Die spraying device

DAG 1000 MCT
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11. Disposal
Safety instructions
WARNING

Operating die spraying devices and their accessories may only be performed by professionals who have been familiarized with the dangers arising from:

- the sprayer
- the equipment functionally connected to the sprayer
- the control unit provided for the sprayer
- proper usage

Professionals are persons who are:
a) authorized to perform the necessary activities
b) aware of the possible dangers and can avoid them.
c) have been trained and instructed on the use of the equipment and have knowledge of the applicable standards, regulations, accident prevention regulations and operating conditions.

BEFORE STARTING THE MACHINE READ THE OPERATING MANUAL !!!

These safety instructions have no claim to completeness. Should you have any queries or should problems arise, please contact Acheson Industries.

Specifications subject to change.

Product monitoring

We want to offer you safe, state-of-the-art products not only today, but also in the future. Please inform us immediately in case of:

- faults in the safety equipment,
- faults in machine operation,
- changed setting values,
- problems working with the machine,
- accidents or near accidents.
Safety Instructions

Proper use
Operation security of the supplied machine can only guaranteed if it is used properly in conformity with the defined application field. The operating conditions and the corresponding maximum values are contained in the technical data sheet and must be observed under all circumstances.

Proper use means
that the die spray system is used with the process lubricant for the cyclical treatment of die surfaces on metal forming machines, using compressed air
- for atomizing the process lubricant
- and for blowing off moisture and production residues out of die engravings.

Atomizing of liquids which contains mineral oil should only be undertaken after consultation with Acheson Industries.

By adequate construction the machine can be used as combined spraying and extractor device.

The moving components are only to be operated in a suitable, bordered working area with the protective equipment of the production machine. Regular integration in the production process is the responsibility of the owner.

Operators of the machines should:
- observe all instructions from the operating manual
- adhere to the inspection and maintenance work schedules.

Operators of the machines should NOT:
- operate the machine
  - in a defective state,
  - without protective shielding
- make unauthorized modifications to the machine,

Checking EMERGENCY-OFF devices and safety equipment
Check every day all
- EMERGENCY-OFF devices
- safety equipment

Unauthorized modification and spare parts
- Modifications or changes to the machine should only be made following written agreement with Acheson.
- Use only genuine spare parts and accessories authorized by the manufacturer.
Special owner obligations

- Each operating company must write operating rules in which the following is specified
  - organizational measures
  - traffic safety etc.
- Should the machine be operated by workers, who are unable to completely understand the safety instructions described in the operating manual, they must be instructed accordingly. The operating company bears the full responsibility for this.

Staff qualification

- Only trained and instructed personnel may work with the machine. The training courses should be repeated regularly.
- The responsibilities of the personnel must be clearly defined for operation, setting and maintenance.
- Operators must be at least 18 years of age.
- Personnel to be trained should only work with the machine under the supervision of an experienced person.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Persons</th>
<th>Instructed persons</th>
<th>Persons with technical qualification</th>
<th>Persons with electrotechnical qualification</th>
<th>Supervisor with corresponding competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble shooting</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble shooting</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mechanical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble shooting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>electrical</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Setting, Tooling</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Maintenance</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Repair</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Disposal</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Special safety instructions

Symbols on machine
Observe all
- safety instructions
- rotating direction arrows
- connection markings

located directly on the machine and keep these symbols in legible condition.

Safety equipment
- Never tamper with
  - the EMERGENCY-OFF devices
  - any other safety equipment

Always keep the access to and view of the EMERGENCY-OFF buttons clear.

If the EMERGENCY-OFF is actuated, the system is shut down. In the process the machine drive motor is switched off and the machine stops in its current position.
The EMERGENCY-OFF button puts the machine in a safe state.

Safety zones on machine
With regard to safe positions on the system, take into consideration that the respective combination with the production machine is relevant. Observe strictly all instructions relating to the safety equipment and work stations specified for the production machine.

Air supply
Do not use compressed air (for control air) which contains chemicals, synthetic oils with organic solvents, salts or caustic gases. This may cause damages or malfunctions.

Compressed air quality classes ISO 8573-1 for the spray equipment:

<table>
<thead>
<tr>
<th>Particle size</th>
<th>Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water (in the air)</td>
<td>Class 4</td>
</tr>
<tr>
<td>Oil (in the air)</td>
<td>Class 2</td>
</tr>
</tbody>
</table>

The filter has to be exchanged all 6 month.
Special dangers on machine

Robots
- The safety instructions of the robot manufacturer have to be considered.

Electrics
- Only have work on the electrical supply carried out by an electrician.
- Inspect the electrical equipment of the machine regularly. Eliminate loose connections and singed or damaged cables immediately.
- The switchgear cabinet must always be kept closed. Access is only permitted to authorized personnel who can use a key or tool.

Mechanics
- Do not perform any work below the useful load range of the vertical motion axes to prevent any danger resulting from the relative position of these axes (do not stand below suspended loads).

Pneumatics
- Exceeding the operating pressure specified in the technical data endangers the safety of the operating personnel and of persons who move within the area around the machine.
- The main line must be blocked and secured before performing any operation in the pneumatic system so that the lube and compressed air lines are completely depressurized by venting.

Noise
- The sound level resulting from spraying and blowing out cannot be influenced by the spraying device itself. It has been minimized by using tested outlet nozzles. Observe the local statutory noise protection regulations during operation (ear protection).

Vapours and smoke
- Only operate the spraying device using suitable measures which ensure that any negative impacts resulting from lube vapor are prevented in compliance with regional statutory regulations.

