ATEQ

USER MANUAL

FIELD BUS NETWORK
ATEQ 5TH SERIES
Version 2.4

www.ateq.com

Reference: UM-NetworksS5P-U

REVISION OF THE FIELDBUS NETWORKS USER MANUAL

Due to continuing improvements, the information contained in this user manual, the features and design of this device are subject to be changed without prior notice.

Edition/ Revision	**Reference**	**Date** (W/Y)	**Chapters updated**
First edition	UM-NetworkS5a-U	15/2003	-----
Second edition	UM-NetworkS5c-U	36/2004	Add ATEQ D and ATEQ G Modbus. General up dating.
Third edition	UM-NetworkS5d-U	22/2005	Add some explanations and some corrections.
Fourth edition	UM-NetworkS5e-U	32/2006	Add Devicenet chapter (13), ATEQ MF5 addresses (chapter 9) and Modbus protocol (chapter 4).
Fifth edition	UM-NetworkS5f-U	49/2006	Add Modbus access direct protocol (chapter 6). Add VT520 Modbus addresses (chapter 12). Add appendices 2 and 3. General renumber of all the chapters. *
Sixth edition	UM-NetworkS5g-U	10/2009	General update. Add chapter 7 bis "F520P addresses".
Seventh edition	UM-NetworkS5h-U	30/2010	Chapter 13: up dated the diagram on paragraph 2 "Profibus or Devicenet networks and central" to correct some mistakes. Chapter 3 and 16 add diagrams. Add appendices 4 " Modbus IP / F26".
Eighth edition	UM-NetworkS5i-U	15/2011	Add chapter 15bis: “Profinet Networks”.
Ninth edition	UM-NetworkS5j-U	25/2011	Correction of some errors.
Tenth edition	UM-NetworksS5K-U	49/2011	Appendices 1, correction of hexadecimals codes mistakes.
Twelfth edition	UM-NetworksS5L-U	22/2012	Add parameters for sealed components for the F5 device (chapter 7). Add complement scheme for Profinet connector (chapter 16). Add VT520 Modbus addresses (chapter 12). Add Ethernet IP chapter (17). Chapters 14 and 15 add new communication boards. Add some minus information.
Thirteenth edition	UM-NetworksS5M-U	25/2013	Add chapter 12 bis H520 identifiers.
Fourteenth edition	UM-NetworksS5N-U	31/2013	Update VT520 identifiers and addresses, add ERD5 device and renumber the chapters.

Edition/ Revision	**Reference**	**Date** (W/Y)	**Chapters updated**
Fifteenth edition	UM-NetworksS5O-U	21/2014	Create chapter 22 "Modbus F26" and remove appendices 4 Modbus / IP F26.
Sixteenth edition	UM-NetworksS5P-U	06/2016	Add information for ERD device firmware ≥ 1.01y3 (chapters 11 and 21). Add "Start" command diagram (chapter 21). Add M12 to RJ45 conversion (chapter 19).

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Chapter 1
MODBUS DEFINITION AND GENERALITIES

1. DEFINITION

The **MODBUS** protocol, developed by Gould MODICON, is a "Master/Slave" multipoint communication protocol between a PC and industrial equipment.

The **MODBUS** protocol is said to be a "Master/slave" if the communication is only established on the initiative of the master and the dialog is composed of a question (sent by the master) and an answer (sent by the slave).

Each instrument operating on a **MODBUS** protocol is given a station number allowing its identification in a network. Therefore the master addresses itself to a particular instrument to establish the communication.

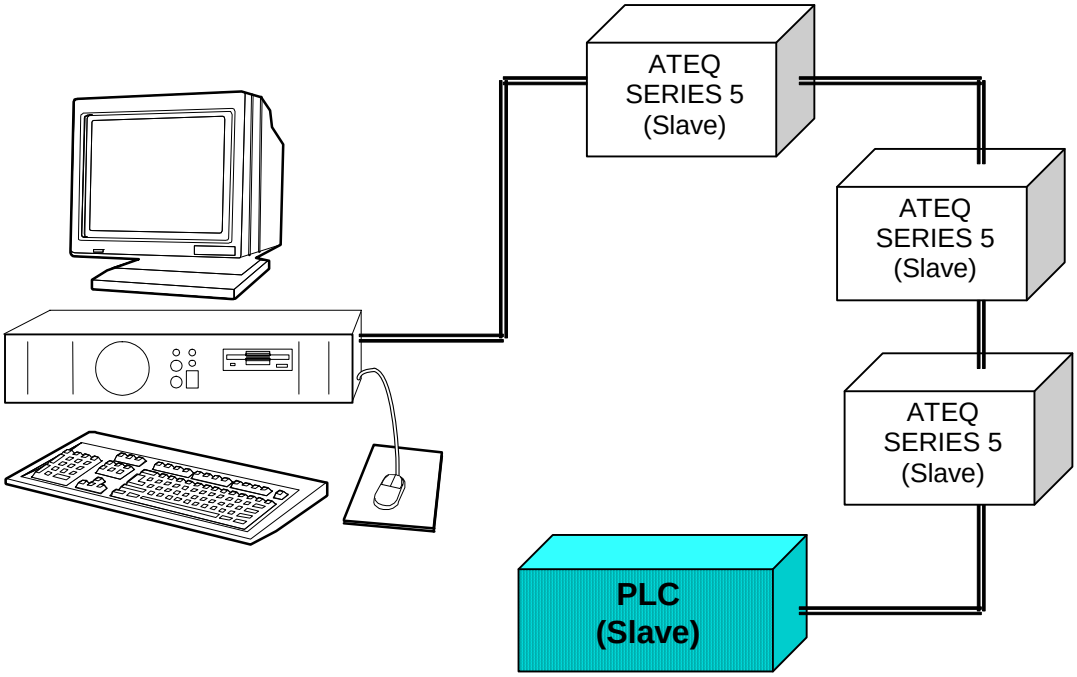
It exist two types of Modbus:

- RTU.
- ASCII.

The protocol used by ATEQ is the RTU Modbus protocol.

Reminder*: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

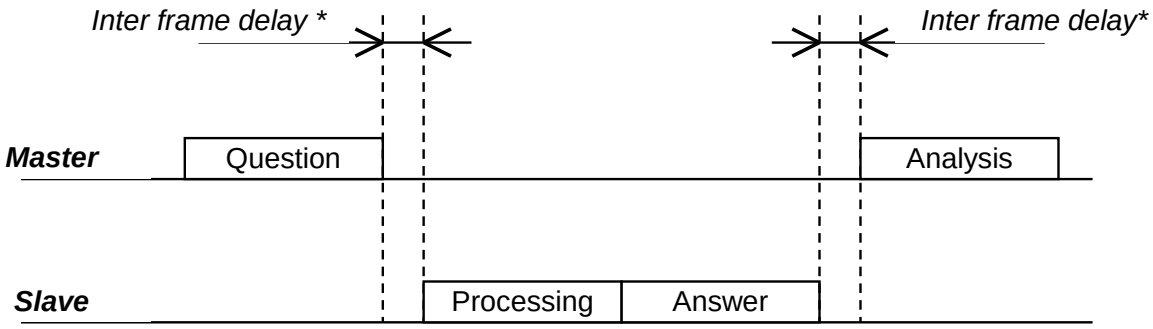
2. PRINCIPLE DIAGRAM FOR A MODBUS NETWORK



3. DIALOG MECHANISM (ASYNCHRONOUS LINK)

The MODBUS data frames do not include delimiters. A demarcation allows the definition of the start and end of a data frame.

The synchronisation is carried out through the use of a delay of 3,5 times the time required for the emission of a character (1 byte). At the end of this delay, the first character received is considered as the start of a new data frame.



** 3,5 the send time of a byte*

4. COMMANDS

The ATEQ instruments are only used a little part of the Modbus commands.

The series 5 ATEQ instruments support three commands:

- Reading N words: **3**.
- Writing N words: **16(d) or 10 h**.
- Bits writing: **5**.

Reminder*: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

5. FORMAT OF THE MODBUS FRAME

5.1. GENERAL FORMAT OF A MODBUS FRAME

ESC (8 bits) **+ CDE** (8 bits) **+ Data** (n*16 bits) **+ CRC** (16 bits)

ESC : address of the slave in the network, (1 byte),

CDE : function code to be executed, (1 byte),

Data : the quantity of data (n) contained in the frame depends on the function used (read or write),

CRC : control code.

5.2. MODBUS FUNCTIONS

3 main functions codes:

Code 10 (hexadecimal) : writing of n consecutive words,

Code 03 (hexadecimal) : reading of n consecutive words,

Code 05 (hexadecimal) : writing of bits.

5.2.1. Reading of n consecutive words

This function allows the reading of n consecutive 16 bits words in the memory of the slave (128 words maximum).

5.2.1. 1) Question

ESC (8 bits) + **CDE** (8 bits) + **OFFSET** (16 bits) + **LONG** (16 bits) + **CRC** (16 bits)

ESC : address of the slave,

CDE : function code (3),

OFFSET : address in the memory of the ATEQ,

LONG : number of 16 bit words to be read,

CRC : control code.

5.2.1. 2) Answer

ESC (8 bits) + **CDE** (8 bits) + **NBYTE** (8 bits) + **DATA1** (8 bits) + **DATA2** (8 bits) + ... + **DATAn** (8 bits) + **CRC** (16 bits)

ESC : address of the slave,

CDE : function code (3),

NBYTE : number of bytes read and contained in the data,

DATAx : All of the data,

CRC : control code.

5.2.2. Writing of n consecutive words

This function allows the writing of n consecutive 16 bit words in the memory of the slave (128 words maximum).

5.2.2. 1) Question

ESC (8 bits) + **CDE** (8 bits) + **OFFSET** (16 bits) + **LONG** (16 bits) + **NBYTE** (8 bits) + **DATA1** (8 bits) + **DATA2** (8 bits) + ... + **DATAn** (8 bits) + **CRC** (16 bits)

ESC : address of the slave,

CDE : function code (16),

OFFSET : address in the memory of the ATEQ,

LONG : number of 16 bit words to be written,

NBYTE : number of octets to be written (NBYTE = LONG * 2),

DATAx : all of the data to be written (DATA = NBYTE),

CRC : control code.

5.2.2. 2) Answer

ESC (8 bits) + **CDE** (8 bits) + **OFFSET** (16 bits) + **LONG** (16 bits) + **CRC** (16 bits)

ESC : address of the slave,

CDE : function code (16),

OFFSET : address in the memory of the ATEQ,

LONG : number of 16 bit words written,

CRC : control code.

5.2.3. Bit writing

5.2.3. 1) Question

ESC (8 bits) + **CDE** (8 bits) + **OFFSET** (16 bits) + **BIT** (8 bits) + **CRC** (16 bits)

ESC : address of the slave,

CDE : function code (16),

OFFSET : address in the memory of the ATEQ,

BIT : value of the bit forced to 0, write 0; forced to 1 write FF,

CRC : control code.

5.2.3. 2) Answer

ESC (8 bits) + **CDE** (8 bits) + **OFFSET** (16 bits) + **BIT** (8 bits) + **CRC** (16 bits)

For the bit write function, the answer data frame is identical to the question frame.

6. CALCULATION OF THE CRC16

6.1. DEFINITION

The CRC16 is a calculation based on the binary value of each character which composes the frame. This function translates the frame into a 16 bit binary word; this binary word is inserted at the end of the frame.

When the master or the slave receives a frame it calculates the CRC16 of the frame and compares the result of the CRC16 content in the frame (last word), in order to check that the exchange has been correctly undertaken.

- If the CRC16 corresponds, the slave responds.
- If the CRC16 is false:
  - ✓ The slave that receives the erroneous frame does not respond,
  - ✓ The master having not received a response restarts the same request for the slave.

***Note**: Generally if the exchange is not accomplished after 2 attempts, the master declares a communication error in the network and stops the exchanges.*

6.2. CRC16 CALCULATION ALGORITHM

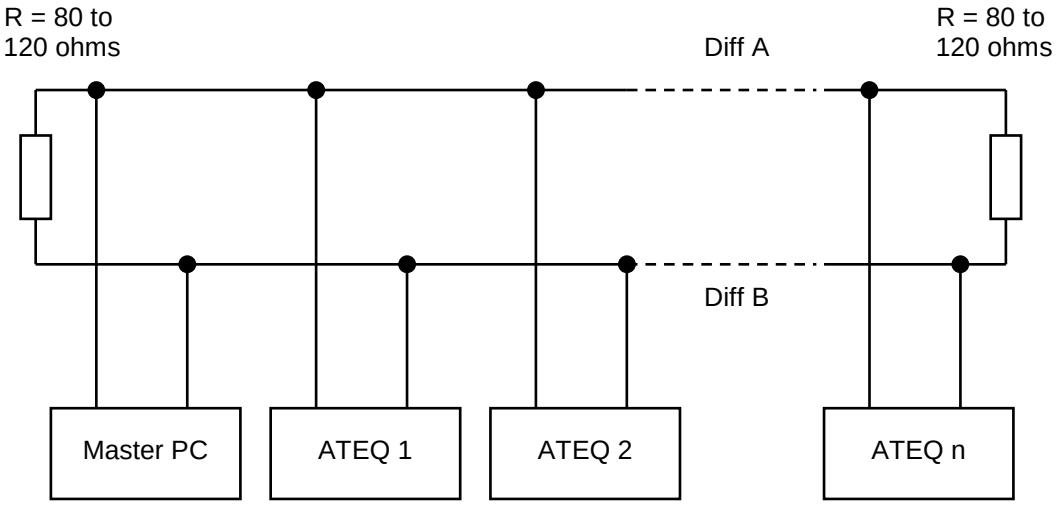
```
CRC16 = 0FFFFh          ; initialisation at the start of each new data frame
As long as (NO(End of frame))
        CRC16=(CRC16 OR exclusive character received)
        for (i=0;i<8;i++)
        {
                CRC16=CRC16/2
                If there are remainders to the division then
                        CRC16= (CRC16 XOR 0A001h)
        }
FTQ
```

Chapter 2
USE OF MODBUS WITH AN ATEQ

ATEQ instruments operate in a **MODBUS** network through the use of an RS232 (single unit) or RS485 (multiple units) serial link.

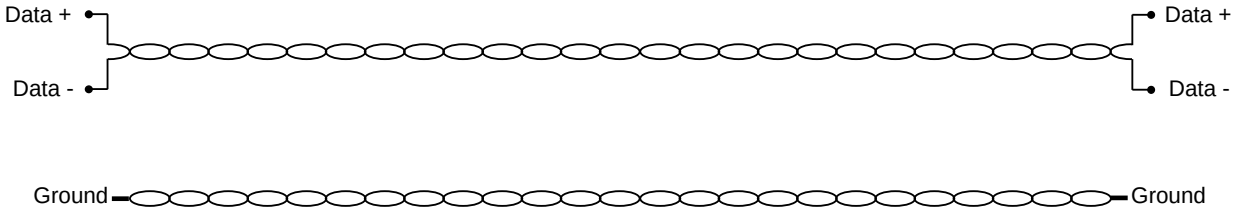
Through the intermediary of the **MODBUS** network, the functions of the **ATEQ** (downloading of the parameters, start, reset,...) are accessible through a PLC or a PC.

1. ARCHITECTURE OF THE MODBUS NETWORK ON THE RS485 LINE



The network is built on the basis of a cable composed of two pairs of entwined and shielded wires.

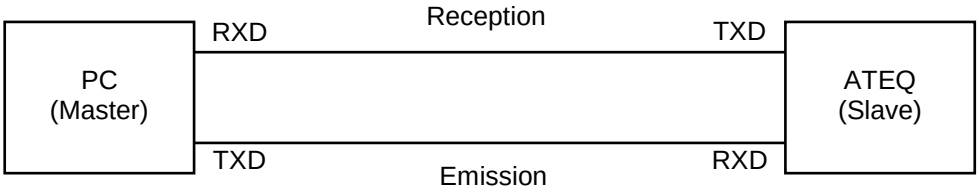
One pair is for the signals and the other is for the ground.



- In network **RS232** or **RS485**, the station address can be between 1h and FFh (or 1(d) and 255(d)). This address can be modifiable in the ATEQ instrument parameters.

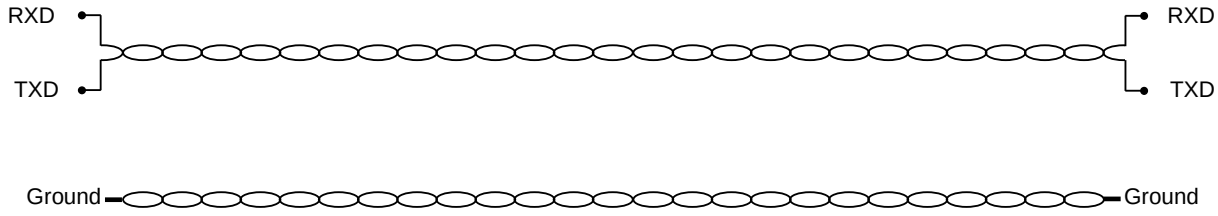
***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

2. ARCHITECTURE OF THE MODBUS NETWORK ON THE RS232 SERIAL LINK



The network is built on the basis of a cable composed of two pairs of entwined and shielded wires.

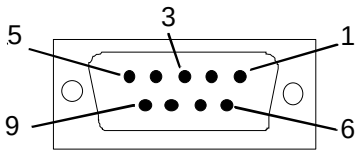
One pair is for the signals and the other pair is for the ground.



3. CONNECTIONS AND CABLING

3.1. RS232 CONNECTOR

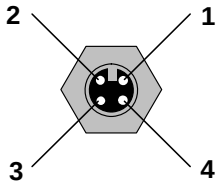
RS232 serial port is on the front or the back panel, 9 pins connector.



Pins	RS232
Pin 1	/
Pin 2	RXD (receive data)
Pin 3	TXD (transmit data)
Pin 4	/
Pin 5	Ground
Pin 6	/
Pin 7	RTS (request to send)
Pin 8	CTS (clear to send)
Pin 9	/

3.2. RS485 CONNECTORS

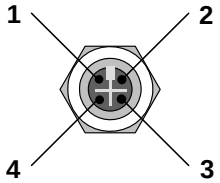
3.2.1. 1) Input connector RS485



ATEQ reserved network**.**
Allows the connection to other **ATEQ** instruments. (Male Lumberg type connector).

PIN 1 (Brown)	Network Data +	PIN 3 (Blue)	Network Data -
PIN 2 (White)	Power + 24 V	PIN 4 (Black)	Ground 0V

3.2.1. 2) Output connector RS485



ATEQ reserved network**.**
Allows the connection to other **ATEQ** instruments. (Female Lumberg type connector).

PIN 1 (Brown)	Network Data +	PIN 3 (Blue)	Network Data -
PIN 2 (White)	Power + 24 V	PIN 4 (Black)	Ground 0V

4. USE WITH AN ATEQ INSTRUMENT

The management of an **ATEQ** with the MODBUS protocol is done by carrying out read or write requests in a table (MODBUS table) contained in the memory of the **ATEQ**.

Each instrument possesses it own MODBUS table, in effect no two instruments have the same operating configuration. In consequent, the "master" unit of the network must address itself differently to the "slaves", if the instruments are of different type or range (ATEQ F5, ATEQ G5…).

Chapter 3
MODBUS ADDRESSES

The **ATEQ** instruments operate in a **MODBUS** network by exploiting the RS232 (single station) or RS485 (multiple stations) serial connection.

Through the intermediary of the **MODBUS** network, the functions of the **ATEQ** (downloading of the parameters, start, reset...) are accessible via a PLC or a PC.

The "**h**" character at the end of each code indicates a hexadecimal code.

The "**(d)**" character at the end of each code indicates a decimal code.

1. GENERALITES

The series 5 ATEQ instruments support three functions:

- Writing N*Words : **10h** or **16(d)**
- Reading N*Words : **03h**
- Bits Writing : **05h**
- Word Writing : **06h**

The parameters of the ATEQ instruments are coded on "long" format, which means on two words and their value is always multiplied by 1000.

Example: a test time of 2.5 seconds, is coded on a “long" having a value of 2500.

When a word is sent or received, it is transmitted in the following order:

Least significant byte (LSB), most significant byte (MSB)

2. ATEQ 5TH SERIES

2.1. WORD ADDRESSES

Writing and / or reading of n*words. The addresses in the table are expressed in words (2 bytes). R = read, W = write.

Hexa address	Meaning	R	W
0	Parameters read address. *Writing on the first word of the number of parameters required (n) then on the following words the identifiers of the n parameters.* *Reading of the identifiers on a word followed by its value on a "long".* ***Note**: an identifier not recognised by the ATEQ instrument will be returned to naught.*	Yes	No
10	Address of the pending results (result in FIFO). Refer to the "Structure of the pending results chain" table. Refer to paragraph 2.3. *Reading of the results structure.*	Yes	No
11	Address for the reading of the last result. *Reading of the results structure.*	Yes	No
20	Address of the step code in progress. *Reading of the step code on one word.*	Yes	No
30	Reading address of all the information of the cycle in live (real time result). Refer to paragraph 2.4. *Live reading of the structure of the information.*	Yes	No
7F	Parameters write address. *Writing on the first word of the number of parameters to be written then on the second word of the identifiers (on one word) followed by the value on a "long".*	No	Yes
100	Write/read address of the general bits (bits of configuration).	Yes	Yes
110	Write/read address of the normal bits (function bits for each program).	Yes	Yes
120	Write and read address for the personalisation (name) of a program, 12 characters maximum.	Yes	Yes
130	Read address for the number of results pending.	Yes	No
200	Write address of the active program on the instrument.	No	Yes
201	Specials cycles writing address.	No	Yes
202	Read address of the active program on the instrument.	Yes	No
3004	Write/read address of the program to be edited (program that you wish to modify).	Yes	Yes

2.2. BIT WRITE ADDRESS

Address for the writing of a bit:

- "Reset" key : **00h,** interruption of the cycle in progress,
- "START" key : **01h,** launch of a test cycle,
- "FIFO reset" : **02h,** reset of the results list.

To make the command, force at 1 the bit at the address of the hoped command.

To force a bit to 0 write 0, to force it to 1 write FFh.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

2.3. STRUCTURE OF THE PENDING RESULTS (RESULT IN FIFO)

Words	Signification
0 (word 1)	Program number.
1 (word 2)	Test type.
2 (word 3)	Relays image.
3 (word 4)	Alarm code.
4 (word 5)	Word of the low part of measurement 1.
5 (word 6)	Word of the high part of measurement 1.
6 (word 7)	Word of the low part of the unit code of measurement 1.
7 (word 8)	Word of the high part of the unit code of measurement 1.
8 (word 9)	Word of the low part of the measurement 2.
9 (word 10)	Word of the high part of the measurement 2.
10 (word 11)	Word of the low part of the unit code of the measurement 2.
11 (word 12)	Word of the high part of the unit code of the measurement 2.

For further information concerning the pending structure, see paragraph 5 "Pending results list structure (FIFO results)" of the specific chapter of each instrument.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Example:

01 03 18 01 00 01 00 01 00 00 00 5A 02 00 00 F8 2A 00 00 A0 92 FF FF 70 17 00 00 DF 4E

01	**03**	**18**	**01 00**	**01 00**	**01 00**	**00 00**
Slave address	read n words	Bytes number	Program number (word 1)	Test type (word 2)	Relays image (word 3)	Alarm code (word 4)

5A 02 00 00	**F8 2A 00 00**	**A0 92 FF FF**	**70 17 00 00**	**DF 4E**
Measure 1 value (words 5 and 6)	Measure 1 unit (word 7 and 8)	Measure 2 value (words 9 and 10)	Measure 2 unit (word 11 and 12)	CRC

Example: Measure 2 value (signed long):

A0 92 FF FF

| LSB | MSB |

FF FF A0 92 = -41106

Divide by 1000 = -41.106

2.4. LIVE STRUCTURE OF THE RESULTS (REAL TIME RESULT)

Words	Signification
0 (word 1)	Program number.
1 (word 2)	Number of results pending in FIFO (available in FIFO).
2 (word 3)	Test type.
3 (word 4)	Status.
4 (word 5)	Step code.
5 (word 6)	Word of the low part of measurement 1.
6 (word 7)	Word of the high part of measurement 1.
7 (word 8)	Word of the low part of the unit code of measurement 1.
8 (word 9)	Word of the high part of the unit code of measurement 1.
9 (word 10)	Word of the low part of the measurement 2.
10 (word 11)	Word of the high part of the measurement 2.
11 (word 12)	Word of the low part of the unit code of measurement 2.
12 (word 13)	Word of the high point of the unit code of measurement 2.

Example:

01 03 1A 00 00 01 00 01 00 21 80 FF FF 0E 00 00 00 2A F8 00 00 28 23 00 00 70 17 00 00 AB 0D

01	03	1A	00 00	01 00	01 00	21 80
Slave address	Read n words	Bytes number	Program number (word 1)	FIFO results number (word 2)	Test type (word 3)	Status (word 4)

FF FF	0E 00 00 00	2A F8 00 00	28 23 00 00	70 17 00 00	AB 0D
Step code (word 5)	Measure 1 value (words 6 and 7)	Measure 1 unit code (words 8 and 9)	Measure 2 value (words 10 and 11)	Measure 2 unit code (words 12 and 13)	CRC

***Note:** the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

Example 1: Measure 2 value (signed long):

28 23 00 00

| LSB | MSB |

00 00 28 23 = 10275

Divide by 1000 = 10.275

***Example 2**: for the pressure, words 5 and 6: 0E 00 00 00 → 00 00 0E 00 h → 3584(d).*

For the unit code, words 7 and 8: F8 2A 00 00 → 00 00 2A F8 h → bar (unit table = 11000).

3. PARAMETERS WRITING BY IDENTIFIER

Each parameter is code by a "long" format (2 words) the download value must be multiplied by 1000.

Example: for a time of 2.5 seconds the download value must be:

2.5 x 1000 = 2500.

Each parameter has his identifier, example: the identifier of the fill time is 1, the one for the test time is 3, etc. See the identifiers tables concerning each instrument (paragraph 2 of the instruments chapters).

The writing to the address 7Fh allows writing the parameters in the memory of the ATEQ instrument.

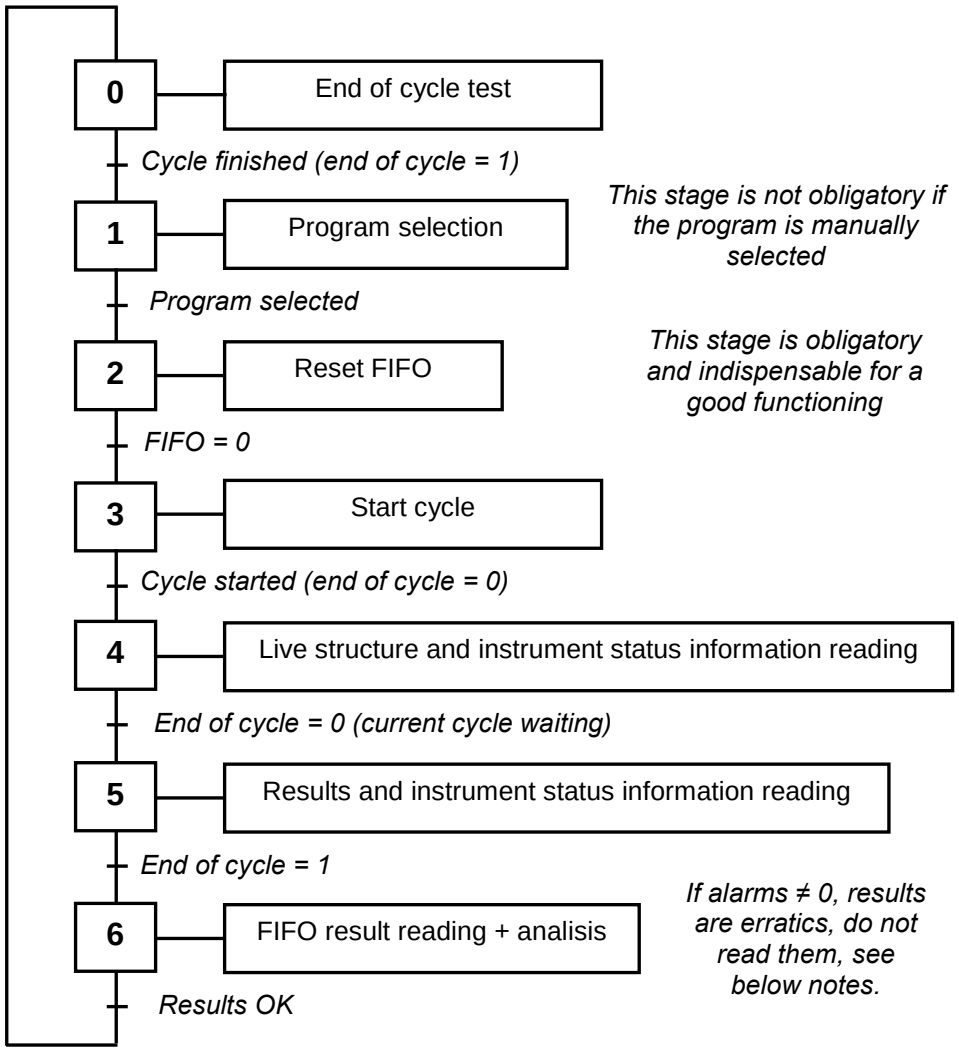
It's possible to write several parameters with only one request. The frame must be set like the following way:

- Word 1: number of identifiers contained in the request.
- Word 2: number 1 parameter identifier to write.
- Words 3 and 4: number 1 parameter value to write.
- Word 5: number 2 parameter identifier to write.
- Words 6 and 7: number 2 parameter value to write.
- Word 8: number X parameter identifier to write.
- Words 9 and 10: number X parameter value.

See example chapter 4 paragraph 3.3 "Creation of a fill time".

4. MODBUS ATEQ INSTRUMENT USING

Base procedure for using an ATEQ instrument in Modbus link:

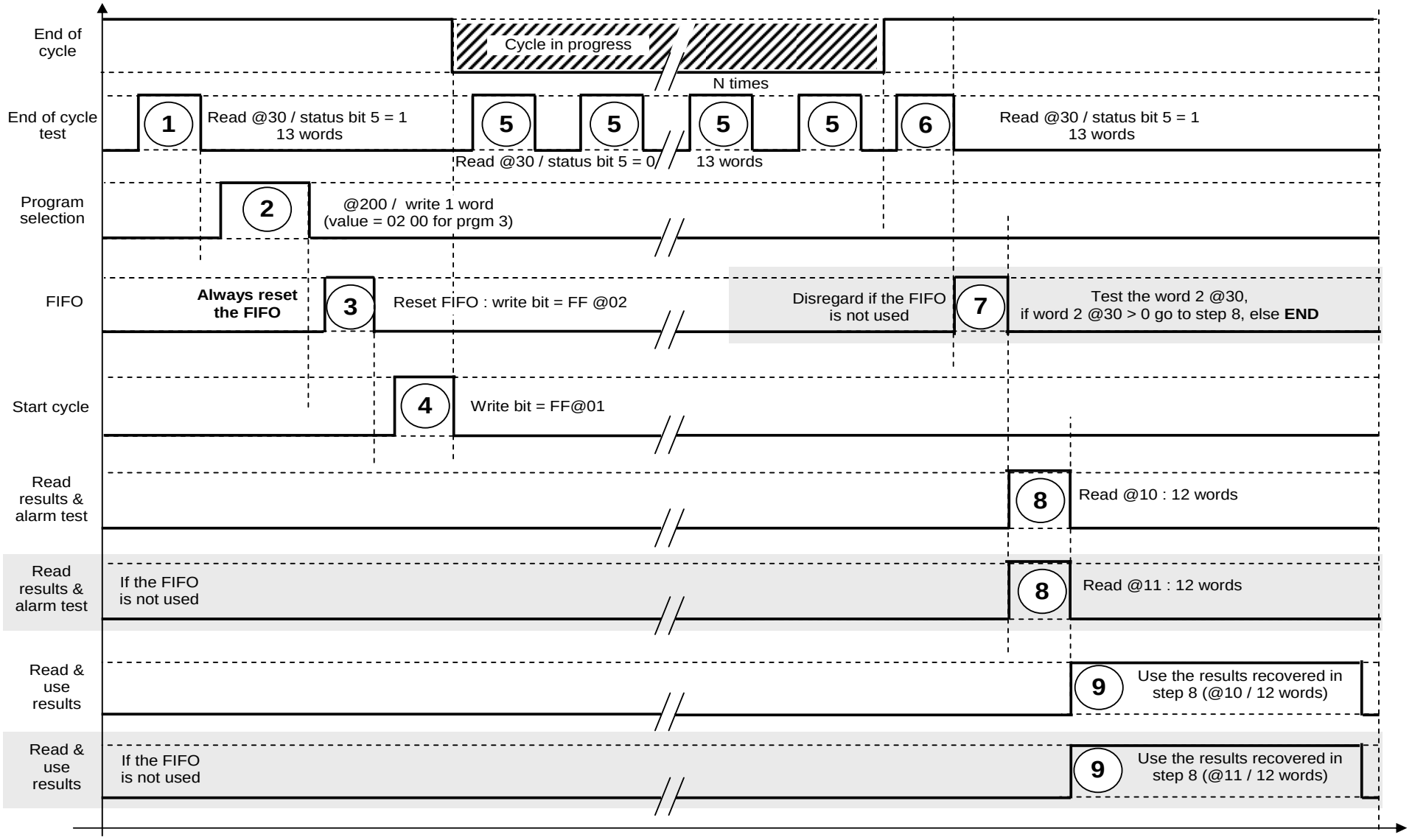


Important notes:

1) *if the number of results in the FIFO = 0, the results are erratics, do not read them.*

2) *if there's an alarm bit, read the alarm code and do not use the measurements results (erratics results).*

5. MODBUS PROGRESS CHART



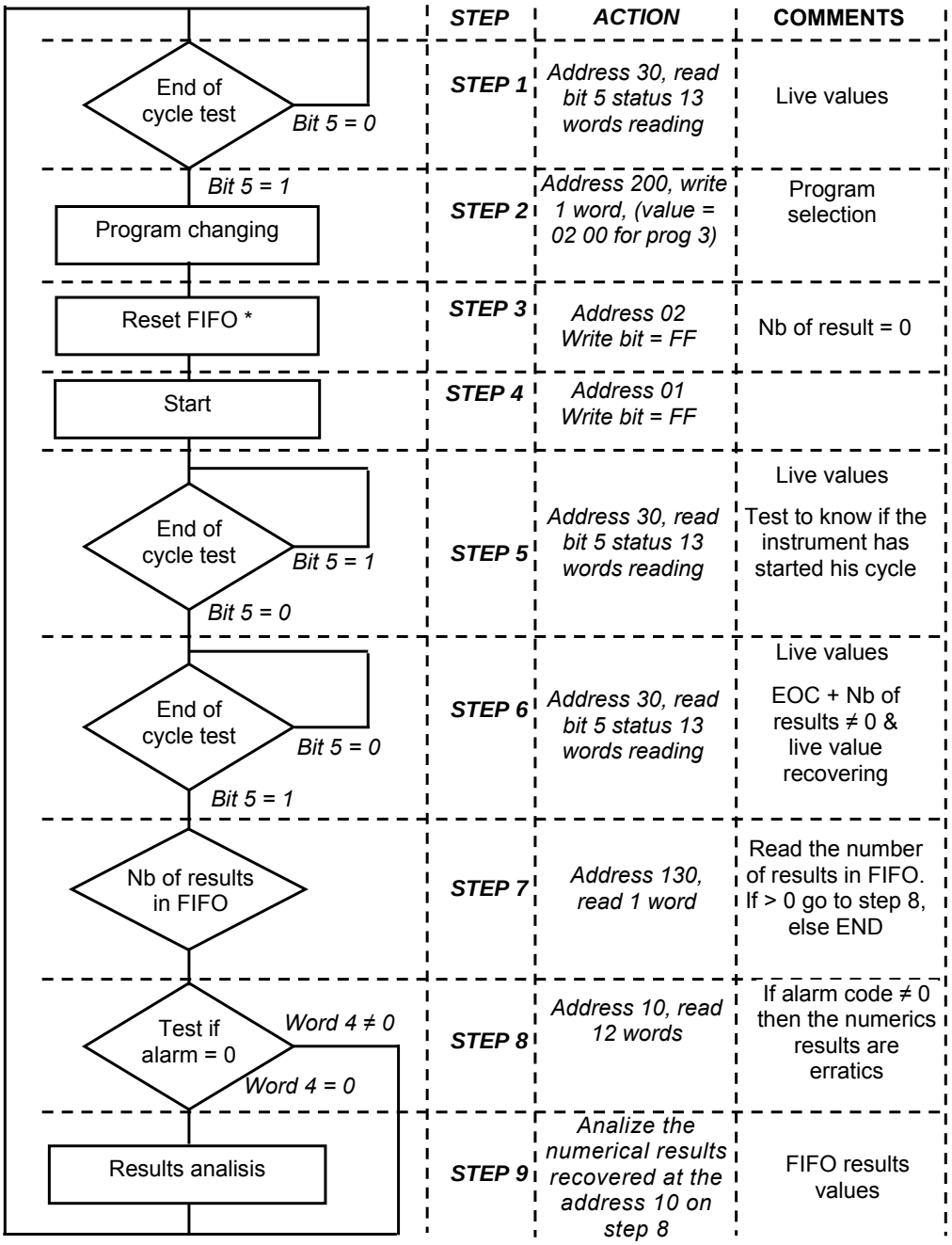
Chapter 4
ATEQ MODBUS PROTOCOL

The aim of this chapter is to explain easily the Modbus protocol functioning with an ATEQ 5th series instrument.

1. SINGLE INSTRUMENT GENERAL CASES

1.1. RESULTS WRITING AND READING (ADDRESS 30)

Processing flow chart for the realization of a classic test cycle with results reading in Modbus protocol:



STEP	ACTION	COMMENTS
STEP 1	*Address 30, read bit 5 status 13 words reading*	Live values
STEP 2	*Address 200, write 1 word, (value = 02 00 for prog 3)*	Program selection
STEP 3	*Address 02 Write bit = FF*	Nb of result = 0
STEP 4	*Address 01 Write bit = FF*	
STEP 5	*Address 30, read bit 5 status 13 words reading*	Live values Test to know if the instrument has started his cycle
STEP 6	*Address 30, read bit 5 status 13 words reading*	Live values EOC + Nb of results ≠ 0 & live value recovering
STEP 7	*Address 130, read 1 word*	Read the number of results in FIFO. If > 0 go to step 8, else END
STEP 8	*Address 10, read 12 words*	If alarm code ≠ 0 then the numerics results are erratics
STEP 9	*Analize the numerical results recovered at the address 10 on step 8*	FIFO results values

* **Note**: if the last result function is requested, don't do the "Reset FIFO" command.

Corresponding frames (F5 instrument):

Step 1: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 00 00 02 00 01 00 21 80 FF FF 0E 00 00 00 F8 2A 00 00 40 1F 00 00 70 17 00 00 B4 7F

Step 2: Change program:

Question: 01 10 02 00 00 01 02 02 00 84 F0

Answer: 01 10 02 00 00 01 00 71

Step 3: Reset FIFO:

Question: 01 05 00 02 00 00 6C 0A

Answer: 01 05 00 02 00 00 6C 0A

Step 4: Start:

Question: 01 05 00 01 FF 00 DD FA

Answer: 01 05 00 01 FF 00 DD FA

Step 5: End of cycle test (cycle started?):

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 07 00 01 00 **00 00** 04 00 5A 02 00 00 F8 2A 00 00 00 00 00 00 70 17 00 00 9D 32

***Note:** 00 00 = 00 00 (bit 5 (end of cycle) = 0).*

Step 6: End of cycle test: (cycle finished?):

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 08 00 01 00 **21 00** FF FF 10 00 00 00 F8 2A 00 00 28 23 00 00 70 17 00 00 42 BB

***Note:** 21 00 = 21 (end of cycle = 20 + pass part = 1).*

Step 7: Number of results in FIFO:

Question: 01 03 01 30 00 01 85 F9

Answer: 01 03 02 **01 00** B9 D4

***Note:** 01 00 = 1 number > 0 = OK.*

Step 8: Alarm code reading (case with an alarm):

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 08 00 01 00 **30 00** FF FF 02 00 00 00 F8 2A 00 00 00 00 00 00 70 17 00 00 20 28

***Note:** 30 00 = 30 (alarm = 10 pressure too low + end of cycle = 20).*

Alarm code reading (case without alarm):

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 07 00 01 00 **00 00** 04 00 5A 02 00 00 F8 2A 00 00 00 00 00 00 70 17 00 00 9D 32

***Note:** 00 00 = 00 00 (alarm = 0, no alarm).*

Step 9: FIFO result reading:

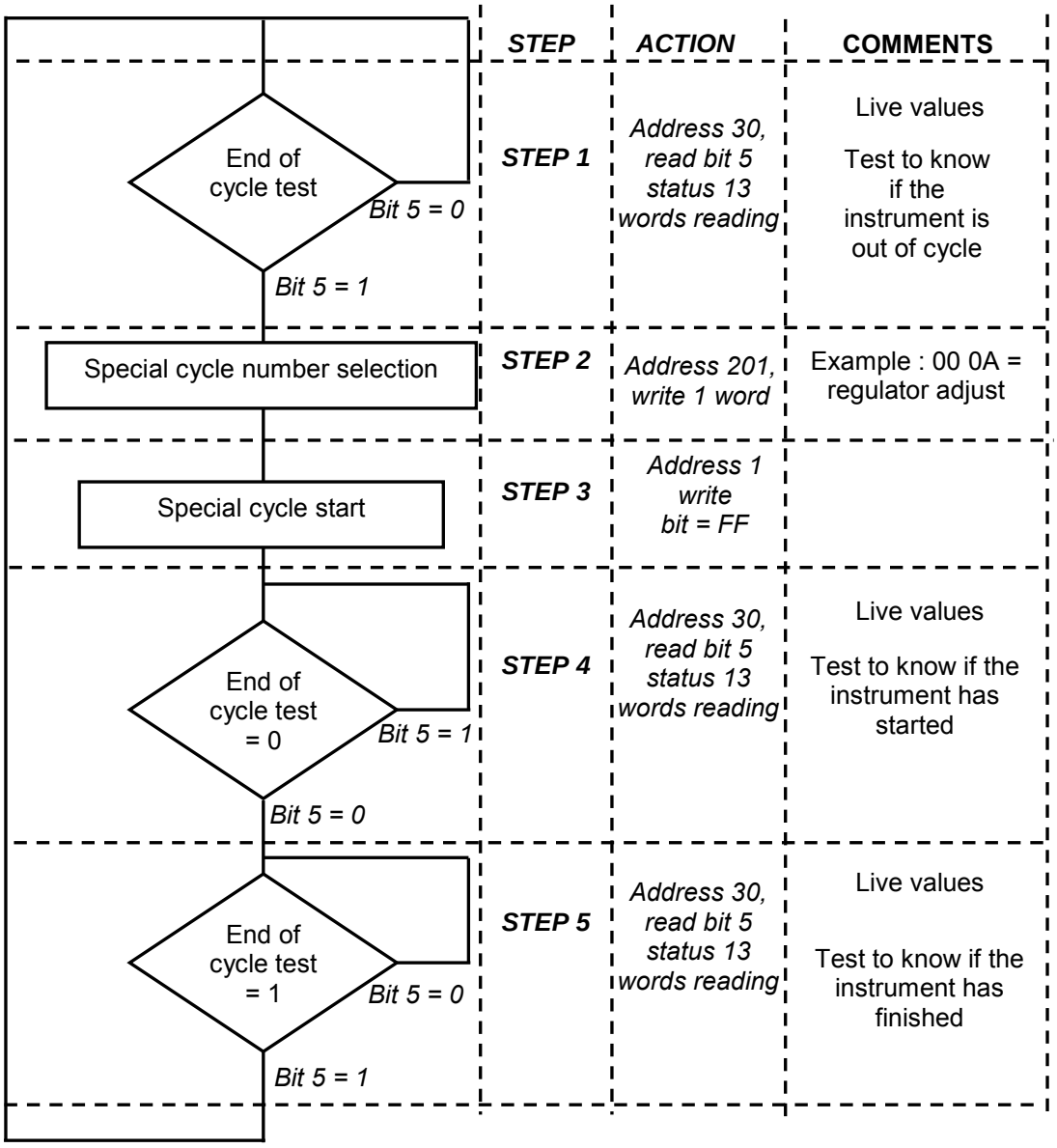
Question: 01 03 00 10 00 0A C4 08

Answer: 01 03 14 02 00 01 00 01 00 00 00 57 02 00 00 F8 2A 00 00 48 77 FF FF 57 70

***Note**: the total number of characters must be under 255, heading and CRC include.*

1.2. SPECIAL CYCLES (ADDRESS 02 01H)

Processing flow chart for the realisation of a special cycle in Modbus protocol:



Corresponding frames (F5 instrument) :

Step 1: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 00 00 01 00 21 00 FF FF 07 00 00 00 F8 2A 00 00 48 77 FF FF 70 17 00 00 F9 59

Step 2: special cycle selection:

Question: 01 10 02 01 00 01 02 0A 00 82 E1

Answer: 01 10 02 01 00 01 51 B1

Step 3: Start cycle:

Question: 01 05 00 01 FF 00 DD FA

Answer: 01 05 00 01 FF 00 DD FA

Step 4: Cycle started test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 02 00 01 00 **00 00** FF FF 5A 02 00 00 F8 2A 00 00 E8 86 FF FF 70 17 00 00 6A 9A

***Note:** 00 00 = 00 00 (bit 5 (end of cycle) = 0).*

Step 5: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 02 00 01 00 **20 00** FF FF 57 02 00 00 F8 2A 00 00 E8 86 FF FF 70 17 00 00 29 68

***Note:** 20 00 = 20 00 (bit 5 (end of cycle) = 1).*

1.3. PARAMETERS MANAGEMENT

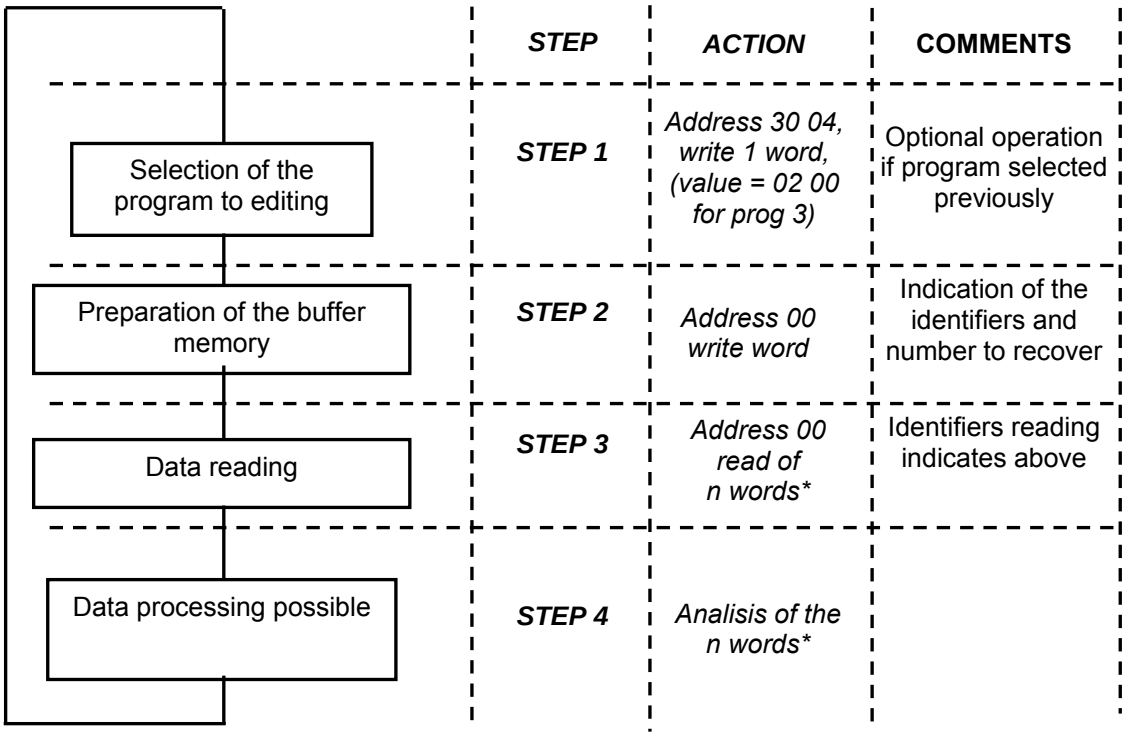
1.3.1. Parameters reading (address 0h)

Parameters reading procedure in an ATEQ instrument, three steps must be realized:

1) Selection of the program to editing, write word (program number) at the address 30 04.

2) Preparation of the buffer memory, number of identifier, identifier 1, identifier 2 etc. write word at the address 00 of the number of identifiers (Write).

3) Read the buffer memory, containing the identifiers and their associated values, reading word at the address 00. (Read).



*n words = 3 x number of parameters to read.

Corresponding frames (F5 instrument) 2 examples:

For the program n° 2

Step 1: Selection of the program to editing (n°2):

Question: 01 10 30 04 00 01 02 01 00 96 47

Answer: 01 10 30 04 00 01 4F 08

Step 2: Reading preparation of the chosen identifiers:

Question: 01 10 00 00 00 04 08	03 00	15 00	01 00	02 00	F4 36
	number of identifiers	Test type identifier	Fill time identifier	Stab time identifier	CRC

Answer: 01 10 00 00 00 04 C1 CA

Step 3: Reading of the chosen identifiers (fill and stabilisation) and their values (respectively 3 s and 4 s):

Question: 01 03 00 00 00 09 85 CC

Answer : 01 03 12 15 00 E8 03 00 00	01 00	C4 09 00 00	02 00	A0 0F 00 00	2B 5E
	(Fill)	(2500 = 2.5 s)	(Stab)	(4000 = 4 s)	

For the program n° 1

Step 1: Selection of the program to editing (n°1):

Question: 01 10 30 04 00 01 02 00 00 97 D7

Answer: 01 10 30 04 00 01 4F 08

Step 2: Reading preparation of the chosen identifiers:

Question: 01 10 00 00 00 04 08	03 00	15 00	01 00	02 00	F4 36
	number of identifiers	Test type identifier	Fill time identifier	Stab time identifier	

Answer: 01 10 00 00 00 04 C1 CA

Step 3: Reading of the chosen identifiers (fill and stabilisation) and their values (respectively 3 s and 4 s):

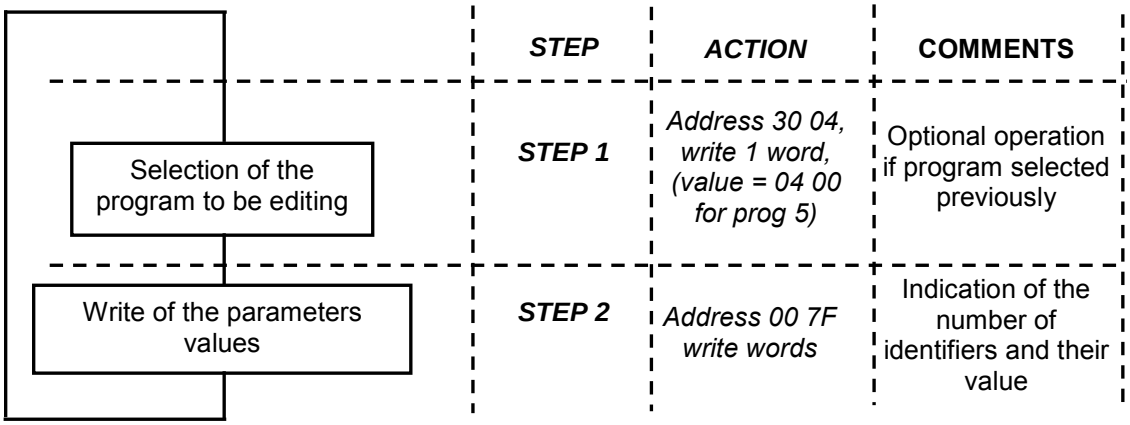
Question: 01 03 00 00 00 09 85 CC

Answer: 01 03 12 15 00 E8 03 00 00	01 00	C4 09 00 00	02 00	A0 0F 00 00	2B 5E
	(Fill)	(2500 = 2.5 s)	(Stab)	(4000 = 4s)	

1.3.2. Parameters writing (address 7Fh)

1) Selection of the program to editing. (Write).

2) Writing of the parameter, number of identifier, [identifier 1; parameter 1], [identifier 2; parameter 2] etc. (Write) at the address 7Fh.



Corresponding frames (F5 instrument):

Step 1: Selection of the program (n°5) to be editing :

Question: 01 10 30 04 00 01 02 04 00 95 17

Answer: 01 10 30 04 00 01 4F 08

Step 2: Identifiers writing (filling and stabilisation) chosen and their values (respectively 1 s and 2 s):

Question: 01 10 00 7F 00 07 0E 02 00	01 00	E8 03 00 00	02 00	D0 07 00 00	CB 0D
	Fill	*1000 = 1 s*	*Stab*	*2000 = 2 s*	

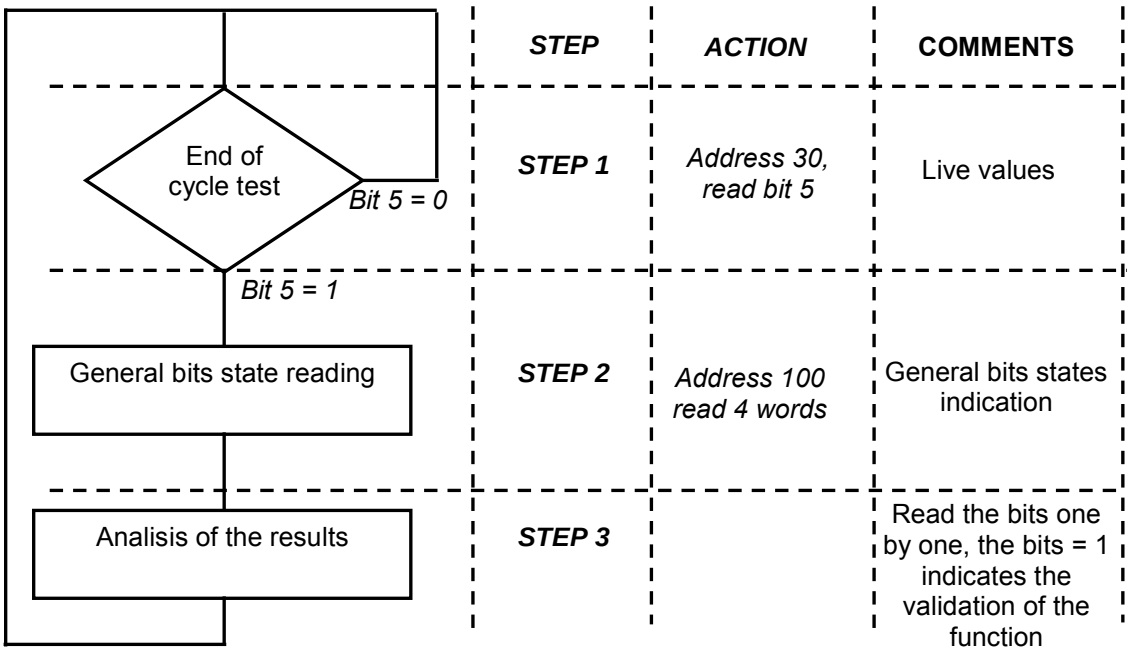
Answer: 01 10 00 7F 00 07 B0 13

***Note**: the total number of characters must be under 255, heading and CRC include.*

1.3.3. General bits reading (address 100h)

The general bits represent the instrument configuration, so the validated functions in the configuration menus of the instrument.

Recover of all the general bits, reading of 4 words.



Corresponding frames (F5 instrument):

Step 1: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 00 00 01 00 20 80 FF FF 01 00 00 00 F8 2A 00 00 00 00 00 00 70 17 00 00 6C 7E

Step 2: general bits reading:

1st example:

Question: 01 03 01 00 00 04 45 F5

Answer: 01 03 08 00 00 00 00 00 00 00 00 95 D7 (no general bit validated).

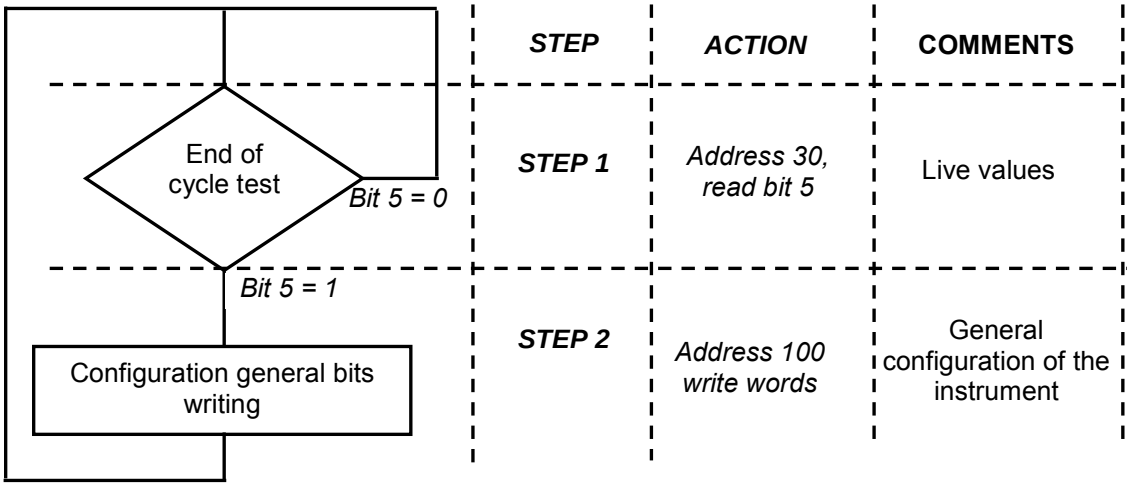
2nd example:

Question: 01 03 01 00 00 04 45 F5 (refer to generals bits table F5).

Answer: 01 03 08	80 00	02 00	20 00	00 08	96 53
	W1: 00 80 = Peak meter	*W2: 00 02 = Valves codes*	*W3: 00 20 = Automatic reset*	*W4: 08 00 = No negative*	*CRC*

1.3.4. General bits writing (address 100h)

The general bits represent the instrument configuration, so the validated functions in the configuration menus of the instrument.



Corresponding frames (F5 instrument):

Step 1: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 01 00 01 00 24 80 FF FF 01 00 00 00 F8 2A 00 00 9A FE FF FF E8 03 00 00 39 CC

Step 2: General bits writing ("filtering" function validation):

Question: 01 10 01 00 00 04 08 80 00 00 00 00 00 00 08 BD 5D

Answer: 01 10 01 00 00 04 C0 36

Check: General bits reading:

Send: 01 03 01 00 00 04 45 F5 (refer to general bits table F5)

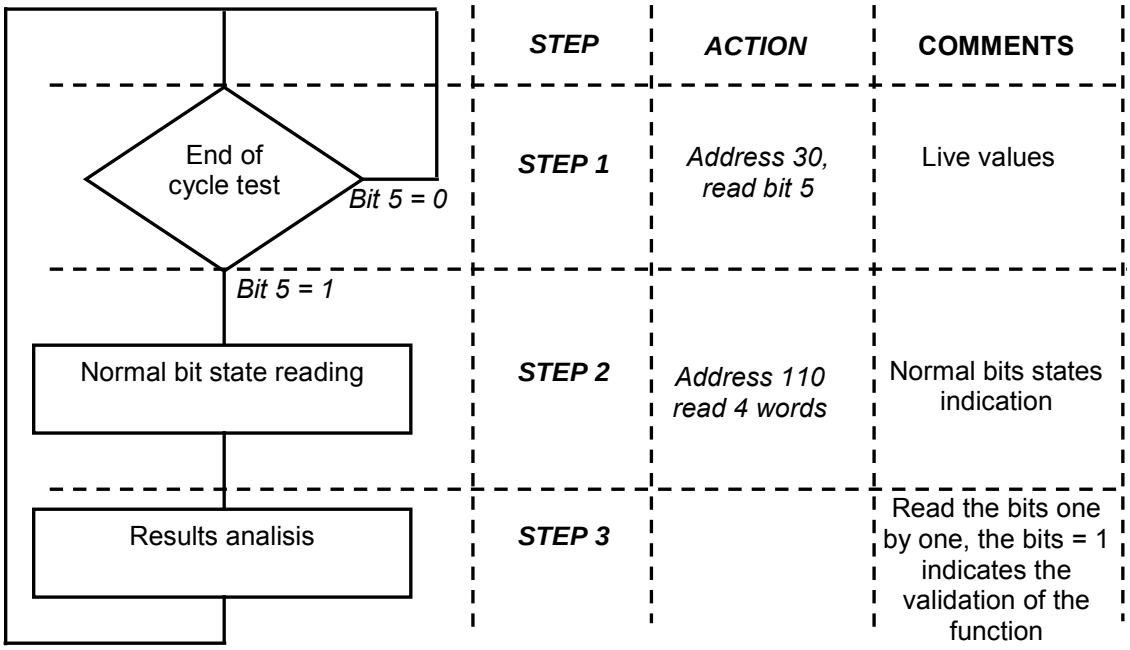
Answer: 01 03 08	80 00	00 00	00 00	00 08	9C 71
	W1: 00 80 = Peak meter	*W2: 00 00 = Nothing*	*W3: 00 00 = Nothing*	*W4: 08 00 = No negative*	*CRC*

***Note**: the total number of characters must be under 255, heading and CRC include.*

1.3.5. Normal bits reading (address 110h)

The normal bits represent the validated functions in the extended menus of the instrument. This paragraph indicates how to read the validated functions in the programs.

Recover of all the bits, read 4 words at the address 110h.



