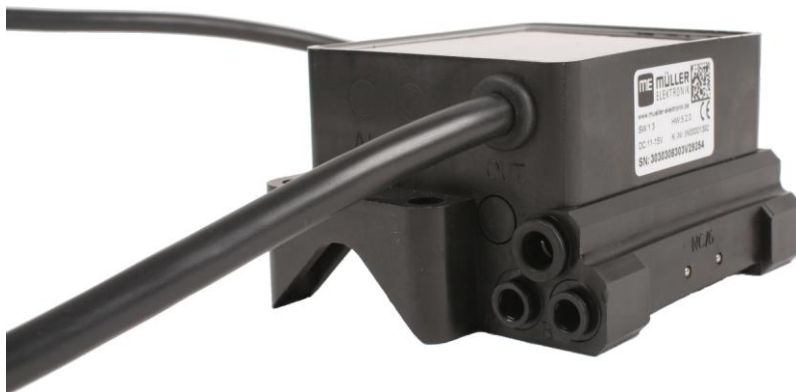


Service manual

EDS-P

Pneumatical Single Nozzle Switching System



Version: V5.20170815



3030308301-02-EN-200

Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

Company details

Document

Service manual

Product: Pneumatical Single Nozzle Switching System

Document number: 3030308301-02-EN-200

As of software version: 1.5

Original language: German

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1 For your safety

1.1 Basic safety instructions



Please read the following safety instructions carefully before using the product for the first time.

- Before installation, switch off the engine and the tractor's ignition.
- Do not make any unauthorized modifications to the product. Unauthorized modifications or use may impair safety and reduce the service life or operability of the unit. Modifications are considered unauthorized if they are not described in the product documentation.
- Never remove any safety mechanisms or stickers from the product.
- The product does not include any user-serviceable parts. Do not open the casing. If the casing is opened, its imperviousness can be changed.
- Before charging the tractor battery, always disconnect the tractor from the job computer.

1.2 Target group for this service manual

This service manual is for specialist staff. The specialist staff must have deep-seated knowledge in the following areas:

- Installation of agricultural machines
- Operating mode and design of field sprayers
- Electrics and electronics
- Installation and connection of CAN-BUS and ISOBUS interfaces

1.3 Directional information in these instructions

All directional information in these instructions, such as "left", "right", "forward", "back", is relative to the movement direction of the vehicle.

2 Product description

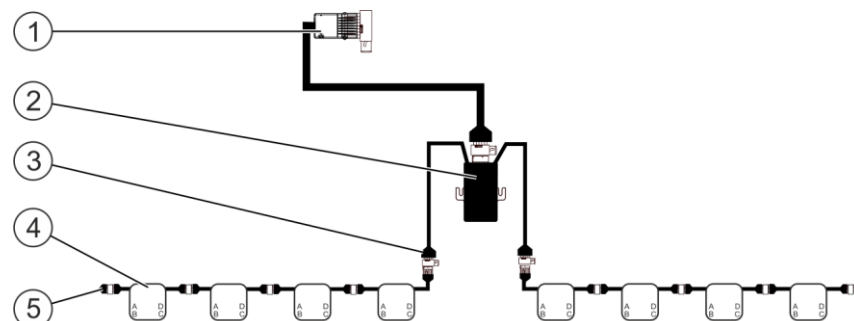
2.1 Basic principles of the EDS single nozzle switching system

The single nozzle switching system [also called EDS] is a system that serves to directly open and close each nozzle on a field sprayer.

This makes it possible to reduce the number of overlaps more effectively than with conventional systems, which can only open and close entire sections.

The system obtains all of the required information from the job computer of the field sprayer and the SECTION-Control application. This gives the driver the ability to either control the nozzles manually, or allow them to be controlled by the software.

2.2 System overview



Electrical connection of the EDS components

①	Connection to the main system or to a system add-on	Cable length - Item number: 0.3 m - 30322355 1.5 m - 30322359 3.2 m - 30322358 6.5 m - 30322357 10 m - 30322356
②	EDS communication module	
③	Connection to the EDS-BUS	
④	EDS modules	
⑤	Termination plug	3130308311 - Is supplied with the EDS communication module.

EDS communication module

The EDS communication module controls the EDS modules. It receives signals from the ISOBUS job computer and sends commands to the EDS modules.

EDS-BUS

EDS-BUS is a data line from the EDS communication module to all of the EDS modules.

The EDS communication module is connected with two EDS modules at the middle of the boom. Other modules are connected to this module in a chain.