Harmful liquids
- There is danger of slipping if liquids escape uncontrolled.
- Catch the liquids in pans which comply with the current local regulations.
- Dispose of the liquids properly.
- Release-agent supply and processing systems connected to drinking water supply must be designed in accordance with the valid waste-water regulations.
Safety instructions

Thermal
- Electric motors, in particular motors on high-dynamic spraying devices, can reach operating temperatures of > 100°C. Do not touch the spraying devices, otherwise burns may result.

Ergonomics
- All maintenance and repair work on spraying devices mounted next to or on production machines may only be performed by observing the prevailing regional accident prevention regulations and using suitable auxiliary and safety devices.

Protection suits
- Safety regulations relating to protective goggles, protective gloves, protective clothing and protection measures on hazardous production equipment must be strictly observed. Setup work on spraying components within the die area must be performed using the greatest possible safety measures.
Technical data sheet
1. General datas

<table>
<thead>
<tr>
<th>Customer:</th>
<th>ACCUS / Chrysler Kokomo (GETRAG)</th>
<th>Com.-No.:</th>
<th>SO 84853</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Order date:</td>
<td>31.07.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shipping date:</td>
<td>23.10.2008</td>
</tr>
<tr>
<td>Located in:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliverer:</td>
<td>ACHESON Industries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lerchenbergstr. 23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>89160 Dornstadt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tel.: 0049-7348 / 2001-0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Specific equipment datas:

<table>
<thead>
<tr>
<th>Equipment type:</th>
<th>DAG 1000 MCT-3-b Teleskop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting area:</td>
<td>opposite operator side</td>
</tr>
<tr>
<td>Equipment No.:</td>
<td>SO84853</td>
</tr>
<tr>
<td>Pneumatic diagram:</td>
<td>PSK S-10200</td>
</tr>
<tr>
<td>Electric diagram:</td>
<td>SO84853_KOKOMO GB</td>
</tr>
<tr>
<td>Software version:</td>
<td>SERVO S7</td>
</tr>
<tr>
<td>Machine data</td>
<td></td>
</tr>
</tbody>
</table>
Die Lubrication System
DAG 1000 MCT

Transport, installation and linking
Transport, installation and linking

Incoming inspection

- Check spray system for transport damage
- Report any damage to freight insurance

Removing the preservation agents

- Remove any preservation agents, in particular on guideways
  (use a cleaning cloth impregnated with kerosene or preservation agent remover)

Transporting the system parts to the machine

For transport use the suspension points indicated in transport scheme (page 4)

**CAUTION**

- Avoid crushing cables and hoses
- Insert padding at pressure points between ropes and equipment

Mechanical installation

Normal case:
- Mount spraying system on fixed die clamping plate of DCM
- Install on operator side or opposite operator side depending on version

Special case:
- Mount spraying system on separate stand

- Drill fixing holes on fixed clamping plate as illustrated in enclosed drilling template
  (not necessary if holes are already provided by DCM manufacturer)
- Mount spraying system so that advancing and retracting the die halves is possible with sufficient safety.
Connecting the pneumatic system

- Install the supplied maintenance unit so that it is easily accessible and near to the spraying device (the required connection dimensions are contained in the technical data sheet and the pneumatic diagram)

**CAUTION**

The minimum requirements for proper operation of the maintenance unit are a compressed air network which provides a minimum pressure of 6 bar during the operating phase of the spraying system (spraying - blowing - travel movements).

- Route the hose and pipe connections between the individual groups (spray system - conditioning unit - lubricant supply system) as described in the connection drawing in the pneumatic diagram

**CAUTION**

Avoid any dirt deposits in the hoses and pipelines (these deposits can lead to operating faults)

Electrical connection

- Hook up the electrical connections between the control unit of the DCM and the control of the spraying system as described in the linking diagram.

- Install the control cabinet so that the entire production process can be observed from the operating panel. For controls with a separate operating stand, the operating stand must be installed near the operating part of the DCM with a view of the production process.

**CAUTION**

- Carry out all links very carefully
- A supply voltage as specified on the type plate at the control cabinet is imperative required for the electrical connection.
If values deviate before commissioning, please contact the electrical department of Acheson.
Transport, installation and linking

Vertikaleinheit

Horizontaleinheit

Schaltschrank
Transport, installation and linking

Combination of Acheson Components

Legend

1. Control
2. Spray System
3. Conditioning unit
4. Operating panel
5. Lubricant feed system
**Transport, installation and linking**

**electrical connections**

<table>
<thead>
<tr>
<th>number</th>
<th>from - to</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>control - DMC</td>
</tr>
<tr>
<td>W2</td>
<td>control - spray system</td>
</tr>
<tr>
<td>W3</td>
<td>control - conditioning unit</td>
</tr>
<tr>
<td>W4</td>
<td>control - operating panel</td>
</tr>
<tr>
<td>W5</td>
<td>control - lubricant feed system</td>
</tr>
</tbody>
</table>

