

Hivus communication protocol

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Supported device types and versions

Hivus communication protocol supports the communication with control units (RJ) and dataloggers (HDL) produced by Hivus. The communication was implemented and tested with control unit RJ-05e. The control unit is used to time control of performance and regulation of DEZOSTER devices (air ozonizers).

Communication line configuration

- Category of communication line: [Serial](#), [MOXA IP Serial Library](#)
- Parameters of serial line:
 - Baud rate: 19200 Baud
 - Parity: optional
Note: Parity MARK (sending the device address) and SPACE (all others) are set during a transmission, so the parity setting is not important.
 - Handshaking: none

Note: communication on [Serial](#) line was tested on computer serial port, virtual serial port corresponding to MOXA NPort device and virtual serial port corresponding to Serial/USB converter USB-COM GemBird.
Communication on [MOXA IP Serial Library](#) line was tested through the use of MOXA NPort 5450I.

Communication station configuration

- Communication protocol: Hivus Controller
- Station address: 1 Byte.
Address 0 is "broadcast" (each device responds to it, but only on reading by 02h function). I/O tag - type 105 (logger number) is used to detect the real address of device.
Addresses 1-255 represents the common addresses of devices (04h function is used to read data).
- Time parameters - recommended polling period is 1 min (to avoid loading processor of control unit by very frequent communication).

Station protocol parameters

Configuration dialog window - [Communication station](#) - field "**Protocol parameters**".
These parameters influence some optional parameters of protocol. These parameters can be used:

Tab. . 1

| Key word | Full name | Description | Unit | Default value |
|----------|------------------|---|------|---------------|
| DBGI | Debug Input | Value 1 activates the listing of information on loaded values of I/O tags in trace file of line in the format: <i>In I/Otag_name = value</i> | - | 2 |
| DBGO | Debug Output | Value 1 activates the listing of information on loaded values of I/O tags in trace file of line in the format: <i>Out I/Otag_name = value</i> | - | 2 |
| RAW | Read After Write | If parameter is True, the writing of value (by 05h function) is followed by reading. Note: Reading does not relate to date and time settings that are done by 01h protocol function (see I/O tag 121). | - | False |

I/O tag configuration

Possible value types of I/O tag: **Ai, Ao, Ci, Di, TxtO, TxtI**.

I/O tag address is written in the format:

- T=*type* - I/O tags without index
- T=*type*;*l=index* - I/O tags with index (channels and signalization of failures on DEZOSTER)
- T=*type*;*l=index*,*j=index*; - I/O tag contains raw data of protocol with address [100](#)

The header, which is read from control unit by KOM process, contains the information that is mapped into I/O tags without index (e.g. moto hours worked, number of engaged channels, type of control unit), information about channels and signalization of failures on DEZOSTER.
There can be configured 0 up to 8 channels. Each channel is defined by characteristics (1-15, see [table](#) below), value, upper/lower limit (something like upper/lower limit in D2000). The channels can be addressed in two ways:

- consecutive number 1-8:
 - instantaneous value is addressed by T=**16**, I=1..8 in I/O tag,
 - type is addressed by T=**17**, I=1..8 in I/O tag
 - upper limit is addressed by T=**18**, I=1..8 in I/O tag
 - lower limit is addressed by T=**19**, I=1..8 in I/O tag
- order within channels with particular characteristic. Instantaneous value of i -th measurements with characteristic t is addressed by T= t , I= i .
For example, instantaneous value of third measurement of type 1 [temperature] is defined by T=**1**, I=3 no matter on which channel this temperature occurs.

Signalization of failures on DEZOSTER enables to read the statuses of DEZOSTER 1..10 that are connected to concentrator 1 (T=**101**) or concentrator 2 (T=**102**).