Corresponding frames (F5 instrument):

Step 1: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 01 00 01 00 24 80 FF FF 01 00 00 00 F8 2A 00 00 9A FE FF FF E8 03 00 00 39 CC

Step 2: Selection of the program (n°5) to be editing:

Question: 01 10 30 04 00 01 02 04 00 95 17

Answer: 01 10 30 04 00 01 4F 08

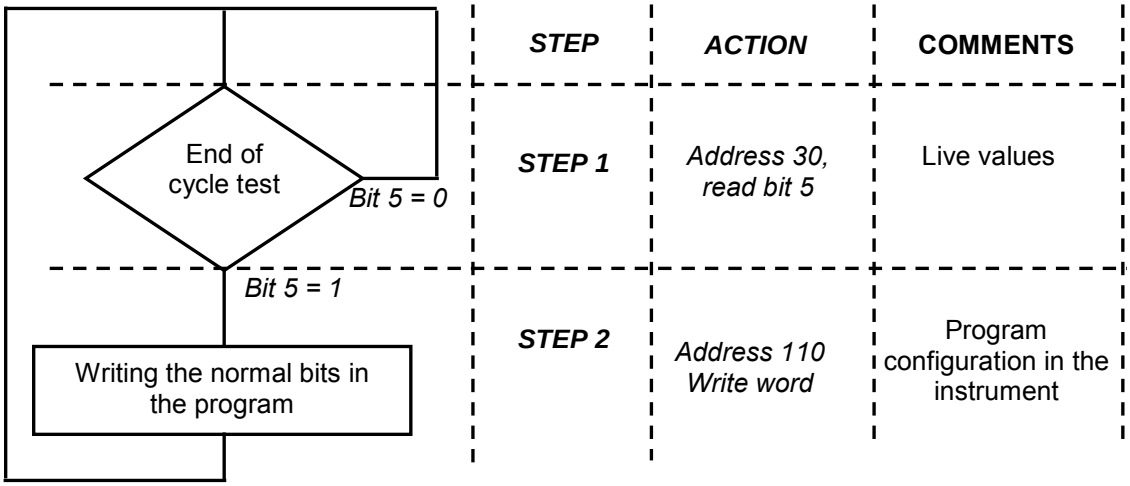
Step 3: Reading of the validated functions:

Question: 01 03 01 10 00 04 44 30 (refer to normal bits table F5)

Answer: 01 03 08	00 42	10 00	10 00	00 80	F0 23
	W1: 42 00 = Peak meter & Chaining pass part	*W2: 00 10 = Chaining with cycle end*	*W3: 00 10 = Stamping pass part*	*W4: 80 00 = No negative*	*CRC*

1.3.6. Normal bits writing (address 110h)

The normal bits represent the validated functions in the extended menus of the instrument. This paragraph indicates how to validate these functions in the programs.



Corresponding frames (F5 instrument):

Step 1: End of cycle test:

Question: 01 03 00 30 00 0D 84 00

Answer: 01 03 1A 02 00 01 00 01 00 24 80 FF FF 01 00 00 00 F8 2A 00 00 9A FE FF FF E8 03 00 00 39 CC

Step 2: Selection of the program (n°5) to be editing:

Question: 01 10 30 04 00 01 02 04 00 95 17

Answer: 01 10 30 04 00 01 4F 08

Step 3: Validation of the ATR0 function in the program:

Question: 01 10 01 10 00 04 08 00 08 00 00 00 00 00 00 FC C4

Answer: 01 10 01 10 00 04 C1 F3

Check: Normal bits reading:

Question: 01 03 01 10 00 04 44 30 (refer to normal bits table F5)

Answer: 01 03 08	00 08	00 00	10 00	00 00	18 D7
	W1: 08 00 = ATR0	*W2: 00 00 = Nothing*	*W3: 00 10 = Stamping pass part*	*W4: 08 00 = Nothing*	*CRC*

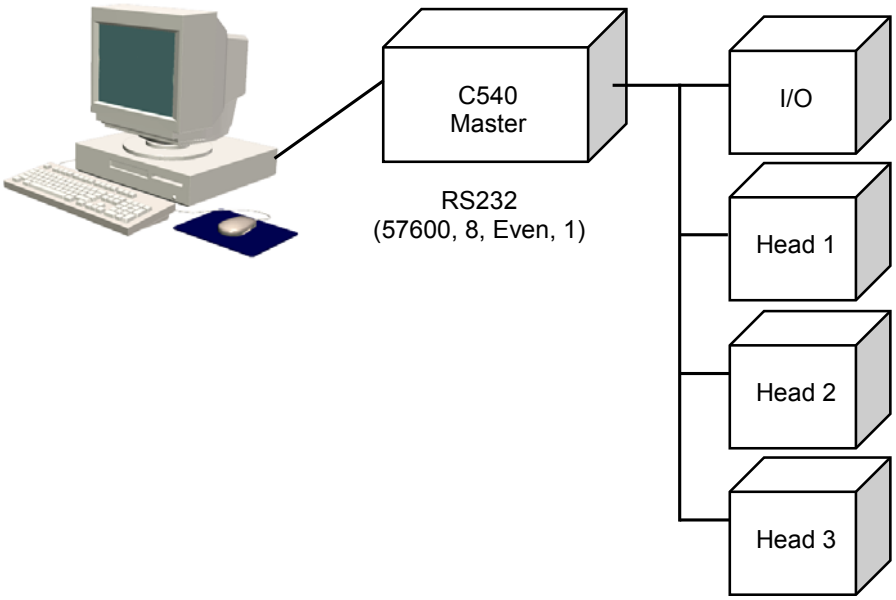
***Note**: the total number of characters must be under 255, heading and CRC include.*

2. MODBUS WITH A CENTRAL AND HEADS

The communication parameters for a central are set parameters, it's important to meet them, they are the following ones:

- Speed: 57600,
- Bit number: 8,
- Stop bit:1,
- Parity: even.

The central address is different according to the connection of the central with the Winateq software or not. If Winateq were connected this would be only one time, the Modbus addresses are modified.



If the central won't communicate with the basis parameters (values without Winateq) try to communicate with the values "with Winateq" depending of the version.

Modbus Address	Without Winateq (Hexa) With Winateq ≥ 2.1	With Winateq < 2.1 (Hexa)
Central C540	FFh	3Fh
I/O	E1h	21h
Head 1	E2h	22h
Head 2	E3h	23h
Head 3	E4h	24h

To return to the addresses per default, it must be done again an identification of the central C540 with Winscan (internal ATEQ software).

3. MODBUS SUMMARY COMMANDS

3.1. MODBUS FUNCTIONS OF THE 5TH SERIES ATEQ INSTRUMENTS

- Write N*Words : **10h or 16(d)**
- Read N*Words : **03h**
- Write Bits : **05h**
- Write one word : **06h**

3.2. WRITING AND READING WORDS ADDRESSES

Command address (hexa)	Address signification
00 00	Reading parameters.
00 10	Reading the FIFO results.
00 11	Reading last result (F5 v1.18; D5 v1.31; F420P v1.01v).
00 20	Reading current step code.
00 30	Reading live information cycle.
00 7F	Writing parameters.
01 00	Writing and reading general bits (configuration).
01 10	Writing and reading normal bits (functions).
01 20	Writing and reading program personalisation (name).
01 30	Reading the number of results in FIFO.
02 00	Writing run program in the instrument.
02 01	Special cycles writing.
02 02	Reading run program in the instrument.
30 00	Configuration reading.
30 04	Writing and reading program to be edited (to be modify).

3.3. WRITING BITS ADDRESSES

- "Reset" key : **00h,** current cycle stop,
- "START" key : **01h,** start test cycle,
- "FIFO reset" : **02h,** reset the FIFO results.

Chapter 5
MODBUS FRAME EXAMPLES

1. GENERALITIES

The instrument ATEQ driving FROM a Modbus protocol can be considered by a command chaining. The following details correspond to some scripts that allow driving, configure and recover the results from an ATEQ instrument.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

2. GENERALS EXAMPLES

2.1. CHANGING THE PROGRAM NUMBER

To change the current program number, it must write one word to the address 02 00h of the program number (see table "Word addresses" chapter 3 paragraph 2.1).

Sending: 01 10 02 00 00 01 02 02 00 84 f0

01	10	02 00	00 01	02	02 00	84 F0
Slave address	Write N words	Address 200h	Number of words	Number of bytes	Program number	CRC

Always remove 1 to the program number value that we want to select, example: choice of the program number 3, then 3 – 1 = 2, else write 2 at the address 200h to run the program 3.

Reception: 01 10 02 00 00 01 00 71

01	10	02 00	00 01	00 71
Slave address	Write N words	Address 200h	Number of bytes	CRC

2.2. START CYCLE ON THE CURRENT PROGRAM

To make a start on the current program, it must do bit writing with the FFh value to the address 01h:

Sending: 01 05 00 01 FF 00 DD FA

01	05	00 01	FF 00	DD FA
Slave Address	Write a bit	Address 01h (start bit)	Forced bit to 1	CRC

Reception: 01 05 00 01 FF 00 DD FA

01	05	00 01	FF 00	DD FA
Slave Address	Write a bit	Address 01h (start bit)	Forced bit to 1	CRC

2.3. RESET FIFO RESULTS

To reset the results FIFO (results pending) it must do the writing of a bit with the value FFh to the address 02h:

Sending: 01 05 00 02 FF 00 2D FA

01	05	00 02	FF 00	2D FA
Slave address	Write a bit	Address 02h (reset bit)	Forced bit to 1	CRC

Reception: 01 05 00 02 FF 00 2D FA

01	05	00 02	FF 00	2D FA
Slave address	Write a bit	Address 02h (reset bit)	Forced bit to 1	CRC

2.4. END OF CYCLE STATUS READING IN THE LIVE STRUCTURE

To read the end of cycle status in the live structure, it must read 13 words to the address 30h (see table chapter 3 paragraph 2.4 "Live structure of the results (real time measure)"):

Sending: 01 03 00 30 00 0D 84 00

01	03	00 30	00 0D	84 00
Slave Address	Read n words	Address 30h	13 words	CRC

Reception: 01 03 1A 02 00 00 00 01 00 21 80 FF FF 00 00 00 00 F8 2A 00 00 08 CF 00 00 70 17 00 00 AE 95

01	03	1A	02 00	00 00
Slave Address	Read n words	Number of bytes (26d)	Program number (3)	Result number in FIFO

01 00	21 80	FF FF	00 00 00 00
Test type (leak)	Status. read 80 21 (80 = key presence; 2 = end of cycle; 1 = pass part)	Step code (FF FF no step in progress).	Pressure value (0)

F8 2A 00 00	08 CF 00 00	70 17 00 00	AE 95
Pressure unit code, read 00 00 2A F8h = 11000(d) = bar).	Leak value: CF 08 = 53000 = 53.	Leak unit code, read 00 00 17 70h = 6000(d) = Pascal	CRC

2.5. RESULTS READING

To read the result, it must read 13 words at the address 10h (see table "Structure of the pending results" for each instrument) the following example is concerning the F5 instrument:

Sending: 01 03 00 10 00 0D 85 CA

01	03	00 10	00 0D	85 CA
Slave Address	Read n words	Address 10h	13 words	CRC

Reception: 01 03 1A 02 00 01 00 01 00 00 00 52 02 00 00 F8 2A 00 00 48 EE 00 00 70 17 00 00 00 00 5B 16

01	03	1A	02 00	01 00
Slave Address	Read n words	Number of bytes (26d)	Program number (3)	Test type, read 00 01h = leak

01 00	00 00	52 02 00 00	F8 2A 00 00
Image of the relays, read 00 01h = 1(d) = good part).	Alarm code, 0 = no alarm	Pressure, read 00 00 02 52h = 594(d) = .594 bar	Unit code, read 00 00 2A F8h = 11000(d) = bar

48 EE 00 00	70 17 00 00	A0 99
Leak value, read 00 00 EE 48h = 61000(d) = 61	Leak unit code, read 00 00 17 70h = 6000(d) = Pascal	CRC

3. OTHERS FRAMES EXAMPLES FOR ATEQ F5

The following examples are for ATEQ instruments of series 5 and of F5 type (Leak measurement). For the other instruments, G5, D5 etc. the frames have the same configuration; however certain codes can be different (refer to previous chapters).

The following examples will allow you to get used to the different tools available to you to ensure the proper operation of your ATEQ instrument. The frames shown here are all expressed in hexadecimal values, and the last words of each frame correspond to the CRC of the Modbus frame.

***Notes**: all the parameter values accessible by an identifier are to be multiplied by a coefficient of 1000.*

When a word is sent or received, it is sent in the following order: least significant byte, most significant byte.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

3.1. SELECTION OF A PROGRAM TO EDIT

Make obligatory before each parameters writing / reading.

Send:

Question: 01 10 30 04 00 01 02 00 00 97 D7

1	2	3	4	5	6	CRC
01	10	30 04	00 01	02	00 00	97 D7

01	1) Request to station 01.
10	2) To write.
30 04	3) To the address "3004h".
00 01	4) 1 word.
02	5) Therefore 2 bytes.
00 00	6) Corresponding to the selection of a program being edited.
97 D7	CRC.

In this example, the program selected is the number 1 (the gap of 1 between the hexadecimal value and the program number, 00 00h is equal to the program 1).

Example: program 1 -> 00h, program 2 -> 01h.

Answer: 01 10 30 04 00 01 4F 08

01	1) Request to station 01.
10	2) to write.
30 04	3) to the address "30 04h".
00 01	4) 1 word.
4F 08	CRC.

The station answers that it has correctly received the write frame at the "30 04h" address of 1 word.

3.2. CREATION OF A TEST TYPE

Question: 01 10 00 7F 00 04 08 01 00 15 00 E8 03 00 00 E5 B8

01	1) Request to station 01.
10	2) To write.
00 7F	3) To the address "00 7Fh".
00 04	4) 4 words of 16 bytes.
08	5) Therefore 8 bytes.
01 00	6) Corresponds to the desired number of parameters to be written.
15 00	7) Download identifier of the test type, read 00 15h = 21d (refers to the parameter table).
E8 03 00 00	8) Read 00 00 03 E8h = 1000(d), divided by 1000 = 1(d) therefore test type = leak.
E5 B8	CRC.

Answer: 01 10 00 7F 00 04 F0 12

01	1) Request to station 01.
10	2) To write.
00 7F	3) To the address "00 7Fh".
00 04	4) 4 words.
F0 12	CRC.

The station 01 answers that it has correctly received the write frame of 4 words.

3.3. CREATION OF A FILL TIME

Question: 01 10 00 7F 00 04 08 01 00 01 00 E8 03 00 00 E6 AC

01	1) Request to station 01.
10	2) To write.
00 7F	3) To the address "00 7Fh".
00 04	4) 4 words.
08	5) Therefore 8 bytes.
01 00	6) Corresponds to the number of parameters that one wants to write.
01 00	7) Download identifier of the fill value 00 01h = 1(d).
E8 03 00 00	8) Read 00 00 03 E8h = 1000d, divided by 1000 = 1(d) therefore 1 second.
E6 AC	CRC

Answer: 01 10 00 7F 00 04 F0 12

01	1) Request to station 01.
10	2) To write.
00 7F	3) To the address "00 7Fh".
00 04	4) 1 word.
F0 12	CRC.

The station answers that it has correctly received the write frame of 4 words to the 7Fh address.

3.4. READING OF THE PARAMETERS

For this operation, 2 steps are necessary.

3.4.1. First step

Question: 01 10 00 00 00 04 08 03 00 15 00 01 00 02 00 F4 36

01	1) Request to station 01.
10	2) To write.
00 00	3) To the address "00h".
00 04	4) 4 words of 16 bits.
08	5) Therefore 8 bytes.
03 00	6) Value corresponding to the number identifiers, read 00 03h = 3(d) = 3 identifiers.
15 00	7) Read 00 15h = 21(d) = test type identifier.
01 00	8) Read 00 01h = 1(d), fill time identifier.
02 00	9) Read 00 02h = 2(d), stabilisation time identifier.
F4 36	CRC.

Answer: 01 10 00 00 00 04 C1 CA

01	1) Request to station 01.
10	2) To write.
00 00	3) To the address "00 00h".
00 04	4) 4 words.
C1 CA	CRC.

The station 01 answers that it has correctly received the write frame of 4 words to the 00h address.

3.4.2. Second step

Question: 01 03 00 00 00 09 85 CC

01	1) Request to station 01.
03	2) To read.
00 00	3) At the address "00 00h".
00 09	4) 9 words.
85 CC	CRC.

This is a request to station 01 to read at the address "00 00h" 9 words.

Answer: 01 03 12 15 00 E8 03 00 00 01 00 E8 03 00 00 02 00 A0 0F 00 00 94 AB

01	1) Request to the station 01.
03	2) To read.
12	3) The read frame for 12h bytes (or 18(d) bytes).
15 00	4) Read 0015h = 21(d) test type identifier.
E8 03 00 00	5) Read 00 00 03 E8h = 1000(d) divided by 1000 = 1(d) test type value: leak.
01 00	6) Read 00 01h = 1(d) fill time identifier.
E8 03 00 00	7) Read 00 00 03 E8h = 1000d divided by 1000 = 1(d) fill time value 1 second.
02 00	8) Read 00 02h = 2(d), stabilisation time identifier.
E8 03 00 00	9) Read 00 00 01 F4h = 500(d) divided by 1000 = 0.5 second, stabilisation time value.
94 AB	CRC.

The 01 station answers that it has correctly received the read frame, by resending the identifiers followed by their value.

Here, we can therefore say that we have a test type of leak, with a fill time "01 00h" (6) of 1 second and a stabilisation time of 0.5 seconds.

3.5. MODIFICATION OF THE CONFIGURATION (EXTENDED MENUS)

Refer to the table of general bits for each instrument.

Question: 01 10 01 00 00 03 06 00 20 00 00 00 00 63 BB

01	1) Request to station 01.
10	2) To write.
01 00	3) To the address 01 00h.
00 03	4) 3 words.
06	5) 6 bytes.
00 20 00 00 00 00	6) Read 00 00 00 00 20 00h = 8192(d) corresponding to the personalisation of a program name.
63 BB	CRC

This is a request to station 01, to write to the address "100h", 3 words, therefore 6 bytes corresponding to the complete field of the general bits (configuration bits).

In this frame, only the bit allowing the personalisation of the program name is validated. The sending of the entire bit field is necessary.

Answer: 01 10 01 00 00 03 81 F4

01	1) Request to station 01.
10	2) To write.
01 00	3) To the address 01 00h.
00 03	4) 3 words.
81 F4	CRC.

Station answers that it has correctly received the frame to write 3 words.

***Note**: for the modification of the "normal bits" field ("functions" menu of the program) the procedure to carry out is identical to the one above, only the address changes "110h" as well as the size of the field to write.*

3.6. MODIFICATION OF A PROGRAM PERSONALISATION

Modification of the personalisation appears in the "functions" menu of the program.

Question: 01 10 01 20 00 05 0A 50 52 4F 47 52 41 4D 4D 45 00 F0 18

01	1) Request to station 01.
10	2) To write.
01 20	3) To the address "01 20h".
00 06	4) 6 words.
0C	5) Therefore 12 bytes.
50 52 4F 47 52 41 4D 4D 45 00	6) The following string of characters: P = 50; R = 52; O = 4F; G = 47; A = 41; M = 4D; E = 45 corresponds at "P R O G R A M M E".
00 00	7) 00 00h to finish the string.
F0 18	CRC.

Request to station 01, to write to the address "120h", 6 words therefore 12 bytes corresponding to the string of characters for the personalisation of the name of program 6.

In this frame, the string signifying "P R O G R A M M E" is sent.

The string can contain a maximum of 12 characters, in our case it contains 9. The formats of the characters sent are in ASCII codes (P = 50; R = 52; O = 4F; G = 47; A = 41; M = 4D).

At the end of the string, it is necessary de place "00 00h" as the insignificant value to indicate the end of the string and avoid an incorrect writing of the program name.

Answer: 01 10 01 20 00 05 00 3C

01	1) Request to station 01.
10	2) To write.
01 20	3) To the address "01 20h".
00 06	4) 6 words.
00 3C	CRC.

The station 01 answers that it has correctly received the write frame of 6 words to the "120h" address.

3.7. SELECTION OF THE PROGRAM TO BE CARRIED OUT

Question: 01 10 02 00 00 01 02 00 00 85 90

01	1) Request to station 01.
10	2) To write.
02 00	3) To the address "02 00h".
00 01	4) 1 word.
02	5) Therefore 2 bytes.
00 00	6) 00 00h= 0(d) corresponding to the programme 1 (always remove 1 to the program number).
85 90	CRC

Request to station 01, to write to the address "200h", 1 word, therefore 2 bytes of value 00h (6).

This request will result in the choice of program 1 as active program (program to be carried out).

Answer: 01 10 02 00 00 01 00 71

01	1) Request to station 01.
10	2) To write.
02 00	3) To the address "02 00h".
00 01	4) 1 word.
00 71	CRC.

The station 01 answers that it has received the write frame for 1 word to the address "200h".

3.8. READING OF THE ACTIVE PROGRAM

Question: 01 03 02 02 00 01 24 72

01	1) Request to station 01.
03	2) To read.
02 02	3) At the address "02 02h".
00 01	4) 1 word.
24 72	CRC.

Request to station 01, to read at the address "202h", 1 word.

Answer: 01 03 02 00 00 B8 44

01	1) Request to station 01.
03	2) To read.
02	3) 2 bytes.
00 00	4) Program number 00 00h = program 1.
B8 44	CRC.

The station answers that it has correctly received the read frame of 2 bytes and that the active program is program number 1.

3.9. ACTIVATION OF THE "START" BIT

Activation of the "START" bit to launch a cycle.

Question: 01 05 00 01 FF 00 DD FA

01	1) Request to station 01.
05	2) To write 1 bit.
00 01	3) To the address "00 01h".
FF 00	4) 1 word of value FF 00.
DD FA	CRC.

Request to station 01, to write 1 bit to the address "01h", 1 word of value FF 00.

This request will result in the start of a cycle.

Answer: 01 05 00 01 FF 00 DD FA

01	1) Request to station 01.
05	2) To write 1 bit.
00 01	3) To the address "00 01h".
FF 00	4) 1 word of value FF 00.
C8 24	CRC.

The station 01 answers that it has correctly received the request.

3.10. READING OF THE STEP IN PROGRESS CODE

Question: 01 03 00 20 00 01 85 C0

01	1) Request to station 01.
03	2) To read.
00 20	3) At the address "00 20h" step code.
00 01	4) 1 word, step code value.
85 C0	CRC.

Request to station 01, to read at the address "20h", 1 word.

Answer: 01 03 02 FF FF B9 F4

01	1) Request to station 01.
03	2) To read.
02	3) Total number of words.
04 00	4) Step code value, read 00 04h = 4(d) fill step.
B9 F4	CRC.

The station answers that it has correctly received the read request and returns a value corresponding to the step at which the cycle is (fill, test, dump…).

Here, the step in progress has the value "04h", which corresponds to the fill step.

3.11. LIVE READING OF THE CYCLE INFORMATION

Refer to the live structure of the results chain table; paragraph 4 "Status and real time measures", chapter 6 (F5), chapter 7 (G5), chapter 8 (D5), etc.

Question: 01 03 00 30 00 0D 84 00

01	1) Request to station 01.
03	2) To read.
00 30	3) At the address 00 30h.
00 0D	4) 13 words.
84 00	CRC.

Request to station 01, to read at the address "30h", 13 Words.

Answer: 01 03 1A 00 00 08 00 01 00 01 80 07 00 11 00 00 00 F8 2A 00 00 B8 0B 00 00 70 17 00 00 BF D2

01	1) Answer of the station 01.
03	2) To read.
1A	3) Total number of words.
00 00	4) Program number in progress, 00 00h= 0(d) corresponds to the program 1 (always remove 1 to the program number).
08 00	5) Number of results pending, read 00 08h = 8 results.
01 00	6) Test type, read 00 01h, corresponds to the leak type.
01 80	7) Instrument status word, read 80 01h key presence value (80 00h) and pass part (00 01h).
07 00	8) Step code word 00 07h, corresponding to the dump step value.
11 00 00 00	9) 2 words of pressure value, read 00 00 00 4Dh = 77(d) divide by 1000 that gives 0,077.
F8 2A 00 00	10) Pressure unit, read 00 00 2A F8h = 11000(d) that gives Bar.
B8 0B 00 00	11) Leak value, read 00 00 0B B8h = 3000(d) divided by 1000 that gives 3.
70 17 00 00	12) Leak unit, read 00 00 17 70h = 6000(d) divided by 1000 that gives 6, that is the Pa unit.
BF D2	CRC

The station returns a frame containing in this order:

- Program number in progress.
- Number of results pending.
- Test type.
- Instrument status (alarm, cycle end ...).
- Step code.
- Pressure value.
- Pressure unit.
- Leak value.
- Leak unit.

***Note**: the other addresses "35h" and "39h" have been created to allow the live access to information concerning the pressure and the leak.*

3.12. READING OF THE PENDING RESULTS LIST (FIFO)

Refer to the pending results chain list, paragraph 5 "Pending results list structure (FIFO results", chapter 6 (F5), chapter 7 (G5), chapter 8 (D5), etc.

Question: 01 03 00 10 00 0C 44 0A

01	1) Request to station 01.
03	2) To read.
00 10	3) At the address 00 10h.
00 0C	4) 12 words.
44 0A	CRC.

Request to station 01, to read at the address "10h", 12 Words.

Answer: 01 03 18 00 00 01 00 02 00 00 00 5D 02 00 00 F8 2A 00 00 A8 C0 05 00 70 17 00 00 F6 F7

01	1) Answer of the station 01.
03	2) To read.
18	3) Total number of words 18h = 24(d).
00 00	4) Program number in progress, 00 00h= 0(d) corresponds to the program 1 (always remove 1 to the program number).
01 00	5) Test type, read 00 01h = 1(d), corresponds to the leak type.
02 00	6) Instrument status word, read 00 02h fail test part value.
00 00	7) Alarm 00 00h = 0(d) no alarm.
5D 02 00 00	8) Pressure value, read 00 00 02 5dh = 605(d) divided by 1000 that corresponds to 0.605 .
F8 2A 00 00	9) Pressure unit, read 00 00 2A F8h = 11000(d) that gives Bar.
A8 C0 05 00	10) Leak value, read 00 0 C0 A8h = 377000(d) divided by 1000 that gives 377.
70 17 00 00	11) Leak unit, read 00 00 17 70h = 6000(d) divided by 1000 that gives 6, that is the Pa unit.
F6 F7	CRC.

The station returns a frame containing in this order:

- Program number in progress.
- Test type.
- Instrument status (part good, cycle end...).
- Alarm.
- Pressure value.
- Pressure unit.
- Leak value.
- Leak unit.

***Note**: the pending results list can only supply the 8 previous results. The reading of a word will cause the deletion of all the results line, in other words of all a frame like the one above, and will leave a space for the following result.*

3.13. READING OF THE NUMBER OF RESULTS AVAILABLE IN FIFO

Question: 01 03 01 30 00 01 85 F9

01	1) Request to station 01.
03	2) To read.
01 30	3) At the address 01 30h.
00 01	4) 1 word.
85 F9	CRC.

Request to station 01 to read at the address "130h", 1 word.

Send :

01 03 02 06 00 BB E4

Answer: 01 03 02 06 00 BB E4

01	1) The station 01 answers.
03	2) To read.
02	3) 2 words.
02 00	4) 00 06h = 6(d) corresponding to the number of results in the FIFO.
BB E4	CRC.

The station 01 answers that there is two frames of results "02h" pending.

3.14. DELETE THE RESULTS INSIDE THE FIFO

Question: 01 05 00 02 FF 00 2D FA

01	1) Request to station 01.
05	2) To write a bit.
00 02	3) To the address 00 02h (reset FIFO).
FF 00	4) 1 forced bit at 1.
2D FA	CRC.

Request to station 01 to write a bit to the address "02h", 1 word.

Answer: 01 05 00 02 FF 00 2D FA

01	1) The station 01 answers.
05	2) To write a bit.
00 02	3) To the address 00 02h (reset FIFO).
FF 00	4) 1 forced bit at 1.
2D FA	CRC.

The station 01 answers that it has correctly received the write frame at the address "02h". "FFh" is equal to 1111 1111 in binary, "the writing" of the bit corresponds therefore to placing all the bits of the byte to 1.

It is necessary to always write "00h" after "FFh".

***Note**: the writing of "FFh" at the address "02h" corresponds to carrying out a reset of the FIFO.*

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Chapter 6
MODBUS ACCESS DIRECT

***Warning**: the "Access direct" addresses values of each instrument are in the identifiers table in the chapters of each concerned instrument. The same for the general bits and normal bits addresses.*

1. ACCESS DIRECT GENERALITIES

- Operations: reading and writing by only one address.
- Reading and writing of one parameter at once.
- Reading and writing of one parameter of general bit and normal bit.
- Status reading (one value).
- Status reading of several consecutives addresses.
- Reading of the last result (one value).
- Reading of the last result of several consecutives values.

2. SUMMARY COMMANDS

2.1. MODBUS FUNCTIONS OF 5TH SERIES INSTRUMENTS IN DIRECT ACCESS

- Write N*Words : 10h or 16(d)
- Read N*Words : 03h

2.2. READ AND WRITE ADDRESSES

Command address (hexa)	Address signification
2000/6000	Selection of the program number in reading and writing edition.
30 04	Reading and writing of the program in edition (to be modified).

2.3. WRITING BITS ADDRESSES

- "Reset" key : **00h,** current cycle stop,
- "START" key : **01h,** start test cycle,
- "FIFO reset" : **02h,** reset the FIFO results.

3. ADRESSES MODBUS ATEQ ACCES DIRECT

The reading and the writing are possible either at the 2000 and 6000 addresses that it is advisable to use according to the needs

3.1. READ AND WRITE ADDRESSE

Program selection in edition: **0x2000**.

Program parameters reading: **0x2001 – 0x21FF**.

- Type: long.
- Length: 4 bytes.
- Coefficient: x1000.

General bits address reading: **0x2401 – 0x24FF**.

- Type: word.
- Length: 2 bytes.

Normal bits address reading: **0x2601 – 0x26FF**.

- Type: word.
- Length: 2 bytes.

Status and real time measurement address reading: **0x2201 – 0x220d**.

Last result reading address: **0x2301 – 0x230c**.

3.2. WRITE AND READ ADDRESSE

Program selection in edition: **0x6000**.

Program parameters writing: **0x6001 – 0x61FF**.

- Type: long.
- Length: 4 bytes.
- Coefficient: x1000.

General bits address writing: **0x6401 – 0x64FF**.

- Type: word.
- Length: 2 bytes.

Normal bits address writing: **0x6601 – 0x66FF**.

- Type: word.
- Length: 2 bytes.

4. ERROR HANDLING

4.1. ERROR FRAME RESPONSE EXAMPLES

- 01 83 02: read error frame with Error code = 02.
- 01 83 03: read error frame with Error code = 03.
- 01 90 02: write error frame with Error code = 02.
- 01 90 03: write error frame with Error code = 03.

The error code is splitting as follow:

- **01** station number (1)
- **83** = 80 + 3 = error code (80) + read (3).
- **90** = 80 + 10 = error code (80) + write (10).
- **03** = error code.

4.2. DIFFERENT ERROR CASES

4.2.1. Read / write parameters

ERRCODE_ILLEGAL_DATA_ADDRESS(2): address out of range.
ERRCODE_ILLEGAL_DATA_VALUE (3): data not valid (option, bit non valid).

4.2.2. Read / write general and normal bits

ERRCODE_ILLEGAL_DATA_ADDRESS (2): address out of range.
ERRCODE_ILLEGAL_DATA_VALUE (3): data not valid (option, bit non valid).

4.2.3. Read status & real time measures

ERRCODE_ILLEGAL_DATA_ADDRESS: address out of range.

4.2.4. Read last cycle results

ERRCODE_ILLEGAL_DATA_VALUE: value not valid (no cycle runs after power on or after reset FIFO command is sent or FIFO empty).
ERRCODE_ILLEGAL_DATA_ADDRESS: address out of range.

5. COMMANDS

5.1. PARAMETERS READING

1) Selection of the program number to edit: write to the address 0x6000 (or 0x2000), 1 word (program number). Program number + 1 = word value (program number 3 = value 2).

2) read the parameters at the address between 0x6001 and 0x61FF (or between 0x2001 and 0x21FF).

Test time parameter reading example (ATEQ F5):

Master	Slave
1) Write 1 word at the address 2000h (or 6000h) corresponding to the program number to be selected. *01 10 20 00 00 01 02 00 00 87 92*	
	2) Answer to the command and selection of the program number. *01 10 20 00 00 01 0A 09*
3) Read 2 words at the address 2003h (or 6003h) (command 03h). *01 03 20 03 00 02 3F CB*	
	4) Answer to the command and display of the result. *01 03 04 D0 07 00 00 73 32*

5.2. STATUS READING

1) Read the status at the basis address 0x2201 (or 0x6201).

Example read the pressure unit code (ATEQ F5):

Master	Slave
1) Read 2 words (1 long) at the address 2208h (or 6208h). *01 03 22 08 00 02 4F B1*	
	2) Answer to the command and display of the pressure unit code. *01 03 04 F8 2A 00 00 EA 9B*

5.3. PARAMETERS WRITING

1) Selection of the program number to edit: write at the address 0x6000 (or 0x2000), 1 word (program number). Program number + 1 = word value (program number 3 = value 2).

2) Write the general options = Extended menus if necessary (1). Bases address 0x6401 (or 0x2401).

3) Write the normal options = Function menu if necessary (1). Bases address 0x6601 (or 0x2601).

4) Write the parameter, example: value 2000 in the parameter, bases address 0x6006 (or 0x2006).

Example put pre-fill with a time of 2 seconds (ATEQ F5):

Master	Slave
1) Write 1 word at the address 6000h (or 2000h) corresponding to the program number to be selected. *01 10 60 00 00 01 02 00 00 C6 56*	
	2) Answer to the command and selection of the program number. *01 10 60 00 00 01 1F C9*
3) Validation "pre-fill" in the general bits, write 1 word = 1 at the address 6403h (or 2403h) *01 10 64 03 00 01 02 01 00 82 35*	
	4) Answer to the general bit command = 1. *01 10 64 03 00 01 EE F9*
5) Validation "pre-fill" in the normal bits, write 1 word = 1 at the address 6603h (or 2603h) *01 10 66 03 00 01 02 01 00 A1 F5*	
	6) Answer to the normal bits command =1. *01 10 66 03 00 01 EF 41*
7) Write 2 words at the address 6006h (or 2006h) the value 2000 (= 2s). *01 10 60 06 00 02 04 D0 07 00 00 52 86*	
	8) Acknowledgement for the correct carry out of the command. *01 10 60 06 00 02 BF C9*

5.4. LAST RESULT READING

In this frame is included the final status of the instrument: relays position, alarm signal, light states, the measurement results values and the units.

Example reading of the pressure unit code (ATEQ F5):

Master	Slave
1) Read 2 words (1 long) at the address 2307h. *01 03 23 07 00 02 7E 4E*	
	2) Display of the pressure unit code. *01 03 04 F8 2A 00 00 EA 9B*

Chapter 7

ATEQ F5 MODBUS ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Writing and / or reading of n*words. Refer to chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".

The special cycles are running correctly only from the ATEQ F5 devices version 1.16zb5.

Write one word in address 201h for select a special cycle.

Versions 1.16, 1.18 and 3.10	Version 1.17	Special cycle
1	6	ATR learning.
2	7	Check calibration.
3	8	Auto – test.
4	9	Calibration.
5	10	Verification calibration.
6	11	ATR + calibration.
7	12	Auto zero piezo
8	13	Auto zero piezo
9	14	Auxiliary regulator.
10	15	Regulator
11	16	Infinite fill.
12	17	Volume calculation.
13	18	No special cycle.
16	X	Sealed PASS Part Learn (1.18 and 3.10 only)
17	X	Sealed FAIL Part Learn (1.18 and 3.10 only)
24		Save parameters in flash.

To activate the special cycle it must make a "Start":

Writing of a forced bit to 1 (FFh) at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instrument as "longs" with fixed point (10^{-3}). A "long" is a two words set.*

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
2	00 02	2002	6002	Stabilization time: 0 > 650 seconds.
3	00 03	2003	6003	Test time: 0 > 650 seconds.
6	00 06	2006	6006	Pre fill time: 0 > 650 seconds.
7	00 07	2007	6007	Pre dump time: 0 > 650 seconds.
9	00 09	2009	6009	Dump time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1: 0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2: 0 > 650 seconds.
20	00 14	2014	6014	Part volume.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, mode D test, operator test. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Blockage mode: 2000. ➢ Desensitized mode: 3000. ➢ Operator mode: 4000.
29	00 1D	201D	601D	Time between 2 chained cycles: 0 > 650 seconds
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit.
60	00 3C	203C	603C	Natural reject value of the test part: 0 > 9999.
61	00 3D	203D	603D	Natural reject level of the test part in recovery: 0 > 9999.
62	00 3E	203E	603E	Natural reject level of the reference part: 0 > 9999.
63	00 3F	203F	603F	Natural reject value of the reference part in recovery: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 > 9999.
67	00 43	2043	6043	Pre-fill instruction value: 0 > 9999.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
68	00 44	2044	6044	Choice of the sealed component: standard or large leak. ➢ Standard: 0000. ➢ Large Leak: 1000.
72	00 48	2048	6048	Calibration drifts percent.
80	00 50	2050	6050	Differential auto reset time.
102	00 66	2066	6066	Type of permanent blowing. ➢ Regulator 2: 0000. ➢ Regulator 1: 1000.
103	00 67	2067	6067	Type of fill. ➢ Standard: 0000. ➢ Instruction: 1000. ➢ Ballistic: 2000.
104	00 68	2068	6068	Type of pre-fill. ➢ Standard: 0000. ➢ Instruction: 1000. ➢ Ballistic: 2000.
106	00 6A	206A	606A	Commutation time of the equalization valve calibration check.
107	00 6B	206B	606B	ATR absorption tolerance.
108	00 6C	206C	606C	Start value of the transient (ATR).
110	00 6E	206E	606E	Type of external dump. ➢ Normally close: 0000. ➢ Normally open: 1000.
111	00 6F	206F	606F	Reference volume.
112	00 70	2070	6070	Function attributed to the entry of the special cycles. ➢ Program selection: 0000. ➢ Verif P1 reg 1: 1000. ➢ Verif P1 reg2: 2000. ➢ Verif P2: 3000. ➢ Verif diff sensor: 4000. ➢ Auto test: 5000. ➢ Sensor points: 6000. ➢ Auxiliary regul: 7000. ➢ Regulator adjust: 8000. ➢ Part regulator adjust: 9000. ➢ Infinite fill: 10000.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
				➢ Piezo reset: 11000. ➢ Calibration: 12000. ➢ Calibration check: 13000. ➢ recalibration: 14000. ➢ ATR learning: 15000. ➢ Sealed comp pass part: 16000. ➢ Sealed comp fail part: 17000. ➢ Volume calculation: 18000. ➢ Calibration check: 19000. ➢ Step by step: 20000. ➢ Auto parametering: 20800. ➢ ATR calibration: 22000. ➢ Bar code: 23000.
117	00 75	X	X	Permanent blowing pressure instruction.
118	00 76	2076	6076	Original unit for the calculation of rejects in cm^3/min.
119	00 77	2077	6077	Minimum sealed component measurement pressure.
120	00 78	2078	6078	Maximum sealed component measurement pressure.
121	00 79	2079	6079	Fill time of the internal volume.
122	00 7A	207A	607A	Sealed component transfer time.
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.
124	00 7C	207C	607C	Reject in calibration check.
125	00 7D	207D	607D	Percentage of the calibration check.
126	00 7E	207E	607E	Maximum pressure value in pre-fill.
127	00 7F	207F	607F	Reject unit.
128	00 80	X	X	Instruction value during a calibration.
140	00 8C	208C	608C	Percentage concerning the temperature compensation.
141	00 8D	208D	608D	Test time for the temperature compensation.
142	00 8E	X	X	Max pressure in recovery test (2 piezos sensors).
143	00 8F	X	X	Min pressure in recovery test (2 piezos sensors).
144	00 90	2090	6090	Setup of the outputs (standard or compact). ➢ Standard: 0000. ➢ Compact: 1000.
145	00 91	2091	6091	Number of program to be copied.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
146	00 92	2092	6092	Number of the program to be pasted.
147	00 93	2093	6093	Minimum pre fill.
148	00 94	2094	6094	Filtering.
149	00 95	2095	6095	Unit type SI or USA. ➢ SI: 0000. ➢ USA: 1000. ➢ CAL: 2000.
161	00 A1	20A1	60A1	Volume unit.
164	00 A4	20A4	60A4	Number of the following program in sequencing.
165	00 A5	20A5	60A5	Number of cycles between two automatic reset.
166	00 A6	20A6	60A6	Time between two automatic reset.
175	00 AF	20AF	60AF	Regulator check during its learning.
179	00 B3	20B3	60B3	Dump volume value.
203	00 CB	20CB	60CB	Regulator check during its learning.
233	00 E9	20E9	60E9	Quick zero.
340	01 54	2154	6154	ATR transient value.

Identifiers for F5, 3TD special version only, these parameters are for the burst test mode.

21	00 15	2015	6015	Test type: ➢ Burst test: 5000.
315	01 3B	X	X	Start pressure instruction burst test mode.
334	01 4E	X	X	Rise time burst test mode.
335	01 4F	X	X	Step time burst test mode.
336	01 50	X	X	Number of stages burst test mode.

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Pre-fill.
1	00 01	Pre-dump.
2	00 02	Sealed component fill.
3	00 03	Sealed component stabilization.
4	00 04	Fill.
5	00 05	Stabilization.
6	00 06	Test.
7	00 07	Dump.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: fail test part. Bit 2 = 1: fail reference part. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: recoverable part. Bit 7 = 1: CAL error or drift. Bit 8 = 1: Calibration check error. Bit 9 = 1: ATR error or drift. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to units table).
9	2209	Pressure unit code high part word (refer to units table).
10	220A	Leak low section word.
11	220B	Leak high section word.
12	220C	Leak unit code low part word (refer to units table).
13	220D	Leak unit code high part word (refer to units table).

5. PENDING RESULTS LIST STRUCTURE (FIFO RESULTS)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, leak too large in test. Bit 2 = 1: fail part, leak too large in reference. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to units table).
8	Pressure unit code high part word (refer to units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to units table).
12	Leak unit code high part word (refer to units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

6. LAST RESULTS STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, the last result is as an array of 12 words. This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The last result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	D. A. address (hexa) R	Meaning	Type	Bytes	Coeff
1	2301	Program number.	Word	2	
2	2302	Test type.	Word	2	
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, leak too large in test. Bit 2 = 1: fail part, leak too large in reference. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
4	2304	Alarm code (refer to the alarm codes table).	Word	2	
5	2305	Pressure low part word.	Long	4	x1000
6	2306	Pressure high part word.			
7	2307	Pressure unit code low part word (refer to units table).	Long	4	x1000
8	2308	Pressure unit code high part word (refer to units table).			
9	2309	Leak low section word.	Long	4	x1000
10	230A	Leak high section word.			
11	230B	Leak unit code low part word (refer to units table).	Long	4	x1000
12	230C	Leak unit code high part word (refer to units table).			

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1			Permanent blowing activation.	Conf
	1	00 02	2	241A	641A	Permanent blowing.	Conf
	2	00 04	4	2404	6404	Fill type.	CExt
	3	00 08	8	2403	6403	Pre-fill type.	CExt
	4	00 10	16	2401	6401	Recovery thresholds.	CExt
	5	00 20	32	241C	641C	Cycle end.	CExt
	6	00 40	64	241D	641D	Mini valve.	CExt
	7	00 80	128	2408	6408	Peak meter.	CExt
	8	01 00	256			Volume calculation.	CExt
	9	02 00	512	2405	6405	Reference volume.	CExt
	10	04 00	1024	240B	640B	ATR 0.	CExt
	11	08 00	2048	240C	640C	ATR 1.	CExt
	12	10 00	4096	240D	640D	ATR 2.	CExt
	13	**20 00**	**8192**	**2413**	**6413**	**Program personalisation.**	**CExt**
	14	40 00	16384	241F	641F	Chaining.	CExt
	15	80 00	32768	2420	6420	Automatic connector.	CExt
2	16	00 01	1	243B	643B	Calibration check.	CExt
	17	00 02	2	2435	6435	Valve codes (output codes).	CExt
	18	00 04	4	2421	6421	Sealed component.	CExt
	19	00 08	8	2422	6422	Stamping.	CExt
	20	00 10	16			Reserved.	
	21	00 20	32	2424	6424	N test.	CExt
	22	00 40	64	2425	6425	Reserved.	
	23	00 80	128			Sending cond.: pass part.	RS232
	24	01 00	256			Sending cond.: fail test part.	RS232
	25	02 00	512			Sending cond.: fail ref. part.	RS232
	26	04 00	1024			Sending cond.: alarm presence.	RS232

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	27	08 00	2048			Sending cond.: pressure error.	RS232
	28	10 00	4096			Sending cond.: end of cycle	RS232
	29	20 00	8192			Sending cond.: recoverable.	RS232
	30	40 00	16384			Sending cond.: calibration.	RS232
	31	80 00	32768			Frame content: time stamp.	RS232
3	32	00 01	1			Frame content: personalization.	RS232
	33	00 02	2			Content of the frame: pressure.	RS232
	34	00 04	4	242F	642F	Security.	Conf
	35	00 08	8	2414	6414	External dump.	Conf
	36	00 10	16			Exportation.	RS232
	37	00 20	32			Automatic reset.	Conf
	38	00 40	64			Placing in stand-by.	Main
	39	00 80	128			Wake up from stand-by.	Main
	40	01 00	256			Remote control.	
	41	02 00	512	2407	6407	Temperature compensation.	CExt
	42	04 00	1024			Recovery test.	CExt
	43	08 00	2048			Automatic setting of the parameters activation.	Conf
	44	10 00	4096			Parameters automatic setting.	Conf
	45	20 00	8192			Page feed.	
	46	40 00	16384	2434	6434	Sign.	CExt
	47	80 00	32768			After sale service cycle.	CExt
4	48	00 01	1	2402	6402	Unit type.	CExt
	49	00 02	2			Automatic reset piezo 2.	Conf
	50	00 04	4			Automatic save activation.	Conf
	51	00 08	8	2438	6438	Electronic regulator mode.	Conf
	52	00 10	16			Auxiliary cedes activation.	CExt
	53	00 20	32	2409	6409	Filtering.	CExt
	54	00 40	64			Quick automatic reset activation.	Conf
	55	00 80	128			Quick automatic reset.	Conf
	56	01 00	256	2442	6442	Permanent electronic regulator.	Conf
	57	02 00	512	2443	6443	Bar code.	Conf
	58	04 00	1028			Flow reject.	
	59	08 00	2048	2436	6436	No negative.	CExt
	60	10 00	4096			Dump threshold.	CExt

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	61	20 00	8192	240E	640E	ATR 3.	CExt
	62	40 00	16384	2445	6445	In 7 test.	CExt
	63	80 00	32168	2446	6446	In 7 test configuration.	Conf
5	64	00 01	1			Absolute value.	Conf
	65	00 02	2			Leak display.	Conf
	66	00 04	4			By pass valve.	Conf
	67	00 08	8			Count down (timer).	CExt
	68	00 10	16			Inversed sealed component.	CExt
	69	00 20	32			Inversed sealed component 2.	CExt
	70	00 40	64			Volume measurement.	CExt
	71	00 80	128			Dump Off.	CExt
	72	01 00	256			Program selection on bar code reading.	CExt
	73	02 00	512			Bar code reset on end of cycle.	CExt
	74	04 00	1024			Cut Off.	CExt
	75	08 00	2048			ATF.	CExt

Example: bit number 13 (personalisation of the program name) activated to 1, will place to "20 00h" the value in the first word. 20 00h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other: **word 1 + word 2 + ….. + word n**

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272(d)). Table of the normal bits per program.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning		Menu
		Hexa	Dec	R/W	R/W			
1	0	00 01	1			Fill regulator number.	See § 8.1	
	1	00 02	2			Pre-fill reg number.		
	2	00 04	4	2604	6604	Fill type activation.		Funct
	3	00 08	8	2603	6603	Pre-fill type activation.		Funct
	4	00 10	16	2601	6601	Recovery thresholds activation.		Funct
	5	00 20	32			Cycle end Activation.		Funct
	6	00 40	64			End of cycle with reset and auto reset activation.		Funct
	7	00 80	128			Cycle end with dump and reset activation.		Funct
	8	01 00	256			Cycle end with fill Activation.		Funct
	9	02 00	512			Peak meter Activation.		Funct
	10	04 00	1024			Reference volume Activation.		
	11	08 00	2048	260B	660B	ATR 0 activation.		Funct
	12	10 00	4096	260C	660C	ATR 1 activation.		Funct
	13	20 00	8192	260D	660D	ATR 2 activation.		Funct
	14	40 00	16384	2622	6622	Chaining activation.		Funct
	15	80 00	32768			Chaining pass part activation.		Funct
2	16	00 01	1			Chaining fail test part activation.		Funct
	17	00 02	2			Chaining fail ref. part activation.		Funct
	18	00 04	4			Chaining with alarm activation.		Funct
	19	00 08	8			Chaining press. switch error activation.		Funct
	20	00 10	16			Chaining with cycle end activation.		Funct
	21	00 20	32	2629	6629	Mini-valve activation.		Funct
	22	00 40	64			Chaining with recovery activation.		Funct
	23	00 80	128			Chaining with calibration activation.		Funct
	24	01 00	256	262B	662B	Automatic connector activation.		Funct
	25	02 00	512	2641	6641	Calibration check activation.		Funct
	26	04 00	1024	2612	6612	Valve codes activation.		Funct
	27	08 00	2048	2613	6613	Valves 1 activation.		Funct
	28	10 00	4096	2614	6614	Valves 2 activation.		Funct

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	29	20 00	8192	2615	6615	Valves 3 activation.	Funct
	30	40 00	16384	2616	6616	Valves 4 activation.	Funct
	31	80 00	32768	2617	6617	Valves 5 activation.	Funct
	32	00 01	1	2618	6618	Valves 6 activation.	Funct
	33	00 02	2	2619	6619	Valves 7 activation.	Funct
	34	00 04	4	261A	661A	Valves 8 activation.	Funct
	35	00 08	8	262C	662C	Stamping activation.	Funct
	36	00 10	16	262D	662D	Stamping pass part activation.	Funct
	37	00 20	32	262E	662E	Stamping fail test part activation.	Funct
	38	00 40	64	262F	662F	Stamping fail ref. part activation.	Funct
	39	00 80	128	2630	6630	Stamping alarm activation.	Funct
3	40	01 00	256	2631	6631	Stamping pressure switch error activation.	Funct
	41	02 00	512	2632	6632	Stamping cycle end activation.	Funct
	42	04 00	1024	2633	6633	Stamping recovery activation.	Funct
	43	08 00	2048	264A	664A	Stamping calibration activation.	Funct
	44	10 00	4096			N alarm activation.	
	45	20 00	8192			N test activation.	Funct
	46	**40 00**	**16384**			**Sealed component activation.**	Funct
	47	80 00	32768			Sealed component valid parameter (do not touch).	
	48	00 01	1			External dump activation.	Funct
	49	00 02	2	2607	6607	T° compensation activation.	Funct
	50	00 04	4			Recovery test activation.	Funct
	51	00 08	8			Dump before cycle in sealed component activation.	
	52	00 10	16			Sign changing activation.	Funct
	53	00 20	32	263E	663E	End of cycle obligatory reset activation.	Funct
	54	00 40	64	2638	6638	Auxiliary codes activation.	Funct
4	55	00 80	128	2639	6639	Auxiliary code 1 activation.	Funct
	56	01 00	256	263A	663A	Auxiliary code 2 activation.	Funct
	57	02 00	512	263B	663B	Auxiliary code 3 activation.	Funct
	58	04 00	1024	263C	663C	Auxiliary code 4 activation.	Funct
	59	08 00	2048	264C	664C	Auto setting parameters activation.	Para
	60	10 00	4096	2609	6609	Filtering activation.	Funct
	61	20 00	8192	264D	664D	Bar code activation.	Funct
	62	40 00	16384			Flow reject.	Funct
	63	80 00	32768			No negative.	Funct
5	64	00 01	1			Start on bar code.	Funct

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	65	00 02	2			ATR 3.	Funct
	66	00 04	4			Absolute value.	Funct
	67	00 08	8	266C	666C	By pass valve.	Funct
	68	00 10	16			Count down (timer).	Funct
	69	00 20	32			Inversed sealed components.	Funct
	70	00 40	64			Inversed sealed components 2.	Funct
	71	00 80	128			Dump off.	Funct
	72	01 00	256			Cut off.	Funct
	73	02 00	512			ATF function.	Funct
	74	04 00	1024			Asynchrone start.	Funct

Example: bit number 46 (activation sealed component) activated on 1, will put to "40 00h" the value in the third word. 40 00h is equivalent to 16384 in decimal and 0100000000000000 in binary.

In the Modbus frame, the words will follow as such: **word 1 + word 2 + ….. + word n**

8.1. REGULATOR SELECTION

Regulator selection for fill and pre-fill (word 1, bit n° 0 and 1) on the table of normal bits.

	Fill regulator	Pre-fill regulator
Regulator 1	1	1
Regulator 2	0	0

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
8	00 08	ATR error.
9	00 09	ATR drift.
10	00 0A	CAL error.
11	00 0B	Volume too small (sealed component).
12	00 0C	Volume too large (sealed component)
14	00 0E	Equalization valve switching error.
43	00 2B	Pressure too high.
44	00 2C	Pressure too low.
45	00 2D	Piezo sensor out of order.
46	00 2E	Dump error.
47	00 2F	CAL drift error.
48	00 30	Calibration check error.
49	00 31	Leak in calibration check too high.
50	00 32	Leak in calibration check too low.
51	00 33	Sealed component learning error.

10. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
0000	00 00	cm^3/s.
1000	03 E8	cm^3/min.
2000	07 D0	cm^3/h.
3000	0B B8	mm^3/h.
4000	0F A0	Calibrated Pascal.
5000	13 88	Calibrated Pascal/second.
6000	17 70	Pascal.
7000	1B 58	High resolution Pascal.
8000	1F 40	Pascal/second.
9000	23 28	High resolution Pascal/second.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
43000	A7 F8	D mode Pascal.
44000	AB E0	Low resolution Pascal.
45000	AF C8	Low resolution Pascal/second.
46000	B3 B0	$Inch^3/s$.
47000	B7 98	$Inch^3/min$.
48000	BB 80	$Inch^3/hour$.
49000	BF 68	$Feet^3/hour$.
50000	C3 50	Millilitre/second.
51000	C7 38	Millilitre/minute.
52000	CB 20	Millilitre/hour.
58000	E2 90	USA cm^3/s same as the cm^3/s.
59000	E6 78	USA cm^3/min same as the cm^3/min.
60000	EA 60	USA cm^3/h same as the cm^3/h.
76000	01 28 E0	$Feet^3/second$.
77000	01 2C C8	$Feet^3/minute$.

Chapter 8

ATEQ F520P MODBUS ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Writing and / or reading of n*words.
Refer to chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".
Write one word in address 201h for select a special cycle.

Version 1.0	Special cycle
6	Auto zero piezo

To activate the special cycle it must make a "Start":
Writing of a forced bit to 1 (FFh) at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instrument as "longs" with fixed point (10^{-3}). A "long" is a two words set.*

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
2	00 02	2002	6002	Stabilization time: 0 > 650 seconds.
3	00 03	2003	6003	Test time: 0 > 650 seconds.
9	00 09	2009	6009	Dump time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1: 0 > 650 seconds.
20	00 14	2014	6014	Part volume.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, mode D test, operator test. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Blockage mode: 2000. ➢ Desensitized mode: 3000. ➢ Operator mode: 4000.
29	00 1D	201D	601D	Time between 2 chained cycles: 0 > 650 seconds
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit.
60	00 3C	203C	603C	Natural reject value of the test part: 0 > 9999.
61	00 3D	203D	603D	Natural reject level of the test part in recovery: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 > 9999.
107	00 6B	206B	606B	ATR absorption tolerance.
108	00 6C	206C	606C	Start value of the transient (ATR).
118	00 76	2076	6076	Original unit for the calculation of rejects in cm^3/min. ➢ Pa : 0000. ➢ Pa/s : 1000.
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
127	00 7F	207F	607F	Reject unit.
148	00 94	2094	6094	Filtering.
164	00 A4	20A4	60A4	Number of the following program in sequencing.
339	01 53	2153	6153	Measure range: ➢ 0.1 – 500 Pa: 0000. ➢ 1 – 1000 Pa: 1000. ➢ 0.01 – 5 kPa: 2000. ➢ 0.01 – 10 kPa: 3000.

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
2	00 02	Fill.
3	00 03	Stabilization.
4	00 04	Test.
5	00 05	Dump.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type. ➢ Leak: 1. ➢ Blockage mode: 2. ➢ Desensitized mode: 3. ➢ Operator mode: 4.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: reserved. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: recoverable part. Bit 7 = 1: reserved. Bit 8 = 1: reserved. Bit 9 = 1: reserved. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to units table).
9	2209	Pressure unit code high part word (refer to units table).
10	220A	Leak low section word.
11	220B	Leak high section word.
12	220C	Leak unit code low part word (refer to units table).
13	220D	Leak unit code high part word (refer to units table).

5. PENDING RESULTS LIST STRUCTURE (FIFO RESULTS)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: reserved. Bit 3 = 1: alarm triggered. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to units table).
8	Pressure unit code high part word (refer to units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to units table).
12	Leak unit code high part word (refer to units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

6. LAST RESULTS STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, the last result is stocked as an array of 12 words. This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The last result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	D. A. address (hexa) R	Meaning	Type	Bytes	Coeff
1	2301	Program number.	Word	2	
2	2302	Test type.	Word	2	
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: reserved. Bit 3 = 1: alarm triggered. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
4	2304	Alarm code (refer to the alarm codes table).	Word	2	
5	2305	Pressure low part word.	Long	4	x1000
6	2306	Pressure high part word.			
7	2307	Pressure unit code low part word (refer to. Units table).	Long	4	x1000
8	2308	Pressure unit code high part word (refer to. Units table).			
9	2309	Leak low section word.	Long	4	x1000
10	230A	Leak high section word.			
11	230B	Leak unit code low part word (refer to. Units table).	Long	4	x1000
12	230C	Leak unit code high part word (refer to. Units table).			

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)). The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	4	00 10	16	2401	6401	Recovery thresholds.	CExt
	5	00 20	32	241C	641C	Cycle end.	CExt
	10	04 00	1024	240B	640B	ATR 0.	CExt
	11	08 00	2048	240C	640C	ATR 1.	CExt
	12	10 00	4096	240D	640D	ATR 2.	CExt
	13	**20 00**	**8192**	**2413**	**6413**	**Program personalisation.**	**CExt**
	14	40 00	16384	241F	641F	Chaining.	CExt
	15	80 00	32768	2420	6420	Automatic connector.	CExt
2	17	00 02	2	2435	6435	Valve codes (output codes).	CExt
	19	00 08	8	2422	6420	Stamping.	CExt
	23	00 80	128			Sending cond.: pass part.	RS232
	24	01 00	256			Sending cond.: fail test part.	RS232
	26	04 00	1024			Sending cond.: alarm presence.	RS232
	27	08 00	2048			Sending cond.: pressure error.	RS232
	28	10 00	4096			Sending cond.: end of cycle	RS232
	29	20 00	8192			Sending cond.: recoverable.	RS232
	30	40 00	16384			Sending cond.: calibration.	RS232
	31	80 00	32768			Frame content: time stamp.	RS232
3	32	00 01	1			Frame content: personalization.	RS232
	33	00 02	2			Content of the frame: pressure.	RS232
	34	00 04	4	242F	642F	Security.	Conf
	35	00 08	8	2414	6414	External dump.	Conf
	36	00 10	16			Exportation.	RS232
	37	00 20	32			Automatic reset.	Conf
	38	00 40	64			Placing in stand-by.	Main
	39	00 80	128			Wake up from stand-by.	Main
	40	01 00	256			Remote control.	
	42	04 00	1024			Recovery test.	CExt
	45	20 00	8192			Page feed.	

