Hivus communication protocol

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Supported device types and versions

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

Communication line configuration

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

Note: communication on the 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 responses to it, but only on reading by 02h function). I/O tag - type 105 (logger number) is used to detect the real address of the 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 overloading the processor of the control unit by very frequent communication).

Station protocol parameters

Configuration dialog window - Communication station - field "**Protocol parameters**".
These parameters influence some optional parameters of the protocol. The following parameters can be used:

Tab. . 1

Keyword	Full name	Description	Unit	Default value
DBGI	Debug Input	Value 1 activates the listing of information about received values of I/O tags in the trace file of the line in the format: *In I/Otag_name = value*	-	2
DBGO	Debug Output	Value 1 activates the listing of information about written values of I/O tags in the trace file of the line in the format: *Out I/Otag_name = value*	-	2
RAW	Read After Write	If the 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 the protocol function 01h (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*;I=*index* - I/O tags with index (channels and signalization of failures on desoster)
- T=*type*;I=*index*;J=*index*; - I/O tag contains raw data of protocol with address 100

The header, which is read from the control unit by the KOM process, contains the information that is mapped into I/O tags without an index (e.g. moto hours worked, number of engaged channels, type of control unit), information about channels and signalization of failures on desosters.
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:

1. 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
2. order within channels with particular characteristics. 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 desoster enables to read the statuses of desoster 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

<table>
<tr><th>Address</th><th>Value type</th><th>Meaning</th></tr>
<tr><td>T=type;I=index</td><td>Ai, Ci, Di</td><td>Reading of instantaneous value of measurement of typ type, which is index-th in order.
Index can be from range 1..8.
Type can be from range 1..15 according to table below:

<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 the fan (0/1)</td></tr>
</table>

Example of address: T=8;I=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.

Note: Instantaneous value of the channel can have a 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 a flag indicating the unconnected sensor, it should be probably 0 with an attribute "WEAK".</td></tr>
<tr><td>T=16;I=index</td><td>Ai, Ci, Di</td><td>Reading of instantaneous value of channel with index. The index can be from range 1..8.
Example of address: T=16;I=2 - I/O tag will contain the instantaneous value of channel 2.

Note: Instantaneous value of the channel can have a 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 a flag indicating the unconnected sensor, it should be probably 0 with an attribute "WEAK".</td></tr>
</table>

T=17;I=*index*	Ai, Ci	Reading of channel characteristics with *index*. The i*ndex* can be from range 1..8. Example of address: *T=17;I=2* - I/O tag will contain the characteristics of channel 2. **Note:** The characteristics can be from range 1..15 with the meaning stated in the table or invalid if no sensor is connected to the channel.
T=18;I=*index*	Ai, Ci	Reading of upper limit of the channel with *index*. The *index* can be from interval 1..8. Example of address: *T=18;I=2* - I/O tag will contain the upper limit of channel 2. **Note:** The value is invalid if no sensor is connected to the channel.
T=19;I=*index*	Ai, Ci	Reading of lower limit of the channel with *index*. The *index* can be from interval 1..8. Example of address: *T=19;I=2* - I/O tag will contain the lower limit of channel 2. **Note:** The value is invalid if no sensor is connected to the channel.

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

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

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

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

Table 4 - I/O tags without indexes

Address	Value type	Meaning
T=103	Ai, Ci	Worked moto hours - value from range 0-999 999.
T=104	Ai, Ci	The number of connected sensors - value from range 0-8. The channels with connected scanners have valid values (I/O tags of types 1 to 19 - see table 1), other channels have invalid values.
T=105	Ai, Ci	The control unit number (equal to the station address). It is used to detect the real address of the station if the station address will be 0 (broadcast).
T=106	TxtI	3-sign string that defines the type of device: • HDL - Hivus Data Logger • RJB - control unit without a fan • RJV - control unit with fan
T=107	Ai, Ao	Setpoint for controlling ozone (O3) in ppm. Also, the writing of value is supported (the protocol function 05h).
T=108	Ai, Ao	The threshold for an indication of the O3 level in ppm. Also, the writing of value is supported (the protocol function 05h).
T=109	TxtI, TxtO	16-sign string - upper and lower limits for the printer. Also, the writing of value is supported (the protocol function 05h). **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.

T=110	TxtI, TxtO	16-sign string - comment of print. Also, the writing of value is supported (the protocol function 05h). **Note:** This I/O tag is also used to set a control band, blocking sensor, signalization, language, to switch manual/automatic mode, to set parameters of modes, etc. For more information, see the documentation for communication protocol.
T=121	TxtO	Writes values to control unit (by protocol function 01h). Supported values: • 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-weekday: Monday=1 .. Sunday=7), e.g. D2304153 means date 23.4.2015, Wednesday
T=122	TxtI, TxtO	Writes 32-bytes of limit values into the control unit (by the protocol function 05h). **Note:** The first 16 bytes is equal to the I/O tag with address 109, the other 16 bytes are equal to the 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.

Literature

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Changes and modifications

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Document revisions

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

Related pages:

Communication protocols