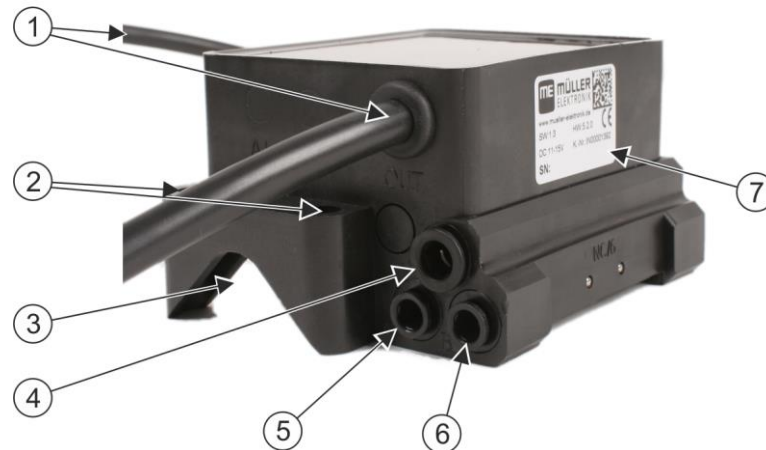
EDS Module

An EDS module is a microprocessor that opens or closes the feed line to a nozzle.

The EDS modules described in these operating instructions work with air pressure. They are also called pneumatic EDS modules or EDS-P modules.

EDS modules differ in terms of:

- the diameter of the quick connectors
- the type of the multiple nozzle holders that they can control
- the item number



Pneumatic EDS module (or EDS-P module). The following labels can be found on the module casing

①	Output (OUT) and input (IN) of the EDS Bus line	⑤	Quick connector for pneumatic output A Diameter: 4mm or 6mm, depending on the model
②	Openings for the U-bracket	⑥	Quick connector for pneumatic output B The pneumatic outputs C and D are located on the opposite side.
③	Slot for the spray agent pipe	⑦	Rating plate
④	Quick connector for the pneumatic line (main line) Diameter: 8mm		

Nozzle holders

The system can work with the following types of nozzle holders:

- Single nozzle holders
- Double nozzle holders - multiple nozzle holder with two nozzles.
 - Prerequisite: ISOBUS job computer manufactured by Müller-Elektronik with a licence for VarioSelect nozzle holders.
- Quadruple nozzle holders - multiple nozzle holder with four nozzles.
 - Prerequisite: ISOBUS job computer manufactured by Müller-Elektronik with a licence for VarioSelect nozzle holders.

The more nozzle holders are connected to an EDS module, the longer the required connection cables for the EDS modules. For this reason, there is a different EDS module for each type of nozzle holder.

You can see it by the item number on the rating plate [→ 7]. The various item numbers can be found in Section: Spare parts [→ 24]

2.3

Information on the rating plate

The rating plate is located on the back of the EDS modules.

Abbreviations on the rating plate

Abbreviation	Meaning
K.-Nr.:	Customer number If the product was manufactured for an agricultural machinery manufacturer, the agricultural machinery manufacturer's item number will be shown here.
HW:	Hardware version
ME-NR:	Müller-Elektronik item number
DC:	Operating voltage The product may only be connected to voltages within this range.
SW:	Software version
SN:	Serial number

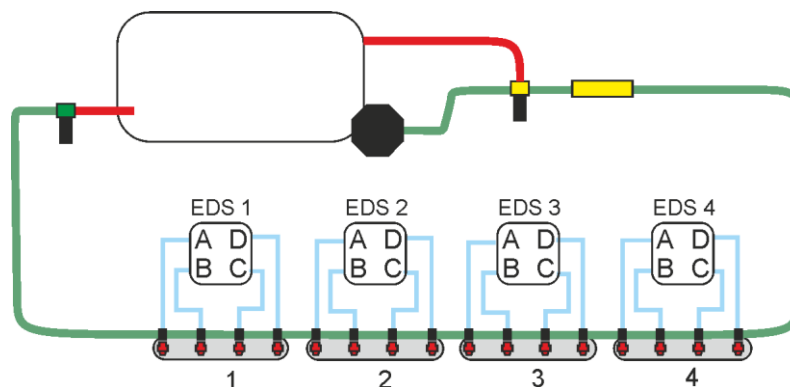
2.4

Intended uses

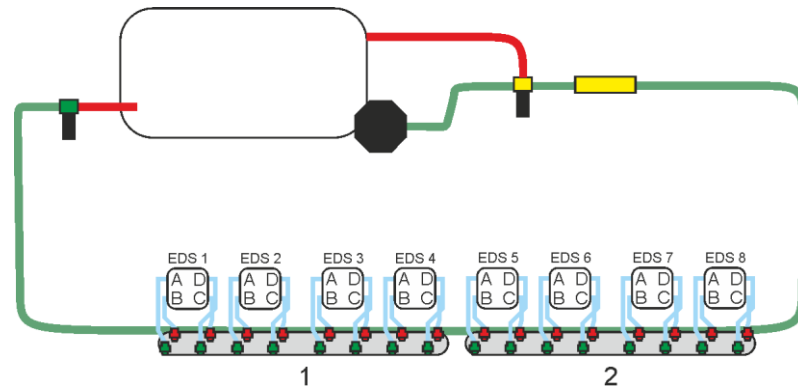
The EDS system can be installed on the field sprayer for different intended uses:

- Single-nozzle switching
- Pairwise nozzle switching
- Section control

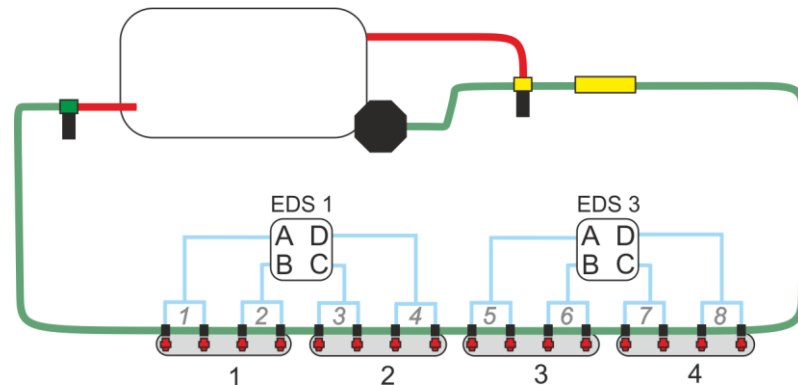
Examples:



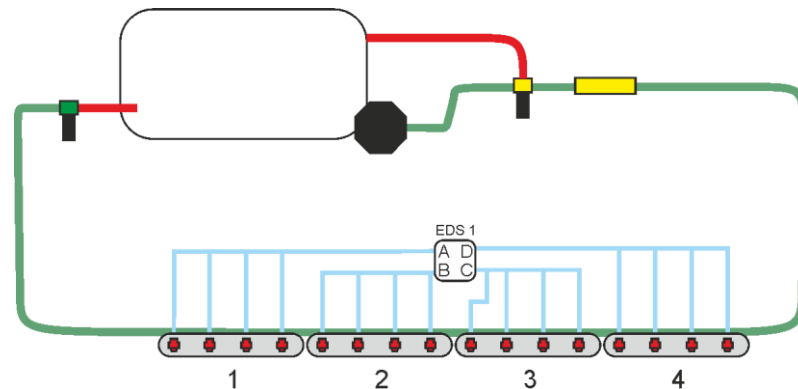
Individual nozzle switching with single nozzle holders and four sections



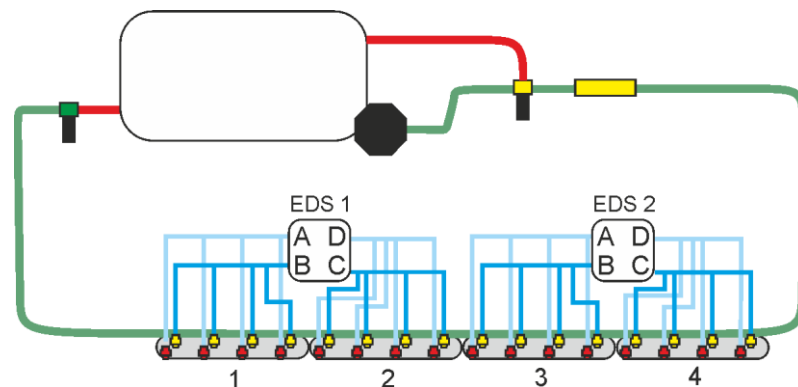
Individual nozzle switching with double nozzle holders and two sections



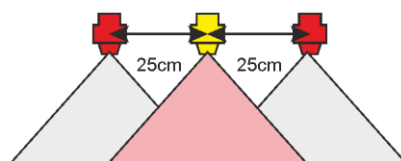
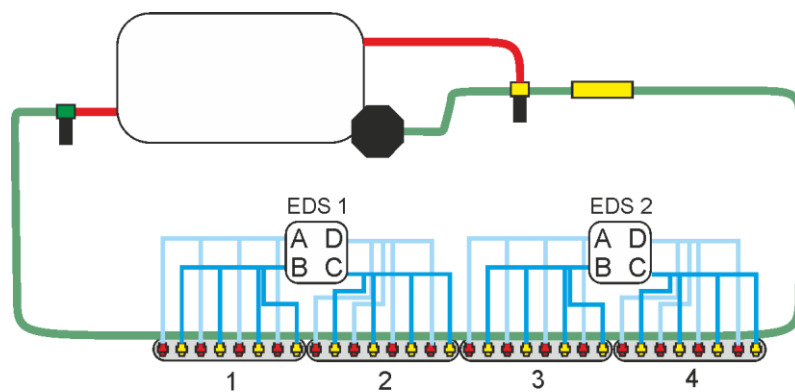
Pairwise nozzle switching with single nozzle holders and four sections



Section control with single nozzle holder.



