

Adept FlexiBowl

Parts Feeders Models 500 and 350 User's Guide



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Chapter 1: Introduction

The Adept FlexiBowl® feeder is a rotary parts feeder, capable of feeding a wide range of loose parts for handling by an industrial robot system with vision. The parts may have various shapes and be made of different materials. They must weigh less than 80 g (2.8 oz).

For lubricated, fragile, and/or delicate parts, please contact Adept's technical office.

Adept FlexiBowl feeders are not suitable for handling liquid products or fine grit.



Figure 1-1. Sample Parts

The Adept FlexiBowl feeder is available in two sizes: the Model 500, and the Model 350. Both are made mostly of stainless steel, with some treated aluminum parts.

The Adept FlexiBowl feeder consists of a cylindrical frame, a rotating disc at the top of the cylinder, and a pneumatic Flip unit. An optional backlight to illuminate the parts is available.

Most of the feeder components are enclosed inside the feeder body. The rotating disc is exposed at the top of the unit, the user-supplied camera is mounted above the feeder, and the Hall spreader and optional Blow unit are mounted on the top ring of the feeder.

The flexible, rotating disc is made of a material similar to conveyor belts. It is available in different materials and thicknesses, depending on the kind of parts being fed.

The rotating disc slides over a circular metal sliding surface, which is provided with an optical window made of Lexan. This window allows the built-in backlight option, mounted inside the Adept

FlexiBowl feeder, to illuminate the rotating disc. Because the rotating disc is transparent to this kind of light, the camera mounted over the feeder can identify the silhouette of the parts on the rotating disc.

The top of the feeder's frame is a steel ring, surrounding the rotating disc. It is designed to contain the parts, which can be shaken or spread out by centrifugal force. It is also used to attach additional parts-handling equipment, such as the Hall spreader or the Blow unit.



Figure 1-2. Model 350 Components

The Flip unit is a pneumatic cylinder that bumps the underside of the rotating disc, making the parts jump. It is located so that it flips the parts before they reach the vision window. A Flip shield, located above the disc, over the Flip unit, keeps parts from being ejected from the feeder when bumped.

The frequency and duration of the bump can be programmed, depending on the type of part being fed. The bump strength can be adjusted using the air pressure regulator, located on the interface panel. See the following figure.



Figure 1-3. Flip Unit and Regulator Knob

1.1 Dangers, Warnings, Cautions, and Notes

There are six levels of special alert notation used in Adept manuals. In descending order of importance, they are:



DANGER: This indicates an imminently hazardous electrical situation which, if not avoided, will result in death or serious injury.



DANGER: This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING: This indicates a potentially hazardous electrical situation which, if not avoided, could result in injury or major damage to the equipment.



WARNING: This indicates a potentially hazardous situation which, if not avoided, could result in injury or major damage to the equipment.



CAUTION: This indicates a situation which, if not avoided, could result in damage to the equipment.

NOTE: Notes provide supplementary information, emphasize a point or procedure, or give a tip for easier operation.

1.2 Intended Use of the Feeders

The Adept FlexiBowl feeders are intended for use in parts assembly and material handling for parts weighing less than 80 g (2.8 oz). See Technical Specifications for complete information on the feeder specifications. Refer to the [Adept Robot Safety Guide](#) for details on the intended use of Adept products.

1.3 Safety Precautions



WARNING: An Adept FlexiBowl feeder can cause personal injury or damage to itself and other equipment if the following safety precautions are not observed:

- All personnel who install, operate, program, or maintain the system must read this guide, read the [Adept Robot Safety Guide](#), and complete a training course for their responsibilities in regard to the feeder.
- All personnel who install the feeder system must read this guide, read the [Adept Robot Safety Guide](#), and must comply with all local and national safety regulations for the location in which the feeder is installed.
- The feeder must not be used for purposes other than described in Intended Use of the Feeders on page 9. Contact Adept if you are not sure of the suitability for your application.
- Power to the feeder must be locked out and tagged out before any maintenance is performed.

The [Adept Robot Safety Guide](#) provides detailed information on safety for Adept robots. It also gives resources for more information on relevant standards.

It ships with each feeder manual, and is also available from the Adept Document Library. See Introduction on page 7

1.4 What to Do in an Emergency Situation

Press any E-Stop button (a red push-button on a yellow background/field) on any robot being used with the feeder, power-down the feeder, and then follow the internal procedures of your company or organization for an emergency situation. If a fire occurs, use CO₂ to extinguish the fire.

1.5 How Can I Get Help?

Refer to the [How to Get Help Resource Guide](#) (Adept P/N 00961-00700) for details on getting assistance with your Adept software and hardware. Additionally, you can access information sources on Adept's corporate Web site:

<http://www.adept.com>

Related Manuals

This manual covers the installation, operation, and maintenance of Adept FlexiBowl parts feeders. Other documents may be of use to you. See the following table. These manuals are available on the Adept Document Library, and the software CD-ROM shipped with each system.

Table 1-1. Related Manuals

Manual Title	Description
<u>Adept Robot Safety Guide</u>	Contains general safety information for all Adept robots.
<u>Adept SmartController User's Guide</u>	Contains complete information on the installation and operation of the Adept SmartController and the sDIO product.
<u>V+ Language User Guide</u>	Describes the V+ language and programming of an Adept control system.
<u>V+ Language Reference Guide</u>	A complete description of the keywords used in the basic V+ system.
<u>V+ Operating System User's Guide</u>	A description of the V+ operating system. Loading, storing, and executing programs are covered in this manual.
<u>V+ Operating System Reference Guide</u>	Descriptions of the V+ operating system commands (known as monitor commands).

Adept Document Library

The Adept Document Library (ADL) contains documentation for Adept products. You can access a local copy of the ADL from the Adept Software CD shipped with your system. Additionally, an Internet version of the ADL can be accessed by going to the Adept Web site and selecting Document Library from the Support tab. To go directly to the Adept Document Library, type the following URL into your browser:

http://www.adept.com/Main/KE/DATA/adept_search.htm

To locate information on a specific topic, use the Document Library search engine on the ADL main page. To view a list of available product documentation, use the menu links located above the search field.

Chapter 2: Components

Each feeder is made up of the following parts:

- Frame

The Sliding surface, which includes the Lexan window, is the top surface of this.
- Rotating Disc

Rotates on top of the sliding surface.
- Flip unit

Inside the frame.
- Flip shield

Attached to top ring of feeder.
- Motor and Controller

Inside the frame.
- Covers
- Interface panel

NOTE: The interface panel is covered in its own chapter.

