ars srl
FlexiBowl
Handbook
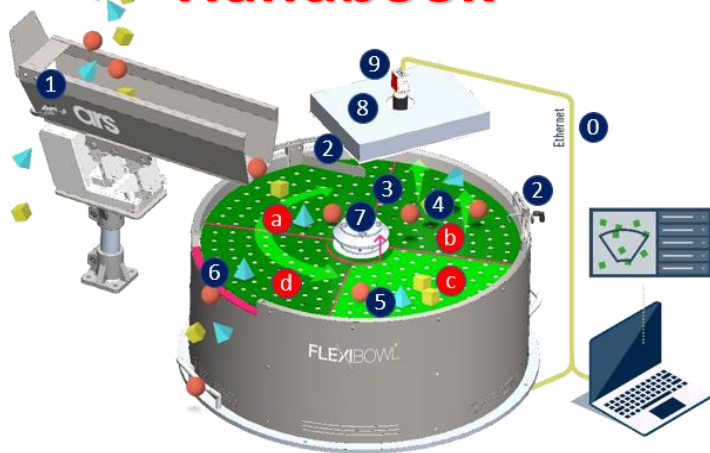
Pos.	Description
0	**Connectivity** Digital I/0, TCP/IP, UDP, Ethernet-IP
1	**Linear Hopper** Drops components and rear emptying
2	**Diverter/ Blow Unit** Diverts components from the ring
3	**Rotary Disc** Custom Discs upon request
4	**Flip Unit** Separates components
5	**Backlight**
6	**Quick Emptying** Automatic Product Changeover
7	**Quick Release** Quick Disc Change
8	**Toplight**
9	**FlexiVision System** Sends parts coordinates to the robot. Controls feeder movements and manages the parts flow from the hopper. Parts database manager
a	Dropping sector
b	Separating sector
c	Picking sector
d	Recirculating sector

Layout
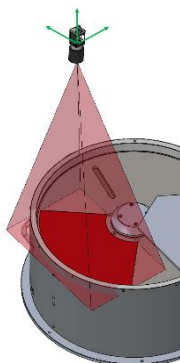
The camera is usually placed at the centre of the picking area. The height is based on the FlexiBowl® dimensions and the desired resolution.
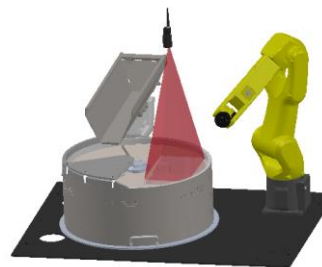
With a 1.3 MP camera and FlexiBowl® 500, it is usually used a 22mm optic at about 1mt height.
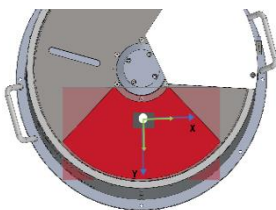
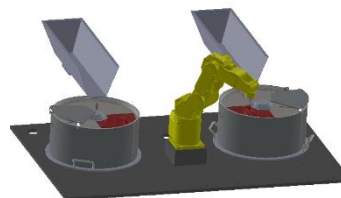| FLB	Backlight Area mm
200	180x90,5 mm
350	230x111 mm
500	334x167 mm
650	404x250 mm
800	404x325 mm

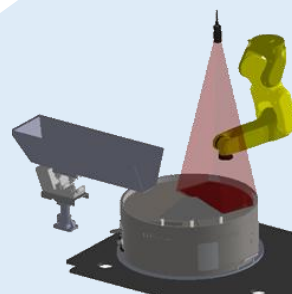**Typical configuration example**: Robot, 1 FlexiBowl, Camera and Bulk feeder

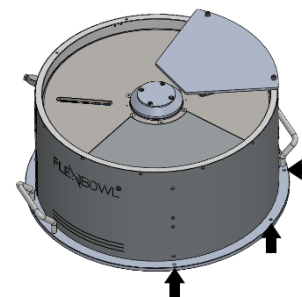**Typical configuration example**: Robot, 2 FlexiBowls, Camera and Bulk feeder

Typical configuration example: Top-Mount Robot, 1 FlexiBowl, Camera and Bulk feeder

Installation

Assembly:

Secure the FlexiBowl® to the work surface through the holes at the external circumference.

