



# ERCP 81

## USER MANUAL

Réf : M – ERCP 81 – 1.0-GB

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## PREFACE

### Purpose of this manual

This technical manual describes the protocol for dialogue between two ERCPCs.  
The performance levels and general characteristics are given in the appended Technical Data Sheet.

### Reference of the manual

The generic reference of a manual is:

- M - <name of the product> - x.y - L where
- M means Manual
- x specifies the number of the document version
- y specifies the page index (local modification)
- L is the language used.

### Update

Version	Index	Date	Nature of the change
1	0	02/03/2006	Original document

### Note

The information contained in the present manual may be modified without prior notice.  
The company BALOGH cannot be held responsible for the consequences of any errors or omissions,  
or for the erroneous interpretation of the information.

## **1 DESCRIPTION**

The ERCP 81 is a short-range transceiver that operates at a carrier frequency of 13.56 MHz. It is a single-point device with integrated antenna, equipped with two cylindrical connectors.

Based on inductive transmission (range under 1 meter), it dialogs with a second identical device facing it in ground/aboard data exchange applications (railway applications). Through an RS422 serial link (8 pins connector), it sends the received data from the transceiver facing it to a ground control equipment (PLC, PC, etc.), and receives from it the data to be transmitted to the facing device. A second connector (19 pins) brings together the input/output data.

When two ERCP81 are in the transmission zone, the logical levels applied to the inputs of one device are copied to the outputs of the other device and vice versa.

The two devices (fixed and mobile) are materially identical. So that the two ERCP 81 do not transmit simultaneously, one of the two devices is declared "Master" and gives the other (declared "Slave") the authorization to transmit. This command is contained in the communication protocol on the serial link (see paragraph 2.2) and has the following consequences:

- The master transmits continuously for it is either seeking the other device, or is in communication with the other device (two-way half-duplex data exchange),
- The slave only transmits when polled by the master.

The ERCP 81 can equally work with only one connector or with two linked up connectors.

If only the connector of inputs/outputs is used, it is the pin "P" of connector 19 pins which defines the master or slave operating mode (see § connection of the datasheet). When the "master" mode is declared by this method, it has priority, and the declarations of mode made by the link series will not be taken into account

## **2 FRAME STRUCTURE**

Each ERCP 81 is connected to the interface by a full-duplex RS 422 serial link.

Transmission speed: 19,200 bauds.

### **2.1 STRUCTURE OF A CHARACTER SENT OR RECEIVED BY THE ERCP81**

- A start bit
- Eight data bits (the least significant bit is sent first).
- A parity bit (even parity)
- A stop bit.

The characters in the same message must not be separated by a time greater than the time it takes to send two characters.

## 2.2 STRUCTURE OF MESSAGES SENT OR RECEIVED BY THE ERCP 81

The successive messages must be separated by a time equal to the time it takes to send 5 characters.  
General message structure:

**<Length/Error><Function><Contents>**

**<Length/Error>**: Field one byte in length:

### In transmission:

The 4 most significant bits give the size of the whole message (2 or 14 bytes), the 4 least significant bits represent a radio transmission error counter.

In the case of a valid exchange, the content of the error counter does not change.

In the case of an invalid exchange, the content of the error counter is incremented by 1 (with saturation at the maximum value of 15 or 4 bits). The ERCP 81 transmits the last valid message received during this transmission or, if no valid message has been received during the transmission, it transmits an acquisition error message to the interface.

The error counter is reset to 0 outside of radio communication phases.

### In reception :

The 4 most significant bits give the size of the whole message (14 bytes); the 4 least significant bits are forced to zero.

**< Function >**: Field one byte in length with the value:

### In transmission :

bit	bit	bit	bit	bit	bit	bit	bit
7	6	5	4	3	2	1	0

Tableau 1

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	
0	0	0	0	0	0	0	1	acknowledgement of receipt and end of message Total length of the message = 2 bytes
0	0	0	0	0	0	1	0	reject notice for incorrect reception and end of message Total length of the message = 2 bytes
E4	E3	E2	E1	0	0	1	1	transmission of message contents to the interface E1 to E4 are images of the facing device inputs. Total length of the message = 14 bytes
0	0	0	0	0	1	0	0	Error during radio transmission and end of message Total length of the message = 2 bytes
E4	E3	E2	E1	0	1	1	1	Sending of the facing device identifier to interface. E1 à E4 are images of the facing device inputs. Total length of the message = 14 bytes

