User manual COMPACT 5 RS

Machine number: _____

Customer: _____

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1 General information

Foreword

This manual is for the spray system Compact 5 RS, developed and constructed by UNISPRAY BV.

This system has been manufactured, tested and checked at the factory with the utmost care. The system is designed for professional applications. The system can be dangerous if it is not used correctly.

You should, therefore, read this manual carefully and pay particular attention to the safety instructions. In addition to these instructions, the users should always observe the general safety instructions in the workplace and avoid accidents.

If, after reading this user manual, you have any questions or if there is anything that is not clear, please contact UNISPRAY.

Use of the manual

The purpose of this manual is:
- to assist the user in his daily work and
- to assist the service department in keeping the system in a good operating condition.

This manual contains all information the user requires to operate and maintain the system.

CE Marking, HACCP

All systems are manufactured in accordance with the essential requirements of the relevant European Directives (CE marking and HACCP).

Symbols and reading instructions

The following pictograms are used in this manual.

	Tip	Suggestions and advice for the user aimed at making certain things easier.
	Attention	The system, the process or the surroundings can be damaged or endangered if the instructions are not strictly observed.
	Warning	The user can be (seriously) injured, his health may be harmed, or the system can be damaged.
	Danger	Dangerous risks for electrical shocks when instructions are not being followed.

Transport and storage

Upon delivery, the system must immediately be checked for possible damage. Any damage found must immediately be reported to the transporter and to UNISPRAY BV.

The packaging materials must be disposed of in an environmentally friendly manner.

If the system is not put into operation straightaway, it must be stored in a dry and frost-free environment.

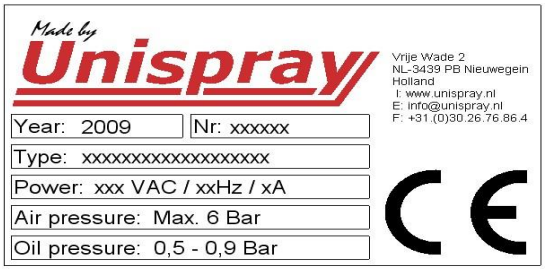
Installation

The system must be installed either by UNISPRAY BV technicians or by technicians designated by UNISPRAY BV for this purpose.

The system must be connected onto the electrical grid by a qualified electrician. The safety precautions must conform to the regulations of the electricity company in question.

Notes

2 Product description



2.1 Product specifications

Year	####
Machine number	######
Machine type	Compact 5 RS
Power (Voltage)	400 VAC met zero and earth, 60 Hertz, fused with 16 Amperes.
Air pressure	Max. 6 bar
Oil pressure	Between 0,5-0,9 bar
Power consumption	0,8 kilowatt
Dimensions	Height 1700 mm Width 1500 mm Depth 1600 mm
Weight	450 kilogram
Compressed air consumption	1000 Nl per minute, of ‘food quality’

2.2 System components

The system contains the following components:

- the control cabinet with spray housing construction,
- the conveyor belt (optional)
- the extraction unit (optional)

2.3 End of lifecycle

At the end of its operating life, the system can be returned to UNISPRAY BV.

UNISPRAY BV will then ensure that the system is disassembled in a responsible and environmentally friendly manner.

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3 Safety instructions

Each customer must establish and document its own instruction and safety procedures, put them into practice and inform the person using the system in order to ensure that the system is operated in a safe manner.

These procedures will include, but are not limited to, the following.

3.1 General instructions

1) Before using the system, the user must check that it is in good condition and safe to operate. If this is not the case, the system must not be used. Before the system is put into operation, the user must check that the system does not show any visible defects. Particular attention should be paid to:
   - Oil leaks
   - Faulty safety switches
   - Faulty control devices (switches, hand-wheels, etc.)
   - Faulty pneumatic connections
   - Faulty electrical connections
   - Construction defects.
2) The space in which the system is installed must be sufficiently large to allow the system to be used safely and must comply with all local and company safety standards. Make sure the environment is clean and no loose rags, parts or tools are littering.
3) The component parts of the system (control cabinet, conveyor belt and extraction unit) must be insulated or shielded to prevent undesirable contact by employees.
4) All the necessary original spare parts for the system must at all times be readily available to ensure that the system can be operated in a correct and safe manner. Only original equipment manufacturer parts may be used for repair and maintenance work.
5) The supply of utilities (electricity, compressed air, water, etc.) to the system must comply with all company and local rules and regulations and must be connected correctly.
6) The system is designed to operate normally at an ambient temperature of between 5 and 40°C.
7) The system may only be operated by properly trained and qualified personnel. The users must have demonstrated their skills in operating the system.