FLB	Fastening
200	5 M5 screws
350	5 M5 screws
500,650,800	4 M6 screws

Connections:

Pos.	Description
1	Outputs Connector
2	Inputs Connector
3	Pressure Indicator
4	Ethernet Port
5	Pressure Regulator
6	AC Switch
7	Status LED
8	Backlight Status LED
9	Compressed Air Connection
10	Air Connection for Air Blow Unit

### Bulk Feeder:
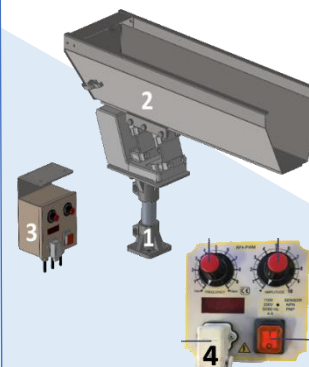
- Place the support (**1**) on the machine (use M8 screws to anchor it firmly).
- Place the vibrating base (**2**) on the support (**1**) fastening it firmly with the screws.
- Place the Controller (**3**) in a suitable place.
- Connect the system to the power supply 220Vac +/- 5% (110Vac upon request) and connect the cable of the base to the outlet connector of the Controller (**4**).
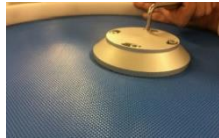
Rotary Disc:

Flexibowl® is supplied with a "Rotary Disc", which is moved by the internal motor, blocked by the superior flange. The Rotary Disc is available in different materials and types (see Rotary Discs manual). *Note*: in case the Backlight is present, the disc has to allow to the light to show through.
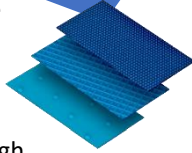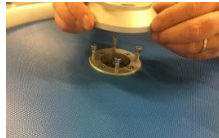
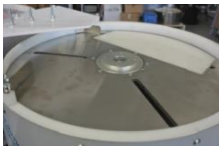## How to change the Rotary Disc:

1. Use an Allen key to unscrew the flange fixing screws without removing them

2. Turn the flange counter-clockwise and remove it

3. Remove the Rotary Disc and replace it

4. Fit a new Rotary Disc on and tighten the fixing screws to 10 Nm

How to manage an emergency:

In case of emergency, disconnect the controller power supply to disable the FlexiBowl® controls safely.

Bulk Feeder Handling:

To start the machine, proceed as described:

1. Connect the cable of the linear base to the outlet connector of the controller (then connect the vibrator to the outlet connector (1)
2. Turn the frequency adjustment (2) and amplitude adjustment (3) knob of the controller to "•"
3. Turn on the controller with the ON/OFF button (button at position 1 (4))
4. Slowly turn the adjustment knobs (2 and 3).

Before bringing vibration to maximum (Amplitude Potentiometer (3)) it is recommended to look for the maximum possible amplitude using the Frequency potentiometer (2).
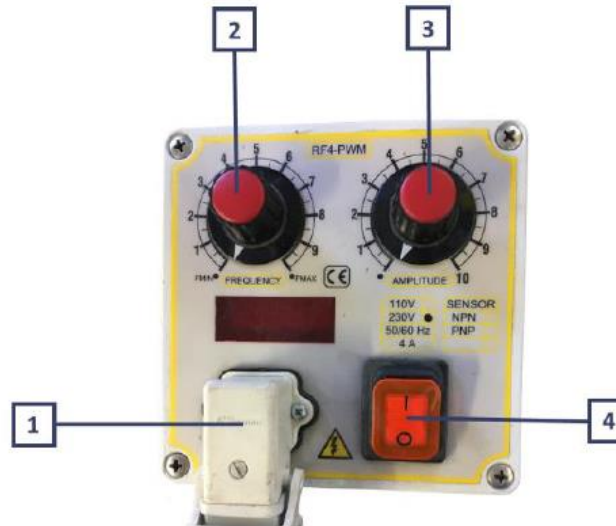
Check the dedicated manual for electric connection and potential adjustments of the inner trimmers.

