Introduction

The Uniflo 1200 1107option card implements an IEC 1107/EN 61107 ‘Tariff’ device.

This document describes the protocol implementation. It is not intended to document the 1107 protocol itself, only the specifics of this implementation.

For general information on this option card, see the installation guide.

IEC 1107 communication startup

Readout mode and programming mode C at 4800 baud are supported.

Addressing

The address in the initial request message must be blank:

/?!<CR><LF>
2f 3f 21 0d 0a

Identification

The device identifies itself as either:

/FLO4U1200-1.0-I<CR><LF>
2f 46 4c 4f 34 55 31 32 30 30 2d 31 2e 30 2d 4d 0d 0a

or

/FLO4U1200-1.0-M<CR><LF>
2f 46 4c 4f 34 55 31 32 30 30 2d 31 2e 30 2d 4d 0d 0a

or

/FLO4U1200-1.0-F<CR><LF>
2f 46 4c 4f 34 55 31 32 30 30 2d 31 2e 30 2d 46 0d 0a

“FLO” is the registered identifier for Flonidan DC A/S. If so configured, the device will use “FLo” instead to indicate support for fast reaction times (20ms) . (Note that the device supports fast reaction times regardless of whether “FLO” or “FLo” is given.)

“4” means the chosen communications speed is 4800 baud, and mode C is chosen for programming mode.

“U1200” identifies the device model, the Uniflo 1200 Gas Flow Computer.

“1.0” is a version number, subject to change.

“I”, “M” or “F” indicates compatibility mode.
“I” indicates that the device is configured for Instromet 555-1107 compatibility.
“M” indicates iMeter MEVC compatibility.
“F” indicates no compatiblity mode is configured.

The serial number of the individual device is *not* indicated. For the serial number, read the "SN" register using readout mode or a programming mode data read.

Acknowledge/option

The client may select programming mode:

<ACK>041<CR><LF>
`06 30 34 31 0d 0a`

or readout mode, primary procedure:

<ACK>040<CR><LF>
`06 30 34 30 0d 0a`

Readout mode

Once readout mode is selected, the device will switch to the selected baud rate (4800 baud) and then transmit the values of the main immediate value registers in formatted code form.

<STX>*entries*!<CR><LF><ETX><BCC>
`02` *entries* `21 0d 0a 03` *bcc*

Each entry has the form

name(*value***unit*)<CR><LF>
name `28` *value* `2a` *unit* `29 0d 0a`

or

name(*value*)<CR><LF>
name `28` *value* `29 0d 0a`

Which registers are reported, and which names and units are used, depends on the compatibility mode. See the register table below.

If no value exists for a register, then *value* will be an empty string. If there was an internal error in retrieving the value for a register, then *value* will be the string ERROR.

Programming mode

These functions are available in programming mode:

- Reading individual registers.
- Reading a load profile date range.
- Alarm reset.
- Load profile reset.
- Setting the clock.

When done, send the signoff command:

<SOH>B0<ETX><BCC>
`01 42 30 03 71`

Reading individual registers.

In programming mode, individual registers can be read using the R2 command, e.g.:

<SOH>R2<STX>CO2()<ETX><BCC>
`01 52 32 02 43 4f 32 28 29 03 5e`

Which engenders a reply like:

<STX>(0.60000*Co2)<ETX><BCC>

```
02 28 30 2e 36 30 30 30 30 2a 43 6f 32 29 03 1e
```

Alarm reset and load profile reset

An alarm reset is performed by sending the following command:

<SOH>E2<STX>0001()<ETX><BCC>

```
01 45 32 02 30 30 30 31 28 29 03 76
```

Reply:

<ACK>

```
06
```

This has the same limited effect as issuing the Reset from the Uniflo Config program.

The same command with any single-character argument is considered a load profile reset command:

<SOH>E2<STX>0001(1)<ETX><BCC>

```
01 45 32 02 30 30 30 31 28 31 29 03 47
```

This command is a shim with no effect. It does not delete any log data from the Uniflo 1200.

Setting the clock

The Uniflo 1200 clock can be set using a W2 register write to one of the registers “C000” and “C003”, with a value formatted as specified in IEC 1107 Appendix C.

The week day and week number components of a C003 value are ignored, and should preferably be 0.