These I/O tags can be configured:

Table 1 - I/O tags for channels

| Address | Value type | Meaning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|--|---|------|-------------|---|------------------|---|-----------------------|---|---|---|----------------|---|----------------|---|-------------------|---|--|---|---------------------|---|--------------|----|---------------|----|---|----|--|----|--------------------------------|----|---------------|----|--------------------|
| T=typ;l=index | Ai, Ci, Di | <p>Reading of instantaneous value of measurement of <i>typ</i> type, which is <i>index</i>-th in order. <i>Index</i> can be from range 1..8. <i>Type</i> can be from range 1..15 according to table below:</p> <table><tr><th>Type</th><th>Description</th></tr><tr><td>1</td><td>Temperature (°C)</td></tr><tr><td>2</td><td>Relative humidity (%)</td></tr><tr><td>3</td><td>Ozone concentration (ppm - parts per million)</td></tr><tr><td>4</td><td>Pressure (kPa)</td></tr><tr><td>5</td><td>Flow (m3/hour)</td></tr><tr><td>6</td><td>Air quality (ppm)</td></tr><tr><td>7</td><td>VOC - Volatile organic compounds (ppm - parts per million)</td></tr><tr><td>8</td><td>Flow velocity (m/s)</td></tr><tr><td>9</td><td>Toxicity (%)</td></tr><tr><td>10</td><td>Intensity (%)</td></tr><tr><td>11</td><td>NH3 concentration (ppm - parts per million)</td></tr><tr><td>12</td><td>CO concentration (ppm - parts per million)</td></tr><tr><td>13</td><td>State of blocking sensor (0/1)</td></tr><tr><td>14</td><td>Dew point (%)</td></tr><tr><td>15</td><td>State of fan (0/1)</td></tr></table> <p>Example of address: T=8;l=1 - I/O tag will contain the instantaneous value of flow velocity that is first in order. If type 8 (flow velocity) is not configured on any of channels 1..8, I/O tag value will be invalid.</p> <p>Note: Instantaneous value of channel can have flag indicating the unconnected sensor. This flag is mapped to an attribute of "WEAK" value in D2000. If the instantaneous value from the example mentioned above should have flag indicating the unconnected sensor, it should be probably 0 with attribute "WEAK".</p> | Type | Description | 1 | Temperature (°C) | 2 | Relative humidity (%) | 3 | Ozone concentration (ppm - parts per million) | 4 | Pressure (kPa) | 5 | Flow (m3/hour) | 6 | Air quality (ppm) | 7 | VOC - Volatile organic compounds (ppm - parts per million) | 8 | Flow velocity (m/s) | 9 | Toxicity (%) | 10 | Intensity (%) | 11 | NH3 concentration (ppm - parts per million) | 12 | CO concentration (ppm - parts per million) | 13 | State of blocking sensor (0/1) | 14 | Dew point (%) | 15 | State of fan (0/1) |
| Type | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Temperature (°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Relative humidity (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Ozone concentration (ppm - parts per million) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Pressure (kPa) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Flow (m3/hour) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Air quality (ppm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | VOC - Volatile organic compounds (ppm - parts per million) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Flow velocity (m/s) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Toxicity (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Intensity (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | NH3 concentration (ppm - parts per million) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | CO concentration (ppm - parts per million) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | State of blocking sensor (0/1) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Dew point (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | State of fan (0/1) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T=16;l=index | Ai, Ci, Di | <p>Reading of instantaneous value of channel with <i>index</i>. <i>Index</i> can be from range 1..8. Example of address: T=16;l=2 - I/O tag will contain the instantaneous value of channel 2.</p> <p>Note: Instantaneous value of channel can have flag indicating the unconnected sensor. This flag is mapped to an attribute of "WEAK" value in D2000. If the instantaneous value from the example mentioned above should have flag indicating the unconnected sensor, it should be probably 0 with attribute "WEAK".</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T=17;l=index | Ai, Ci | <p>Reading of channel characteristics with <i>index</i>. <i>Index</i> can be from range 1..8. Example of address: T=17;l=2 - I/O tag will contain the characteristics of channel 2.</p> <p>Note: The characteristics can be from range 1..15 with the meaning stated in table or invalid, if no sensor is connected to the channel.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T=18;l=index | Ai, Ci | <p>Reading of upper limit of channel with <i>index</i>. <i>Index</i> can be from interval 1..8. Example of address: T=18;l=2 - I/O tag will contain the upper limit of channel 2.</p> <p>Note: The value is invalid, if no sensor is connected to the channel.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T=19;l=index | Ai, Ci | <p>Reading of lower limit of channel with <i>index</i>. <i>Index</i> can be from interval 1..8. Example of address: T=19;l=2 - I/O tag will contain the lower limit of channel 2.</p> <p>Note: The value is invalid, if no sensor is connected to the channel.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 2 - I/O tags - raw data from protocol