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
4	51	00 08	8	2438	6438	Electronic regulator mode.	Conf
	56	01 00	256	2442	6442	Permanent electronic regulator.	Conf

Example: bit number 13 (personalization of the program name) activated to 1, will place to "20 00h" the value in the first word. 20 00h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other: **word 1 + word 2 + ….. + word n**

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272(d)). Table of the normal bits per program. The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	4	00 10	16	2601	6601	Recovery thresholds activation.	Funct
	5	00 20	32			Cycle end Activation.	Funct
	6	00 40	64			End of cycle with reset and auto reset activation.	Funct
	7	00 80	128			Cycle end with dump and reset activation.	Funct
	8	01 00	256			Cycle end with fill Activation.	Funct
	11	08 00	2048	260B	660B	ATR 0 activation.	Funct
	12	10 00	4096	260C	660C	ATR 1 activation.	Funct
	13	20 00	8192	260D	660D	ATR 2 activation.	Funct
	14	40 00	16384	2622	6622	Chaining activation.	Funct
	15	80 00	32768			Chaining pass part activation.	Funct
2	16	00 01	1			Chaining fail test part activation.	Funct
	17	00 02	2			Chaining fail ref. part activation.	Funct
	18	00 04	4			Chaining with alarm activation.	Funct
	19	00 08	8			Chaining press. switch error activation.	Funct
	20	00 10	16			Chaining with cycle end activation.	Funct
	22	00 40	64			Chaining with recovery activation.	Funct
	23	00 80	128			Chaining with calibration activation.	Funct
	24	01 00	256	262B	662B	Automatic connector activation.	Funct
	25	02 00	512	2641	6641	Calibration check activation.	Funct
	26	04 00	1024	2612	6612	Valve codes activation.	Funct
	27	08 00	2048	2613	6613	Valves 1 activation.	Funct

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	28	10 00	4096	2614	6614	Valves 2 activation.	Funct
	29	20 00	8192	2615	6615	Valves 3 activation.	Funct
	30	40 00	16384	2616	6616	Valves 4 activation.	Funct
	31	80 00	32768	2617	6617	Valves 5 activation.	Funct
3	32	00 01	1	2618	6618	Valves 6 activation.	Funct
	33	00 02	2	2619	6619	Valves 7 activation.	Funct
	34	00 04	4	261A	661A	Valves 8 activation.	Funct
	35	**00 08**	**8**	**262C**	**662C**	**Stamping activation.**	**Funct**
	36	00 10	16	262D	662D	Stamping pass part activation.	Funct
	37	00 20	32	262E	662E	Stamping fail test part activation.	Funct
	38	00 40	64	262F	662F	Stamping fail ref. part activation.	Funct
	39	00 80	128	2630	6630	Stamping alarm activation.	Funct
	40	01 00	256	2631	6631	Stamping pressure switch error activation.	Funct
	41	02 00	512	2632	6632	Stamping cycle end activation.	Funct
	42	04 00	1024	2633	6633	Stamping recovery activation.	Funct
	43	08 00	2048	264A	664A	Stamping calibration activation.	Funct
4	48	00 01	1			External dump activation.	Funct
	53	00 20	32	263E	663E	End of cycle obligatory reset activation.	Funct

Example: bit number 35 (stamping activation) activated on 1, will put to "00 08h" the value in the third word. 00 08h is equivalent to 8 in decimal and 000000000001000 in binary.

In the Modbus frame, the words will follow as such: **word 1 + word 2 + ….. + word n**

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
8	00 08	ATR error.
9	00 09	ATR drift.
10	00 0A	CAL error.
11	00 0B	Volume too small (sealed component).
12	00 0C	Volume too large (sealed component)
14	00 0E	Equalization valve switching error.
43	00 2B	Pressure too high.
44	00 2C	Pressure too low.
45	00 2D	Piezo sensor out of order.
46	00 2E	Dump error.
47	00 2F	CAL drift error.

10. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
0000	00 00	cm^3/s.
1000	03 E8	cm^3/min.
2000	07 D0	cm^3/h.
3000	0B B8	mm^3/h.
4000	0F A0	Calibrated Pascal.
5000	13 88	Calibrated Pascal/second.
6000	17 70	Pascal.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
43000	A7 F8	D mode Pascal.

Chapter 9
ATEQ G5 ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Writing and/or reading of n*words.
Refer to chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".
Write at the address 201h one word allowing a special cycle selection.

Value	Description
1	Volume calculation
6	Piezzo auto zero

To activate the special cycle it must make a "Start":
Write of a forced byte to 1 at the address 01h.

There's two special cycles on the G520 instrument.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instrument as "longs" with fixed point (10^{-3}). A "long" is a set with two words.*

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
2	00 02	2002	6002	Stabilisation time: 0 > 650 seconds.
3	00 03	2003	6003	Test time: 0 > 650 seconds.
6	00 06	2006	6006	Pre fill time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1: 0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2: 0 > 650 seconds.
20	00 14	2014	6014	Part volume.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, mode D test, operator test. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Operator mode: 4000.
29	00 1D	201D	601D	Time between 2 sequencing cycles: 0 > 650 seconds
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit.
60	00 3C	203C	603C	Natural reject value of the test part: 0 > 9999.
61	00 3D	203D	603D	Natural reject level of the test part in recovery: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 > 9999.
67	00 43	2043	6043	Pre-fill instruction value: 0 > 9999.
73	00 49	2049	6049	Screen light intensity value. ➢ 0 %: 0000. ➢ 15 %: 1000. ➢ 30 %: 2000. ➢ 45 %: 3000. ➢ 50 %: 4000. ➢ 75 %: 5000. ➢ 90 %: 6000. ➢ 100 %: 7000.

103	00 67	2067	6067	Type of fill. ➢ Standard: 0000. ➢ Instruction: 1000. ➢ Ballistic: 2000.
104	00 68	2068	6068	Type of pre-fill. ➢ Standard: 0000. ➢ Instruction: 1000. ➢ Ballistic: 2000.
112	00 70	2070	6070	Function attributed to the entry of the special cycles. ➢ Program selection: 0. ➢ Piezo reset: 1.
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.
126	00 7E	207E	607E	Maximum pressure value in pre-fill.
127	00 7F	207F	607F	Reject unit.
144	00 90	2090	6090	Setup of the outputs (standard or compact).
145	00 91	2091	6091	Number of program to be copied.
146	00 92	2092	6092	Number of the program to be pasted.
147	00 93	2093	6093	Minimum pre fill.
148	00 94	2094	6094	Filtering.
155	00 9B	209B	609B	Standard customer temperature (correction in temperature).
156	00 9C	209C	609C	Standard customer pressure (correction in pressure).
158	00 9E	209E	609E	Percents of the bar graph.
164	00 A4	20A4	60A4	Number of the following program in sequencing.

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Pre-fill.
1	00 01	Fill.
2	00 02	Stabilisation.
3	00 03	Test.
4	00 04	Dump.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: gross leak. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: unused. Bit 7 = 1: unused. Bit 8 = 1: unused. Bit 9 = 1: unused. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to. Units table).
9	2209	Pressure unit code high part word (refer to. Units table).
10	220A	Leak low section word.
11	220B	Leak high section word.
12	220C	Leak unit code low part word (refer to. Units table).
13	220D	Leak unit code high part word (refer to. Units table).

5. PENDING RESULTS LIST STRUCTURE (RESULTS IN FIFO)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: gross leak. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to. Units table).
8	Pressure unit code high part word (refer to. Units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to. Units table).
12	Leak unit code high part word (refer to. Units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

6. LAST RESULT STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	Direct access address (hexa) R	Meaning	Type	Bytes	Coeff
1	2301	Program number.	Word	2	
2	2302	Test type.	Word	2	
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: gross leak. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
4	2304	Alarm code (refer to the alarm codes table).	Word	2	
5	2305	Pressure low part word.	Long	4	x1000
6	2306	Pressure high part word.			
7	2307	Pressure unit code low part word (refer to. Units table).	Long	4	x1000
8	2308	Pressure unit code high part word (refer to. Units table).			
9	2309	Leak low section word.	Long	4	x1000
10	230A	Leak high section word.			
11	230B	Leak unit code low part word (refer to. Units table).	Long	4	x1000
12	230C	Leak unit code high part word (refer to. Units table).			

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)).

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2404	6404	Fill type.	CExt
	1	00 02	2	2403	6403	Pre-fill type.	CExt
	2	00 04	4	2401	6401	Recovery thresholds.	CExt
	3	00 08	8	241E	641E	Volume calculation.	CExt
	4	00 10	16	2413	6413	Personalisation of the program name.	CExt
	5	00 20	32	241F	641F	Chaining.	CExt
	6	00 40	64	2420	6420	Automatic connector.	CExt
	7	00 80	128	2416	6416	Valves codes (outputs codes).	CExt
	8	01 00	256	2422	6422	Stamping.	CExt
	9	02 00	512			Pass part sending conditions.	RS232
	10	04 00	1024			Fail part sending conditions.	RS232
	11	08 00	2048			Presence of an alarm sending conditions.	RS232
	12	10 00	4096			Pressure error sending conditions.	RS232
	13	**20 00**	**8192**			**End of cycle send conditions.**	**RS232**
	14	40 00	16384			Recoverable send conditions.	RS232
	15	80 00	32768			Time stamp frame content.	RS232
2	16	00 01	1	2413	6413	Content of the frame: personalisation.	RS232
	17	00 02	2			Content of the frame: pressure.	RS232
	18	00 04	4	242F	642F	Security.	Conf
	19	00 08	8	2414	6414	External dump.	Conf
	20	00 10	16			Exportation.	RS232
	21	00 20	32	240F	640F	Automatic reset.	Conf
	22	00 40	64			Placing in stand-by.	Main

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	23	00 80	128			Return to operation from stand-by.	Main
	24	01 00	256			Remote control.	
	25	02 00	512	2419	6419	Automatic start.	CExt
	26	04 00	1024	2461	6461	Cut valve.	Conf
	27	08 00	2048	2409	6409	Filtering.	CExt
	28	10 00	4096	2417	6417	General correction.	CExt
	29	20 00	8192	2406	6406	Pressure compensation.	CExt
	30	40 00	16384	2407	6407	Temperature compensation.	
	31	80 00	32768			Line feed (label).	
Word 3	32	00 01	1	241C	641C	End of cycle.	
	33	00 02	2			Unit type.	
	34	00 04	4	243A	643A	Bar graph display.	Conf
	35	00 08	8	2462	6462	Negatives reject levels.	Conf
	36	00 10	16	2437	6437	Automatic save activation.	Conf
	37	00 20	32	2463	6463	Negative flow display.	

Example: bit number 13 (End of cycle send conditions) activated to 1, will place to "20 00h" the value in the first word. 20 00h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other:

word 1 + word 2 + ….. + word n

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272d). Table of the normal bits per program.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2604	6604	Activation of the fill type.	Funct
	1	00 02	2	2603	6603	Activation of the pre-fill type.	Funct
	2	00 04	4	2601	6601	Activation of the recovery thresholds.	Funct
	3	00 08	8	261E	661E	Activation of the cycle end.	Funct
	4	00 10	16	261F	261F	Activation of the end of cycle with reset and reset to 0.	FEoc
	5	00 20	32	2620	6620	Activation of the cycle end with dump and reset.	FEoc
	6	00 40	64	2621	6621	Activation of the cycle end with fill.	FEoc
	7	00 80	128	2622	6622	Activation of chaining.	Funct
	8	01 00	256	2623	6623	Activation of the chaining with a pass part.	FChai
	9	02 00	512	2624	6624	Activation of chaining with a fail part.	FChai
	10	04 00	1024	2626	6626	Activation of chaining with alarm.	FChai
	11	08 00	2048	2627	6627	Activation of chaining with pressure switch error.	FChai
	12	10 00	4096	2628	6628	Activation of chaining with cycle end.	FChai
	13	20 00	8192	262A	662A	Activation of the chaining with recovery.	FChai
	14	40 00	16384	262B	662B	Activation of the automatic connector.	Funct
	15	80 00	32768	2612	6612	Activation of the valve codes.	
2	16	00 01	1	2613	6613	Activation valve code 1.	
	17	00 02	2	2614	6614	Activation valve code 2.	
	18	00 04	4	2615	6615	Activation valve code 3.	
	19	00 08	8	2616	6616	Activation valve code 4.	

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	20	00 10	16	2617	6617	Activation valve code 5.	
	21	00 20	32	2618	6618	Activation valve code 6.	
	22	00 40	64	2619	6619	Activation valve code 7.	
	23	00 80	128	261A	661A	Activation valve code 8.	
	24	01 00	256	262C	662C	Activation of the stamping.	Funct
	25	02 00	512	262D	662D	Activation of the stamping with pass part.	FStp
	26	04 00	1024	262E	662E	Activation of the stamping with fail part.	FStp
	27	08 00	2048	2630	6630	Activation of the stamping with alarm.	FStp
	28	10 00	4096	2631	6631	Activation of stamping with pressure switch error.	FStp
	29	20 00	8192	2632	6632	Activation of the stamping with the cycle end.	FStp
	30	40 00	16384	2633	6633	Activation of the stamping with recovery.	FStp
	31	80 00	32768			Activation of the external dump.	Funct
3	32	00 01	1			Activation of the temperature compensation.	Funct
	33	00 02	2	261C	661C	Activation of the automatic start cycle.	Funct
	34	00 04	4	2606	6606	Activation of the pressure compensation.	Funct
	35	00 08	8	2609	6609	Activation of the filtering.	Funct
	36	**00 10**	**16**	**261D**	**661D**	**Standard conditions activation.**	Funct
	37	00 20	32			Negative flow displaying activation.	

Example: bit number 36 (Standard conditions activation) activated on 1, will put to "00 10h" the value in the third word. 00 10h is equivalent to 16 in decimal and 0000000000010000 in binary.

In the Modbus frame, the words will follow as such:

word 1 + word 2 + ….. + word n

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
14	00 0E	Equalization valve switching error.
43	00 2B	Pressure too high.
44	00 2C	Pressure too low.
45	00 2D	Piezo sensor out of order.

10. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
0000	00 00	$Cm^3/s.$
1000	03 E8	$Cm^3/min.$
2000	07 D0	$Cm^3/h.$
3000	0B B8	$Mm^3/h.$
6000	17 70	Pascal.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
30000	75 30	Litre/hour.
46000	B3 B0	$Inch^3/s.$
47000	B7 98	$Inch^3/min.$
48000	BB 80	$Inch^3/hour.$
49000	BF 68	$Feet^3/hour.$
50000	C3 50	Millilitre/second.
51000	C7 38	Millilitre/minute.
52000	CB 20	Millilitre/hour.

Chapter 10
ATEQ D5 MODBUS ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Write and/or reading of n*words.
Refer to Chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".
Write at the address 201h one word allowing a special cycle selection.

Value	Description
1	ATR learning.
4	Calibration
5	Verification – calibration.
7	Electronic regulator learning.
9	Auto zero piezo.
10	Calibration on test.
12	Auxiliary regulator.
13	Regulator adjust.
15	Measure on reference.
24	Save parameters in flash.

To activate the special cycle it must make a "Start":
Write of a forced bit to 1 at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instrument as "longs" with fixed point (10^{-3}). A "long" is a two words set.*

Identifier N°		Direct access address (hexa)		Meaning
Dec	Hexa	R/W	R/W	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
2	00 02	2002	6002	Stabilisation time: 0 > 650 seconds.
3	00 03	2003	6003	Test time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1:0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2:0 > 650 seconds.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, mode D test, operator test. ➢ Invalid: 0000. ➢ Direct test: 1000. ➢ Recovery test: 2000. ➢ Reference test: 4000. ➢ Bridge test: 5000. ➢ Step by step test: 6000. ➢ Operator test: 7000.
29	00 1D	201D	601D	Time between 2 sequencing cycles: 0 > 650 seconds
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit.
60	00 3C	203C	603C	Maximum reject value: 0 > 9999.
61	00 3D	203D	603D	Maximum reject value in recovery: 0 > 9999.
62	00 3E	203E	603E	Minimum reject value: 0 > 9999.
63	00 3F	203F	603F	Minimum reject value in recovery: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 > 9999.
72	00 48	2048	6048	Calibration drifts percent.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
73	00 49	2049	6049	Screen light intensity value. ➢ 0 %: 0000. ➢ 15 %: 1000. ➢ 30 %: 2000. ➢ 45 %: 3000. ➢ 50 %: 4000. ➢ 75 %: 5000. ➢ 90 %: 6000. ➢ 100 %: 7000.
80	00 50	2050	6050	Differential auto reset time.
90	00 5A	205A	605A	Read capillary for 2 capillaries (3.10g1 only).
103	00 67	2067	6067	Type of fill. ➢ Standard: 0000. ➢ Ballistic: 2000.
107	00 6B	206B	606B	ATR tolerance absorption.
108	00 6C	206C	606C	Transitory start value (ATR).
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.
127	00 7F	207F	607F	Reject unit.
128	00 80	2080	6080	Instruction value during a calibration.
148	00 94	2094	6094	Filtering.
149	00 95	2095	6095	Unit type SI or USA. ➢ SI: 0000. ➢ USA: 1000. ➢ CAL: 2000.
150	00 96	2096	6096	Pressure instruction.
151	00 97	2097	6097	Offset on a flow.
154	00 9A	209A	609A	Piezo reset type. ➢ Before cycle: 0000. ➢ After cycle: 1000. ➢ Without auto reset: 2000.
155	00 9B	209B	609B	Standard customer temperature (correction in temperature).
156	00 9C	209C	609C	Standard customer pressure (correction in pressure).
158	00 9E	209E	609E	Percents of the bar graph.
164	00 A4	20A4	60A4	Number of the following program in sequencing.
165	00 A5	20A5	60A5	Number of cycles between two automatic reset.
166	00 A6	20A6	60A6	Time between two automatic reset.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
218	00 DA	20DA	60DA	Flow unit for the master jet.
219	00 DB	20DB	60DB	Flow value of the master jet.
220	00 DC	20DC	60DC	Pressure value of the master jet.
221	00 DD	20DD	60DD	Atmospheric pressure value for the master jet.
222	00 DE	20DE	60DE	Temperature value for the master jet.
223	00 DF	20DF	60DF	Drift value for the master jet.
224	00 E0	20E0	60E0	Flow unit for the master part.
225	00 E1	20E1	60E1	Flow value for the master part.
226	00 E2	20E2	60E2	Pressure value for the master part.
227	00 E3	20E3	60E3	Atmospheric pressure for the master part.
228	00 E4	20E4	60E4	Temperature value for the master part.
274	01 12	2112	6112	Pressure filtering.
276	01 14	2114	6114	Fill percent.
277	01 15	2115	6115	Pneumatic configuration during the rest phase. ➢ Without blow: 0000. ➢ Blow on reference side: 1000. ➢ Blow on test side: 2000.
278	01 16	2116	6116	Electronic regulator state during the rest phase. ➢ Regulator on instruction: 0000. ➢ Regulator set to 0: 1000.
280	01 18	2118	6118	Reference program associated.
281	01 19			Capillary number with dual capillaries option only: ➢ Capillary 1: 0000. ➢ Capillary 2: 1000.
284	01 1C			Type of gas. ➢ Nitrogen: 0000. ➢ Natural gas: 1000. ➢ Propane: 2000. ➢ Butane: 3000. ➢ G110: 4000.

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Fill.
1	00 01	Stabilisation.
2	00 02	Test.
3	00 03	Dump.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: fail part maximum flow. Bit 2 = 1: fail part minimum flow. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: unused. Bit 7 = 1: unused. Bit 8 = 1: unused. Bit 9 = 1: unused. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to. Units table).
9	2209	Pressure unit code high part word (refer to. Units table).
10	220A	Flow low section word.
11	220B	Flow high section word.
12	220C	Flow unit code low part word (refer to. Units table).
13	220D	Flow unit code high part word (refer to. Units table).

5. PENDING RESULTS LIST STRUCTURE (RESULTS IN FIFO)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, maximum flow reject. Bit 2 = 1: fail part, minimum flow reject. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to. Units table).
8	Pressure unit code high part word (refer to. Units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to. Units table).
12	Leak unit code high part word (refer to. Units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

6. LAST RESULT STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	Direct access address (hexa) R	Meaning
1	2301	Program number.
2	2302	Test type.
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, maximum flow reject. Bit 2 = 1: fail part, minimum flow reject. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	2304	Alarm code (refer to the alarm codes table).
5	2305	Pressure low part word.
6	2306	Pressure high part word.
7	2307	Pressure unit code low part word (refer to. Units table).
8	2308	Pressure unit code high part word (refer to. Units table).
9	2309	Leak low section word.
10	230A	Leak high section word.
11	230B	Leak unit code low part word (refer to. Units table).
12	230C	Leak unit code high part word (refer to. Units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2403	6403	Fill type.	CExt
	1	00 02	2	2401	6401	Recovery thresholds.	CExt
	2	00 04	4	241C	641C	End of cycle.	CExt
	3	00 08	8	241D	641D	Mini valve.	CExt
	4	00 10	16	2408	6408	Peak hold.	CExt
	5	00 20	32	240C	640C	ATR1.	CExt
	6	00 40	64	240D	640D	ATR2.	CExt
	7	00 80	128	2413	6413	Personalisation of the program name.	CExt
	8	01 00	256	241F	641F	Chaining.	CExt
	9	02 00	512	2420	6420	Automatic connector.	CExt
	10	04 00	1024	2416	6416	Valves codes (outputs codes).	CExt
	11	08 00	2048	240A	640A	Offset.	CExt
	12	10 00	4096	2409	6409	Filtering.	CExt
	13	**20 00**	**8192**	**2447**	**6447**	**Automatic mode.**	CExt
	14	40 00	16384	2422	6422	Stamping.	CExt
	15	80 00	32768			Reserved.	
2	16	00 01	1			N test.	CExt
	17	00 02	2	2402	6402	Unit type.	CExt
	18	00 04	4	2406	6406	Pressure correction.	CExt
	19	00 08	8			ΔP correction.	
	20	00 10	16	2449	6449	Piezo auto zero.	
	21	00 20	32			Unused.	
	22	00 40	64			Sending condition: pass part.	RS232
	23	00 80	128			Sending condition: fail part maximum flow.	RS232

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	24	01 00	256			Sending condition: fail part minimum flow.	RS232
	25	02 00	512			Sending condition: presence of an alarm.	RS232
	26	04 00	1024			Sending condition: pressure defect.	RS232
	27	08 00	2048			Sending condition: end of cycle.	RS232
	28	10 00	4096			Sending condition: recoverable.	RS232
	29	20 00	8192			Content of the frame: time.	RS232
	30	40 00	16384			Content of the frame: personalisation.	RS232
	31	80 00	32768			Content of the frame: pressure.	RS232
3	32	00 01	1	242F	642F	Security.	Conf
	33	00 02	2			Exportation.	RS232
	34	00 04	4	2449	6449	Automatic piezo reset.	
	35	00 08	8			Placing in stand-by.	Main
	36	00 10	16			Return to operation from stand-by.	Main
	37	00 20	32			Unused.	
	38	00 40	64	243A	643A	Bar graph displaying.	Conf
	39	00 80	128			Presence of a second piezo sensor.	
	40	01 00	256	244E	644E	Auxiliary output 1 configuration.	
	41	02 00	512	244F	644F	Auxiliary output 2 configuration.	
	42	04 00	1024	2450	6450	Auxiliary output 3 configuration.	
	43	08 00	2048	2451	6451	Auxiliary output 4 configuration.	
	44	10 00	4096	2452	6452	Internal output 1 configuration.	
	45	20 00	8192	2453	6453	Internal output 2 configuration.	
	46	40 00	16384	2454	6454	External output 1 configuration.	
	47	80 00	32768	2455	6455	External output 2 configuration.	
4	48	00 01	1	2456	6456	External output 3 configuration.	
	49	00 02	2	2457	6457	External output 4 configuration.	
	50	00 04	4	2458	6458	External output 5 configuration.	
	51	00 08	8	2459	6459	External output 6 configuration.	
	52	00 10	16			Unused.	
	53	00 20	32	245A	645A	Single calibration.	CExt

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	54	00 40	64	2436	6436	No negative.	CExt
	55	00 80	128	245B	645B	Calibration on test.	Conf
	56	01 00	256			Sending condition on reference.	RS232
	57	02 00	512	245D	645D	Rest mode, blow on test side or reference side.	Conf

Example: bit number 13 (automatic mode) activated to 1, will place to "20 00h" the value in the first word. 20 00h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other: **word 1 + word 2 + ….. + word n**

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272(d)). Table of the normal bits per program.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2650	6650	Automatic mode.	Funct
	1	00 02	2			Unused.	
	2	00 04	4	2604	6604	Fill type activation.	Funct
	3	00 08	8	2601	6601	Recovery thresholds activation.	Funct
	4	00 10	16	261E	661E	Cycle end activation.	Funct
	5	00 20	32	261F	661F	End of cycle with reset and piezo reset Activation.	Funct
	6	00 40	64	2620	6620	Cycle end with dump and reset activation.	Funct
	7	00 80	128	2621	6621	Cycle end with fill activation.	Funct
	8	01 00	256	2608	6608	Peak hold activation.	Funct
	9	02 00	512			Pressure correction.	
	10	04 00	1024			ΔP correction.	
	11	08 00	2048	260C	660C	ATR1 activation.	Funct
	12	10 00	4096	260D	660D	ATR2 activation.	Funct
	13	20 00	8192	2622	6622	Chaining activation.	Funct
	14	40 00	16384	2623	6623	Pass part chaining activation.	Funct
	15	80 00	32768			Fail part maximum flow chaining activation.	
2	16	00 01	1			Fail part minimum flow chaining activation.	
	17	00 02	2	2626	6626	Chaining with alarm activation.	Funct
	18	00 04	4	2627	6627	Pressure switch error chaining activation.	Funct
	19	00 08	8	2628	6628	Cycle end chaining activation.	Funct
	20	00 10	16	2629	6629	Recovery chaining activation.	Funct
	21	00 20	32			Mini valve Activation.	
	22	00 40	64	262B	662B	Automatic connector activation.	Funct
	23	00 80	128	2612	6612	Valve codes activation.	

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	24	01 00	256	2613	6613	Valve 1 activation.	
	25	02 00	512	2614	6614	Valve 2 activation.	
	26	04 00	1024	2615	6615	Valve 3 activation.	
	27	08 00	2048	2616	6616	Valve 4 activation.	
	28	10 00	4096	2617	6617	Valve 5 activation.	
	29	20 00	8192	2618	6618	Valve 6 activation.	
	30	40 00	16384	2619	6619	Valve 7 activation.	
	31	80 00	32768	261A	661A	Valve 8 activation.	
3	32	00 01	1	262C	662C	Stamping activation.	
	33	00 02	2	262D	662D	Pass part stamping Activation.	
	34	00 04	4	262E	662E	Fail part maximum flow stamping activation.	
	35	00 08	8	262F	662F	Fail part minimum flow stamping activation.	
	36	00 10	16	2630	6630	Alarm stamping activation.	
	37	00 20	32	2631	6631	Pressure switch error stamping activation.	
	38	00 40	64	2632	6632	Cycle end stamping activation.	
	39	00 80	128	2633	6633	Recovery stamping activation.	
	40	01 00	256	2607	6607	Standard conditions activation.	Funct
	41	02 00	512			Reserved.	
	42	04 00	1024			N test.	
	43	08 00	2048			Unused.	
	44	10 00	4096	2609	6609	Filtering Activation.	Funct
	45	20 00	8192	2657	6657	Piezo automatic reset.	Funct
	46	**40 00**	**16384**	**260A**	**660A**	**Offset.**	Funct
	47	80 00	32768	2602	6602	Unit type.	Funct
4	48	00 01	1			Piezo sensor 2.	
	49	00 02	2	263F	663F	Negative flow displaying activation.	Funct
	50	00 04	4	2659	6659	High precision activation.	Funct
	51	00 08	8	265A	665A	Reference start type.	Funct

Example: bit number 46 (Offset) activated on 1, will put to "40 00h" the value in the third word. 40 00h is equivalent to 16384 in decimal and 0100000000000000 in binary.

In the Modbus frame, the words will follow as such:

word 1 + word 2 + ….. + word n

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
8	00 08	ATR defect.
9	00 09	ATR drift.
10	00 0A	Calibration drift.
14	00 0E	Equalization valve switching error.
43	00 2B	Pressure too high.
44	00 2C	Pressure too low.
45	00 2D	Piezo sensor out of order.
47	00 2F	Calibration drift.

10. UNIT TABLE

This list gives all the units used in the D5 instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
30000	75 30	Litter/hour.
33000	80 E8	CAL.
43000	A7 F8	D mode Pascal.
46000	B3 B0	$Inch^3/s$.
47000	B7 98	$Inch^3/min$.
48000	BB 80	$Inch^3/hour$.
49000	BF 68	$Feet^3/hour$.
50000	C3 50	Millilitre/second.
51000	C7 38	Millilitre/minute.
52000	CB 20	Millilitre/hour.
53000	CF 08	Litre/minute.
54000	D2 F0	$Meter^3/hour$.

Chapter 11

ATEQ ERD5 MODBUS ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Write and/or reading of n*words.

Refer to Chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".

Write at the address 201h one word allowing a special cycle selection.

Value	Description
7 / 8	Auto zero piezo.
9	Electronic regulator learning.
	Infinite fill (not available).

To activate the special cycle it must make a "Start":

Write of a forced bit to 1 at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instrument as "longs" with fixed point (10^{-3}). A "long" is a two words set.*

Identifier N°		Direct access address (hexa)		Meaning
Dec	Hexa	R/W	R/W	
4	00 04	2004	6004	Rise time: 0 > 650 seconds.
5	00 05	2005	6005	Drop time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1:0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2:0 > 650 seconds.
12	00 0C	200C	600C	Pre-dump time: 0 > 650 seconds.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, mode D test, operator test. ➢ Invalid: 0000. ➢ Pressure cycle: 1000. ➢ Operator test: 2000.
29	00 1D	201D	601D	Time between 2 sequencing cycles: 0 > 650 seconds
53	00 35	2035	6035	Pressure unit.
73	00 49	2049	6049	Screen light intensity value. ➢ 0 %: 0000. ➢ 15 %: 1000. ➢ 30 %: 2000. ➢ 45 %: 3000. ➢ 50 %: 4000. ➢ 75 %: 5000. ➢ 90 %: 6000. ➢ 100 %: 7000.
80	00 50	2050	6050	Differential auto reset time.
112	00 70	2070	6070	Function attributed to the entry of the special cycles. ➢ Program selection: 0000. ➢ Infinite fill: 1000. ➢ Piezo AZ: 2000.
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.
127	00 7F	207F	607F	Reject unit.
128	00 80	2080	6080	Instruction value during a calibration.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
145	00 91	2091	6091	Number of program to be copied.
146	00 92	2092	6092	Number of the program to be pasted.
149	00 95	2095	6095	Unit type SI or USA. ➢ SI: 0000. ➢ USA: 1000.
185	00 B9	20B9	60B9	Initial pressure.
186	00 BA	20BA	60BA	Step pressure.
187	00 BB	20BB	60BB	Step time.
188	00 BC	20BC	60BC	Final pressure.
189	00 BD	20BD	60BD	Step minimum pressure.
190	00 BE	20BE	60BE	Step maximum pressure.
191	00 BF	20BF	60BF	Step minimum flow.
192	00 C0	20C0	60C0	Step maximum flow.
193	00 C1	20C1	60C1	Up contact type: ➢ Opened: 0000. ➢ Closed: 1000.
194	00C2	20C2	60C2	Donw contact type: ➢ Opened: 0000. ➢ Closed: 1000.
195	00 C3	20C3	60C3	Up minimum flow parameter.
196	00 C4	20C4	60C4	Down maximum flow parameter.
197	00 C5	20C5	60C5	Up minimum pressure.
198	00 C6	20C6	60C6	Up maximum pressure.
199	00 C7	20C7	60C7	Down minimum pressure.
200	00 C8	20C8	60C8	Down maximum pressure.
201	00 C9	20C9	60C9	2nd piezo maximum pressure.
202	00 CA	20CA	60CA	2nd piezo minimum pressure.
243	00 F3	20F3	60F3	Differential valve commutation time.
352	01 60	2160	6160	Up valve type (version 1.01y10 and later only).

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Up.
1	00 01	Step.
2	00 02	Down.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code; **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: Up fail part flow. Bit 2 = 1: Down fail part flow. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: unused. Bit 7 = 1: unused. Bit 8 = 1: unused. Bit 9 = 1: unused. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to. Units table).
9	2209	Pressure unit code high part word (refer to. Units table).
10	220A	Flow low section word.
11	220B	Flow high section word.
12	220C	Flow unit code low part word (refer to. Units table).
13	220D	Flow unit code high part word (refer to. Units table).

5. PENDING RESULTS LIST STRUCTURE (LAST RESULTS IN FIFO)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

5.1. ERD FIRMWARE VERSION < 1.01Y3

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: Up fail part flow. Bit 2 = 1: Down fail part flow. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to. Units table).
8	Pressure unit code high part word (refer to. Units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to. Units table).
12	Leak unit code high part word (refer to. Units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

5.2. ERD FIRMWARE VERSION ≥ 1.01Y3

At the end of each cycle, a result is stocked as an array of 36 words contained in a FIFO of 20 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units and values measured).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: Up fail part flow. Bit 2 = 1: Down fail part flow. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5 / 6 (Long)	Rise Pressure value low part / high part.
7 / 8 (Long)	Rise Pressure unit code low part / high part (refer to Units table).
9 / 10 (Long)	Rise Flow value low part / high part.
11 / 12 (Long)	Rise leak unit code low part / high part (refer to Units table).
13 / 14 (Long)	Step pressure value low part / high part.
15 / 16 (Long)	Step Pressure unit code low part / high part (refer to Units table).
17 / 18 (Long)	Step Flow value low part / high part.
19 / 20 (Long)	Step leak unit code low part / high part (refer to Units table).
21 / 22 (Long)	Drop Pressure value low part / high part.
23 / 24 (Long)	Drop Pressure unit code low part / high part (refer to Units table).
25 / 26 (Long)	Drop Flow value low part / high part.
27 / 28 (Long)	Drop Pressure unit code low part / high part (refer to Units table).
29 / 30 (Long)	Rise Switch pressure value low part / high part (>v1.01z0).
31 / 32 (Long)	Rise Switch pressure unit low part / high part (>v1.01z0).
33 / 34 (Long)	Drop Switch pressure value low part / high part (>v1.01z0).
35 / 36 (Long)	Drop Switch pressure unit low part / high part (>v1.01z0).

6. LAST RESULT STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

6.1. ERD FIRMWARE VERSION < 1.01Y3

At the end of each cycle, a result is stocked as an array of 12 words.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	Direct access address (hexa) R	Meaning
1	2301	Program number.
2	2302	Test type.
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: Up fail part flow. Bit 2 = 1: Down fail part flow. Bit 3 = 1: alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	2304	Alarm code (refer to the alarm codes table).
5	2305	Pressure low part word.
6	2306	Pressure high part word.
7	2307	Pressure unit code low part word (refer to. Units table).
8	2308	Pressure unit code high part word (refer to. Units table).
9	2309	Leak low section word.
10	230A	Leak high section word.
11	230B	Leak unit code low part word (refer to. Units table).
12	230C	Leak unit code high part word (refer to. Units table).

6.1. ERD FIRMWARE VERSION ≥ 1.01Y3

At the end of each cycle, a result is stocked as an array of 36 words.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units and values measured).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: Pass part. Bit 1 = 1: Up fail part flow. Bit 2 = 1: Down fail part flow. Bit 3 = 1: Alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5 / 6 (Long)	Rise Pressure value, low part / high part.
7 / 8 (Long)	Rise Pressure unit code, low part / high part (refer to Units table).
9 / 10 (Long)	Rise Flow value, low part / high part.
11 / 12 (Long)	Rise Leak unit code, low part / high part (refer to Units table).
13 / 14 (Long)	Step Pressure value, low part / high part.
15 / 16 (Long)	Step Pressure unit code, low part / high part (refer to Units table).
17 / 18 (Long)	Step Flow value, low part / high part.
19 / 20 (Long)	Step Leak unit code, low part / high part (refer to Units table).
21 / 22 (Long)	Drop Pressure value, low part / high part.
23 / 24 (Long)	Drop Pressure unit code, low part / high part (refer to Units table).
25 / 26 (Long)	Drop Flow value, low part / high part.
27 / 28 (Long)	Drop Pressure unit code, low part / high part (refer to Units table).
29 / 30 (Long)	Rise Switch pressure value, low part / high part (>v1.01z0).
31 / 32 (Long)	Rise Switch pressure unit, low part / high part (>v1.01z0).
33 / 34 (Long)	Drop Switch pressure value, low part / high part (>v1.01z0).
35 / 36 (Long)	Drop Switch pressure unit, low part / high part (>v1.01z0).

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2403	6403	End of cycle.	CExt
	1	00 02	2	2401	6401	Mini valve.	CExt
	2	00 04	4	241C	641C	Personalization of the program name.	CExt
	3	00 08	8	241D	641D	Chaining.	CExt
	4	00 10	16	2408	6408	Automatic connector.	CExt
	5	00 20	32	240C	640C	Valves codes (outputs codes).	CExt
	6	00 40	64	240D	640D	Stamping.	CExt
	7	00 80	128	2413	6413	Unit type.	CExt
	8	01 00	256	241F	641F	Piezo auto zero.	CExt
	9	02 00	512	2420	6420	Sending condition: pass part.	CExt
	10	04 00	1024	2416	6416	Sending condition: fail part up.	CExt
	11	08 00	2048	240A	640A	Sending condition: fail part step.	CExt
	12	10 00	4096	2409	6409	Sending condition: fail part down.	CExt
	13	**20 00**	**8192**	**2447**	**6447**	**Sending condition: presence of an alarm.**	CExt
	14	40 00	16384	2422	6422	Sending condition: pressure defect.	CExt
	15	80 00	32768			Sending condition: end of cycle.	
2	16	00 01	1			Content of the frame: time.	CExt
	17	00 02	2	2402	6402	Content of the frame: personalization.	CExt
	18	00 04	4	2406	6406	Content of the frame: pressure.	CExt
	19	00 08	8			Security.	
	20	00 10	16	2449	6449	Exportation.	
	21	00 20	32			Automatic piezo reset.	
	22	00 40	64			Placing in stand-by (power off).	RS232

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	23	00 80	128			Return to operation from stand-by (power on)).	RS232
	24	01 00	256			Filtering.	RS232
	25	02 00	512			Remote control (TLC).	RS232
	26	04 00	1024			Form feed.	RS232
	27	08 00	2048			Automatic save activation.	RS232
	28	10 00	4096			Pressure correction.	RS232
	29	20 00	8192			ΔP correction.	RS232
	30	40 00	16384			Mass.	RS232
	31	80 00	32768			Offset.	RS232
3	32	00 01	1	242F	642F	Presence of a second piezo sensor.	Conf
	33	00 02	2			Auxiliary output 1 configuration.	RS232
	34	00 04	4	2449	6449	Auxiliary output 2 configuration.	
	35	00 08	8			Auxiliary output 3 configuration.	Main
	36	00 10	16			Auxiliary output 4 configuration.	Main
	37	00 20	32			Internal output 1 configuration.	
	38	00 40	64	243A	643A	Internal output 2 configuration.	Conf
	39	00 80	128			External output 1 configuration.	
	40	01 00	256	244E	644E	External output 2 configuration.	
	41	02 00	512	244F	644F	External output 3 configuration.	
	42	04 00	1024	2450	6450	External output 4 configuration.	
	43	08 00	2048	2451	6451	External output 5 configuration.	
	44	10 00	4096	2452	6452	External output 6 configuration.	
	45	20 00	8192	2453	6453	Pressure control.	
	46	40 00	16384	2454	6454	Auxiliary outputs activation.	
	47	80 00	32768	2455	6455	Sign activation.	

Example: bit number 13 (Sending condition: presence of an alarm) activated to 1, will place to "20 00h" the value in the first word. 20 00h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other: **word 1 + word 2 + ….. + word n**

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272(d)). Table of the normal bits per program.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2650	6650	Up flow function.	Funct
	1	00 02	2			Down flow function.	
	2	00 04	4	2604	6604	Step flow function.	Funct
	3	00 08	8	2601	6601	Cycle end activation.	Funct
	4	00 10	16	261E	661E	End of cycle with piezo reset activation.	Funct
	5	00 20	32	261F	661F	Chaining activation.	Funct
	6	00 40	64	2620	6620	Pass part chaining activation.	Funct
	7	00 80	128	2621	6621	Fail part up chaining activation.	Funct
	8	01 00	256	2608	6608	Fail part step chaining activation.	Funct
	9	02 00	512			Fail part down chaining activation.	
	10	04 00	1024			Chaining with alarm activation.	
	11	08 00	2048	260C	660C	Pressure error chaining activation.	Funct
	12	10 00	4096	260D	660D	Cycle end chaining activation.	Funct
	13	20 00	8192	2622	6622	Mini valve Activation.	Funct
	14	40 00	16384	2623	6623	Automatic connector activation.	Funct
	15	80 00	32768			Valve codes activation.	
2	16	00 01	1			Valve 1 activation.	
	17	00 02	2	2626	6626	Valve 2 activation.	Funct
	18	00 04	4	2627	6627	Valve 3 activation.	Funct
	19	00 08	8	2628	6628	Valve 4 activation.	Funct
	20	00 10	16	2629	6629	Valve 5 activation.	Funct
	21	00 20	32			Valve 6 activation.	
	22	00 40	64	262B	662B	Valve 7 activation.	Funct
	23	00 80	128	2612	6612	Valve 8 activation.	
	24	01 00	256	2613	6613	Stamping activation.	
	25	02 00	512	2614	6614	Pass part stamping Activation.	

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	26	04 00	1024	2615	6615	Fail part up stamping activation.	
	27	08 00	2048	2616	6616	Fail part step stamping activation.	
	28	10 00	4096	2617	6617	Fail part down stamping activation.	
	29	20 00	8192	2618	6618	Alarm stamping activation.	
	30	40 00	16384	2619	6619	Pressure error stamping activation.	
	31	80 00	32768	261A	661A	Cycle end stamping activation.	
3	32	00 01	1	262C	662C	Filtering Activation.	
	33	00 02	2	262D	662D	Unit type.	
	34	00 04	4	262E	662E	Piezo automatic reset.	
	35	00 08	8	262F	662F	Up contact activation.	
	36	00 10	16	2630	6630	Down contact activation.	
	37	00 20	32	2631	6631	Up contact type.	
	38	00 40	64	2632	6632	Up pressure activation.	
	39	00 80	128	2633	6633	Step pressure activation.	
	40	01 00	256	2607	6607	Down pressure activation.	Funct
	41	02 00	512			Pressure correction.	
	42	04 00	1024			Temperature correction.	
	43	08 00	2048			ΔP correction.	
	44	10 00	4096	2609	6609	Mass activation.	Funct
	45	20 00	8192	2657	6657	Offset.	Funct
	46	40 00	16384	260A	660A	Piezo sensor 2.	Funct
	47	80 00	32768	2602	6602	Short cycle.	Funct
4	48	00 01	1			Down contact type.	
	49	00 02	2	263F	663F	Pressure control activation.	Funct
	50	00 04	4	2659	6659	Auxiliary codes activation.	Funct
	51	00 08	8	265A	665A	Auxiliary code 1 activation.	Funct
	52	00 10	16			Auxiliary code 2 activation.	
	53	00 20	32			Auxiliary code 3 activation.	
	54	00 40	64			Auxiliary code 4 activation.	
	55	00 80	128			Sign change.	

Example: bit number 46 (Piezo sensor 2) activated on 1, will put to "40 00h" the value in the third word. 40 00h is equivalent to 16384 in decimal and 0100000000000000 in binary.

In the Modbus frame, the words will follow as such: **word 1 + word 2 + ….. + word n**

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Large leak on TEST (TEST F. Sc.).
2	00 02	Large leak on REF.
3	00 03	Pressure over full scale. (F. SCALE).
4	00 04	Pressure below full scale. (MPPP).
5	00 05	Differential sensor error. (SENSOR ERROR).
6	00 06	Pressure sensor error. (P SENS. ERROR).
7	00 07	Pressure over the maximum threshold. (P>).
8	00 08	Pressure below the minimum threshold. (P<).
9	00 09	Dump error.
10	00 0A	Leak calculation failed.
11	00 0B	Pressure calculation failed.
12	00 0C	Rise (Up) flow error.
13	00 0D	Rise (Up) contact error.
14	00 0E	Step flow error.
15	00 0F	Drop (Down) flow error.
16	00 10	Drop (Down) contact error.
17	00 11	Rise (Up) pressure error.
18	00 12	Step pressure error.
19	00 13	Drop (Down) pressure error.

10. UNIT TABLE

This list gives all the units used in the ERD5 instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
30000	75 30	Litter/hour.
33000	80 E8	CAL.
43000	A7 F8	D mode Pascal.
46000	B3 B0	$Inch^3$/s.
47000	B7 98	$Inch^3$/min.
48000	BB 80	$Inch^3$/hour.
49000	BF 68	$Feet^3$/hour.
50000	C3 50	Millilitre/second.
51000	C7 38	Millilitre/minute.
52000	CB 20	Millilitre/hour.
53000	CF 08	Litre/minute.
54000	D2 F0	$Meter^3$/hour.

Chapter 12
ATEQ MF5 MODBUS ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Writing and / or reading of n*words.

Refer to chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".

Write one word in address 201h for select a special cycle.

Value v1.00	Special cycle
1	ATR learning.
2	Reserved.
3	Auto test.
4	Calibration.
5	Verification calibration.
6	Reserved.
7	Auto zero piezo

To activate the special cycle it must make a "Start":

Writing of a forced bit to 1 at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
2	00 02	2002	6002	Stabilisation time: 0 > 650 seconds.
3	00 03	2003	6003	Test time: 0 > 650 seconds.
6	00 06	2006	6006	Pre fill time: 0 > 650 seconds.
7	00 07	2007	6007	Pre dump time: 0 > 650 seconds.
9	00 09	2009	6009	Dump time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1: 0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2: 0 > 650 seconds.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, operator test. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Blockage mode: 2000. ➢ Operator mode: 4000.
29	00 1D	201D	601D	Time between 2 chained cycles: 0 > 650 seconds
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit.
60	00 3C	203C	603C	Natural reject value of the test part: 0 > 9999.
61	00 3D	203D	603D	Natural reject level of the test part in recovery: 0 > 9999.
62	00 3E	203E	603E	Natural reject level of the reference part: 0 > 9999.
63	00 3F	203F	603F	Natural reject value of the reference part in recovery: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 > 9999.
67	00 43	2043	6043	Pre-fill instruction value: 0 > 9999.
68	00 44	2044	6044	Choice of the sealed component: standard or large leak. ➢ Standard: 0000. ➢ Gross leak: 1000.
72	00 48	2048	6048	Calibration drifts percent.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
73	00 49	2049	6049	Screen light intensity value. ➢ 0 %: 0000. ➢ 15 %: 1000. ➢ 30 %: 2000. ➢ 45 %: 3000. ➢ 50 %: 4000. ➢ 75 %: 5000. ➢ 90 %: 6000. ➢ 100 %: 7000.
102	00 66	2066	6066	Type of permanent blowing. ➢ Regulator 2: 0000. ➢ Regulator 1: 1000.
103	00 67	2067	6067	Type of fill. ➢ Standard: 0000. ➢ Instruction: 1000. ➢ Ballistic: 2000.
104	00 68	2068	6068	Type of pre-fill. ➢ Standard: 0000. ➢ Instruction: 1000. ➢ Ballistic: 2000.
107	00 6B	206B	606B	ATR absorption tolerance.
108	00 6C	206C	606C	Start value of the transient (ATR).
110	00 6E	206E	606E	Type of external dump. ➢ Positive: 0000. ➢ Negative: 1000.
112	00 70	2070	6070	Function attributed to the entry of the special cycles. ➢ Program selection: 0000. ➢ Calibration Pressure 1: 1000. ➢ Calibration check: 2000. ➢ Diff sensor calibration: 3000. ➢ Auto test: 4000. ➢ Piezo sensor calibration: 5000. ➢ Regulator adjust: 7000. ➢ Infinite fill: 8000. ➢ Piezo reset: 9000. ➢ Volume calculation: 16000. ➢ Atmospheric conditions: 19000.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
117	00 75	2075	6075	Permanent blowing pressure instruction.
119	00 77	2077	6077	Minimum sealed component measurement pressure.
120	00 78	2078	6078	Maximum sealed component measurement pressure.
121	00 79	2079	6079	Fill time of the internal volume.
122	00 7A	207A	607A	Sealed component transfer time.
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.
126	00 7E	207E	607E	Maximum pressure value in pre-fill.
127	00 7F	207F	607F	Reject unit.
128	00 80	2080	6080	Instruction value during a calibration.
135	00 87	2087	6087	Percentage concerning the auto parametering.
138	00 8A			Fill regulator number.
139	00 8B			Pre-fill regulator number.
140	00 8C	208C	608C	Percentage concerning the temperature compensation.
141	00 8D	208D	608D	Test time for the temperature compensation.
144	00 90	2090	6090	Setup of the outputs (standard or compact).
145	00 91	2091	6091	Number of program to be copied.
146	00 92	2092	6092	Number of the program to be pasted.
148	00 94	2094	6094	Filtering.
149	00 95			Unit type SI or USA. ➢ SI: 0000. ➢ USA: 1000. ➢ CAL: 2000.
155	00 9B	209B	609B	Standard customer temperature (correction in temperature).
156	00 9C	209C	609C	Standard pressure customer.
161	00 A1	20A1	60A1	Volume unit.
164	00 A4	20A4	60A4	Number of the following program in sequencing.
165	00 A5	20A5	60A5	Number of cycles between two automatic reset.
166	00 A6	20A6	60A6	Time between two automatic reset.
176	00 B0			Reference volume.
177	00 B1			Test volume.
340	01 54	2154	6154	ATR transient value.

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
00	00 00	Pre-fill.
01	00 01	Pre-dump.
02	00 02	Sealed components fill.
03	00 03	Sealed components stabilisation.
04	00 04	Fill.
05	00 05	Stabilisation.
06	00 06	Test.
07	00 07	Dump.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: test fail part. Bit 2 = 1: reference fail part. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: recoverable part. Bit 7 = 1: CAL error or drift. Bit 8 = 1: Calibration check error. Bit 9 = 1: ATR error or drift. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2206	High pressure section word.
8	2208	Pressure unit code low part word (refer to. Units table).
9	2209	Pressure unit code high part word (refer to. Units table).
10	220A	Leak low section word.
11	220B	Leak high section word.
12	220C	Leak unit code low part word (refer to. Units table).
13	220D	Leak unit code high part word (refer to. Units table).

5. PENDING RESULTS LIST STRUCTURE (RESULTS IN FIFO)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, leak too large in test. Bit 2 = 1: fail part, leak too large in reference. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to. Units table).
8	Pressure unit code high part word (refer to. Units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to. Units table).
12	Leak unit code high part word (refer to. Units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

6. LAST RESULTS STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	Direct access address (hexa) R	Meaning	Type	Bytes	Coeff
1	2301	Program number.	Word	2	
2	2302	Test type.	Word	2	
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part, leak too large in test. Bit 2 = 1: fail part, leak too large in reference. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
4	2304	Alarm code (refer to the alarm codes table).	Word	2	
5	2305	Pressure low part word.	Long	4	x1000
6	2306	Pressure high part word.			
7	2307	Pressure unit code low part word (refer to. Units table).	Long	4	x1000
8	2308	Pressure unit code high part word (refer to. Units table).			
9	2309	Leak low section word.	Long	4	x1000
10	230A	Leak high section word.			
11	230B	Leak unit code low part word (refer to. Units table).	Long	4	x1000
12	230C	Leak unit code high part word (refer to. Units table).			

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	241A	641A	Activation of the permanent blowing.	
	1	00 02	2	241B	641B	Permanent blowing.	
	2	00 04	4	2404	6404	Fill type.	CExt
	3	00 08	8	2403	6403	Pre-fill type.	CExt
	4	00 10	16	2401	6401	Recovery thresholds.	CExt
	5	00 20	32	241C	641C	Cycle end.	CExt
	6	00 40	64	241D	641D	Mini valve.	CExt
	7	00 80	128	2408	6408	Peak meter.	CExt
	8	01 00	256	241E	641E	Volume calculation.	CExt
	9	02 00	512	240B	640B	ATR 0.	CExt
	10	04 00	1024	240C	640C	ATR 1.	CExt
	11	08 00	2048	2413	6413	Personalisation of the program name.	CExt
	12	10 00	4096	241F	641F	Chaining.	CExt
	13	**20 00**	**8192**	**2420**	**6420**	**Automatic connector.**	CExt
	14	40 00	16384	2416	6416	Valve codes (output codes).	CExt
	15	80 00	32768	2421	6421	Sealed component.	CExt
2	16	00 01	1	2422	6422	Stamping.	CExt
	17	00 02	2			Reserved.	
	18	00 04	4			N test.	CExt
	19	00 08	8			Reserved.	
	20	00 10	16	2426	6426	Sending conditions: pass part.	RS232
	21	00 20	32	2427	6427	Sending conditions: fail test part.	RS232
	22	00 40	64	2428	6428	Sending conditions: fail reference part.	RS232

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	23	00 80	128	2429	6429	Sending conditions: presence of an alarm.	RS232
	24	01 00	256	242A	642A	Sending conditions: pressure error.	RS232
	25	02 00	512	242B	642B	Sending conditions: end of cycle	RS232
	26	04 00	1024	242C	642C	Sending conditions: recoverable.	RS232
	27	08 00	2048	242D	642D	Content of the frame: time stamp.	RS232
	28	10 00	4096	2412	6412	Content of the frame: personalisation.	RS232
	29	20 00	8192	242E	642E	Content of the frame: pressure.	RS232
	30	40 00	16384	242F	642F	Security.	Conf
	31	80 00	32768	2414	6414	External dump.	Conf
3	32	00 01	1	2430	6430	Exportation.	RS232
	33	00 02	2	240F	640F	Automatic reset.	Conf
	34	00 04	4			Placing in stand-by.	Main
	35	00 08	8			Return to operation from stand-by.	Main
	36	00 10	16			Remote control.	
	37	00 20	32	2407	6407	Temperature compensation.	CExt
	38	00 40	64			Automatic setting of the parameters activation.	Conf
	39	00 80	128	243E	643E	Automatic setting of the parameters.	Conf
	40	01 00	256	2439	6439	Page feed.	
	41	02 00	512			Sign.	CExt
	42	04 00	1024	2440	6440	ATEQ service cycle.	Conf
	43	08 00	2048	2402	6402	Unit type.	Conf
	44	10 00	4096	2437	6437	Automatic save activation.	Conf
	45	20 00	8192	2438	6438	Electronic regulator mode.	Conf
	46	40 00	16384			Auxiliary codes activation.	
	47	80 00	32768	2409	6409	Filtering.	CExt
4	48	00 01	1	2436	6436	No negative.	CExt

Example: bit number 13 (automatic connector) activated to 1, will place to "20 00h" the value in the first word. 20 00h is equivalent to 8192 in decimal and 0010000000000000 in binary.

In the Modbus frame, the words will follow each other: **word 1 + word 2 + ….. + word n**

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272(d)). Table of the normal bits per program.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FVC = Function / Valves codes; Fstp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1			Fill regulator number.	
	1	00 02	2			Pre-fill regulator number.	
	2	00 04	4	2604	6604	Activation of the fill type.	Funct
	3	00 08	8	2603	6603	Activation of the pre-fill type.	Funct
	4	00 10	16	2601	6601	Recovery thresholds activation.	Funct
	5	00 20	32	261E	661E	Cycle end activation.	Funct
	6	00 40	64	261F	661F	Cycle with reset and auto reset.	FEoc
	7	00 80	128	2620	6620	Dump and reset cycle end activ.	FEoc
	8	01 00	256	2621	6621	Cycle end with fill activation.	FEoc
	9	02 00	512	2608	6608	Peak meter activation.	Funct
	10	04 00	1024	260B	660B	ATR 0 activation.	Funct
	11	08 00	2048	260C	660C	ATR 1 activation.	Funct
	12	10 00	4096	2622	6622	Chaining activation.	Funct
	13	20 00	8192	2623	6623	Pass part chaining activation.	FChai
	14	40 00	16384	2624	6624	Fail test part chaining activation.	FChai
	15	80 00	32768	2625	6625	Fail ref. part chaining activation.	FChai
2	16	00 01	1	2626	6626	Chaining with alarm activation.	FChai
	17	00 02	2	2627	6627	Pressure switch error chaining.	FChai
	18	00 04	4	2628	6628	Chaining with cycle end activation.	FChai
	19	00 08	8			Mini-valve activation.	Funct
	20	00 10	16	262A	662A	Chaining with recovery activation.	FChai
	21	00 20	32			Automatic connector activation.	Funct
	22	00 40	64	2612	6612	Valve codes activation.	Funct
	23	00 80	128	2613	6613	Valves codes 1 activation.	FVC
	24	01 00	256	2614	6614	Valves codes 2 activation.	FVC
	25	02 00	512	2615	6615	Valves codes 3 activation.	FVC
	26	04 00	1024	2616	6616	Valves codes 4 activation.	FVC

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	27	08 00	2048	2617	6617	Valves codes 5 activation.	FVC
	28	10 00	4096	2618	6618	Valves codes 6 activation.	FVC
	29	20 00	8192	2619	6619	Valves codes 7 activation.	FVC
	30	40 00	16384	261A	661A	Valves codes 8 activation.	FVC
	31	80 00	32768	262C	662C	Stamping activation.	Funct
3	32	00 01	1	262D	662D	Pass part stamping activation.	Fstp
	33	00 02	2	262E	662E	Fail test part stamping activation.	Fstp
	34	00 04	4	262F	662F	Fail ref. part stamping activation.	Fstp
	35	00 08	8	2630	6630	Alarm stamping activation.	Fstp
	36	00 10	16	2631	6631	Pressure switch error stamping.	Fstp
	37	00 20	32	2632	6632	Cycle end stamping activation.	Fstp
	38	00 40	64	2633	6633	Recovery stamping.	Fstp
	39	00 80	128			Reserved.	
	40	01 00	256			Reserved.	
	41	02 00	512	2636	6636	Sealed component activation.	Funct
	42	04 00	1024			Sealed component valid parameter (do not touch).	
	43	08 00	2048	261B	661B	External dump activation.	Funct
	44	10 00	4096	2607	6607	T° compensation activation.	Funct
	45	20 00	8192			Dump before cycle in sealed component activation.	
	46	**40 00**	**16384**			**Sign changing activation.**	
	47	80 00	32768			End of cycle obligatory reset.	FEoc
4	48	00 01	1	2638	6638	Auxiliary codes activation.	
	49	00 02	2	2639	6639	Auxiliary code 1 activation.	
	50	00 04	4	263A	663A	Auxiliary code 2 activation.	
	51	00 08	8	263B	663B	Auxiliary code 3 activation.	
	52	00 10	16	263C	663C	Auxiliary code 4 activation.	
	53	00 20	32	264C	664C	Auto setting parameters.	Para
	54	00 40	64	2609	6609	Filtering activation.	Funct
	55	00 80	128	261D	661D	Standard conditions.	Funct
	56	01 00	256	263F	663F	No negative	Funct

Example: bit number 36 (activation of sign changing) activated on 1, will put to "00 10h" the value in the third word. 00 10h is equivalent to 16 in decimal and 0000000000010000 in binary.

In the Modbus frame, the words will follow as such: **word 1 + word 2 + ….. + word n**

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
8	00 08	ATR error.
9	00 09	ATR drift.
10	00 0A	CAL error.
14	00 0B	Equalization valve switching error.
43	00 0C	Pressure too high.
44	00 0E	Pressure too low.
45	00 2B	Piezo sensor out of order.
46	00 2C	Dump error.
47	00 2D	CAL drift error.
48	00 2E	Calibration check error.
49	00 27	Leak in calibration check too high.
50	00 33	Leak in calibration check too low.
51	00 00	Sealed component learning error.

10. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
0000	00 00	$cm^3/s.$
1000	03 E8	$cm^3/min.$
2000	07 D0	$cm^3/h.$
3000	0B B8	$mm^3/h.$
4000	0F A0	Calibrated Pascal.
6000	17 70	Pascal.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
46000	B3 B0	$Inch^3/s.$
47000	B7 98	$Inch^3/min.$
48000	BB 80	$Inch^3/hour.$
49000	BF 68	$Feet^3/hour.$
50000	C3 50	Millilitre/second.
51000	C7 38	Millilitre/minute.
52000	CB 20	Millilitre/hour.
58000	E2 90	USA cm^3/s same as the $cm^3/s.$
59000	E6 78	USA cm^3/min same as the $cm^3/min.$
60000	EA 60	USA cm^3/h same as the $cm^3/h.$
65000	01 01 D0	Gram/second.
66000	01 05 B8	Gram/minute.
67000	01 09 A0	Gram/hour.
68000	01 0D 88	Oz (US) /second.
69000	01 11 70	Oz (US) /minute.
70000	01 15 58	Oz (US) /hour.
71000	01 19 40	Oz (UK) /second.
72000	01 1D 28	Oz (UK) /minute.
73000	01 21 10	Oz (UK) /hour.

Chapter 13
ATEQ F420P MODBUS ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Writing and / or reading of n*words.
Refer to chapter 3 "MODBUS addresses".

1.2. SPECIAL CYCLE BIT TABLE

Refer to Chapter 3 "MODBUS addresses".
Write one word in address 201h for select a special cycle.

Version 1.01	Special cycle
1	ATR learning
3	Auto – test
7	Auto zero piezo
10	Regulator
11	Infinite fill

To activate the special cycle it must make a "Start
Writing of a forced bit to 1 (FFh) at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
2	00 02	2002	6002	Stabilization time: 0 > 650 seconds.
3	00 03	2003	6003	Test time: 0 > 650 seconds.
6	00 06	2006	6006	Pre fill time: 0 > 650 seconds.
7	00 07	2007	6007	Pre dump time: 0 > 650 seconds.
9	00 09	2009	6009	Dump time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1: 0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2: 0 > 650 seconds.
20	00 14	2014	6014	Part volume.
21	00 15	2015	6015	Test type: invalid test, leak test, mode P test, mode D test, operator test. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Blockage mode: 2000. ➢ Desensitized mode: 3000. ➢ Operator mode: 4000.
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit.
60	00 3C	203C	603C	Natural reject value of the test part: 0 > 9999.
61	00 3D	203D	603D	Natural reject level of the test part in recovery: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 – 9999.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
73	00 49	2049	6049	Screen light intensity value. ➢ 0 %: 0000. ➢ 15 %: 1000. ➢ 30 %: 2000. ➢ 45 %: 3000. ➢ 50 %: 4000. ➢ 75 %: 5000. ➢ 90 %: 6000. ➢ 100 %: 7000.
118	00 76	2076	6076	Original unit for the calculation of rejects in cm^3/min. ➢ Pascal: 0000. ➢ Pascal/Second: 1000.
123	00 7B	207B	607B	Choice of the language. ➢ Default language: 0000. ➢ 2nd predefined language: 1000.
126	00 7E	207E	607E	Maximum pressure value in pre-fill.
127	00 7F	207F	607F	Reject unit.
145	00 91	2091	6091	Number of program to be copied.
146	00 92	2092	6092	Number of the program to be pasted.

3. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Pre-fill.
1	00 01	Pre-dump.
2	00 02	Fill.
3	00 03	Stabilization.
4	00 04	Test.
5	00 05	Dump.
65535	FF FF	No step in progress.

4. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: good part. Bit 1 = 1: bad test part. Bit 2 = 1: bad reference part. Bit 3 = 1: alarm. Bit 4 = 1: pressure error. Bit 5 = 1: cycle end. Bit 6 = 1: recoverable part. Bit 7 = 1: CAL error or drift. Bit 8 = 1: Calibration check error. Bit 9 = 1: ATR error or drift. Bit 10 = 1: unused. Bit 11 = 1: unused. Bit 12 = 1: unused. Bit 13 = 1: unused. Bit 14 = 1: unused. Bit 15 = 1: key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to units table).
9	2209	Pressure unit code high part word (refer to units table).
10	220A	Leak low section word.
11	220B	Leak high section word.
12	220C	Leak unit code low part word (refer to units table).
13	220D	Leak unit code high part word (refer to units table).

5. PENDING RESULTS LIST STRUCTURE (FIFO RESULTS)

Codes at the address 10h (16(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words contained in a FIFO of 8 results.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: good part. Bit 1 = 1: bad part, leak too large in test. Bit 2 = 1: bad part, leak too large in reference. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word.
6	Pressure high part word.
7	Pressure unit code low part word (refer to. Units table).
8	Pressure unit code high part word (refer to. Units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to. Units table).
12	Leak unit code high part word (refer to. Units table).

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

6. LAST RESULTS STRUCTURE

Codes at the address 11h (17(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked as an array of 12 words.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	D. A. address (hexa) R	Meaning	Type	Bytes	Coeff
1	2301	Program number.	Word	2	
2	2302	Test type.	Word	2	
3	2303	Image of the relays: Bit 0 = 1: good part. Bit 1 = 1: bad part, leak too large in test. Bit 2 = 1: bad part, leak too large in reference. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
4	2304	Alarm code (refer to the alarm codes table).	Word	2	
5	2305	Pressure low part word.	Long	4	x1000
6	2306	Pressure high part word.			
7	2307	Pressure unit code low part word (refer to. Units table).	Long	4	x1000
8	2308	Pressure unit code high part word (refer to. Units table).			
9	2309	Leak low section word.	Long	4	x1000
10	230A	Leak high section word.			
11	230B	Leak unit code low part word (refer to. Units table).	Long	4	x1000
12	230C	Leak unit code high part word (refer to. Units table).			

7. TABLE OF THE GENERAL BITS

Codes at the address 100h (256(d)).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2401	6401	Recovery thresholds.	CExt
	1	00 02	2	241C	641C	Cycle end.	CExt
	2	00 04	4	240B	640B	ATR 0.	CExt
	3	00 08	8	240C	640C	ATR 1.	CExt
	4	00 10	16	240D	640D	ATR 2.	CExt
	5	00 20	32	2413	6413	Personalization of the program name.	CExt
	6	00 40	64	241F	641F	Chaining.	CExt
	7	**00 80**	**128**	**2420**	**6420**	**Automatic connector.**	**CExt**
	8	01 00	256	2416	6416	Valve codes (output codes).	CExt
	9	02 00	512			Reserved.	CExt
	10	04 00	1024			Sending conditions: good part.	RS232
	11	08 00	2048			Sending conditions: fail test part.	RS232
	12	10 00	4096			Sending conditions: fail reference part.	RS232
	13	20 00	8192			Sending conditions: presence of an alarm.	RS232
	14	40 00	16384			Sending conditions: pressure error.	RS232
	15	80 00	32768			Sending conditions: end of cycle	RS232
2	16	00 01	1			Sending conditions: recoverable.	RS232
	17	00 02	2			Content of the frame: personalization.	RS232
	18	00 04	4			Content of the frame: pressure.	RS232
	19	00 08	8	242F	642F	Security.	Conf
	20	00 10	16			Reserved.	Conf
	21	00 20	32			Exportation.	RS232

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	22	00 40	64			Automatic reset.	Conf
	23	00 80	128	2464	6464	Negatives thresholds.	Conf
	24	01 00	256			Line feed (label).	
	25	02 00	512	2460	6460	Pre-fill.	CExt
	26	04 00	1024	2415	6415	Dump supervision.	Conf
	27	08 00	2048	2465	6465	I/O configuration (input 5).	Conf
	28	10 00	4096	2434	6434	Sign.	CExt
	29	20 00	8192			Unused.	
	30	40 00	16384			Unused.	
	31	80 00	32768			Unused.	

Example: bit number 7 (automatic connector) activated to 1, will place to "00 80h" the value in the first word. 00 80h is equivalent to 128 in decimal and 0000000010000000 in binary.

In the Modbus frame, the words will follow each other:

word 1 + word 2 + ….. + word n

8. TABLE OF THE NORMAL BITS

Codes at the address 110h (272(d)). Table of the normal bits per program.

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FVC = Function / Valves codes; Fstp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2601	6601	Recovery thresholds activation.	Funct
	1	00 02	2	261E	661E	Cycle end activation.	Funct
	2	00 04	4	261F	661F	End of cycle with reset and auto reset activation.	FEoc
	3	00 08	8	2620	6620	Cycle end with dump and reset activation.	FEoc
	4	00 10	16	2621	6621	Cycle end with fill activation.	FEoc
	5	00 20	32	260B	660B	ATR 0 activation.	Funct
	6	00 40	64	260C	660C	ATR 1 activation.	Funct
	7	00 80	128	260D	660D	ATR 2 activation.	Funct
	8	01 00	256	2622	6622	Activation of chaining.	Funct
	9	02 00	512	2623	6623	Good part chaining activation.	FChai
	10	04 00	1024	2624	6624	Fail test part chaining activation.	FChai
	11	08 00	2048			Fail reference part chaining activation.	FChai
	12	**10 00**	**4096**	**2626**	**6626**	**Alarm chaining activation.**	FChai
	13	20 00	8192	2627	6627	Pressure switch error chaining activation.	FChai
	14	40 00	16384	2628	6628	Cycle end chaining activation.	FChai
	15	80 00	32768	262A	662A	Recovery chaining activation.	FChai
2	16	00 01	1	262B	662B	Automatic connector activation.	Funct
	17	00 02	2	2612	6612	Valve codes activation.	FCV
	18	00 04	4	2661	6661	Valves codes 1 activation.	FCV
	19	00 08	8	2662	6661	Valves codes 2 activation.	FCV
	20	00 10	16			Reserved.	
	21	00 20	32			Reserved.	
	22	00 40	64			Reserved.	
	23	00 80	128			Reserved.	
	24	01 00	256			Reserved.	
	25	02 00	512			Reserved.	
	26	04 00	1024			Reserved.	
	27	08 00	2048			Reserved.	

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	28	10 00	4096			Reserved.	
	29	20 00	8192	2663	6663	Negatives thresholds activation.	Funct
	30	40 00	16384	265E	665E	Pre-fill activation.	Funct
	31	80 00	32768	2611	6611	Sign.	
	61	20 00	8192			Reserved.	Funct

Example: bit number 12 (activation cycling with alarm) activated on 1, will put to "10 00h" the value in the third word. 10 00h is equivalent to 4096 in decimal and 0001000000000000 in binary.

In the Modbus frame, the words will follow as such:

word 1 + word 2 + ….. + word n

9. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
8	00 08	ATR error.
9	00 09	ATR drift.
10	00 0A	CAL error.
43	00 2B	Pressure too high.
44	00 2C	Pressure too low.
45	00 2D	Piezo sensor out of order.
46	00 2E	Dump error.
47	00 2F	CAL drift error.

10. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
0000	00 00	$cm^3/s.$
1000	03 E8	$cm^3/min.$
2000	07 D0	$cm^3/h.$
3000	0B B8	$mm^3/h.$
4000	0F A0	Calibrated Pascal.
5000	13 88	Calibrated Pascal/second.
6000	17 70	Pascal.
7000	1B 58	High resolution Pascal.
8000	1F 40	Pascal/second.
9000	23 28	High resolution Pascal/second.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
18000	46 50	KiloPascal/second.
43000	A7 F8	D mode Pascal.

Chapter 14

ATEQ VT520 MODBUS ADDRESSES

The VT520 instrument is functioning only on the "Access direct" Modbus.

1. READ/WRITE ACCESS DIRECT ADDRESSES IDENTIFIERS

1.1. DOWNLOADING OF THE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instrument as "longs" with fixed point (10^{-3}). A "long" is a two words set.*

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
3	00 03	2003	6003	Test time: 0 > 650 seconds.
21	00 15	2015	6015	Test type: valve test = 1000.
46	00 2E	202E	602E	Antenna type selection ➢ Axial: 0000. ➢ Tangent: 1000.
50	00 32	2032	6032	Minimum pressure.
51	00 33	2033	6033	Maximum pressure.
52	00 34	2034	6034	Transmitter configuration: ➢ A + B / H: 0000. ➢ A + B / h: 1000. ➢ A / H: 2000. ➢ A / h: 3000. ➢ B / H: 4000. ➢ B / h: 5000.
53	00 35	2035	6035	Pressure unit: bar; kPa; PSI (See unit table).
293	01 25	2125	6125	Frequency selection: ➢ 315 MHz: 0000. ➢ 433.92 MHz: 1000. ➢ 434.42 MHz: 2000.
310	01 36	2136	6136	Valve type (depends of the customer's application).
311	01 37	2137	6137	Trigger mode (depends of the customer's application). ➢ Sniffing: 0000. ➢ Learning mode: 1000.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
314	01 3A	213A	613A	Valve identifier. ➢ Decimal: 0000. ➢ Hexadecimal: 1000.
322	01 42	2142	6142	Minimum temperature.
323	01 43	2143	6143	Maximum temperature.
324	01 44	2144	6144	Temperature unit. ➢ Celsius: 0000. ➢ Fahrenheit: 1000.
325	01 45	2145	6145	Acceleration minimum (0.0 – 99.9 g). Example: write 999000 = 99.9.
326	01 46	2146	6146	Acceleration maximum (0.0 – 99.9 g). Example: write 999000 = 99.9.
327	01 47	2147	6147	Power transmission (%).

2. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

***Reminder**: **"h"** indicates a hexadecimal code; **"(d)"** indicates a decimal code.*

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: not used. Bit 3 = 1: alarm. Bit 4 = 1: not used. Bit 5 = 1: cycle end. Bit 6 = 1: not used. Bit 7 = 1: not used. Bit 8 = 1: not used. Bit 9 = 1: not used. Bit 10 = 1: not used. Bit 11 = 1: not used. Bit 12 = 1: not used. Bit 13 = 1: not used. Bit 14 = 1: not used. Bit 15 = 1: key presence.
5	2205	Status results. Bit 0 = 1: ID OK. Bit 1 = 1: Pressure OK. Bit 2 = 1: Not used. Bit 3 = 1: Acceleration OK. Bit 4 = 1: Temperature OK. Bit 5 = 1: Battery OK. Bit 6 = 1: Status OK.

3. LAST RESULTS DIRECT ACCESS ADDRESSES

This result includes the final state of the instrument: position of the relays, alarm signal, state of the indicators…, but also of the test, units, values measured for the pressure and the leak.

D. A. address (hexa) R	Meaning	Type	Bytes	Coeff
2301	Program number.	Word	2	
2302	Test type.	Word	2	
2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail part. Bit 2 = 1: fail part. Bit 3 = 1: presence of an alarm. Bit 4 = 1: unused. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
2304	Alarm code (refer to the alarm codes table).	Word	2	
2305	Pressure low part word.	Long	4	x1000
2306	Pressure high part word.			
2307	Pressure unit code (see units table).	Word	2	x1000
2308	Temperature value.	Word	2	
2309	Temperature unit: C°= 0000; F°= 1000.	Word	2	
230A	Acceleration.	Word	2	x10
230B	Valve identifier low part word.	DWord	4	Hexa
230C	Valve identifier high part word.			
230D	Battery frame characters string.	Chars	22	
2318	Status frame characters string.	Chars	22	
2323	Wu frame characters string (Wheel unit).	Chars	42	

4. TABLE OF THE GENERAL BITS

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

D. A. address (hexa)		Meaning	Menu
R/W	R/W		
2412	6412	Frame content: personalisation.	RS232
2413	6413	Program personalisation.	CExt
2416	6416	Valves codes.	CExt
241F	641F	Chaining.	CExt
2426	6426	Sending cond.: good part.	RS232
2427	6427	Sending cond.: fail part.	RS232
2429	6429	Sending cond.: alarm presence.	RS232
242B	642B	Sending cond.: end of cycle	RS232
242D	642D	Frame content: time.	RS232
242E	642E	Frame content: pressure.	RS232
242F	642F	Security.	Conf
2430	6430	Exportation.	RS232
2437	6437	Automatic save activation.	Conf
2439	6439	Page feed.	RS232
2466	6466	Frame content: result.	RS232
2467	6467	Frame content: valve identifier.	RS232
2468	6468	Frame content: temperature.	RS232
2469	6469	Frame content: acceleration.	RS232
246A	646A	Frame content: battery state.	RS232
246B	646B	Frame content: valve state.	RS232
246C	646C	Frame	RS232
246D	646D	Frame content: valve name.	RS232
246E	646E	Acceleration extended menu.	CExt
246F	646F	Temperature extended menu.	CExt
2470	6470	Pressure extended menu.	CExt

5. TABLE OF THE NORMAL BITS

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

D. A. address (hexa)		Meaning	Menu
R/W	R/W		
2612	6612	Valve codes activation.	Funct
2622	6622	Chaining activation.	Funct
2623	6623	Chaining good part activation.	FChai
2624	6624	Chaining fail test part activation.	FChai
2626	6626	Chaining with alarm activation.	FChai
2628	6628	Chaining with cycle end activation.	FChai
2638	6638	Auxiliary codes activation.	Funct
2639	6639	Auxiliary code 1 activation.	Funct
263A	663A	Auxiliary code 2 activation.	Funct
263B	663B	Auxiliary code 3 activation.	Funct
263C	663C	Auxiliary code 4 activation.	Funct
2642	6642	Valves 1 activation.	Funct
2643	6643	Valves 2 activation.	Funct
2644	6644	Valves 3 activation.	Funct
2645	6645	Valves 4 activation.	Funct
2646	6646	Valves 5 activation.	Funct
2647	6647	Valves 6 activation.	Funct
2648	6648	Valves 7 activation.	Funct
2649	6649	Valves 8 activation.	Funct
2664	6664	Minimum and maximum pressure option.	Funct
2665	6665	Minimum and maximum temperature option.	Funct
2666	6666	Minimum and maximum acceleration option.	Funct

6. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	Hexadecimal	
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.

Chapter 15

ATEQ H520 DIRECT ACCESS ADDRESSES

***Note**: the Modbus direct access with the H520 device is running from version **3.01d2** only.*

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code; **"(d)"** indicates a decimal code.*

1.1. SPECIAL CYCLE BIT TABLE

Write one word in address 201h for select a special cycle.

Value	Special cycle
7	Auto zero piezo
8	Regulator adjust

To activate the special cycle it must make a "Start".

Write of a forced bit to 1 (FFh) at the address 01h.

2. IDENTIFIERS AND READ/WRITE ACCESS DIRECT ADDRESSES

2.1. DOWNLOADING OF THE PARAMETERS

Identifier N°		Direct access address (hexa)		Meaning
Dec	Hexa	R/W	R/W	
1	00 01	2001	6001	Fill time: 0 > 650 seconds.
3	00 03	2004	6004	Cut.
6	00 06	2006	6006	Fill time: 0 > 650 seconds.
9	00 09	2009	6009	Dump time: 0 > 650 seconds.
10	00 0A	200A	600A	Coupling time 1: 0 > 650 seconds.
11	00 0B	200B	600B	Coupling time 2: 0 > 650 seconds.
20	00 14	2014	6014	Part volume.
21	00 15	2015	6015	Test type: Fine test or External Probe. ➢ Fine test: 1000. ➢ External Probe: 2000.
29	00 1D	201D	601D	Time between 2 chained cycles: 0 > 650 seconds
50	00 32	2032	6032	Minimum pressure value: - 9999 > 9999.
51	00 33	2033	6033	Maximum pressure value: - 9999 > 9999.
53	00 35	2035	6035	Pressure unit H_2.
60	00 3C	203C	603C	Natural reject value of the test part: 0 > 9999.
66	00 42	2042	6042	Fill instruction value: 0 > 9999.
103	00 67	2067	6067	Type of fill. ➢ Standard: 0000. ➢ Instruction: 1000.
126	00 7E	207E	607E	Maximum pressure value in pre-fill.
127	00 7F	207F	607F	Reject unit.
145	00 91	2095	6095	Unit type SI or USA. ➢ SI: 0000. ➢ CAL: 1000.
146	00 92	20A1	60A1	Volume unit.
		20A4	60A4	Number of the following program in sequencing.
		20A5	60A5	Number of cycles between two automatic reset.
		20A6	60A6	Time between two automatic reset.
		20EA	60EA	Auto zero time (AZ).
		20EB	60EB	Vacuum time (VACCUUM).
		20EC	60EC	Vacuum test time (VACCUUM TEST).
		20EE	60EE	Accumulation time.
		20EF	60EF	Fin test time.

Identifier N°		Direct access address (hexa)		Meaning
Dec	**Hexa**	**R/W**	**R/W**	
		20F0	60F0	Minimum pressure vacuum instruction (<0).
		20F1	60F1	Purge time (PURGE).
		211B	611B	Cleaning.
		211C	611C	Gas type.
		211D	611D	User gas viscosity.
		212B	612B	Vacuum test reject level.
		2158	6158	Vacuum pressure unit.
		2159	6159	Pollution level (%).
		215A	615A	User gas molar mass.
		215B	615B	Gas Concentration.
348	01 5C	215C	615C	Vacuum flow value. (VACUUM).

3. STATUS AND REAL TIME MEASURES

Words	Direct access address (hexa) R	Meaning
1	2201	Program number.
2	2202	Number of results waiting in the results FIFO memory.
3	2203	Test type.
4	2204	Status: Bit 0 = 1: Pass part. Bit 1 = 1: Fail test part. Bit 2 = 1: Fail vacuum part. Bit 3 = 1: Alarm. Bit 4 = 1: Unused. Bit 5 = 1: Cycle end. Bit 6 = 1: Unused. Bit 7 = 1: Unused. Bit 8 = 1: Unused. Bit 9 = 1: Unused. Bit 10 = 1: Unused. Bit 11 = 1: Unused. Bit 12 = 1: Unused. Bit 13 = 1: Unused. Bit 14 = 1: Unused. Bit 15 = 1: Key presence.
5	2205	Step code (refer to steps table).
6	2206	Low pressure section word.
7	2207	High pressure section word.
8	2208	Pressure unit code low part word (refer to units table).
9	2209	Pressure unit code high part word (refer to units table).
10	220A	Leak low section word.
11	220B	Leak high section word.
12	220C	Leak unit code low part word (refer to units table).
13	220D	Leak unit code high part word (refer to units table).

4. LAST RESULTS STRUCTURE

At the end of each cycle, the last result is stocked as an array of 12 words. This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The last result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Words	D. A. address (hexa) R	Meaning	Type	Bytes	Coeff
1	2301	Program number.	Word	2	
2	2302	Test type.	Word	2	
3	2303	Image of the relays: Bit 0 = 1: pass part. Bit 1 = 1: fail test part. Bit 2 = 1: fail reference part. Bit 3 = 1: alarm. Bit 4 = 1: reserved. Bit 5 = 1: reserved. Bit 6 = 1: unused. Bit 7 = 1: unused.	Word	2	
4	2304	Alarm code (refer to the alarm codes table).	Word	2	
5	2305	Pressure low part word.	Long	4	x1000
6	2306	Pressure high part word.			
7	2307	Pressure unit code low part word (refer to. Units table).	Long	4	x1000
8	2308	Pressure unit code high part word (refer to. Units table).			
9	2309	Leak low section word.	Long	4	x1000
10	230A	Leak high section word.			
11	230B	Leak unit code low part word (refer to. Units table).	Long	4	x1000
12	230C	Leak unit code high part word (refer to. Units table).			

***Note:** all the values are treated as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

***Example 1:** pressure, words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

***Example 2:** leak value words 9 and 10 (signed long):*

94 FF FF FF

| LSB | MSB |

FF FF FF 94 = -108; divide by 1000 = -0.108

5. TABLE OF THE GENERAL BITS

The bits below are mostly present in the "**extended menus**". They are only used to allow the access to other parameters according to the configuration, depending on the configuration, these are active or not.

Menus: Conf = configuration; CExt = Configuration/Extended menus; RS232 = configuration/RS232 ; Main = Main menu.

Words	Bits N°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
1	0	00 01	1	2404	6404	Fill type.	CExt
	1	00 02	2			Not used.	CExt
	2	00 04	4	241C	641C	Cycle end.	CExt
	3	00 08	8	2408	6408	Peak meter.	CExt
	4	00 10	16	2496	6496	Short Cycle.	CExt
	5	00 20	32	2413	6413	Program personalization.	CExt
	6	00 40	64	241F	641F	Chaining.	CExt
	7	00 80	128	2420	6420	Automatic connector.	CExt
	8	01 00	256	2416	6416	Valves Codes (outputs codes).	CExt
	9	02 00	512			Not used.	CExt
	10	04 00	1024			Not used.	CExt
	11	08 00	2048			Not used.	CExt
	12	10 00	4096			Not used.	CExt
	13	**20 00**	**8192**	**2426**	**6426**	**Sending condition: pass part.**	**RS232**
	14	40 00	16384	2427	6427	Sending condition: fail test part.	RS232
	15	80 00	32768	2429	6429	Sending condition: Alarm.	RS232
2	16	00 01	1	242A	642A	Sending condition: pressure fault.	RS232
	17	00 02	2	242B	642B	Sending condition: end of cycle (all).	RS232
	18	00 04	4	242C	642C	Sending condition: recovery.	RS232
	19	00 08	8	242D	642D	Frame: date.	RS232
	20	00 10	16	2412	6412	Frame: personalization.	RS232
	21	00 20	32	242E	642E	Frame: pressure.	RS232
	22	00 40	64	242F	642F	Security.	CExt
	23	00 80	128	2430	6430	Export.	CExt
	24	01 00	256	240F	640F	Automatic Auto-zero.	CExt
	25	02 00	512	2431	6431	Standing by.	CExt
	26	04 00	1024	2432	6432	Wake up the device when standing by.	CExt

Words	Bits N°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
	27	08 00	2048			Not used.	CExt
	28	10 00	4096	2433	6433	Vacuum Control.	CExt
	29	20 00	8192	2439	6439	Page feed.	CExt
	30	40 00	16384	2440	6440	Services Cycles (specials).	CExt
	31	80 00	32768	2402	6402	Unit Type.	CExt
3	32	00 01	1	2437	6437	Automatic save activation.	CExt
	33	00 02	2			Not used.	CExt
	34	00 04	4	2435	6435	Auxiliaries output codes activation.	CExt
	35	00 08	8			Not used.	CExt
	36	00 10	16			Not used.	CExt
	37	00 20	32	245E	645E	Gas configuration activation.	CExt
	38	00 40	64	2498	6498	Pollution offset activation.	CExt
	39	00 80	128	2460	6460	Pre-fill.	CExt
	40	01 00	256	2499	6499	Infinite test.	CExt
	41	02 00	512	249A	649A	Dump off.	CExt

6. TABLE OF THE NORMAL BITS

The bits below are present in the "functions menu" of each program, if these have been previously validated in the configuration menu.

Menu: Funct = Functions menu; FEoc = Function / End of cycle; FChai = Function / Chaining; FStp = Function / Stamping; Para = Parameters.

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
Word 1	0	00 01	1	2604	6604	Fill type activation.	
	1	00 02	2			Not used.	
	2	00 04	4	261E	661E	End of cycle.	
	3	00 08	8	261F	661F	End of cycle automatic reset.	Funct
	4	00 10	16	2620	6620	End of cycle dump and reset.	
	5	00 20	32	2621	6621	End of cycle fill.	Funct
	6	00 40	64	2608	6608	Peak meter.	Funct
	7	00 80	128	2677	6677	Short Cycle	Funct
	8	01 00	256	2622	6622	Chaining activation.	Funct
	9	02 00	512	2623	6623	Chaining pass part.	Funct
	10	04 00	1024	2624	6624	Chaining test fail part.	Funct
	11	08 00	2048	2626	6626	Chaining alarm.	Funct
	12	10 00	4096	2627	6627	Chaining pressure fault.	Funct
	13	20 00	8192	2628	6628	Chaining end of cycle (all).	Funct
	14	40 00	16384	262A	662A	Chaining with recovery.	Funct
	15	80 00	32768	262B	662B	Automatic connector activation.	Funct
Word 2	16	00 01	1	2612	6612	Valve codes activation.	Funct
	17	00 02	2	2642	6642	Valves 1 activation.	Funct
	18	00 04	4	2643	6643	Valves 2 activation.	Funct
	19	00 08	8	2644	6644	Valves 3 activation.	Funct
	20	00 10	16	2645	6645	Valves 4 activation.	Funct
	21	00 20	32	2646	6646	Valves 5 activation.	Funct
	22	00 40	64	2647	6647	Valves 6 activation.	Funct
	23	00 80	128	2648	6648	Valves 7 activation.	Funct
	24	01 00	256	2649	6649	Valves 8 activation.	Funct
	25	02 00	512			Not used.	Funct
	26	04 00	1024			Not used.	Funct
	27	08 00	2048			Not used.	Funct
	28	10 00	4096			Not used.	Funct
	29	20 00	8192			Not used.	Funct
	30	40 00	16384			Not used.	Funct
	31	80 00	32768			Not used.	Funct

Word	Bit n°	Bit weight		D. A. address (hexa)		Meaning	Menu
		Hexa	Dec	R/W	R/W		
Word 3	32	00 01	1			Not used.	Funct
	33	00 02	2			Not used.	Funct
	34	00 04	4	264B	664B	Vacuum control.	Funct
	35	00 08	8	263E	663E	End of cycle obligatory reset activation.	Funct
	36	00 10	16	2638	6638	Auxiliary codes activation.	Funct
	37	00 20	32	2639	6639	Auxiliary code 1 activation.	Funct
	38	00 40	64	263A	663A	Auxiliary code 2 activation.	Funct
	39	00 80	128	263B	663B	Auxiliary code 3 activation.	Funct
	40	01 00	256	263C	663C	Auxiliary code 4 activation.	Funct
	41	02 00	512			Not used.	Funct
	42	04 00	1024			Not used.	Funct
	43	08 00	2048	265C	665C	Gas Configuration.	Funct
	44	10 00	4096	2679	6679	Gas Offset (Saturation)	Funct
	45	20 00	8192	265E	665E	Pre-fill.	Funct
	46	40 00	16384	267C	667C	End of cycle dump.	Funct
	47	80 00	32768	267A	667A	Infinite test.	Funct
Word 4	48	00 01	1	267B	667B	Dump off.	Funct

7. ALARM CODES TABLE

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Test side leak (EEEE).
2	00 02	Reference side leak (MMMM).
3	00 03	Pressure alarm (too high).
4	00 04	Pressure alarm (too low).
5	00 05	Leak zero missed.
6	00 06	Pressure zero missed.
7	00 07	Pressure too high.
8	00 08	Pressure too low.
9	00 09	Dump fault.
10	00 0A	Leak calculation missed.
11	00 0B	Pressure calculation missed.
12	00 0C	CAL learning fault.
13	00 0D	Drift CAL fault.
14	00 0E	Calibration check fault.
15	00 0F	Calibration check tab UV+
16	00 10	Calibration check tab UV-
17	00 11	Vacuum test: level not reached.
18	00 12	Vacuum test: delta vacuum too high > vacuum reject.
19	00 13	Tainted atmosphere.
20	00 14	Taint check.
21	00 15	Blocked tube.
22	00 16	Leak zero missed piezo 2.
23	00 17	Pressure alarm piezo 2 (too high).
24	00 18	Pressure alarm piezo 2 (too low).
25	00 19	Offset drift too high.

8. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Vacuum.
1	00 01	Test vacuum.
2	00 02	Pre-fill.
3	00 03	Fill.
4	00 04	Accumulation.
5	00 05	Test fin.
6	00 06	Dump.
7	00 07	Purge.
8	00 08	Cleaning.
65535	FF FF	No step in progress.

9. UNIT TABLE

This list gives all the units used in the instrument in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
6000	17 70	Pascal.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
50000	C3 50	Milliliter/second.
51000	C7 38	Milliliter/minute.
76000	01 28 E0	Ppm (Part per million).
78000	01 30 B0	CAL ppm (Part per million calibrate).
79000	01 34 98	Grams/year.

Chapter 16
NETWORKS WITH A CENTRAL

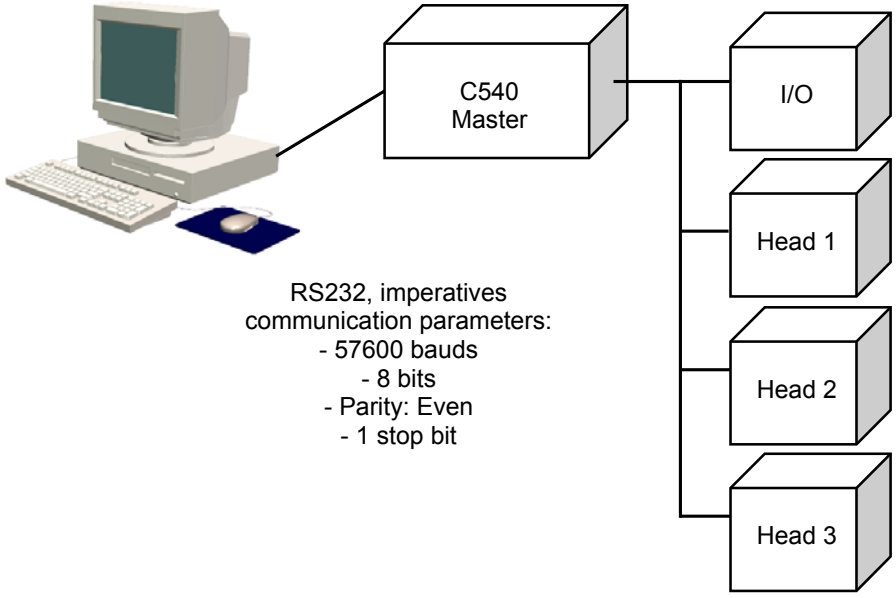
1. MODBUS NETWORKS WITH CENTRAL AND HEADS

Important reminders:

1) The communication parameters for a central are set parameters, it's important to meet them, they are the following ones: 57600 / 8 / 1 stop / Even.

2) The central address is different according to the connection of the central with the Winateq software or not. If Winateq were connected this would be only one time, the Modbus addresses are modified.

To return to the addresses per default, it must be done again an identification of the central C540 with Winscan (internal ATEQ software).

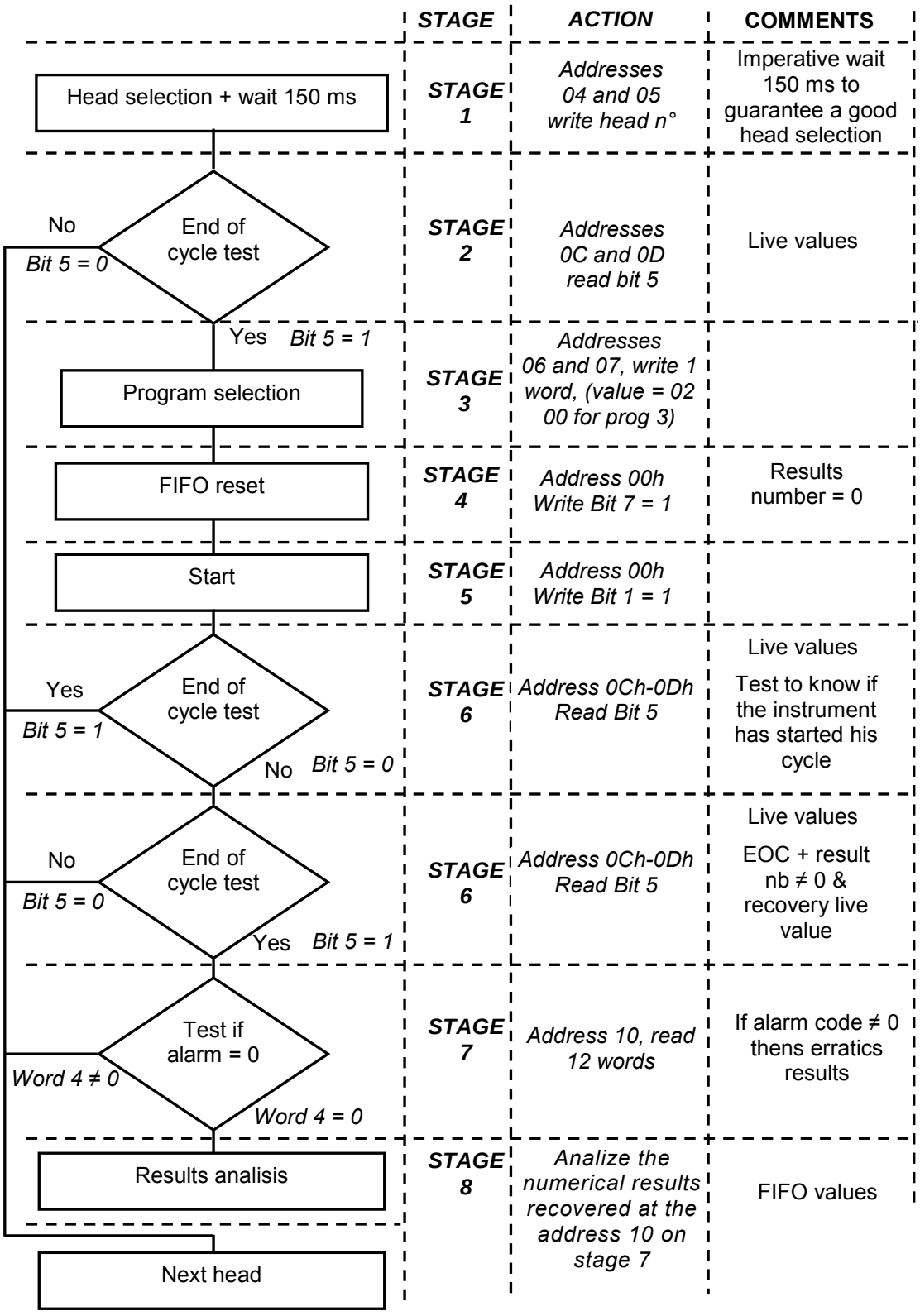


Modbus Address	Without Winateq (Hexa) With Winateq ≥ 2.1	With Winateq < 2.1 (Hexa)
Central C540	FFh	3Fh
I/O	E1h	21h
Head 1	E2h	22h
Head 2	E3h	23h
Head 3	E4h	24h

If the central won't communicate with the basis parameters (values without Winateq) try to communicate with the values "with Winateq" depending of the version.

2. PROFIBUS OR DEVICENET NETWORKS AND CENTRAL

To communicate in Profibus or DeviceNet network with a central ATEQ, it's important to meet the following procedure:

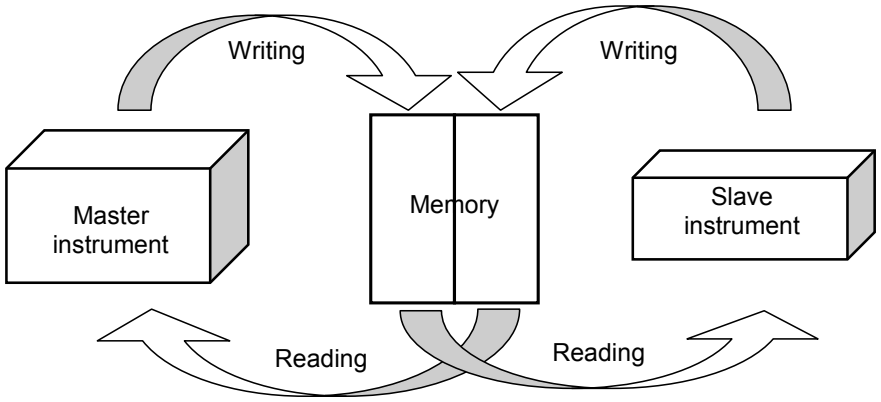


Chapter 17

PROFIBUS NETWORKS

1. DEFINITION

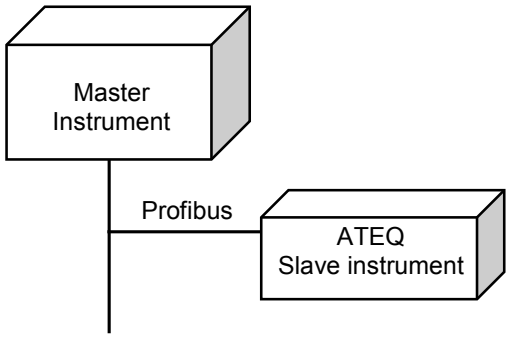
The connection between an ATEQ 5th series to a Profibus-DP instrument is made through a protocol converter card (COM-DPS or COMX 100XX-DP/DPS).



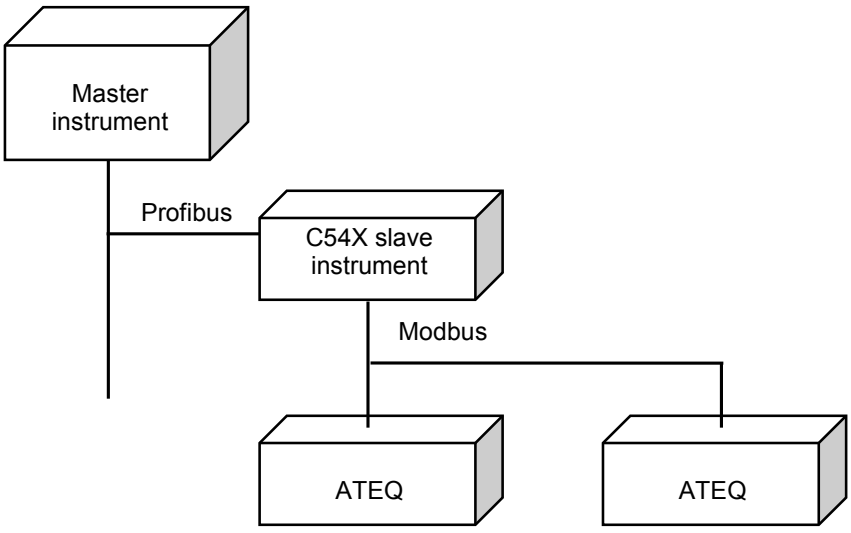
The architecture of the network is composed of a master instrument and a slave. Each instrument writes and reads in a reserved part of the memory.

In the case of several slave instruments, each instrument should be given a different address.

Single architecture example (Master/Slave direct ATEQ):



ATEQ Network architecture example (Master – C540 - ATEQ):



***Note**: use only this configuration with low speed networks (this network is very slow).*

Dialogue between master and ATEQ

- *The master instrument activates a command.*
- *The slave ATEQ instrument takes in account the command, by putting an executing flag **"in progress"** status, then executes the request.*
- *At the end of the command execution, the slave instrument puts the flag command status to **"end of command"** and update the error code, if exists.*
- *The master instrument deactivates the command.*

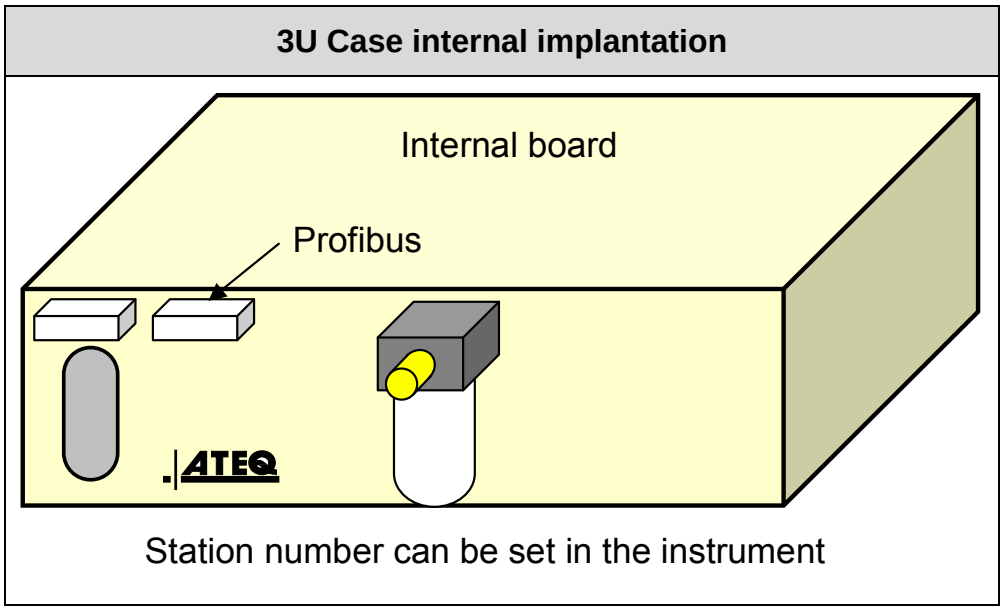
***Note:** the ATEQ instrument is taking in account the command only on the rising edge. (When the bit state becomes from 0 to 1).*

Characteristics of the serial port:

The Profibus serial port cannot be configured, the detection of the speed and the format is automatic (detected by the automatic module).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

2. CABLING

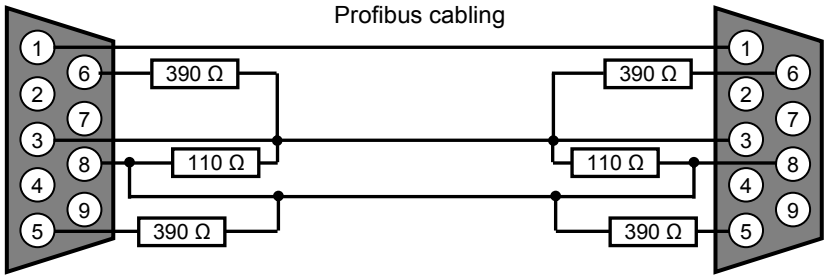


The module name is : **COM_DPS or COMX 100XX-DP/DPS**

The configuration file is : **HIL_7501.GSD for COM_DPS**

HIL_0C0F.GSD for COMX 100XX-DP/DPS

2.1. PROFIBUS CABLING



Pin 1	PE (earth ground)	Pin 6	VP (power supply)
Pin 2	Not connected	Pin 7	Not connected
Pin 3	Data line A	Pin 8	Data line B
Pin 4	CNTR – A (repeater control signal)	Pin 9	Not connected
Pin 5	DGND (data reference potential)		

3. ATEQ PROFIBUS MODULES CONFIGURATION (COM OR COMX)

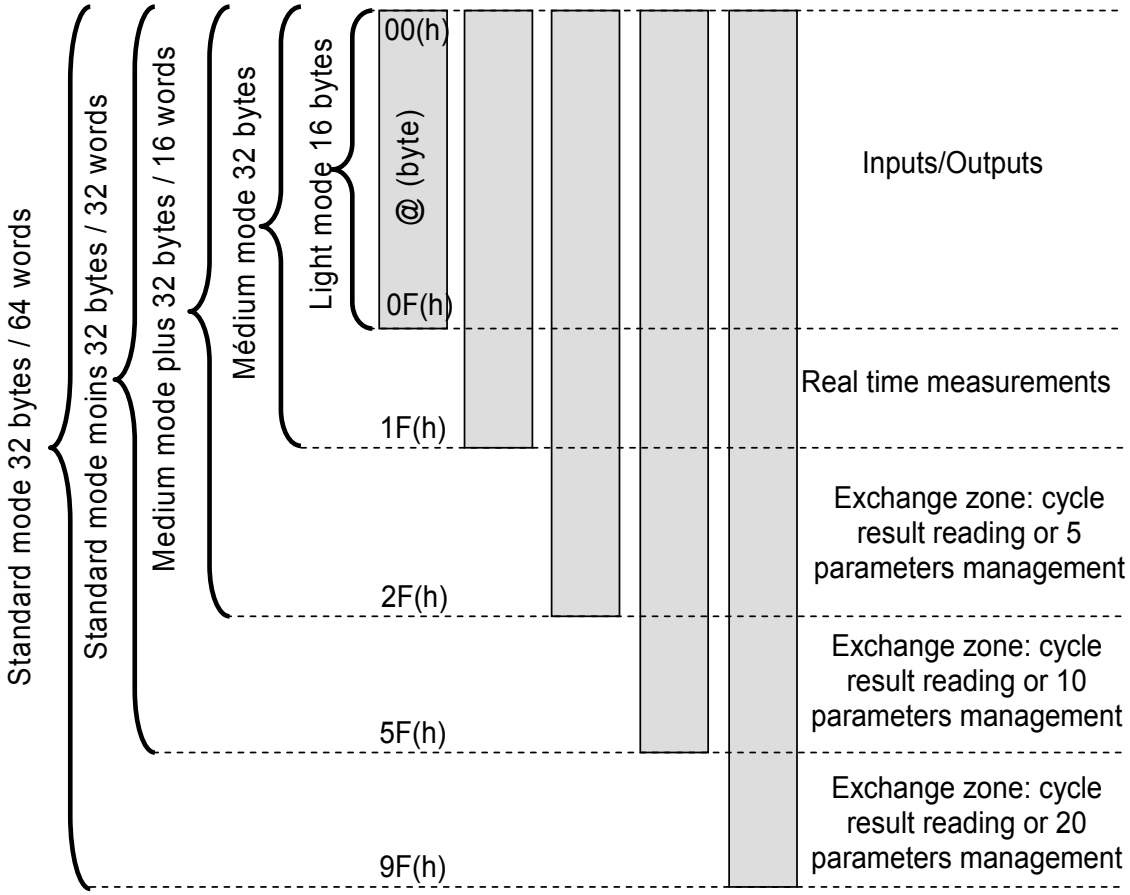
The ATEQ Profibus module name is : COM_DPS or COMX 100XX-DP/DPS

The Profibus module configuration file is : HIL_7501.GSD for COM_DPS

HIL_0C0F.GSD for COMX 100XX-DP/DPS

Five configuration modes are available:

- The **standard mode** : for the inputs/outputs, real time measurements, the cycle results and management of 20 parameters.
- The **standard less mode** : for the inputs/outputs, real time measurements, the cycle results and management of 10 parameters.
- The **medium plus mode**: for the inputs/outputs and the real time measurements and management of 5 parameters.
- The **medium mode** : for the inputs/outputs and the real time measurements.
- The **light mode** : for the digital inputs/outputs.



Note 1: *by default the ATEQ instrument use the **standard mode.** Changing the mode by using the "Fieldbus.exe" ATEQ program.*

Note 2: *the connection from PC → ATEQ is identical as WINATEQ.*

For information *(exchange zone from 020h)**:***

64 Words → 20 parameters.

32 Words → 10 parameters.

16 Words → 5 parameters.

3.1. STANDARD MODE CONFIGURATION

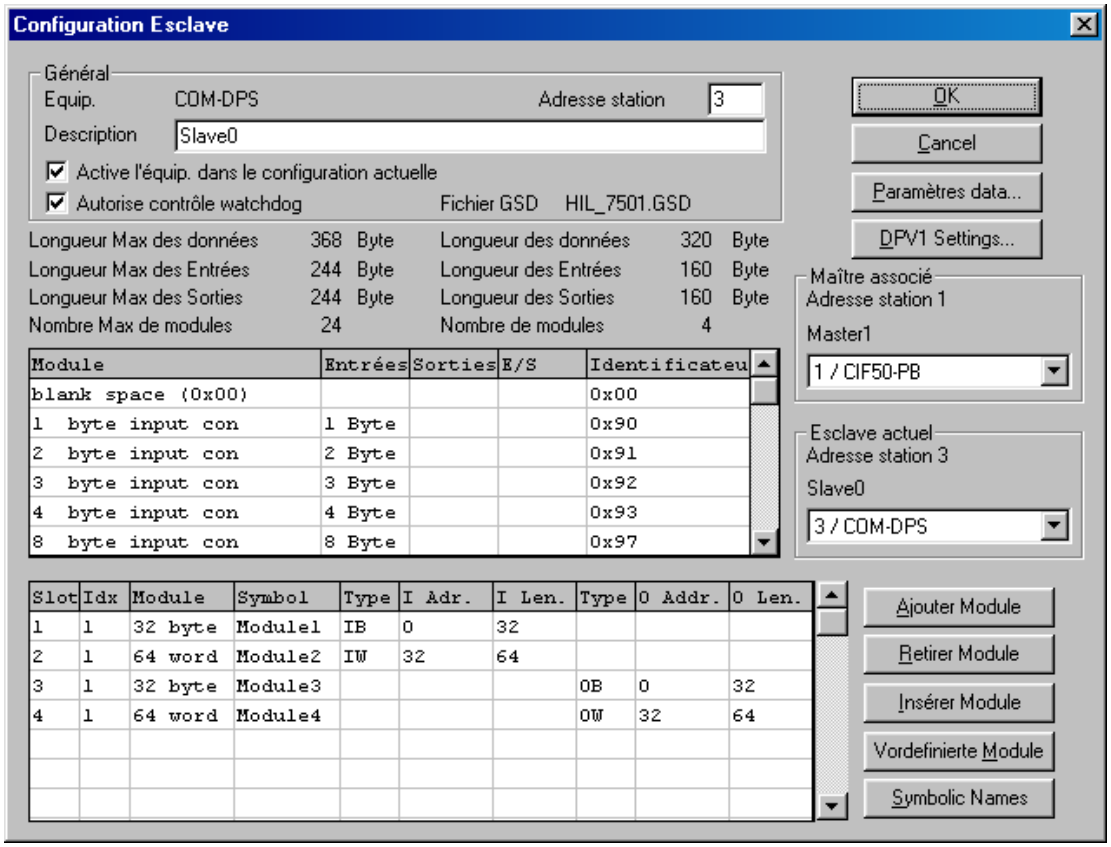
The **standard mode** allows completely controlling an ATEQ instrument with the management of 20 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (20).*

The parameters configuration must be like the following ones:

- ✓ 32 bytes input con (IB) : module 1.
- ✓ 64 words input con (IW) : module 2.
- ✓ 32 bytes output con (OB) : module 3.
- ✓ 64 words output con (OW) : module 4.

Example of configuration window of the PC Profibus board (master) to communicate with the ATEQ Profibus board (slave) in standard mode with SYCON software:



3.2. STANDARD LESS MODE CONFIGURATION

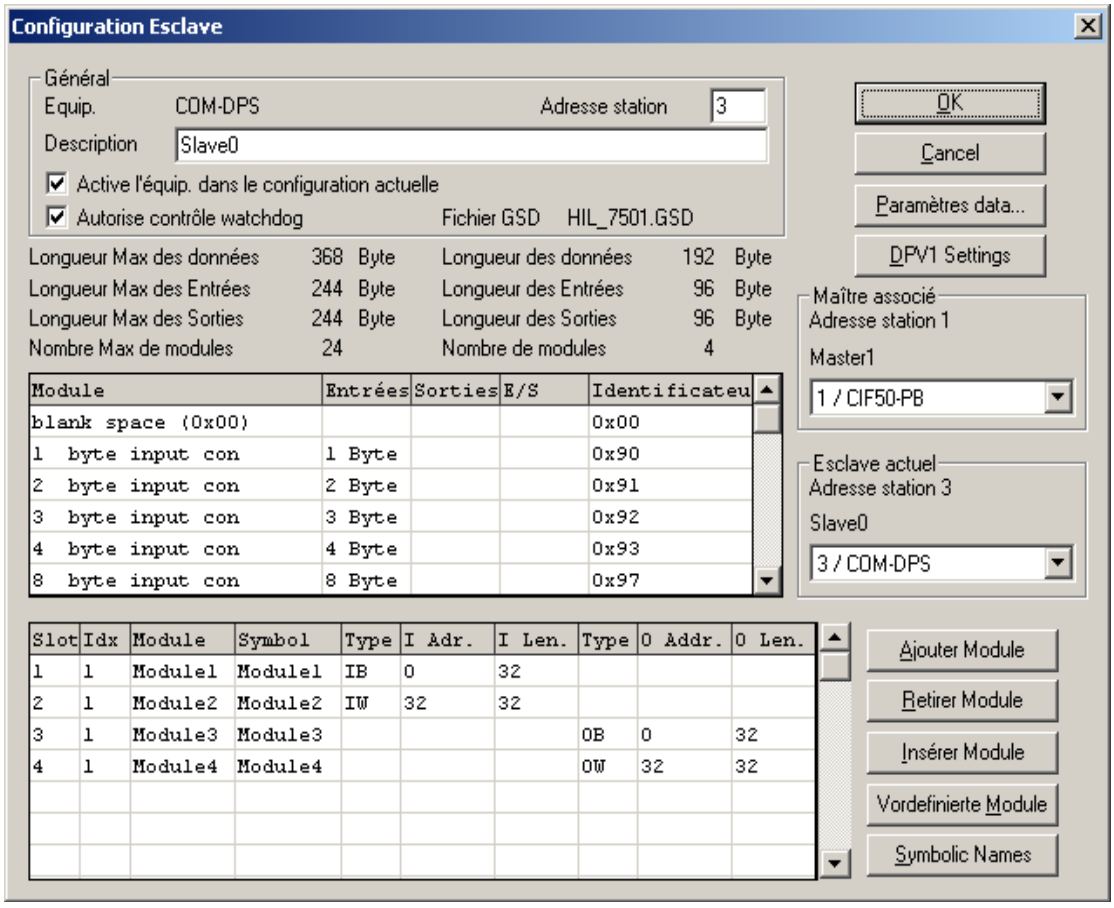
The **standard less mode** allows completely controlling an ATEQ instrument with the management of 10 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (10).*

The parameters configuration must be like the following ones:

- ✓ 32 bytes input con (IB) : module 1.
- ✓ 32 words input con (IW) : module 2.
- ✓ 32 bytes output con (OB) : module 3.
- ✓ 32 words output con (OW) : module 4.

Example of configuration window of the PC Profibus board (master) to communicate with the ATEQ Profibus board (slave) in standard less mode with SYCON software:



3.3. MEDIUM MORE MODE CONFIGURATION

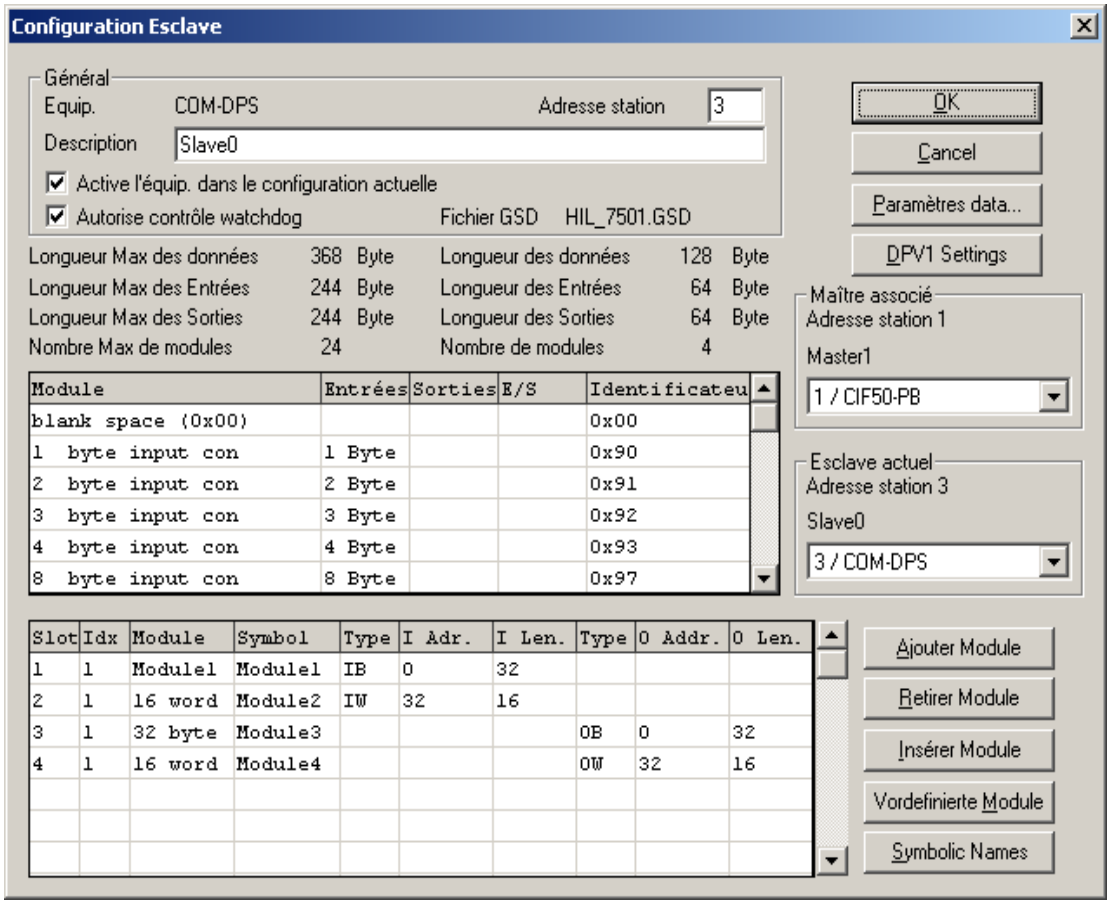
The **medium more mode** allows completely controlling an ATEQ instrument with the management of 5 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (5).*

The parameters configuration must be like the following ones:

- ✓ 32 bytes input con (IB) : module 1.
- ✓ 16 words input con (IW) : module 2.
- ✓ 32 bytes output con (OB) : module 3.
- ✓ 16 words output con (OW) : module 4.

Example of configuration window of the PC Profibus board (master) to communicate with the ATEQ Profibus board (slave) in medium more mode with SYCON software:



3.4. MEDIUM MODE CONFIGURATION

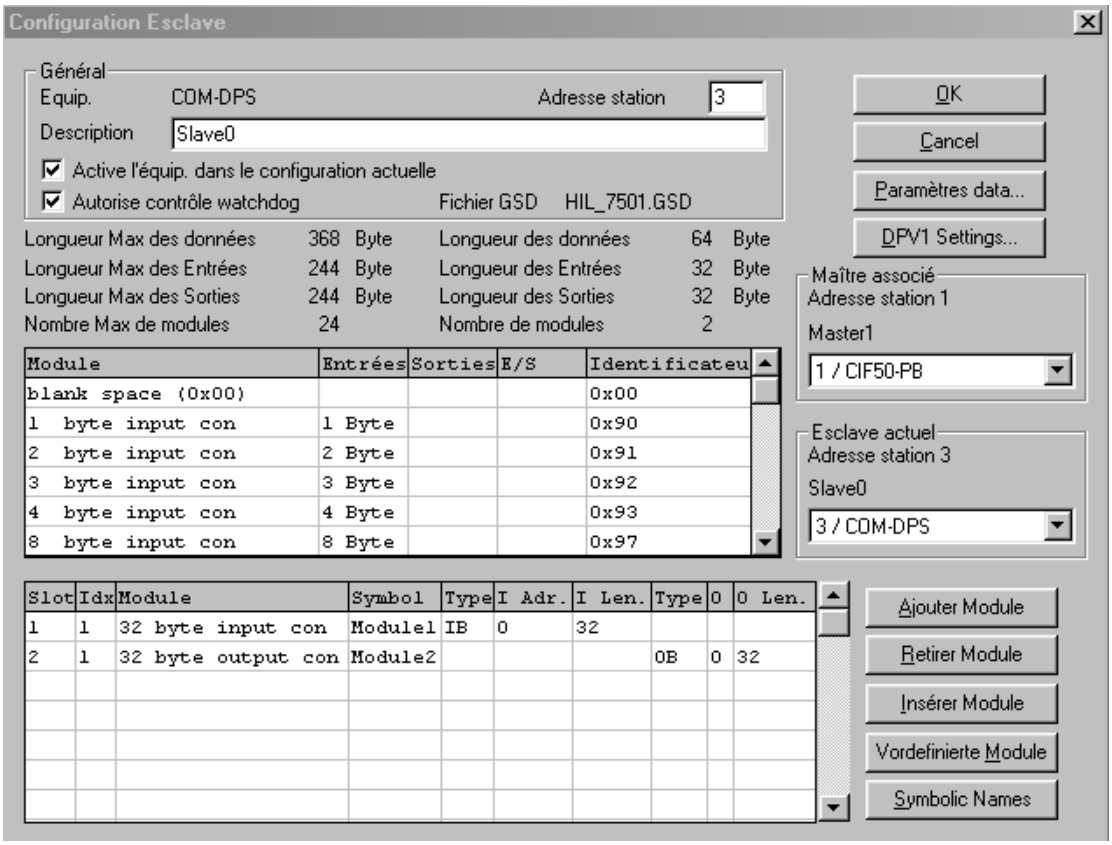
The **medium mode** allows writing commands and reading real time measurement:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm*.
- Read real time measurement values*: pressure and leak*.

The parameters configuration must be like the following ones:

- ✓ 32 bytes input con (IB) : module 1.
- ✓ 32 bytes output con (OB) : module 2.

