ATEQ

D6/ERD6 Series – Profibus
Manual

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ATEQ Manufacturer Plants – Measurement Solution, Global Leader

ATEQ 15, rue des Dames, Z.I. 78340 LES CLAYES-SOUS-BOIS FRANCE	info@ateq.com ateq.com	T.: +33 1 30 80 1020 F.: +33 1 30 54 1100
ATEQ K.K. 3 – 41 ATEQ Building, Ikehata Chiryu-city, Aichi-pref JAPAN	info@ateq.co.jp ateq.co.jp	T.: +81 566-84-4670 F.: +81 566-84-4680
ATEQ China 98 Jian Peng Lu Shanghai CHINA	shanghai@ateq.com.cn ateq.com.cn	T.: +86 21 6763 9508 F.: +86 21 6763 9528
ATEQ SYSTEMS ANALYSIS TAIWAN CO., LTD. NO. 3, LAN 223, San Jia Dong Street 40642, TAICHUNG TAIWAN	ateqtaiwan@ateq.com.tw ateq.com.tw	T.: +886 4 2437 5278 F.: +886 4 2437 3675
ATEQ CORP. 35980 Industrial Road Suite L Livonia MI 48150 UNITED STATES	leaktest@atequsa.com atequsa.com	T.: +1 734-838-3100 F.: +1 734-838-0644

We continuously work on improving our products. This is why inforamtion contained in this manual, the device and the technical specifications may be modified without prior notification.

Pictures and figures in this manual are non contractual

Safety advisory / Warranty

GOOD PRACTICES AND SAFETY INSTRUCTIONS

Safety recommendations

If the device is supplied with 100 / 240 V AC, it is mandatory to connect it to the ground with a good link to the ground, to protect against electric hazard or electrocution.

It is dangerous to change the status of the outputs.
They can control power actuators or other equipment (mechanical, pneumatic, hydraulic, electrical or other) which can cause serious personal injury and damage to surrounding material.

For safety and quality measurement reasons, it is important, before powering on the device, to ensure that it is air supplied with a minimum operating pressure (0.6 MPa ± 15%).

Recommendations for the test environment

Keep the test area as clean as possible.

Recommendations for operators

ATEQ recommends that the operators who use the devices have training and a level of qualification that correspond to the job to perform.

General recommendations

— Read the user manual before using the device.
— All electrical connections to the device must be equipped with safety systems (fuses, circuit breakers, etc.) adapted to the needs and in accordance with the applicable standards and rules.
— To avoid electromagnetic interference, electrical connections to the device must be shorter than 2 meters.
— Power supply plug must be grounded.
— Disconnect the device from the mains before performing any maintenance work.
— Shut off the compressed air supply when working on the pneumatic assembly.
— Do not open a connected device.
— Avoid splashing water on the device.

ATEQ is at your disposal for any information concerning the use of the device under maximum safety conditions.
We draw your attention to the fact that ATEQ cannot be held responsible for any accident related to a misuse of the measuring instrument, the workstation or non-compliance of the installation with safety rules.
In addition, ATEQ declines any responsibility for the calibration or the fitting of their instruments that is not done by ATEQ.
ATEQ also declines any responsibility for any modification (program, mechanical or electrical) of the device done without their written consent.

Preamble

INTRODUCTION

This manual intends to help you for the configuration and the use of your ATEQ D6/ERD6 device on the Profibus network.

For more information on your ATEQ equipment, refer to the Quick Start Manual.

The numerical values used in the ATEQ device are coded on a **Long** format.

ATEQ devices are configured in **Little Endian format**. It means that the **Least Significant Byte** is **sent first** on the network.

Word

A word is a 16-bit data. It is coded with two bytes (8bits):

- The first byte is the Least Significant Byte (**LSB**)
- The second byte is the Most Significant Byte (**MSB**)

Example of a word:

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

On network: 98 28

Byte 0 *Byte 1*

- Word = 2898h
- LSB = 98h
- MSB = 28h

Long format (Signed Double word)

A **Long** format data is coded with two words (of 16 bits).
In the memory range of the ATEQ device or when they are transmitted, both words are coming in the following order:

- The first word is the least significant word
- The second word is the most significant word
- Example of a **Long** format:

On network: 98 28 03 00

Byte 0 *Byte 1* *Byte 2* *Byte 3*

- Word 1 = 2898h (least significant word)
- Word 2 = 0003h (most significant word)
- Long value = 00032898h = 207000(d)

Address value

All address values are treated with the **Long** format.
Example – address of the "millibar" unit in the Unit table (see Unit table):

On network: B0 36 00 00

Byte 0 *Byte 1* *Byte 2* *Byte 3*

- Word 1 = 36B0h
- Word 2 = 0000h
- Address value = 000036B0h

Numerical value

All the numerical values are treated with the **Long** format with fixed comma (10^{-3}).
Thus, their value is expressed in thousandths of unit. So, this value must be multiplied by 1000 to get the value in units.
For example, a value of 207055 represents 207.055. So, any numerical value must be divided by 1000 to get the real value:

— 207.055 = 207055 ÷ 1000

Example – Pressure:

On network: E3 | 28 | 03 | 00
Byte 0 | Byte 1 | Byte 2 | Byte 3

- Word 1 = 28E3h
- Word 2 = 0003h
- Value = 000328E3h = 207 055(d) = 207 055 of thousandths of unit
- Real value = 207 055 ÷ 1000 = 207.055 expressed in units

Negative numerical value

All the negative numerical values are treated with **Signed long** format with fixed comma (10^{-3}).
Thus, they must be multiplied by 1000 to get the value in units.
Example – Leak value (signed long):

On network: 94 | FF | FF | FF
Byte 0 | Byte 1 | Byte 2 | Byte 3

- Word 1 = FF94h
- Word 2 = FFFFh
- Value = FFFFFF94h = - 108(d) = - 108 of thousandths of unit
- Real value = - 108 ÷ 1000 = - 0.108 expressed in units

Hardware installation

HARDWARE CONFIGURATION

Connect your ATEQ equipment to the Profibus fieldbus using its Profibus connectors and compatible cables.
Your device has a Profibus internal board and one Profibus connectors.
The Profibus internal board is located inside your device. Only one version is available:

- **COMX 100**

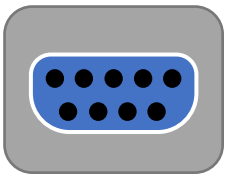
> You can see the version installed using your user interface (see Identification of the version of the **Profibus** module).

Your device has one Profibus type connectors.

> For more information on your ATEQ equipment, refer to the Quick Start Manual.

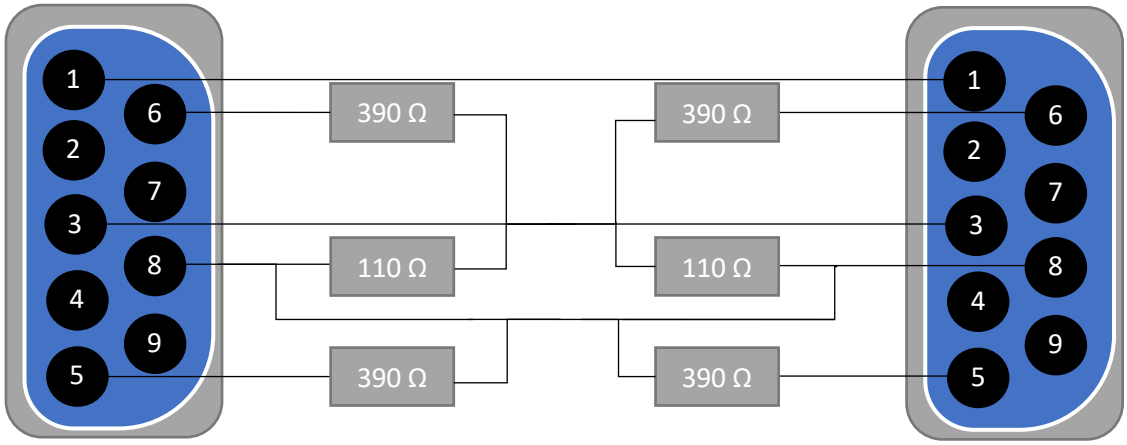
Profibus connector

Standard connection RS232 protocol.



Wiring instructions

Profibus Cabling



Pin 1	PE (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)		

Configuration of the ATEQ device (slave)

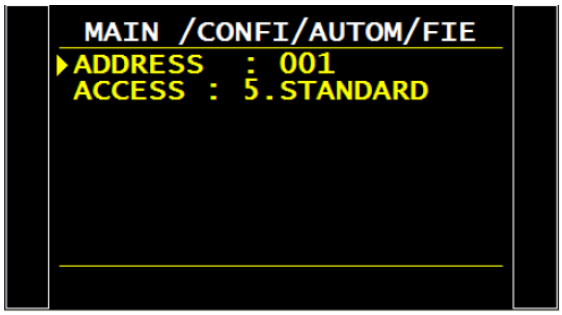
Use this procedure to configure your device.

This configuration can be done with the front panel of your ATEQ device or with the ATEQ Fieldbus Configurator software.

SETUP OF THE STATION NUMBER

The station number must be the same on slave and master.

