

JBC

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PROGRAMMERS GUIDE



Communication Protocol

For JTSE Control Unit

Communication Protocol

This communication protocol was developed to use JBC devices in automated soldering processes. It allows communication between stations and a robot (PC or PLC).

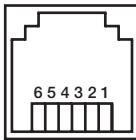
The protocol is divided into the following 3 layers:

- **PHL:** Physical Layer
- **DLL:** Data Link Layer
- **APL:** Application Layer (depends on station model)

Physical Layer (PHL)

It must be previously configured on your computer, and once connected it must not allow to change parameters from the equipment unless the connection is aborted. In addition it cannot allow new connections. To enter it is needed the express request of the user by entering to station settings and activating the robot mode, which is Control mode's type in this case.

Physically it is type RS-232 with RJ12 connector (RJ-11, only 4 pins are used) and configuration: speed from 1200 to 500000 bps; 8 bits of data; even parity, odd parity or no parity; and 1 or 2 bits of stop (e.g. 19200-8E1). See the following pin distribution:



*Female RJ12
Connector*

Pin distribution	
Pin	Description
1	NC
2	GND
3	Tx
4	Rx
5	GND
6	NC

The equipment configuration is DCE type and the robot configuration is DTE type, so that the connection cable can be direct. Anyway, you can reverse the connection type by turning the connection of one of the ends of the RJ-12 cable.

To enter it is needed the express request of the user by entering to station settings and activating the robot mode, which is Control mode's type in this case.

This type of connection does not need to maintain the connection, i.e., the connected robot can set a temperature and not send any order more. The equipment remains with the last configured status awaiting new orders.

Possible Configurations

Speed of transmission
1200 bps
2400 bps
4800 bps
9600 bps
19200 bps
38400 bps
57600 bps
115200 bps
230400 bps
250000 bps
460800 bps
500000 bps

Parity
Even
Odd
None

Stop Bits
1 bit
2 bits

Data Link Layer (DLL)

The frame format is the following, in which the field data may or may not depending on the type of frame. Furthermore the address fields may or may not appear depending on if has been activated sending / receiving with address:

With no address

Start	Control Header*	Control Command	Data*	Stop	Check
1 byte	1 byte	3 bytes	0 or 5 bytes	1 byte	1 byte
STX	'R', 'W', 'A', 'N'	"code"	"-9999" to "99999"	ETX	BCC

With address (factory default)

Start	Source Address	Target Address	Control Header*	Control Command	Data*	Stop	Check
1 byte	2 bytes	2 bytes	1 byte	3 bytes	0 or 5 bytes	1 byte	1 byte
STX	"00" to "99"	"00" to "99"	'R', 'W', 'A', 'N'	"code"	"-9999" to "99999"	ETX	BCC

*Info

Control Header Field*		Data Field
R (Read)		Is not used
W (Write)		Used
A (Acknowledgement)	Response to Reading Comands	Used
	Response to Writing Comands	Is not used
N (Negative Acknowledgement)		Used

Frame Fields

Start	Start of transmission. Corresponds to the character STX of ASCII code (0x02).
Source Address	The Source Address range is from "00" to "99". The factory setting for Robot Address is "00".
Target Address	The Target Address range is from "00" to "99". Factory settings for JBC devices are as follows: · Soldering Stations Address is "01" · Solder Feeder Address is "10" · Fume Extractor Address is "20"
Control Header	Four codes are used (see table from page 4).
Control Command	Select the command to be used (see pages 10-17).
Data	Composed of five digits. First tens of thousand is sent and thereafter successively until the last unit. Example: in order to send "12345" it is first sent "1", and finally "5". If it is a negative number, the minus sign is at the tens of thousands digit, shown as an ASCII character "-". Example: In order to send "-50", the data will be sent is "-0050". If the number has less than five digits, then zeros will be placed before. Example: in order to send "375" the data will be sent is "00375".
Stop	End of transmission. Corresponds to the ASCII code character ETX (0x03).
Check	This is an error Check Field. The value is obtained by calculating the logic function XOR for the whole frame, excluding the BCC.

