

# 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 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 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: <i>In I/Otag_name = value</i>	-	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: <i>Out I/Otag_name = value</i>	-	2
RAW	Read After Write	If the parameter is True, the writing of value (by 05h function) is followed by reading. <b>Note:</b> Reading does not relate to date and time settings that are done by the protocol function 01h (see I/O tag <a href="#">121</a> ).	-	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:

- 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 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**

Address	Value type	Meaning																																
T= <i>type</i> ;I= <i>index</i>	Ai, Ci, Di	<p>Reading of instantaneous value of measurement of <i>typ type</i>, 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 the fan (0/1)</td></tr></table> <p>Example of address: <i>T=8;I=1</i> - 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><b>Note:</b> 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".</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 the fan (0/1)
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T=16;I= <i>index</i>	Ai, Ci, Di	<p>Reading of instantaneous value of channel with <i>index</i>. The <i>index</i> can be from range 1..8. Example of address: <i>T=16;I=2</i> - I/O tag will contain the instantaneous value of channel 2.</p> <p><b>Note:</b> 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".</p>																																

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

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

Address	Value type	Meaning
T=100;I=index; J=index	TxtI	<p>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&lt;=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).</p> <p><b>Note:</b> These I/O tags are intended for specialists and for future extension of the protocol.</p>

**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	<p>Reading of signalization of device failure with an <i>index</i> that is connected to concentrator No. 1 (if T=101) or concentrator No. 2 (if T=102). If the <i>index</i> 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 <i>index</i>=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. <b>Note:</b> If the information in the protocol contains a bit, which signalizes "concentrator is not connected", the value of the I/O tag will be <i>Invalid</i>.</p>

**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 <a href="#">table 1</a> ), 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	<p>3-sign string that defines the type of device:</p> <ul style="list-style-type: none"> <li>• HDL - Hivus Data Logger</li> <li>• RJB - control unit without a fan</li> <li>• RJV - control unit with fan</li> </ul>
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	<p>16-sign string - upper and lower limits for the printer. Also, the writing of value is supported (the protocol function 05h). <b>Note:</b> 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	TxtI, TxtO	16-sign string - comment of print. Also, the writing of value is supported (the protocol function 05h). <b>Note:</b> 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: <ul style="list-style-type: none"> <li>time - format of value: Thhmmss (hh-hour, mm-minute, ss-second), e.g. T142030 means a time 14:20:30</li> <li>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</li> </ul>
T=122	TxtI, TxtO	Writes 32-bytes of limit values into the control unit (by the protocol function 05h). <b>Note:</b> The first 16 bytes is equal to the I/O tag with address <a href="#">109</a> , the other 16 bytes are equal to the I/O tag with address <a href="#">110</a> . It is recommended to read and write values by I/O tags T= <a href="#">107</a> , T= <a href="#">108</a> , and T= <a href="#">110</a> .

## Literature

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## Changes and modifications

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## Document revisions

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



### Related pages:

[Communication protocols](#)