8) Children are not allowed to operate the system.
9) Maintenance and operating instructions must be strictly observed.
10) The user must be fully informed of the nature and the quantity of the material to be applied by spraying.
11) The safety procedures must be available close to the system and clearly visible to the users. The safety procedures must comply with all company and local rules and regulations.
12) Users must at all times be able to reach the necessary personal protective equipment fast.
13) A complete manual for the system must be available to the user and the maintenance personnel at all times.
14) Important warning signs for ensuring the safe use of the system must be present on the system.
15) The user must use the system in accordance with this user manual. The user must observe the general safety instructions of the plant and must act in an anticipatory manner to prevent accidents. He must take the local circumstances and the presence of other people into account.
16) Only qualified experts are allowed to repair or carry out maintenance on the system. They must be familiar with the contents of this user manual.
17) Before you start to work on any component, you must make sure that all the utility supplies have been switched off and that they cannot accidentally be switched on again.
18) Filters can only be opened after the system has been completely depressurised.
19) If the system is to be shut down for any length of time, it is recommended to replace the release agent present in the system with a vegetable oil; e.g. rape oil.
20) The conveyor belt contains a residual frequency drive, this can cause electrical shocks due to residual voltages. It is not allowed to open the system or to disconnect the quick release couplings until 5 minutes after the voltage has been switched off.
21) Some systems also include a fan heater. Never cover it, otherwise there would be a serious fire risk!
22) The system pressure must never exceed that of the components with the lowest pressure rating. Make sure that you always know the possibilities, the maximum pressures and the maximum flow rates of your system and all its components.

You are not allowed to start up the system before you have checked that all its components are in a good condition and safe to operate.

3.2 Product specific instructions

Control cabinet

The control cabinet contains a serious risk for electric shocks.

a. To reduce the risk of electric shocks, the user is not allowed to open the door of the cabinet.
b. If it is necessary to access the main fuse, this must be done by a qualified electrician of the maintenance department and the electrical current must be completely switched off while the work is carried out.
c. The system contains no parts to be serviced by the user. o For maintenance or repairs, contact UNISPRAY BV.

Polarisation/earthing

The system must be properly earthed at all times. Make sure that suitable plugs and power supplies are used.

Water and moisture

The standard control cabinets have a protection level of IP65. This means that the control boxes are not designed to be sprayed with water or chemicals under either low or high pressure. They are only protected against splashing water from any direction.

Carrying out maintenance work

Do not try to overhaul the system unless you are qualified or authorised to make repairs.

- For maintenance or repairs, contact UNISPRAY BV.
- Only authorised UNISPRAY BV personnel are allowed to correct problems.
- Any maintenance carried out by non-authorised personnel will render all warranties null and void.

Spray housing construction

The spray housing construction, mounted on the control unit, is a heavily moving construction. When this is not covered by the extraction unit, sufficient distance has to be guarded from the moving construction when operational. Unnecessary presence near the spray housing has to be avoided.

Maintenance and repair should only be executed when the conveyor belt is switched OFF, and only then by UNISPRAY-authorized technician.

Cause of the length and the vulnerable construction, no objects may be put on or attached to the spray housing construction.

Conveyor belt (optional)

When a conveyor belt is used to transport the various product trays under the spray bar of the spray unit. Make sure that the product tray can pass unimpeded under the nozzles so that it can be sprayed properly.

The conveyor belt unit consist of turning and moving parts. They are shielded against needless contact as much as possible.

Maintenance and repair should only be executed when the conveyor belt is switched OFF, and only then by UNISPRAY-authorized technician.

Extraction unit (optional)

Optionally an extraction unit is present for sucking redundant spray above the spray housing. The motor is protected against unnecessary contact as much as possible.

The extraction unit also functions as a protective cover of the moving spray housing.

Maintenance and repair should only be executed when the extraction unit is switched OFF, and only then by UNISPRAY-authorized technician.

The protective hood is sealed and demand specific tools to be opened. Only designated technician are allowed to do this.

