DOCUMENTATION

Telegram structure LoRa EHCA

Rev. 1.5

INNOTAS ELEKTRONIK GMBH

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1 Table of Contents

2 Revision directory

REVISION	DATE	MODIFICATION
1.0	15 11 2018	First edition
1.1	16 01 2019	Change of sending intervals
1.2	26 05 2019	Longer transmission intervals and monthly data transmission
1.3	03 03 2020	Filling protocols introduced at (two) weekly
1.4	10.06.2021	Addition commando ReJoin
1.5	25.01.23	software variant with additional monthly value + Rejoin parameter

3 Upload protocols

2 transmission modes can be selected: the normal mode and the mode with extended transmission intervals. The normal mode enables the maximum number of transmission telegrams per day, taking into account the energy budget. The mode with extended transmission intervals enables the volume of data to be reduced for reasons of data protection or network load. In the mode with extended transmission intervals, only one protocol is sent a day.
In normal mode, 2 different protocols are sent cyclically, protocol 1 and protocol 2 (alternatively protocol 3). The identification of which protocol type is currently being sent is in the port no. coded. The protocol number is the port number.
In the mode with extended transmission intervals, protocol 2 (alternatively protocol 3) and protocol 10 are always sent.

3.1 Protocol 1

4 byte Current counter reading as a 4 byte number in units.

3.2 Protocol 2

4 byte Current counter reading as a 4-byte number in units.
4 byte Counter reading on the due date as a 4-byte number in units.
2 byte Error and status code
1 byte Due date month

Engraving is done once a year (annually) or once a month (monthly), at the end of each month.

3.3 Protocol 3

Protocol 3 is only sent instead of Protocol 2 if requested by the customer. Protocol 2 is then omitted.
HCA with this special software must be ordered seperately. A minimum order quantity is necessary. If you are interested, please contact us.

4 Byte Current meter reading as a 4 byte number in units
4 Byte Meter reading as of the due date as a 4 byte number in units
2 Byte Last monthly value, with the setting „Monthly due date“ always the monthly consumption, with „Day date annually“ always the accumulated consumption since the last reference date
2 Byte Error und status code
1 Byte Due date month
Engraving is done once a year (annually) or once a month (monthly), in each case at the end of the month.

3.4 Protocol 9

Protocol 9 sends the number of bytes sent, broken down according to the spreading factor.
4 byte number of bytes sent in SF7
4 byte number of bytes sent in SF8
4 byte number of bytes sent in SF9
4 byte byte number of bytes sent in SF10

4 byte number of bytes sent in SF11
4 byte number of bytes sent in SF12
1 byte number of JOIN attempts
Protocol 9 is only sent on request.

3.5 Protocol 10

2 byte Error and status code

Protocol 10 does not contain any counter readings, only the status code. The protocol is used to maintain the LoRa network operation without transferring user-relevant data (data protection). In the mode with extended transmission intervals, a telegram can be transmitted daily, but the amount of user data can be further reduced. Protocol 2 (alternatively protocol 3) is then only sent every 7 days (weekly) or every 14 days (every two weeks).

3.6 Numerical representation

value	presentation
Current meter reading	Hex, MSB first, e.g. 0000 012C = 300 units
Meter reading on the due date	Hex, MSB first, e.g. 001F 5C40 = 2055.232 units
Due date month	Hex, e.g. 0x01 = January; 0x0C = December
Number of bytes sent	Hex, LSB first, e.g. 2A01 0000 = 298 bytes
Number of JOIN attempts	Hex, one byte, e.g. 04 = 4 Join attempts

3.7 Status bits

byte	Bit no	Meaning / function
MSB	7	reserve
MSB	6	reserve
MSB	5	Reset error
MSB	4	RF error
MSB	3	CS error
MSB	2	Batt. low
MSB	1	sabotage
MSB	0	Measurement error
LSB	7	reserve
LSB	6	reserve
LSB	5	reserve
LSB	4	reserve
LSB	3	Due date annually (0) / monthly (1)
LSB	2	Send interval according to bit 0 + 1 (0) Send interval 2
LSB	1	Normal mode (0) User data daily (1)
LSB	0	Weekly user data (2) Bi-weekly user data (3)