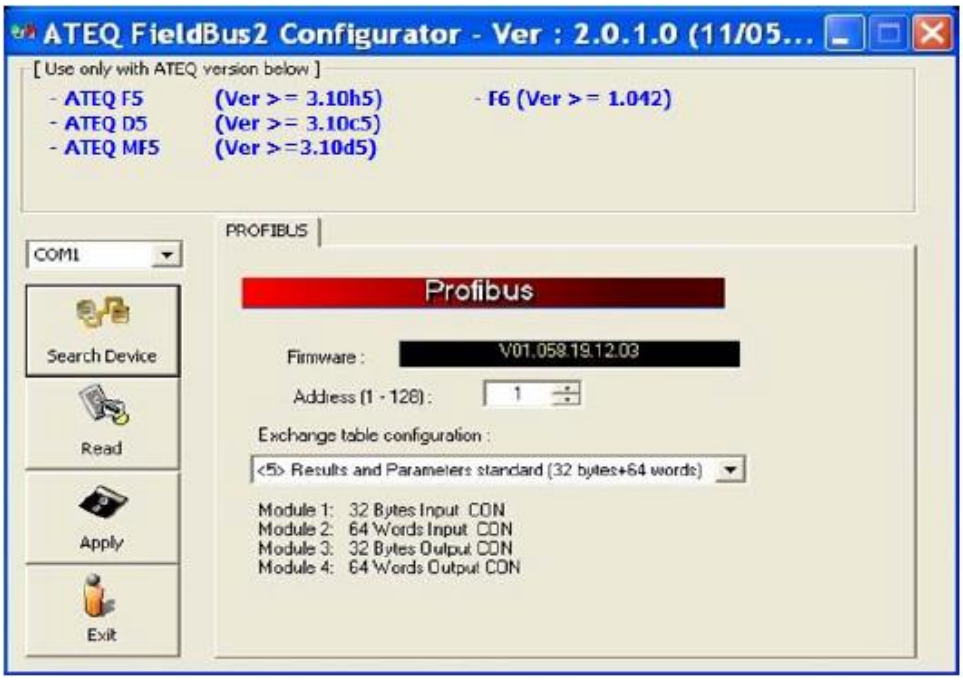
From the ATEQ device



From the **MAIN MENU** screen of your ATEQ device:

- **CONFIGURATION**
- **AUTOMATISM**
- **FIELDBUS**
- **ADDRESS**

From the ATEQ Fieldbus Configurator software



SETUP OF THE PROFIBUS CONFIGURATION MODE

Five configuration modes are available according to the bytes number available:

Mode number	Configuration mode	Use
5	**Standard mode (normal)**	For the inputs/outputs, real time measurements, the live cycle results and parameters management
4	**Standard less mode**	For the inputs/outputs, real time measurements, the live cycle results and parameters management
3	**Medium more mode**	For the inputs/outputs, the real time measurements, the live cycle results and parameters management
2	**Medium mode**	For the inputs/outputs and the real time measurements
1	**Light mode**	For the digital inputs/outputs

Configuration modes according to bytes number available

Memory range	Mode number and bytes available					Functions available
	(5) 32 Bytes / 64 words	(4) 32 Bytes / 32 words	(3) 32 Bytes / 16 words	(2) 32 bytes	(1) 16 bytes	
00h-0Fh	X	X	X	X	X	Inputs/outputs
10h-1Fh	X	X	X	X		Real time measurements
20h-3Fh	X	X	X			Exchange zone: cycle result reading or 5 parameters management
40h-5Fh	X	X				Exchange zone: cycle result reading or 10 parameters management
60h-9Fh	X					Exchange zone: cycle result reading or 20 parameters management

From the **MAIN MENU** screen of your ATEQ device:

- **CONFIGURATION**
- **AUTOMATISM**
- **FIELDBUS**
- **ACCESS**

Configuration of the master

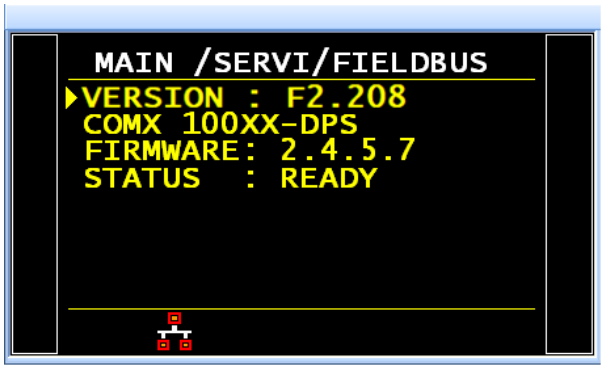
INSTALLATION OF THE PROFIBUS MODULE

Identification of the version of the Profibus module

You can identify the hardware configuration using your ATEQ device or using a fieldbus configuration software.

For the installation and configuration of the Profibus module, you have to select the component that corresponds to the firmware (see Configuration files).