2.1 Sliding Surface

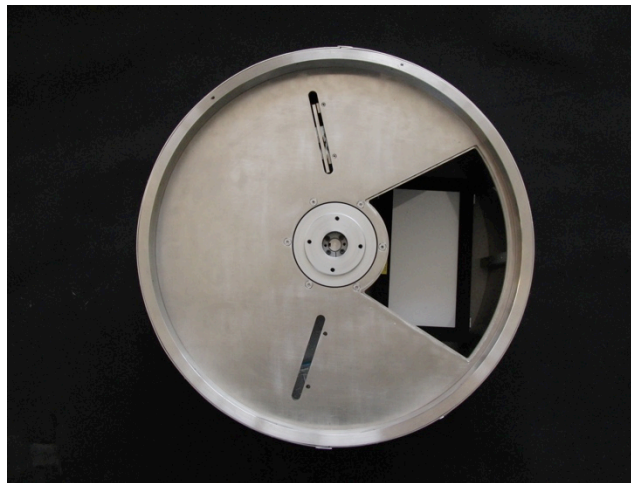


Figure 2-1. Sliding Surface, Window, and Flip Slots

The sliding surface supports the rotating disc. It includes a window, made of Lexan, for the optional backlight to shine through. The preceding graphic shows a backlight.

2.2 Rotating Disc

The rotating disc is driven by the motor housed inside the feeder frame. It can be made of different silicon or plastic-based materials. If used with a backlight, it must appear transparent to the backlight's light.



Figure 2-2. Rotating Disc

2.3 Covers

The covers conceal and shield the internal parts of the feeder, to protect the user from unnecessary exposure to electrical voltage and moving parts.



Figure 2-3. Covers

Chapter 3: Installation

3.1 Transportation and Handling

The Adept FlexiBowl feeder is shipped in a 700 x 700 x 400 mm (28 x 28 x 16 in.) wooden crate.

The packaging displays appropriate labels indicating handling requirements: shelter from rain (umbrella), fragile (glass), do not turn over (upwards arrow), lifting point (arrows).

To handle the crated feeder, use a forklift or pallet jack with at least a 50 kg (110 lb) capacity.

Insert the forks at the points indicated by the arrows in the following figure:

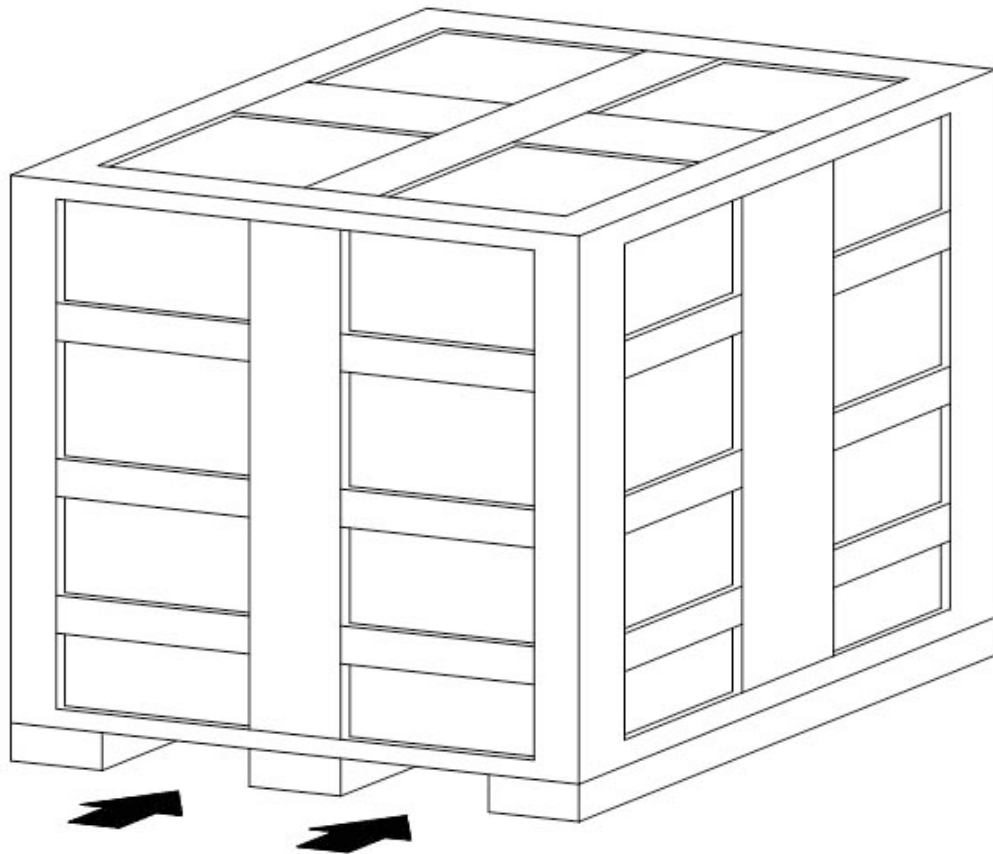


Figure 3-1. Adept FlexiBowl Feeder Shipping Crate

The forks must be as long as the crate and of suitable capacity.

This procedure must be carried out by skilled and instructed personnel only.

3.2 Uncrating

1. Pry the lid off of the FlexiBowl crate to expose the feeder.

2. Unscrew the feeder from the base of the shipping crate.

There are four screws holding the feeder down to the base of the crate.

3. Remove the CD and final test sheet from the crate.

Retain these for later use.

4. Using the handles on the feeder, lift the feeder out of the crate.

Use two people to lift the feeder.

3.3 Installation

Mounting

1. Position the feeder, checking that it is level and stable.

If the feeder will be installed on the platform of a machine that is sensitive to vibration, place insulating and anti-vibration material between the feeder and the platform.

2. Mount the feeder with user-supplied screws via the mounting holes.

Because of the variability of possible mounting surfaces, we do not attempt to specify what hardware to use. The feeders have four 6.5 mm (0.25 in.) holes in their bases for mounting them to a surface. See Dimensions on page 35.

AC

1. Connect the machine to a 230 VAC power supply equipped with a switch and with delivery capacity of at least 6 A.
2. Ensure that the AC is grounded.

NOTE: The AC power cord is user-supplied.

DC

Power Supply

The 24 VDC power supply is user-supplied.

NOTE: *You must provide your own power supply.* Make sure the power cables and power supply conform to the specifications in the following table.