**In reception :**

bit	bit	bit	bit	bit	bit	bit	bit
7	6	5	4	3	2	1	0

Tableau 2

0	0	0	0	0	0	1	1	Assignment of slave status with reception of data to transmit Total length of the message = 14 bytes
0	0	0	0	0	1	0	1	Assignment of master status with reception of data to transmit Total length of the message = 14 bytes
0	0	0	0	0	1	1	1	Writing of an identifier in memory EEPROM (12 bytes) Total length of the message = 14 bytes

**<Contents > :** Field 12 bytes in length:

This field represents the message contents received or sent by the ERCP 81.

### 3 OPERATION

#### 3.1 POWER UP

When powered up, the ERCP 81 charges the contents of its memory (EEPROM) in the buffer of transmission and puts itself in "slave" mode. In this mode, the ERCP 81 does not radiate.

##### 3.1.1 Case where only the serial link is connected

In absence of any order coming from the serial link, it will remain in the slave mode, and will transmit the contents of the EEPROM to an ERCP 81 "Master" at any request. As of the first request, the ERCP 81 will be put in the mode defined by the orders, will place the data received in its buffer of transmission and will remain in this operating mode until a new request or a new powering (see table 2).

##### 3.1.2 Case where only the input/output are connected

The ERCP 81 charges the contents from its memory EEPROM to the buffer of transmission and it puts itself in the mode defined by wiring on connector 19 pins (see datasheet).

##### 3.1.3 Case where the serial link and the input/output are connected

Case 3.1.1 applies except if the master mode is imposed by wiring on connector 19 pins. In this case, the mode imposed by serial link will remain inoperative. The buffer of transmission of the ERCP 81 will contain, either the contents of the EEPROM, or the data received by the serial link and will remain unchanged until a new request or a new powering.

## 3.2 ERCP 81 OUTSIDE RADIO DIALOGUE

- The ERCP 81 is ready to receive data messages from the interface.
- It transmits an acknowledgement or rejection notice for the message<sup>1</sup>.

**<Length/Error>< Function >**

## 3.3 ERCP 81 IN RADIO DIALOGUE

The ERCP 81s face to face continuously exchange the contents of their buffer of transmission. In the same way, the logical levels of the inputs will be recopied on the outputs of the partner.

Output "presence" becomes active.

During this time, the receptions of contents will not be acknowledged.

The serial links continuously emit in an asynchronous way to the interface.

These messages contain :

- a) Last useful data received by partner and images of their outputs contain in the function byte.

**<Length/Error><Function><useful data>**

- b) Or an error message if, until this moment, no radio transmission were validated.

**<Length/Error><Function>**

An invalid message after the reception of valid messages will not involve an error message. In this case, the error is added to the error counter.

At the end of radio transmission, the ERCP 81 repeats the last message received to the interface.

Output "presence" will deactivate only after a time from 0,5 to 1 S according to the end of the dialogue.

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<sup>1</sup> If a radio transmission has started, this acknowledgement will only be sent after a time of between 500 ms and 2 seconds after the end of the inductive coupling. If no response is received by the interface, this indicates a fault in the ERCP 81 – interface link.

## 4 MAINTENANCE

### 4.1 PREVENTIVE MAINTENANCE

N/A

### 4.2 CORRECTIVE MAINTENANCE

#### 4.2.1 TROUBLESHOOTING

Symptom: absence of message acknowledgement outside radio dialogue.

Troubleshooting:

- Make sure the power supplied to the ERCPC 81 is within the specified limits,
- Check that the interface's UART is working properly by loop connection of the serial link lines,
- Check the ERCPC 81 – interface link: quality of contacts, continuity of wires and protection, etc.

If it turns out that the ERCPC 81 is not working, replace it.

Symptom: no valid message in radio dialogue despite proper exchange conditions (see datasheet)

Replace the ERCPC 81.

#### 4.2.2 REPLACING AN ERCPC 81

1) Remove the ERCPC 81:

- Switch off the power supply,
- Disconnect and unscrew the ERCPC 81.

2) Replace the ERCPC 81:

- Screw the ERCPC 81 in,
- Remove the protective plug and connect the ERCPC 81,
- Power up.