HygroClip 2
Communication Protocol

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1 FOREWORD

The ROTRONIC HygroClip II communication protocol uses ASCII characters and requires very little formatting. This protocol allows access to the digital measurement data and to almost every function of the probes and instruments based on the HygroClip II technology. Users that do not wish to use the ROTRONIC HW4 software can use this protocol to communicate with the HygroClip II products with Windows HyperTerminal or any other communication software. The protocol design should facilitate integration of the digital HygroClip II products with OEM applications.

2 GENERAL COMMAND STRUCTURE

RS485	„{“	ID	Adr	Command	Data	Chksum	CR

RS485 | (vertical bar) this character is required only when the string is to be passed to another device within a RS-485 multi-drop.

{ Beginning of the string (curly bracket)

ID Device type identifier (one ASCII character)

ADR RS485 Address of the device (00-64)

Command 3 ASCII characters

Data ASCII characters, each individual data block is followed by a semi-colon (separator)

Chksum Checksum or curly bracket }

CR End of the string (Carriage Return)

- Each individual data block, including the last, is followed by a semi-colon (separator)
- Leading and trailing space characters are allowed
- The decimal symbol is always a dot

Checksum calculation

Checksum = ((sum of all characters Hex values) AND 0x003F)

Note: AND = bitwise AND logical operation

The following characters are not used for the checksum calculation: RS485 character (|), the String end (}) and (CR)

RS485

The vertical bar | is used to indicate that the command string is to be passed to another device connected by RS-485 (multi-drop network with a master and one or several slaves). Upon receiving the string, the master device strips the vertical bar and sends the rest of the string to the RS-485 driver.

Depending on the device, the stripped string may also be sent to the PC. The software used by the PC should be designed so as not to confuse this string with an answer.

3 COMMANDS

3.1 RDD command: read values

Returns the measured and calculated values as well as the information necessary to interpret the data (calculated parameter type, engineering units, status, serial number and name of the device, etc.)

Command format:

{	ID	Adr	RDD	Chksum	CR

Answer format:

{	ID	Adr	rdd	Data	Chksum

The data are returned according to the following structure:

Example	Type	Description
1..3	Byte	Probe type (1= digital probe, 2=analog probe, 3=pressure probe)
1234.56	Float	Relative humidity or analog value
%RH	String	Humidity or analog value engineering unit
0..1	Bool	Humidity or analog value alarm (out-of-limits)
+	Char	Humidity or analog value trend (+,-,= or " ")
1234.56	Float	Temperature value
°C	String	Temperature engineering unit
0..1	Bool	Temperature alarm (out-of-limits)
=	Char	Temperature trend (+,-,= or " ")
Dp	String	Calculated parameter type (nc: no calculation, Dp: dew point, Fp: frost point)
1234.56	Float	Calculated numerical value
°C	String	Calculated parameter engineering unit
0..1	Bool	Calculated parameter alarm (out-of-limits)
+	Char	Calculated parameter trend (+,-,= or " ")
1..255	Byte	Device type (HygroClip, Logger, HF, HM, …)
V1.0	String	Firmware version
12345678	String	Probe serial number
Name	String	Probe name
000…255	Byte	Alarm Byte: (Bit0=out-of-limits value, Bit5= sensor quality, Bit6 = humidity simulator, Bit7= temperature simulator)

Each individual data block, including the last, is followed by a semi-colon (separator)

Examples:

{F04RDD_^M
{F04rdd 001; 4.45;%RH;000;=; 20.07;°C;000;=;Fp;-19.94;°C;000;+;001;B2.8;0000000002;HyClp 2   ;006;J^M

{F04RDD_^M
{F04rdd 001; 4.45;%RH;000;=; 20.06;°C;000;=;nc;---.--;°C;000; ;001;B2.8;0000000002;HyClp 2   ;006;6^M

{F04RDD_^M
{F04rdd 001; 4.47;%RH;000;=; 20.04;°C;000;=;nc;-19.92;°C;000;=;001;B2.8;0000000002;HyClp 2   ;006;4^M

Note: after changing the HC2 from dew or frost point to “no calculation”, the probe will still send a value after the characters “nc”. This value has no meaning and will disappear after a power reset.

3.2 REN command: change the RS-485 address

This command is used to change the RS-485 address of the device

Command format:

{	ID	Current Address	REN	Serial number; New Address	Chksum	CR

Answer format

{	ID	New address	ren OK	Chksum

Example: change RS address of probe serial number 0000000002 from 5 to 4

{F05REN 0000000002;4;W^M
{F04ren OKD^M

3.3 HCA command: probe adjustment

This command is used to adjust the probe against a reference (humidity and temperature)

Command format

{	ID	Adr	HCA	Parameters	Chksum	CR

Answer format

{	ID	Adr	hca OK	Chksum

Command parameter structure:

0	• Individual probe and instrument with integral probe: always use 0 as the probe input number • All other devices: use the probe input number
0..5	0 = Humidity adjustment (against a ROTRONIC standard – RHS) 1 = Humidity adjustment against a reference instrument 2 = Temperature adjustment against a reference instrument
0..3	0 = Save current measurement and reference value 1 = Adjust (global) 2 = Return to factory original adjustment 3 = Delete all saved calibration points
-50...200	Reference Value

Examples:

Save humidity (RHS) calibration point – no adjustment

{F01HCA 0;0;0;20.00;Y^M
{F01hca OK(^M

Adjust temperature at one point

{F04HCA 0;2;1;23.06;)^M
{F04hca OK+^M

QUESTION: how do you do a multi-point adjustment with this command?