| Address | Value type | Meaning |
|---------|------------|---------|
|---------|------------|---------|

| | | |
|--|------|---|
| T=100;l= <i>index</i> ;J= <i>index</i> | Txtl | <p>Reading the raw data from protocol header into the text I/O tag. "I" and "J" indicate beginning and end byte (1-128), and this condition must be valid: I≤J.</p> <p>For example I/O tag with address T=100;l=113;J=128 (bytes 113-128 from header) contains a comment from printer (it is the same as I/O tag T=110).</p> <p>For example I/O tag with address T=100;l=27;J=29 (bytes 27-29 from header) contains type of device (it is the same as I/O tag T=106).</p> <p>Note: These I/O tags are intended for specialists and for future extension of protocol.</p> |
|--|------|---|

Table 3 - I/O tags relating to fault conditions of dezoster

| Address | Value type | Meaning |
|--|------------|--|
| T=101;l= <i>index</i> T=102;l= <i>index</i> | Ai, Ci, Di | <p>Reading of signalization of device failure with <i>index</i> that is connected to concentrator No. 1 (if T=101) or concentrator No. 2 (if T=102). If <i>index</i> is from the range 1..10, I/O tag value will contain the information about the failure on particular dezoster (according to the value 0 /1, False/True).</p> <p>If <i>index</i>=0, I/O tag will contain the information about all 10 dezosters as integer (status of dezoster 1 in 1. bite up to dezoster 10 in 10. bite)</p> <p>Example of address: T=101;l=2 - I/O tag will read the failure signal of dezoster 2 that connected with concentrator 1.</p> <p>Note: If information in protocol contains bit, which signalizes "concentrator is not connected", the value of I/O tag is <i>Invalid</i>.</p> |

Table 4 - I/O tags without indexes

| Address | Value type | Meaning |
|---------|------------|--|
| T=103 | Ai, Ci | Worked moto hours - value form range 0-999 999. |
| T=104 | Ai, Ci | Number of connected sensors -value form range 0-8. The channels with connected scanners have valid values (I/O tags of types 1 to 19 - see table 1), other channels has invalid values. |
| T=105 | Ai, Ci | Number of control unit (equal to station address). It is used to detect the real address of station if station address will be 0 (broadcast). |
| T=106 | Txtl | <p>3-sign string that defines type of device:</p> <ul style="list-style-type: none"> HDL - Hivus Data Logger RJB - control unit without fan RJV - control unit with fan |
| T=107 | Ai, Ao | Setpoint for controlling ozone (O3) in ppm. Also the value writing is supported (function of protocol 05h). |
| T=108 | Ai, Ao | Threshold for indication of O3 level in ppm. Also the value writing is supported (function of protocol 05h). |
| T=109 | Txtl, TxtO | <p>16-sign string - upper and lower limits for printer. Also the value writing is supported (function of protocol 05h).</p> <p>Note: Presently, this string contains only a protocol-encoded setpoint for controlling ozone and threshold of ozone indication, therefore it is recommended to read and write values by I/O tags T=107 and T=108.</p> |
| T=110 | Txtl, TxtO | <p>16-sign string - comment of print. Also the value writing is supported (function of protocol 05h).</p> <p>Note: This I/O tag is also used to set a control band, blocking sensor, signalization, language, to switch manual / automat mode, to set parameters of modes, etc. For more information, see documentation for communication protocol.</p> |
| T=121 | TxtO | <p>Writes values to control unit (by protocol function 01h). Supported values:</p> <ul style="list-style-type: none"> time - format of value: Thhmmss (hh-hour, mm-minute, ss-second), e.g. T142030 means a time 14:20:30 date - format of value Dddmmyyw (dd-day, mm-month, yy-year, w-week day: Monday=1 .. Sunday=7), e.g. D2304153 means date 23.4.2015, Wednesday |
| T=122 | Txtl, TxtO | <p>Writes 32-bytes of limit values into control unit (by protocol function 05h).</p> <p>Note: The first 16 bytes is equal to I/O tag with address 109, other 16 bytes is equal to I/O tag with address 110. It is recommended to read and write values by I/O tags T=107, T=108 and T=110.</p> |

Literature

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Changes and modifications

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Document revisions

- Ver. 1.0 - April 23, 2015 - creating document



Related pages:

[Communication protocols](#)