**hose connections**

<table>
<thead>
<tr>
<th>from - to</th>
<th>medium</th>
<th>nominal diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCT 1</td>
<td>MCT 2</td>
</tr>
<tr>
<td>H1 main energy connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of conditioning unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>air lubricant water</td>
<td>R 1/2&quot; ø42</td>
<td>R 1/2&quot; ø42</td>
</tr>
<tr>
<td>R 1/2&quot; ø15 (2x)</td>
<td>R 3/4&quot; ø22 (2x)</td>
<td>R 3/4&quot; ø22 (4x)</td>
</tr>
<tr>
<td>R 1/2&quot; ø15</td>
<td>R 3/4&quot; ø22 (2x)</td>
<td>R 3/4&quot; ø22 (4x)</td>
</tr>
<tr>
<td>H2 conditioning unit spray system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>air lubricant cent greasing</td>
<td>R 1/2&quot; ø42</td>
<td>R 1/2&quot; ø42</td>
</tr>
<tr>
<td>R 1/2&quot; ø15 (2x)</td>
<td>R 3/4&quot; ø22 (2x)</td>
<td>R 3/4&quot; ø22 (4x)</td>
</tr>
<tr>
<td>R 1/2&quot; ø15</td>
<td>R 3/4&quot; ø22 (2x)</td>
<td>R 3/4&quot; ø22 (4x)</td>
</tr>
<tr>
<td>H3 lubricant feed system conditioning unit</td>
<td>lubricant (outlet)</td>
<td>R 1/2&quot; ø15 (2x)</td>
</tr>
<tr>
<td>spray piston (outlet)</td>
<td>R 1/2&quot; ø15 (2x)</td>
<td>R 1/2&quot; ø15 (1x)</td>
</tr>
<tr>
<td>R 1/2&quot; ø15</td>
<td>R 1/2&quot; ø15 (2x)</td>
<td>R 1/2&quot; ø15 (1x)</td>
</tr>
<tr>
<td>R 1/2&quot; ø6</td>
<td>R 1/2&quot; ø6</td>
<td>R 1/2&quot; ø6</td>
</tr>
<tr>
<td>H4 main energy connections</td>
<td>water lubricant</td>
<td>R 1/2&quot; ø15</td>
</tr>
<tr>
<td>of lubricant feed system</td>
<td>R 1/2&quot; ø15</td>
<td>R 1/2&quot; ø15</td>
</tr>
</tbody>
</table>
DAG 1000 FCT

Hardware interface

BL-Servo
FCT-Servo ab Version S4.1
MCT-Servo
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9. SIGNALS FROM LUBRICANT SUPPLY SYSTEM 8
1. General Information

Following interface description refers to spray unit DAG 1000 FCT with BL_Servo, FCT-Servo from version 4.1 and MCT-Servo based on Simatic S7 3xx control.

This description takes validity from hardware version BL_x, 54.x and M1.x on.

The behaviour of the signals can be adapted to the DCM conditions by setting options. Options are listed in the user's manual of the spray unit.

**ATTENTION!**

Options which are set incorrectly can cause damages to the machine and injuries to the operating persons!

Wrong connections of the interface as well as bridging of signals may lead to damages to the machine and to the operating persons!

2. Interface realisation

The interface for non-safety-related signals can be carried out in serial coupling via ProfiBus or in parallel by wiring.

2.0 Safety signals

Safety signals are being lead by plugs XS91.1 and XS91.2 independent of the realisation of the control signals.

2.1 parallel version

All signals coming from and going to the spray unit are potential related and guided via cable. The connection in the cabinet of the spray unit is made by using connecting terminals.

The terminal strip for the interface signals is marked with the designation X91. The signals are identified by the designation 91 xxx.

Signals from spray unit to DCM control are transmitted by semiconductor outputs or switches. Maximum charge of the contacts is 24V/0.25A.

Signals from DCM control to spray unit can be switched by potential-free contacts or semiconductors. Contacts or semiconductors must be designed for 24V/0.1A charge.

2.2 Profibus version

Please see separate file „Profibus interface“ for details.

Signals have to be confirmed according to this file or need to be defined with the order. Profile „Profibus DP“ is used for the coupling.
3. Emergency stop circuit and signals of the limit switches

3.1 Emergency stop signals

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XS91.1.3</td>
<td>to DCM</td>
<td>Contact of the emergency push-button on the spray unit.</td>
</tr>
<tr>
<td>XS91.1.4</td>
<td>EMERGENCY STOP ACHESON channel 1</td>
<td>The signal status is independent whether the control of the spray unit is switched on or off.</td>
</tr>
<tr>
<td>XS91.1.5</td>
<td>to DCM</td>
<td>Contact of the emergency push-button on the spray unit.</td>
</tr>
<tr>
<td>XS91.1.6</td>
<td>EMERGENCY STOP ACHESON channel 2</td>
<td>The signal status is independent whether the control of the spray unit is switched on or off.</td>
</tr>
<tr>
<td>XS91.2.2</td>
<td>from DCM</td>
<td>24V from the emergency stop combination located in the control cabinet of the spray unit.</td>
</tr>
<tr>
<td>XS91.2.3</td>
<td>EMERGENCY STOP CIRCUIT DCM O.K. channel 1</td>
<td>In the die casting machine, this signal is switched by a contact which opens in emergency stop condition.</td>
</tr>
<tr>
<td>XS91.2.4</td>
<td>from DCM</td>
<td>24V from the emergency stop combination located in the control cabinet of the spray unit.</td>
</tr>
<tr>
<td>XS91.2.5</td>
<td>EMERGENCY STOP CIRCUIT DCM O.K. channel 2</td>
<td>In the die casting machine, this signal is switched by a contact which opens in emergency stop condition.</td>
</tr>
<tr>
<td>XS91.1.8</td>
<td>to DCM</td>
<td>Feedback signal for emergency stop.</td>
</tr>
<tr>
<td>XS91.1.9</td>
<td>EMERGENCY STOP FEEDBACK</td>
<td></td>
</tr>
</tbody>
</table>

3.1 Protection door

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XS91.2.6</td>
<td>from DCM</td>
<td>In automatic mode, the sprayer can only move if this contact is closed.</td>
</tr>
<tr>
<td>XS91.2.7</td>
<td>DOOR CLOSED Channel 1</td>
<td>In manual mode this signal can be bridged by means of the enabling device.</td>
</tr>
<tr>
<td>XS91.2.8</td>
<td>an DGM</td>
<td>In automatic mode, the sprayer can only move if this contact is closed.</td>
</tr>
<tr>
<td>XS91.2.9</td>
<td>PROTECTION DOOR CLOSED Channel 2</td>
<td>In manual mode this signal can be bridged by means of the enabling device.</td>
</tr>
</tbody>
</table>
3.3 Signals of the limit switches

These limit switches are not available with bei BL und MCT!