3.4 LGC command: programming of the data recording function

This command has two different formats and is used either to read (query) or to program the log function

● Command format 1 (used to check - query - the status of the function):

{	ID	Adr	LGC	Chksum	CR

Answer format

{	ID	Adr	lgc	Settings	Chksum

● Command format 2 (used to program the function):

{	ID	Adr	LGC	Settings	Chksum	CR

Answer format:

{	ID	Adr	lgc OK	Chksum

Structure used for the log settings:

0..1	Boolean	0 = Stop recording data, 1= Start recording data (see note 1 below)
1..2	Byte	1 = Start-Stop mode (record until memory is full) 2 = Loop recording (dump oldest data when memory is full and keep recording)
1..65535	Word	Log interval (in multiples of 5 seconds) 1 = 5s, 2 = 10s, etc.
123456789	Long	Current date and time referenced to Jan, 01, 2000 and expressed in increments of 5 seconds – see note 2 below 1 = Jan, 01, 2000, 00:00:05, 2 = Jan, 01, 2000, 00:00:10, etc.
0…2000	Word	Number of data points (only when answering command format 1)

Note 1:

- After sending the command to start recording data, the command to stop recording must be sent before a new recording can be started
- Whenever the probe starts recording data, all previously recorded data is erased from the memory

Note 2:

The HC2 itself does not keep track of the date and time. An internal time counter ensures that data is recorded at fixed intervals of time as configured by the user (multiples of 5 seconds). When the recorded data is eventually downloaded to the PC, the date and time associated with each pair of recorded values can be reconstructed as explained below:

- Start-Stop mode: when data logging is started, the log interval is saved to the probe. In the Start-Stop mode the current date and time are saved to the probe when the data recording is started but not when it is stopped. When downloading data recorded in the Start-Stop mode, use the initial date and time saved to the probe together with log interval to reconstruct the date and time associated with each pair of values.

- Loop mode: when data logging is started, the log interval is saved to the probe. In the loop mode, the current date and time are saved to the probe when data recording is started and again when data recording is stopped, thus replacing the initial value with the end value. When downloading data recorded in the Loop mode, use the date and time saved to the probe as the date and time of most recent pair of recorded values. Together with the log interval, use this to reconstruct the date and time associated with the older pairs of values.

Examples:

Start recording in the Start-Stop Mode, 10s log interval

{F05LGC 1;1;2;50746164;]^M
{F05lgc OK6^M

Check function status (Query)

{F05LGC\^M
{F05lgc 001;001;00002;0050746164;00000;H^M

Stop recording data

{F05LGC 0;1;2;50746164;\^M
{F05lgc OK6^M

Check function status (Query)

{F05LGC\^M
{F05lgc 000;001;00002;0050746164;00037;Q^M

3.5 ERD command: read the EPROM / download recorded data

This command is used to read data from the EPROM (the data are read Byte after Byte)

Command format:

{	ID	Adr	ERD	Parameters	Chksum	CR

Command parameter structure:

0..1	0 = internal EPROM 1 = external EPROM
0..65535	EPROM Start Address
0..65535	Number of Bytes to be read

Answer format

	ID	Adr	erd	Data	Chksum

The data is transmitted Byte by Byte:

Example: {B01erd 032;154;202;001;016;}

Read recorded data : ERD 0; 2179; 6003 (2179 = first address, 6003 = number of bytes)
Device write protection : ERD 0; 192; 0;

Note: detailed instructions about using this command will be provided in the next document release.

3.6 TST command: measurement model data / humidity sensor status

This command is used to test the condition of the humidity sensor

Command format:

{	ID	Adr	TST	Test number	Chksum	CR

Answer format

{	ID	Adr	tst	Data	Chksum

Test number and data in the answer:

Test number	Description	Answer data
10	Humidity data	Counts, raw humidity value [%RH] based on the count scaling, factory correction A1%, user correction A2%, sensor temperature correction, sensor drift correction, humidity end value
	Temperature data	Counts (x1000), resistance value [Ohm] as measured based on the count scaling, numerical temperature end value
20	RH sensor status	Sensor quality 0 to100 or 255 0 = good sensor quality 100 = bad sensor quality The value 255 is used when the sensor quality is not available due to the settings of the test function

Examples:

{F04TST 10;;7^M
{F04tst 22388; 21.04; -1.5; 0.19; 0.00; 0.00; 19.74;0039649684;109.10; 23.05;$^M

{F01TST 20;;5^M
{F01tst 255;T^M (sensor quality not available due to the test function settings)

{F01TST 20;;5^M
{F01tst 000;H^M (good sensor quality)

4 DEVICE IDENTIFIERS

Device	ID	Device type
HP21	F	021
HF32	F	032
HF33	F	033
HF34	F	034
HF42	F	042
HF43	F	043
HF45	F	045
HF62	F	062
HF63	F	063
HF64	F	064
HF65	F	065
HM42	F	142
HM43	F	143
HM45	F	145
HM62	F	162
HM63	F	163
HM65	F	165
HL20	F	120
HL21	F	121
HC2 probes	F	001

5 DOCUMENT RELEASES

Doc. Release	Date	Notes
_10	Jan. 31, 2008	Original release