Section control with double nozzle holder.



Section control with EDS modules. In this version single nozzle holders are installed every 25 cm.

3 Installation

3.1 Install the EDS communication module

The EDS communication module must be firmly installed on the field sprayer.

The place of installation must be selected such that the ISOBUS job computer and the EDS modules can be connected later on.

3.2 Installing the EDS modules

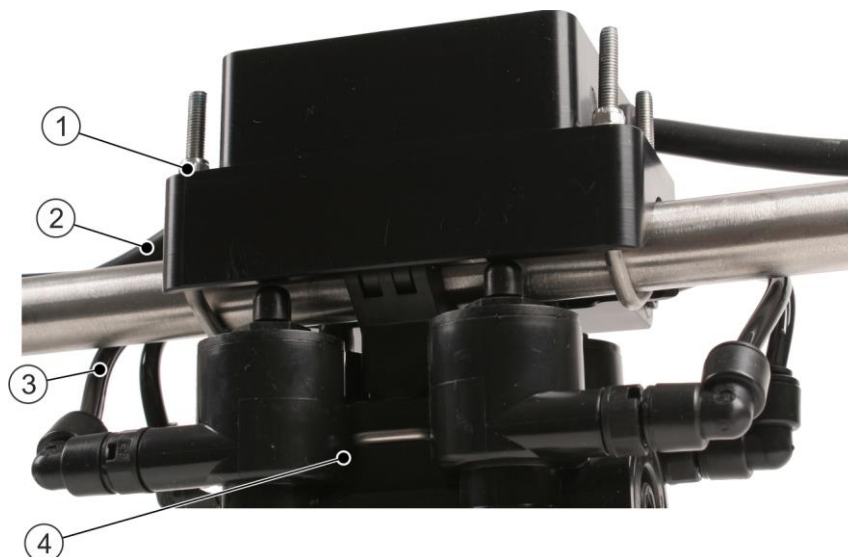
You should bear the following in mind when installing the EDS modules:

- Install the EDS modules on the field sprayer boom, close to the nozzle holders.
- To attach the EDS modules, you can use e.g. the universal bracket in the form of a U-bolt (M5).
- The position of the EDS module is irrelevant. It is only important that all of the nozzle holders can be easily reached with the hoses.
- Pneumatic valves must be connected to the nozzles in a specific sequence.
- The plugs must be connected to the nozzles in a specific sequence.
- On field sprayers with more than 72 EDS modules, additional power must be supplied to the outer half of the EDS modules on each boom side. The following cable harnesses are used for this purpose: 3030308340 and 3030308341

Preventing leaks

Observe the following instructions to prevent leaks in the system:

- Protect the pneumatic connections and plug contacts of the EDS modules from humidity and dust. The pneumatic connections must be clean both during installation and also during transport and storage. Dirty connections can cause leaks.
- Only use pneumatic hoses made of hard plastic like polyamide (PA). Soft hoses, e.g. made of polyurethane (PU) or polyethylene (PE), can cause leaks in the connection area of the EDS module.
- Do not paint the EDS modules.



Installation example: EDS-P module installed directly over a quadruple nozzle holder

①	Universal bracket M5 for attachment to the pipe
②	Cable for the EDS line. The main pneumatic line cannot be seen on this photo.
③	Each pneumatic valve is connected with a hose to one nozzle.
④	The nozzle holder is located directly below the EDS module.