<table>
<thead>
<tr>
<th>Signal</th>
<th>Naming</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XS91.1:9</td>
<td>to DCM</td>
<td>Contact of the limit switch for home position of the horizontal axis. The signal is generated by a cam with about 50 mm length. The signal status is independent whether the control of the spray unit is switched on or off.</td>
</tr>
<tr>
<td>XS91.1:10</td>
<td>AXIS Y RETRACTED</td>
<td></td>
</tr>
<tr>
<td>XS91.1:11</td>
<td>to DCM</td>
<td>Contact of the limit switch for home position of the vertical axis. The signal is generated by a cam with about 50 mm length. The signal status is independent whether the control of the spray unit is switched on or off.</td>
</tr>
<tr>
<td>XS91.1:12</td>
<td>AXIS Z RETRACTED</td>
<td></td>
</tr>
</tbody>
</table>
## 4. Signals from Sprayer to DCM control

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XS91.1:1</td>
<td>24V</td>
<td>voltage from DCM</td>
</tr>
<tr>
<td>XS91.1:2</td>
<td>0V</td>
<td>voltage from DCM</td>
</tr>
</tbody>
</table>
| X91.91312| Disturbance spray unit | Signal is active in automatic mode if a fault is announced. Faults get issued with:  
- internal „fault“  
and  
- Timeout spray cycle (1 min)  
or  
- Y- and Z-axis Home (internal Signal) |
| X91.91317| Release DCM | Signal shows the end of the spray program. The signal is issued after the first cycle in automatic mode when „Home“ is reached.  
The signal is set until a new start signal is given to the sprayer (signal 91417) or if the „Home“ position of the sprayer is left. If a fault is issued (internal signal) the signal isn't active.  
The signal can be set with programmable output 0, however it is issued to DCM not until Z-axis reaches „Home“ position.  
Options: With option „signal 91317 before first cycle“ the signal is issued when switch over to automatic mode. |
| X91.91322| Home Y-Axis | Home position of Y-axis (horizontal axis)  
Conditions:  
- Actual value of Y-axis must be „0“.  
If FCT Servo: Limit switch 22S10 must be active.  
or  
- Zero setting Z-axis reached (91323)  
and  
- Allocation „Release DCM“ in spray program active |
| X91.91323| Home Z-Axis | Home position of Z-axis (vertical axis)  
Conditions:  
- Actual value of Z-axis must be „0“.  
If FCT Servo: Limit switch 23S10 must be active. |
5. Signals from DCM to sprayer

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X91:91400</td>
<td>24V Sprayer</td>
<td>24 voltage from sprayer</td>
</tr>
<tr>
<td>X91:91414</td>
<td>Automatic</td>
<td>With signal „high“, automatic mode is selected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Conditions for automatic mode:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lamp HOME is lighting</td>
</tr>
<tr>
<td>X91:91415</td>
<td>Manual</td>
<td>Release of manual functions via panel. If 91414 is on „0“ manual functions are released as well.</td>
</tr>
<tr>
<td>X91:91416</td>
<td>DCM open</td>
<td>With signal „high“ all activities for sprayer are released in hand and automatic mode. When signal changes to „low level“ in automatic mode, the sprayer stops. If signal changes to „high level“ again, the sprayer goes on.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>In the following situation the level of the signal isn’t analysed:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- With output 0 set, when Home Z is reached</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the activity of Y-axis is released</td>
</tr>
<tr>
<td>X91:91417</td>
<td>Start Spray unit</td>
<td>Start signal for sprayer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The signal must be dynamic</td>
</tr>
<tr>
<td>X91:91418</td>
<td>2. Start</td>
<td>Signal is analysed on rising edge. This is carried out as fix programming in the PLC. With option „enable movement without 2.start“ analysis can be shifted to user’s program. Wait E0 has to be programmed in there. Signal remains stored until HOME is reached again. If static analysis is desired, set option „91418 static“.</td>
</tr>
<tr>
<td>X91:91421</td>
<td>Home driving</td>
<td>Signal for driving back the sprayer to it’s HOME position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It works in dead man function.</td>
</tr>
<tr>
<td>X91:91422</td>
<td>Test run</td>
<td>Signal for testing the program in manual mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It works in dead man function.</td>
</tr>
<tr>
<td>X91:91423</td>
<td>Disturbance</td>
<td>Signal for quitting actual faults.</td>
</tr>
<tr>
<td></td>
<td>acknowledge</td>
<td></td>
</tr>
</tbody>
</table>
6. Programmable Outputs

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X91.91331</td>
<td>Progr. Output 1</td>
<td>Programmable Output. Programmable outputs are set to 0 at the end of the spray program.</td>
</tr>
<tr>
<td>X91.91332</td>
<td>Progr. Output 2</td>
<td>Programmable output 2</td>
</tr>
<tr>
<td>X91.91333</td>
<td>Progr. Output 3</td>
<td>Programmable output 3</td>
</tr>
<tr>
<td>X91.91334</td>
<td>Progr. Output 4</td>
<td>Programmable output 4</td>
</tr>
<tr>
<td>X91.91335</td>
<td>Progr. Output 5</td>
<td>Programmable output 5 - not with BL-Servo</td>
</tr>
<tr>
<td>X91.91336</td>
<td>Progr. Output 6</td>
<td>Programmable output 6 - not with BL-Servo</td>
</tr>
<tr>
<td>X91.91337</td>
<td>Progr. Output 7</td>
<td>Programmable output 7 - not with BL-Servo</td>
</tr>
<tr>
<td>X91.91338</td>
<td>Progr. Output 8</td>
<td>Programmable output 8 - not with BL-Servo</td>
</tr>
</tbody>
</table>