24 VDC Power Specifications

Table 3-1. Specifications for 24 VDC User-Supplied Power Supply

Customer-Supplied Power Supply	24 VDC (-10%, +5%), 150 W (6 A)
Circuit Protection	Not more than 8 A (below the amperage rating of the cable used)



CAUTION: Make sure you select a 24 VDC power supply that meets the specifications in the preceding table. Using an underrated supply can cause system problems and prevent your equipment from operating correctly. See the following table for recommended power supplies.

Table 3-2. Recommended 24 VDC Power Supplies

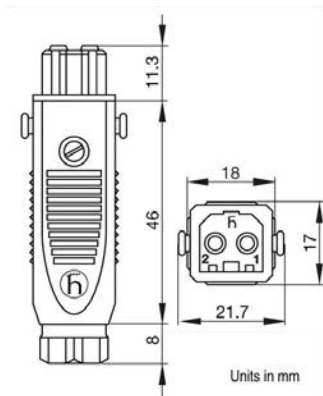
Vendor Name	Model	Ratings
XP Power	JPM160PS24	24 VDC, 6.7 A, 160 W
Mean Well	SP-150-24	24 VDC, 6.3 A, 150 W
Astrodyne	ASM150-24	24 VDC, 6.66 A, 150 W

Connector Assembly

1. Use the Adept-supplied connector to attach the user-supplied 24 VDC power supply to the feeder.

Use 15 or 16 gauge wire, with ground, to connect the power supply to the connector.

2. Locate the 24 VDC connector that is shipped with the feeder. See the following figure:



PIN	Connection
1	24 VDC Return
2	+24 VDC

Chapter 3: Installation

Connector:

Stak 20 Hirschmann (931 264-106)

3. Remove the set screw that holds the black pin-end of the connector to the grey connector body.

Retain the set screw for reassembly. It is quite small.

4. Remove the black pin-end from the grey connector body, and set aside.

Retain the square rubber seal that goes around the black pin-end.

5. Remove the grey plastic nut from the end of the grey connector body. Also remove the metal washer and foam gasket.

Retain the nut, washer, and foam gasket.

6. Feed the 24 VDC cable through the nut, washer, foam gasket, and then the grey plastic connector body.

7. Strip 7 mm of insulation from the ends of the two wires of the 24 VDC cable.

8. Feed the 24 VDC cable through the strain-relief clamp at the end of the black plastic pin-end of the connector.

Do not tighten the clamp yet.

9. Connect the VDC cable wires to the pin-end of the connector.

- a. Connect the negative wire to pin 1 of the connector.

Tighten the clamp on that wire.

- b. Connect the positive wire to pin 2 of the connector.

Tighten the clamp on that wire.

- c. Connect the ground to the ground of the connector.

Tighten the clamp on the ground wire.

Ensure that all wires are clamped on metal, not on their insulators.

10. Gently pull any slack out of the cable, and tighten the strain-relief clamp on it securely.

This must clamp on the insulator, not metal wire.

11. Push the black pin-end of the connector into the grey connector body.

Make sure it is aligned so the set screw hole aligns with the threaded hole in the pin-end.

12. Tighten the set screw, retained from when you separated the grey and black parts of the connector, to reconnect those parts of the connector.

13. Gently pull any slack out of the cable from the end of the grey plastic connector.

14. Slide the foam gasket and metal washer into the grey plastic body, and screw in the grey plastic nut. Tighten.

15. Put the square rubber seal around the black plastic end of the connector.

16. Plug the 24 VDC connector into the 24 VDC jack on the interface panel.

Air

1. Connect a Ø6 mm (0.24 in.) air hose to the Air Supply socket on the interface panel. Ensure that there is a shut-off valve between your facility air supply and the feeder.

Air must be supplied at a minimum pressure of 6 bar (87 psi), filtered and dry. Compressed air lubrication is not necessary.
2. If you ordered a Blow unit, connect the Ø6 mm (0.24 in.) air hose to the Air Blow socket on the interface panel, and connect the other end to the Blow unit.

I/O

Connect the Ethernet or I/O cables as appropriate.

Attachments

1. Attach the Hall spreader to the ring at the top of the feeder.

This is used to push parts away from the top ring of the feeder, making them easier to pick by a robot.

See the following figure.



Figure 3-2. Hall Spreader

For both models, this is held in place with set screws.

The Hall spreader is generally positioned just before the Flip unit or the Lexan window, to give your robot as much time as possible to pick parts seen by the camera.

2. Connect the Blow unit, if ordered, to the top ring of the feeder.

This is held in place with set screws, which lock onto the top ring.

3.4 Initial Power-On



WARNING: When first supplying compressed air, the Flip units may move unpredictably. Before turning on the air, ensure that the feeder is completely assembled, the Flip shield is in place, and that there are no personnel near the feeder.

Turn on the power switch and connect 24 Volt power.

Verify that the green Ready light on the interface panel is lit. If not, check the 230 VAC and 24 VDC power supplies.

Chapter 4: Interface Panel



Figure 4-1. Interface Panel

4.1 Interface Panel Connectors, Controls, and Indicators

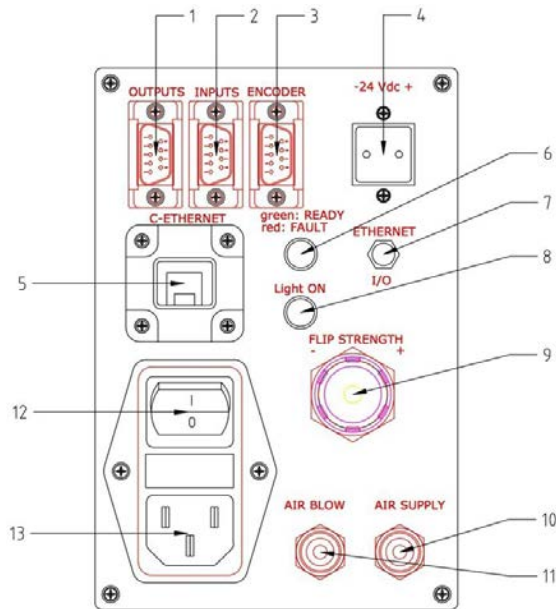


Figure 4-2. Interface Panel Components

No.	Description	Connector
1	Outputs connector	DE9F
2	Inputs connector	DE9M
3	Encoder connector	DE9M
4	24 VDC plug	Hirschmann
5	Ethernet port	802.3
6	Status LED	-
7	Ethernet/IO switch	-
8	Backlight Status LED	-
9	Air Pressure Regulator	-
10	Air Supply (from source)	6 mm
11	Air Blow (to Blow unit)	6 mm
12	AC Power switch	-
13	230 VAC plug	-