3.3

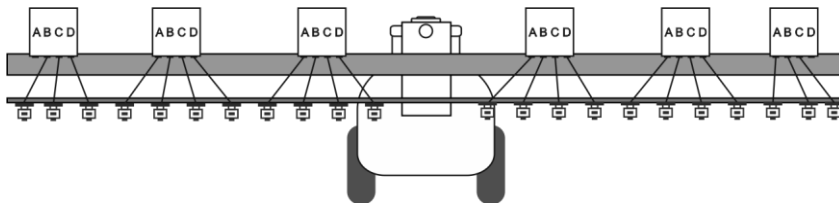
Connecting the nozzle holders to the EDS modules

Planing the sequence

The sequence in which you must connect the nozzles to the pneumatic valves depends on the nozzle holders that you are using:

- Single nozzle holders
 - One pneumatic valve per nozzle holder.
 - A, B, C, D from left to right.
 - If you cannot maintain the sequence on an EDS module and the nozzle holders are connected in the sequence D, C, B, A, you have to mark this EDS module as "rotated". See: "EDS" tab
 - If the number of nozzles on each side of the boom cannot be divided by four, a few pneumatic valves are left over. These must always be the pneumatic valves located at the outer ends of the boom.

For example: If 22 nozzles are installed on the left side of the boom, two pneumatic valves are left over after the installation. They are located at the ends of the boom. On the left side, pneumatic valve A remains open, and on the right side, pneumatic valve D.



Arrangement of the pneumatic EDS modules on a boom with single nozzle holders

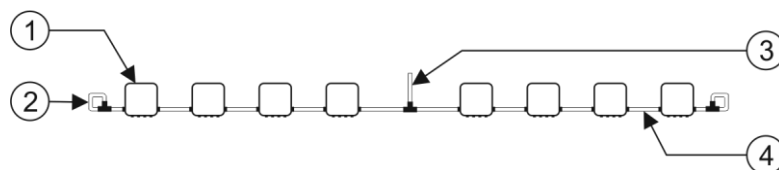
- Double nozzle holders
 - Connect pneumatic valves A, B with the first nozzle holder and pneumatic valves C, D with the second nozzle holder.
 - Pneumatic valve A and pneumatic valve C have to be connected to the same type of nozzle on all of the nozzle holders, because they are switched simultaneously.
- Quadruple nozzle holder
 - Use one EDS module per nozzle holder.
 - Each pneumatic valve must correspond to one nozzle type. This association must be maintained for all of the nozzle holders.

Connecting the pneumatic line to the EDS modules

Preconditions

Before connecting the EDS modules to the air compressor, make sure that it fulfils the following requirements:

- The pneumatic system must include a central pressure regulator with filter and a water separator.
- Compressed air quality: Technical characteristics of the EDS modules [→ 22]
- Operating pressure: Technical characteristics of the EDS modules [→ 22]



EDS modules and the pneumatic line

①	EDS Module	③	Hose to the air compressor of the field sprayer
②	Loop or plug The hoses must be closed off at the ends.	④	Hose between the EDS modules Diameter: 8mm

Inserting the hose

Procedure

1. Push the end of the hose into the opening of the quick connector.
⇒ The hose will be hooked onto the quick connector and cannot be pulled out.

Pulling out the hose

Procedure

1. Press the quick connector towards the middle of the EDS module.
⇒ The locking mechanism releases the hose.
2. Pull the hose out. The hose can be pulled out very easily when the quick connector was properly pressed in.

3.4

Connecting the cable

Every EDS module has two cables that can be used to connect to other modules and the communication module. The connected EDS modules thereby form a line. This line is called EDS BUS.

Connecting the communication module to the EDS modules

The end of each cable from the communication module is marked with a letter:

- "L" - For connecting the EDS modules on the left side of the boom
- "R" - For connecting the EDS modules on the right side of the boom

Connecting the EDS modules to each other



Connecting two EDS modules

① Input EDS module

② Output EDS module

Outer EDS modules

There is one EDS module remaining on each side of the boom where the output cannot be connected to another EDS module. The outer outputs must be closed using the supplied terminating plugs.

3.5

Connecting the AMP connectors

Procedure

This is how to connect two AMP connectors:

1. Pull out the red locking device of the AMP socket all the way to the end.



- ⇒ You will hear a loud clicking sound.
- ⇒ The openings for inserting the locking pins of the connector are visible.

2. Insert the plug into the socket. It should be possible to easily insert the locking pins in the openings.



- ⇒ The connector is loosely inserted in the socket.

3. Press in the red locking device.



- ⇒ You will hear a loud clicking sound.
- ⇒ A part of the locking device comes through to the other side of the socket.
- ⇒ You have connected and locked the connector with the socket.



3.6

Separating the AMP connectors

Procedure

This is how to separate two AMP connectors:

1. Press in both ends of the red locking device in direction of the connector.



⇒ You will hear a loud clicking sound.



⇒ The locking device has been released.

2. Pull out the red locking device of the AMP socket all the way to the end.
3. Pull the connector out of the socket.

4 Configuring the single nozzle switching

You must configure the individual nozzle switching in the application job computer SPRAYER-Controller 3.0 job computer.

