Manual

FlexiBowl®

ABB Plug-In

ars | Feeding Industrial Robotics

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This Plugin was developed with the idea of communicating **quickly and safely with FlexiBowl®** through ABB robots by using instructions in RAPID.

The Plugin requires an additional license to manage the sockets:

-**Pc interface.**

An optional license can be used as well:

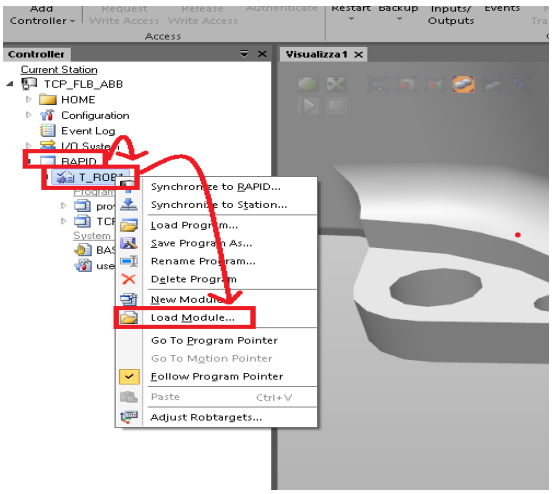
-**Multitasking**

To control and activate the hopper in a parallel task without having to block the main cycle of the robot.

FlexiBowl® Plug-In

Plug-In Installation

Step 1.

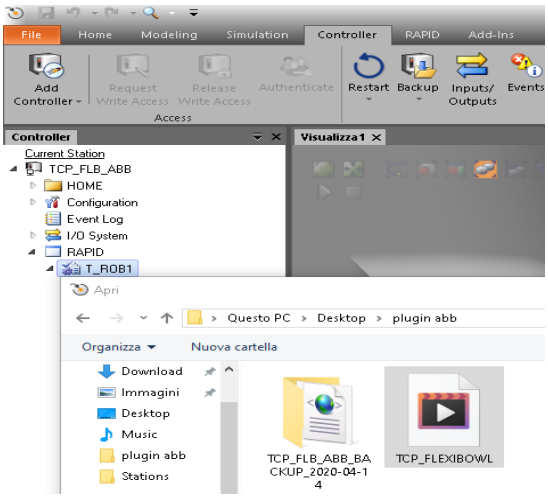


Select the following in the ***Controller*** menu:

Rapid → T_ROB1

Right click on ***T_ROB1*** and select ***Load Module***

Step 2.



In the dialogue window that appears, select the ***TCP_FLEXIBOWL*** Plugin provided by ARS.

Step 3.

```
4
5       var string returnflb;
6       returnflb:= TCP_FLB("192.168.0.161","QX2
7
```

After importing the FlexiBowl Plug-in, we just need to add these two simple lines of code in our main program to be able to control all its functions.

Plug-In Installation

Step 4.

```
5    var string returnflb;
6    returnflb:= TCP_FLB("192.168.0.161","QX2")
```

We will then need to assign ***TCP_FLB*** ***"IP"*** and ***"COMMAND"*** to the function as arguments

Step 5.

The ***TCP_FLB*** function will provide as output a string containing:
- "***done***" if the command sent was a movement command.
-***"\00" "\07" "reply from the FlexiBowl" "\0D"*** if a query command is sent to the driver

```
returnflb:= TCP_FLB
```

E.g.
Command sent= "\00" "\07" "SC" "\0D"
Reply from the FlexiBowl= -*"\00" "\07" "SC=0001" "\0D"*

FlexiBowl Command List

List of commands and descriptions to be sent to the FlexiBowl:

Correct syntax for each packet			
Header		**Command**	**Footer**
Chr(0)	Chr(7)	Comando	Chr(13)

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 Flip simultaneously
SHAKE	Shakes the feeder with the current parameters
LIGHT ON	Light on
LIGHT OFF	Light off
FLIP	Flip
BLOW	Blow
QUICK_EMPTING	Quick Emptying Option
RESET_ALARM	Reset Alarm and enable the motor