7. Programmable Inputs

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>91431</td>
<td>Progr. Input 1</td>
<td>Programmable Input 1</td>
</tr>
<tr>
<td>91432</td>
<td>Progr. Input 2</td>
<td>Programmable Input 2</td>
</tr>
<tr>
<td>91433</td>
<td>Progr. Input 3</td>
<td>Programmable Input 3</td>
</tr>
<tr>
<td>91434</td>
<td>Progr. Input 4</td>
<td>Programmable Input 4</td>
</tr>
<tr>
<td>91435</td>
<td>Progr. Input 5</td>
<td>Programmable Input 5 - not with BL-Servo</td>
</tr>
<tr>
<td>91436</td>
<td>Progr. Input 6</td>
<td>Programmable Input 6 - not with BL-Servo</td>
</tr>
<tr>
<td>91437</td>
<td>Progr. Input 7</td>
<td>Programmable Input 7 - not with BL-Servo</td>
</tr>
<tr>
<td>91438</td>
<td>Progr. Input 8</td>
<td>Programmable Input 8 - not with BL-Servo</td>
</tr>
</tbody>
</table>

8. Signals to Lubricant supply system

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X91.93400</td>
<td>Pump lubricant supply</td>
<td>Potential free contact. Signal switches as soon as Z-axis leaves HOME position.</td>
</tr>
<tr>
<td>X91.93417</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Signals from Lubricant supply system

<table>
<thead>
<tr>
<th>Signal</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X91.93310</td>
<td>Ready for operation</td>
<td>Signal must be active in automatic mode.</td>
</tr>
<tr>
<td>X91.93311</td>
<td>Message Open Tank</td>
<td>General message from lubricant supply system.</td>
</tr>
</tbody>
</table>
Die spraying device

DAG 1000 FCT / BLS / MCT

Startup, spraying technology, functional description
## Contents

1. Preliminary conditions 2

2. Startup procedure 3

3. Spraying technology 4
   3.1 Principles of spraying technology 4
   3.2 Preliminary physical requirements 5
   3.3 Design of a spraying tool 6

4. Functional description of system 7
   4.1 Vertical unit 7
   4.2 Axial unit 7
1. **Preliminary conditions**

- Study all the sections in the documentation carefully.
- Were all preservation agents removed?
- Was the spraying system properly mounted on the DCM?
- Are all the spraying system connections properly connected (lube connection, compressed air network, electrical connection)?
- Were the electrical and pneumatic lines installed to ensure trouble-free operation?
- Were the electrical links to the DCM made and checked based on the valid linking diagram?
- Was the electrical voltage supply checked?
- Was the direction of rotation of the motors checked?
- Was the conditioning unit filled with the prescribed oil?
- Was the central greasing system filled and checked?

**WARNING**

Only perform startup, if all the preliminary conditions listed above were observed.

**WARNING:**

Don't use spray-nozzle with mineral oil containing lubricant and cleaner !!!
2. **Startup procedure**

- Set the compressed air pressure to the values specified in the technical data sheet.
- Switch the system on by the main switch.
- Check the electrical interlocks (chapter 9)

**WARNING**

Only advance the sprayer between the die halves of the DCM after you obtain the electrical message "Open die"!

When you perform an interlock test, the DCM and spraying system controls must be set so that no damage can occur to the system in the event of a fault!

- Check the interlocks in manual mode
- Check the interlocks and links in all operating modes
- Enter a spraying program
- Run the program in manual mode: Single step
- Run the program in test mode (one cycle automatically performed)
3. **Spraying technology**

3.1 **Principles of spraying technology**

In order to meet the required quality demands for castings, disturbances in the production process should be avoided as far as possible. This requires a continuous casting process and process parameters must be constant.

One of the main parameters is automatic die spraying performing:

- a constantly good quality
- a reduction of the reject rate
- increasing of production output per unit of time

Automatic die spraying systems are mainly used to apply lubricant films on the die surface. Another function is partly the short-term cooling of the die surface.

**ATTENTION**

The total heat balance of a tool should be regulated by other suitable measures (temperature conditioning devices).
### Preliminary physical conditions

The lubricant carrier medium, mainly water, must evaporate to permit the formation of a lubrication film on the die surface. Evaporation draws off heat from the die surface, i.e. the die surface temperature drops for a short period of time until the so-called *wetting temperature* is reached. Within this temperature range, the die surface can be wetted with lubricant.

This condition is achieved fastest by atomizing the lubricant with air. Compared with an application by gushing, the efficiency achieved is higher by a factor of 20.

**MAIN INFLUENCING PARAMETERS FOR EFFICIENT SPRAYING ARE:**

- Spray distance, i.e. the distance between the die surface and the spray nozzle
- Spray jet energy, the product of the drop volume and its velocity
- The shape and characteristic of the spray jet itself
- The radiation heat of the die and the vapor pressure acting against the spray jet

For these reasons, the design of the spray tools and the selected application method are vitally important.

In general two atomizing methods are used in die spraying technology. They operate according to the two-component principle, i.e. air and lubricant are routed through a nozzle:

- **the externally mixing two-component nozzle**
  - lubricant and air are mixed outside the actual nozzle
- **the internally mixing two-component nozzle**
  - lubricant and air are mixed inside the nozzle
3.3 **Design of a spray tool**

Firstly, the following parameters define the design and construction of a spray tool:

- the geometry of the die to be lubricated
- the temperature curve within the die
- selection of lubricant
- lubrication requirements on the die surface

In addition, the question relating to the use of one lubricant or possibly a combination of several lubricants will influence the design of the spray tool.

It can be assumed that the use of a universal spray tool for all dies will not increase efficiency. However, for similar dies the use of one spray tool is possible. When shapes are different and the spraying problems are complex, a spray tool designed for the individual range of requirements must be used.