4.1 Configuring the EDS communication module on the terminal

4.1.1 Open the application of the EDS communication module

Procedure

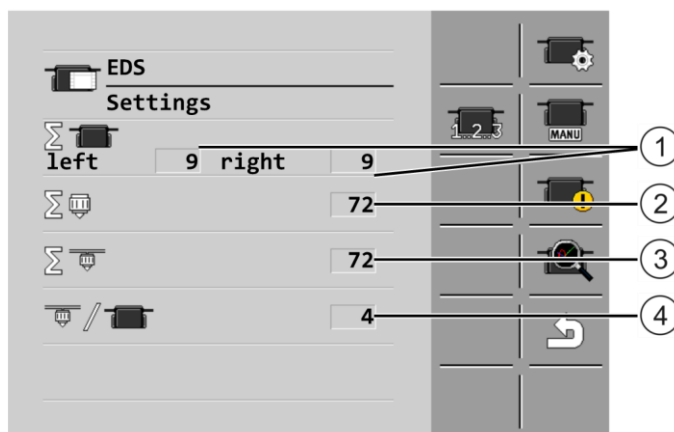
- ☒ You have properly connected all of the components.
- ☒ You have configured the SPRAYER-Controller 3.0 job computer.

1. Switch on the terminal.
2. Open the job computer application.
3. On the work screen, press:



⇒ The "EDS / Settings" screen appears. In this screen most settings are made.



4.1.2 Start screen of the EDS application



Start screen of the EDS application

①	Number of EDS modules on the left resp. right side of the boom. The system determines the numbers during the address allocation.
②	Sum of the nozzles.
③	Sum of the nozzle holders.
④	Number of nozzle holders on each EDS module.

Function icon	Meaning
	Starts the address allocation.
	Opens the "EDS Parameter" screen.
	Enables manual switching of nozzles

Function icon	Meaning
	Indicates the EDS modules on which errors were detected [→ 20].
	Open the diagnostic screen of the EDS modules [→ 20].

4.1.3

Allocating the addresses for the EDS modules

For the sprayer job computer to be able to properly switch the pneumatic valves, every EDS module must have a clear address.

You must allocate the addresses in the following cases:

- With the first configuration
- When replacing an EDS module

Procedure

To allocate the addresses for the EDS modules:

- ☒ You have properly connected all of the components.

1. Open the start screen of the "EDS" application.



2. - Start the address allocation.

⇒ The individual EDS modules are counted during the address allocation.

⇒ The EDS modules on the left side of the boom are counted first, then the EDS modules on the right side of the boom.

⇒ The address allocation is finished if there is no error message after it.

4.1.4

Testing the configuration - "Demo" function

Once you have allocated the addresses for the EDS modules, you can test whether all of the nozzles are switched properly and in the correct sequence.

You can test the nozzles automatically or manually.

Procedure

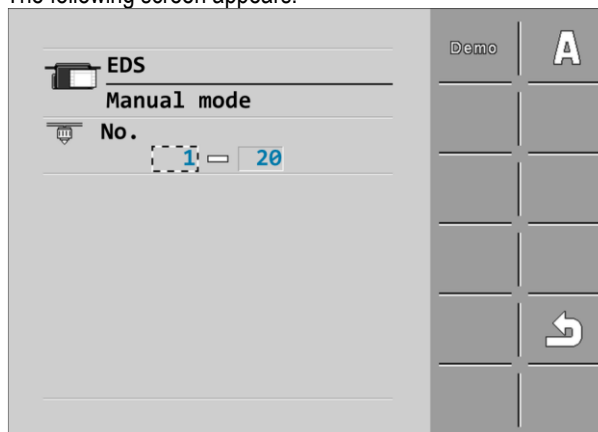
This is how to test the nozzles automatically:


1. Open the start screen of the "EDS" application.



2. - Open the "EDS / Manual mode" screen.

⇒ The following screen appears:



3.  - Activate the demo function.
⇒ The nozzles will be opened successively from left to right.
4. Check if the nozzles are opened in the correct sequence. If not, it is possible that valves were connected rotated.
5. Or: Use A, B, C, D to switch the desired pneumatic valves.



4.1.5

Configuring the power supply of the EDS modules

If there are problems with the power supply, you can set the voltage with which the valves of the EDS modules are switched and operated.