Connection Description

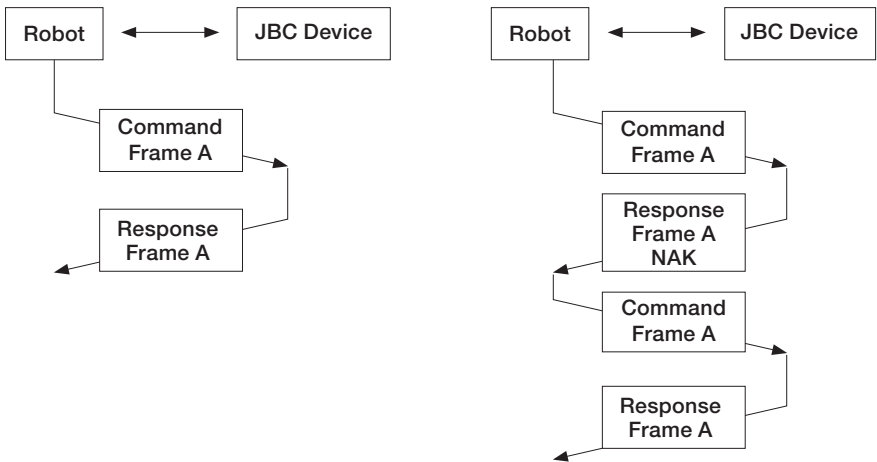
Connection is selected from the station by activating the Robot mode. The equipment will only respond to instructions from the RS232 connection. This type of connection does not have an initial connection stage or a time-out to control the connection. It can only be activated and deactivated from the station.

Frame Reception

Every frame that the robot sends to JBC equipment is evaluated at “data layer link (DLL)”. To know if the received frame is correct or not if: it starts with STX + finishes with ETX + correct BCC + correct length.

Once you have checked this is correct, the information is sent to application level (APL) and this will answer with a frame according to what is requested. Or else it is the layer link which answers with a frame of the type NACK.

The number of repetitions followed by erroneous frames is determined by the Robot programmer.



The number of repetitions followed by erroneous frames is determined by the Robot. The JBC equipment does not expect an ACK from the information the Robot sends. If the Robot receives a frame with errors, it cannot ask this to be resent, so that it only can repeat everything once again.

Application Layer (APL)

The application layer offers several services through order-answer type. The communication always begins in the ROBOT and the UC destination responds with a frame answer.

The data is always in ASCII five digit bytes.

- Temperatures are always shown in °C.
- The power is given as in thousands of the theoretical maximum power station [‰] without decimals.

A list of other kinds of data follows:

When the equipment is connected to the Robot, the tools ignore the sleep mode and the stand extractor. The tool status is decided by the Robot.

Neither do the temperature nor temperature levels regulators work.

Tools:

Number	Description
00000	Without tool
00001	JT
00002	TE

Ports:

Number	Description
00001	Port 1

Tool Errors:

Number	Description
00000	OK
00001	Air pump malfunction
00002	Insufficient air flow: check for air leaks or obturation in heater
00003	Heater malfunction: replace heater
00004	Thermocouple needed
00005	Self temp. not reached
00006	Short-circuit: replace heater
00007	Incorrect tool resistance
00008	Incorrect heater
00009	No tool
00010	Checking tool

Station Errors:

Number	Description
00000	OK
00001	Stop by overload (TRAFO) (not used)
00002	Temperature sensor (not used)
00003	Memory
00004	Mains frequency
00005	Station model
00006	Not connected MCU Tools

Communication Errors:

Number	Description
00001	BCC error (frame error when doing the sum check)
00002	Format error (format is not correct, i.e. incorrect size)
00003	Out of range (modified value out of limit)
00004	Control error (control code not accepted)
00005	Control Mode (must control the equipment, robot mode)
00006	Station model error (station unknown)
99999	Undefined (error not defined)

Tool Status:

Number	Description
XXXX0	Tool OFF
XXXX1	Tool ON (heater ON, air pump ON)

Cooling Status:

Number	Description
XXX0X	Cooling OFF
XXX1X	Cooling ON (heater OFF, air pump ON)

Suction Status:

Number	Description
XX0XX	Suction OFF
XX1XX	Suction ON

Work Modes:

Number	Description
00000	Manual mode (Profiles OFF)
00001	Profile mode (Profiles ON)

Commands

Code	Description	Details
<p>R-STx</p>	<p>Read - Select. Air Temperature + port</p>	<p>To read the selected air temperature, you need to replace the 'x' with the number of the destination port in ASCII, for example, "RST1".</p> <p>The equipment answers with an "ASTx" as the control field, as in the example "AST1".</p> <p>The data field will contain the requested information. Table "Ports" in page 7 lists the number of available ports.</p>
<p>W-STx</p>	<p>Write - Select. Air Temperature + port</p>	<p>To modify the selected air temperature, the 'x' should be replaced with the destination port in ASCII, for example "WST3".</p> <p>Equipment answers with an "ASTx" as the control field, in the example "AST1".</p> <p>Warning: selected temperature is a volatile setting, therefore use the WNVS frame in order to save it into the station memory.</p>
<p>R-SFx</p>	<p>Read - Select. Air Flow + port</p>	<p>To read the selected air flow, you need to replace the 'x' with the number of the destination port in ASCII, for example, "RSF1".</p> <p>The equipment answers with an "ASFx" as the control field, as in the example "ASF1".</p> <p>The data field will contain the requested information. See Ports table on page 7 to check the number of available ports.</p>
<p>W-SFx</p>	<p>Write - Select. Air Flow + port</p>	<p>To modify the selected air flow, the 'x' should be replaced with the destination port in ASCII, for example "WSF1".</p> <p>Equipment answers with an "ASFx" as the control field, in the example "ASF1".</p>

