminating the need for a subframe.

SHC with mechanical springs

SHC with hydropneumatic springs  
(membrane hydropneumatic accumulators)

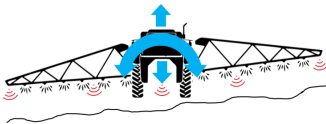


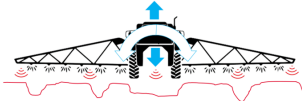
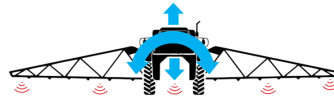


**System functions**

SHC system provides various operation modes, which can be selected depending on the working situation, the basic system includes 2 distance sensors. With that a more cost-effective setup is provided.

By using 3 or 5 distance sensors, the boom can be positioned more precisely to the plant canopy. The software can also automatically detect laid crops through which the boom isn't diving in at such an area. The automatic detection of laid crops is limited: with a setup of 3 sensors it can detect laid crops at one sensor, with 5 sensors it can detect laid crops at 2 sensors at one time. This additionally relieves the driver.

**Choose the required functions:**

Operational mode	Basic functions	Optional functions with additional components
<b>Working mode</b> Regular mode during spraying 	<ul style="list-style-type: none"> <li>- Automatic control the height and tilt of the boom</li> <li>- Boom height is adjustable by the operator</li> </ul>	<ul style="list-style-type: none"> <li>- Automatic detection of laid crops using 3 or 5 distance sensors</li> <li>- Damping control of tilt movements (damping module is required)</li> </ul>
<b>Fold in/out mode</b> Before starting work After work 	<ul style="list-style-type: none"> <li>- Adjusting the position of the boom when folding</li> <li>- System is remotely controlled</li> <li>- Boom height adjustment is manual</li> <li>- Movement speed adjustable</li> </ul>	<ul style="list-style-type: none"> <li>- Automatic control of the boom's tilt position to achieve horizontal position to chassis (angle sensor must be installed)</li> </ul>
<b>Headland mode</b> To turn around the machine at headland 	<ul style="list-style-type: none"> <li>- Boom is lifted up to certain position</li> </ul>	<ul style="list-style-type: none"> <li>- Damping will increase to prevent the boom from oscillating too much (if damping module is installed)</li> </ul>
<b>Laid crops mode</b> If there are too many laid crops 	<ul style="list-style-type: none"> <li>- Automatic distance control is off</li> <li>- Collision control is active</li> <li>- Mode is activated for a short time</li> <li>- Tilt control is deactivated, only the lift valve is active</li> </ul>	
<b>Manual mode</b> Manual boom control 	<ul style="list-style-type: none"> <li>- Manual height and tilt control</li> <li>- Setting the speed of the arms</li> <li>- Damping settings</li> </ul>	

**Ordering code of the system**

SHC - [ ] - [ ] - [ ] - [ ] - [ ]		
<b>Sprayer Height Control System</b>		<b>Rated supply voltage of solenoid</b>
<b>Suspension</b>		12
Hydro-pneumatic	H	24
Mechanical	M	
<b>Qty of Distance sensors</b>		<b>Damping Module</b>
2		with
3		without
5		
		<b>Angle sensor</b>
	00	yes
	01	no

## Control Panel - Service tool software



The Control Panel is a PC software designed as a tool for the service and commissioning of the SHC system, the system's parameters can be easily set up to the machines or the customer's properties. The Control Panel also provides a diagnostic tool.

### CONTROLLING & MONITORING INTERFACE

- Allowed fully control the system, switch to the required modes, change settings, as well as calibrate sensors or manually control the boom

Provide information about:

- How much distance sensors are implemented and what are their individual measured heights between spray nozzles and ground or plant canopy
- Actual value of the angle sensor
- Settings of the lift/lower, tilt and damping valve

### CONFIGURATION TOOL

- Setting parameters according to the characteristics of the machine and the desired performance
- Save/store control unit parameters configuration to/from file

### DIAGNOSTIC INTERFACE

- Allows to monitor error messages in the system in real time, listen to the CAN messages and store them
- For analysing signal characteristics over time, a graphical view is integrated.

### Key Features

- › Parametrization of ECU without any programming knowledge
- › Monitor and diagnostic functions
- › Connection through CAN Bus interface
- › Save/store ECU parameters configuration to/from file.
- › Graphical view of the measured variables.
- › Monitoring of control unit error messages.