The possibility to "spray" and to "blow" with an advanceable spray system at stillstand and during oscillation movement, the various adjustment possibilities in the control system, the high-performance pneumatic system and the overall stable design of our systems ensure trouble-free operation and are capable of solving complex spraying problems.

**ATTENTION**

It is vital to keep precisely to our operating and maintenance instructions.
Functional description of the system

4.1 Vertical unit

- The DAG 1000 FCT 1 to FCT 3, BLS and MCT 1 to MCT 3 series are driven by three-phase AC gear motors. The motion speed of 0.05 to 1.5 m/sec can be variably regulated by a drive regulator, which is integrated in the control cabinet. The drive unit is arranged on the rear of the vertical unit.
- Folding sheet-metal paneling provides protection against coarse fouling.
- The entire unit is managed by a THK system which meets very high requirements.
- The axial unit is driven by the gear shaft of the gear motor by means of a drive pinion on a gear rack. The end stops are also protected by means of rubber buffers.
- Rubber buffers used as end stops protect the system from damage in the event of a failure.
- Spray air, control air and lubricant are fed through high-quality and long-life hoses which are routed in a metal section fabric.
- The switching valves are mounted in blocks on the vertical unit and are easily accessible. The valves operate with short switching times and are highly rugged.
- Distance is measured by a digital position transducer.
- No complex setting work is required.
- If the system is maintained according to the specifications, it will have a long life.

4.2 Axial unit

- Drive as described in 4.1.
  - Speed control is also identical to 4.1.
- The axial unit is driven by the gear shaft of the gear motor by means of a drive pinion on a gear rack. The end stops are also protected by means of rubber buffers.
- Position measurement is also identical to the vertical unit (as described in 4.1).
- The axial unit guides are identical to those described in 4.1, however, they have a double design. The same also applies to maintenance and the central greasing system.
DAG 1000 MCT Servo
DAG 1000 FCT Servo
BL Servo

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Created 03/03/2006 12:30 PM
Last modification 09/08/2007 5:23 PM
Control cubicle

General information

You find the main switch on the door of the control cubicle. The cubicle houses the drive for the axes, the automation unit and the power supplies. The cubicle is cooled as required by a cooler (see technical data sheet).

Power connection

The power supply connection is made by means of the related terminals in the control cubicle. Please refer to the technical data sheet for the correct connecting values.
Handheld

There are two panels available for the sprayer. They offer the same functions and can be replaced by each other.

- Panel in plastic housing

Touchpanel and enabling device are integrated in the housing. Data exchange can be done by a slot for a CompactFlash card. The handheld can be unplugged by a circular plug. By means of a blind plug the sprayer can be run without handheld. The handheld can be hung up on the door of the cubicle.

- Handheld in tin box (not available for BL Servo)

The handheld consists of a tin box in which a touch panel is built in. A handle with an integrated enabling device is located on the rear side. The handheld is connected by a cable with the control cubicle. It can be disconnected in the control cubicle. With a blind plug the sprayer can be operated without handheld. The handheld can be hung up on the door of the control cubicle.
**Touchpanel**

The touch panel consists of a monochrome display with a touch-sensitive folio. Areas triggering a function are marked with frames or grey-coloured areas. Grey-coloured areas are used for opening or closing windows and confirming data. Areas with a double frame are used as switches for functions and for jogging the axes. Areas with a single frame are used for indications.

If no area is pressed for longer than two minutes the display switches to a standby mode. With a touch somewhere on the display it switches on again.

Example:

![Touchpanel Diagram](image)

**Enabling device**

The enabling device must be pushed halfway in if the sprayer shall be moved with opened safeguarded space. The enabling device works only in manual mode.

The enabling device owns three positions:

- **released:** no enable for movement
- **pushed halfway in:** enable movement
- **pushed in:** no enable for movement
Starting up

The sprayer is switched on with the main switch in the door of the control cubicle. A green LED at the lower left corner of the touch panel indicates power on. After power on the display and the control is checked if no errors have been detected the initial screen will be displayed.

Software versions

On starting up, the software versions of PLC and panel are displayed for some seconds.

Initial screen

You see the name of the actual program and buttons for driving HOME, driving Test and cancelling faults.
After reaching HOME the following screen is displayed:

**HOME**: frame is bright
- Ready for driving HOME: frame is blinking
- Not ready for driving HOME: frame is dark

Driving Test is enabled now

On this screen, TEST is always performed in continuous flow.
In the 1. message box, messages are displayed with a number and a text. The message remains until the cause has been removed and "Q" is pressed. If there is more than one message, a button appears for paging. This box is only shown on the initial screen.

The 2. message box is displayed on each screen. Press "Q" in order to acknowledge the message immediately. Press "?" to see the message text. Press "<" to return to the previous screen.

The 2. message box also shows information messages. Information messages are displayed only as long as the cause is active.
# Information messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDC not open</td>
<td>Signal &quot;PDC open&quot; is missing</td>
</tr>
<tr>
<td>Select manual</td>
<td>PDC is not in manual mode</td>
</tr>
<tr>
<td>Fault</td>
<td>A fault has occurred. The cause is displayed in the initial screen</td>
</tr>
<tr>
<td>Z is at top</td>
<td>The vertical axis can't be moved any more upwards.</td>
</tr>
<tr>
<td>Not with Y=0</td>
<td>The vertical axis can't be moved because the horizontal axis is in HOME.</td>
</tr>
<tr>
<td>Z up !</td>
<td>The vertical axis has to be moved upwards.</td>
</tr>
<tr>
<td>Y min</td>
<td>The horizontal axis can't be moved any more backwards.</td>
</tr>
<tr>
<td>Y max</td>
<td>The horizontal axis can't be moved any more forwards.</td>
</tr>
<tr>
<td>Z max</td>
<td>The vertical axis can't be moved any more downwards.</td>
</tr>
<tr>
<td>Watchdog</td>
<td>Communication timeout between PLC and touchpanel. Check plugs in the housing of the panel and on the PLC. Check cable between control cubicle and touchpanel. Check whether shielding of cable is fixed to the shielding bar in the control cubicle</td>
</tr>
<tr>
<td>Touchpanel</td>
<td></td>
</tr>
<tr>
<td>Protection door ?</td>
<td>Protection door or safety fence is open</td>
</tr>
<tr>
<td>Override=0</td>
<td>As long as the override is set to 0 no more movement of the axis is possible</td>
</tr>
<tr>
<td>Switch off HOME!</td>
<td>Signal HOME is set via interface to DCM. (see interface DCM) It must be switched off, else TEST can not be performed.</td>
</tr>
<tr>
<td>Timeout tank</td>
<td>A timeout has occurred while filling the integrated dilution tank</td>
</tr>
</tbody>
</table>