Code	Description	Details
R-SEx	Read - Select. External Temperature + port	<p>To read the selected external temperature, you need to replace the 'x' with the number of the destination port in ASCII, for example, "RSE1".</p> <p>The equipment answers with an "ASEx" as the control field, as in the example "ASE1".</p> <p>The data field will contain the requested information.</p> <p>Table "Ports" in page 7 lists the number of available ports.</p>
W-SEx	Write - Select. External Temperature + port	<p>To modify the selected air flow, the 'x' should be replaced with the destination port in ASCII, for example "WSE1".</p> <p>Equipment answers with an "ASEx" as the control field, in the example "ASE1".</p>
R-ATx	Read - Air Temperature + port	<p>To read the real air temperature from tool thermocouple, the 'x' must be replaced with the number of the destination port in ASCII, for example, "RAT1".</p> <p>The equipment answers with an "AATx" as the control field, as in the example "AAT1". Data field will contain the requested information.</p>
R-ETx	Read - External Temperature + port	<p>To read the real temperature from external thermocouple, the 'x' must be replaced with the number of the destination port in ASCII, for example, "RET1".</p> <p>The equipment answers with an "AETx" as the control field, as in the example "AET1". Data field will contain the requested information.</p>

Code	Description	Details
R-WMx	Read - Work Mode + port	<p>To read the selected work mode, you need to replace the 'x' with the number of the destination port in ASCII, for example, "RWM1".</p> <p>The equipment answers with an "AWMx" as the control field, as in the example "AWM1".</p> <p>The data field will contain the requested information. Table "Ports" in page 7 lists the number of available ports. Table "Work Modes" in page 7 lists the work modes available.</p>
W-WMx	Write - Work Mode + port	<p>To modify the selected work mode, the 'x' should be replaced with the destination port in ASCII, for example "WWM1".</p> <p>Equipment answers with an "AWMx" as the control field, in the example "AWM1".</p> <p>Table "Work Modes" in page 7 lists the work modes available.</p>
R-PPx	Read - Port Power + port	<p>To read the power supplied to the tool, the 'x' must be replaced with the number of destination port in ASCII, for example "RPP3".</p> <p>The equipment answers with an "APPx" as the control field, in the example "APP1".</p> <p>Data field will contain the requested information.</p>
R-PEx	Read - Port Error + port	<p>To read the port error, the 'x' must be replaced with the number of the destination port in ASCII, for example "RPE1".</p> <p>Equipment answers with an "APEx" as the control field, in the example "APE1".</p> <p>Field data will contain the requested information. Table "Tool Errors" in page 7 lists the possible tool errors.</p>

Code	Description	Details
R-PSx	Read - Port Status + port	<p>To read the port status, the 'x' must be replaced with the number of the destination port in ASCII, for example "RPS1".</p> <p>The equipment answers with an "APSx" as the control field, in the example "APS1".</p> <p>Control field will contain the requested information. Table "Tool Errors" in page 7 lists the possible tool errors.</p>
W-PSx	Write - Port Status + port	<p>To modify the port status, the 'x' must be replaced with the number of the destination port in ASCII, for example "WPS1". The data field will contain the value you need to modify (see list of tool status).</p> <p>The only permitted values of this table are 00000 – 00001 since entering sleep or hibernation mode will depend on the parameters programmed in the station (delay).</p> <p>The equipment answers with an "APSx" as the control field, as in the example "APS1".</p> <p>When the equipment is connected to a robot, the tools ignore the sleep mode and the stand extractor, the tool status is decided by the robot.</p>
R-CTx	Read - Connected Tool + port	<p>To read the connected tool, the 'x' must be replaced with the number of the destination port in ASCII, for example "RCT1".</p> <p>The equipment answers with an "ACTx" as the control field, as in the example "ACT1".</p> <p>The data field will contain the requested information.</p>
R-Axy	Read - Adjust. Temp. + port + tool	<p>To read the tool adjustment temperature, the 'x' must be replaced with the destination port in ASCII, and 'y' with the specific tool. For example "RA11", port 1 and tool 1 (JT).</p> <p>The equipment answers with an "Axy" as the control field, in the example "AA11".</p> <p>The data field will contain the requested information.</p>