From the ATEQ device



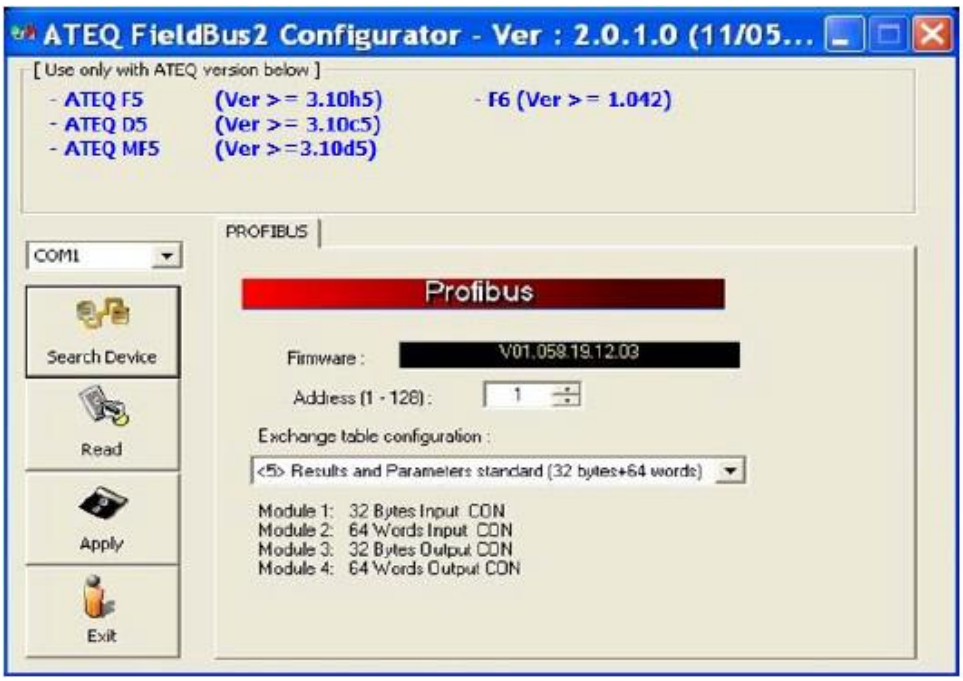
From the **MAIN MENU** screen of your ATEQ device:

- **SERVICE**
- **FIELDBUS**

The Hilscher firmware version is displayed in the **FIRMWARE** parameter.

From the ATEQ Fieldbus Configurator software

Connect your PC to the RS232 connector of your ATEQ device.
Run the ATEQ Fieldbus Configurator software:



The Hilscher firmware version is displayed in the **FIRMWARE** parameter.

CONFIGURATION FILES

Configuration files to use for the configuration of the master instrument.

Profibus hardware and software compatibilities

The table below gives the configuration file to use according to the hardware reference of the Profibus internal board of your ATEQ device (Hilscher hardware reference).

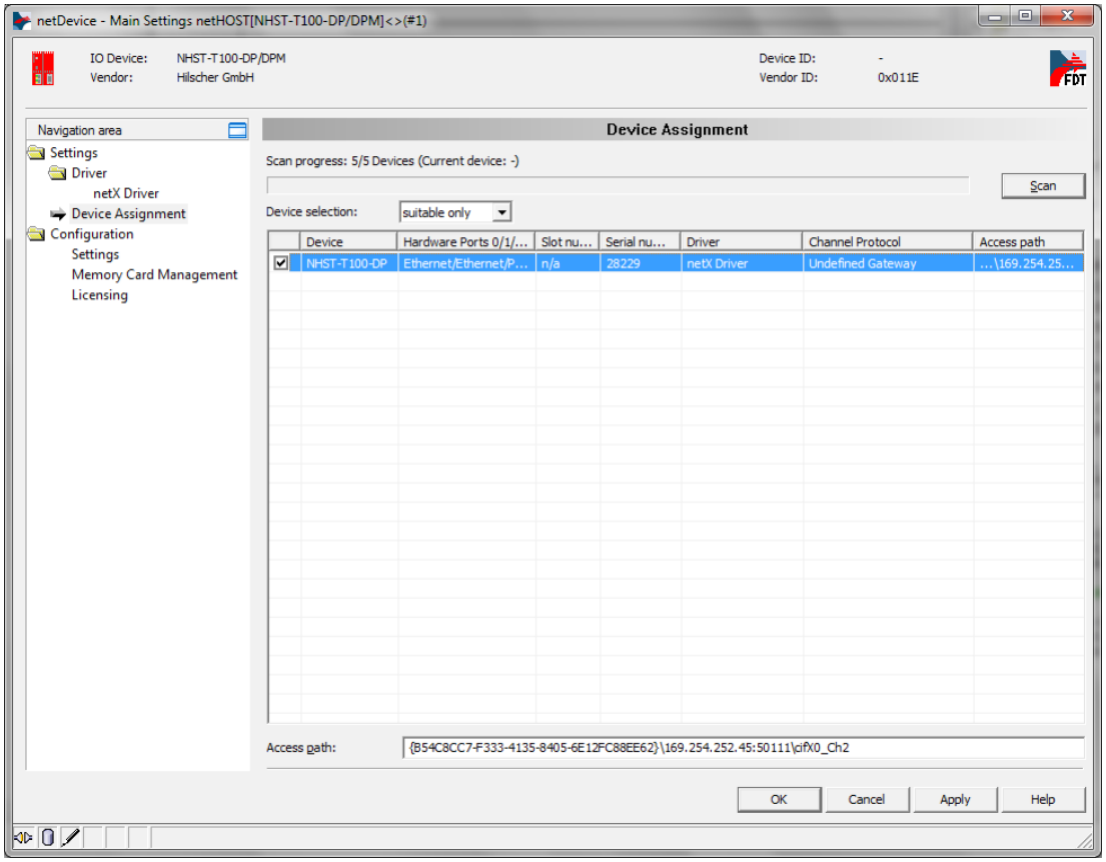
Device software	Fieldbus Software	Hilscher Firmware	Config Files	Hilscher Hardware Ref
≥ 1.324	> 2.104	2.7.2	**HIL_7501.GSD (09/03/2000)**	**COMX 100**

In all cases, use the HIL_7501.GSD configuration file and the COM_DPS module name, even if the COMX 100XXDP/DPS module is used.