FlexiBowl® Controls:

| Action	Action Description
Move	Moves the feeder the current parameters.
Move - Flip	Moves the feeder and activates Flip simultaneously
Move -Blow- Flip	Moves the feeder and activates Flip and blow simultaneously
Move - Blow	Moves the feeder and activates blow simultaneously
Shake	Shakes the feeder with the current parameters
Light on	Backlight on
Light off	Backlight off
Flip	Activates "Flip" with the current parameters
Blow	Activates "Blow" with the current parameters
Quick emptying option	Activates Quick Emptying Option
Reset Alarm	Resets Alarm and enables motor

Digital I/Os:

Input

Pin	Segnale
1	Move
2	Move-Flip
3	Move-Flip-Blow
4	Move-Blow
5	Shake
6	Backlight ON
7	Backlight OFF
8	Flip
9	Reset Alarm
10	Quick Emptying
11	Emptying door open (Solo lettura)
12	Emptying door closed (Solo lettura)
13	24Vdc out
14	24Vdc comune
15	24Vdc out
16	Strobe Backlight +
17	Strobe Backlight -

Output

Pin	Segnale
1	Busy +
2	Ready +
3	Fault +
5	Comune
4,6,7,8,9	-
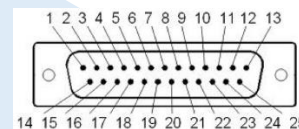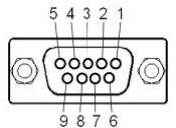
Ethernet Configuration:

Change your IP address to the same subnet mask of FlexiBowl®.

Characteristic Flb	Value
Default IP address	192.168.1.10
Default subnet mask	255.255.0.0

How to start Flexibowl HMI:

Requirements

- ✓ Windows 7 computer (or above)
- ✓ At least .Net 4.0 installed
- ✓ Admin rights on used pc

Installation

1. Insert USB
2. Go to "FlexibowlParameters" folder
3. Launch the "Flexibowl_Interface.exe" program

Connect

- ➤ Connect power supply and Ethernet cable to FlexiBowl®
- ➤ Connect from interface to default FlexiBowl® address 192.168.1.10

From here you can change the FlexiBowl® IP, test the movements, change, save or upload the parameters.

Refer to the manual for a more complete guide.

Programming:

Standard communication can be established using socket messages via UDP - TCP/IP - Ethernet/IP – Digital I/O.

Software Integration:

Software Plug-in:

TCP/IP Example with Python:

```python
import socket

def move_flb():

    #Define the address
    TCP_IP = 192.168.1.10
    TCP_PORT = 7776
    BUFFER_SIZE = 1024

    #Create the message
    MESSAGE = chr(0)+chr(7)+"QX2"+chr(13)

    #Create the socket
    s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    try:
        #Connect to socket
        s.connect((TCP_IP, TCP_PORT))

        #Send the message
        s.send(MESSAGE)

        #Recive the echo command
        data = s.recv(BUFFER_SIZE)

        #Print the message
        print("Message send: " + MESSAGE)
        print("Message recive: " + data)

        #Close the server
        s.close()

    except :
        print("Not Connected")
        return False
```
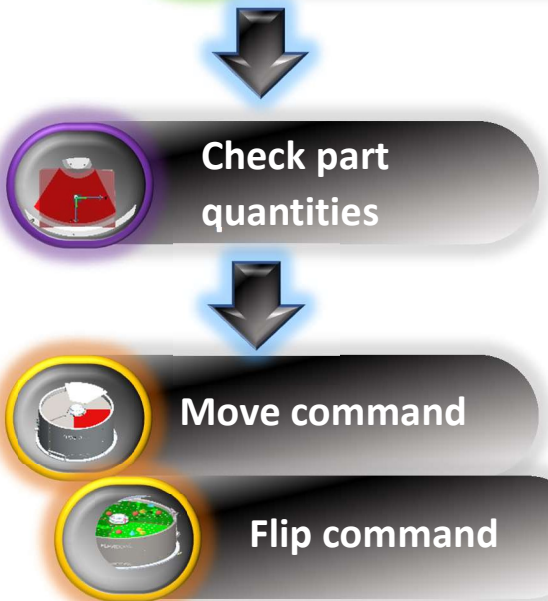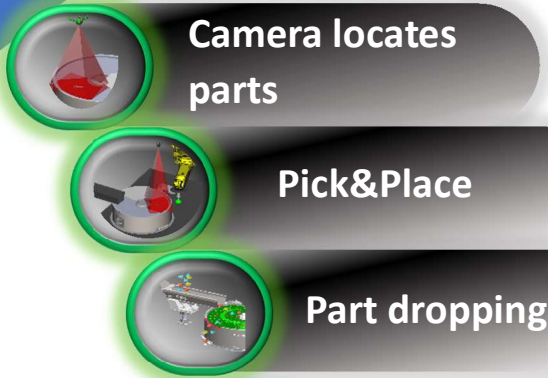
The correct syntax for each datagram is:			
Header		Description	Footer
Chr(0)	Chr(7)	Comando	Chr(13)