4.2 Inputs Connector

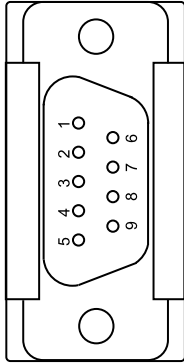


Figure 4-3. DE9M Connector

Pinouts

PIN	Signal
1	Function BIT 0
2	Function BIT 1
3	Function BIT 2
4	Function BIT 3
5	Strobe
6, 7, 8	No Connection
9	Input Return

Input Circuit Specifications

Operational voltage range	0 to 30 VDC
OFF state voltage range	0 to 7 VDC
ON state voltage range	12 to 30 VDC
Operational current range	0 to 9 mA
ON state current range	2 to 9 mA
Impedance (V_{in}/I_{in})	2.49 k Ω
Current at $V_{in} = +24$ VDC	$I_{in} \leq 7$ mA

4.3 Outputs Connector

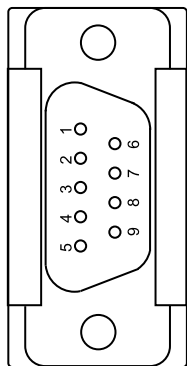


Figure 4-4. DE9F Connector

Pinouts

Pin	Signal
1	Fault +
2	Ready +
3	Busy +
4, 5, 9	No Connection
6	Fault -
7	Ready -
8	Busy -

Output Circuit Specifications

Voltage range	0 to 30 VDC
Current Range	$I_{out} \leq 250 \text{ mA}$

4.4 Encoder Connector

The Encoder connector is an output, which can be used for circular conveyor tracking. The connector uses RS-422 differential signaling.

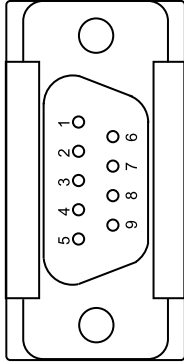
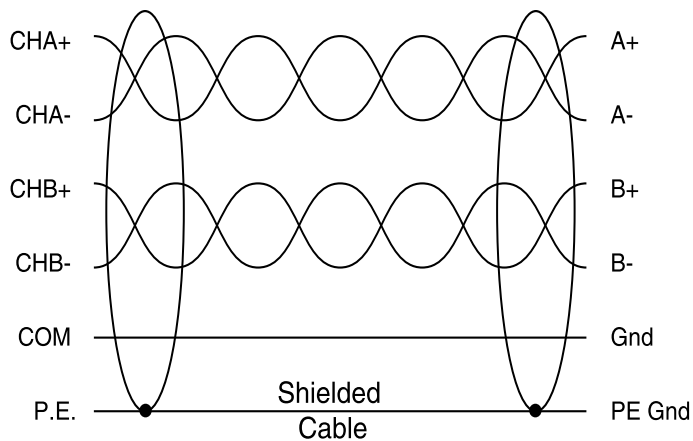


Figure 4-5. DE9M Connector

Pin	Signal
1, 2, 9	No Connection
3	CHA +
4	CHA -
5	CHB +
6	CHB -
7	COM
8	P.E.

FlexiBowl
Encoder Connector

Adept Controller
Belt Encoder

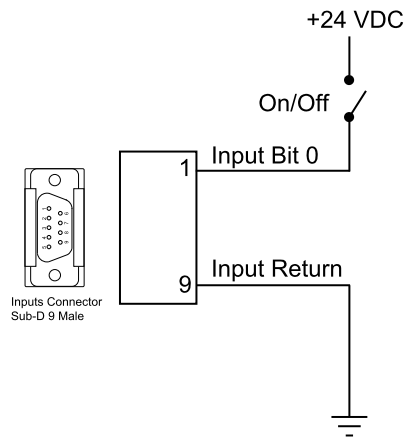


FlexiBowl P.E. COM
and Adept Controller
chassis ground
connected to
cable shield.

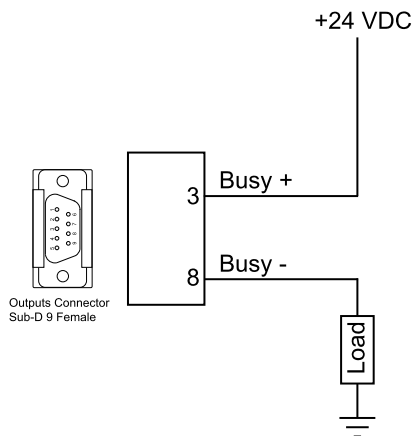
Figure 4-6. Typical Use of Encoder Connector

4.5 Input and Output Connection Examples

Input



Output



4.6 Pressure Regulator

The pressure regulator controls the strength with which the Flip unit bumps the underside of the rotating disc, to flip the parts over. It also controls the pressure to the Blow unit, if present.

To set the pressure, pull the regulator knob away from the body of the feeder, and twist it. Counter-clockwise will lessen the pressure, clockwise will increase the pressure.

When you have set the pressure you want, press the knob back towards the feeder body, and it will lock into that setting. This prevents accidental changes to the pressure setting.

Chapter 5: Operation

Should a hazardous situation or anomalous machine operation occur, cut the power supply, stopping all machine functions.

NOTE: Before starting the machine, check that all covers and shields are in place.



WARNING: The machine covers are NOT inter-locked. Never remove a cover unless you have shut off all power to the feeder first.

NOTE: After each use of the machine, it is good practice to remove all power to the feeder by switching the main switch to "O" and removing 24 Volt power connector.

5.1 Programming

The Adept FlexiBowl feeders can be managed and programmed in one of the following modes:

- Programming via the V+ library, used in combination with an Adept SmartController motion controller and system;
- Programming via port TCP/IP (UDP protocol);
- Programming and handling via Digital I/O.