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4 Functional description

Read the chapters on General information, Product description and Safety instructions before the system is operated, cleaned or serviced, or before any malfunctions are solved.

4.1 Introduction

UNISPRAY BV spray systems are designed to spray liquids in the food industry.

Each spray system is specially designed and constructed to spray the trays, forms or products presented by the customer.

The products to be applied by spraying, such as oil or water-borne release agents, water and water-soluble agents, all have their own settings depending on the purpose and application for which they are used. This means that it is not possible to change the agent to be sprayed without adjusting the settings. The settings should only be changed by a UNISPRAY BV technician or by a technician trained and authorised by UNISPRAY BV.

4.2 Mode of operation of the spray system

The spray system contains a pressure tank which is filled manually or automatically with the product to be sprayed. A pneumatic pressure regulator is used to apply an excess pressure to the liquid in the pressure tank. The excess pressure ensures that the product to be sprayed is forced to the nozzles of the spray heads through hoses and couplings. The nozzles are closed by means of needles.

The patented spray heads of UNISPRAY are assembled into a single housing. This housing is used to feed the atomizing air, which is necessary to turn the material to be sprayed into an aerosol. There is also a control air tube for activating the needles for spraying the oil.

Following a start signal generated by the electronic control system, the atomizing air will flow to the exit opening near the nozzles and after some time the needles that close the nozzles will be lifted up so that the liquid flow is also started up and becomes an aerosol.

At the end of the spraying cycle, a spring ensures that the needle closes the nozzle again. Shortly afterwards, the atomizing air will also be shut off, which ends the spraying cycle.

By increasing the pressure on the liquid in the pressure tank or by making the opening between the needle and the nozzle larger, it is possible to adjust the dosage of liquid sprayed.

The coarseness of the spray pattern can be adjusted by increasing or decreasing the amount of atomizing air.

The settings of the spraying pattern are registered in the recipes. Every recipe has its own specific value.

4.3 Automatic oil filling system

The purpose of the filling system is to ensure that there is a buffer stock of the release agent to be sprayed. This buffer stock is used as soon as the supply of the release agent to the machine is interrupted. As soon as the supply to the machine stops, the filling system will generate an alarm. A communication connector can lead the alarm signal to connect with an external device.

4.4 Extraction unit

The extraction unit remains active while trays are being sprayed on the conveyor belt. When longer than 10 minutes trays are not being sprayed on, the air suction unit stops automatically. With the first following signal to the spraying heads, the extraction unit starts automatically.

4.5 Conveyor belt (optional)

The conveyor belt has an adjustable speed. By setting the rotating speed of the motor, the transportation speed of the belt can be tuned up with incoming and outgoing transportation belts. Possible conflicts in throughput are being solved by a ‘stopper’, mounted in the conveyor belt. It blocks incoming trays, when discharge of trays is obstructed.

4.6 Control elements and indicators

Main switch

The mains switch serves three functions:

1) On/off switch to switch the electrical power supply to the system on and off.
2) Safety switch to lock the switch in the “Off” position with a padlock during maintenance so that no one can switch the system on accidentally.
3) Emergency stop function to cut off the power supply to the system in case of an accident.

In case a separate emergency stop circuit is installed, the on/off switch is coloured black. When the on/off switch is part of the emergency stop circuit, it is coloured red/yellow.

Control panel

The control panel is used to switch on and off miscellaneous functions and adjust different parameters of the spray system. It is constructed with physical (analogue) switches or as a digital panel.

The following functions are supported:

- Switching on/off the extraction unit
- Switching on/off the automatic filling system (AFS)
- Selecting baking products or trays and recipes
- Setting and adjusting the system parameters
- Testing the spraying settings
- Resetting the alarm of the automatic filling system

Description function keys (digital panel)

F1 Pressing F1 activates the atomizing air.
The test key for vapour mist is used to adjust the spray heads or to check them. When this key is pressed, the vapour mist will start to flow to the spray heads. As soon as the key is pressed, it is possible to check the total outflow of vapour mist.

F2 Pressing F2 activates the release agent
The test key for liquid is used to adjust the spray heads or to check them. If function key F2 is pressed, the needles in the nozzles are lifted during a spraying cycle so that the liquid starts to flow. As soon as the key is pressed, it is possible to check the dosage of liquid from the individual spray heads.

