JBC

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PROGRAMMERS GUIDE

Communication Protocol

For DDR and HDR Control Units

Communication Protocol

This communication protocol was developed to use JBC devices, such as DDR and HDR stations, in automated soldering processes. It allows communication between these 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)

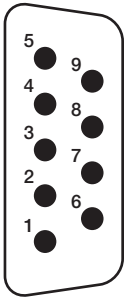
Supported software versions or higher:
- HDR: 9996779
- DDR: 9996780

Physical Layer (PHL)

The Robot mode can be activated and deactivated with the menu option “station settings” by clicking on “robot” mode. It is in “off “by default. When the robot mode is activated, no communication through the USB is permitted.

Physically of type RS-232 with connector DB-9, and configuration: speed 19200 bps; 8 bits of data; no parity; and 1 bit of stop (19200-8N1).

Pin distribution is as follows:



DB9 Connector

Pin distribution	
Pin	**Description**
1	NC
2	Tx
3	Rx
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC

The equipment configuration is DCE type and the robot configuration is DTE type, so that the connection cable can be direct.

Data Link Layer (DLL)

The frame format is the following, in which the data field may or may not depending on the type of frame.

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

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

***In case of Negative Acknowledgement, the Data Field contains one of the following Error Values:*

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 (modifying value out of limit)
00004	Control error (control command not accepted)
00006	JBC device model error (device unknown)
00009	Undefined (error not defined)

Frame Fields

Start	Start of transmission. Corresponds to the character STX of ASCII code (0x02).
Control Header	Four Codes are used (see table from previous page).
Control Command	Select the command which should be used (see pages 10-18).
Data	Shown in 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 code “-”. Example: In order to send “-50”, the data that 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 that 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

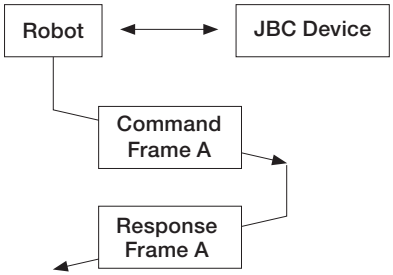
Connection is selected from the station by activating the Robot mode. The equipment will only respond to instructions from the RS232 connection. This type of connection does not have an initial connection stage or a time-out to control the connection. It can only be activated and deactivated from the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

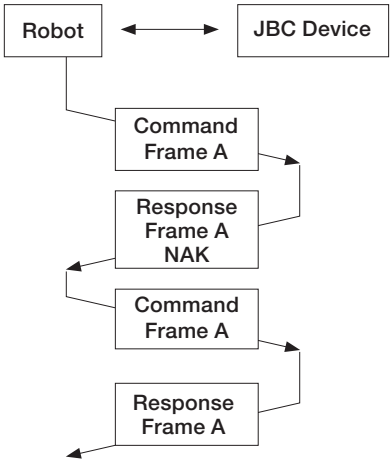
Frame Reception

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.





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 ºC.
- 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
0	Without tool
1	T210
2	T245
3	PA
4	HT
5	DS
6	DR
7	NT105
8	NP105

Ports:

Number	Description
1	Port 1
2	Port 2
3	Port 3
4	Port 4

Tool Errors:

Number	Description
00000	OK
00001	Short-circuit
00002	Short-circuit non-recoverable, equipment should be restarted
00003	Open circuit
00004	No tool
00005	No tool accepted
00006	Tool detection
00007	Stop due to maximum power (not implemented)
00008	Stop due to overload (MOS)

Station Errors:

Number	Description
00000	OK
00001	Stop by overload (TRAFO)
00002	Temperature sensor
00003	Memory
00004	Mains frequency

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 equimpent, robot mode)

Tool Status:

Number	Description
00000	No stand
00001	Stand, it still has not gone into sleep mode (delay)
00002	Sleep
00003	Hibernation

Cooling Status:

Number	Description
00000	Extractor OFF
00010	Extractor ON

Suction Status:

Number	Description
00000	Desoldering OFF
00100	Desoldering ON

List of Stations:

Type	Description
DDR	• 2 ports for tools • Supported tools: T210, T245, PA, HT, DS and DR • Maximum temperature: 450 ºC • Minimum temperature: 90 ºC • Maximum factory temperature: 400 ºC • Minimum factory temperature: 200 ºC • Maximum power delivered by 150 W • One expansion port : MS, MV, MN and FS
HDR	• One port for tool • Supported tools: T470 • Maximum temperature: 500 ºC • Minimum temperature: 90 ºC • Maximum factory temperature: 450 ºC • Minimum factory temperature: 200 ºC • Maximum power delivered by 270 W