The following parameters are used for this purpose:

- "Switch-on Voltage" (German: Einschaltspannung)
The valves in each EDS module is switched on with this voltage. The optimal value is 9V.
- "Hold-on Voltage" (German: Haltespannung)
After the switch-on time has expired, the valves will be supplied with this voltage.
- "Switch-on Time" (German: Einschaltdauer)
After this time following switching, the voltage changes from the "Switch-on Voltage" to the "Hold-on Voltage".
- "Group Delay" (German: Gruppenverzögerung)
This parameter describes the delay with which the valves are successively switched.
 - As a standard 0
 - If the modules do not switch on reliably, you can increase this value to 10 or 20ms.
 - Booms with 72 modules (36m working width) require 20ms group delay.

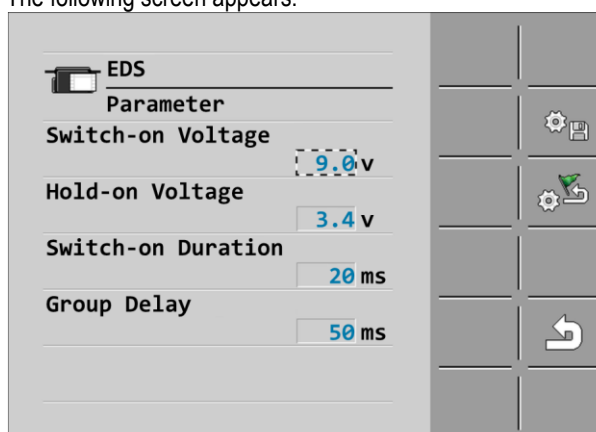
Function icon	Meaning
	Saves the settings.
	Loads the factory default settings.

Procedure

1. Open the job computer application.
2. On the work screen, press:



⇒ The following screen appears:



3. Set the parameters.



4. - Optionally restore the standard values.



5. - Transmit the settings to the EDS modules.

⇒ The following message appears: **"The parameters have been transmitted to the modules."**

6. Confirm the alarm message.

⇒ You have configured the power supply of the EDS modules.

4.2

Configuring SECTION-Control for EDS

Configure the following parameter in the SECTION-Control application:

- **"Overlapping nozzles (EDS)"**

Activate parameter.

A description of this parameter can be found in the TRACK-Leader operating instructions.

Configure the following parameters in the geometry of the job computer application:

- **"Delay on start" and "Delay on stop"**

Because the field sprayer does not have any section valves and the nozzles cannot be directly controlled, the standard value is not current.

Procedure

1. On the work screen, press:



2. The **"SECTION-Control"** screen appears:

3. Enter the determined delay times under **"Delay on start"** and **"Delay on stop"**.

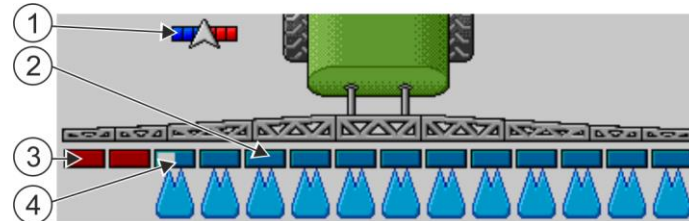
A description of this parameter can be found in the job computer operating instructions.

5 Operating the single nozzle switching

As soon as the EDS system is installed and configured, the work screen of the sprayer job computer application changes.

Nothing changes with the operation of the field sprayer.

On the following diagram, you can see how the single nozzle switching is shown on the work screen:



Representation of the switched EDS modules in the sprayer job computer application

①	Activated SECTION-Control	③	Switched-off nozzles These nozzles are not applying.
②	Switched-on nozzles These nozzles are applying.	④	Sections that are switched on and sections where at least one nozzle is switched on.



6 Troubleshooting

The communication module can check the status of the EDS modules and make it easier to diagnose errors.

You can perform the following actions to search for errors:

- View system detected errors
- View different information about individual EDS modules

Controls

Function icon	Meaning
	Indicates the EDS modules on which errors were detected [→ 20].
	Open the diagnostic screen of the EDS modules [→ 20].

6.1


Search for faulty EDS modules

Procedure


To search for faulty EDS modules.

1. Open the start screen of the "EDS" application.



2.  - Open the error display screen.
⇒ You see which modules have reported which errors.



3.  - Optionally delete the displayed error list.

See also: Alarm messages [→ 21]

6.2


Using the diagnostic function of the EDS modules

You can use a diagnostic function for the individual EDS modules.

Procedure

1. Open the start screen of the "EDS" application.



2.  - Open the diagnostic screen.
⇒ The "EDS / Diagnostics" screen appears.

3. Use the parameter "No." to select for which EDS module you want to see the diagnostic values.

⇒ The diagnostic values for the selected module are shown.