F1+F2 When both function keys F1 + F2 are pressed the final spraying image can be tested.

F3 Pressing F3 resets the alarm when this has been activated by the loss of external oil supply.

In the analogue version of the panel specific knobs are present for these functions.

Adjusting the parameters (digital panel)

The control panel offers two levels to adjust the parameters.
Level 1: Accessible for the operator, only 10% of the parameter value can be changed.
Level 2: Accessible for the maintenance specialist, this requires a pass word.

Appendix 6.2 Control panel shows the different screens of the control panel.

4.7 Operating the system

Before operating the system the following connections have to be established:

- external supply for atomizing air
- external supply for release agent (oil)
- the plugs for incoming and out-going communication signals. (optional)
- connections between the control cabinet and the conveyor belt (optional)
- connections between the control cabinet and the extraction unit (optional)
- the external supply voltage.

Switching on the system:

- Switch the mains on/off switch to “ON”.
- Wait till the control panel is ready (digital version)
- Choose the desired baking product or tray
- Choose the desired recipe

The system is ready for use.

Notes

5 Technical description

5.1 General

Read the chapters on General information, Product description and Safety instructions before the system is operated, cleaned or serviced, or before any malfunctions are solved.

5.2 Settings

The desired dosage of product to be sprayed can be set by adjusting the following parameters.

Setting the spraying time

The duration of the spraying cycle is defined in the PLC program. For each of the spraying programs it is possible to choose from 3 different recipes. The spraying cycle is defined in the recipe and has the following settings:

- atomizing air before oil
- oil spray time
- atomizing air after oil

An example for varieties can be the different adjustments within a maintenance-cycle due to changing performance of the system.

Setting the oil pressure

The oil pressure is defined by the air pressure on the internal pressure tank.

The required air pressure is also specified in the recipe.

By changing the set value of the air pressure above the liquid, it is possible to increase or decrease the amount of oil which is sprayed. In or decreasing the oil pressure will change the amount of oil for all spray heads.

The air pressure should preferably be changed in small steps. Depending on the product to be sprayed, the following values can be used as a guide.

- Water 0.2 bar
- Oil 0.5 bar
- Emulsion 0.8 bar

To avoid any misunderstanding, it must be pointed out that the aforementioned values should solely be used as a guide. The final values to be set, however, depend on the viscosity of the product to be sprayed and the opening of the nozzle during the spraying cycle.

Setting the atomizing air

By changing the flow rate of the Atomizing Air, it is possible to set the fineness of the spraying pattern.

The Atomizing Air flow rate is set in the recipe. In each recipe, it is possible to set a unique flow rate for the Atomizing Air.

Setting the nozzle opening during the spraying cycle

The setting for the nozzle opening can be changed while spraying by means of the adjustment knob on the top of the spray housing. The adjustment knob is under the cover on top of the spray bar. The purpose of the cover is to shield the adjustment knob during spraying.

- Turning the adjustment knob clockwise will decrease the opening between the needle and the nozzle, thus decreasing the dosage.
- Turning the adjustment knob counter-clockwise will increase the opening between the needle and the nozzle, thus increasing the dosage.

Changing the setting by means of the adjustment knob must be done for each spray head individually. In doing so, it should be remembered that for a correct setting the dosage from all the spray heads should be the same.

Checking the spraying pattern

A simple method for checking whether the dosage from the spray heads are the same, is to compare the outflows of the product without air flow on a stationary object. For testing the spraying pattern, knobs (analogue version) or function keys (digital panel) are present.

To check whether the prescribed product dosage is being delivered, the yield from each spray head should be collected and weighed.

When setting the values for the atomizing air, remember that too widely setting can cause the spray to be deposited around the system, creating unnecessary pollution. It is, therefore, recommended to set the spray pattern as economic as possible.

Preparing the system for first time operation

The following procedure should be used for adjusting the settings of the system when it is put into operation for the first time or after servicing.

1. Check that the air pressure is set correctly.
2. Check that the oil pressure is set correctly.
3. Check the spraying pattern.
4. Perform a test run by letting some trays pass under the spraying head. Check the trays for the spraying pattern.

5.3 Maintenance

In designing the system, every effort was made to keep maintenance to a minimum. Preventive maintenance is however necessary and consists of:

Daily maintenance

- Cleaning the outside of the system with a dry cloth
- Emptying the drip tray (if present).