Example of configuration window of the PC Profibus board (master) to communicate with the ATEQ Profibus board (slave) in medium mode with SYCON software:



3.5. LIGHT MODE CONFIGURATION

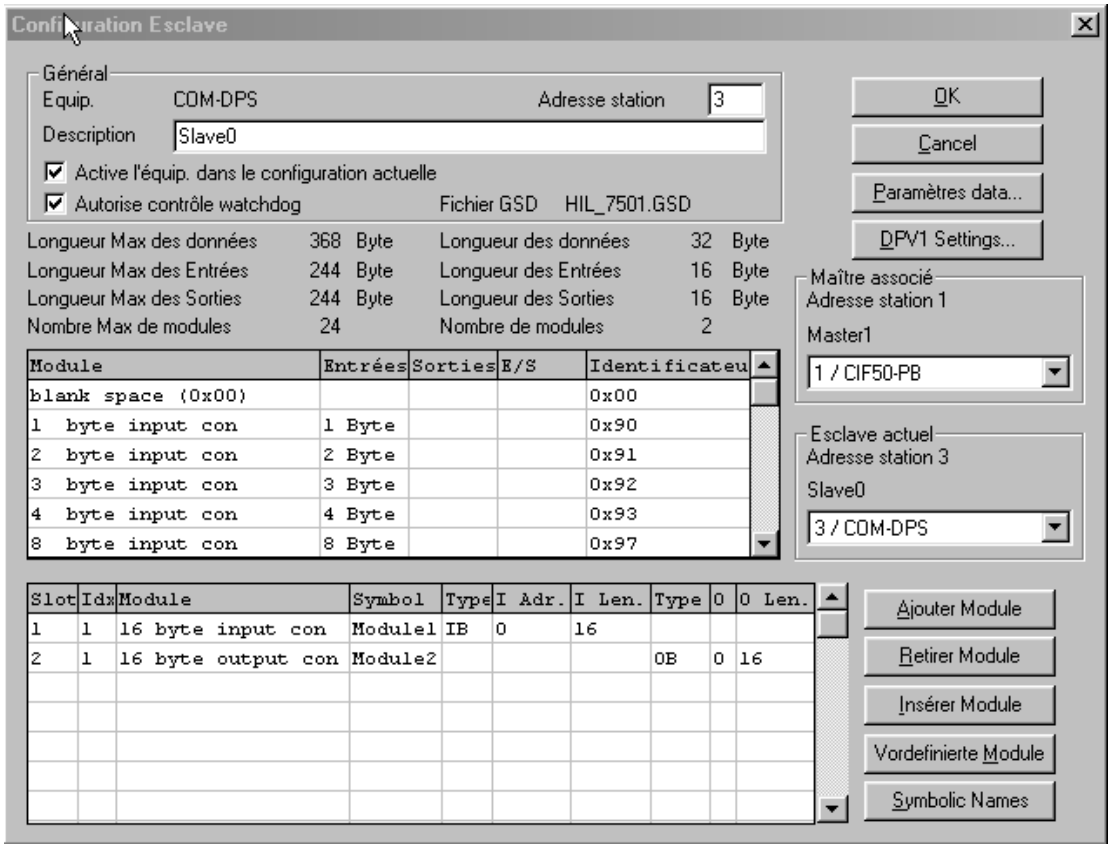
The **light mode** allows writing commands and reading relays results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm*.

The parameters configuration must be:

- ✓ 16 bytes input con (IB) : module 1.
- ✓ 16 bytes output con (OB) : module 2.

Example of configuration window of the PC Profibus board (master) to communicate with the ATEQ Profibus board (slave) in light mode with SYCON software:



3.6. PROFIBUS STARTING INSTRUCTION

To start communication with an ATEQ in Profibus protocol, follow these instructions:

1- Find which Profibus module is installed in the ATEQ instrument (COM or COMX) :

- Services menu.
- FieldsBus.

2- For the slave instrument configuration, if the Profibus module is :

- **COM_DPS**, use "**HIL_7501.GSD**" configuration file.
- **COMX 100XX-DP/DPS**, use "**HIL_0C0F.GSD**" configuration file.

3- Configure the slave I/O module on the master instrument.

- Refer to the preceding paragraphs, the modules configuration being different in regard to the selected mode, standard, medium or light.

4- Setup a **station number** on ATEQ instrument.

- Configuration menu.
- Network.
- FieldsBus.
- Station.

***Note 1**: the ATEQ **station number** must be the same on both side (ATEQ and MASTER).*

***Note 2**: the I/O configuration must be the same between the ATEQ instrument and the slave configuration on the master.*

3.7. D.E.L. STATUS AT PROFIBUS STARTING

3.7.1. D.E.L. status on COM_DPS module

At the powering of the board:

- In a first time the "**RUN**" light is flashing and the "**READY**" light is fixed.
- When the ATEQ has detected the board, the "**RUN**" and "**READY**" lights disappears during 1 to 2 seconds.
- Then the "**RUN**" light is flashing and the "**READY**" light is fixed.
- At the end of the starting, for a correct Profibus functioning, the D.E.L. "**RUN**", "**READY**" and "**STAT**" must be fixed.

3.7.2. D.E.L. status on COMX 100XX-DP/DPS module

At the powering of the board:

- In a first time the "**RUN**" light is fixed and the "**READY**" light is cleared.
- When the ATEQ has detected the board, the "**RUN**" light disappears and "**READY**" lights .
- Then the "**RUN**" lights and the "**READY**" light turns off again.
- At the end of the starting, for a correct Profibus functioning, the D.E.L. "**RUN**" and "**STAT**" must be fixed.

4. F A Q PROFIBUS

***Reminder**: **"h"** indicates a hexadecimal number, **"(d)"** indicates a decimal number.*

***Question**: when it exist several GSD files, which one do we used for an ATEQ instrument?*

Answer: If profibus module is COM_DPS, use "HIL_7501.GSD" configuration file.

If profibus module is COMX 100XX-DP/DPS, use "HIL_0C0F.GSD" configuration file.

Question: how can we know if the Profibus connection is correct?

Answer: if the connection is correct, on the ATEQ instrument, the D.E.L. status must be like the following ones:

DEL	COM_DPS	COMX 100XX-DP/DPS
STAT	ON	ON
ERROR	OFF	OFF
RUN	ON	ON
READY	ON	OFF

On the PLC, get the information from the PLC supplier.

Question: how to get the good part, fail part and alarm information?

Answer: to have good part, fail part and alarm information, it must read in the bytes at the addresses 0Ch and 0Dh. See the table on chapter 16, paragraph 1.2 "reading table".

- **Good part**: at the address 0Ch we have the value 21h = 00100001 in binary, the bits 5 "end of cycle" and 0 "good part" are at 1. The value at the address 0Dh is 00h.
- **Fail test part**: at the address 0Ch we have the value 22h = 00100010 in binary, the bits 5 "end of cycle" and 1 "fail test part" are at 1. The value at the address 0Dh is 00h.
- **Fail reference part**: at the address 0Ch we have the value 24h = 00100100 in binary, the bits 5 "end of cycle" and 2 "fail test part" are at 1. The value at the address 0Dh is 00h.
- **Alarm**: at the address 0Ch we have the value 28h = 00101000 in binary, the bits 5 "end of cycle" and 3 "alarm" are at 1. The value at the address 0Dh is 00h.

Question: How to select the target module?

Answer: to select the target module, it must write in the bytes at the addresses 4 and 5. See table chapter 16, paragraph 1.1 " Write table (COMMANDS, ORDERS)".

- Selection of the module 1: write at the address 4 = 01h and at the address 5 = 00h.
- Selection of the module 2: write at the address 4 = 02h and at the address 5 = 00h.

***Question**: how to select the current program number?*

Answer: to select the current program number, follow the hereafter procedure, see tables on chapter 16, paragraph 1.1 "Writing table" to "**write**" and paragraph 1.2 "Reading table" to "**read**":

1) Select the program number, for example 3: **write** at the address 6 = 02h (program number minus 1) and at the address 7 = 00h.

2) **Write** at the address 0 the value 08h = 00001000 in binary that gives bit 3 "program selection" = 1.

3) **Read** at the address 0 until the address 0 gets the value 8.

4) When the address 0 is equal to 8, **read** the address 2

5) If the value at the address 2 is equal to 00h, all is OK.

6) If the value at the address 2 is different than 00h, a problem occurred, very probably that the selected program number is not valid.

7) Then write at the address 0 the value 00h this is to reset the ATEQ instrument. This operation is very important, if it's not done, it's impossible to launch a new start cycle on the ATEQ instrument.

***Question:** in general, each data contained 2 bytes, which one to use and in which order?*

Answer: each data written with to bytes is written in the following order: least significant byte (LSB) for the first and most significant byte (MSB) for the second ("LSB … MSB").

Example: to select a program number, use the addresses 06h and 07h. The address 06h contains the LSB and the address 07h contains the MSB.

For a program number of 4, write 03h (4 – 1 = 3) at the address 06h and 00h at the address 07h.

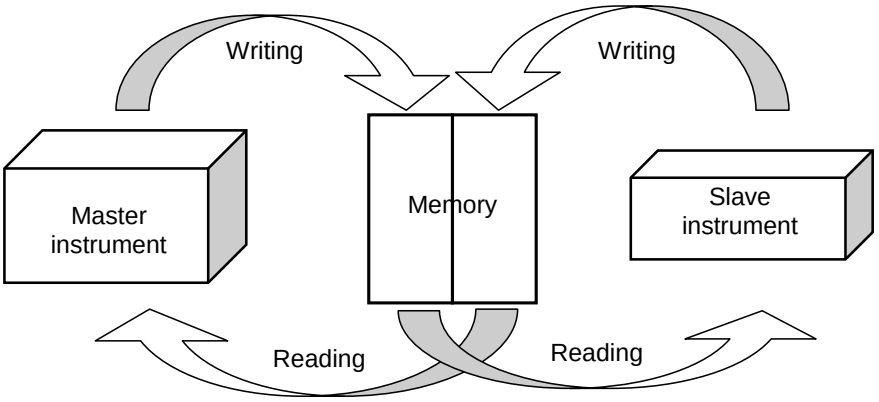
Chapter 18

DEVICENET NETWORKS

1. DEFINITION

The connection between an ATEQ 5th series instrument to a DeviceNet fieldbus is made through a protocol converter card.

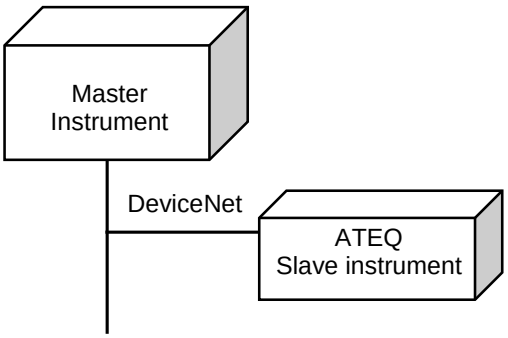
The communication between the ATEQ instrument (master) and the case (slave) is under the Modbus protocol.



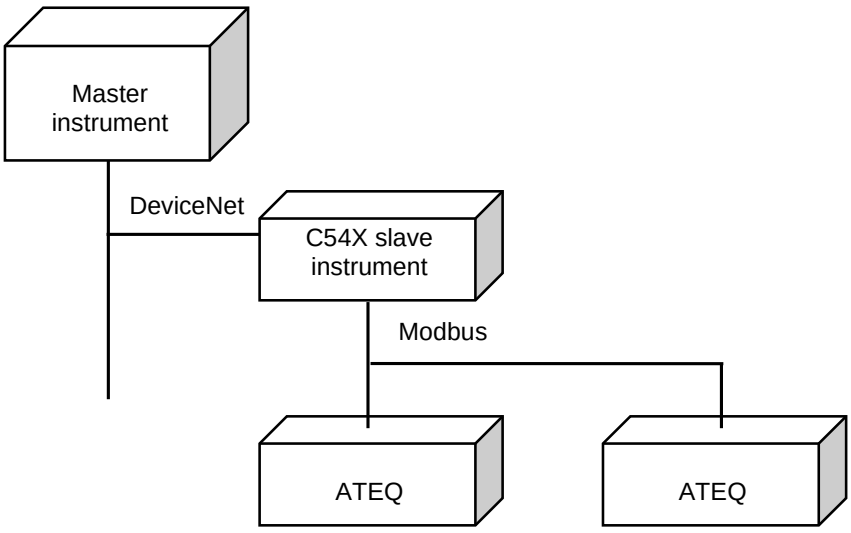
The architecture of the network is composed of a master instrument and a slave. Each instrument writes and reads in a reserved part of the memory.

In the case of several slave instruments, each instrument should be given a different address.

Single architecture example (Master/Slave direct ATEQ):



ATEQ Network architecture example (Modbus):



Dialogue between master and ATEQ:

- *The master instrument activates a command.*
- *The slave instrument takes in account the command, by putting an executing flag **"in progress"** status, then executes the request.*
- *At the end of the command execution, the slave instrument puts the flag command status to **"end of command"** and update the error code, if exists.*
- *The master instrument deactivates the command.*

***Note:** the ATEQ instrument is taking in account the command only on the rising edge. (When the bit state becomes from 0 to 1)*

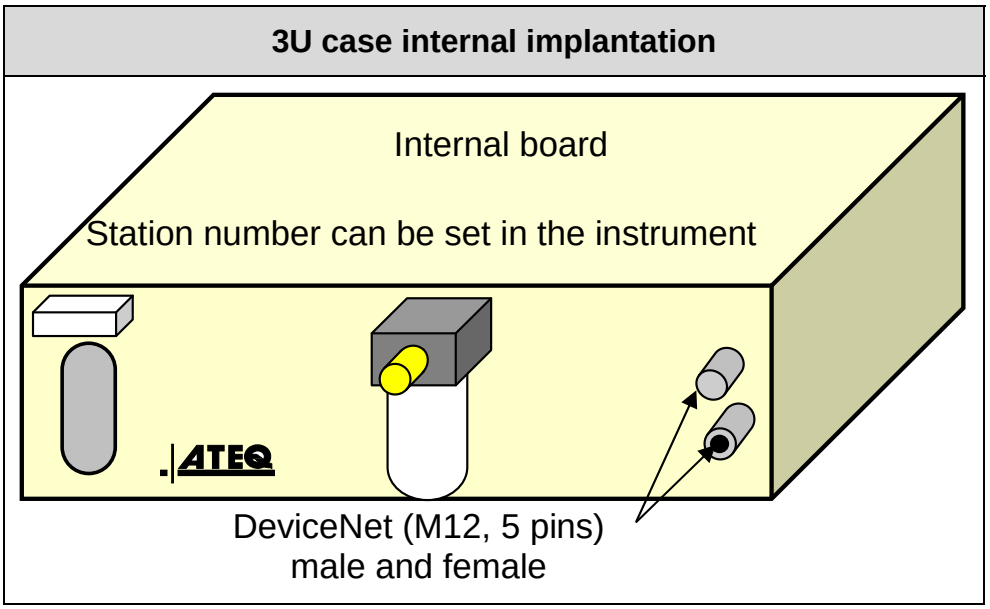
Characteristics of the serial port:

The Profibus serial port cannot be configured, the detection of the speed and the format is automatic (detected by the automatic module).

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

2. CABLING

The Devicenet conversion board is internal of the instrument.



The module name is : **COM-DNS or COMX 100XX DN/DNS**

The file to install is : **COMDNS.EDS for COM-DNS**

COMX_100XX-DN_DNS.EDS for COMX 100XX DN/DNS

2.1. DEVICENET CABLING

Pin 1	drain
Pin 2	V+
Pin 3	V-
Pin 4	CAN_H
Pin 5	CAN_L

3. ATEQ DEVICENET MODULES CONFIGURATION (COM OR COMX)

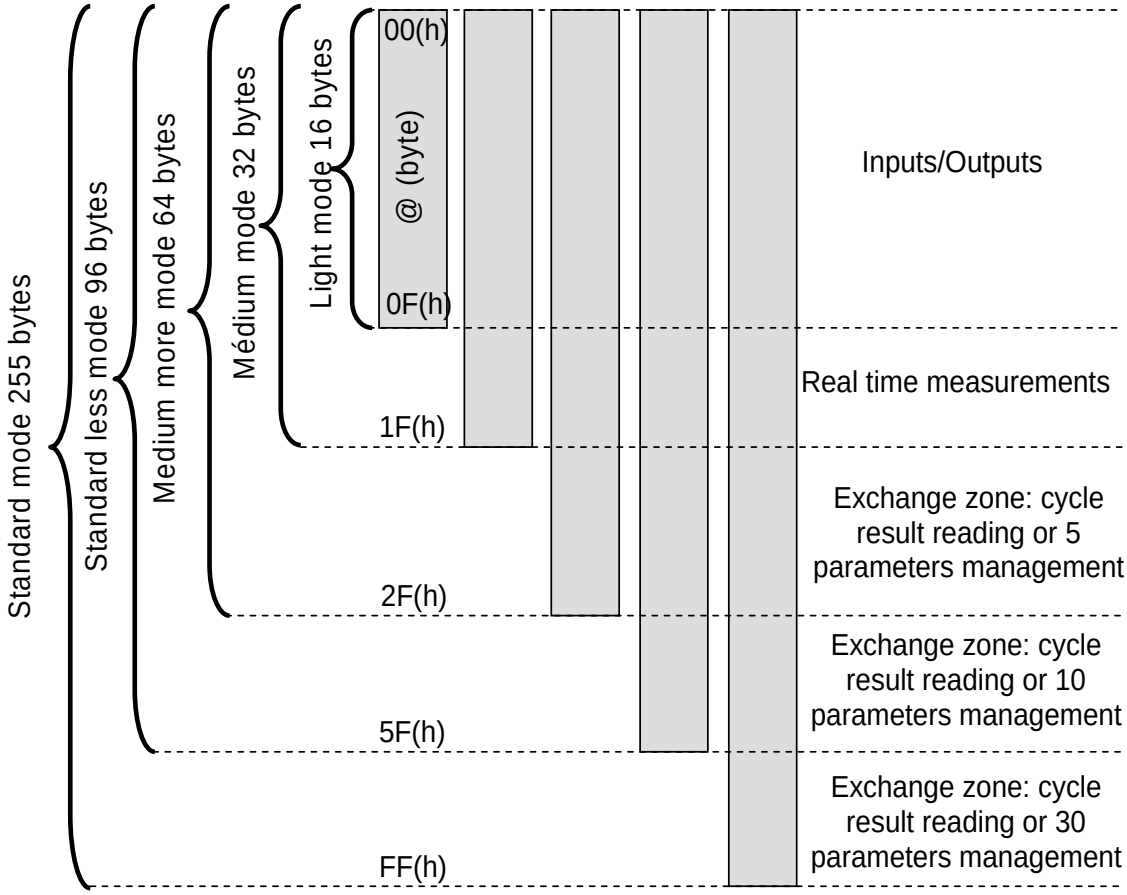
The ATEQ DeviceNet module name is : COM-DNS or COMX 100XX DN/DNS

The DeviceNet configuration module file is :

- COMDNS.EDS for COM-DNS module
- COMX 100XX-DN_DNS.EDS for COMX 100XX DN/DNS module

Five configuration modes are available:

- The **standard mode (normal)** : for the inputs/outputs, real time measurements, the live cycles results and parameters management.
- The **standard less mode** : for the inputs/outputs, real time measurements, the live cycles results and parameters management.
- The **medium more mode** : for the inputs/outputs, the real time measurements and the live cycles results.
- The **medium mode** : for the inputs/outputs and the real time measurements.
- The **light mode** : for the digital inputs/outputs.



***Note 1:** by default the ATEQ instrument use the **standard mode.** Change the mode by using the "Fieldbus.exe" ATEQ program.*

***Note 2:** the connection from PC → ATEQ is identical as WINATEQ.*

***For information**: 1 parameter corresponds to 6 bytes.*

3.1. STANDARD MODE CONFIGURATION

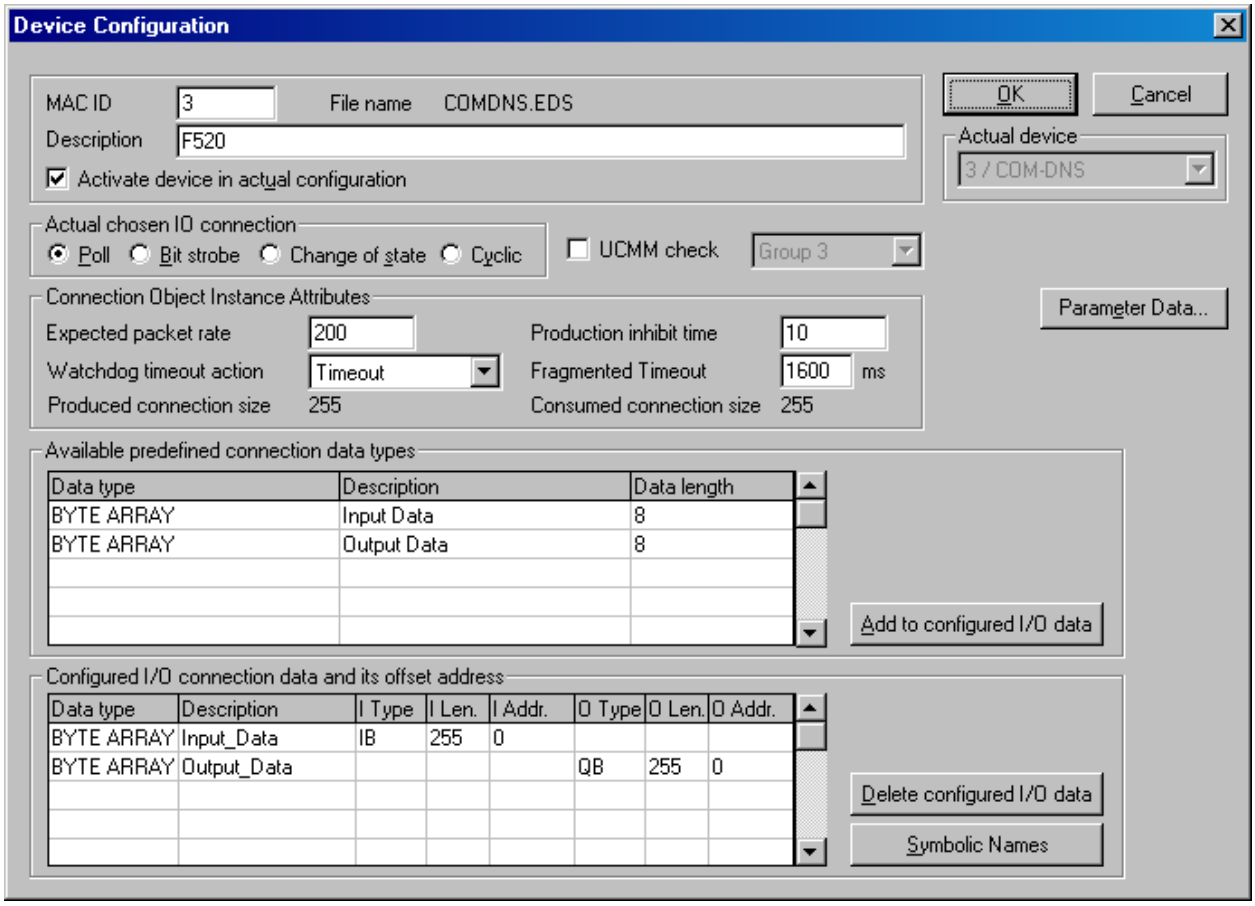
The **standard mode** allows completely controlling an ATEQ instrument with the management of 30 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (30).*

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data (IB) 255 bytes
- ✓ Byte Array : Output_Data (QB) 255 bytes

Example of a configuration window of the PC DeviceNet board (master) for communication with the ATEQ DeviceNet board (slave) in standard mode with the SYCON software:



3.2. STANDARD LESS MODE CONFIGURATION

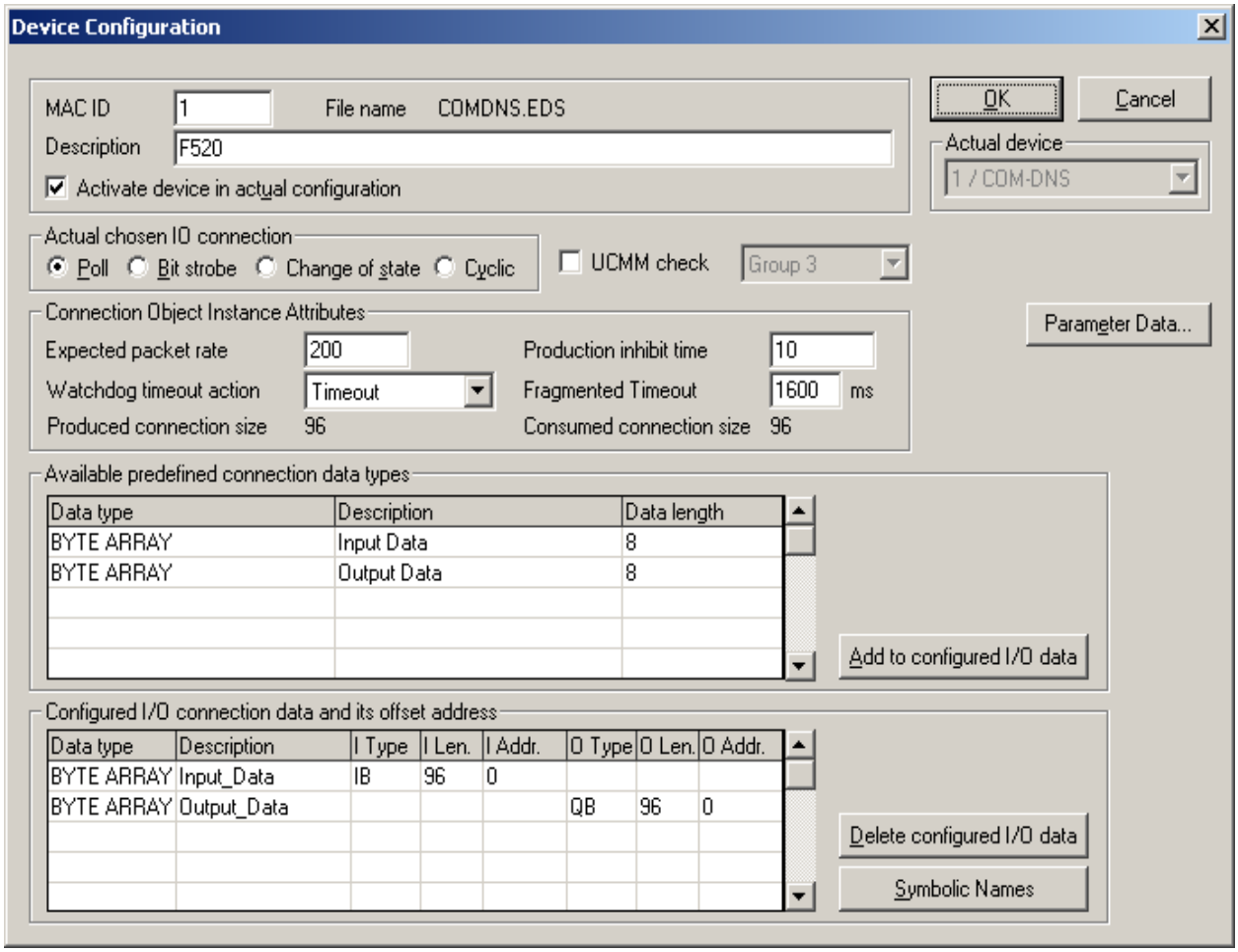
The **standard less mode** allows completely controlling an ATEQ instrument with the management of 10 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (10).*

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data (IB) 96 bytes
- ✓ Byte Array : Output_Data (QB) 96 bytes

Example of a configuration window of the PC DeviceNet board (master) for communication with the ATEQ DeviceNet board (slave) in standard less mode with the SYCON software:



3.3. CONFIGURATION IN MEDIUM MORE MODE

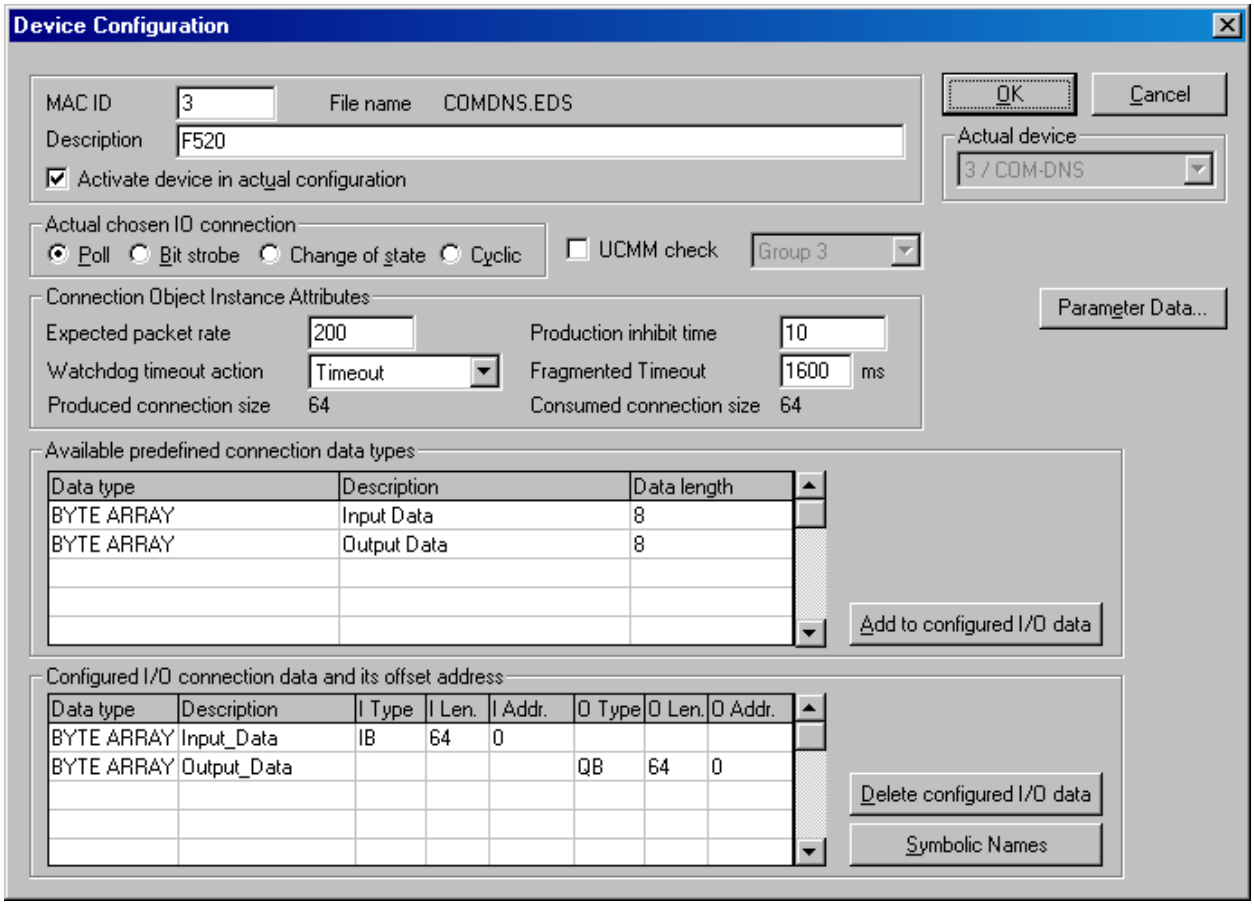
The **medium more mode** allows sending commands and read the live measurements results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data (IB) 64 bytes
- ✓ Byte Array : Output_Data (QB) 64 bytes

Example of a configuration window of the PC DeviceNet board (master) for communication with the ATEQ DeviceNet board (slave) in medium more mode with the SYCON software:



3.4. CONFIGURATION IN MEDIUM MODE

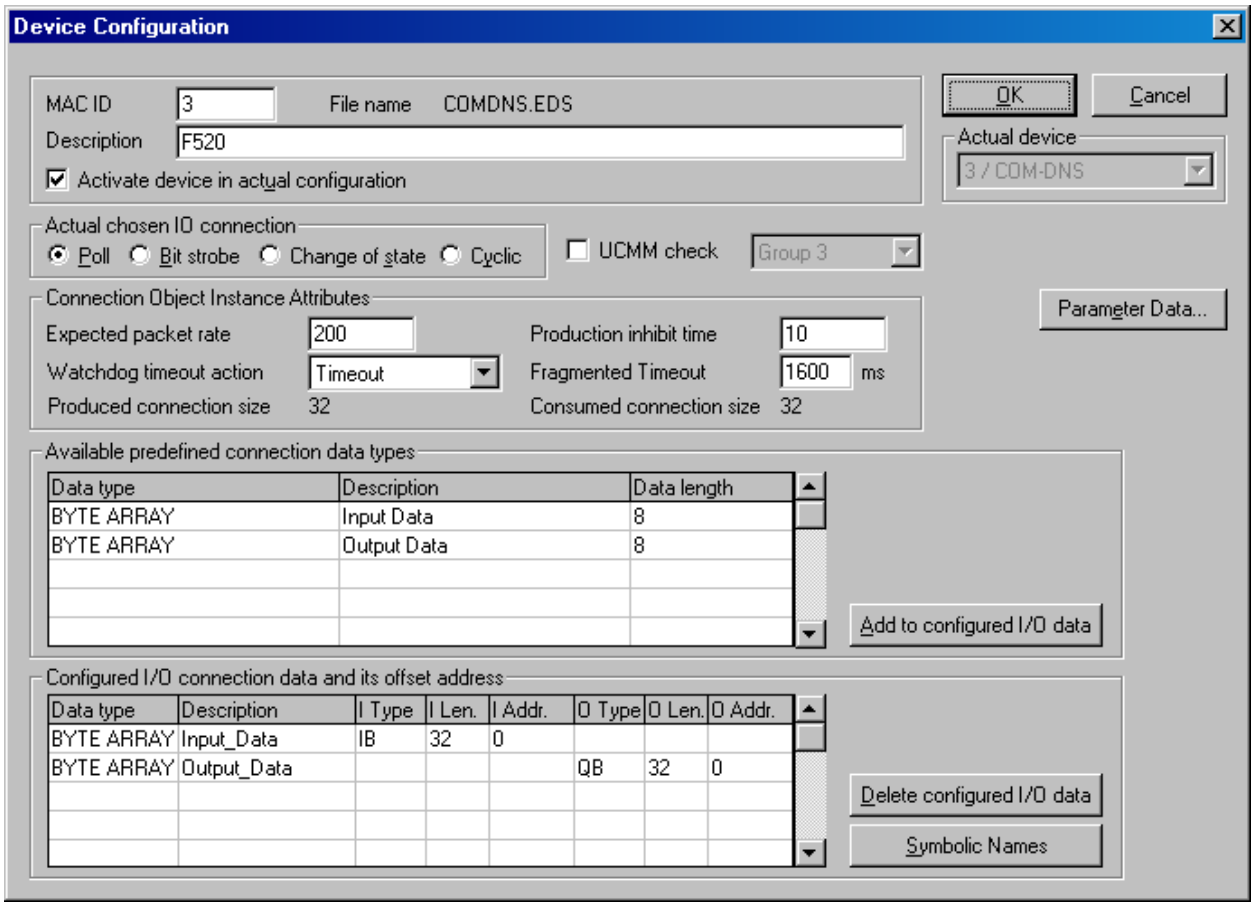
The **medium mode** allows sending commands and read the live measurements results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data (IB) 32 bytes
- ✓ Byte Array : Output_Data (QB) 32 bytes

Example of a configuration window of the PC DeviceNet board (master) for communication with the ATEQ DeviceNet board (slave) in medium mode with the SYCON software:



3.5. CONFIGURATION IN LIGHT MODE

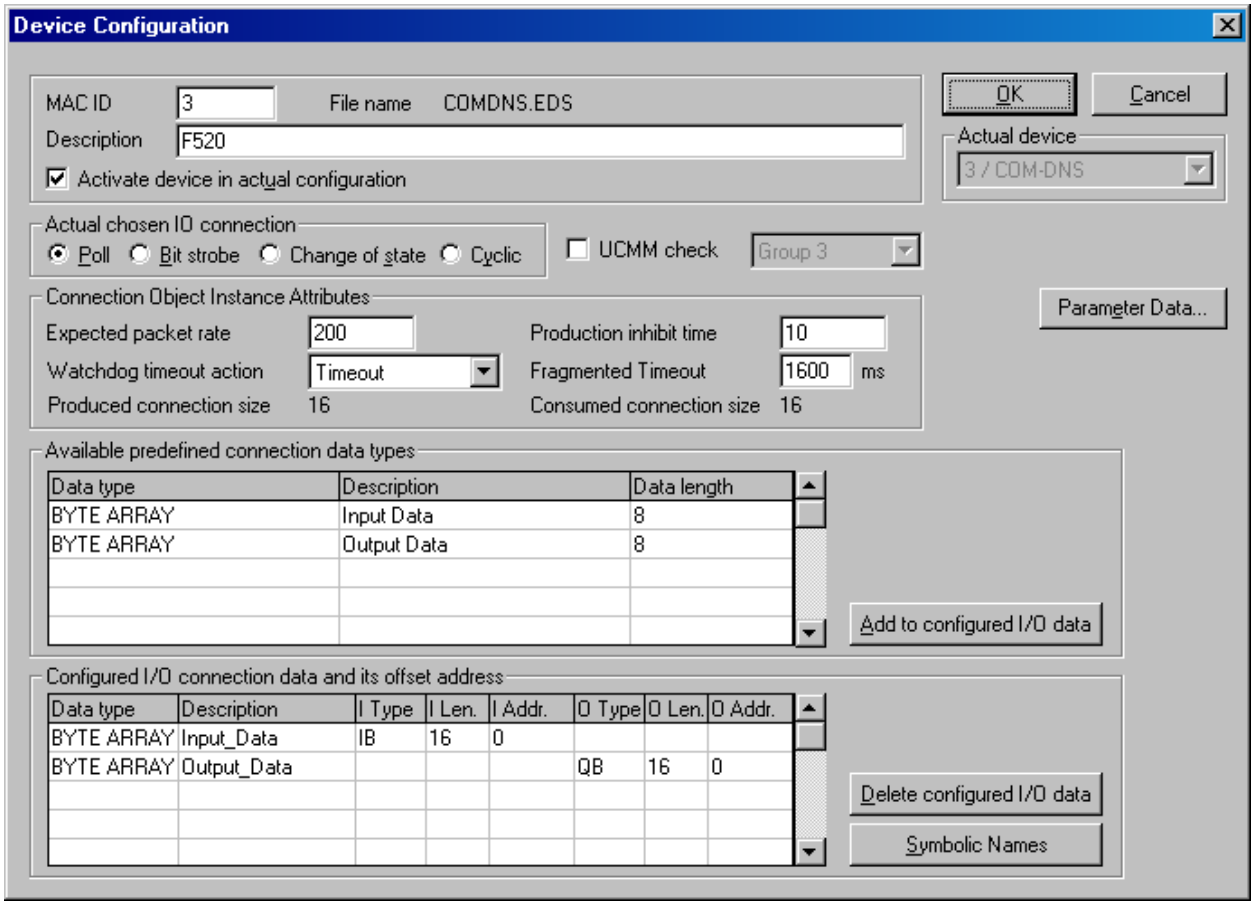
The **light mode** allows sending commands and read the relays status:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data (IB) 16 bytes
- ✓ Byte Array : Output_Data (QB) 16 bytes

Example of a configuration window of the PC DeviceNet board (master) for communication with the ATEQ DeviceNet board (slave) in light mode with the SYCON software:



3.6. DEVICENET STARTING INSTRUCTION

To start communication with an ATEQ in DeviceNet, follow these instructions:

1- Find which DeviceNet module is installed in the ATEQ instrument (COM or COMX) :

- Services menu.
- FieldsBus.

2- For the slave instrument configuration, if the DeviceNet module is :

- **COM_DNS**, use "**COMDNS.EDS** " configuration file.
- **COMX 100XX-DN/DNS**, use "**COMX 100XX-DN/DNS.EDS**" configuration file.

3- Configure the slave I/O module on the master instrument (I/O adjustments).

- Refer to the above paragraphs, the modules configuration being different in regard to the selected mode, standard, medium+, medium or light.

4- Setup a **station number** on ATEQ instrument.

- Configuration menu.
- FieldsBus network.
- Station

5- Select the communication speed betwen **“125kbits/s”**, **“250kbits/s”**, **“500kbits/s”** or **“Auto” (If “Auto” exists).**

***Note 1**: the ATEQ **station number** must be the same on both instruments (ATEQ and MASTER).*

***Note 2**: the I/O configuration must be the same between the ATEQ instrument and the slave configuration on the master.*

3.7. D.E.L. STATUS AT DEIVICENET STARTING

3.7.1. D.E.L. status on COM_DNS module

At the powering of the board:

- In a first time the "**RUN**" light is flashing and the "**READY**" light is fixed.
- When the ATEQ has detected the board, the "**RUN**" and "**READY**" lights disappears during 1 to 2 seconds.
- Then the "**RUN**" light is flashing and the "**READY**" light is fixed.
- At the end of the starting, for a correct DeviceNet functioning, the D.E.L. "**RUN**", "**READY**" and "**STAT**" must be fixed.
- In case of board detection error, "**ERROR**", "**READY**" and "**STAT**" are fixed and "**RUN**" is flashing.

3.7.2. D.E.L. status on COMX 100XX-DN/DNS module

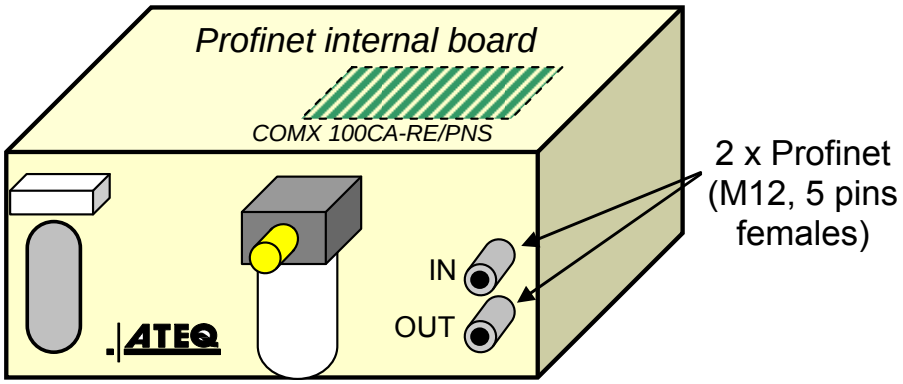
At the powering of the board:

- In a first time the "**RUN**" light is fixed and the "**READY**" light is cleared.
- When the ATEQ has detected the board, the "**RUN**" light disappears and "**READY**" lights .
- Then the "**RUN**" lights and the "**READY**" light turns off again.
- At the end of the starting, for a correct DevieNet functioning, the D.E.L. "**RUN**" and "**STAT**" must be fixed.

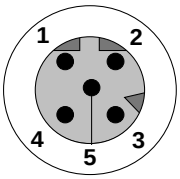
Chapter 19

PROFINET NETWORKS

1. CABLING



Ethernet connector IN:

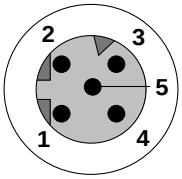


Ethernet / M12 pin assignment. (5 pins)

M12 female connector, D coded.

Pin 1	Ethernet Tx + (Transmit Data +)	Pin 3	Ethernet Tx - (Transmit Data -)
Pin 2	Ethernet Rx + (Receive Data +)	Pin 4	Ethernet Rx - (Receive Data -)
Pin 5	Not used.		

Connector Ethernet OUT:



Ethernet / M12 pin assignment. (5 pins).

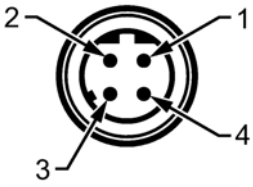
M12 female connector, D coded.

Pin 1	Ethernet Tx + (Transmit Data +)	Pin 3	Ethernet Tx - (Transmit Data -)
Pin 2	Ethernet Rx + (Receive Data +)	Pin 4	Ethernet Rx - (Receive Data -)
Pin 5	Not used.		

M12 to RJ45 conversion:

M12 cabling:

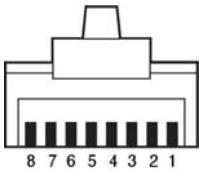
(Female)



(Male)

1 White-Orange
2 White-Green
3 Orange
4 Green

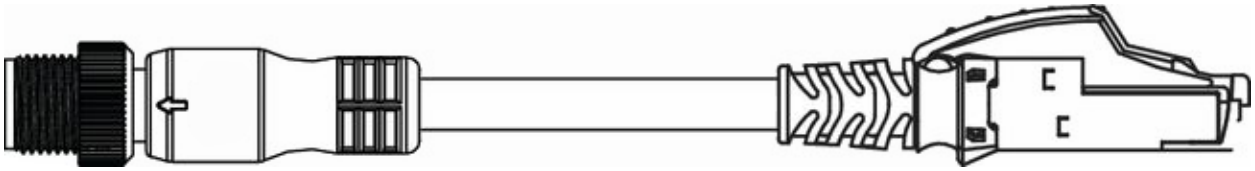
RJ45 cabling:



(Ethernet)

8-Pin		**4-Pin**	
1 White/Orange	Tx Data +	1 White/Orange	Tx Data +
2 Orange	Tx Data –	2 Orange	Tx Data –
3 White/Green	Rx Data +	3 White/Green	Rx Data +
4 Blue	Unused	4 -	-
5 White/Blue	Unused	5 -	-
6 Green	Rx Data –	6 Green	Rx Data –
7 White/Brown	Unused	7 -	-
8 Brown	Unused	8 -	-

M12 to RJ45 conversion patchcord cabling:



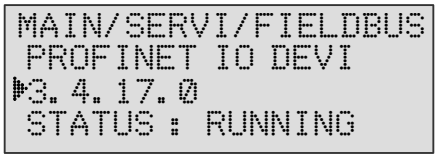
M12		**RJ45**
(Male M12 D-Code)		*(Ethernet)*
1 – White/Orange	———	1 - White/Orange
2 – White/Green	———	3 - White/Green
3 - Orange	———	2 - Orange
4 - Green	———	6 - Green

For the Profinet commands, refer to the chapter 16 “**Fieldbus commands**”.

2. INSTALLATION AND CONFIGURATION

For the installation and configuration of the Profinet module, you must have to select the component that corresponds to the firmware.

The version of the Profinet module can be checked following two ways:

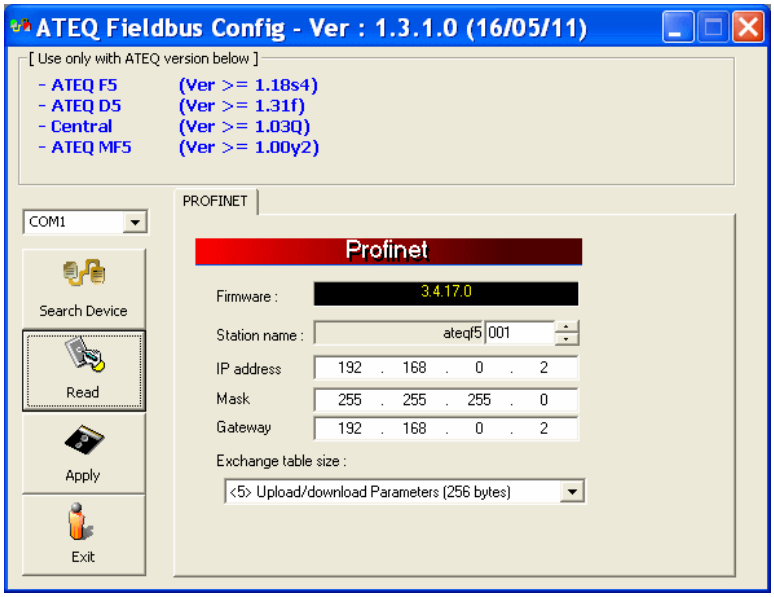


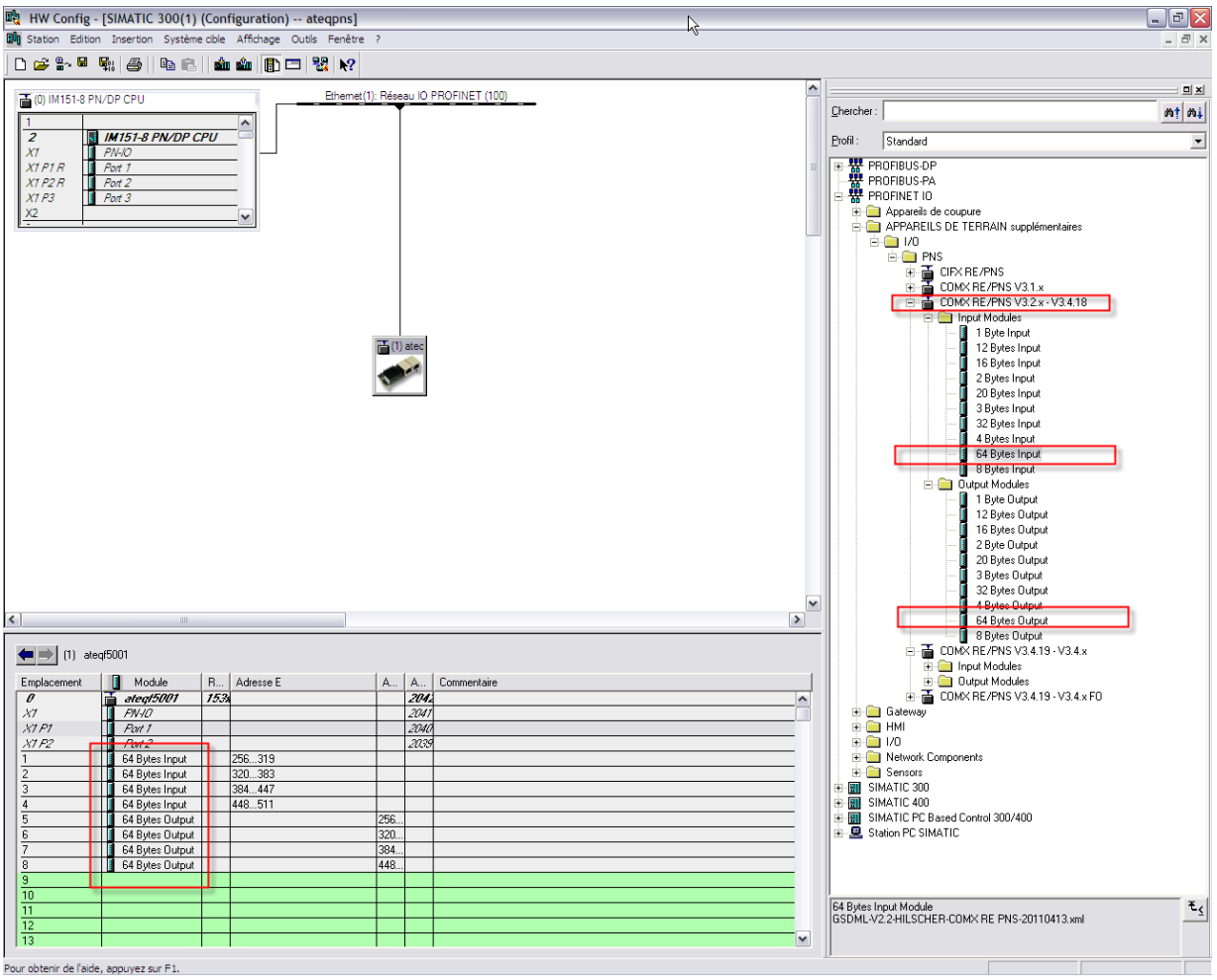
The first way is by the **SERVICE/FIELDBUS** menu of the **ATEQ** device.

The second way is by running the ATEQ Fieldbus configuration software. The version is displayed in the **Firmware** field.

After, configure the module with the same versions displayed above.

See the following example with the "**Step7**" software (software for the PLC configuration).





Then select the same version as detected above, the selection of the version is in the right window.

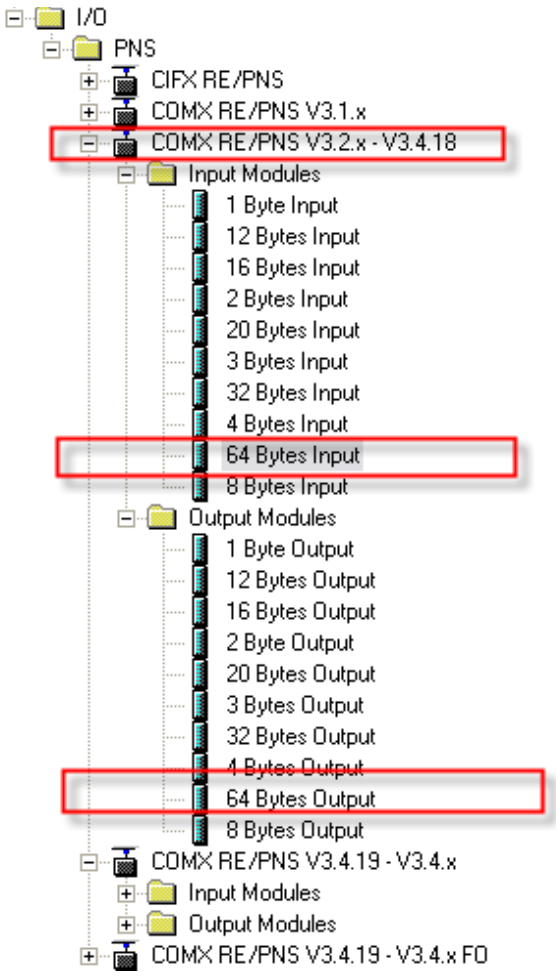
Example:

The firmware displayed:

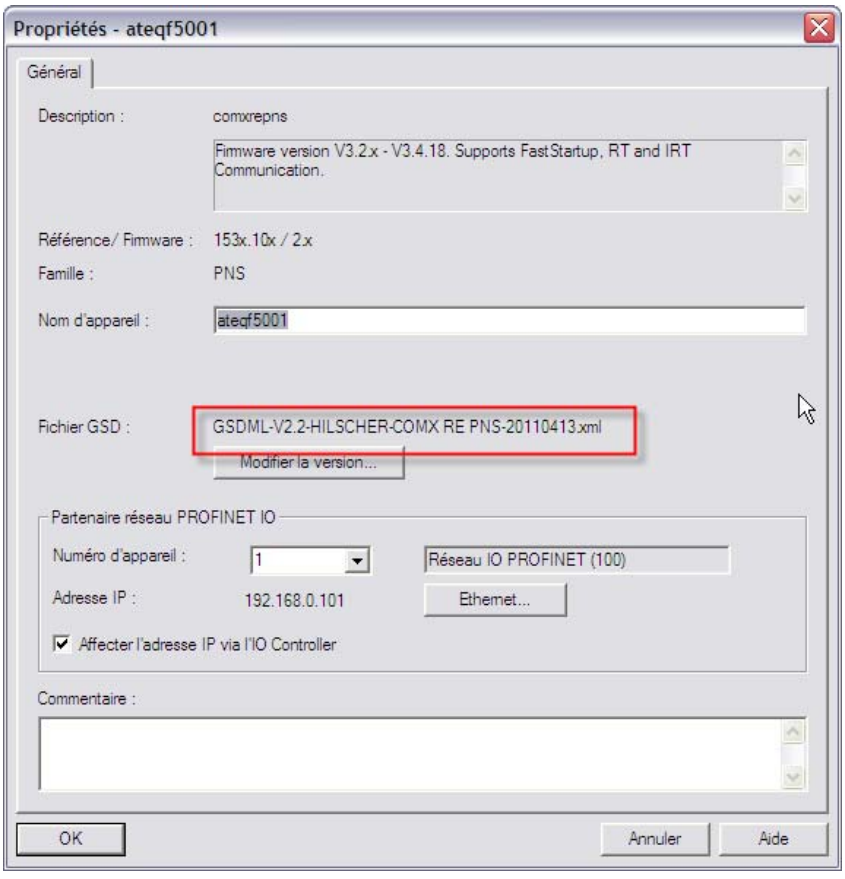
3.4.17.0

the component to be selected:

COMX RE/PNS V3.2.x – V3.4.18



In the "**Properties**" menu of the "**Step7**" software, check the versions and the files.



Once the right version is configured select the mode available in the version.

2.1. PROFINET MODULE CONFIGURATION

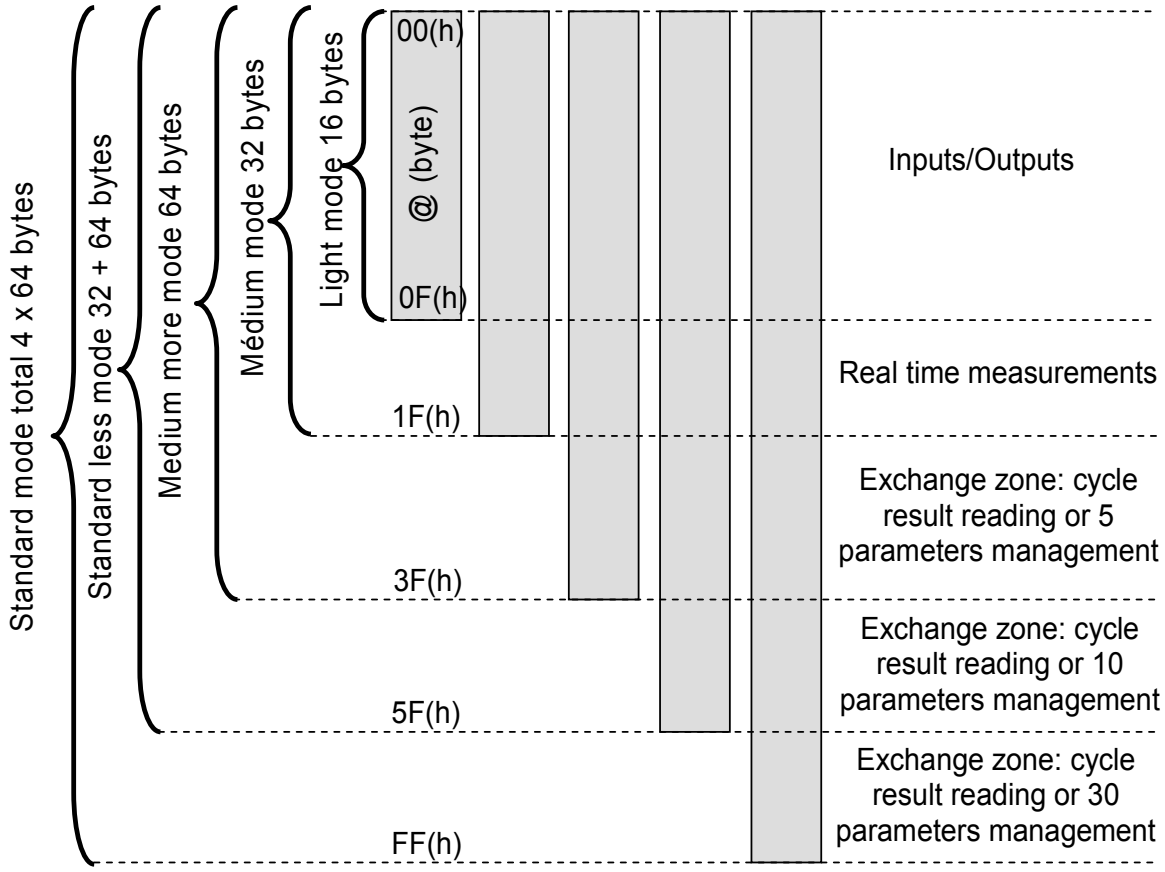
The ATEQ Profinet module name is: **COMX-RE-PNS.**

The Profinet configuration module file is:

GSDML-V2.2-HILSCHER-COMX RE PNS-20110413.xml

Five configuration modes are available following the bytes number available. :

- The **standard mode (normal)** : for the inputs/outputs, real time measurements, the live cycles results and parameters management.
- The **standard less mode** : for the inputs/outputs, real time measurements, the live cycles results and parameters management.
- The **medium more mode** : for the inputs/outputs, the real time measurements and the live cycles results.
- The **medium mode** : for the inputs/outputs and the real time measurements.
- The **light mode** : for the digital inputs/outputs.