Control	Description
QX2	Move
QX3	Move - Flip
QX4	Move - Blow - Flip
QX5	Move - Blow
QX5	Shake
QX7	Light on
QX8	Light off
QX9	Flip
QX10	Blow
QX11	Quick Emptying Option
QX12	Reset Alarm

Layout Software:

SW program can be developed according to this simple logic sequence

Camera locates parts

Pick&Place

Part dropping

Check part quantities

Move command

Flip command

Two **Parallel Tasks** are recommended: one to handle robot movements, the second one to handle vision, Bulk Feeder and Flexibowl®.

Bulk Feeder Control:

In order to have a constant part-flow on the FlexiBowl® surface, we demonstrate one of the methods to manage the Bulk Feeder.

*Here is what we recommend to manage the part-flow from bulk feeder:*

Example: let's assume a 60-degree forward movement for the disc and 3 steps necessary to shift from picking area to hopper dropping area.
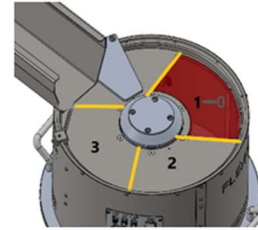
A FIFO register (shift register) stores the histogram result acquired from the camera above the picking area. The status of the last register turns the hopper on / off.
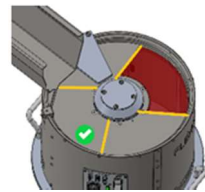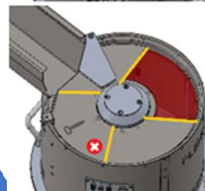
At time T0, no parts are left in the pick area Fifo array [3] is false, the hopper is activated. **Fifo array [1] is false.**
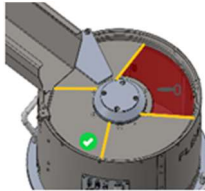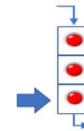
At time T1, there are parts left in the pick area, Fifo array [3] is false, the hopper is activated. **Fifo array [1] is true.**
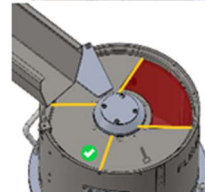
At time T2, no parts left in the pick area, Fifo array [3] is false, the hopper is activated. **Fifo array [1] is false.**
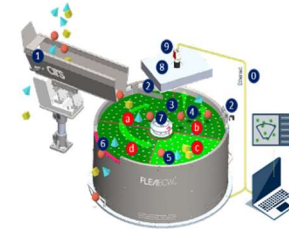
At time T3, no parts left in the pick area, Fifo array [3] is true, the hopper isn't activated. **Fifo array [1] is false.**

Documents:

All the documents are in the USB support.

Flexibowl and Bulk Feeder:

- ➢ **FlexiBowl Manual**
  User Guide Flexibowl
- ➢ **Bulk Feeder Manual**
  User Guide Bulk Feeder
- ➢ **Rotary Disck**
  Appendix A FlexiBowl-Rotary Discs

Download 3D drawings, Manuals, Software Plug-Ins directly on our website:

www.flexibowl.com

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