The following diagnostic values are available

- **"Voltage Electronic (VE)"**
The currently measured voltage.
- **"Voltage Power (VL)"**
The currently measured voltage.
- **"Outputs"**
Is the respective output is switched on or off.
- **"Software version"**
The current software version on the EDS modules.

6.3

After a modul change

After replacing an EDS module, reallocate the addresses for the EDS modules. [→ 16]

6.4

Alarm messages

Possible alarm messages

Alarm text	Possible cause	Remedial measure
Configuration error! The detected number of nozzles is different than the number of nozzles configured in the sprayer job computer.	The number of nozzles that was determined by the communication module during the allocation of the addresses is different from the number of nozzles saved in the sprayer job computer. Cause 1: Not all of the EDS modules were reached during the address allocation Cause 2: The configuration of the sprayer job computer using the configurator does not correspond to the design of the field sprayer.	1. Check if all of the EDS modules can be reached. 2. Check the configuration of this job computer.
Nozzle holder error	Faulty EDS module detected. See section: Search for faulty EDS modules [→ 20]	
Defect Output x.	Short circuit, e.g. by defective solenoid valves.	Check the EDS modules for damage.
Voltage is too low.	The cables are too long.	Check the wiring.
Connection lost.	The module does not answer anymore.	Check the wiring. Check if all termination plugs are mounted correctly.
Faulty configuration or not enough EDS modules connected.	The configuration does not match the number of mounted EDS modules.	Check the configuration or the number of the EDS modules.

7 Technical specifications

7.1 Cable harness pin assignment

EDS module cable pin assignment

Pin	Signal	Pin	Signal	Pin	Signal
1	12 VL	5	Address allocation	8	0 VL
2	0 VL	6	0 VE	9	12 VL
3	CAN_H EDS-BUS	7	12 VE	10	0 VL
4	CAN_L EDS-BUS				

Communication module pin assignment

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1		5	0 VL	9		13	12 VL
2	CAN_L	6	0 VL	10	CAN_H	14	12 VL
3	CAN_0 V	7	0 VL	11	CAN_EN	15	12 VL
4	0 VE	8	0 VL	12	12 VE	16	12 VL

Legend:

- VL – Power voltage. Voltage for supplying the actuators.
- VE – Electronics voltage. Voltage for supplying the electronics.

7.2 Technical characteristics of the EDS modules

Technical characteristics of the EDS modules

Power supply	12 V DC
Current consumption 12 VE	ca. 22 mA
Current consumption 12 VL	ca. 16µA in standby mode
Current consumption 12 VL	ca. 3.3 mA during operation
Operating temperature	-5°C - +50°C
Protection class	IP69K (after installation)
Compressed air quality	According to ISO8573-1, Class 7 + 4, filtered at 40 µm, free of aggressive constituents
Operating pressure	Operational at 3 – 10 bar Optimal 5 - 8 bar

Compressed air temperature	-5°C - +50°C
Miscellaneous	The pneumatic system must include a central pressure regulator with filter and a water separator. The set pressure must be adjusted to 5 bar.

To save power, the EDS modules are operated in PWM mode 20ms after being switched on.

8 Spare parts

Pneumatic EDS Modules

Item number	Item name	Characteristics
3030308303	ME_AR EDS module 4-fold 6mm air single	For single nozzle holders
3030308304	ME_AR EDS module 4-fold 6mm air double	For double nozzle holders
3030308305	ME_AR EDS module 4-fold 6mm air quadruple	For quadruple nozzle holders

Communication module

Item number	Item name	Characteristics
3030308530	ME_RE job computer ISO communication module EDS for MAXI 3.0	

Cable harness to connect the job computer to the communication module

Item number	Item name	Characteristics
30322355	ME_KAB connection cable for job computer 0.30m	0.3 m
30322359	ME_KAB connection cable for job computer 1.50m	1.5 m
30322358	ME_KAB connection cable for job computer 3.20m	3.2 m
30322357	ME_KAB connection cable for job computer 6.50m	6.5 m
30322356	ME_KAB connection cable for job computer 10m	10 m

Extension cable for the EDS modules

Item number	Item name	Comment
3030308320	ME_KAB EDS module extension cable	0.85m
3030308321	ME_KAB EDS module extension cable	1.35m
3030308322	ME_KAB EDS module extension cable	2.35m

Cable for the power supply for systems with more than 72 EDS modules

Item number	Item name	Comment
3030308340	ME_KAB battery connector power	8m
3030308341	ME_KAB EDS additional power supply	37m

Others

Item number	Item name	Comment
3130308300	Universal bracket to attach an EDS module	2 pieces + 4 washers, 4 self-locking nuts M5
3130308311	ME_ST CAN terminator plug 120Ohm, 10-pin. AMP connector	