***Note 1:** by default the ATEQ instrument use the **standard mode.** Change the mode by using the "Fieldbus.exe" ATEQ program.*

***Note 2:** the connection from PC → ATEQ is identical as WINATEQ.*

***For information**: 1 parameter corresponds to 6 bytes.*

2.2. STANDARD MODE CONFIGURATION

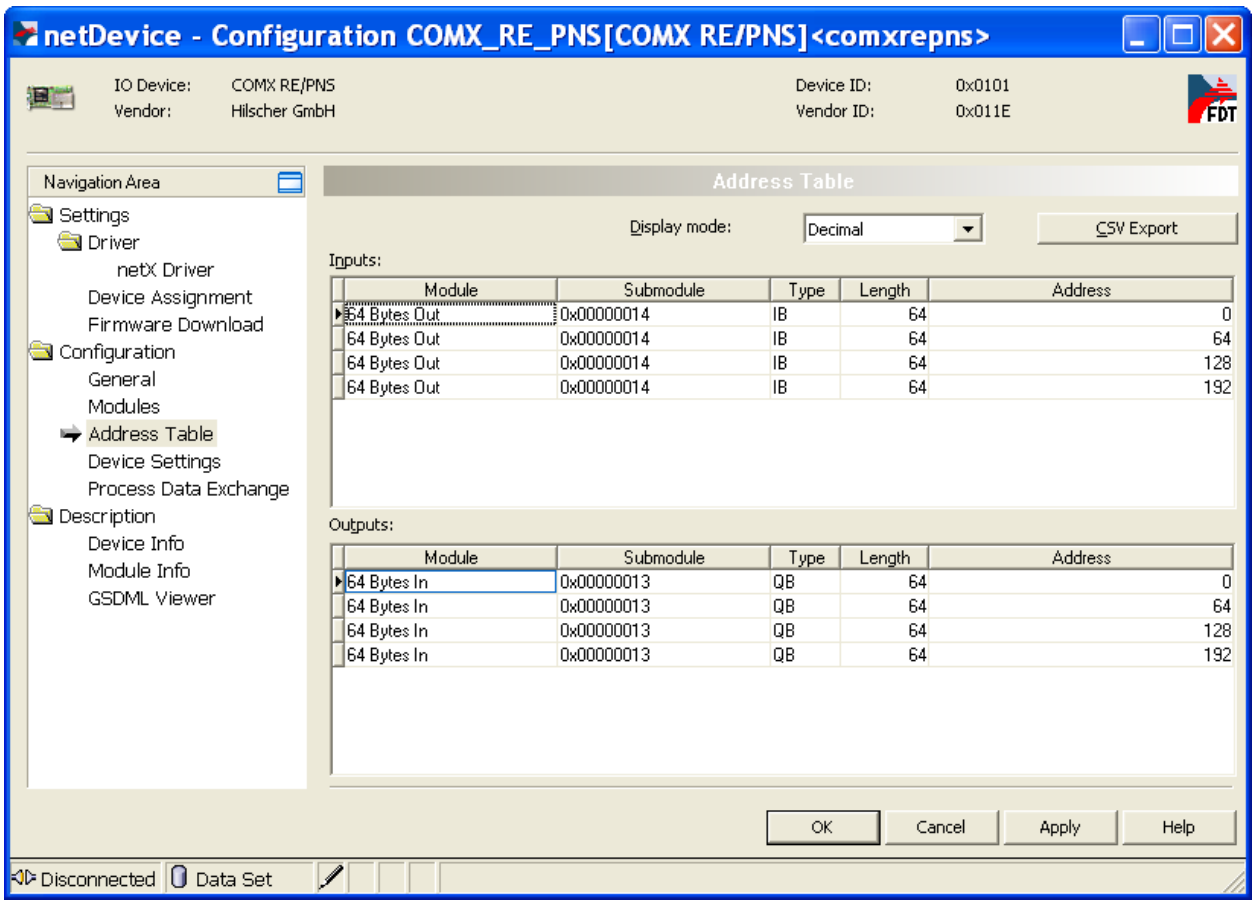
The **standard mode** allows completely controlling an **ATEQ** instrument with the management of 30 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (30).*

The parameters configuration must be like the following ones:

- ✓ Input_Data (IB) 256 bytes total:
  - IB = 64 (module 1).
  - IB = 64 (module 2).
  - IB = 64 (module 3).
  - IB = 64 (module 4).
- ✓ Output_Data (QB) 256 bytes total:
  - QB = 64 (module 1).
  - QB = 64 (module 2).
  - QB = 64 (module 3).
  - QB = 64 (module 4).

Example of a configuration window of the PC Profinet board (master) for communication with the ATEQ Profinet board (slave) in standard mode with the SYCON.NET software:



2.3. STANDARD LESS MODE CONFIGURATION

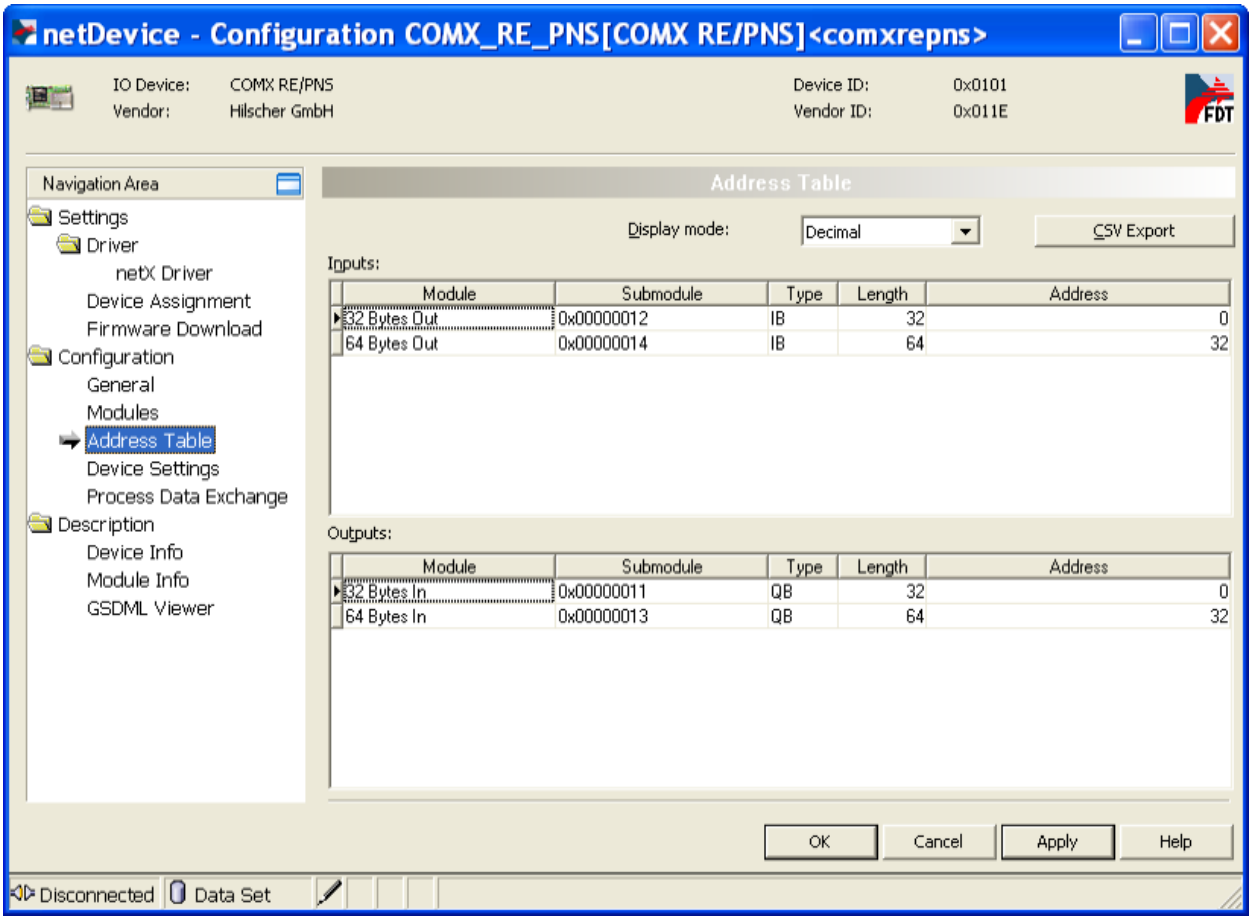
The **standard less mode** allows completely controlling an **ATEQ** instrument with the management of 10 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (10).*

The parameters configuration must be like the following ones:

- ✓ Input_Data (IB) 96 bytes total:
  - IB = 32.
  - IB = 64.
- ✓ Output_Data (QB) 96 bytes total:
  - QB = 32.
  - QB = 64.

Example of a configuration window of the PC Profinet board (master) for communication with the ATEQ Profinet board (slave) in standard less mode with the SYCON.NET software:



2.4. CONFIGURATION IN MEDIUM MORE MODE

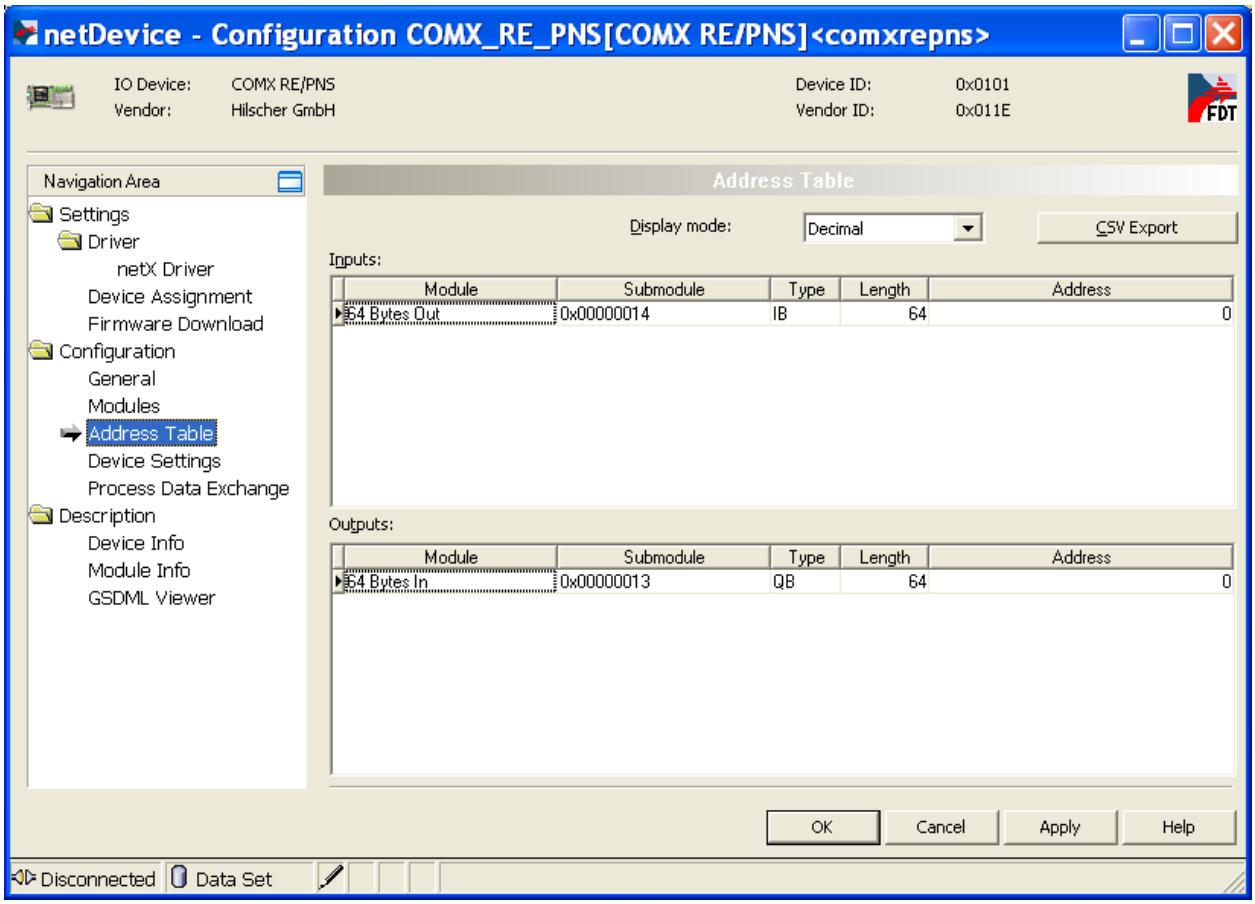
The **medium more mode** allows sending commands and read the live measurements results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.

The parameters configuration must be like the following ones:

- ✓ Input_Data: IB = 64 bytes.
- ✓ Output_Data: QB = 64 bytes.

Example of a configuration window of the PC Profinet board (master) for communication with the ATEQ Profinet board (slave) in medium more mode with the SYCON.NET software:



2.5. CONFIGURATION IN MEDIUM MODE

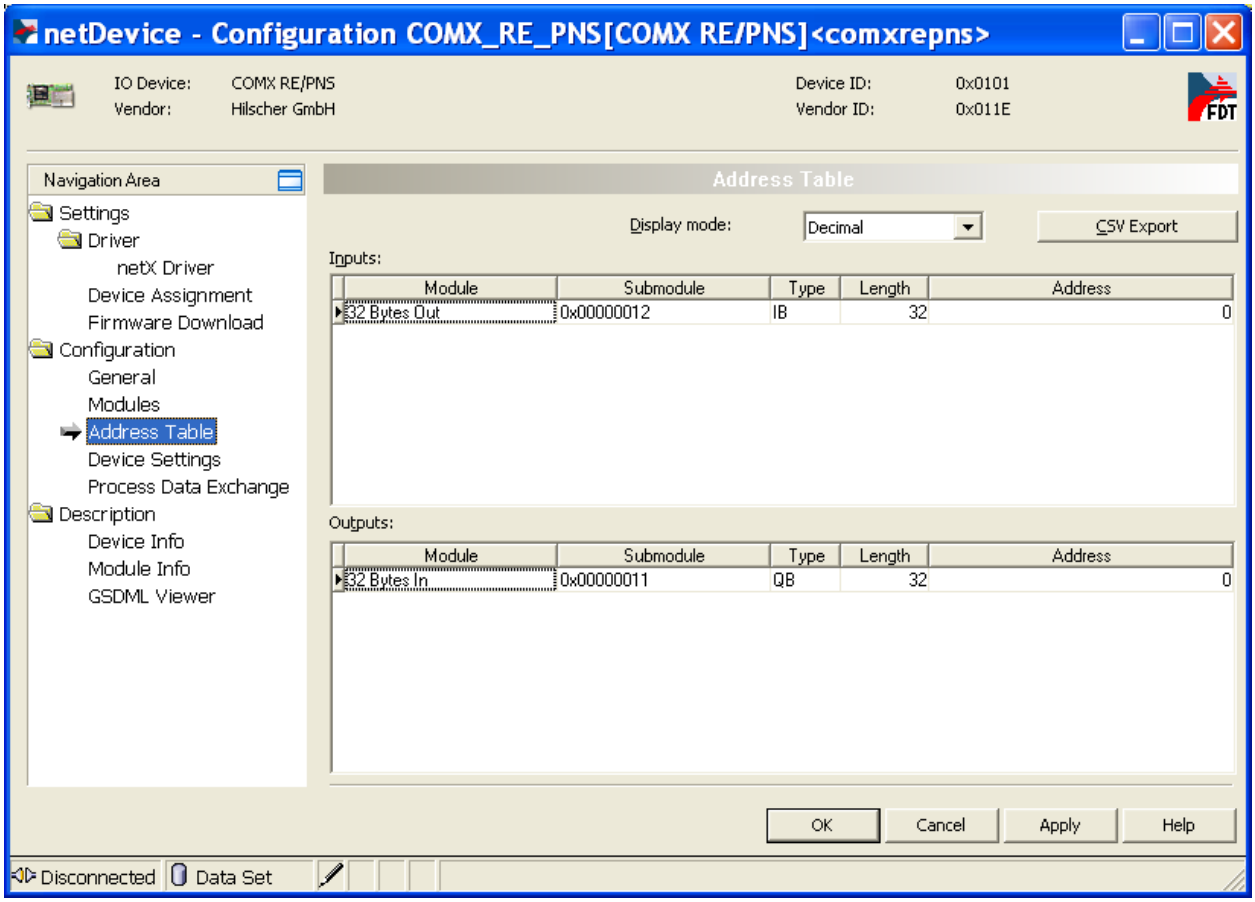
The **medium mode** allows sending commands and read the live measurements results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.

The parameters configuration must be like the following ones:

- ✓ Input_Data: IB: = 32 bytes
- ✓ Output_Data QB: = 32 bytes

Example of a configuration window of the PC Profinet board (master) for communication with the ATEQ Profinet board (slave) in medium mode with the SYCON.NET software:



2.6. CONFIGURATION IN LIGHT MODE

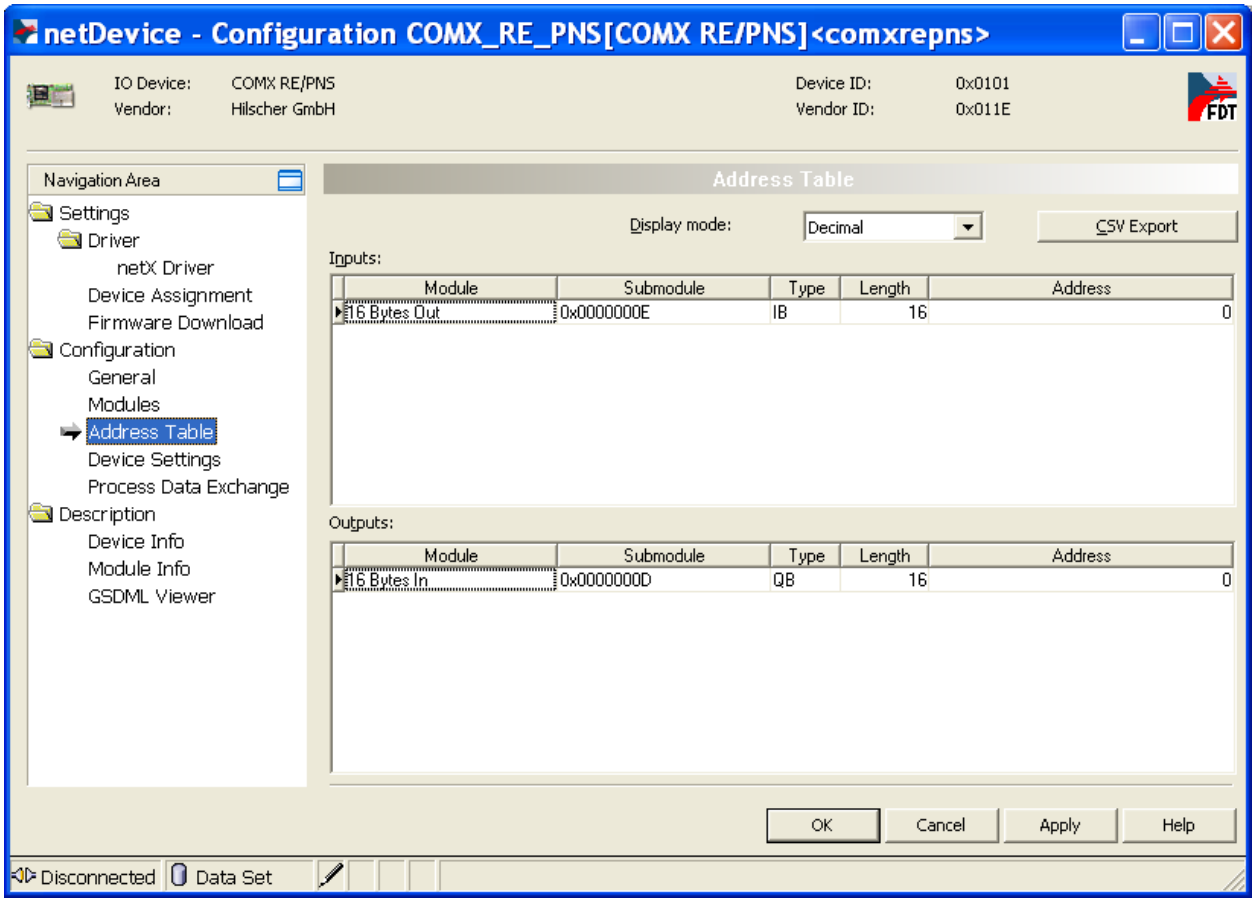
The **light mode** allows sending commands and read the relays status:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*

The parameters configuration must be like the following ones:

- ✓ Input_Data: IB = 16 bytes
- ✓ Output_Data: QB = 16 bytes

Example of a configuration window of the PC Profinet board (master) for communication with the ATEQ Profinet board (slave) in light mode with the SYCON.NET software:



2.7. PROFINET STARTING INSTRUCTION

To start communication with an **ATEQ** instrument in Profinet, follow these instructions:

1- Use the Profinet "**GSDML-V2.2-HILSCHER-COMX RE PNS-20110413.xml**" file for the slave instrument configuration.

2- Configure the slave I/O module on the master instrument (I/O adjustments).

- Refer to the above paragraphs, the modules configuration being different in regard to the selected mode, standard, medium+, medium or light.

3- Setup a **station name** on ATEQ instrument.

- Configuration menu.
- FieldsBus network.
- Address.

***Note 1**: the **ATEQ station name** must be the same on both instruments (**ATEQ** and MASTER).*

***Note 2**: the I/O configuration must be the same between the **ATEQ** instrument and the slave configuration on the master.*

2.8. D.E.L. STATUS AT PROFINET STARTING ON COMX-CN-RE

At the powering of the board the L.E.D. status are read on the COMX-RE-RE module:

- In a first time the "**SYS**" light is yellow then it becomes green and "**BF**" light is fixed.
- When the ATEQ has detected the board, the "**SYS**" light is fixed and "**BF**" light is flashing.
- At the end of the starting, for a correct Profinet functioning, the D.E.L. "**SYS**" must be fixed besides "**SF**" and "**BF**" are cleared.
- In case of board detection error, "**SYS**" and "**BF**" are fixed. Whereas if a configuration error is detected, "**SYS**" is still fixed but "**BF**" is flashing.

Chapter 20

ETHERNET/IP NETWORKS

For the Ethernet/IP commands, refer to the chapter 16 “Profibus and Devicenet commands”.

1. CABLING

Ethernet RJ45 standard connector.

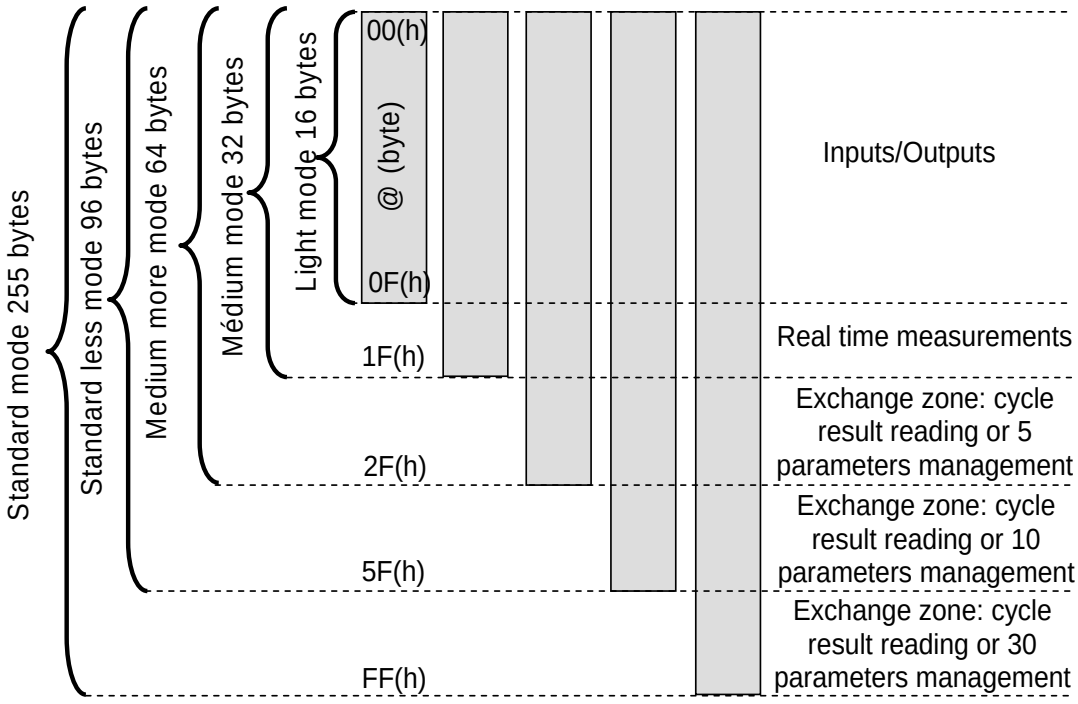
2. ETHERNET/IP MODULE CONFIGURATION

The ATEQ Ethernet/IP module name is: **COMX-1OOXX-RE-EIS.**

The EtherNet/IP configuration module file is: **HILSCHER COMX 100XX-RE EIS V1.1.EDS.**

Five configuration modes are available:

- The **standard mode (normal)** : for the inputs/outputs, real time measurements, the live cycles results and parameters management.
- The **standard less mode** : for the inputs/outputs, real time measurements, the live cycles results and parameters management.
- The **medium more mode** : for the inputs/outputs, the real time measurements and the live cycles results.
- The **medium mode** : for the inputs/outputs and the real time measurements.
- The **light mode** : for the digital inputs/outputs.



***Note 1:** by default the ATEQ instrument use the **standard mode.** Change the mode by using the "Fieldbus.exe" ATEQ program.*

***Note 2:** the connection from PC → ATEQ is identical as WINATEQ.*

***For information**: 1 parameter corresponds to 6 bytes.*

2.1. STANDARD MODE CONFIGURATION

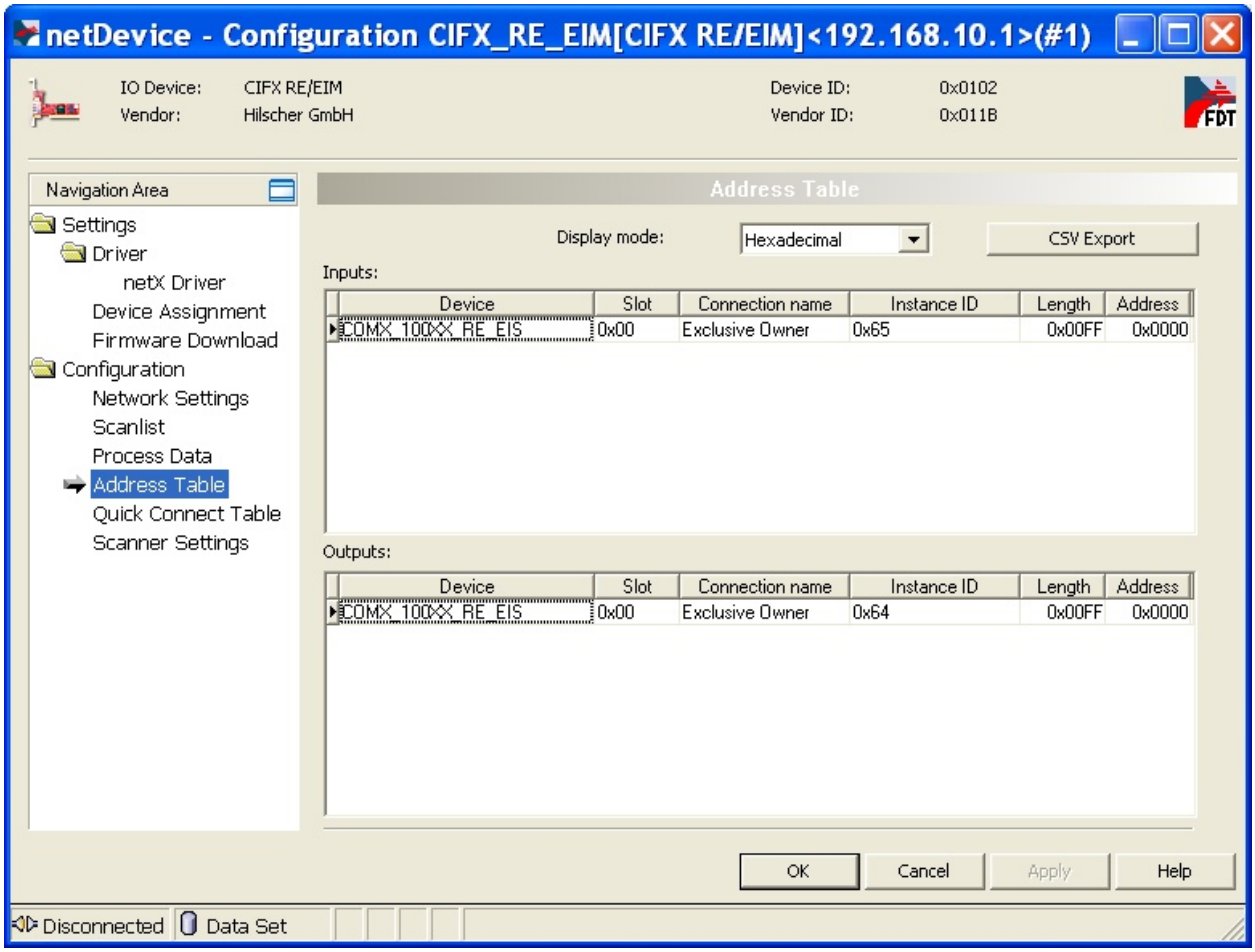
The **standard mode** allows completely controlling an **ATEQ** instrument with the management of 30 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (30).*

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data 255 bytes
- ✓ Byte Array : Output_Data 255 bytes

Example of a configuration window of the PC EtherNet/IP Scanner board (master) for communication with the ATEQ EtherNet/IP Adapter board (slave) in standard mode with the SYCON.NET software:



2.2. STANDARD LESS MODE CONFIGURATION

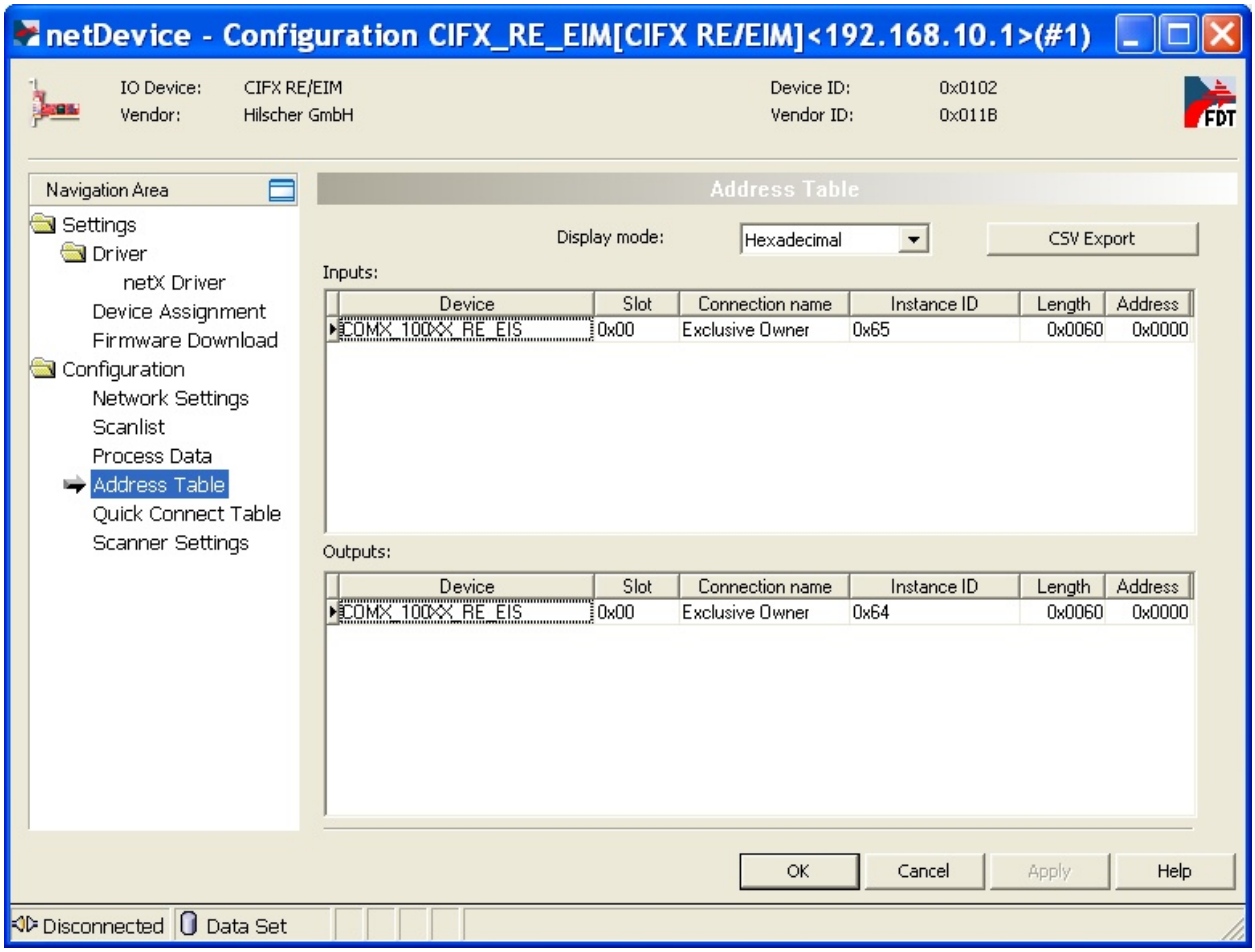
The **standard less mode** allows completely controlling an **ATEQ** instrument with the management of 10 parameters:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.
- Read and write the *program parameters (10).*

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data 96 bytes
- ✓ Byte Array : Output_Data 96 bytes

Example of a configuration window of the PC EtherNet/IP Scanner board (master) for communication with the ATEQ EtherNet/IP Adapter board (slave) in standard less mode with the SYCON.NET software:



2.3. CONFIGURATION IN MEDIUM MORE MODE

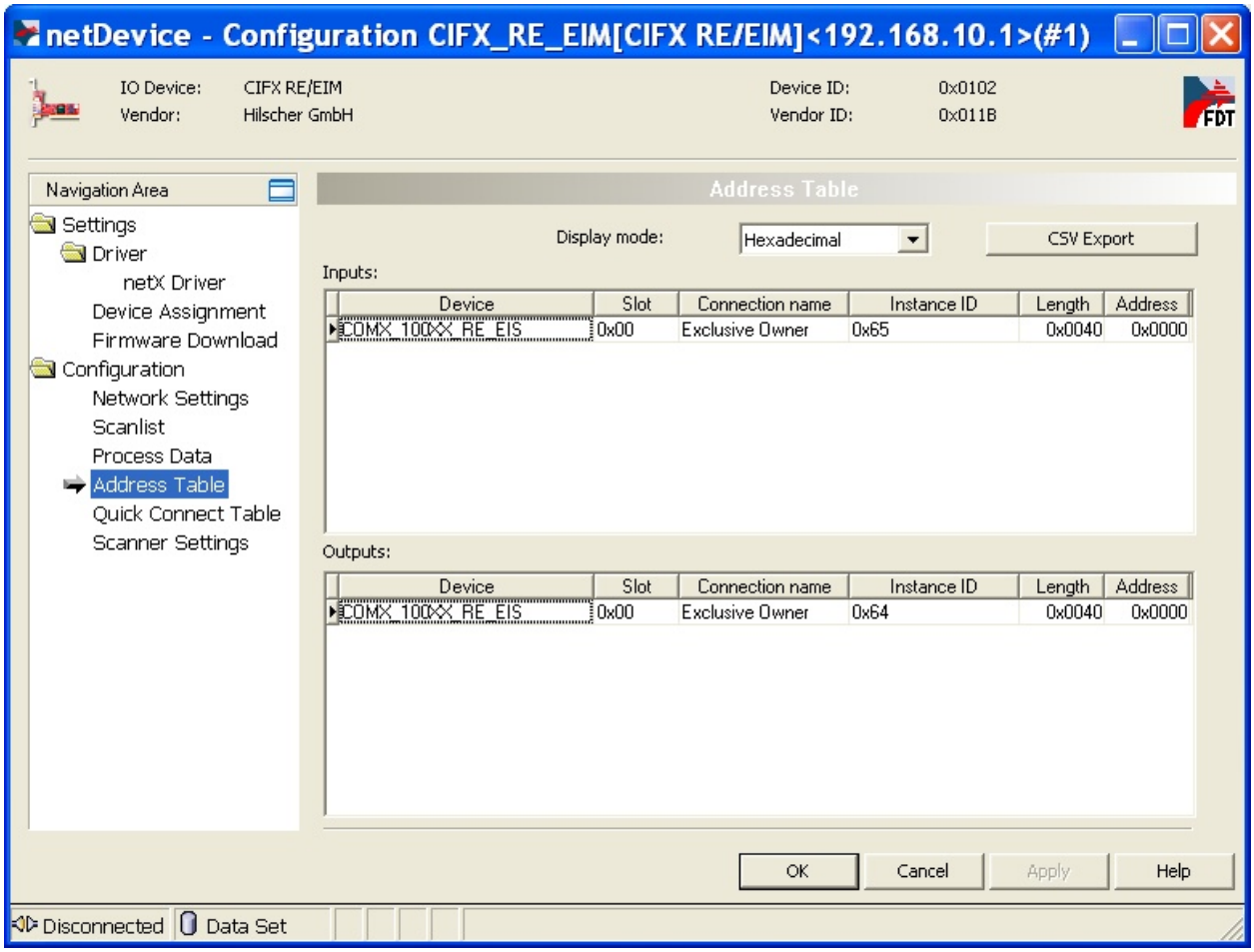
The **medium more mode** allows sending commands and read the live measurements results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.
- Read the *8 lasts measurement cycles*.

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data 64 bytes
- ✓ Byte Array : Output_Data 64 bytes

Example of a configuration window of the PC EtherNet/IP Scanner board (master) for communication with the ATEQ EtherNet/IP Adapter board (slave) in medium more mode with the SYCON.NET software:



2.4. CONFIGURATION IN MEDIUM MODE

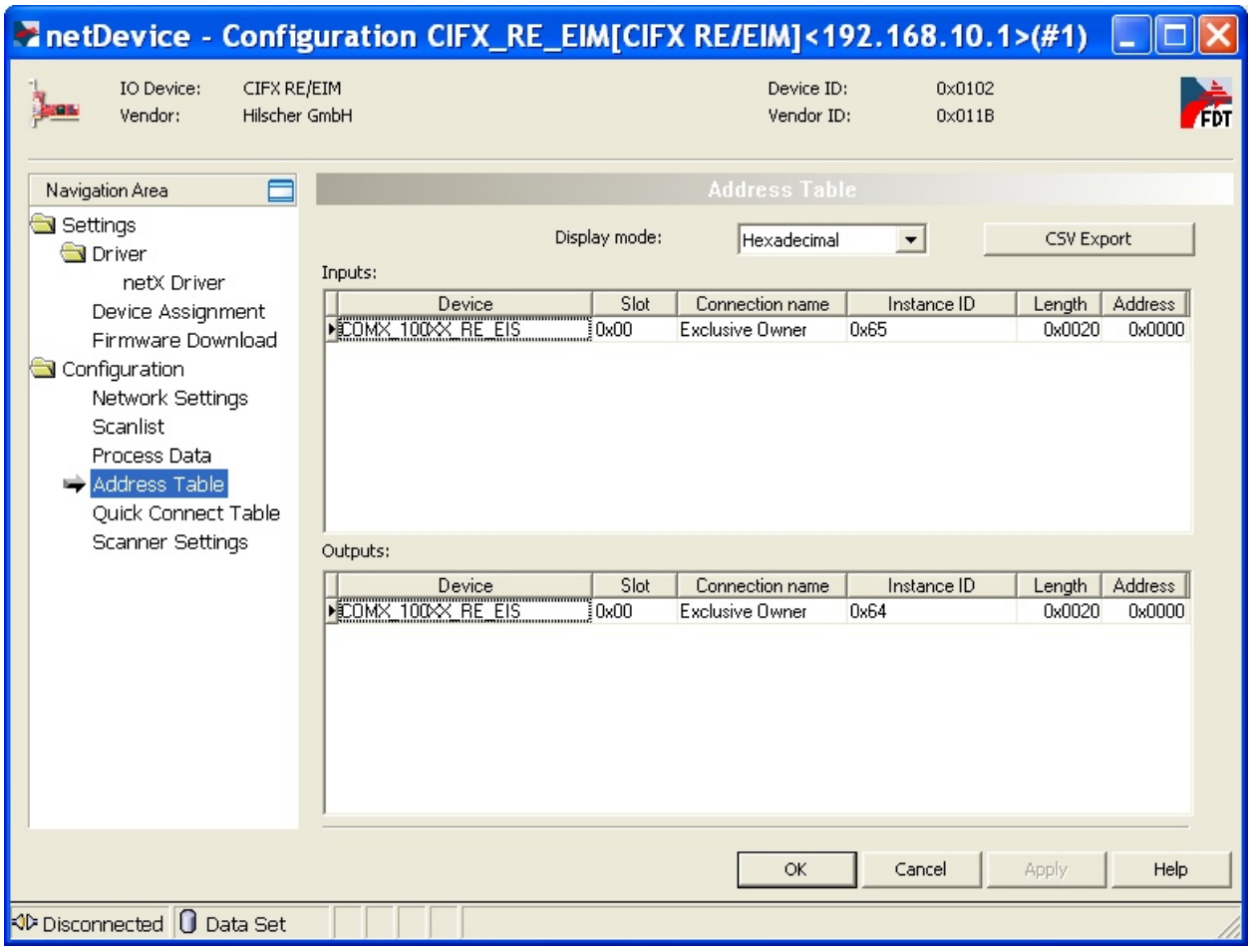
The **medium mode** allows sending commands and read the live measurements results:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*
- Read real time measurement values: *pressure and leak*.

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data 32 bytes
- ✓ Byte Array : Output_Data 32 bytes

Example of a configuration window of the PC EtherNet/IP Scanner board (master) for communication with the ATEQ EtherNet/IP Adapter board (slave) in medium mode with the SYCON.NET software:



2.5. CONFIGURATION IN LIGHT MODE

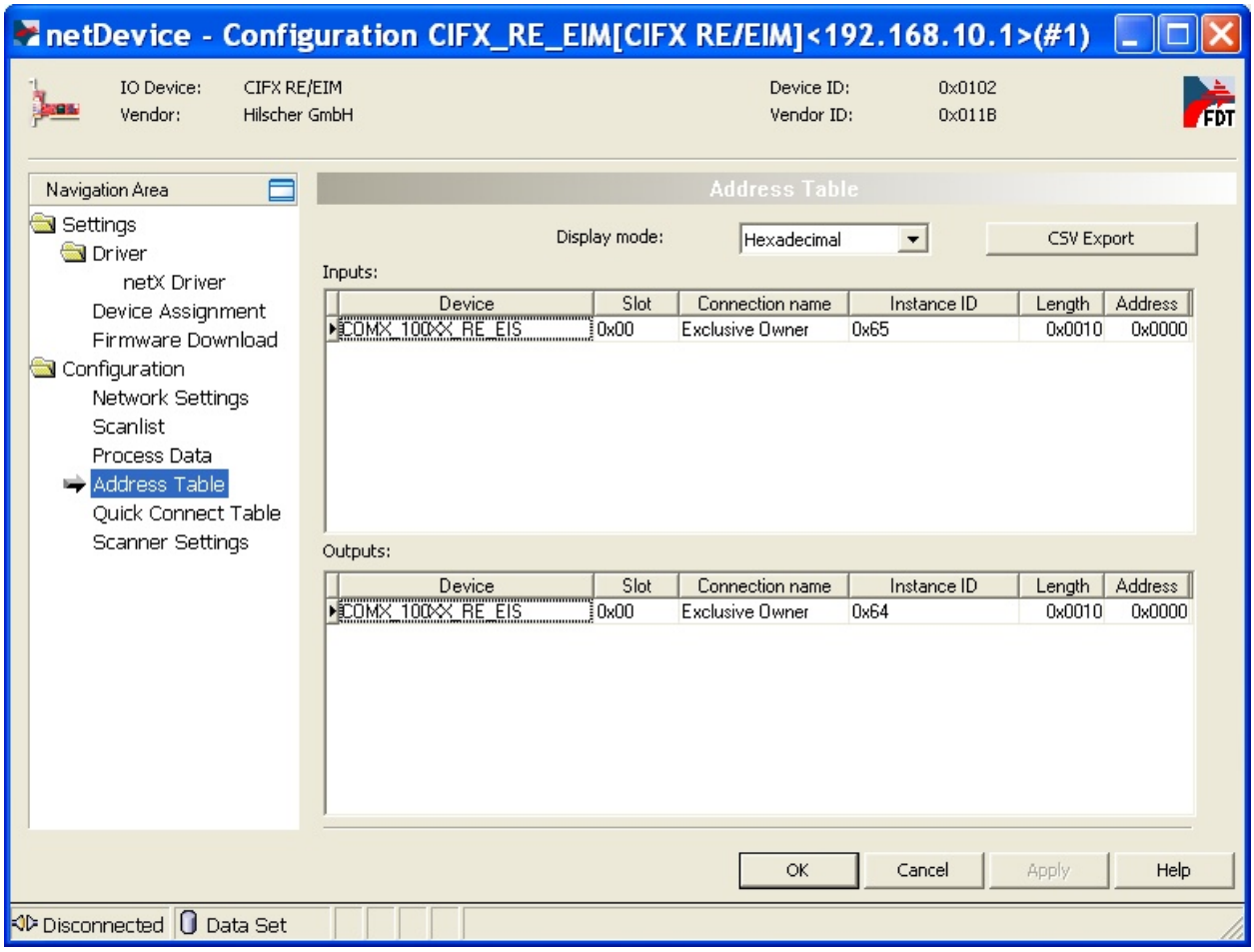
The **light mode** allows sending commands and read the relays status:

- Write cycle command: *start cycle, reset, head selection and program selection*.
- Read relays status: *pass part, fail part, end of cycle and alarm.*

The parameters configuration must be like the following ones:

- ✓ Byte Array : Input_Data 16 bytes
- ✓ Byte Array : Output_Data 16 bytes

Example of a configuration window of the PC EtherNet/IP Scanner board (master) for communication with the ATEQ EtherNet/IP Adapter board (slave) in light mode with the SYCON.NET software:



2.6. ETHERNET/IP STARTING INSTRUCTION

To start communication with an **ATEQ** instrument in Ethernet/IP, follow these instructions:

1- Use the EtherNet/IP " **HILSCHER COMX 100XX-RE EIS V1.1.EDS** " file for the slave instrument configuration.

2- Configure the slave I/O module on the master instrument (I/O adjustments).

- Refer to the above paragraphs, the modules configuration being different in regard to the selected mode, standard, medium+, medium or light.

3- Setup an Ip address to the ATEQ instrument by using FieldBus.exe.

***Note 1**: the **IP ADDRESS** must be the same on both instruments (**ATEQ** and MASTER).*

***Note 2**: the I/O configuration must be the same between the **ATEQ** instrument and the slave configuration on the master.*

Chapter 21

FIELDBUS COMMANDS

1. FUNCTIONS (READ AND WRITE TABLES)

1.1. WRITE TABLE (COMMANDS, ORDERS)

Address (bytes)	Description
00h Commands	Bit 0 = 1 > Reset (stop the current cycle).
	Bit 1 = 1 > Start (starting a test cycle).
	Bit 2 = 1 > Special cycle (start a special cycle, example: regulator adjust).
	Bit 3 = 1 > Program selection.
	Bit 4 = 1 > Read the FIFO cycles results (the FIFO contains the 8 lasts results, standard mode only).
	Bit 5 = 1 > Read of the parameters.
	Bit 6 = 1 > Write of the parameters.
	Bit 7 = 1 > Reset of the results FIFO (reset all available results in the FIFO).
01h Commands	*Bit 0 = 1 > Read of the instrument configuration.*
	Bit 1 = 1 > Read of the general bits.
	Bit 2 = 1 > Read of the normal bits.
	Bit 3 = 1 > Write of the general bits.
	Bit 4 = 1 > Write of the normal bits.
	Bit 5 = 1 > Read of the program personalisation.
	Bit 6 = 1 > Write of the program personalisation.
	Bit 7 = 1 > Read last result.
02h – 03h	Not used.
04h – 05h	Address 04h: Number of the targeted module (C540) selection of the head connected to the C540 central. Address 05h = 0
06h – 07h	Address 06h: Number of the program to be selected. Address 07h =0
08h – 09h	Address 08h: Special cycle. Address 09h=0
0Ah – 0Bh	Address 0Ah: Test type. Address 0Bh=0
0Ch – 0Dh	Not used.
0Eh – 0Fh	Not used.

***Note**: the command byte 0, bits 4, 5, 6 and 7 and byte 1 are not available for the medium and light modes.*

1.2. READING TABLE

Echo: acknowledgement of delivery of the master command allowing to determinate in which state is the slave (current command or command realised).

Error code: in case of command execution error, the corresponding command error bit is activated.

Results status: (@: 00h – 0Fh)

Address (bytes)	Description
00h Echo	Bit 0 = 1 > Echo reset.
	Bit 1 = 1 > Echo start.
	Bit 2 = 1 > Echo special cycle.
	Bit 3 = 1 > Echo program selection.
	Bit 4 = 1 > Echo reading of the results FIFO.
	Bit 5 = 1 > Echo reading of the parameters.
	Bit 6 = 1 > Echo writing of the parameters.
	Bit 7 = 1 > Echo reset of the results FIFO.
01h Echo	Bit 0 = 1 > Echo reading of the instrument configuration.
	Bit 1 = 1 > Echo reading of the general bits.
	Bit 2 = 1 > Echo reading of the normal bits.
	Bit 3 = 1 > Echo writing of the general bits.
	Bit 4 = 1 > Echo writing of the normal bits.
	Bit 5 = 1 > Echo reading of the program personalisation.
	Bit 6 = 1 > Echo writing of the program personalisation.
	Bit 7 = 1 > Unused.
02h Error code (≠ FFh)	Bit 0 = 1 > Reset error.
	Bit 1 = 1 > Start error.
	Bit 2 = 1 > Special cycle error.
	Bit 3 = 1 > Program selection error.
	Bit 4 = 1 > Reading of the results FIFO error.
	Bit 5 = 1 > Reading of the parameters error.
	Bit 6 = 1 > Writing of the parameters error.
	Bit 7 = 1 > Reset of the results FIFO error.
03h Error code (≠ FFh)	Bit 0 = 1 > Reading of the instrument configuration error.
	Bit 1 = 1 > Reading of the general bits error.
	Bit 2 = 1 > Reading of the normal bits error.
	Bit 3 = 1 > Writing of the general bits error.
	Bit 4 = 1 > Writing of the normal bits error.
	Bit 5 = 1 > Reading of the program personalisation error.

Address (bytes)	Description
	Bit 6 = 1 > Writing of the program personalisation error.
	Bit 7 = 1 > Unused.
04h – 05h	Current module in use (when use C540 network).
06h – 07h	Current program in use.
08h – 09h	Number of results in FIFO (quantity of available results recorded in the FIFO).
0Ah – 0Bh	Type of test in progress.
0Ch – 0Dh Real time test results	Bit 0 = 1 > Pass part. (OK)
	Bit 1 = 1 > Fail test part.(NOK)
	Bit 2 = 1 > Fail reference part.(NOK)
	Bit 3 = 1 > Alarm.
	Bit 4 = 1 > Pressure error.
	Bit 5 = 1 > Cycle end (system ready).
	Bit 6 = 1 > Part recoverable.
	Bit 7 = 1 > Calibration error.
	Bit 0 = 1 > Calibration check error.
	Bit 1 = 1 > ATR fault.
	Bit 2 to 7 > Not used, all always at 0.
0Eh – 0Fh	Program step in progress.

Real time measurements: (@: 10h – 1Fh)

Address (bytes)	Description
10h – 13h	Pressure current value. Example: reading of 524000 = 524 x 1000 thus the real value is 524.
14h – 17h	Pressure unit code. Example: reading 6000 = 6 x 1000 thus the value is 6, which corresponds to Pa.
18h – 1Bh	Leak current value. Example: reading 20000 = 20 x 1000 thus the real value is 20.
1Ch – 1Fh	Leak unit code. Example: reading 8000 = 8 x 1000 thus the value is 8, which corresponds to the Pa/s unity.

Example: Leak value (signed long):

18 - 1B(h) = 94 FF FF FF

| LSB | MSB |

(18 = 94; 19 = FF; 1A = FF; 1B = FF)

FF FF FF 94 = -108

Divide by 1000 = -0.108

1.2.1. Profibus exchange zone

Exchange zone: (@: 20h – 9Fh)).

Address (bytes)	Description
20h – 60h	- Cycle results exchange zone. - Parameters reading and writing exchange zone.

***Note**: from the address @20h the table address is in words (16 bits).*

1.2.2. DeviceNet exchange zone

Exchange zone: (@: 20h - FFh).

Address (bytes)	Description
20h – FFh	- Cycle results exchange zone. - Parameters reading and writing exchange zone.

2. TREATMENT OF THE COMMANDS

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

2.1. COMMUNICATION BETWEEN MASTER AND ATEQ (WITH "HAND SHAKE")

2.1.1. Head selection in the ATEQ network

Master	Slave
1) Select the head X (X > 0) and write at the address 04h the value X (Write a byte). (Only if we use the network with an ATEQ 540 central instrument). **2)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central).	

2.1.2. Program selection command on the ATEQ Instrument

Master	Slave
1) Select the head (only if we use the network with an ATEQ 540 central instrument). **2)** Write 1 word at the address 06h corresponding to the program number to be selected. @06h = 01 00h (01 = the program n° 2). **3)** Activate the command "program selection". Write at the address 00h the value 08 00h (byte 0, bit 3 = 1).	
	4) Acknowledgment. Byte 0 = 08h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	5) Running "Program selection"
	6) When the command is finished: Byte 0 = 08h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly executed. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
7) Wait the end of command, command echo = 08 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
8) Deactivate the "Program selection" command, write at the address 00h the value 00 00h (byte 0, bit 3 = 0).	

***Important**: the master instrument must always set to zero the command bit. If it's not done, the slave instrument won't detect the following command on this bit. It's detection on the rising edge (when the bit state becomes from 0 to 1).*

2.1.3. Start cycle command on the ATEQ Instrument

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Selection of the program number to be carried out. **3)** Activate the "Start" command, write at the address 00h the value 02 00h (byte 0, bit 1 = 1).	
	4) Acknowledgment Byte 0 = 02h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). (FF FFh: command in progress).
	5) Running "Start" command.
	6) When the command is finished : Byte 0 = 02h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
7) Waiting the end of the command: command echo = 02 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
8) Deactivate the "Start" command, write at the address 00h the value 00 00h (byte 0, bit 1 = 0).	

***Important**: the master instrument must always set to zero the command bit. If it's not done, the slave instrument won't detect the following command on this bit. It's detection on the rising edge (when the bit state becomes from 0 to 1).*

2.1.3. 1) Start command diagram

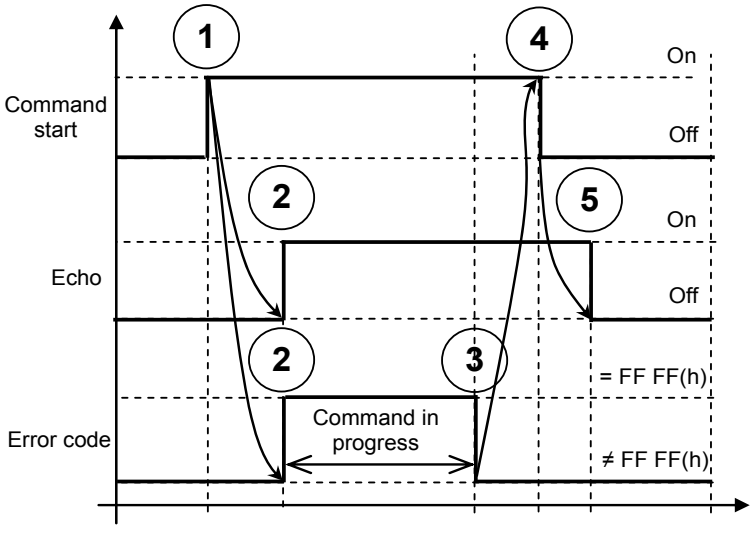
(1) Start command = **On**

(2) Acknowledge by **ATEQ** = (Command echo = **On**) and (Error code **=** FF FF(h))

(3) Wait **End of Start** command = (Command echo = **On**) and (Error code **≠** FF FF(h))

(4) Start command = **Off**

(5) Acknowledge by **ATEQ** = (Command echo = **Off**) and (Error code **≠** FF FF(h))



***Note**: The "**Echo command**" is a copy of "**Start command**"; "**Start signal**" must be maintain "**On**" till the end of the Start command condition is reached.*

2.1.4. Reset command on the ATEQ Instrument

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Activate the "Reset" command, write at the address 00h the value 01 00h (byte 0, bit 0 = 1).	
	3) Acknowledgment. Byte 0 = 01h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(FF FFh: command in progress)**.
	4) Running "Reset" command.
	5) When the command is finished: Byte 0 = 01h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
6) Waiting the end of the command: command echo = 01 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
7) Deactivate the "Reset" command. Write at the address 00h the value 00 00h (byte 0, bit 0 = 0).	

***Important**: the master instrument must always set to zero the command bit. If it's not done, the slave instrument won't detect the following command on this bit. It's detection on the rising edge (when the bit state becomes from 0 to 1).*

2.1.5. Auto-zero on the ATEQ instrument

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Selection of the program number to run. **3)** Write to the address 08h the "Function value" and at the address 09h = 0 **4)** Activate the command "Start special cycle", write at the address 00h the value 06 00h (byte 0, bit 1 = 1 and bit 2 = 1).	**Function value:** the "auto-zero" special cycle number is depending of the instrument type. See the special cycle table concerning each instrument (at the first page of each instrument's specific chapter, paragraph: "Special cycle bit table").
	5) Command acknowledgement. Byte 0 = 06h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress)**.
	6) Running "Start" command.
	7) When the command is finished: Byte 0 = 06h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 et Byte 3 ≠ 0 error (equal to the error code value, see reading table).
8) Waiting the end of the command: command echo = 06 00h and error code ≠ FF FFh.	
9) Deactivate the "Start" command. Write at the address 00h the value 00 00h (byte 0, bit 1 = 0).	

***Important**: the master instrument must always set to zero the command bit. If it's not done, the slave instrument won't detect the following command on this bit. It's detection on the rising edge (when the bit state becomes from 0 to 1).*

2.1.6. Saving parameters in flash

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central).	
3) Write to the address 08h the value 18h (24) and at the address 09h = 0	

2.1.7. Reading of status and relays

Master	Slave
4) Select the head (only if we use the network with an ATEQ central instrument). **5)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central).	
6) Read the status and the result, read at the address 04h, 12 bytes.	

2.1.8. Reading of real time measurement

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central).	
3) Read the live measurement, read at the address @:10h, 16 bytes.	

2.1.9. Reading of relays status (Running-End of cycle)

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central).	
3) Read the relays state, read at the address 0Ch, 2 bytes. Cycle in progress: bit 5 of the 1st byte = 0. End of cycle: bit 5 of the 1st byte = 1.	

2.2. READING OF THE PARAMETERS

The reading of the parameters is carried out by data exchange at the address 020h. Each parameter is identified by one identifier. See identifiers table.

This table is an example based on the reading of two parameters:

- *Test time (identifier number 3).*
- *Stabilisation time (identifier number 2).*

Master	Slave
1) Select the head (only if we use the network with an ATEQ 540 central instrument). **2)** Select the program number to be modified **3)** Write at the address 20h the number of parameters followed by its identifiers. example: write 3 words at the address 20h @20h = 02 00h 03 00h 02 00h. - 02 00h: 2 parameters. - 03 00h: test time identifier. - 02 00h: stabilisation time identifier. **4)** Write the "Parameters reading" command. Write at the address 00h the value 20 00h (byte 0, bit 5 = 1).	
	5) Acknowledgment. Byte 0 = 20h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	6) Running "Read Parameters" command.
	7) When the command is finished: Byte 0 = 20h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
8) Wait the end of the command: Command echo = 20 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
9) Deactivate the "Parameters reading" command, write at the address 00h the value 00 00h (byte 0, bit 5 = 0).	

Master	Slave
10) Read at the address 20h, the parameter identifier followed by the value. Read 6 words at the address 20h. **Word 1** = identifier number of the first read parameter. **Word 2** and **Word 3** = first parameter value x1000 (long format). **Word 4** = second identifier number of the read parameter. **Word 5** and **Word 6** = second parameter value x1000 (long format). **Example**: @20h = 03 00h E8 03h 00 00h 02 00h F4 01 00 00h. - 03 00h: test time identifier. - E8 03 00 00h: test time value 1000(d)/1000 -> 1 sec. - 02 00h: fill time identifier. - F4 01 00 00h : stabilisation time value 500(d)/1000 -> 0,5 sec.	

***Note**: the download identifiers are listed: paragraph 2 "Identifiers" in the table of each specific chapter for the instruments.*

2.3. CYCLE RESULTS READING (LAST 8 RESULTS IN FIFO)

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central). **3)** Read the number of available results in the FIFO at the address 08h. @08h = 00h (no results). @08h > 00h (results available). **4)** Activate the "FIFO reading results" command. Write at the address 00h the value 10 00h (byte 0, bit 4 = 1).	
	5) Acknowledgment. Byte 0 = 10h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	6) Running "Read FIFO results" command.

Master	Slave
	7) When the command is finished : Byte 0 = 10h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
8) Wait the end of the command: command echo = 10 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
9) Deactivate the "FIFO reading results" command, write at the address 00h the value 00 00h (byte 0, bit 4 = 0).	
10) Read at the address 20h, 12 Words.	*See table on § 2.6 "FIFO / last result table (address 20h)" below.*

***Note**: from the address 20h, the table is in words (16 bits).*

2.4. LAST RESULTS READING

***Important note:** for the using of this function, it's important to:*

- *Before having done a start on the instrument,*
- *Not having done a reset of the FIFO.*

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Wait 150 ms (temporisation = 150 ms only if network with ATEQ central). **3)** Activate the "Last result reading" command. Write at the address 01h the value 00 80h (byte 1, bit 7 = 1).	
	4) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 80h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	5) Running "Last result reading" command.
	6) When the command is finished : Byte 0 = 00h (command echo). Byte 1 = 80h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).

Master	Slave
7) Wait the end of the command: command echo = 00 80h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
8) Deactivate the "Last result reading" command, write at the address 01h the value 00 00h (byte 1, bit 7 = 0).	
9) Read at the address 20h, 12 Words. *(36 words for ERD5 unit)*	*See table on § 2.6 "FIFO / last result table (address 20h)" below.*

***Note**: from the address 20h, the table is in words (16 bits).*

2.5. RESET THE FIFO RESULTS

This command resets the 8 last cycle's results available in the FIFO.

Master	Slave
1) Select the head (only if we use the network with an ATEQ 540 central instrument). **2)** Activate the "Reset results FIFO" command, write at the address 00h, the value 80 00h (byte 0, bit 7 = 1).	
	3) Acknowledgment. Byte 0 = 80h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress)**.
	4) Running "Reset results FIFO" command.
	5) When the command is finished : Byte 0 = 80h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
6) Wait the end of the command: command echo = 80 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
7) Deactivate the "Reset results FIFO", write at the address 00h the value 00 00h (byte 0, bit 7 = 0).	