Weekly maintenance

- Draining moisture from the pressure regulators
- Visually checking the pneumatic, mechanical and electrical connections
- Cleaning the inside of the liquid filter
- Cleaning internally (if necessary).

Extensive maintenance

- Cleaning the Spray heads of the spray housing (ref.5.4 Maintenance of the spraying heads)
- Cleaning the product filter
- Cleaning the nozzles
- Cleaning the pressure control valves
- Extensive checking of the pneumatic connections
- Extensive checking of the mechanical connections
- Extensive checking of the electrical connections
- Re-adjusting the dosage setting
- Re-adjusting the spray pattern

UNISPRAY BV recommends a minimal maintenance interval after 10 million breads, or once a year.

It is recommended to have the extensive maintenance carried out by a specialised UNISPRAY BV technician.

5.4 Maintenance of the spraying heads

The following procedure is to be used when maintaining the spraying heads:

On the top side of the spraying housing:

- Remove the cap nr.15, by turning it counter clockwise
- Remove the cylinder with adjustment knob (nr.13, 14) by turning it counter clockwise
- Remove the spring and replace when necessary
- Remove the needle (11) with gasket (10) and replace when necessary
- Remove the "O ring” (9) and replace when necessary.

- Remove the valve house (8)
- Remove the gasket (6) and replace when necessary
- Remove the spacer (7) and replace when necessary
- Remove the gasket (6) and replace when necessary

On the bottom side of the spraying housing:

- Remove air rotary jet (2) and clamp nut (1) by turning it counter clockwise
- Remove nozzle (3) by turning it counter clockwise
- Clean the inside of the nozzle on the top with Loctite SF 7063 and a Q-tip
- Clean the inside of the nozzle on the bottom side by spraying with release agent. Check with a mirror if the inside is clean
- Clean all separate parts with Loctite SF 7063 and a cotton cloth
- Grease all cleaned parts with a “O ring” grease, suitable for the food industry
- Replace parts with numbers 6, 7, 9,10 and 12
- After cleaning replace all parts in reverse order
- Repeat this for all spraying heads, and re-adjust the settings for the correct spraying dosage.

The maintenance procedure is explained at length in a support video on the UNISPRAY website (www.unispray.info).

5.5 Malfunctions

In this chapter, a number of known malfunctions and possible troubleshooting procedures are listed. However, this is not a complete picture of all the possible malfunctions and solutions. To provide you with a more complete overview in the future, and to make improvements where possible, we would appreciate it if you could share your experiences of spotting and solving malfunctions with us.

You can send information on malfunctions encountered by you, solutions and suggestions for improvements to: service@unispray.nl.

Malfunction	***Cause***	***Solution***
System switched on but does not spray	No supply voltage	Check the fuses
	No compressed air	Check the compressor
	Sensor not connected	Check the connections
	Sensor produces no signal	Check the settings
System sprays only air	No or insufficient product feed	Check the liquid level
	Product feed blocked	Check hoses for kinks
	Feed filter blocked	Clean filter element
System does not fill up automatically	AFS is switched off	Switch on AFS
	Feed line to pump blocked	Check hoses/couplings
System sprays irregularly	Air in product feed line	Check the liquid level
	Pressure tank is empty	Top up the pressure tank
System sprays only liquid	Aerosolise-air regulator is closed	Check aerosolise-air setting
Spraying pattern doesn't match the baking tray	Approaching detector defective	Check the approaching detector with an iron key. The light has to lit up. Replace it when defect.

Notes

6 Appendix

6.1 Parts

6.2 Control panel

6.3 Pictures

6.4 Electronic flows

6.5 Pneumatic flows

6.6 Declaration of conformity

Declaration of conformity

UNISPRAY BV

Vrije Wade 2

NL3439 PB Nieuwegein The Netherlands

Hereby declare at our own responsibility that the UNISPRAY system

Type: Compact 5 RS

Machine no.: ######

to which this declaration applies,
conforms with the essential requirements of the:

European Machinery Directive 98/37/EC

Conforms with the following other relevant standards:

Low Voltage Directive 73/23/EC

EMC Directive 89/336/EC

Conforms with the harmonised European Standards:

EN 292-1, EN 292-2, EN 418, EN 294, EN 349 EN 1672-2 and EN 1672-1.

Nieuwegein, _____

A.G.C.Gosman