SELECTION OF THE MASTER BOARD

The screenshot used in this section correspond to the Sycon.net from Hilscher software. Nevertheless, you may use your own software to configure the master.

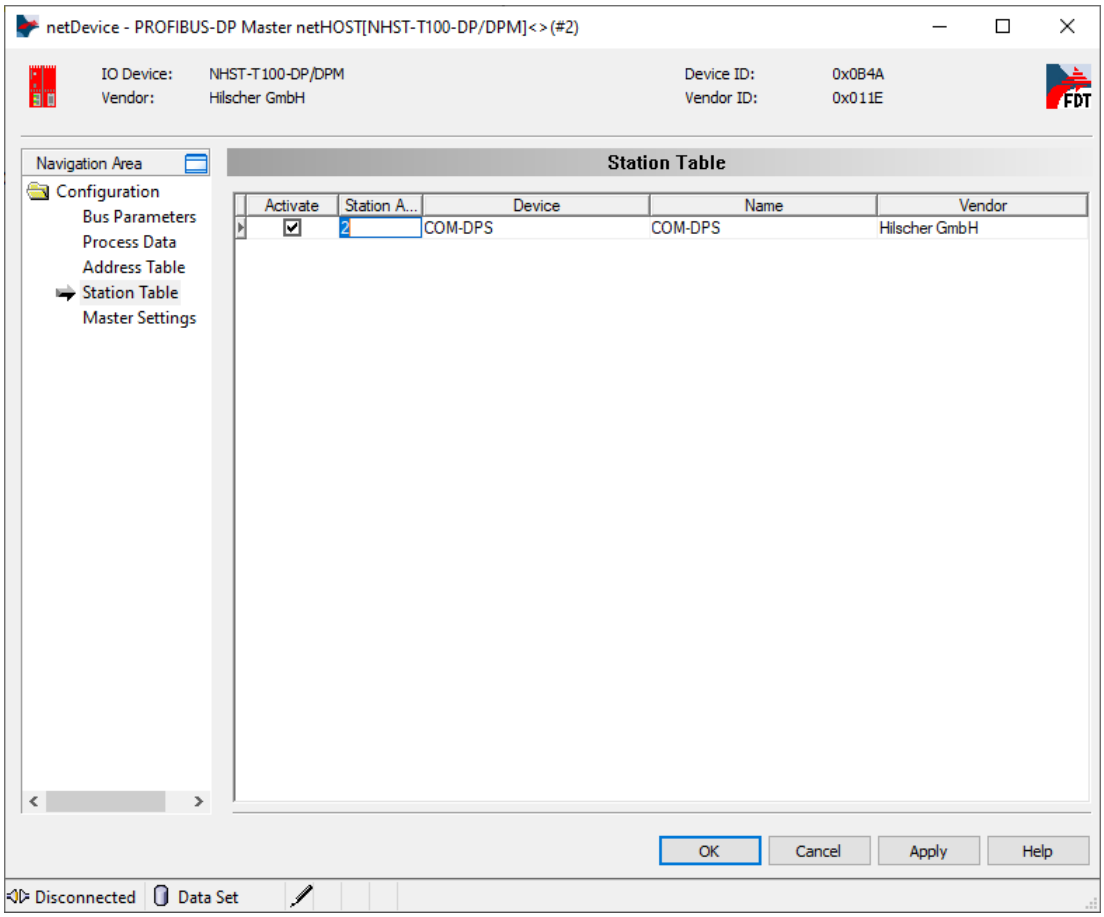
From the **Device Assignment** screen, select the master card:



SETUP OF THE STATION ADDRESS

The screenshot used in this section correspond to the Sycon.net from Hilscher software. Nevertheless, you may use your own software to configure the master.

Select the Station Table Settings screen to set up the Station Address:

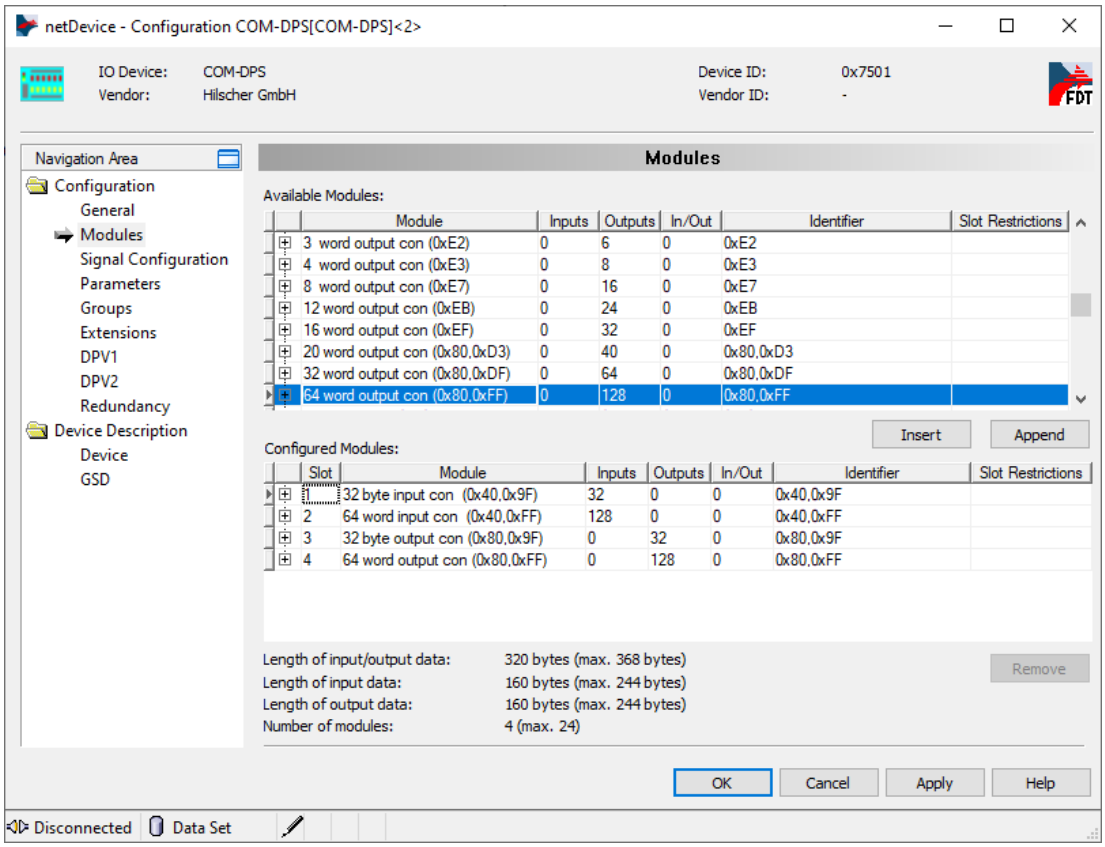


Five configuration modes are available according to the bytes number available (see Configuration of the ATEQ device (slave)).

Setup of the Standard mode (normal)

The parameters configuration must be like the following ones:

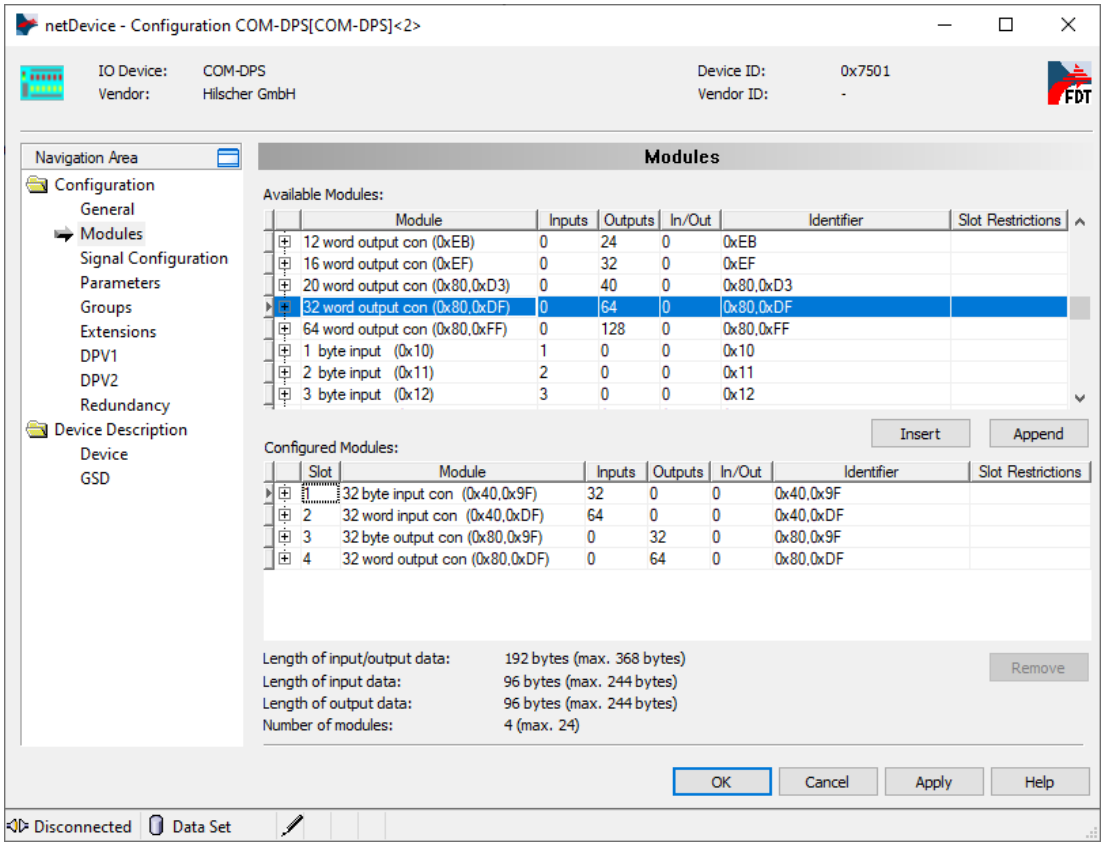
- 32 bytes input con (IB) : module 1.
- 64 words input con (IW) : module 2.
- 32 bytes output con (OB) : module 3.
- 64 words output con (OW) : module 4.