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

Script

“TCP_FLEXIBOWL“ Module.

```
MODULE TCP_FLEXIBOWL
!Dichiarazione variabili globali
!Global variables declaration  VAR string
 Return_From_FLB;  VAR socketdev
 client_socket;  VAR byte rispByteArray{50};

 func string TCP_FLB(string ip,string command)
     !Dichiarazione variabili locali  VAR string
     TCP_IP;
     VAR num TCP_port;

     !creazione socket  SocketCreate
     client_socket;
     !define ip and port (stardard tcp port= 7776 /standard udp port=7775)  TCP_IP:=ip;
     TCP_port:=7776;
     Return_From_FLB:="";
    !Convert all Lower Char in Upper Char
    command := StrMap(command,STR_LOWER, STR_UPPER);
     !call connection proc  Connection_FLB
     TCP_IP,TCP_port;
     !call sending formatted command proc  Send_FLB
     command;
     !If was a movement command (QX...) will wait untill the end of the movement  IF (
     StrFind(Return_From_FLB,1,"%")<= strlen(Return_From_FLB)) THEN
       !aspetto che il movimento sia finito e inserisco "done"come valore di ritorno  IF (
       StrFind(command,1,"Q")<= strlen(Return_From_FLB)) THEN
          Wait_No_Move;
       ENDIF  ENDIF
     !Return "done" if the command was a movement or return the
     !answare from FlexiBowl if was an  instruction
     RETURN Return_From_FLB;  endfunc


!*************************************************************************
**************************************************************************
*****************************************************************

   !handle the connection and catch rising exceptions  PROC
   Connection_FLB(string ip,num port)
      SocketConnect client_socket, ip, port;
   ERROR
      !If an error occours during the connection close the socket and write on the tp  SocketClose
      client_socket;
      TPWrite("Connection Problems");

   ENDPROC
```

Script

```
!format and send the command string to flb  PROC Send_FLB(string command)
      Return_From_FLB:="";
      !format the message adding the header (chr0 chr7) and the end of line character  (chr13)
      !and read the response from Flexibowl
      SocketSend client_socket \Str := "\00\07"+command+"\0D";
      SocketReceive client_socket\Data:=rispByteArray;
       Return_From_FLB:=Get_String_Answer(rispByteArray);
    ERROR
      !If an error occours during the connection close the socket and write on the tp
      SocketClose client_socket;
      TPWrite("Connection Problems");  ENDPROC

   FUNC string Get_String_Answer(byte byteArray{*})  VAR string sChar;
      VAR bool bLoop:=TRUE;  VAR num ii;
      ii:=3;
      WHILE bLoop DO  sChar:=ByteToStr(rispByteArray{ii}\Char);

         IF sChar<>"\0D" THEN
            Incr ii;  Return_From_FLB:=Return_From_FLB+sChar;
         ELSE
            bLoop:=FALSE;  ENDIF
      ENDWHILE

      RETURN Return_From_FLB;  ENDFUNC

    !aspetto la fine del movimento
   !wait untill the movement finish
    PROC Wait_No_Move()
      VAR string bit_s;
      VAR string bit_i;
      VAR bool moving:=TRUE;  VAR num len;

      WHILE moving DO
         !send the "status controll" command SC  Send_FLB "SC";

         !la risposta sarà del tipo : (chr0)(chr7)SC=abcd(chr13) andremo quindi ad controllare
         !il bit "c"  per sapere se il movimento è terminato
         !the standard answare will be like : (chr0)(chr7)SC=abcd(chr13) we will controll
         !the "c" bit to  know if the movement is terminated
         !Return_From_FLB:="";
         bit_s:=StrPart(Return_From_FLB,6,1);

         Send_FLB "IO";  len:=StrLen(Return_From_FLB);
         bit_i:=StrPart(Return_From_FLB,len,1);

       IF (bit_i="1" and bit_s="0") THEN  moving:=FALSE;
        ENDIF
        ENDWHILE
           SocketClose client_socket;
           Return_From_FLB:="done";
       RETURN;
      ENDPROC

ENDMODULE
```

Script

“F_PLUGIN“ Module.

Below is shown the simple module “**F_plugin**”.

```
MODULE F_plugin
    PERS robtarget place:=[[324.27,-107.97,225.31],[0.000552446,0.00305038,-0.999985,-
0.00448437],[-1,0,-1,0],[9E+09,9E+09,9E+09,9E+09,9E+09,0.0300813]];
    PERS robtarget place1:=[[324.27,-107.97,320.31],[0.000552446,0.00305038,-0.999985,-
0.00448437],[-1,0,-1,0],[9E+09,9E+09,9E+09,9E+09,9E+09,0.0300813]];
    VAR string ritorno;
    PROC main()
      pick_place;
    ENDPROC

    PROC pick_place()
      WHILE TRUE DO
        movel place,vmax,fine,tool0 \WObj:=wobj0;
        ritorno:=TCP_FLB ("192.168.125.23","QX2");
        movel place1,vmax,fine,tool0 \WObj:=wobj0;
        ritorno:=TCP_FLB ("192.168.125.23","QX6");
      ENDWHILE
    Endproc

ENDMODULE
```