Code	Description	Details
W-Axy	Write - Adjust Temp. + port + tool	<p>To modify the adjustment of the temperature, the 'x' must be replaced with the number of destination port in ASCII, and 'y' with the specific tool. For example "WA11", port 1 and tool 2 (JT).</p> <p>The equipment answers with an "AAxy" as the control field, in the example "AA11".</p>
R-SMN	Read - Station Model Name	<p>To read the station model name. For example "DDR".</p> <p>The equipment answers with an "ASMN" as the control field.</p> <p>The data file will contain the requested information.</p>
R-MAT	Read - Maximum Temperature	<p>To read the maximum working temperature of the station.</p> <p>The equipment answers with an "AMAT" as the control field.</p> <p>The data file will contain the requested information.</p>
W-MAT	Write - Maximum Temperature	<p>This modifies the maximum working temperature.</p> <p>The equipment answers with an "AMAT" as the control field.</p>
R-MIT	Read - Minimum Temperature	<p>To read the minimum working temperature.</p> <p>The equipment answers with an "AMIT" as the control field.</p> <p>The data field will contain the requested information.</p>
W-MIT	Write - Minimum Temperature	<p>It modifies the minimum working temperature.</p> <p>The equipment answers with an "AMIT" as the control field.</p>

Code	Description	Details
R-MAF	Read - Maximum Air Flow	To read the maximum working air flow of the station. The equipment answers with an "AMAF" as the control field. The data file will contain the requested information.
W-MAF	Write - Maximum Air Flow	This modifies the maximum working air flow of the station. The equipment answers with an "AMAF" as the control field.
R-MIF	Read - Minimum Air Flow	To read the minimum working air flow of the station. The equipment answers with an "AMIF" as the control field. The data field will contain the requested information.
W-MIF	Write - Minimum Air Flow	It modifies the minimum working air flow of the station. The equipment answers with an "AMIF" as the control field.
R-MAE	Read - Maximum External Temperature	To read the maximum working external temperature of the station. The equipment answers with an "AMAE" as the control field. The data file will contain the requested information.
W-MAE	Write - Maximum External Temperature	This modifies the maximum working external temperature of the station. The equipment answers with an "AMAE" as the control field.
R-MIE	Read - Minimum External Temperature	To read the minimum working external temperature of the station. The equipment answers with an "AMIE" as the control field. The data field will contain the requested information.

Code	Description	Details
W-MIE	Write - Minimum External Temperature	<p>To read the maximum working air flow of the station.</p> <p>The equipment answers with an "AMAF" as the control field.</p> <p>The data file will contain the requested information.</p>
R-SER	Read - Station Error	<p>To read the station error.</p> <p>The equipment answers with an "ASER" as the control field.</p> <p>The data field will contain the requested information. See table "Station Errors" in page 8.</p>
W-RSP	Write - Reset Station Parameters	<p>To reset the station parameters at factory values.</p> <p>The equipment answers with an "ARSP" as the control field.</p>
R-OHx	Read Counter Plugged Hours + port	<p>To read the connected-hours counter, the 'x' must be replaced with the number of destination port in ASCII of the request, for example "ROH1".</p> <p>The equipment answers with an "AOHx" as the control field, in the example, "AOH1".</p> <p>The data field will contain the requested information.</p>
R-WHx	Read - Counter Work Hours + port	<p>To read the working hours counter, the 'x' must be replaced with the number of the destination port in ASCII, for example "RWH1".</p> <p>The equipment answers with an "AWHx" as the control field, in the example "AWH1".</p> <p>The data field will contain the requested information.</p>

Code	Description	Details
R-TCx	Read - Counter Tool Cycles + port	<p>To read the tool work-cycles counter, the 'x' must be replaced with the number of destination port in ASCII of the request, for example "RTC1".</p> <p>The equipment answers with an "ATCx" as the control field, in the example, "ATC1".</p> <p>The data field will contain the requested information.</p>
R-SCx	Read - Counter Suction Cycles + port	<p>To read the desoldering counter cycles the 'x' must be replaced with the destination port number in ASCII , for example "RSC1".</p> <p>The equipment answers with an "ASCx" as the control field, in the example "ASC1".</p> <p>Data field will contain the requested information.</p>



This product should not be thrown in the garbage.
In accordance with the European directive 2012/19/EU, electronic equipment at the end of its life must be collected and returned to an authorized recycling facility.



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