Commands

Code	Description	Details
R-STx	Read - Select Temperature + port	To read the selected temperature, you need to replace the 'x' with the number of the destination port in ASCII, for example, "RST3". The equipment answers with an "ASTx" as the control field, as in the example "AST3". The data field will contain the requested information. Table "Ports" in page 7 lists the number of available ports.
W-STx	Write - Select Temperature + port	To modify the selected temperature, the 'x' should be replaced with the destination port in ASCII, for example "WST3". Equipment answers with an "ASTx" as the control field, in the example "AST3". **Warning**: selected temperature is a volatile setting, therefore use the WNVS frame in order to save it into the station memory.
R-TTx	Read - Tip Temperature + port	To read the real tip temperature, the 'x' must be replaced with the number of the destination port in ACCII, for example, "RTT3". The equipment answers with an "ATTx" as the control field, as in the example "ATT3". Data field will contain the requested information.
R-PPx	Read - Port Power + port	To read the power supplied to the tool, the 'x' must be replaced with the number of destination port in ASCII, for example "RPP3". The equipment answers with an "APPx" as the control field, in the example "APP3". Data field will contain the requested information.

Code	Description	Details
R-PEx	Read - Port Error + port	To read the port error, the 'x' must be replaced with the number of the destination port in ASCII, for example "RPE3". Equipment answers with an "APEx" as the control field, in the example "APE3". Field data will contain the requested information (see page 8 for tool errors table).
R-PSx	Read - Port Status + port	To read the port status, the 'x' must be replaced with the number of the destination port in ASCII, for example "RPS3". The equipment answers with an "APSx" as the control field, in the example "APS3". Control field will contain the requested information (see page 9 for tool status table).
W-PSx	Write - Port Status + port	To modify the port status, the 'x' must be replaced with the number of the destination port in ASCII, for example "WPS3". The data field will contain the value you need to modify (see list of tool status). 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). The equipment answers with an "APSx" as the control field, as in the example "APS3". 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.
R-CTx	Read - Connect Tool + port	To read the connected tool, the 'x' must be replaced with the number of the destination port in ASCII, for example "RCT3". The equipment answers with an "ACTx" as the control field, as in the example "ACT3". The data field will contain the requested information.

Code	Description	Details
R-EDx	Read - Enter Delay Time (Sleep-Hibernation) + port	To read the delay time in seconds before going into sleep or hibernation mode, the ‘x’ must be replaced with the number of the destination port in ASCII , for example, “RED3”. The equipment answers with an “AEDx” as the control field, as in the example “AED3”. The data field will contain the requested information.
R-Axy	Read - Adjust Temp. + port + tool	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 “RA32”, port 3 and tool 2 (T245). The equipment answers with an “AAxy” as the control field, in the example “AA32”. The data field will contain the requested information.
W-Axy	Write - Adjust Temp. + port + tool	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 “WA32”, port 3 and tool 2 (T245). The equipment answers with an “AAxy” as the control field, in the example “AA32”.
R-Sxy	Read - Sleep Temp. + port + tool	To read sleep temperature of the tool, the ‘x’ must be replaced with the number of destination port in ASCII, and ‘y’ by the specific tool. For example “RS32”, port 3 and tool 2 (T245). The equipment answers with an “ASxy” as the control field, in the example “AS32”. The data field will contain the requested information.

Code	Description	Details
W-Sxy	Write - Sleep Temp. + port + tool	To modify the sleep temperature, the 'x' must be replaced with the number of destination port in ASCII, and 'y' with the specific tool. For example "WS32", port 3 and tool 2 (T245). The equipment answers with an "ASxy" as the control field, in the example "AS32".
R-Dxy	Read - Sleep Delay + port + tool	To read sleep delay of the tool, the 'x' must be replaced with the number of the destination port in ASCII, and 'y' with the specific tool. For example "RD32", port 3 and tool 2 (T245). The equipment answers with an "ADxy" as the control field, in the example "AD32". The data field will contain the requested information. If received "99999", it means the sleep mode is disabled.
W-Dxy	Write - Sleep Delay + port + tool	To modify the sleep delay, the 'x' must be replaced with the number of the destination port in ASCII, and 'y' with the specific tool. For example, "WD32", port 3 and tool 2 (T245). The equipment answers with an "ADxy" as the control field, in the example "AD32". To disable the sleep mode, send "99999".
R-Hxy	Read - Hibernation Delay + port + tool	To read the sleep delay temperature of the tool, the 'x' must be replaced with the number of destination port in ASCII, and 'y' with the specific tool. For example "RH32", port 3 and tool 2 (T245). The equipment answers with an "AHxy" as the control field, in the example "AH32". The data field will contain the requested information.