2.6. FIFO / LAST RESULT TABLE (ADDRESS 20H)

2.6.1. All devices (except ERD5)

Bytes number	Offset at @20h (in words)	Description
2	00h	Current program in use.
2	01h	Test type.
2	02h	Relays state. *Bit 0 = 1 : Pass part* *Bit 1 = 1 : Test fail part* *Bit 2 = 1 : Reference fail part* *Bit 3 = 1 : Alarm* *Bit 4 = 1 : Pressure fault* *Bit 5=1 : Resrved* *Bit 6=1 : Recoverable part* *Bit 7=1 : Calibration fault* *Bit 8=1 : Calibration check fault* *Bit 9=1 : ATR fault* *Bit 10 to 15 : Not used (all at zero)*
2	03h	Alarm code.
4	04h –05h	Pressure value. *Example: reading 524000 = 524 x 1000 thus real value is 524.*
4	06h –07h	Pressure unit. *Example: reading 6000 = 6 x 1000 thus real value is 6 which corresponds at Pa.*
4	08h – 09h	Leak value. *Example: reading 20000 = 20 x 1000 thus real value 20.*
4	0Ah –0Bh	Leak unit. *Example: reading 8000 = 8 x 1000 thus the value is 8 which corresponds to Pa/s unit.*

***Note**: the number of available results in the FIFO is decreased by 1 at each reading.*

2.6.2. ERD firmware version ≥ 1.01y3

Bytes number	Offset at @20h (in words)	Description
2	00h	Current program in use.
2	01h	Test type.
2	02h	*Relays state.* *Bit 0 = 1 : Pass part* *Bit 1 = 1 : Up fail part flow* *Bit 2 = 1 : Down fail part flow* *Bit 3 = 1 : Alarm* *Bit 4 = 1 : Unused* *Bit 5=1 : Reserved* *Bit 6=1 : Unused* *Bit 7=1 : Unused*
2	03h	Alarm code.
4	04h – 05h	Rise Pressure value. *Example: see above.*
4	06h – 07h	Rise Pressure unit. *Example: see above.*
4	08h – 09h	Rise Flow value. *Example: see above.*
4	0Ah – 0Bh	Rise Leak unit. *Example: see above.*
4	0Ch – 0Dh	Step pressure value.
4	0Eh – 0Fh	Step Pressure unit code.
4	10h – 11h	Step Flow value.
4	12h – 13h	Step leak unit code.
4	14h – 15h	Drop Pressure value.
4	16h – 17h	Drop Pressure unit code.
4	18h – 19h	Drop Flow value.
4	1Ah – 1Bh	Drop Pressure unit code.
4	1Ch – 1Dh	Rise Switch pressure value.
4	1Eh – 1Fh	Rise Switch pressure unit.
4	20h – 21h	Drop Switch pressure value.
4	22h – 23h	Drop Switch pressure unit.

***Note**: the number of available results in the FIFO is decreased by 1 at each reading.*

2.7. READING OF INSTRUMENT CONFIGURATION

Master	Slave
1) Select the head (only if we use the network with an ATEQ 540 central instrument). **2)** Activate the "Configuration reading" command, write at the address 00h, the value 00 01h (byte 1, bit 0 = 1).	
	3) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 01h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	4) Running "Read Configuration" command.
	5) When the command is finished: Byte 0 = 00h (command echo). Byte 1 = 01h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
6) Wait the end of the command: command echo = 00 01h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
7) Deactivate the "Configuration reading" command, write at the address 00h the value 00 00h (Byte 2, bit 0 = 0).	
8) Read the configuration at the address 20h of X Words.	

2.8. READING OF GENERAL BITS CONFIGURATION

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Activate then "General bits reading" command, write at the address 00h, the value 00 02h (byte 1, bit 1 = 1).	
	3) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 02h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	4) Running "Read General bits" command.
	5) When the command is finished: Byte 0 = 00h (command echo). Byte 1 = 02h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
6) Wait the end of the command: command echo = 00 02h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
7) Deactivate the "General bits reading", write at the address 00h the value 00 00h (Byte 1, bit 1 = 0).	
8) Read the general bits at the address 20h of X Words or read the normal bits at the address 20h of X Words.	

***Note 1**: the configuration bits are in the table, paragraph 7 "General bits table" for the "extended menus" of each specific chapter for the instruments.*

***Note 2:** the configuration bits (general) are independents of program number.*

2.9. READING OF NORMAL BITS CONFIGURATION

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Selection of the program to be modified number. **3)** Activate the "Normal bit reading" command, write at the address 00h the value 00 04h (normal bits) (byte 1, bit 2 = 1).	
	4) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 04h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	5) Running "Read Normal bits" command.
	6) When the command is finished: Byte 0 = 00h (command echo). Byte 1 = 04h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
7) Wait the end of the command: command echo = 00 04h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
8) Deactivate the "Normal bits reading", write at the address 00h the value 00 00h (Byte 1, bit 2 = 0).	
9) Read the normal bits at the address 20h of X Words.	

***Note 1**: the configuration bits are in the table paragraph 8 "Normal bits table" for the functions, of each specific chapter for the instruments.*

***Note 2:** the function bits (normal) are dependent of the program number in edition, a program selection is to be realised.*

2.10. READING OF "PERSONNALISATION" STRING

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Select the number of the program to be read. **3)** Activate the "Personalisation reading" command, write at the address 00h, the value 00 20h (byte 1, bit 5 = 1).	
	4) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 20h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	5) Running "Read Personalisation" command.
	6) When the command is finished : Byte 0 = 00h (command echo). Byte 1 = 20h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
7) Wait the end of the command: command echo = 00 20h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
8) Deactivate the "Personalisation reading" command, write at the address 00h the value 00 00h (Byte 1, bit 1 = 0).	
9) Read the personalisation at the address 20h de 13 Bytes (12 characters maximum + 1 end of chain).	

***Note:** the personalization string is dependent of the program number in edition, a program selection is to be realised.*

2.11. PARAMETERS WRITING

The parameters' writing uses the address 020h to exchange the data.

Each parameter is identified by an identifier. See identifiers table.

This table is an example based on the writing of two parameters:

- *Test time (identifier number 3) = 1 second.*
- *Stabilisation time (identifier number 2) = 2 seconds.*

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Select the number of the program to be modified. **3)** Write the identifiers number, followed by the couple identifier and parameters value. **example**: write at the address 20h @20h = 02 00h 03 00h E8 03h 00 00h 02 00h D0 07h 00 00h **4)** Activate the "Write parameters" command, write at the address 00h, the value 40 00h (byte 0, bit 6 = 1).	
	5) Acknowledgment. Byte 0 = 40h (command echo). Byte 1 = 00h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	6) Running "Write parameters" command.
	7) When the command is finished : Byte 0 = 40h (command echo). Byte 1 = 00h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
8) Wait the end of the command: command echo = 40 00h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
9) Deactivate the "Write parameters" command, write at the address 00h the value 00 00h (Byte 0, bit 6 = 0).	

***Note:** the download identifiers are listed in the table paragraph 2 "Identifiers" of each specific chapter for the instruments.*

2.12. WRITING OF GENERAL BITS

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Write the general bits field at the address 20h. **3)** Activate the "General bits writing", write at the address 00h, the value 00 08h (byte 1, bit 3 = 1).	
	4) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 08h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	5) Running "Write General bits" command.
	6) When the command is finished : Byte 0 = 00h (command echo). Byte 1 = 08h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
7) Wait the end of the command: command echo = 00 08h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
8) Deactivate the "General bits writing", write at the address 00h the value 00 00h (Byte 1, bit 3 = 0).	

***Note 1**: the configuration bits are in the table, paragraph 7 "Generals bits table" for the "Extended menus" of each specific chapter for the instruments.*

***Note 2:** the configuration bits (general) are independents of the program number.*

2.13. WRITING OF NORMAL BITS

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Select the number of the program to be modified. **3)** Write the general or normal bits field at the address 20h. **4)** Activate the "Normal bits writing", write at the address 00h, the value 00 10h (byte 1, bit 4 = 1).	
	5) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 10h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	6) Running "Write General bits" or "Write Normal bits" command.
	7) When the command is finished : Byte 0 = 00h (command echo). Byte 1 = 10h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
8) Wait the end of the command: command echo = 00 10h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
9) Deactivate the "Normal bits writing", write at the address 00h the value 00 00h (Byte 1, bit 4 = 0).	

***Note 1**: the configuration bits are in the table paragraph 8 "Normal bits table" for the functions of each specific chapter for the instruments.*

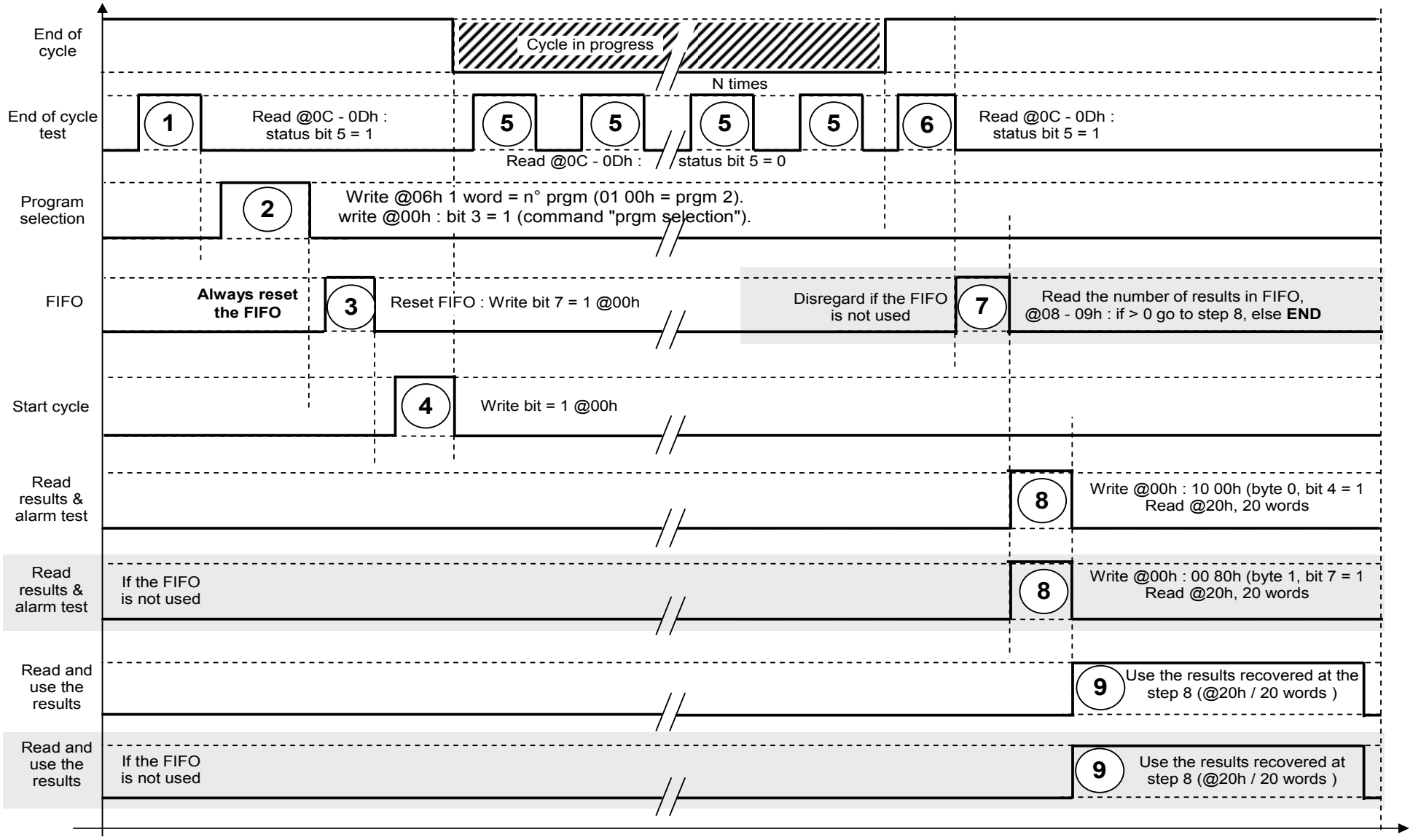
***Note 2:** the function bits (normal) are dependent of the program in edition, a program selection is to be realised.*

2.14. WRITING OF PERSONALISATION STRING

Master	Slave
1) Select the head (only if we use the network with an ATEQ central instrument). **2)** Select the number of the program to be modified. **3)** Write the personalisation string at the address 20h, 13 characters maximum (12 characters + 1 end of chain). **4)** Activate the "Personalisation write" command, write at the address 00h, the value 00 40h (byte 1, bit 6 = 1).	
	5) Acknowledgment. Byte 0 = 00h (command echo). Byte 1 = 40h (command echo). Byte 2 = FFh (error code). Byte 3 = FFh (error code). **(If error code = FF FFh: command in progress).**
	6) Running "Write personalisation" command.
	7) When the command is finished : Byte 0 = 00h (command echo). Byte 1 = 40h or 10h (command echo). Byte 2 and Byte 3 = 0 if the command is correctly carried out. Byte 2 and Byte 3 ≠ 0 error (equal to the error code value, see reading table).
8) Wait the end of the command: command echo = 00 40h and error code ≠ FF FFh. **(If error code ≠ FF FFh: end of command).**	
9) Deactivate the "Personalisation writing" command, write at the address 00h the value 00 00h (Byte 1, bit 6 = 0).	

***Note:** the personalization string is dependent of the program number in edition, a program selection is to be realised.*

3. PROFIBUS AND DEVICENET MODBUS PROGRESS CHART



Chapter 22

MODBUS F26 ADDRESSES

1. ADDRESSES

***Reminder**: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

1.1. WORD ADDRESSES

Writing and / or reading of n*words. Refer to chapter 3 "MODBUS addresses".

2. READ / WRITE PARAMETERS

The table below represents the download identifiers of the parameters.

The addresses in the MODBUS table are expressed in Words (2 bytes).

***Note:** all the choice parameters values above have a treatment by the ATEQ instruments as "longs" with fixed point (10^{-3}). A "long" is two words set.*

Identifier N°		Meaning
Dec	**Hexa**	
1	00 01	Fill time: 0 > 650 seconds.
2	00 02	Stabilization time: 0 > 650 seconds.
3	00 03	Test time: 0 > 650 seconds.
9	00 09	Dump time: 0 > 650 seconds.
10	00 0A	Coupling time 1: 0 > 650 seconds.
21	00 15	Test type: Invalid test, leak test, Mode D, Mode P, Valve Code. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Mode D: 2000. ➢ Mode P: 3000. ➢ Valve Code: 4000.
50	00 32	Minimum pressure value: - 9999 > 9999.
51	00 33	Maximum pressure value: - 9999 > 9999.
53	00 35	Pressure unit.
60	00 3C	Natural reject value of the test part: 0 > 9999.
61	00 3D	Natural reject level of the test part in recovery: 0 > 9999.
62	00 3E	Natural reject value of the reference part: 0 > 9999.
127	00 7F	Reject unit.

3. USUAL PARAMETERS STRUCTURE

Codes at the address 2700h.

Reminder*: **"h"** indicates a hexadecimal code.*

Words	D. A. address (hexa) R	D. A. address (hexa) W	Meaning	Type	Bytes	Coeff
1	2700	6700	Program number.	Word	2	
2	2701	6701	Test type: Invalid test, leak test, Mode D, Mode P, Valve Code. ➢ Invalid: 0000. ➢ Leak: 1000. ➢ Mode D: 2000. ➢ Mode P: 3000. ➢ Valve Code: 4000.	Long	4	x1000
4	2702	6702	Coupling time 1: 0 > 650 seconds.	Long	4	x1000
6	2703	6703	Fill time: 0 > 650 seconds.	Long	4	x1000
8	2704	6704	Stabilization time: 0 > 650 seconds.	Long	4	x1000
10	2705	6705	Test time: 0 > 650 seconds.	Long	4	x1000
12	2706	6706	Dump time: 0 > 650 seconds.	Long	4	x1000
14	2707	6707	Pressure unit.	Long	4	x1000
16	2708	6708	Maximum pressure value: - 9999 > 9999.	Long	4	x1000
18	2709	6709	Minimum pressure value: - 9999 > 9999.	Long	4	x1000
20	270A	670A	Reject unit.	Long	4	x1000
22	270B	670B	Natural reject value of the test part: 0 > 9999.	Long	4	x1000
24	270C	670C	Natural reject value of the reference part: 0 > 9999.	Long	4	x1000
26	270D	670D	Recovery ON / OFF	Long	4	
28	270E	670E	Natural reject level of the test part in recovery: 0 > 9999.	Long	4	x1000

4. STEPS TABLE

This table represents the codes of the steps in the cycle.

Code		Steps
Decimal	**Hexadecimal**	
0	00 00	Pre-fill.
1	00 01	Pre-dump.
4	00 04	Fill.
5	00 05	Stabilization.
6	00 06	Test.
7	00 07	Dump.
65535	FF FF	No step in progress.

5. STATUS AND REAL TIME MEASURES

Codes at the address 30h (48(d)).

Reminder*: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

This example is valid for all the series 5 instruments.

Words	Meaning
1	Program number.
2	Number of results waiting in the results FIFO memory.
3	Test type.
4	Image of the relays: Bit 0 = 1: pass part (00 01h). Bit 1 = 1: fail part. Bit 2 = 1: not used. Bit 3 = 1: not used. Bit 4 = 1: presence of an alarm. Bit 5 = 1: end of cycle. Bit 6 = 1: recoverable part Bit 7 = 1: not used.
5	Step code (refer to steps table).
6	Low pressure section word.
7	High pressure section word.
8	Pressure unit code low part word (refer to units table).
9	Pressure unit code high part word (refer to units table).
10	Leak low section word.
11	Leak high section word.
12	Leak unit code low part word (refer to units table).
13	Leak unit code high part word (refer to units table).

6. FIFO RESULTS LIST STRUCTURE

Codes at the address 10h (16(d)).

Reminder*: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, a result is stocked under a 12 word frame form contained in a FIFO of 8 results' frames.

This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 10h address.

Words	Meaning
1	Program number.
2	Test type.
3	Image of the relays: Bit 0 = 1: pass part (00 01h). Bit 1 = 1: fail part. Bit 2 = 1: not used. Bit 3 = 1: not used. Bit 4 = 1: presence of an alarm. Bit 5 = 1: reserved. Bit 6 = 1: recoverable part Bit 7 = 1: not used.
4	Alarm code (refer to the alarm codes table).
5	Pressure low part word. **(98 28)**
6	Pressure high part word. **(03 00)**
7	Pressure unit code low part word (refer to units table).
8	Pressure unit code high part word (refer to units table).
9	Leak low section word.
10	Leak high section word.
11	Leak unit code low part word (refer to units table).
12	Leak unit code high part word (refer to units table).

Note: *all the above values are treated by the ATEQ as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

Example: *for the pressure, the words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

For the unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → mbar (unit table page 52).

7. LAST RESULTS STRUCTURE

Codes at the address 11h (17(d)).

Reminder*: **"h"** indicates a hexadecimal code, **"(d)"** indicates a decimal code.*

At the end of each cycle, the last result is stocked under a 12 word frame form. This result includes the final state of the instrument (position of the relays, alarm signal, state of the indicators…), but also of the test (units, values measured for the pressure and the leak).

The last result is contained in the memory of the instrument. To obtain them, it is necessary to carry out a result read request on the slave instrument at the 11h address.

Word	Meaning	Type	Bytes	Coeff
1	Program number.	Word	2	
2	Test type.	Word	2	
3	Image of the relays: Bit 0 = 1: pass part (00 01h). Bit 1 = 1: fail part. Bit 2 = 1: not used. Bit 3 = 1: not used. Bit 4 = 1: presence of an alarm. Bit 5 = 1: reserved. Bit 6 = 1: recoverable part Bit 7 = 1: not used.	Word	2	
4	Alarm code (refer to the alarm codes table).	Word	2	
5	Pressure low part word. **(98 28)**	Long	4	x1000
6	Pressure high part word. **(03 00)**			
7	Pressure unit code low part word (refer to. Units table).	Long	4	x1000
8	Pressure unit code high part word (refer to. Units table).			
9	Leak low section word.	Long	4	x1000
10	Leak high section word.			
11	Leak unit code low part word (refer to. Units table).	Long	4	x1000
12	Leak unit code high part word (refer to. Units table).			

Note: *all the above values are treated by the ATEQ as "longs" with fixed comma (10^{-3}) thus they must be multiply by 1000 (a "long" is a whole of two words).*

Example: *for the pressure, the words 5 and 6: 98 28 03 00 → 00 03 28 98 h → 207000(d)*

For the unit code, the words 7 and 8: B0 36 00 00 → 00 00 36 B0 h → millibar (unit table page 71).

8. ALARM CODES TABLE

This list gives the alarms in hexadecimal code for the **F26** device.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	PST en stab / test
4	00 04	PPPP
5	00 05	MPMP
6	00 06	OFFD reject
7	00 07	Large leak on TEST (EEEE).
8	00 08	Large leak on REF (MMMM).
9	00 09	ATR error.
10	00 0A	Auto-test error.
11	00 0B	Pressurization error.
12	00 0C	Equalization leak error.
13	00 0D	Gabarit Press
14	00 0E	Gabarit fuite
15	00 0F	CAL error.
16	00 10	Drift CAL error.

9. UNIT TABLE

This list gives the units used in the **F26** device in hexadecimal code.

Identifier n°		Unit
Decimal	**Hexadecimal**	
1000	03 E8	cm^3/min.
2000	07 D0	cm^3/h.
6000	17 70	Pascal.
8000	1F 40	Pascal/second.
11000	2A F8	Bar.
12000	2E E0	KiloPascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	MegaPascal.
18000	46 50	KiloPascal/seconde.
33000	80 E8	CAL.

Appendices 1
UNIVERSAL LISTS

The lists and tables presented below cover all the identifiers and codes present in all the **ATEQ** series 5 instruments.

1. PARAMETER DOWNLOADING IDENTIFIERS

* Only if the option is **installed** in the device and **validate** in the configuration (extended menus).

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
0	00 00			Invalid ID	Y	Y	Y	Y	Y	Y	
1	00 01	2001	6001	Fill time.		Y	Y	Y	Y	Y	Y
2	00 02	2002	6002	Stabilization time.		Y	Y	Y	Y	Y	Y
3	00 03	2003	6003	Test time.	Y	Y	Y	Y	Y	Y	Y
4	00 04			Up time.							
5	00 05			Down time.							
6	00 06	2006	6006	Pre fill time. (1)		Y	Y		Y	Y	
7	00 07	2007	6007	Pre dump time. (1)		Y			Y	Y	
8	00 08			Coupling time (unused).							
9	00 09	2009	6009	Dump time.		Y			Y	Y	Y
10	00 0A	200A	600A	Coupling time 1.		Y	Y	Y	Y	Y	Y
11	00 0B	200B	600B	Coupling time 2. (2)		Y	Y	Y	Y	Y	
12	00 0C			Stamping time. (2)							
13	00 0D			CAL number associated to the rank.							
14	00 0E			Waiting time 1 CAL set.							
15	00 0F			Min. supervision CAL threshold (D2P).							
16	00 10			Maximum supervision CAL threshold (D2P).							
17	00 11			Minimum threshold reject (number of master turn).							
18	00 12			Maximum threshold reject (number of master turn).							
19	00 13			Nominal Test value (HT instruction).							
20	00 14	2014	6014	Part volume.		Y	Y		Y		Y
21	00 15	2015	6015	Test type.	Y	Y	Y	Y	Y	Y	Y
22	00 16			End of cycle type. (1)							
23	00 17			RS232 sending conditions.							
24	00 18			Line feed after the result frame.							
25	00 19			Program 1 options validation.							
26	00 1A			Program 2 options validation.							
27	00 1B			Relays code.							
28	00 1C			Sequencing conditions. (1)							
29	00 1D	201D	601D	Time between 2 chained cycles. (1)		Y	Y	Y		Y	Y
30	00 1E			Stamping condition. (2)							
31	00 1F			Start cycle time delay.							
32	00 20			Ground continuity offset.							
33	00 21			Counter.							
34	00 22			Calibration drift (D2P)							

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
35	00 23			Number of cycle between two calibration check.							
36	00 24			Running program.							
37	00 25			Cycle type associated to the rank.							
38	00 26			Range 1 options validation.							
39	00 27			Range 2 options validation.							
40	00 28			Sequence 1 options validation.							
41	00 29			Sequence 2 options validation.							
42	00 2A			General 1 options validation.							
43	00 2B			General 2 options validation.							
44	00 2C			Learning value.							
45	00 2D			ATR adjustment percent. (1)							
46	00 2E	202E	602E	Measurement mode (all devices). Antenna type selection (VT520)	Y						
47	00 2F			Measurement unit.							
48	00 30			Results maintain time between two cycles.							
49	00 31			Active dump (F2P).							
50	00 32	2032	6032	Minimum pressure value.	Y	Y	Y	Y	Y	Y	Y
51	00 33	2033	6033	Maximum pressure value.	Y	Y	Y	Y	Y	Y	Y
52	00 34	2034	6034	Test mode. Transmitter configuration (VT520)	Y						
53	00 35	2035	6035	Pressure unit.	Y	Y	Y	Y	Y	Y	Y
54	00 36			Station number.							
55	00 37			Temperature correction coefficient. (1)							
56	00 38			Calibration check reject.							
57	00 39			Calibration volume.							
58	00 3A			Calibration exponent.							
59	00 3B			Calibration instruction.							
60	00 3C	203C	603C	Natural reject level of the test part.		Y	Y	Y	Y	Y	Y
61	00 3D	203D	603D	Natural reject level recovery test part.		Y	Y	Y	Y	Y	Y
62	00 3E	203E	603E	Natural reject level of the reference part.		Y		Y		Y	
63	00 3F	203F	603F	Natural reject level recovery reference Part.		Y		Y		Y	
64	00 40			Valve code.							
65	00 41			Measurement mode selection.							
66	00 42	2042	6042	Fill instruction value.		Y	Y	Y	Y	Y	Y
67	00 43	2043	6043	Pre-fill instruction value. (1)		Y	Y			Y	
68	00 44	2044	6044	Sealed component mode: standard or large leak. (2)		Y				Y	
69	00 45			Sealed component low reject threshold percent. (2)							
70	00 46			Sealed component high reject threshold percent. (2)							
71	00 47			Number of failed parts before alarm.							
72	00 48	2048	6048	Calibration drifts percent. (1)		Y		Y		Y	
73	00 49	2049	6049	Screen light intensity value.			Y	Y	Y	Y	
74	00 4A			Target pressure.							
75	00 4B			Waiting time 2, CAL set.							
76	00 4C			Stabilization time, CAL set.							
77	00 4D			Test time, CAL set.							
78	00 4E			Calibration pressure.							
79	00 4F			Ground continuity, start type.							
80	00 50	2050	6050	Differential auto reset time.		Y		Y			

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
81	00 51			Step number.							
82	00 52			Test exhaustion number.							
83	00 53			Calibration coefficient high part.							
84	00 54			Calibration coefficient low part.							
85	00 55			Minimum reject threshold n°2.							
86	00 56			Maximum reject threshold n°2.							
87	00 57			Board to read choice.							
88	00 58			P ATR 1 2							
89	00 59			Color print condition.							
90	00 5A			Output codes.							
91	00 5B			Line feed at each end of sequence.							
92	00 5C			Number of line feed at the end of sequence.							
93	00 5D			Correction voltage.							
94	00 5E			Double leaf opening time out.							
95	00 5F			Rising edge detection.							
96	00 60			RS232 serial link speed.							
97	00 61			RS232 serial link parity.							
98	00 62			Line feed before result frame.							
99	00 63			Line feed between each result in a frame.							
100	00 64			Program page selection.							
101	00 65			Automatic reset.							
102	00 66	2066	6066	Type of permanent blowing. (2)		Y				Y	
103	00 67	2067	6067	Fill type. (1)		Y	Y	Y		Y	
104	00 68	2068	6068	Pre-fill type. (1)		Y	Y			Y	
105	00 69			Program name personalization. (1)							
106	00 6A	206A	606A	Commutation time of the equalization valve calibration check.		Y					
107	00 6B	206B	606B	ATR absorption tolerance. (1)		Y		Y		Y	Y
108	00 6C	206C	606C	Transient start value (ATR). (1)		Y		Y		Y	Y
109	00 6D			Systematic fill with fail part. (1)							
110	00 6E	206E	606E	Type of external dump. (2)		Y				Y	
111	00 6F	206F	606F	Reference volume.		Y					
112	00 70	2070	6070	Function attributed to the entry of special cycles. (1)		Y	Y			Y	
113	00 71			Function attributed to the remote F1 key. (2)							
114	00 72			Function attributed to the remote F2 key. (2)							
115	00 73			Function attributed to the remote F3 key. (2)							
116	00 74			Function attributed to the remote F4 key. (2)							
117	00 75			Permanent blowing pressure instruction. (1)		Y				Y	
118	00 76	2076	6076	Original unit for calculation of rejects in cm3/min.		Y			Y		Y
119	00 77	2077	6077	Minimum pressure sealed component. (2)		Y				Y	
120	00 78	2078	6078	Maximum pressure sealed component. (2)		Y				Y	
121	00 79	2079	6079	Fill time of the internal volume. (2)		Y				Y	
122	00 7A	207A	607A	Sealed component transfer time. (2)		Y				Y	
123	00 7B	207B	607B	Choice of the language.		Y	Y	Y	Y	Y	Y
124	00 7C	207C	607C	Reject in calibration check.		Y					
125	00 7D	207D	607D	Percentage of the calibration check. (1)		Y					
126	00 7E	207E	607E	Maximum pressure value in pre-fill. (1)		Y	Y		Y	Y	
127	00 7F	207F	607F	Reject unit.		Y	Y	Y	Y	Y	Y

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
128	00 80			Instruction value during a calibration.		Y		Y		Y	
129	00 81			Program curve choice.							
130	00 82			Frequency curve 1.							
131	00 83			Frequency curve 2.							
132	00 84			Curve acquisition mode.							
133	00 85			Sensor choice curve 1.							
134	00 86			Sensor choice curve 2.							
135	00 87	2087	6087	Percentage concerning the auto parametering. (2)						Y	
136	00 88			RS485 serial link speed. (2)							
137	00 89			RS485 serial link station number. (2)							
138	00 8A			Fill regulator number. (2)						Y	
139	00 8B			Pre-fill regulator number. (2)						Y	
140	00 8C	208C	608C	Percentage for the temperature compensation. (1)		Y				Y	
141	00 8D	208D	608D	Test time for the temperature compensation. (1)		Y				Y	
142	00 8E			Max pressure recovery test (2 piezzos sensors). (2)		Y					
143	00 8F			Min pressure recovery test (2 piezzos sensors). (2)		Y					
144	00 90	2090	6090	Setup of the outputs (standard or compact).		Y	Y			Y	
145	00 91	2091	6091	Program number to copy.		Y	Y		Y	Y	
146	00 92	2092	6092	Program number to paste.		Y	Y		Y	Y	
147	00 93	2093	6093	Minimum pre fill. (1)		Y	Y				
148	00 94	2094	6094	Filtering. (1)		Y	Y	Y		Y	Y
149	00 95	2095	6095	Unit type SI or USA. (1)		Y		Y		Y	
150	00 96	2096	6096	Pressure instruction.				Y			
151	00 97	2097	6097	Offset on a flow.				Y			
152	00 98			RS232 serial link type.							
153	00 99			RS485 serial link type. (2)							
154	00 9A	209A	609A	Piezzo reset type.				Y			
155	00 9B	209B	609B	Standard customer temperature (T° correction). (1)			Y	Y		Y	
156	00 9C	209C	609C	Standard customer pressure (press. correction). (1)			Y	Y		Y	
157	00 9D			Used fluid density. (1)							
158	00 9E	209E	609E	Percents of the bar graph. (2)			Y	Y			
159	00 9F			Pressure difference (minimum threshold).							
160	00 A0			Pressure difference (maximum threshold).							
161	00 A1	20A1	60A1	Volume unit.		Y				Y	
162	00 A2			Delta P correction instruction.							
163	00 A3			Calibration instruction.							
164	00 A4	20A4	60A4	Following program number in sequencing. (1)		Y	Y	Y		Y	Y
165	00 A5	20A5	60A5	Number of cycles between two piezzos reset.		Y		Y		Y	
166	00 A6	20A6	60A6	Time between two piezzos reset.		Y		Y		Y	
167	00 A7			Charge time coil.							
168	00 A8			Discharge time coil.							
169	00 A9			Minimum level (number of turns in short circuit).							
170	00 AA			Maximum level (number of turns in short circuit).							
171	00 AB			HV mini. supervision threshold in instruction percent.							
172	00 AC			HV max. supervision threshold in instruction percent.							
173	00 AD			Number of turns of the master coil.							
174	00 AE			Relays commut time between charge and discharge.							
175	00 AF	20AF	60AF	Regulator check during its learning. (2)		Y					

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
176	00 B0			Reference volume parameter.						Y	
177	00 B1			Test volume parameter.						Y	
178	00 B2			Internal reserve volume parameter.							
179	00 B3			Internal test volume parameter.						Y	
		20B3	60B3	Dump volume value.		Y					
180	00 B4			Capillary characteristics.							
181	00 B5			Calibration pressure parameter.							
182	00 B6			Instruction pressure parameter.							
183	00 B7			Turns number of the master coil 1.							
184	00 B8			Turns number of the master coil 2.							
185	00 B9			Beginning rise pressure.							
186	00 BA			Step pressure.							
187	00 BB			Step time.							
188	00 BC			Final Pressure.							
189	00 BD			Step minimum pressure.							
190	00 BE			Step maximum pressure.							
191	00 BF			Step minimum flow.							
192	00 C0			Step maximum flow.							
193	00 C1			Switch type parameter during the rise.							
194	00 C2			Switch type parameter during the down.							
195	00 C3			Minimum flow rise parameter.							
196	00 C4			Maximum flow rise parameter.							
197	00 C5			Rise minimum pressure.							
198	00 C6			Rise maximum pressure.							
199	00 C7			Down minimum pressure.							
200	00 C8			Down maximum pressure.							
201	00 C9			Maximum pressure second piezzo sensor. (2)							
202	00 CA			Minimum pressure second piezzo sensor. (2)							
203	00 CB	20CB	60CB	Regulator check during its learning. (2)		Y					
204	00 CC			Start time for the differential area calculation.							
205	00 CD			End time for the differential area calculation.							
206	00 CE			Result choice, turns in short circuit or nb of turns.							
207	00 CF			Impulsions number before measurement.							
208	00 D0			Start signal for the corona effect calculation.							
209	00 D1			Stop signal for the corona effect calculation.							
210	00 D2			Stop signal for the corona effect calculation.							
211	00 D3			Waiting time before coil charge.							
212	00 D4			Waiting time before coil discharge.							
213	00 D5			Curve type display, result (large graphic screen).							
214	00 D6			Curve to display choice (large graphic display).							
215	00 D7			Curve regeneration curve (large graphic display).							
216	00 D8			Curve to display, old, new, etc…							
217	00 D9			Electronic regulator instruction, indirect mode. (2)							
218	00 DA	20DA	60DA	Flow unit for the master jet. (1)				Y			
219	00 DB	20DB	60DB	Flow value of the master jet. (1)				Y			
220	00 DC	20DC	60DC	Pressure value of the master jet. (1)				Y			
221	00 DD	20DD	60DD	Atmospheric pressure value for the master jet. (1)				Y			
222	00 DE	20DE	60DE	Temperature value for the master jet. (1)				Y			

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
223	00 DF	20DF	60DF	Drift value for the master jet. (1)				Y			
224	00 E0	20E0	60E0	Flow unit for the master part. (1)				Y			
225	00 E1	20E1	60E1	Flow value for the master part. (1)				Y			
226	00 E2	20E2	60E2	Pressure value for the master part. (1)				Y			
227	00 E3	20E3	60E3	Atmospheric pressure for the master part. (1)				Y			
228	00 E4	20E4	60E4	Temperature value for the master part. (1)				Y			
229	00 E5			Density parameter.							
230	00 E6			ATEQ VT country code.							
231	00 E7			ATEQ ER pressure control.							
232	00 E8			Authorized ATR drift in reject threshold percent. (1)							
233	00 E9	20E9	60E9	Quick reset.		Y					
234	00 EA			Automatic reset time.							
235	00 EB			Alcohol injection time.							
236	00 EC			Fill time.							
237	00 ED			Dump time.							
238	00 EE			Vacuum extraction time.							
239	00 EF			Atmosphere restoration time.							
240	00 F0			Minimum vacuum instruction.							
241	00 F1			Suction check drift.							
242	00 F2			Automatic UV time.							
243	00 F3			Differential valve commutation time.							
244	00 F4			Input 3 configuring.							
245	00 F5			Input 4 configuring.							
246	00 F6			Input 5 configuring.							
247	00 F7			Input 6 configuring.							
248	00 F8			Input 7 configuring.							
249	00 F9			Programmed external output 1 delay time.							
250	00 FA			Programmed external output 2 delay time.							
251	00 FB			Programmed external output 3 delay time.							
252	00 FC			Programmed external output 4 delay time.							
253	00 FD			Programmed external output 5 delay time.							
254	00 FE			Programmed external output 6 delay time.							
255	00 FF			Programmed internal output 2 delay time.							
256	01 00			Programmed internal output 1 delay time.							
257	01 01			Programmed auxiliary output 1 delay time.							
258	01 02			Programmed auxiliary output 2 delay time.							
259	01 03			Programmed auxiliary output 3 delay time.							
260	01 04			Programmed auxiliary output 4 delay time.							
261	01 05			Programmed external output 1 duration time.							
262	01 06			Programmed external output 2 duration time.							
263	01 07			Programmed external output 3 duration time.							
264	01 08			Programmed external output 4 duration time.							
265	01 09			Programmed external output 5 duration time.							
266	01 0A			Programmed external output 6 duration time.							
267	01 0B			Programmed internal output 2 duration time.							
268	01 0C			Programmed internal output 1 duration time.							
269	01 0D			Programmed auxiliary output 1 duration time.							
270	01 0E			Programmed auxiliary output 2 duration time.							

Dec	Hexa	R/W	R/W	Meaning	VT	F	G	D	F4	MF	F5P
271	01 0F			Programmed auxiliary output 3 duration time.							
272	01 10			Programmed auxiliary output 4 duration time.							
273	01 11			Dump time for calibration check.							
274	01 12	2112	6112	Pressure filtering.				Y			
275	01 13			DP filtering.							
276	01 14	2114	6114	Fill percent.				Y			
277	01 15	2115	6115	Pneumatic configuration during the rest phase.				Y			
278	01 16	2116	6116	Electronic regulator state during the rest phase. (2)				Y			
279	01 17			Reference cycle start type.							
280	01 18	2118	6118	Reference program associated.				Y			
281	01 19			Capillary number if double capillary. (2)				Y			
284	01 1C			Type of gas.				Y			
293	01 25	2125	6125	Time (min) to run reference cycle (all devices) Frequency selection (VT520)	Y						
310	01 36	2136	6136	Valve type.	Y						
311	01 37	2137	6137	Trigger mode.	Y						
314	01 3A	213A	613A	Valve identifier.	Y						
315	01 3B			Start pressure instruction burst test mode.		Y					
322	01 42	2142	6142	Minimum temperature.	Y						
323	01 43	2143	6143	Maximum temperature.	Y						
324	01 44	2144	6144	Temperature unit.	Y						
325	01 45	2145	6145	Minimum acceleration.	Y						
326	01 46	2146	6146	Maximum acceleration.	Y						
327	01 47	2147	6147	Power transmission.	Y						
334	01 4E			Rise time burst test mode.		Y					
335	01 4F			Step time burst test mode.		Y					
336	01 50			Number of stages burst test mode.		Y					
339	01 53	2153	6153	Measure range.							Y
340	01 54	2154	6154	ATR transient value. (1)		Y				Y	
341	01 55			Capillary 1 type. (2)				Y			
342	01 56			Capillary 2 type. (2)				Y			

2. TABLE OF THE UNIT CODES

This list gives the hexadecimal code of all the units used by all the the ATEQ instruments.

Identifier n°		Unit
Decimal	**Hexadecimal**	
0000	00 00	$Cm^3/s.$
1000	03 E8	$Cm^3/min.$
2000	07 D0	$Cm^3/h.$
3000	0B B8	$Mm^3/h.$
4000	0F A0	Calibrated Pascal.
5000	13 88	Calibrated Pascal/second.
6000	17 70	Pascal.
7000	1B 58	High resolution Pascal.
8000	1F 40	Pascal/second.
9000	23 28	High resolution Pascal/second.
10000	27 10	Second.
11000	2A F8	Bar.
12000	2E E0	Kilopascal.
13000	32 C8	PSI.
14000	36 B0	Millibar.
15000	3A 98	Mega Pascal.
16000	3E 80	Litre.
17000	42 68	Calibration unit.
18000	46 50	Kilopascal/second.
19000	4A 38	Millimetre.
20000	4E 20	Mega ohm.
21000	52 08	Ohm.
22000	55 F0	Kilovolt.
23000	59 D8	Ampere.
24000	5D C0	Milliampere.
25000	61 A8	Milliohm.
26000	65 90	Percent (%).
27000	69 78	Kilowatt.
28000	6D 60	Volt.
29000	71 48	dB.
30000	75 30	Litre/hour.

Identifier n°		Unit
Decimal	**Hexadecimal**	
31000	79 18	Millihenry.
32000	7D 00	Microfarad.
33000	80 E8	Cal.
34000	84 D0	Factory cal.
35000	88 B8	Calibrated Kilopascal.
36000	8C A0	Calibrated Kilopascal/second.
37000	90 88	Rotation/min.
38000	94 70	Giga ohm.
39000	98 58	Watt.
40000	9C 40	Degrees (in diphase shift).
41000	A0 28	No unit.
42000	A4 10	mbar/second.
43000	A7 F8	D mode Pascal.
44000	AB E0	Low resolution Pascal.
45000	AF C8	Low resolution Pascal/second.
46000	B3 B0	$Inch^3$/s.
47000	B7 98	$Inch^3$/min.
48000	BB 80	$Inch^3$/hour.
49000	BF 68	$Feet^3$/hour.
50000	C3 50	Millilitre/second.
51000	C7 38	Millilitre/minute.
52000	CB 20	Millilitre/hour.
53000	CF 08	Litre/min.
54000	D2 F0	$Meter^3$/hour.
55000	D6 D8	$Millimètre^3$.
56000	DA C0	$Centimètre^3$.
57000	DE A8	Microsecond.
58000	E2 90	USA cm^3/s same as the cm^3/s.
59000	E6 78	USA cm^3/min same as the cm^3/min.
60000	EA 60	USA cm^3/h same as the cm^3/h.
61000	EE 48	Millilitre.
62000	F2 30	Litre.
63000	F6 18	$Inch^3$.
64000	FA 00	$Feet^3$.
65000	FD E8	Gram/second.

Identifier n°		Unit
Decimal	**Hexadecimal**	
66000	01 01 D0	Gram/minute.
67000	01 05 B8	Gram/hour.
68000	01 09 A0	Oz (US) /second.
69000	01 0D 88	Oz (US) /minute.
70000	01 11 70	Oz (US) /hour.
71000	01 15 58	Oz (UK) /second.
72000	01 19 40	Oz (UK) /minute.
73000	01 1D 28	Oz (UK) /hour.
74000	01 21 10	US Gallon.
75000	01 24 F8	UK Gallon.
76000	01 28 E0	$Feet^3$/second.
77000	01 2C C8	$Feet^3$/minute.
78000	01 30 B0	No unit.

3. TABLE OF THE ALARM CODES

This list gives the code in hexadecimal of all the alarms used by all of the ATEQ instruments.

Identifier n°		Alarm
Decimal	**Hexadecimal**	
0	00 00	No alarm.
1	00 01	Pressure switched alarm (test pressure too high).
2	00 02	Pressure switch (test pressure too small).
3	00 03	Large leak on TEST (EEEE).
4	00 04	Large leak on REF (MMMM).
7	00 07	Sensor out of order (overrun).
8	00 08	ATR error.
9	00 09	ATR drift.
10	00 0A	CAL error.
11	00 0B	Volume too small (sealed component).
12	00 0C	Volume too large (sealed component)
14	00 0E	Equalization valve switching error.
16	00 10	CAL drift.
29	00 1D	No pressure.
43	00 2B	Pressure too high.
44	00 2C	Pressure too low.
45	00 2D	Piezo sensor out of order.
46	00 2E	Dump error.
47	00 2F	CAL drift error.
48	00 30	Calibration check error.
49	00 31	Leak in calibration check too high.
50	00 32	Leak in calibration check too low.
51	00 33	Sealed component learning error.

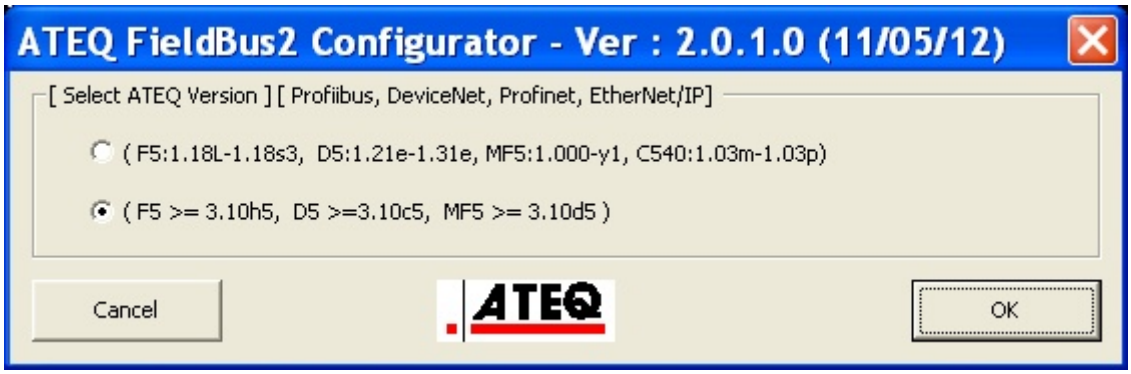
Appendices 2
FIELDBUS MANAGER USE

***ATTENTION**: check having chosen the same mode with Fieldbus and Sycon.*

1. PROGRAM STARTING

To start the software, double click on the icon:

The following window appears:



Select the family which is the instrument to configure. Then click on the "**OK**" button (to get out of the software, click on the "**Cancel**" button.

***ATTENTION**: In ATEQ instrument, one of the two following modules is installed:*

- ***Com** module (Ex: **Com**-DNS)*
- ***ComX** module (Ex: **ComX** 100XX-DP/DPS)*

With ComX module, you must select the second option in ATEQ Version.

(F5>=3.10h5 , D5>=3.10c5 , MF5>=3.10d5).

To identify which kind module is installed in ATEQ instrument, from le front panel of the instrument, go to:

- ***Services Menu***
- ***Fieldbus***

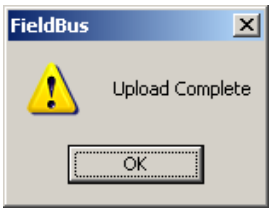
The detection of the protocol type (Profibus, DeviceNet and Profinet, EtherNet/IP) is automatic.

2. CONFIGURATION WITH FIELDBUS

To detect the module, it needs:

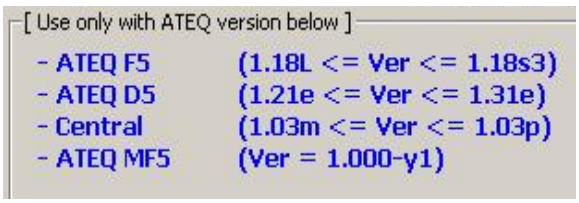
- select the communication port concerned (COM) by using the pick list (PC port on which one the instrument is connected),
- click on "**Search Device**" button.

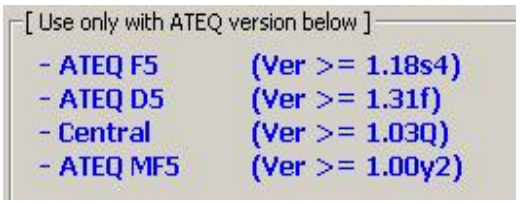
An information window will be opened to indicate that the detected module information are downloaded.



If Fieldbus Manager doesn't detect the module, the opposite message appears:

It is important to check that the instrument and its version are on the list written on the window *("Use only with ATEQ version below")* else the configuration can cause serious malfunctioning in the instrument.



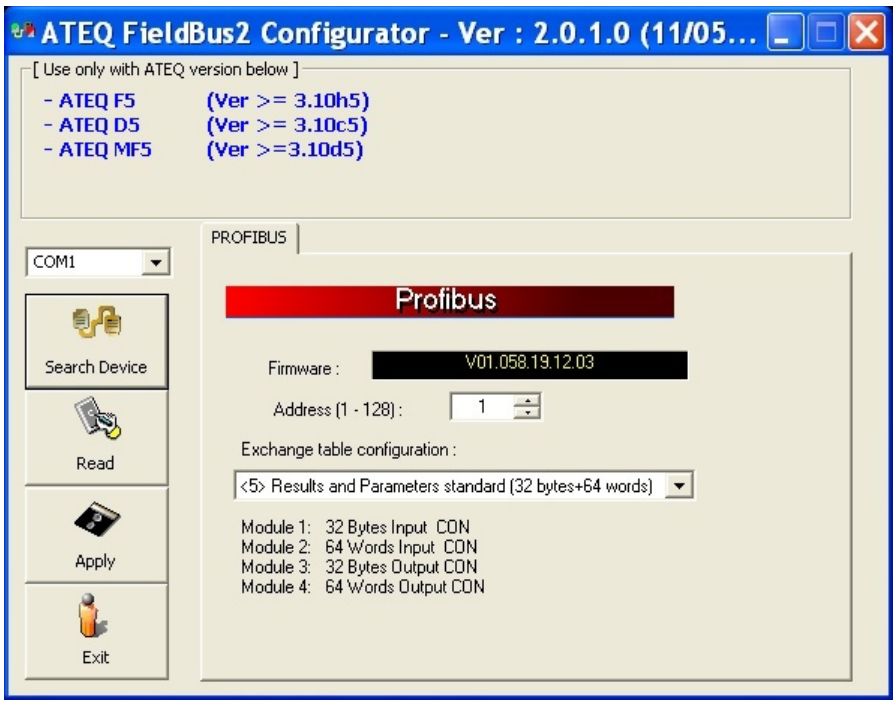


2.1. PROFIBUS NETWORK CONFIGURATION

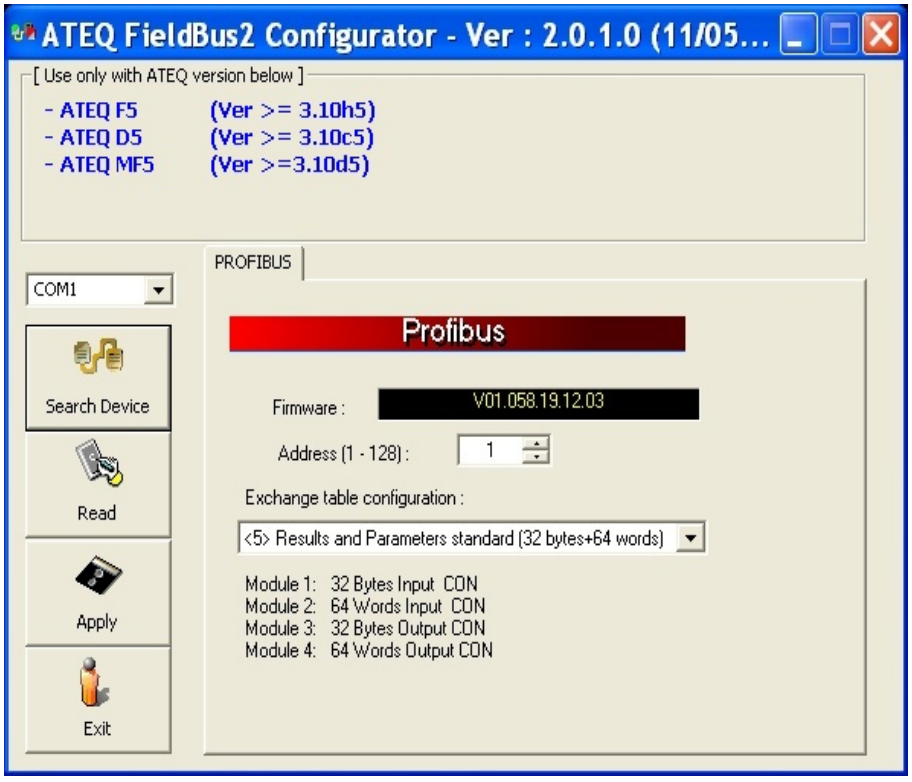
In the window "**Address**" configure the module address (between 1 and 128).

In the window "**Exchange table configuration**" choose in the list the hoped configuration mode (choice from 1 to 5 following the number of parameters to be managed).

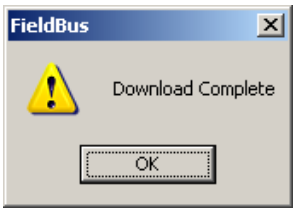
For further information on the configuration mode, see *chapter 14 "Profibus Networks".*



When the parameters are selected, click on the "**Apply**" button to download them into the module.

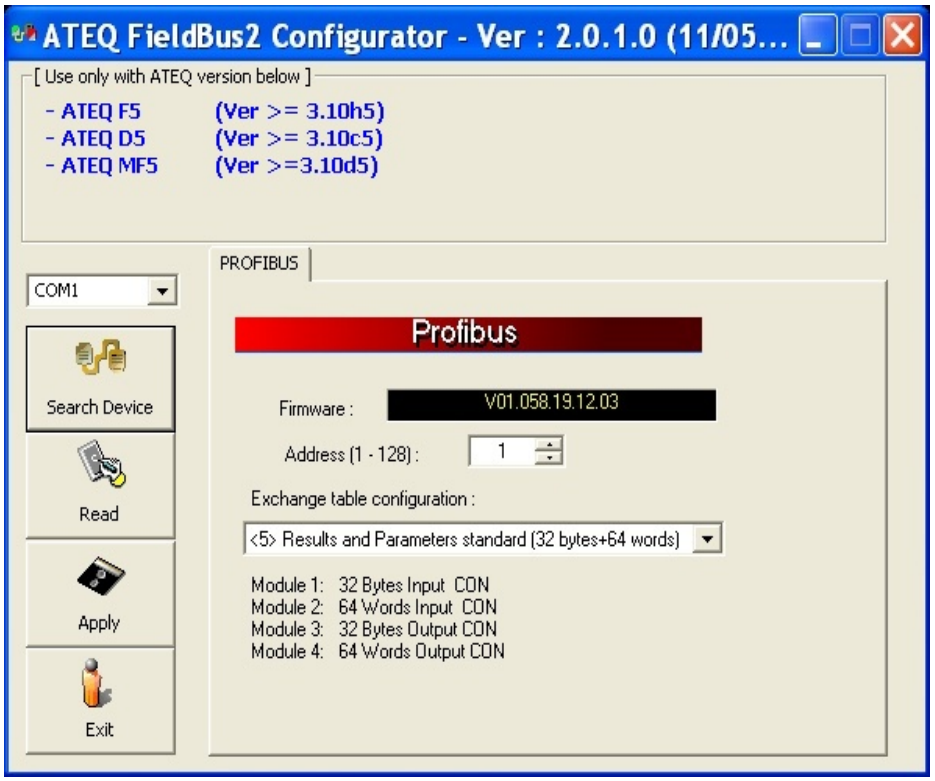


An information window will be opened to indicate the good downloading of the parameters into the module.

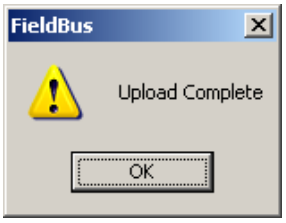


2.2. PROFIBUS CONFIGURATION READING

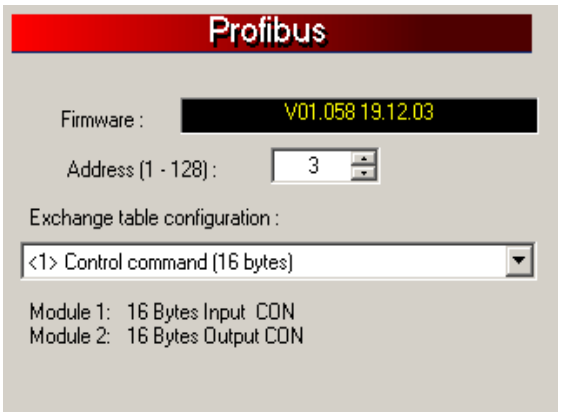
To read the parameters contained into the module, click on the "**Read**" button to display them on the screen.

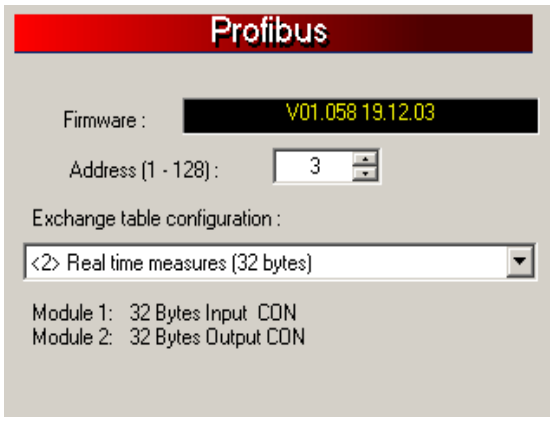


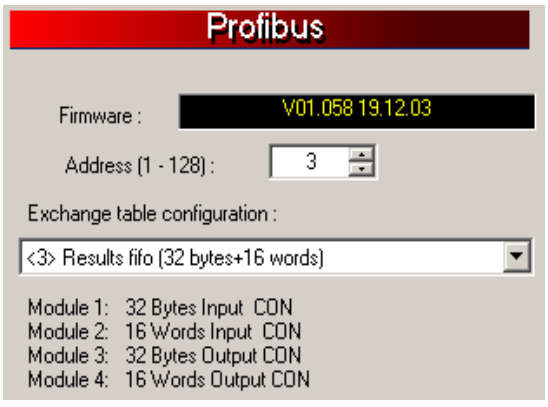
An information window will be opened to indicate that the information is downloaded from the module.

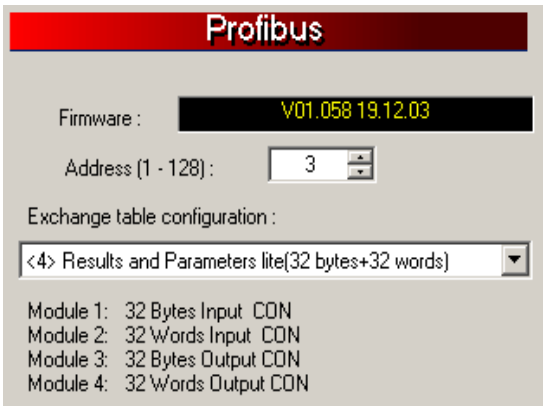


Depending of the module mode, the different configurations can be displayed.









2.3. DEVICENET NETWORK CONFIGURATION

In the "**Address**" window, configure the module address (between 1 and 63).

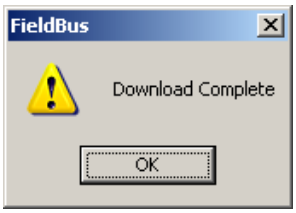
In the "**Baud rate**" window select the "**Auto**" mode.

In the "**Exchange table size**" window choose in the pick list the hoped configuration (choice from 1 to 5 following the number of parameters to be managed).

For further information on the configuration mode see the *chapter 15 "DeviceNet networks".*

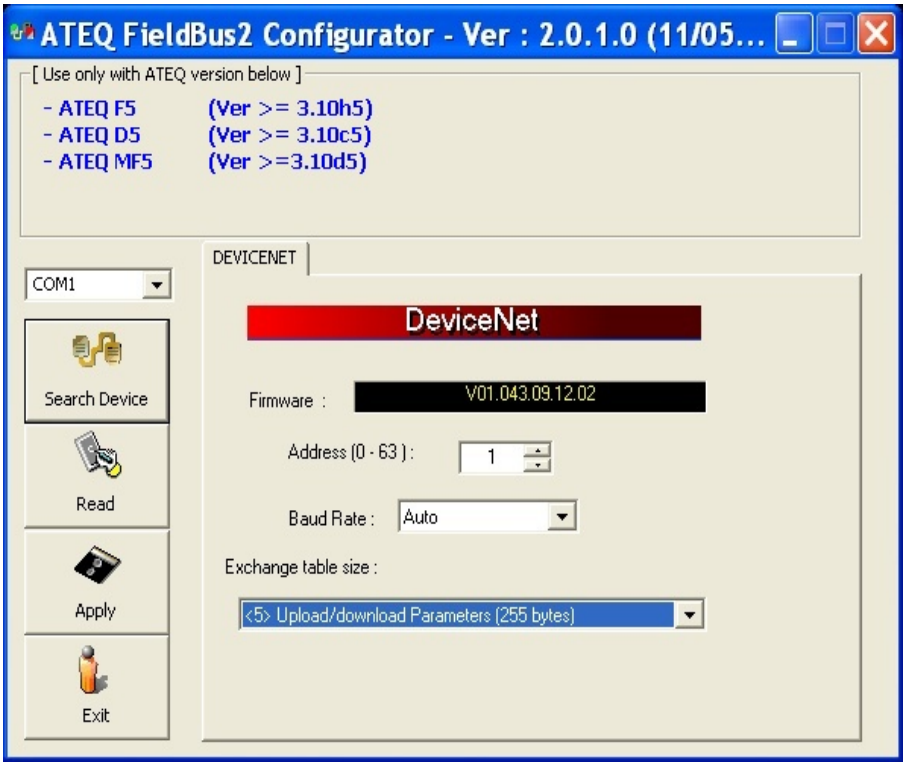
When the parameters are selected, click on the "**Apply**" button to download them into the module.

An information window will be opened to indicate the good downloading of the parameters into the module.