E.g. to set the clock to December 16 2008, 12:27:02, send this:

<SOH>W2<STX>C003(0812161227020000)<ETX><BCC>

```
01 57 32 02 43 30 30 33 28 30 38 31 32 31 36 31 32 32 37 30 32 30 30 30 30 29 03 1d
```

If the daylight savings time flag is 1, then the time set is adjusted to take into account that a summer time value was sent. The device, however,

E.g. to set the clock to May 7, 2009, 09:11:13 (summer time), send this:

<SOH>W2<STX>C003(0905070911130001)<ETX><BCC>

```
01 57 32 02 43 30 30 33 28 30 39 30 35 30 37 30 39 31 31 31 33 30 30 30 31 29 03 14
```

Since the device uses local normal time, this will set the clock to the equivalent normal (winter) time. So if the time is immediately read back with:

<SOH>R2<STX>C003()<ETX><BCC>

the reply will be May 7, 2009, 08:11:13 (winter time), like this:

<STX>(0905070811130000)<ETX><BCC>

Reading a load profile date range.

Hourly log entries can be read using a read from the register named “9004” with the date range on the form YYMMDDyymmdd as a parameter. This will read the date range from 00:00 o’clock on the first date given, to 24:00 o’clock on the second day given.

E.g. to read the log for December 2008:

<SOH>R2<STX>9004(081201081231)<ETX><BCC>

```
01 52 32 02 39 30 30 34 28 30 38 31 32 30 31 30 38 31 32 33 31 29 03 6e
```

The format for the reply is specified in the *Load profile format details* section below. Here, just a short example of what it could look like (extremely abbreviated to show only two entries) .

The reply will then (extremely abbreviated, showing only two entries) something like:

<STX>80(890360)<CR><LF>
(08-12-01 00:00)4700(000b001000010000)<CR><LF>
4700(000d001500030000)<CR><LF>
<ETX><BCC>

02 38 30 28 38 39 30 33 36 30 29 0d 0a 28 30 38 2d 31 32 2d 30 31 20 30 30 3a 30 30 29 34 37 30 30 28 30 30 30 62 30 30 31 30 30 30 30 31 30 30 30 30 29 0d 0a 34 37 30 30 28 30 30 30 64 30 30 31 35 30 30 30 33 30 30 30 30 29 0d 0a 03 19

The values sent in this example are:

Time period	*Vm in period*	*Vb in period*	*Vm, error in period*	*Vb,error in period*
Dec 01 00:00 – 01:00	11	16	1	0
Dec 01 01:00 – 02:00	13	21	3	0

Register names

TBD

Timing

After the last byte of a completed frame is received, the device will wait for 200-1500ms before sending the first byte of the reply. How long exactly depends on the nature of the data to be retrieved.

The device can be configured to use a 200 ms time instead of 20 ms. Replies that immediately follow a baud rate change are exempted – they always wait 200 ms to give the client time to change the baudrate.

There may be pauses in the data, while the device is retrieving information. The client should be tolerant of such pauses,which per IEC 1107 can last up to 1500 ms (the “interbyte timeout”).

Once in programming mode, if the client fails to send the signoff frame, then the mode is exited with a return to the default baud rate of 300 baud, after 60 seconds of silence. This timeout is configurable.

Error handling

In programming mode, parity errors, checksum errors and frame format errors are indicated by the transmission of a NAK byte (15), prompting the sender to retransmit the frame. All other errors are indicated by the transmission of an error frame starting with the text “ERR “, e.g.:

<STX>ERR Unsupported<ETX><BCC>

```
02 45 52 52 20 55 6e 73 75 70 70 6f 72 74 65 64 03 73
```

Configuration settings

The behaviour of the option board can be modifed by configuring it using the Uniflo Config program. Note that such reconfiguration does *not* take place using the IEC-1107 connection – it is a part of configuration the Uniflo 1200.)

(Or at least it will be – changing any of these settings is not implemented in Uniflo Config at the time of this writing.)

Communication settings

- *Programming mode timeout (seconds)*: The time it takes for an idle device to exit 1107 'programming mode'. Default: 60 seconds.
- *Interbyte timeout (ms)*: The maximum allowed pause in a middle of a frame sent to the option board. Default: 1500ms.
- *Baudrate fixed at 4800 (flag)*: When set, the baudrate is fixed at 4800 and no baudrate switching takes place. Default: Set.
- *8 bits (flag)*: If not set, the communication options are 7 data bits, equal parity, 1 stop bits. When set, they are 8 data bits, no parity, 1 stop bits. Default: Not set (7E1).

1107 tweaks:

- *Declare as 20ms reaction time (flag)*: When this flag is set, the option card provides the manufacturer ID "FLo" instead of "FLO". Default: Not set.
- *20ms standard (flag)*: When this flag is set, replies are sent after 20ms instead of waiting the full 200 ms required by IEC-1107. Default: Not set.
- *Emulation choice*: The device is can be set to either Instromet 555-1107 or iMeter MEVC emulation. The default is Instromet 555-1107. The emulation is not complete; basically it just sets the names of the registers in the readout.
- *ERROR values (flag)*: If set, register values that could not be retrieved for any reason will be the string "ERROR". If not set (the default), if no value can be retrieved, an empty value is returned.