Code	Description	Details
W-Hxy	Write - Hibernation Delay + port + tool	To modify the hibernation delay, the 'x' must be replaced with the number of the destination port in ASCII, and 'y' with the specific tool. For example, "WH32", port 3 and tool 2 (T245). The equipment answers with an "AHxy" as the control field, as in the example "AH32".
R-QTx	Read - Transistor Temperature + port	To read the transistor temperature regulation, the 'x' must be replaced with the number of destination port in ASCII, for example "RQT3". The equipment answers with an "AQTx" as the control field, in the example "AQT3". The data field will contain the requested information.
R-HAx	Read - Higher Temperature Alarm + port	To read the higher temperature alarm, the 'x' must be replaced with the number of destination port in ASCII, for example "RHA3". The equipment answers with an "AHAx" as the control field, in the example, "AHA3". Data field will contain the requested information.
W-HAx	Write - Higher Temperature Alarm + port	To modify the higher temperature alarm, the 'x' must be replaced with the number of destination port in ASCII, for example "WHA3". The equipment answers with an "AHAx" as the control field, in the example "AHA3".

Code	Description	Details
R-LAx	Read - Lower Temperature Alarm + port	To read the lower temperature alarm, the 'x' must be replaced with the number of the destination port in ASCII, for example "RLA3". The equipment answers with an "ALAx" as the control field, in the example "ALA3". The data field will contain the requested information.
W-LAx	Write - Lower Temperature Alarm + port	To modify the lower temperature alarm, the 'x' must be replaced with the destination port number in ASCII, for example "WLA3". The equipment answers with an "ALAx" as the control field, in the example "ALA3".
R-TAx	Read - Temperature Alarm + port	To read the alarm flag, once you have read the flag this is deleted. The 'x' must be replaced with the number of the destination port in ASCII, for example "RTA3". The equipment answers with an "ATAx" as the control field, in the example "ATA3". The data field will contain the requested information. The unit digit contains the high temperature flag alarm: • '0' there is no alarm • '1' the alarm has been on The tens digit contains the low temperature alarm flag: • '0' there is no alarm • '1' alarm has been on
R-SMN	Read - Station Model Name	To read the station model name. For example "DDR". The equipment answers with an "ASMN" as the control field. The data file will contain the requested information.

Code	Description	Details
R-MAT	Read - Maximum Temperature	To read the maximum working temperature of the station. The equipment answers with an “AMAT” as the control field. The data file will contain the requested information.
W-MAT	Write - Maximum Temperature	This modifies the maximum working temperature. The equipment answers with an “AMAT” as the control field.
R-MIT	Read - Minimum Temperature	To read the minimum working temperature. The equipment answers with an “AMIT” as the control field. The data field will contain the requested information.
W-MIT	Write - Minimum Temperature	It modifies the minimum working temperature. The equipment answers with an “AMIT” as the control field.
R-PLM	Read - Power Limit	To read by the thousands the maximum power delivered by the station to a tool. The equipment answers with an “APLM” as the control field. The data field will contain the requested information.
W-PLM	Write - Power Limit	To modify the maximum power delivered by the station to a tool. The equipment answers with an “APLM” as the control field.

Code	Description	Details
R-SER	Read - Station Error	To read the station error. The equipment answers with an “ASER” as the control field. The data field will contain the requested information.
R-TT	Read - Transformer Temperature	To read the temperature of the transformers. The equipment answers with an “ATT” as the control field. The Control field will contain the requested information.
W-RSP	Write - Reset Station Parameters	To reset the station parameters at factory values. The equipment answers with an “ARSP” as the control field.
R-CPx	Read - Counter Plugged Hours + port	To read the connected-hours counter, the ‘x’ must be replaced with the number of destination port in ASCII , for example “RCP3”. The equipment answers with an “ACPx” as the control field, in the example, “ACP3”. The data field will contain the requested information.
R-CNx	Read - Counter No Tool Hours + port	To read by the thousands the maximum power delivered by the station to a tool. The equipment answers with an “APLM” as the control field. The data field will contain the requested information.
R-CSx	Read - Counter Sleep Hours	To read the counter of sleep hours, the ‘x’ must be replaced with the number of destination port in ASCII, for example “RCS3”. The equipment answers with an “ACSx” as the control field, in the example “ACS3”. Data field will contain the requested information.

Code	Description	Details
R-CHx	Read - Counter Hibernation Hours + port	To read the counter of hibernation hours, the 'x' must be replaced with the number of the destination port in ASCII, for example "RCH3". The equipment answers with an "ACHx" as the control field, in the example "ACH3". Data field will contain the requested information.
R-CWx	Read - Counter Work Hours + port	To read the working hours counter, the 'x' must be replaced with the number of the destination port in ASCII, for example "RCW3". The equipment answers with an "ACWx" as the control field, in the example "ACW3". The data field will contain the requested information.
R-CCx	Read - Counter Sleep + port	To read the counter sleep cycles, the 'x' must be replaced with the number of the destination port in ASCII, for example "RCC3". The equipment answers with an "ACCx" as the control field, in the example "ACC3". The data field will contain the requested information.
R-CDx	Read - Counter Desold + port	To read the desoldering counter cycles the 'x' must be replaced with the destination port number in ASCII , for example "RCD3". The equipment answers with an "ACDx" as the control field, in the example "ACD3". Data field will contain the requested information.

Notes

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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More information available on our website

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