5.2 Programming via V+ Library

The programming and management of the Adept FlexiBowl feeder via the V+ library can only be carried out with an Adept SmartController motion controller. The library is called FBMODxxx.V2 (where xxx identifies the version you are using). It contains the following routines:

First Level Routines

Handling and service:

- flb.srv.state(ser.lun, state)
- flb.light(ser.lun, state)
- flb.forward(ser.lun)
- flb.flip(ser.lun, pist.num)
- flb.shake(ser.lun)
- flb.break(ser.lun)

- flb.flip.Blow(ser.lun)
- flb.fwd.flp.blw(ser.lun)
- flb.fwd.flp(ser.lun,pist.num)
- flb.fwd.Blow(ser.lun)
- flb.att.ser(serial, ser.lun)

Handling parameters

- flb.par.speed(ser.lun, speed)
- flb.par.angle(ser.lun, angle)
- flb.par.acc(ser.lun, acc)
- flb.par.dec(ser.lun, dec)

Flip Parameters

- flb.par.fl.cnt(ser.lun, fl_count, pist.num)
- flb.par.fl.dly(ser.lun, fl_delay, pist.num)

Shake Parameters

- flb.par.sh.sp(ser.lun, sh_speed)
- flb.par.sh.ang(ser.lun, sh_angle)
- flb.par.sh.cnt(ser.lun, sh_count)
- flb.par.sh.acc(ser.lun, sh_acc)
- flb.par.sh.dec(ser.lun, sh_dec)

Blow Parameter

- flb.par.bl.time(ser.lun, time)

Additional function

- flb.res.err(ser.lun)

Support Routines

- flb.chk.err(ser.lun)

Support routines cannot be called directly, but are called by the first level routines.

Example Test Routine

- test()

The description of the routine is in the header of the routine.

5.3 Programming via UDP

Settings

- The TCP/IP address is written in the final test sheet.
The final test sheet is included in the shipping crate.
- The UDP port is 5100.

Command Structure

For each string sent to the feeder, the feeder will return an ECHO of the received command in the following form:

- If the sent string is a command that does not return a value, the ECHO will be of the form:
Message_sent{CR};
- If the sent string is a command that does return a value, the ECHO will be of the form:
Message_sent{CR}Answer;

NOTE: The decimal value of the ASCII character {CR} is 13.

Once connected to the feeder, you can send the following strings directly to achieve the described result.

Command Strings

String	Ans.	Description
servo={state}		servo= 1 activates the servo. servo= 0 deactivates the servo.
light={state}		light= 1 activates the backlight. light= 0 deactivates the backlight.
forward= 1		Moves the feeder forward with the current parameters.
flip=1		Activates piston 1 with the current parameters.
flip2=1		Activates piston 2 with the current parameters.
shake=1		Shakes the feeder with the current parameters.
flip_Blow=1		Activates valves 1 and 2 simultaneously.
Blow=1		Activates the Blow unit for Blow_time milliseconds.
fwd_fl_bw=1		Moves the feeder forward and activates Flip 1 and Flip2/Blow simultaneously.
fwd_blw=1		Moves the feeder and activates the Blow unit simultaneously.

String	Ans.	Description
ob[6]	1 or 0	If the answer is 1, the feeder is performing an operation and is not able to accept new commands until it is completed; if the answer is 0 it is available.
speed={speed}		Speed, in RPM, at which the feeder will advance at each subsequent "forward=1" instruction. Between 1 and 130.
angle={angle}		Angle by which the feeder will advance at each subsequent "forward=1" instruction. This is positive for clockwise rotation, or negative for counter-clockwise rotation.
acc={acceleration}		Acceleration used for each subsequent "forward=1" instruction. Between 10 and 10000.
dec={deceleration}		Deceleration used for each subsequent "forward=1" instruction. Between 10 and 10000.
fl_count={fl_count}		Number of ON/OFF cycles that the piston will perform at each subsequent "flip=1" instruction. Must be positive.
fl_delay={fl_delay}	-	Time, in milliseconds, between an ON and an OFF of the piston at each subsequent "flip=1" instruction. Must be positive.
sh_speed={sh_speed}	-	Speed, in RPM, at which to shake the feeder at each subsequent "shake=1" instruction. Between 1 and 130.
sh_angle={sh_angle}	-	Angle the feeder moves for each shake for subsequent "shake=1" instructions. With positive values the first movement will be clockwise, counter-clockwise for negative values.
sh_count={sh_count}	-	Number of movements, in alternate directions, to be performed at subsequent "shake=1" instructions. Example: sh_count=3 means the feeder will advance by sh_angle, go back by -sh_angle, and advance again by sh_angle.
sh_acc={sh_acc}	-	Acceleration used for each subsequent movement of the "shake=1" instruction. Between 10 and 10000.

String	Ans.	Description
sh_dec={sh_dec}	-	Deceleration used for each subsequent movement of the "shake=1" instruction. Between 10 and 10000.
Blow_time={Blow_time}		Blowing time, in milliseconds.
KL	-	Immediately stops the execution of the Adept Flex-iBowl feeder internal program. To be used only in case of error followed by instruction "XQ##init", which makes the execution of the internal program restart from the beginning (has the same effect as switching the FlexiBowl feeder off and on again).
XQ##init	-	Makes the internal Adept FlexiBowl feeder program restart, to be performed only after the "KL" instruction.
SR	Status	<p>Returns the current feeder status:</p> <p>If bit 0 == 0 there are no problems.</p> <p>If bit 0 == 1 there is a problem and the fault is indicated by bits 1,2,3.</p> <p>Fault == 2 -> feeder is under-voltage. Check AC.</p> <p>Fault ==4 -> feeder is over-voltage. Check AC.</p> <p>Fault ==10 -> Short circuit. The motor or its wiring may be defective.</p> <p>Fault ==12 -> Temperature. The drive is overheating.</p>

Default Values

Parameter	Default values	Range
speed (RPM)	60	1 to 130
angle (±degrees)	30	n/a
acc	10000	10 to 10000
dec	10000	10 to 10000
fl_count	2	positive

Parameter	Default values	Range
fl_delay (ms)	100	positive
sh_speed (RPM)	90	1 to 130
sh_angle (\pm degrees)	30	n/a
sh_count (#)	3	n/a
sh_acc	10000	10 to 10000
sh_dec	10000	10 to 10000
Blow_time (ms)	200	n/a

5.4 Programming and Handling via Digital I/O

NOTE: Disconnect the Inputs connector, if connected.

The FlexiBowl Parameters program is included in the CD shipped with the feeder. The CD also contains instructions on using the program.

1. Use the FlexiBowl Parameters program supplied by Adept to set the system default parameters. You can then continue operation via digital I/O.

Instructions for using the program are contained on the CD, along with the actual program.

2. Move the Ethernet-I/O switch on the interface panel to the I/O position.

After two seconds, the FlexiBowl feeder will be in Digital I/O operation mode.