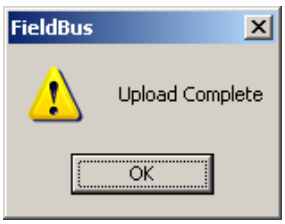


2.4. DEVICENET CONFIGURATION READING

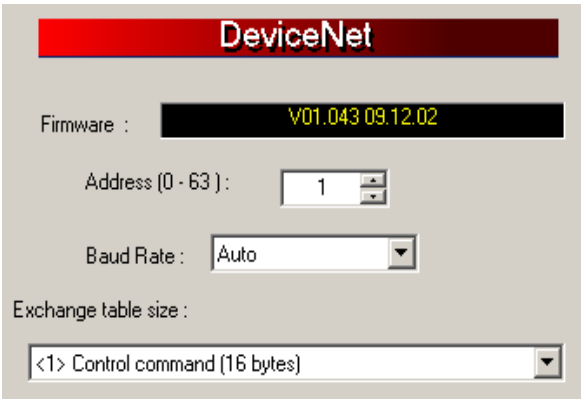
To read the parameters contained into the module, click on the "**Read**" button to display them on the screen.

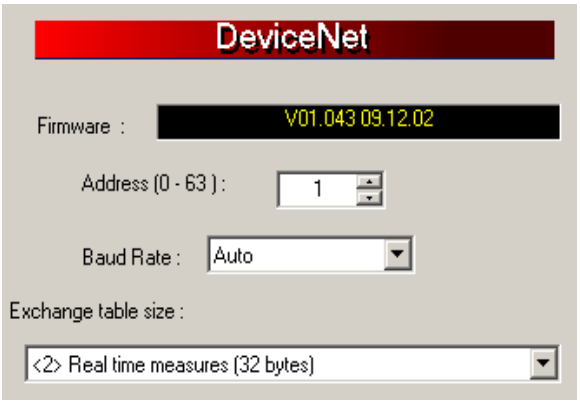


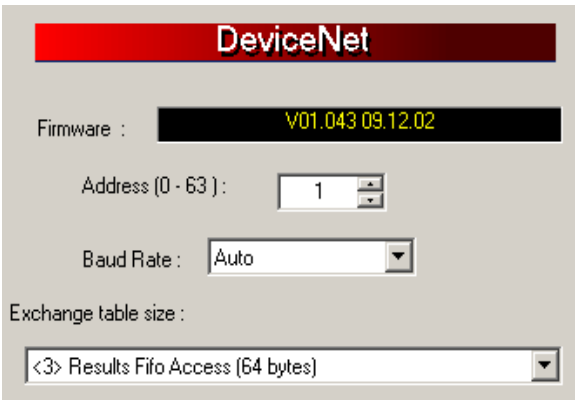
An information window will be opened to indicate that the information is downloaded from the module.

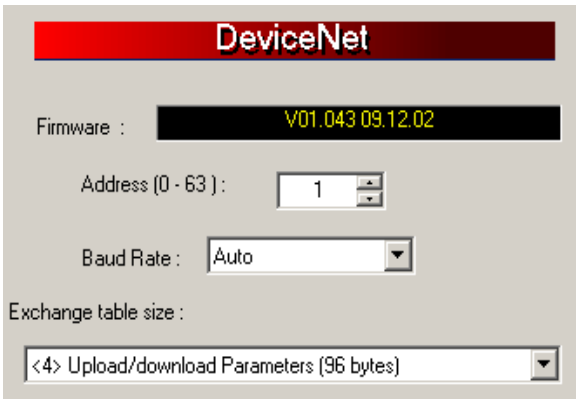


Depending of the module mode, the different configurations can be displayed.









2.5. PROFINET NETWORK CONFIGURATION

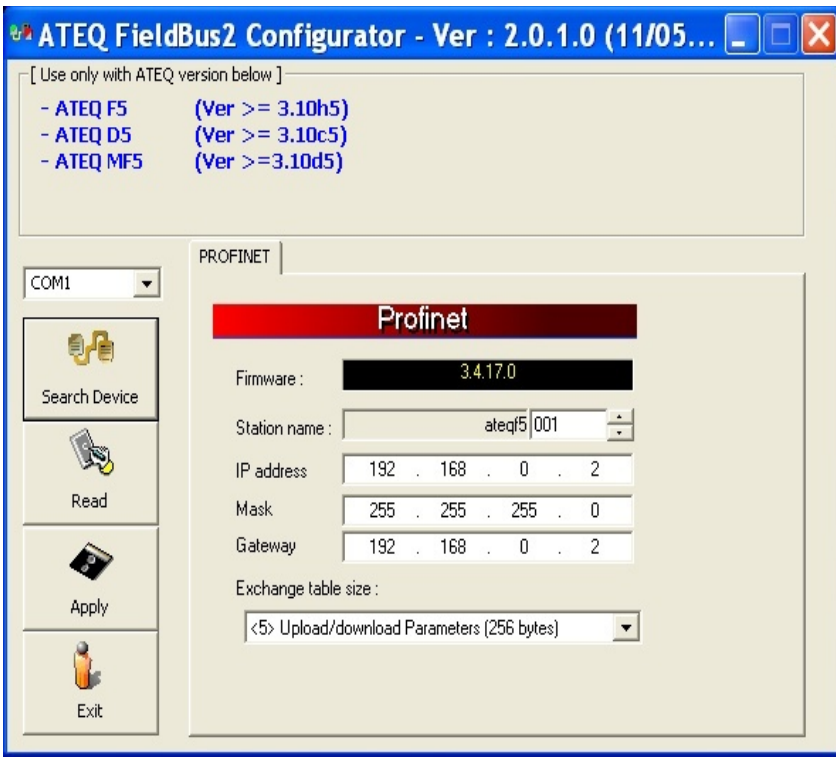
In the "**Station name**" window, configure the module address (between 1 and 255).

The Station name always is:

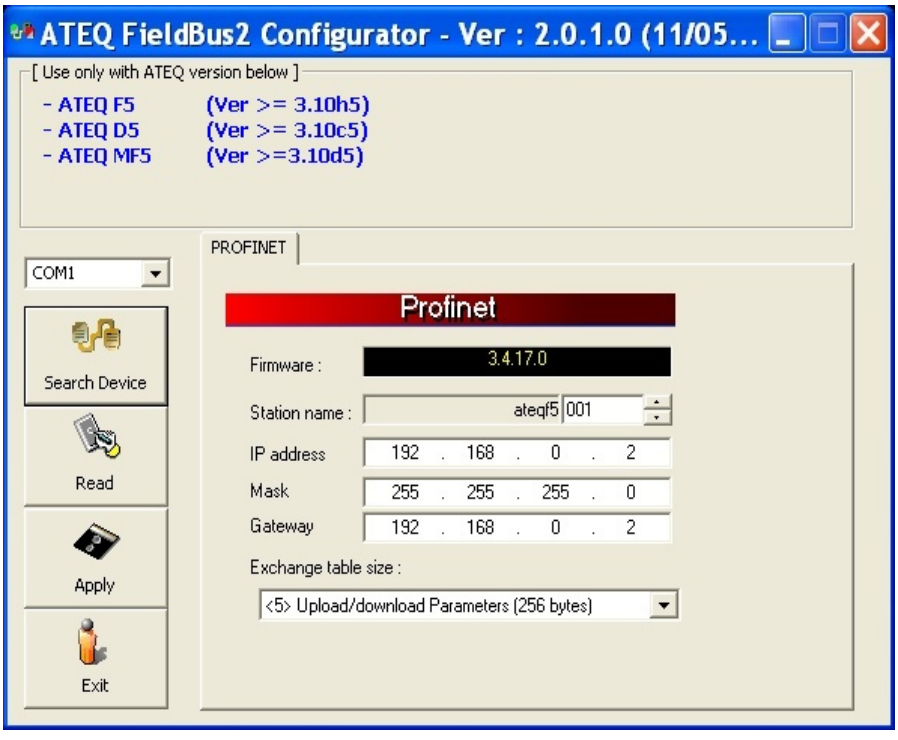
- **ateqf5 + address** for a F5 instrument (Ex: ateqf5001).
- **ateqd5 + address** for a D5 instrument (Ex: ateqd5001).

In the "**Exchange table size**" window choose in the pick list the hoped configuration (choice from 1 to 5 following the number of parameters to be managed).

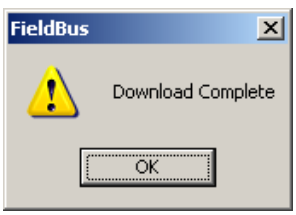
For further information on the configuration mode see the *chapter 15 bis "Profinet networks".*



When the parameters are selected, click on the "**Apply**" button to download them into the module.

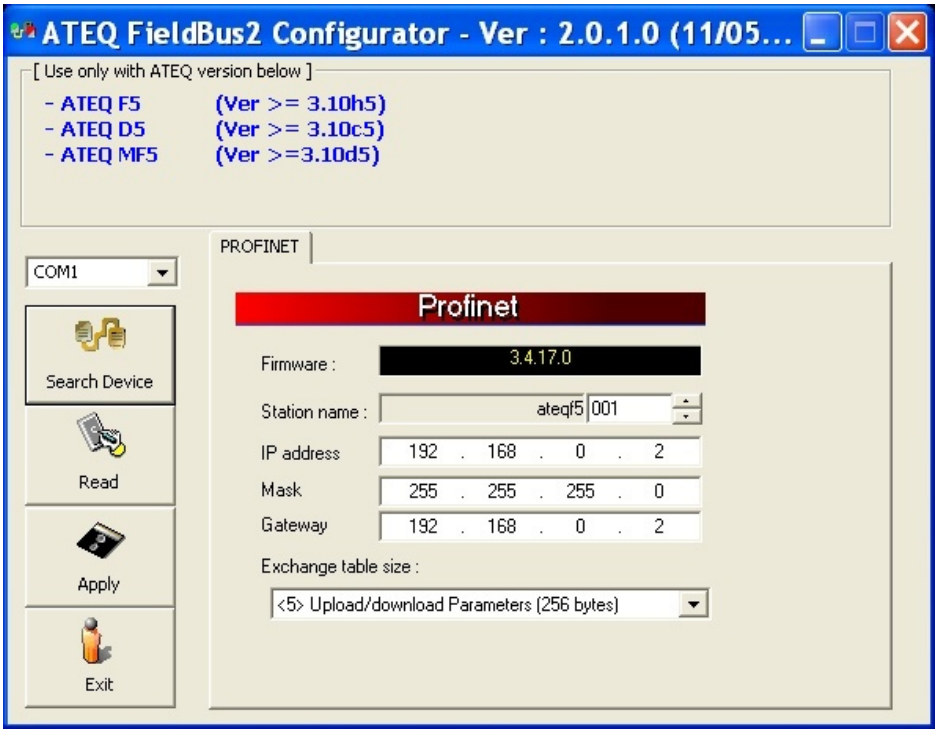


An information window will be opened to indicate the good downloading of the parameters into the module.

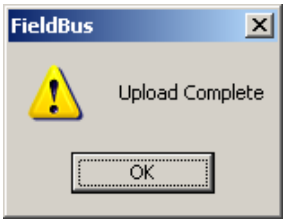


2.6. PROFINET CONFIGURATION READING

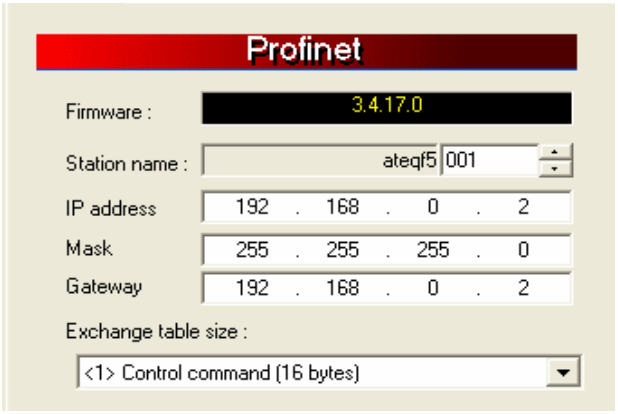
To read the parameters contained into the module, click on the "**Read**" button to display them on the screen.

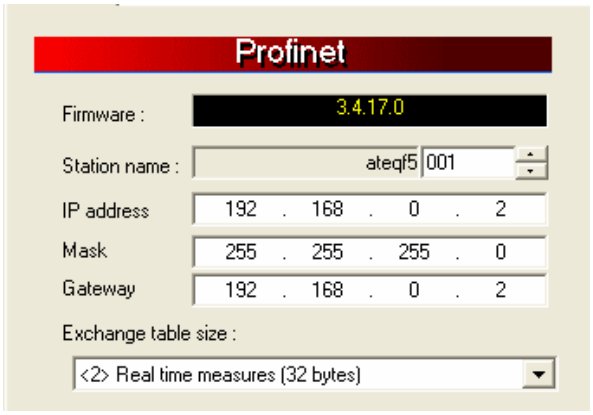


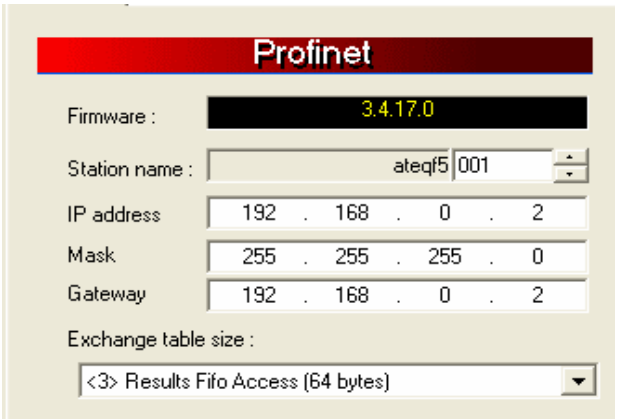
An information window will be opened to indicate that the information is downloaded from the module.

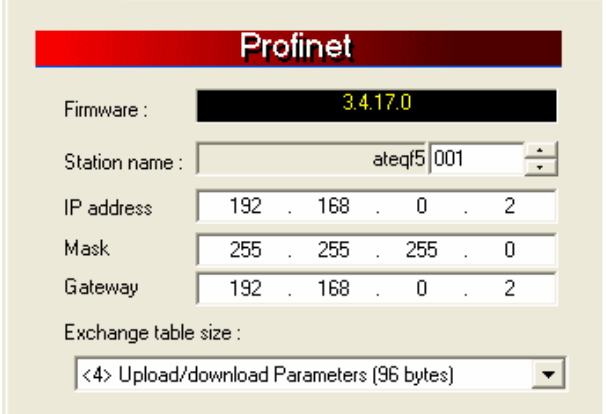


Depending of the module mode, the different configurations can be displayed.









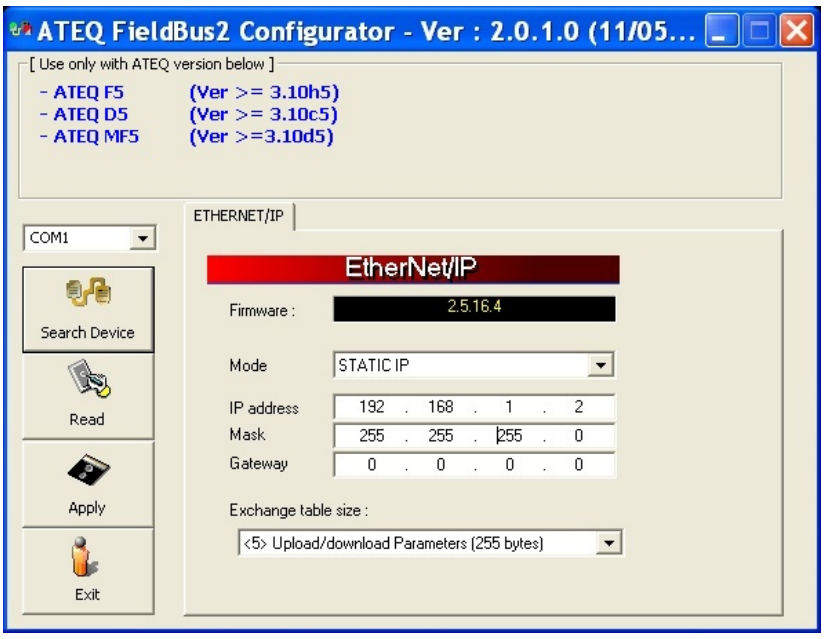
2.7. ETHERNET/IP NETWORK CONFIGURATION

In the "**Mode**" section, select DHCP or Static IP.

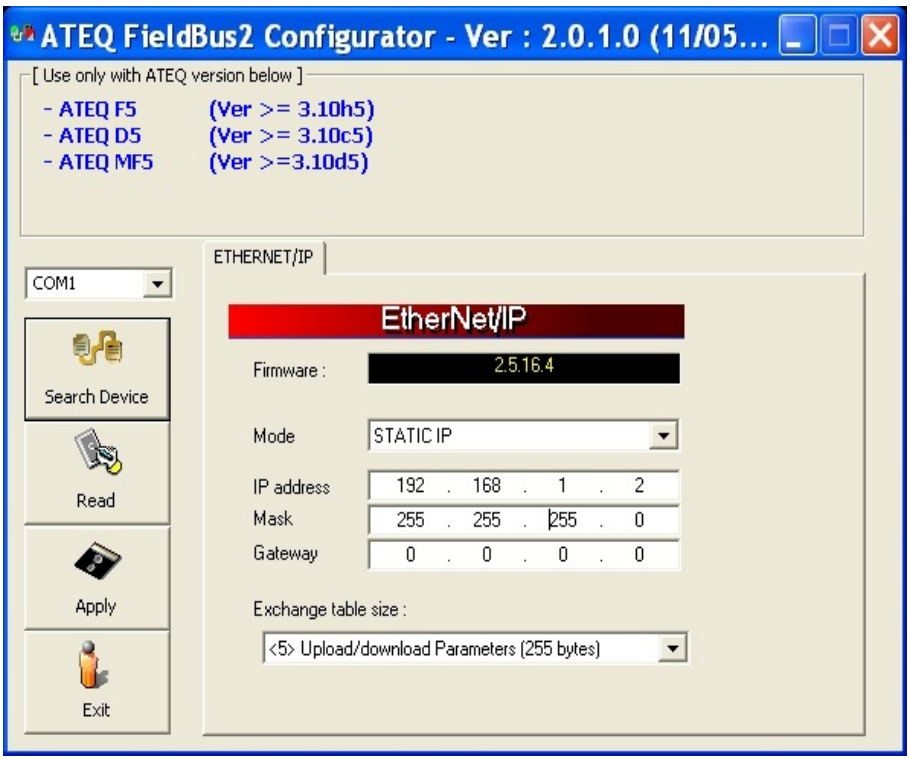
Configure the IP address, mask and gateway.

In the "**Exchange table size**" section choose in the pick list the hoped configuration (choice from 1 to 5 following the number of parameters to be managed).

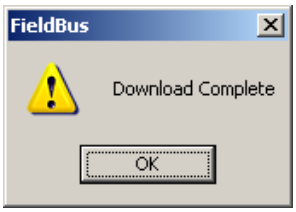
For further information on the configuration mode see the *chapter 15 bis "EtherNet/IP networks".*



When the parameters are selected, click on the "**Apply**" button to download them into the module.

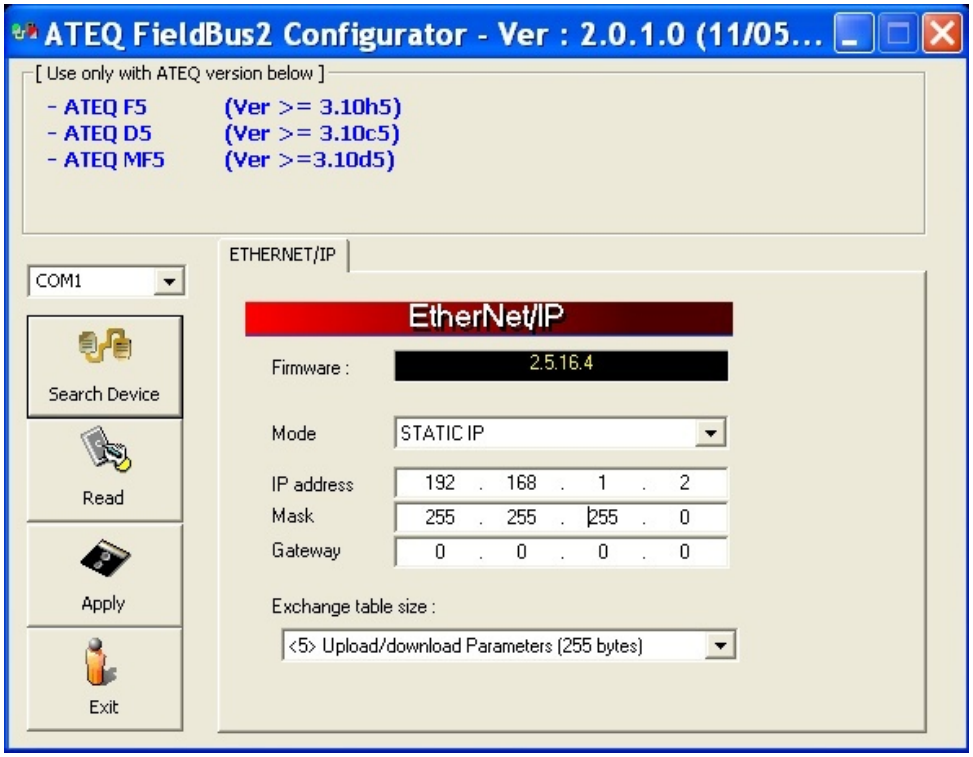


An information window will be opened to indicate the good downloading of the parameters into the module.

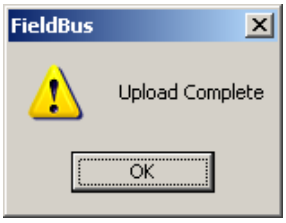


2.8. ETHERNET/IP CONFIGURATION READING

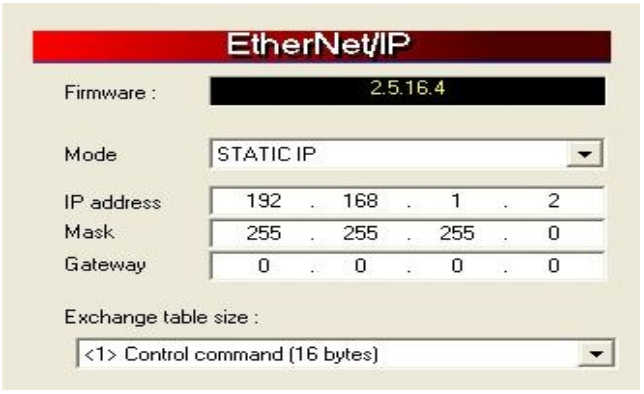
To read the parameters contained into the module, click on the "**Read**" button to display them on the screen.

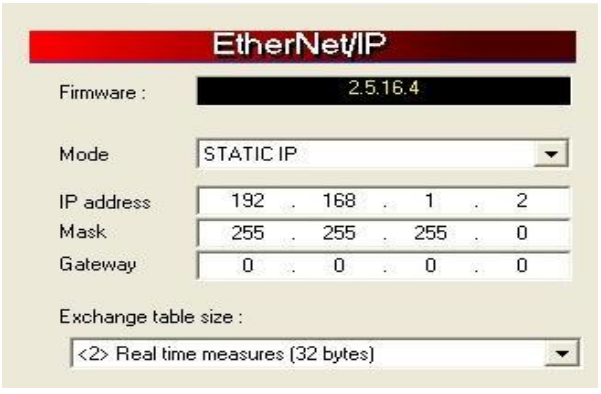


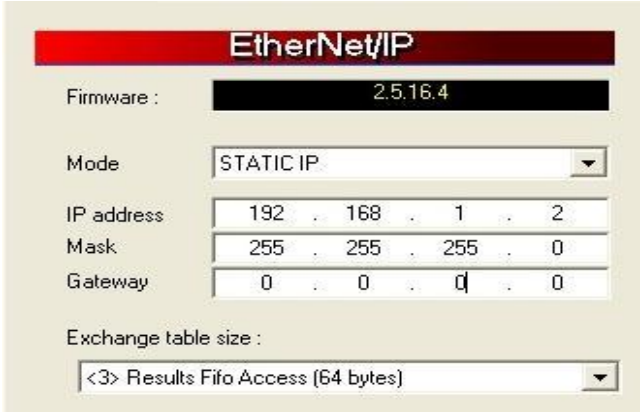
An information window will be opened to indicate that the information is downloaded from the module.

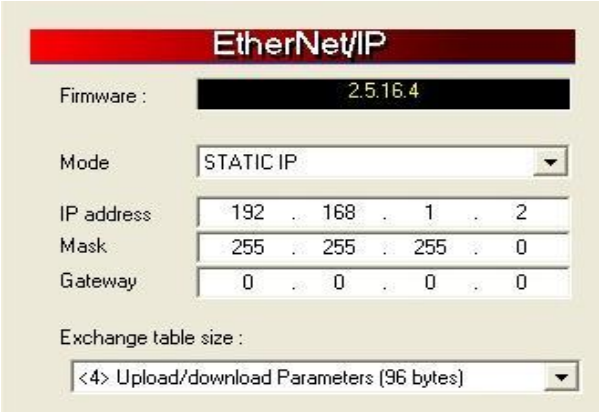


Depending of the module mode, the different configurations can be displayed.









Appendices 3

SYCON INSTALL AND USE

1. DRIVERS INSTALLATION

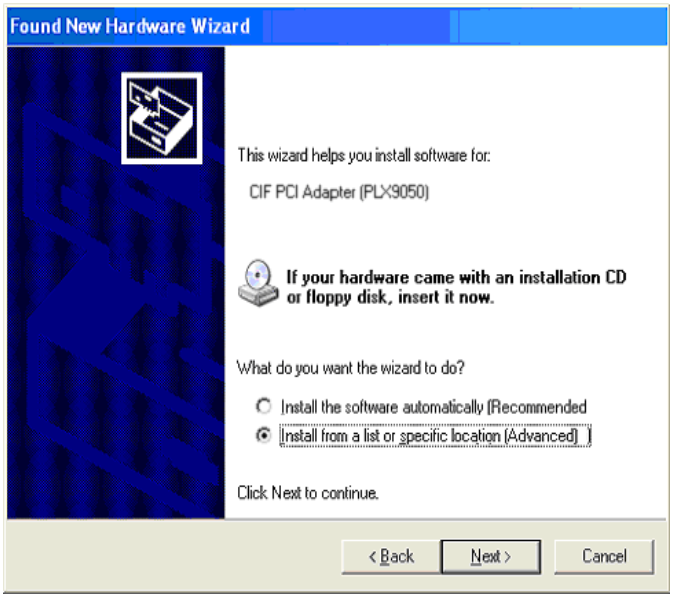
1.1. WINDOWS WIZARD

Once the DeviceNet board connected, at the starting of the Window operating system, the board is automatically detected.

The following window is opened to install the drivers.

Select to not be connected to the windows update by validate "**No, not this time**" then click on the "**Next >**" button.

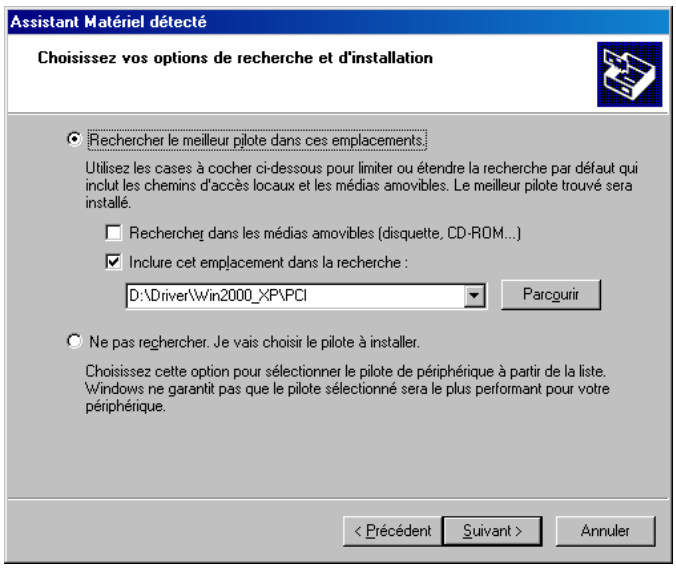
Select the installation from a specified location by validating on "**Install from a list or specific location (advanced)**" then click on the "**Next >**" button.



Then insert the install CDROM and then seek the path (see example on the opposite side) by clicking on the "**Browse**" button.

Depending of the PC, the path for the CD reader can be different.

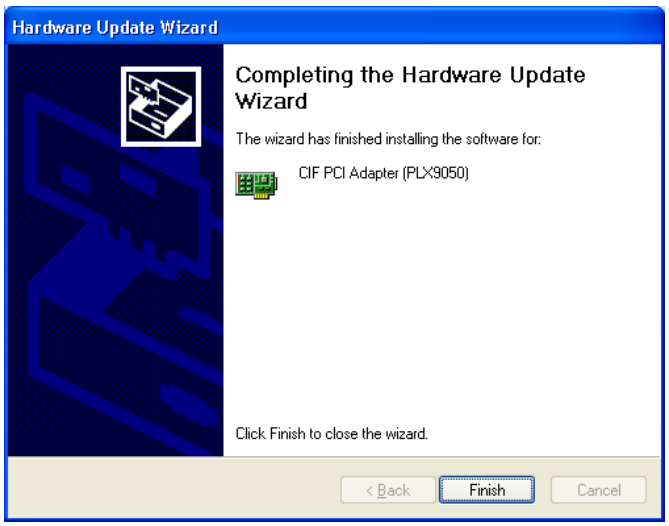
Click on the "**Next >**" button to validate.



The installation in starting and the drivers are copying on the PC.

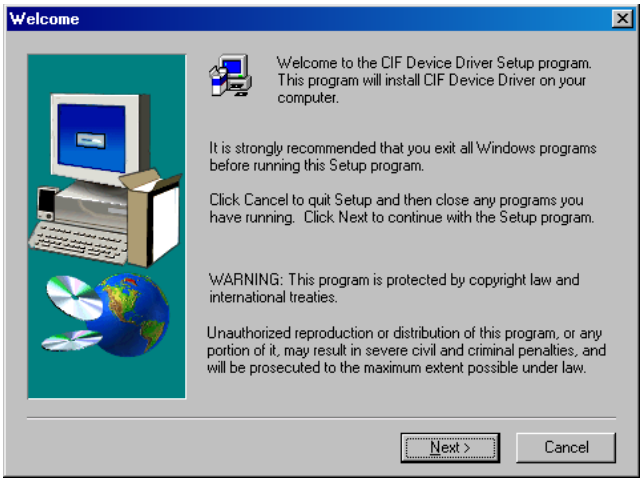
Once the window (on the opposite side) appears, it's meaning that the drivers are correctly installed.

Click on the "**Finish**" button to exit from the hardware update wizard.



1.2. CIF DEVICE DRIVERS INSTALLATION

Search in the CDROM the folder named "**Driver**". This folder contains software "**Setup.exe**". At the first window click on "**Next >**".



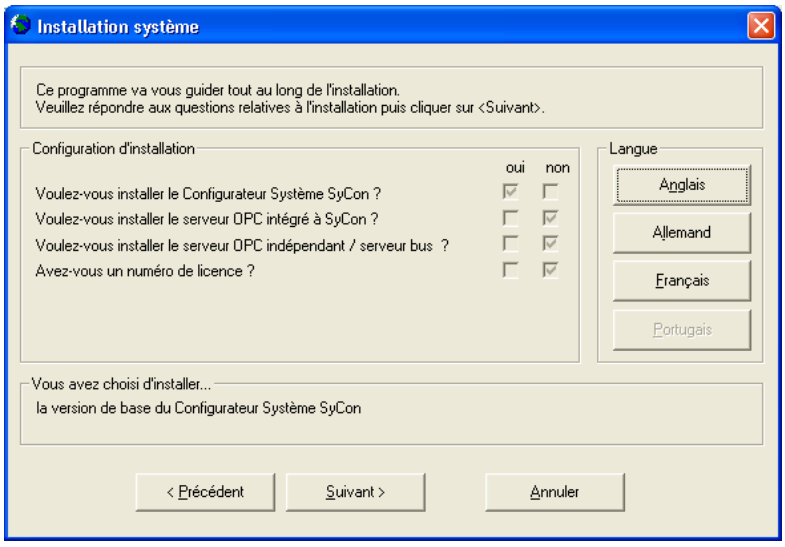
It's better to leave the default location for the installation. Click on "**Next >**".

Click twice on "**Next >**". The installation is made. Click on "**Finish**" to exit from the installation.

1.3. SOFTWARE INSTALLATION

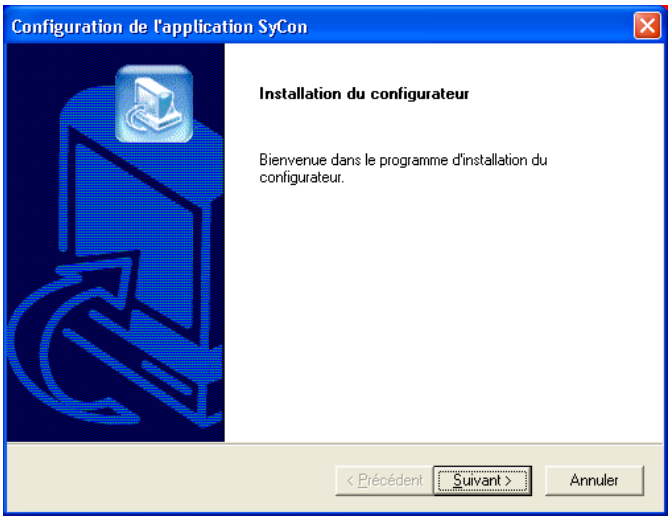
When inserting the CDROM in the reader, a window is displayed during the automatic start.

Select the language on the right side then activate the boxes as the example on the opposite side:



Click on the "**Next >**" button.

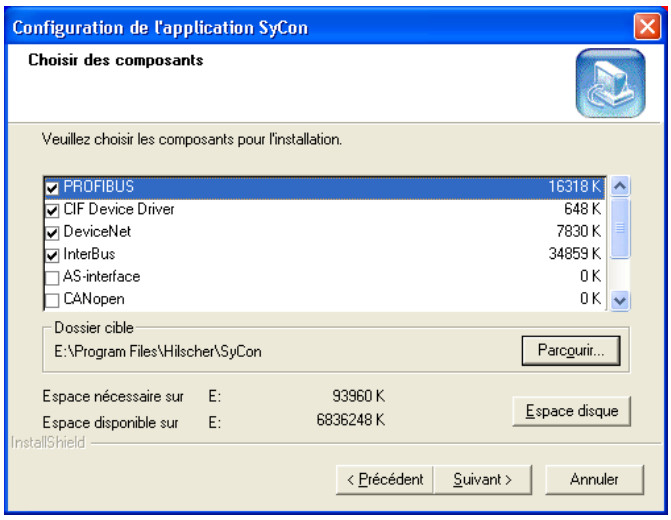
Click on "**Next >**" to continue the installation processing.



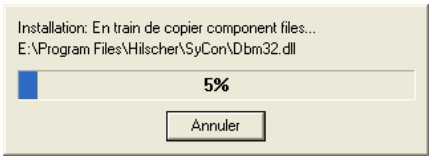
In the objects to install screen selection, all the components are validated. To not installing the unused components, invalidates the following ones:

- AS Interface,
- CAN open,
- Control Net,
- Interbus.

It's better to leave the install path by default for the components. The click on "**Next >**" to start the installation.

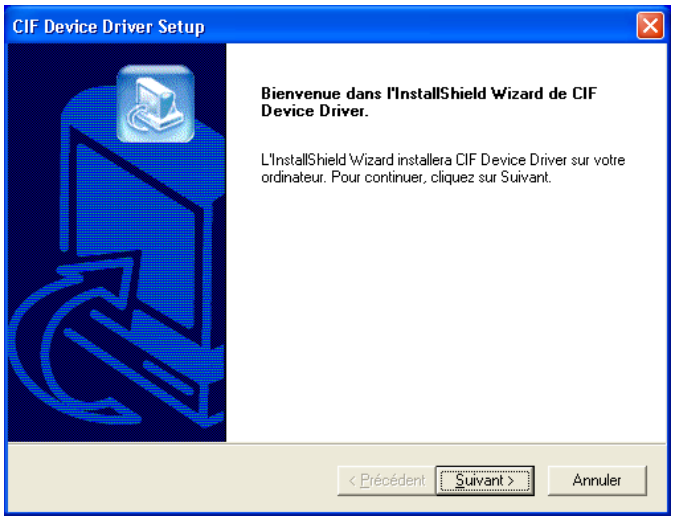


The Sycon, Profibus and DeviceNet installation will be successive.

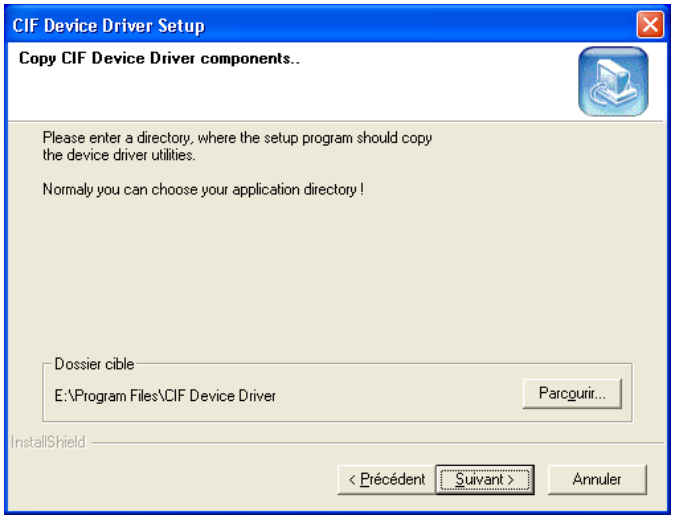


If one or several errors like the example on the opposite side appear, click on "**OK**", these errors won't have any influence on the good process of the installation.

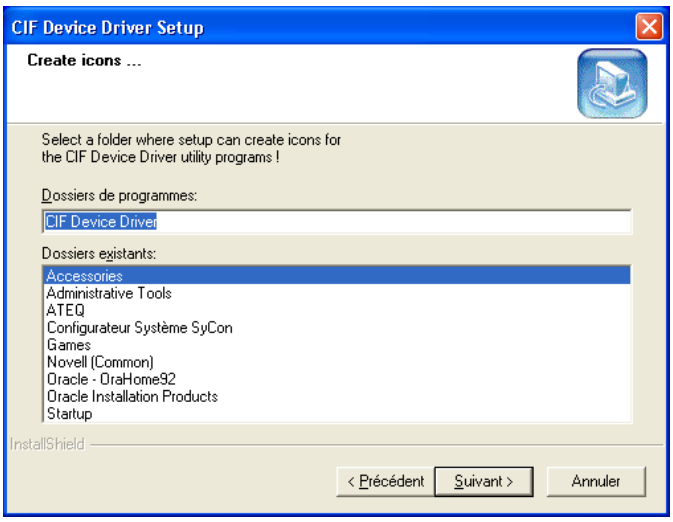
Click on "**Next >**" to continue.



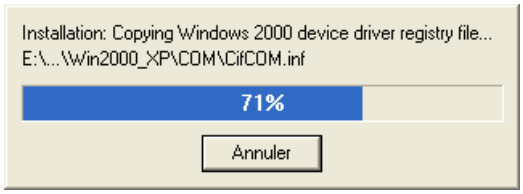
Click on the "**Next >**" button to start the installation. (Leave the default installation path).



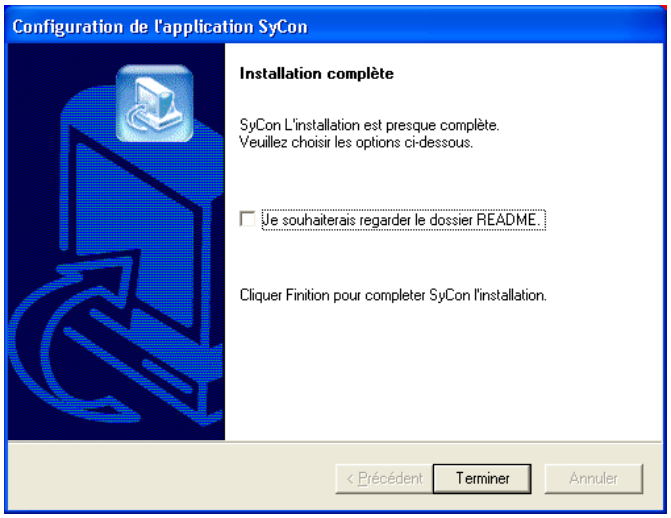
Click on "**Next >**".



The "**CIF Device Driver**" installation is started.



To finish the set of installations, click on the "**Finish**" button.

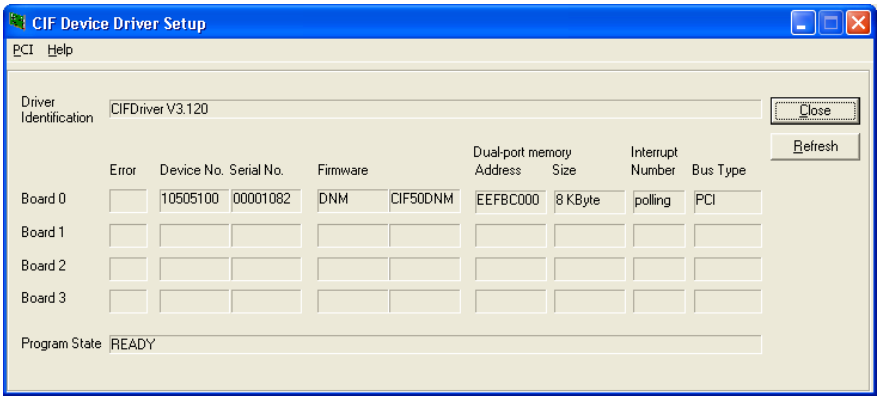


1.4. PERIPHERAL CONNEXION VALIDATION

Go in the "**Start**", "**Programs**", "**CIF Device Driver**" menu and then start "**CIF Device Driver Setup**".

The field "**Board**" indicates if the boards are inserted. In the columns "**Firmware**" the correspondences are the following ones:

- DNM = DeviceNet.
- PB = Profibus.

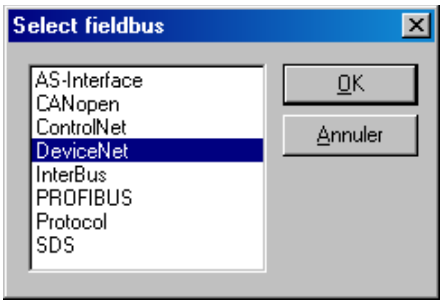


2. DEVICENET CONFIGURATION WITH SYCON

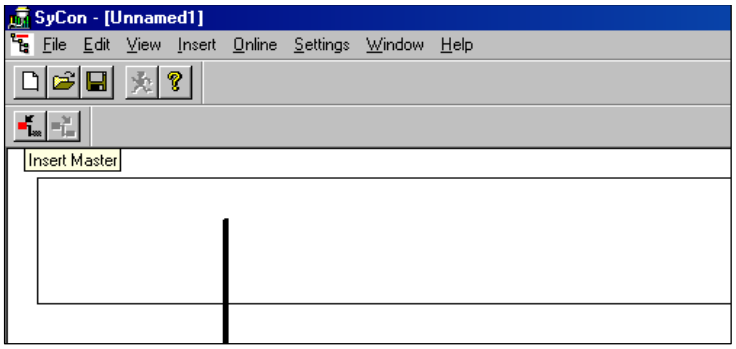
To launch Sycon, open the menu "**Start**", "**Programs**", "**Sycon System Configuration**" and then start "**Sycon**".

Click on "**File**" then "**New**".

Select "**DeviceNet**" then click on "**OK**".

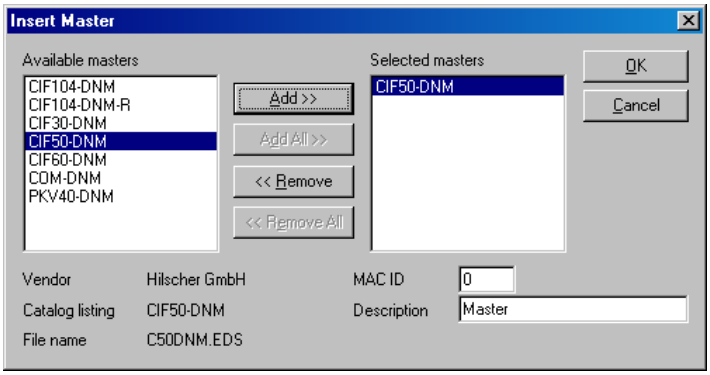


Click on the icon "**Insert Master**".

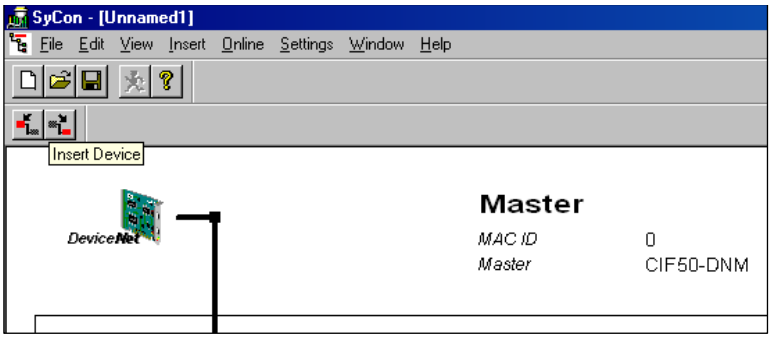


In the window "**Insert Master**", click on "**CIF50-DNM**", click on "**Add**" and then on "**OK**".

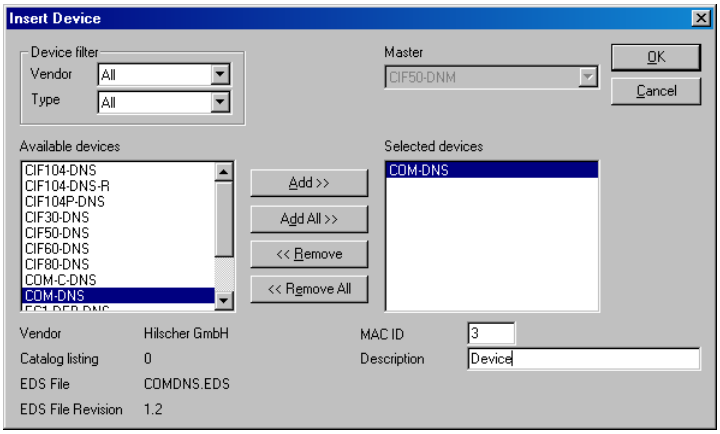
The software will allocate your "**Master**" automatically to the "**DeviceNet**" board. Validate by cliquing on "**Yes**".



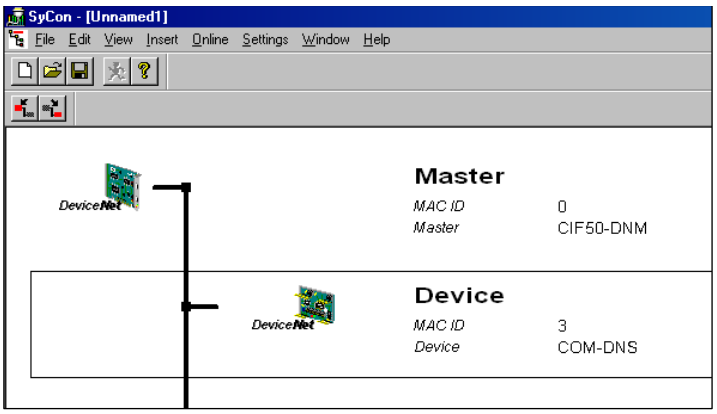
Then click on the icon "**Insert Device**" and click down the rectangle in the screen on the line (cursor with a "**D**" and an arrow).



In the window "**Insert Device**", click on "**COM-DNS**", click on "**Add**" and then on "**OK**". In the "**MAC ID**" case write the address of your instrument.

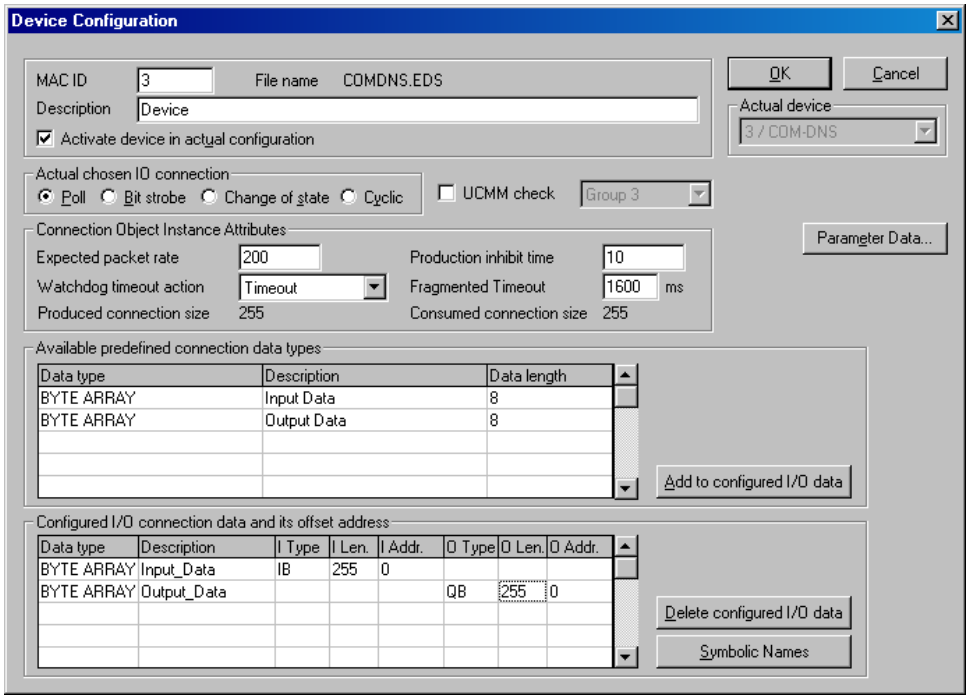


Double click on the rectangle of the "**Slave**" a window is opened.



In this example, the configuration will be made for the "**Standard**" mode.

Check first your instrument address by changing the "**MAC ID**" value.



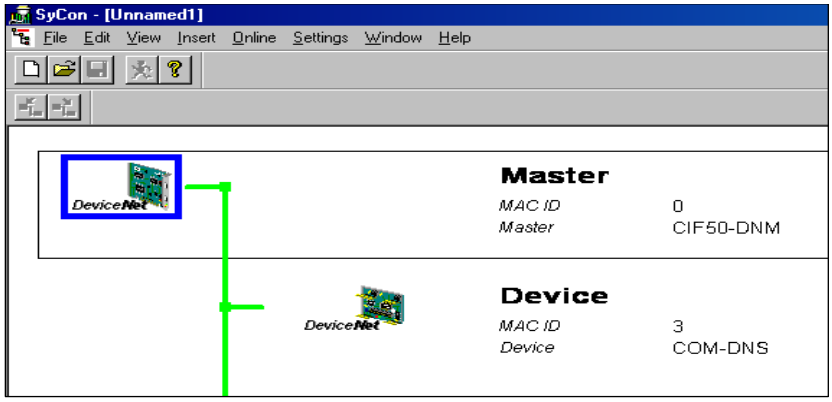
To fill the "**Configured I/O**" table fields, double click on "**Input Data**" then change the value "**I Len**" to 255. Then double click on "**Output Data**" and change the "**I Len**" value to 255.

To test the communication, in the menu "**Online**", click on "**Download**" and wait the downloading.

Return in the "**Online**" menu and click on "**Start Debug Mode**".

If the bus is in "**Green**" colour, the communication is correct.

Is the bus is in "**Red**" colour, check the configuration.

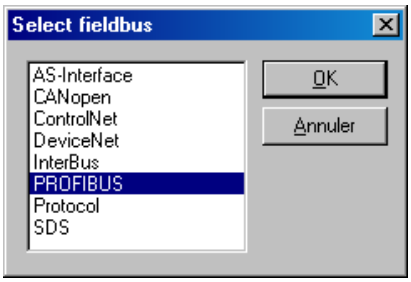


3. PROFIBUS CONFIGURATION WITH SYCON

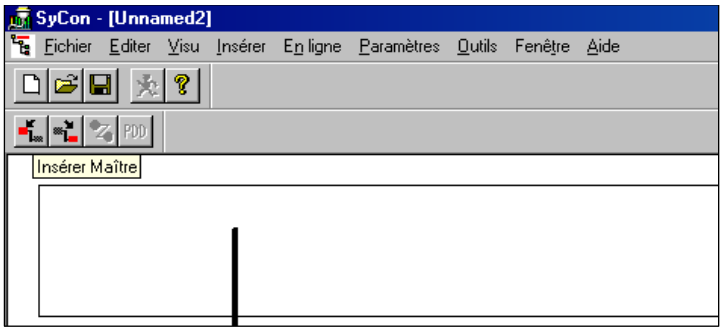
To start Sycon, go in the "**Start**", "**Programs**", "**Sycon System Configurator**", and start "**Sycon**".

Click on "**File**" then "**New**".

Select "**ProfiBus**" and click on "**OK**".



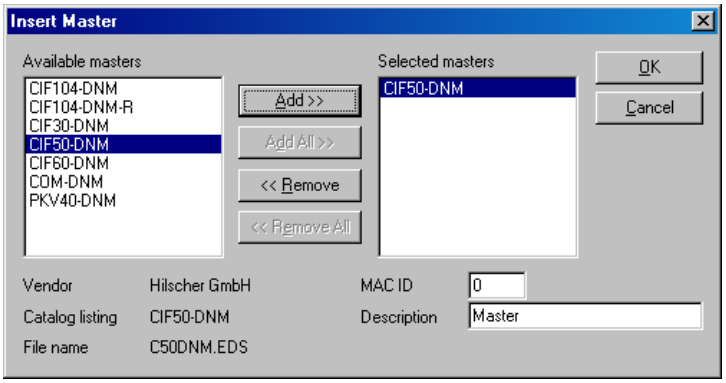
Click on the icon "**Insert Master**".



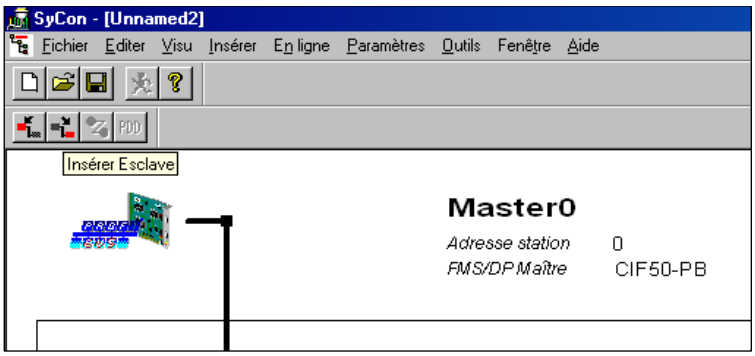
In the window "**Insert Master**", click on the end of the black line with the "**M**" cursor.

Click on "**CIF50-DNM**", click on "**Add**" then click on "**OK**".

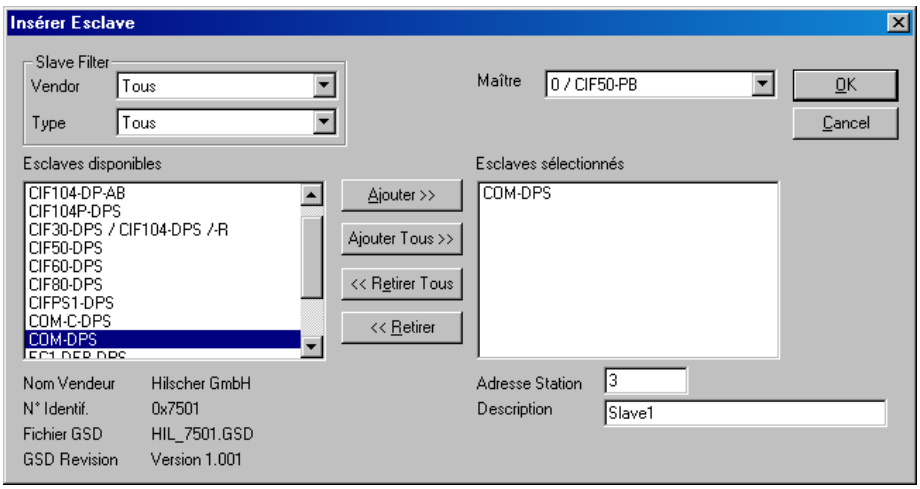
The software will allocate your "**Master**" automatically to your "**Profibus**" board. Validate by clicking on "**Yes**".



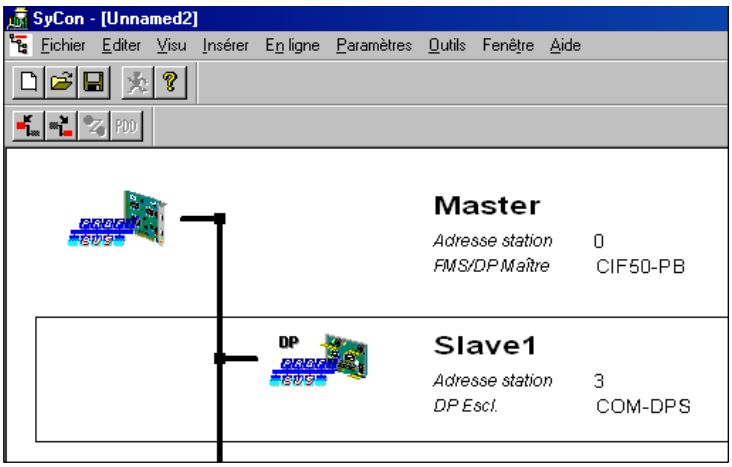
Then click on the icon "**Insert slave**" and click down the rectangle on the screen on the fat black line ("**S**" cursor).



In the window "**Insert slave**", click on "**COM-DPS**", click on "**Add**" and then on "**OK**". In "**MAC ID**" indicate your instrument address.



Double click on the le rectangle of your "**Slave**" a window is opened.

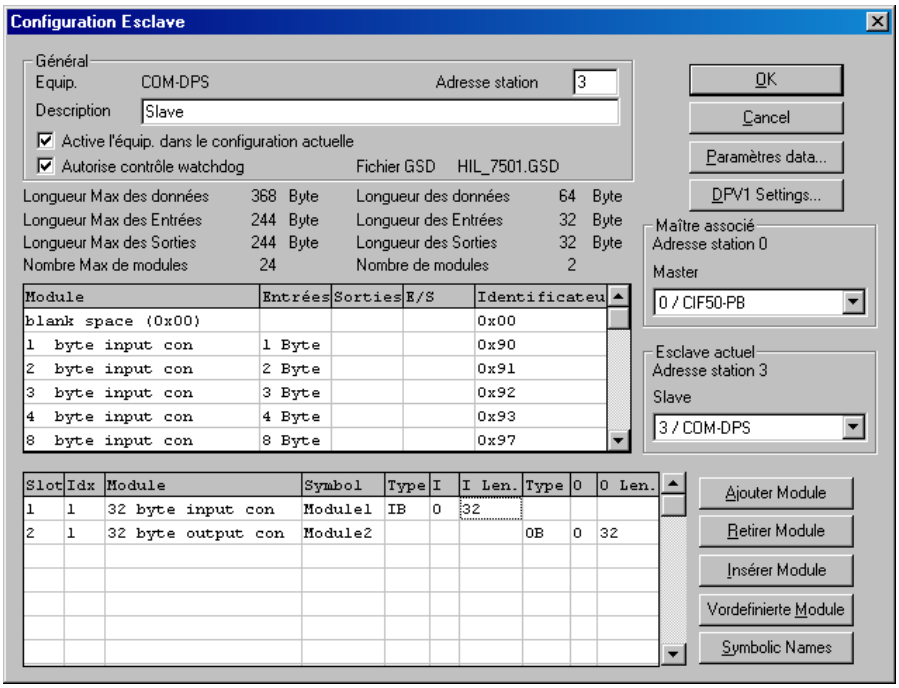


In this example, the configuration will be for the "**Medium**" mode.

Check first the address of your instrument by changing the "**MAC ID**" value.

To fill the second table fields, search in the first desired modules.

***Example**: double click on "**32 byte input con**" thus on "**32 byte output**".*

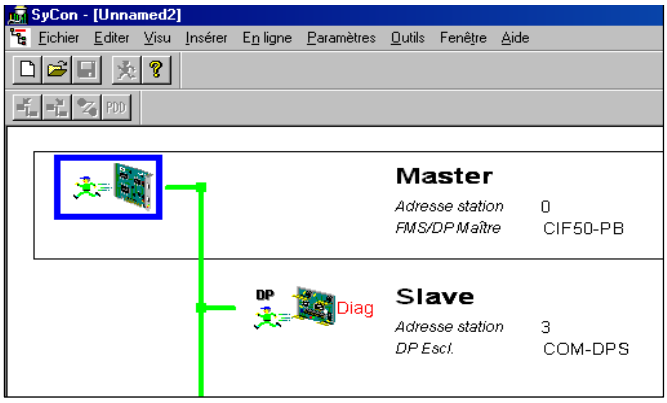


To test the communication, in the "**In line**" menu, click on "**Download**" and wait the downloading.

Return in the "**In line**" menu and click on "**Start Debug Mode**".

If the bus is in "**Green**" colour, the communication is correct.

If the bus is in "**Red**" colour, check the configuration.



4. COMMANDS TREATMENT MINIMUM TIME

Commands	Time (ms)
Start	300
Reset	281
Program selection	121
Clear Results	160

5. ENCOUNTERED PROBLEMS

During the downloading attempt, if a "**Driver Select**" window appears, select "**CIF Device Driver**" and click on "**Ok**".

In the "**Driver CIF**" coordination window, validate the adequate board and click on the "**Ok**" button.

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