Only with BL Servo

<p>| Gate?/Em.stop DCM? | Safety fence is open or emergency stop circuit of DCM is cut |</p>
<table>
<thead>
<tr>
<th>Nr</th>
<th>Text</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Motorprotection triggered</td>
<td>Check motor setting values and switch on motor protection.</td>
</tr>
<tr>
<td>02</td>
<td>Emergency stop panel</td>
<td>Unlock emergency stop button on handheld</td>
</tr>
<tr>
<td>03</td>
<td>Fault inverter Y</td>
<td>Check display on inverter and check temperature of motors Main switch off and on again.</td>
</tr>
<tr>
<td>04</td>
<td>Central lubrication empty</td>
<td>Refill with oil or check fill level switch</td>
</tr>
<tr>
<td>05</td>
<td>Warning inverter Z</td>
<td>Check display on inverter</td>
</tr>
<tr>
<td>06</td>
<td>Profibus coupling faulty</td>
<td>The coupling to the DCM via profibus shows an error. Check whether your equipment is able to run a profibus coupling at all. (See options). Check the connectors on the coupler in the cubicle. Check wiring for damages.</td>
</tr>
<tr>
<td>07</td>
<td>Emergency stop PDC</td>
<td>Unlock emergency stop button at PDC</td>
</tr>
<tr>
<td>08</td>
<td>Fault inverter Z</td>
<td>Check display on inverter and check temperature of motors Main switch off and on again.</td>
</tr>
<tr>
<td>09</td>
<td>Max runtime DAG181</td>
<td>The pump for the release agent has been running longer than 15min, without any spray function has been performed. It will be stopped after that. With pressing “Q” it restarts again.</td>
</tr>
<tr>
<td>10</td>
<td>Ext.Prog-no wrong</td>
<td>Demanded program number is wrong. Only valid when option „Profibus Interface“ is set</td>
</tr>
<tr>
<td>11</td>
<td>Encoder Y not synchronised</td>
<td>Main switch off-on. If the fault still comes up again inverter has to be checked with diagnosis tool SIMOCOM U</td>
</tr>
<tr>
<td>12</td>
<td>Fault air pressure</td>
<td>Check air pressure setting ( &gt; 8 bar ) Check pressure switch</td>
</tr>
<tr>
<td>13</td>
<td>Centr lubrication-always pressure</td>
<td>Check pressure switch</td>
</tr>
<tr>
<td>14</td>
<td>Centr lubrication-no pressure</td>
<td>Check pressure switch and electrical wiring</td>
</tr>
<tr>
<td>16</td>
<td>Fault I.switch HOME Y/Encoder</td>
<td>Check limit switches, encoders and wiring</td>
</tr>
<tr>
<td>17</td>
<td>Fault I.switch HOME Z/Encoder</td>
<td>Check limit switches, encoders and wiring</td>
</tr>
<tr>
<td>18</td>
<td>Broken wire encoder Z</td>
<td>Check encoders and wiring</td>
</tr>
<tr>
<td>19</td>
<td>Loading/storing program faulty</td>
<td>A problem has occurred while loading or storing data from/on the memory card in the PLC. Please get in touch with AID.</td>
</tr>
<tr>
<td>20</td>
<td>Warning inverter Y</td>
<td>Check display on inverter</td>
</tr>
<tr>
<td>21</td>
<td>Encoder axis Z not synchronised</td>
<td>Main switch off-on. If the fault still comes up again inverter has to be checked with diagnosis tool SIMOCOM U</td>
</tr>
<tr>
<td>22</td>
<td>Warning! Replace MMC (50000)</td>
<td>The MMC has been written 50000 times. Siemens guarantees amax 100000m cycles. Replacement is required.</td>
</tr>
<tr>
<td>23</td>
<td>Inverter not ready (73.1)</td>
<td>Signal “Ready” (pin 73.1) of the inverter is missing. Check adjustment on 7-A60 (5s). Diagnosis via display on the inverter and LEDs (Modul 11A10)</td>
</tr>
<tr>
<td>Page</td>
<td>Description</td>
<td>Action/Notes</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td>24</td>
<td>Inverter: enable inhibited</td>
<td>Signal &quot;Inverter ready for being switched on&quot; missing. Check terminal 63/633. Further analysis with Simocom U</td>
</tr>
<tr>
<td>26</td>
<td>Not in HOME with automatic start</td>
<td>Drive to Home in manual mode</td>
</tr>
<tr>
<td>29</td>
<td>Die limit Y-</td>
<td>Adjust die limit with command Limit Y- or in menu &quot;Options&quot;</td>
</tr>
<tr>
<td>30</td>
<td>PLC error</td>
<td>Internal fault of PLC. Main switch off-on. Contact AID Service if this does not helps.</td>
</tr>
<tr>
<td>31</td>
<td>Lubricant pressure ?</td>
<td>The pressure switch for lubricant is not switched. (Option)</td>
</tr>
<tr>
<td>33</td>
<td>Z locked, cause Y out of die limit -</td>
<td>Z-axis can't be moved because Y-axis is out of die limits. Modify program or die limit</td>
</tr>
<tr>
<td>34</td>
<td>PDC open missing</td>
<td>Interface signal missing</td>
</tr>
<tr>
<td>35</td>
<td>Die limit Y+</td>
<td>Adjust die limit with command Limit Y+ or in menu &quot;Options&quot;</td>
</tr>
<tr>
<td>36</td>
<td>Brake Z voltage without command</td>
<td>Check electrical components in electrical path</td>
</tr>
<tr>
<td>40</td>
<td>Lube supply not ready</td>
<td>Signal 93310 missing</td>
</tr>
<tr>
<td>41</td>
<td>Fault lube supply</td>
<td>Signal 93311 must be on 0</td>
</tr>
<tr>
<td>42</td>
<td>Ins step &gt;99 impossible</td>
<td>Max. number of steps exceeded</td>
</tr>
<tr>
<td>45</td>
<td>Max stroke Y exceeded</td>
<td>Check parameter &quot;Max. stroke Y&quot;</td>
</tr>
<tr>
<td>46</td>
<td>Max stroke Z exceeded</td>
<td>Check parameter &quot;Max. stroke Z&quot;</td>
</tr>
<tr>
<td>48</td>
<td>Emergency stop PLC</td>
<td>PLC has triggered an internal emergency stop. Probably this is caused by a loss of reference point for Simodrive. Please look whether there are more messages</td>
</tr>
</tbody>
</table>
Choosing the menu