Miscellaneous:

- *Modbus address*: Default: 1. Don't change this. (Must be set to the same value as the Uniflo 1200 modbus slave address register, for the two to communicate. The only situation when changing can be relevant is if multiple Uniflo 1200's share a modem.)

Load profile format details

The Load Profile record format will typically consist of three types of data as follows:

a) Header

This is the first item in each Load profile output, it is a fixed format and cannot be altered . The format is as follows:

80(890360)

80(	8				9				0				3				60	)CRLF
	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1		

Where
- 80(Indicates start of header
- 8 Indicates that the Load profile is ON
- 9 Indicates that Status Byte 4 and Status Byte 1 are operational
- 0 Indicates that Measurement channels 5, 6, 7 and 8 are Off
- 3 Indicates that Measurement channels 1 and 2 are On, 3 and 4 are Off
- 60 Indicates that the Record interval time is 60 min.
-)CRLF Indicates end of Header.

b) Time Stamp

This item will occur within a Load profile under the following circumstances:-

1) At Power On or Reset
2) At Midnight for each day
3) When the Time and Date setting is altered either to adjust the time or to alter the Summer/Winter Time setting.

The Time and Date Format is as follows:

(YY-MM-DD HH:mm)

Where
- YY Year of Time Stamp
- MM Month of Time Stamp
- DD Day of Time Stamp
- HH Hour of Time Stamp
- mm Minute of Time Stamp

The actual time and date indicated in the Time stamp refers to the time of the preceding record in the load profile or if there is no preceding record it is the time of First Power On or Reset or time stamp of start of oldest day record.

c) Load profile record

The load profile record can contain records for the past XX days in hourly records before the records will be over written.

Each hourly load profile record will consist of the following elements:

XXYY(MMMMBBBBEEEE0000)CRLF

Where
- XX Status byte 1 in Hex notation
- YY Status Byte 4 in Hex notation
- MMMM Measurement channel 1 (Hourly Vm) in Hex notation

BBBBB	Measurement channel 2 (Hourly Vb) in Hex notation
EEEE	Hourly Vm at error in Hex notation.
0000	Hourly Vb at error Hex notation. Currently always 0 for the Uniflo 1200.

Status Byte 1 is a fixed format byte with the following functions:

Bit	Function in UNIFLO 1200	Remarks
7	Time Correction	1 = Time Correction, 0 = No Time Correction
6	Power Fail /Reset	1 = No Power Fail, 0 = Power Fail or Reset
5	Summer /Winter Time	1 = Summer , 0 = Winter
4	Reset of Meter Parameters	No function in UNIFLO 1200 always 0
3	Meas. period aborted	No function in UNIFLO 1200 always 0
2	Power fail 1	No function in UNIFLO 1200 as general power fail
1	Power fail 2	No function in UNIFLO 1200 as general power fail
0	Power fail 3	No function in UNIFLO 1200 as general power fail

There are 5 possible cases from the above that will appear in a UNIFLO 1200

1)	Power Fail or Reset	00H
2)	Normal operation in winter	47H
3)	Time change in winter	C7H
4)	Normal operation in Summer	67H
5)	Time change in Summer	E7H

Status Byte 4 reports general alarm conditions within the UNIFLO 1200 as follows:

Bit	Function in UNIFLO 1200	Remarks
7	Spare	Always 0
6	Low Battery	Uniflo 1200 alarm #17, “Low battery”
5	Pulse Output Alarm	Uniflo 1200 alarm #5, “Pulse count”
4	Alarm Input	Uniflo 1200 alarm #22, “Extern alarm”
3	tmax, tmin, and tDf Alarm	Sensor failure, no reading available (alarm #4, “Temperature sensor”)
2	t Hi , t Lo Alarm	User-specified high/low level alarm triggered. Uniflo 1200 alarms #9 and #10.
1	pmax, pmin, and pDf Alarm	Sensor failure, no reading available (alarms #3, “Pressure sensor” and #6, “Pressure sensor eeprom”)
0	pHi , pLo Alarm	User-specified high/low level alarm triggered. Uniflo 1200 alarms #11 and #12.

Bit value 1 = Alarm on, bit value 0 = Alarm off

Measurement Channel 1 represents the Vm total in meter integer units for the record period which is either 1 hour between adjacent records within the Load profile ,or is the period of time between a time stamp and the next hour, if records are not adjacent.
This number will be in the range 0000H to FFFFH or 0 to 65535 decimal.

Measurement Channel 2 represents the Vb total in meter integer units for the record period which is either 1 hour between adjacent records within the Load profile ,or is the period of time between a time stamp and the next hour, if records are not adjacent.
This number will be in the range 0000H to FFFFH or 0 to 65535 decimal.