The operating principle is the following:

- Apply the code for the operation you wish to perform to Function BIT 0,1,2,3 inputs. Use ground for logic level 0 and 24 V for logic level 1;
- Apply 24 V to the Input Strobe (Pin 5) and Input Return (Pin 9) for a limited time (about 50 ms);
- The Busy output is available between Pin 3 and 8 on the Output connector.

NOTE: The Strobe signal is inhibited until the FlexiBowl feeder has completed its current operation.

NOTE: The Busy output of the Outputs connector stays activated until the current operation is completed.

Bits Function Inputs Encoding Table

Bits Function				Command
3	2	1	0	
0	0	0	1	Servo ON
0	0	1	0	Servo OFF
0	0	1	1	Backlight ON
0	1	0	0	Backlight OFF
0	1	0	1	Forward
0	1	1	0	Backward
0	1	1	1	Shake
1	0	0	0	Flip
0	1	1	0	Forward Flip
1	0	0	1	Flip2
1	0	1	0	Flip2 Forward
1	0	1	1	Blow Forward
1	1	0	0	Blow
1	1	0	1	Forward Flip Blow
1	1	1	0	Flip Blow/Flip 1&2
1	1	1	1	Forward Flip 1&2

Chapter 6: Technical Specifications

6.1 Dimensions

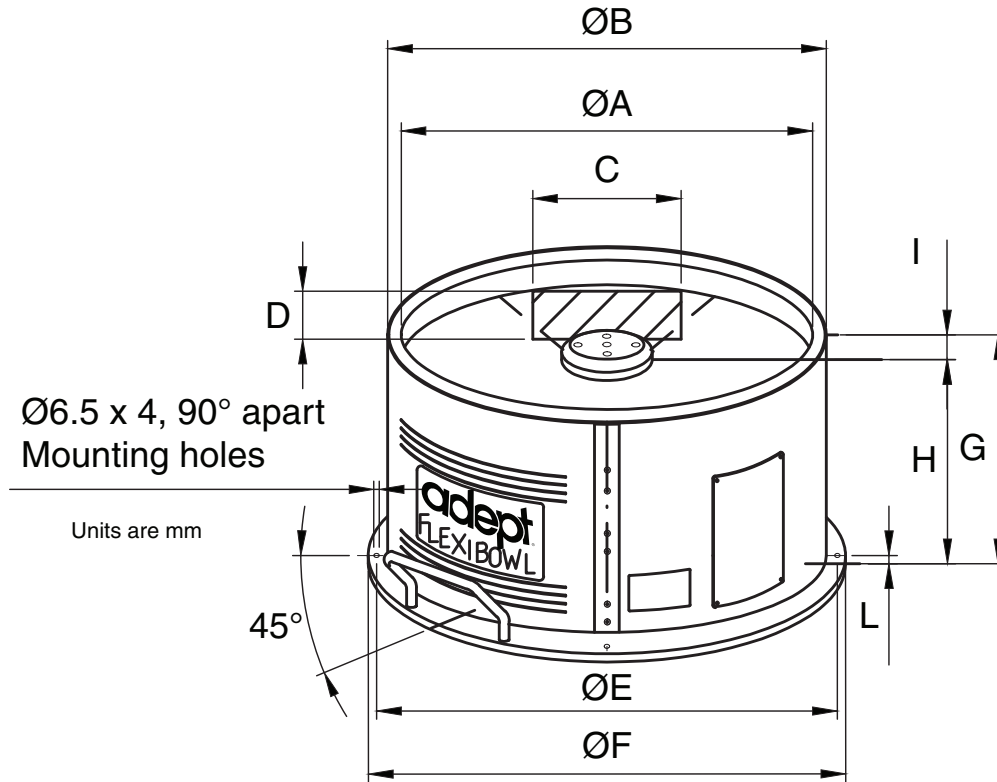


Figure 6-1. General Dimensions

Dimension (mm)	FlexiBowl 350	FlexiBowl 500
A	325	500
B	360	533
C	100	228
D	80	160
E	384	560
F	404	580
G	268.5	267
H	242	239
I	26.5	28
L	15	10

6.2 Specifications

Specification	Model 500	Model 350
Crated Weight	62 kg (137 lbs)	42 kg (93 lbs)
Uncrated Weight	47 kg (104 lbs)	27 kg (60 lbs)
Maximum dimensions	Ø 580 mm, h. 267 mm (22.8 in., 10.5 in.)	Ø 404 mm h. 268.5 mm (15.9 in., 10.57 in.)
Maximum load	5 kg (11 lb)	
Operating temperature	5° to 40° C (41° to 104° F)	
Operating humidity	5 to 90% non-condensing	
Electrical power supply	230 Volts – 50/60 Hz	
230 VAC current	6 A	
24 VDC current	3 A	
Continuous RMS	2.1 A	
Peak	4.2 A	
Compressed air supply	6 bar (87 psi) , filtered and dry	
Infrared Backlight	20,000 – 30,000 hours, 850 nm LED	
Ethernet port	1	
Encoder port	1	
Digital I/O	6 inputs, 3 outputs	

Chapter 7: Maintenance

7.1 Cleaning

To maintain machine efficiency, you must perform some preventive maintenance on the components subject to continuous mechanical stress, such as friction. Therefore it is recommended that you perform preventive maintenance as follows:

- Remove the processing waste or scraps from the rotating disc daily
- Check the condition of the rotating disc.

Remove grease or oil using non-acid products or solvents on a daily basis.



CAUTION: Do not use acids or solvents for cleaning the rotating disc.

Use mild, non-abrasive products, such as household grease remover or common soap.

To remove particles and processing dust, use a paintbrush and wear protective goggles.

7.2 Non-Routine Maintenance

NOTE: Internal machine maintenance must be carried out exclusively by authorized personnel.



WARNING: Machine covers are not interlocked. Remove all power from the feeder before removing the covers.



WARNING: Do not attempt to perform repairs on the Adept FlexiBowl feeder unless you are qualified to do so.



WARNING: Maintenance on an Adept FlexiBowl feeder can cause injury, or damage to the feeder and other equipment if the following safety precautions are not observed:

Maintenance must only be performed after disconnecting all electrical power and closing the compressed air valve.

Changing the Rotating Disc

The Rotating disc can be replaced by removing the four M6 cap screws in the hub that holds the disc in place.

1. Unscrew the four M6 socket-head cap screws from the hub cover at the center of the disc.
Retain the screws for reassembly.
2. Lift the hub cover off of the hub.
Retain the hub cover for reassembly.
See the following figure.