3.8 Sending intervals

The transmission interval in normal mode SF7 to SF10 is 2 hours, with SF11 it is 3 hours and with SF12 = 6 hours. The device sends 12 telegrams within 24 hours (only 8 telegrams with SF11 and only 4 telegrams with SF12). After starting the device (join), 255 telegrams with a cycle time of 2 minutes are sent for commissioning (possibly a slightly longer cycle time if the duty cycle is exceeded due to large spreading factors). The start of the cycles begins with the join time, it does not run synchronously on the hour! The first telegram (cycle 0) is sent after the connection has been successfully established (join). When evaluating consumption values, the possible time discrepancy between internal time and server time must be taken into account.

The current cycle time can be reset to 2 minutes for another 255 telegrams at any time using the optical interface or download protocol. The reduced cycle time begins after the next regular protocol has been sent. Warning, repeated use of the 2-minute mode shortens the life of the battery!

Normal mode

cycle	Protocol no	Number per day	Number per day for SF11	Number per day for SF12
0-10	1	11	7.333 *	3,666 *
11	2	1	0.666 *	0.333 *
total		12	8	4

* Protocol 2 is only sent for all 12 protocols, i.e. not every day for SF 11 and SF12!

Modes with extended transmission intervals

Fashion	Telegrams / day	Protocol no.
Usage data daily	1	always protocol 2
Usage data weekly	1	6x protocol 10; 1x protocol 2
Payload every two weeks	1	13x protocol 10; 1x protocol 2

In the mode with extended transmission intervals, a telegram is sent per day. Protocol 2 or protocol 10 is transmitted. You can switch between the individual modes via download protocols.

4 Download Protocols

Immediately after receiving a telegram, the server can send data or commands to the device.

4.1 Set spreading factor

The command to set the spreading factor is 0x55 followed by the spreading factor [0x00-SF12,… 0x05-SF7] eg 0x55 0x05 sets the spreading factor to SF7, 0x55 0x01 sets the SF11

4.2 Set device PIN

The command to set the device PIN is: 0x56 PIN0 PIN1
e.g.: 0x56 0x12 0x34 sets the device PIN to 1234.
The factory default PIN is 0000 and is ignored by the PC program.

4.3 Query number of bytes sent

The command 0x57 causes the device to send the send byte statistics.

4.4 Change due date month

The due date value (meter reading on the due date) is recorded once a year or monthly at the end of the month. The month of December is preset at the factory for annually. The command 0x58 followed by the month (0x01 = January… 0x0C = December) sets a different set day month. Caution, this command is only useful for the key date "annually".

If the due date month is subsequently changed, the last due date value is transferred and re-engraved on the new due date.

The EHCA display shows the consumption since the key date. If the due date is changed, the consumption indicator in the display is accumulated for more or less than 12 months and then reset. We therefore recommend avoiding a subsequent change to the key date.

4.5 Change the sending interval

To change the send interval, the command 0x59 is sent, followed by the value from the table:

Command byte	Meaning / function
Bit 0	Send interval normal (00) data daily (01) 7-day data (10) 14-day data (11)
Bit 1	
Bit 2	Send interval according to bit 1 + 2 (0) Send interval 2 minutes (1)
Bit 3	Reference date annually (0) Reference date monthly (1)
Bit 4	Reserve (0)
Bit 5	Reserve (0)
Bit 6	Reserve (0)
Bit 7	Reserve (0)

It is recommended to select "monthly due date" for longer transmission intervals, since monthly values can hardly be derived from the current consumption values.

Example: Command 0x59 0x0E

→Send interval every 2 minutes, due date monthly, after the expiry of 255 telegrams every 2 minutes, the send interval is switched to daily, data every 7 days

4.6 Execute ReJoin

From software version V7.8 in the long design version of the HCA without button and starting at version V1.7 in the compact version with button, an additional command was integrated, whereby the device leaves the network and starts the rejoin process. This command can be useful when changing the network configuration.

This command is 0x60 followed by the number of hours of delay from receipt of the telegram.

The range of values is 0-255 hours.

Example: 0x60 0x0A. The HCA starts a Rejoin after receiving the command.