Press to select the menu
Menu

The selection of screens depends on the password level and the template for the menu in „Options“.

Press to open the next menu screen

The access to this menu is locked by a password
Manual functions

Arrangement of spray circuits

Deltacast

The arrangement of the spray circuits is equal to the view on the panel. The numbering of the circuits run top down. The separate blowing is at the top of the tool.

Flextool

The arrangement of the circuits is not inevitable equal to the view on the panel. Due to the possibility of arranging the circuits individually on the tool, the view on the panel is only well-defined if the circuits are arranged as with the DELTACAST tool. The numbering of the circuits on the panel runs from left to right.
Jogging and spraying

- Indicating the state of "enable movement"
- Keys for jogging the axes
- Actual position
- Key for on/off spray function
- Actual pressure (Air / lubricant) if available
- Keys for the spray functions
- Selection spray mode
- Press for adjusting the pressure or changing the spray mode

Pressure control

- Increases the pressure
- Decreases the pressure
- Return to previous screen
- Speed override for jogging

Pulse-spraying: control air valves are pulsed with 0.25 sec
Programming

**Actual program**

Pressing here, a screen opens, on which you can select a step or seek in the program.
Paging and seeking in the program

You can select a step or seek for an address by pressing on the box, entering a number and pressing the button on the right of it.

This button seeks for the end of the program.

These buttons seek for a certain command.
List of commands

Press the key INS to open the list of commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>POS Y/Z</td>
<td>Moving the axis</td>
</tr>
<tr>
<td>SPEED</td>
<td>Setting the speed of the movement</td>
</tr>
<tr>
<td>LimitY-</td>
<td>Die limitation fixed plate</td>
</tr>
<tr>
<td>LimitY+</td>
<td>Die limitation movable plate</td>
</tr>
<tr>
<td>Spray</td>
<td>Spray function</td>
</tr>
<tr>
<td>Blow</td>
<td>Blow function</td>
</tr>
<tr>
<td>Pressure</td>
<td>Pressure adjustment for lube and air (not with BL Servo)</td>
</tr>
<tr>
<td>Time</td>
<td>Delay time</td>
</tr>
<tr>
<td>Wait I</td>
<td>Waiting for an input (level 0 or 1)</td>
</tr>
<tr>
<td>Pulse</td>
<td>Setting an output as a pulse</td>
</tr>
<tr>
<td>Set O</td>
<td>Setting an output</td>
</tr>
<tr>
<td>Reset O</td>
<td>Resetting an output</td>
</tr>
<tr>
<td>Blow Off</td>
<td>Switching off the blow function when driving up the vertical axis</td>
</tr>
</tbody>
</table>
Command POS Y/Z: Moving the axis

Options of the command

Keypad for numeric input

Press here for switching off-on the actual spray function.

Press to confirm data and return to previous screen

Press to switch back from "Teach In" to numeric input

Confirm the Teach-In position

Press to cancel data and return to previous screen

Speed override for jogging axis

Options of the command

When Skip is set, then, depending on an external signal or an option, the step will not be performed. See test-mode

With these options die limits can be opened for this step. With the next step die limits are active again.
Function "Execute"

The function described below is only available if the option "Execute" is active. The "Execute" option must be indicated on the page "Info about versions." (See: Options- Language and other - i)

Press this button to immediately approach the position you entered at the top.
Command SPEED: Speed adjustment for both axis

Input range 0-99%

Options of the command

Press to confirm data and return to previous screen

Press to cancel data and return to previous screen

Options of the command

When Skip is set then, depending on an external signal or an option, the step will not be performed. See "program organisation"
Command SPRAY : Spray function

Depending to the adjustments in „Options“ you will see here a schematic view of the spray tool. Here you can see a spray tool size „FCT1“ with Option „Pressure regulation“.

Options and adjustments
Press to cancel data and return to previous screen
Press here if you want to combine the function with a time.
Enter the value here
Resolution is 0.1 s
When Skip is set then, depending on an external signal or an option, the step will not be performed. See "program organisation".

Pulse spraying: control air valves will be pulsed with 0.25 sec when the option is set.

The adjustments are only valid for the test of the spray function. The pressure has to be set by a separate command "Pressure".

Return to previous screen.