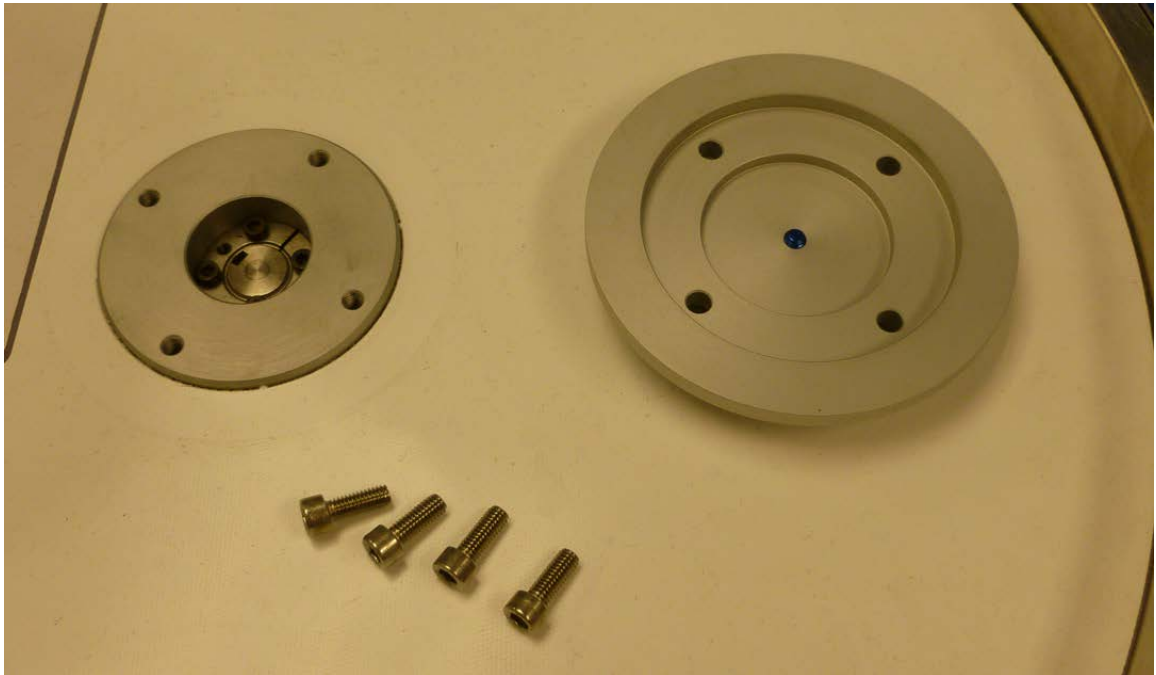


Figure 7-1. Removed Hub Cover (upside-down at right), Cap Screws, and Hub

3. Lift the disc off of the sliding surface.
If the disc is being replaced to process different parts, rather than for wear, retain the disc.
4. Install the new or replacement disc over the hub, on the sliding surface.
Ensure that the new disc slides under the Hall spreader, and lies flat on the sliding surface.
5. Reinstall the hub cover, ensuring that the holes line up with the holes in the hub.
Reinstall the four M6 socket-head cap screws to attach the cover to the hub.

Replacing the Backlight

NOTE: The infrared backlight emits no visible light, and may appear to be non-functioning. Check it with an infrared camera to verify its function before replacing. Many smart phone cameras can detect infrared, too.

The backlights on the two feeders are each held in place with four socket-head cap screws. The mounting setup is different, but the connector is the same for both.

1. Remove the power cord from the interface panel.



WARNING: Machine covers are not interlocked. Remove all power from the feeder before removing the covers.

2. Remove the feeder covers.

Retain all of the screws removed for reassembly.

The joints between the cover halves are covered with a stainless steel strip. The screws go through this strip and the covers, into the support posts.

The half cover that houses the control panel cannot be moved far from the feeder body because of all of the connections. It's best to tip the top of the cover away from the feeder body, and lay the half cover down beside the feeder.

The ring of screws around the top of the cover halves attach the top ring to the feeder body. It is easiest if you do not move the top ring. The backlight can be replaced without touching it.

3. Unplug the single connector the goes from the backlight to the connector board.

You will need to cut any cable ties attaching the backlight cable to other cables.

The connector is held in place by a spring-loaded plastic latch. Squeeze the end of the latch to release it.

4. Unscrew the four socket-head screws holding the backlight in place.

Retain the screws for reassembly.

For the model 500, those screws go through a frame horizontally into the backlight.

For the model 350, those screws go down through the top of the backlight into a frame.

5. Install the replacement backlight, using the four screws you retained from the old one.

6. Plug the backlight cable into the connector board.

Cable-tie it to the other cables, to replace the cable tie you cut in removal.

7. Replace the feeder covers.

This process is easiest if you just start a number of screws at various locations around the feeder, so you have some leeway in aligning the holes.

Note that the top ring, the cover strips, and the feeder body posts are all drilled such that they can only go one way.

Chapter 7: Maintenance

Ensure that the top ring is positioned so that the flip shield covers the end of the flip unit.

If the posts of the frame need to be aligned, they can be loosened from underneath the feeder body with a 5 mm hex wrench.

Chapter 8: Options

NOTE: When selecting additional equipment, contact our technical office.

Several options are available with the Adept FlexiBowl feeders:

Blow Unit

The first or second Flip can be replaced with a Blow unit. The Blow unit is to achieve a better separation of parts. It is mounted on the feeder's top ring.

Because of the variability of the parts that can be fed on the Adept FlexiBowl feeder, the Blow unit's copper tube must be shaped by the end user. You can cut, bend, and adapt the tubing in order to achieve the best parts separation. The Blow unit has its own commands, because its operation is different than the Flip unit. The Blow unit is normally used with a single pulse, whereas Flip units use a pulse train.

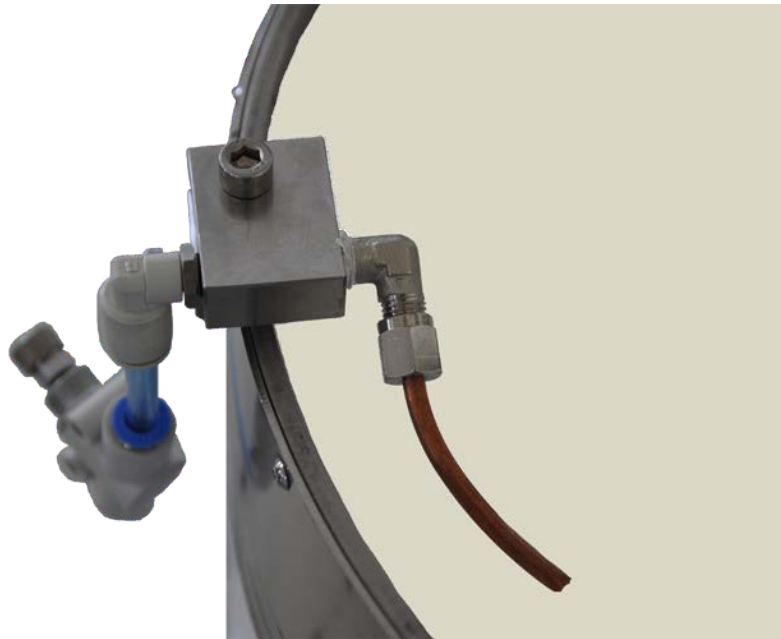


Figure 8-1. Blow Unit

Backlight

The backlight is a light, located under the Lexan window of the sliding surface, so its light will strike the bottom of the rotating disc, and the parts on the disc will be visible in silhouette to your vision system.

The backlight is available in infrared, red, and white light.

NOTE: The infrared backlight emits no visible light, and may appear to be non-functioning. Check it with an infrared camera to verify its function before replacing. Many smart phone cameras can detect infrared, too.



Figure 8-2. Backlight

Rotating Discs

There are five available rotating discs.

The white standard is the default. If a different rotating disc is ordered, it will be shipped in place of the white standard disc.

Options are:

- Thick white (1.8 mm)
- White Silicone standard thickness
- Thick white silicone (2.1 mm)
- Blue standard thickness

Second Flip Unit

A second Flip unit can be installed after the Lexan window. This unit can be actuated independently from the first one.

If a second Flip unit is ordered when purchasing the feeder, it will be installed at the factory, as will the second Flip shield.

NOTE: The FlexiBowl 350 feeder cannot be equipped with a second Flip unit. It can, however, have the Blow unit.

Chapter 9: Safety and Standards

In compliance with the laws in force relative to safety it is absolutely forbidden to remove or modify any safety device when using the machine (Presidential Decree 547/55, 392/89, and subsequent, Presidential Decree 459/96).

Carefully follow this instruction manual for installation, operation, and maintenance.

The machine is equipped with passive safety systems, designed to avoid or minimize any risk the operator may be exposed to during operation and maintenance.

9.1 Passive Safety Devices

Passive safety devices act mechanically and consist of:

- Fixed protection enclosure for all mobile parts.
- Fixed protection enclosure for all electrically live parts.
- Electrical power switch.

9.2 Solutions Adopted for the Prevention of Risks

Other security provisions to be followed by the integrator:

Type of Risk	Safety Devices
Mechanical hazards	
Electrical hazards due to direct or indirect contacts.	Low tension (24 V) command devices. Electrical switch

9.3 Provisions for Limiting Residual Risks

To limit the persistence of residual risks that cannot be identified in the current FlexiBowl supply, the user must provide personal protective systems and indications to be applied on the machine with labels to inform operators of the correct operating modalities.

The following table lists the compulsory personal protection devices required by the risk.

Type of risk	Personal Protection Devices
Abrasion, cuts, impact hazard	Gloves
Noise	N.A.
Dusts, splinters, etc.	N.A.

9.4 Labels



DANGER: Potentially lethal voltages exist within the feeder. Only qualified and trained personnel should perform service on the feeder.



WARNING: Feeder covers are not interlocked. Remove all power, both AC and DC, from the feeder before either cleaning or service.



Identity Plates and CE Marking

In compliance with the standards in force (directive EEC 89/392 and Presidential Decree 459/96), the feeder has a "CE" marked identity plate applied to its side. The plate is shown in the following graphic.

Should the identity plate deteriorate or be removed for any reason, inform the safety manager or whom it may concern immediately.

Manufactured by ars <small>srl</small> for Adept Technology, Inc.		
Model FlexiBowl - 350	Serial Number FB350- xxx	Manufacturing year 2013
Output Voltages 230 VAC 24 VDC	Input Currents 6 A max 3 A max	Air Pressure 6 bar
Power 1 kW		

Manufactured by ars <small>srl</small> for Adept Technology, Inc.		
Model FlexiBowl - 500	Serial Number FB500- xxx	Manufacturing year 2013
Output Voltages 230 VAC 24 VDC	Input Currents 6 A max 3 A max	Air Pressure 6 bar
Power 1 kW		

Figure 9-1. CE Identity Plates



CAUTION: Tampering with or removing the plate is punishable by law and will void the warranty.

9.5 Acoustic Emission Declaration



“Acoustic Emission” DECLARATION

We

ARS S.r.l.
Via P. Gobetti, 19
52100 Arezzo (Italy)

Declares under our exclusive responsibility that the Product:

FLEXIBOWL 350/500

this declaration refers to, has a continuous sound pressure level, equal to weighted “A” in the work place, during operation, up to 90db (A).

In compliance with the directive 98/24/EC, DLGS 81/2008.

Place: Arezzo
Date: 01-DEC-2012

Signature:
Full Name:


Marco Mazzini

9.6 Electromagnetic Compatibility Declaration



“EMC” DECLARATION OF CONFORMITY

We

ARS S.r.l.
Via P. Gobetti, 19
52100 Arezzo (Italy)

Declare under our exclusive responsibility that the Product:

FLEXIBOWL 350/500

This declaration refers to compliant with the following standards or with other regulations:

EN 61000-6-2:2005 electromagnetic compatibility (EMC) – Part 6-2
EN 61000-6-4:2007 electromagnetic compatibility (EMC) – Part 6-4

In compliance with the directive 2004/108/EC.

Place: Arezzo
Date: 30-OCT-2012

Signature:
Full Name:


Marco Mazzini

9.7 “CE” Declaration of Conformity



“CE” DECLARATION OF CONFORMITY

We

ARS S.r.l.
Via P. Gobetti, 19
52100 Arezzo (Italy)

Declare under our exclusive responsibility that the Product:

FLEXIBOWL 350/500

This declaration refers to compliant with the following standards or with other regulations:

DLGS 17/2010
2006/42/EC: “Partly completed machinery”

In compliance with the directive 17/2010 including the use of 2006/42/EC.

Place: Arezzo
Date: 30-OCT-2012

Signature: 
Full Name: Marco Mazzini



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