Setup of the Standard less mode

The parameters configuration must be like the following ones:

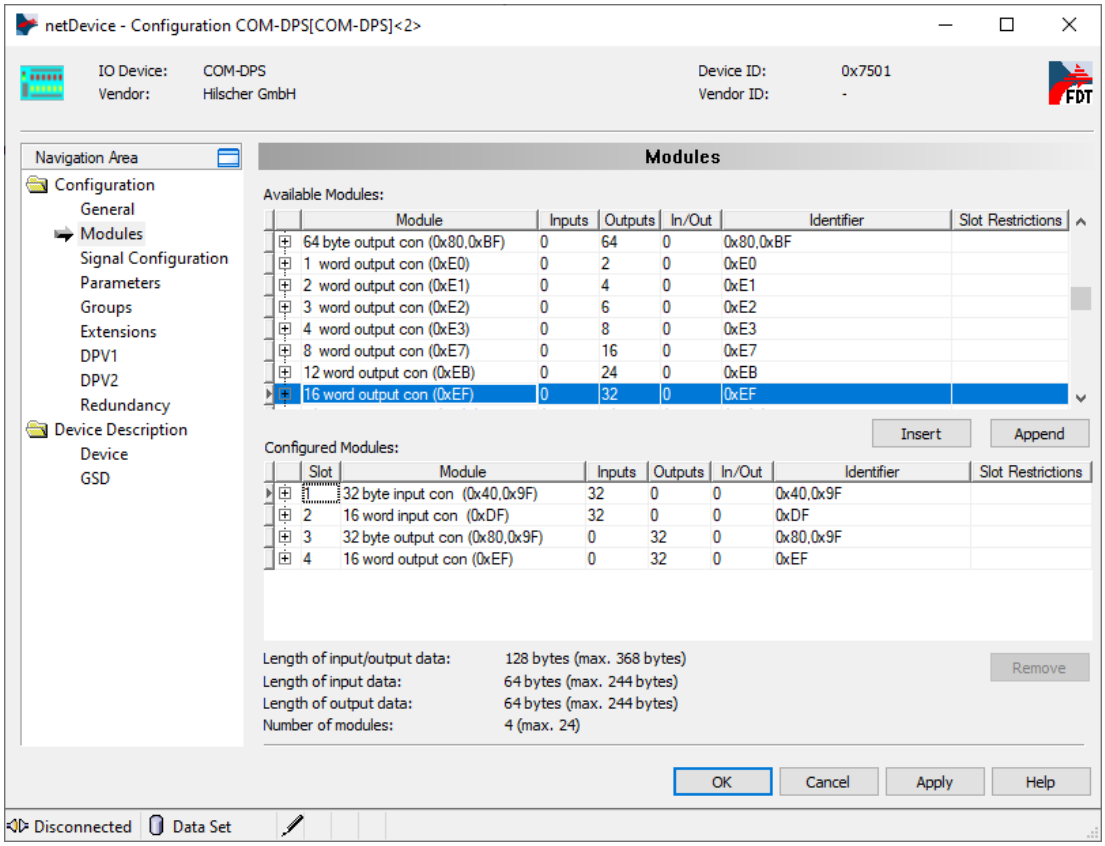
- 32 bytes input con (IB) : module 1.
- 32 words input con (IW) : module 2.
- 32 bytes output con (OB) : module 3.
- 32 words output con (OW) : module 4.



Setup of the Medium more mode

The parameters configuration must be like the following ones:

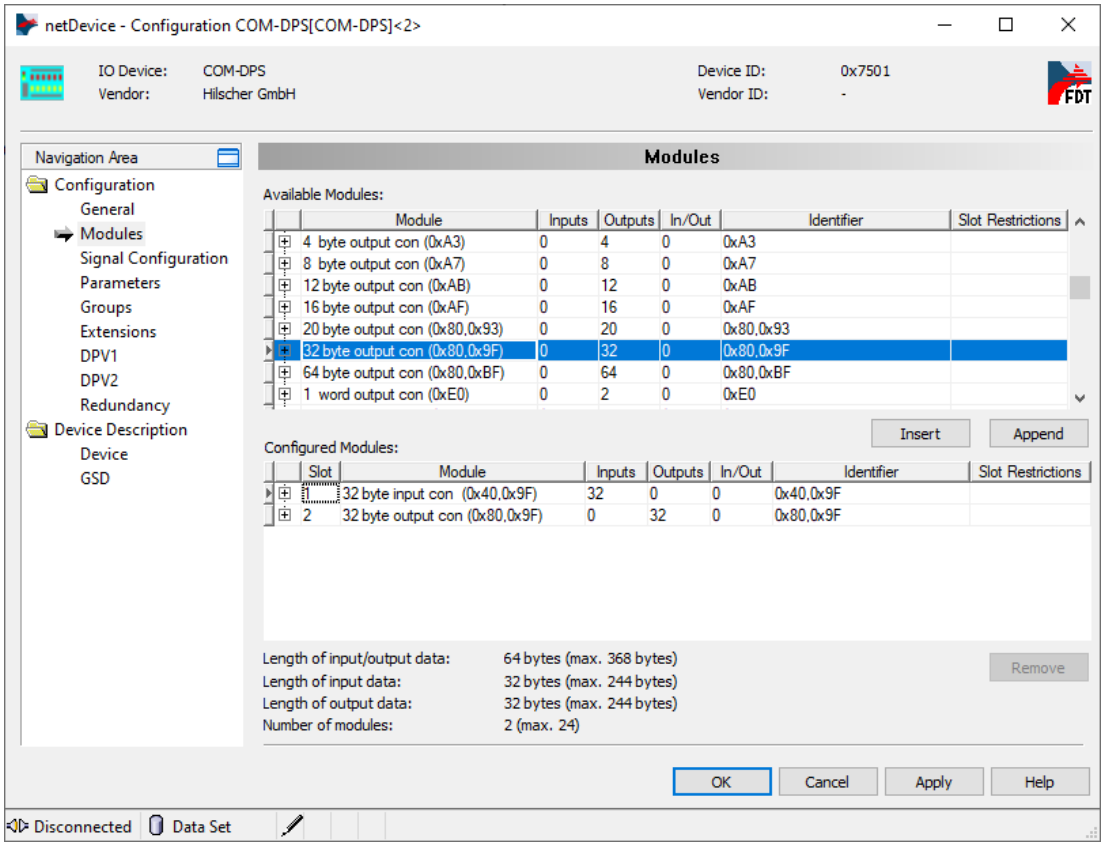
- 32 bytes input con (IB) : module 1.
- 16 words input con (IW) : module 2.
- 32 bytes output con (OB) : module 3.
- 16 words output con (OW) : module 4.



Setup of the Medium mode

The parameters configuration must be like the following ones:

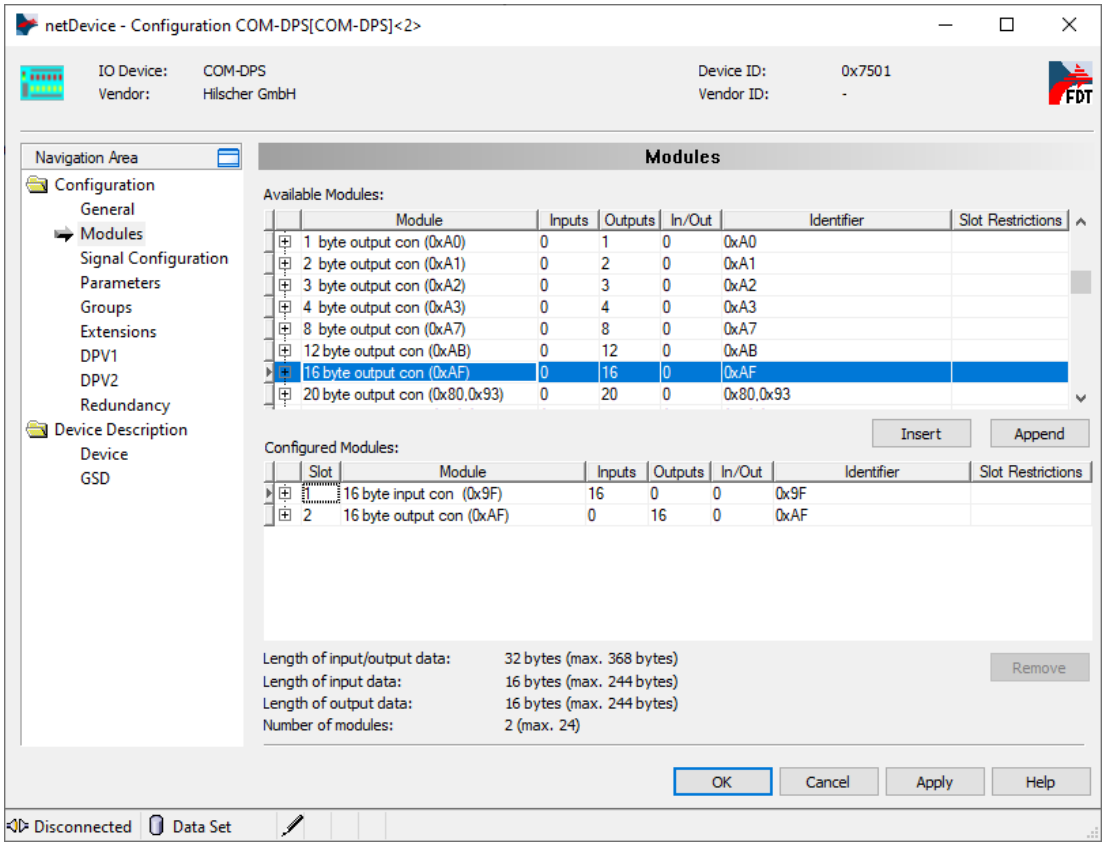
- 32 bytes input con (IB) : module 1.
- 32 bytes output con (OB) : module 2.



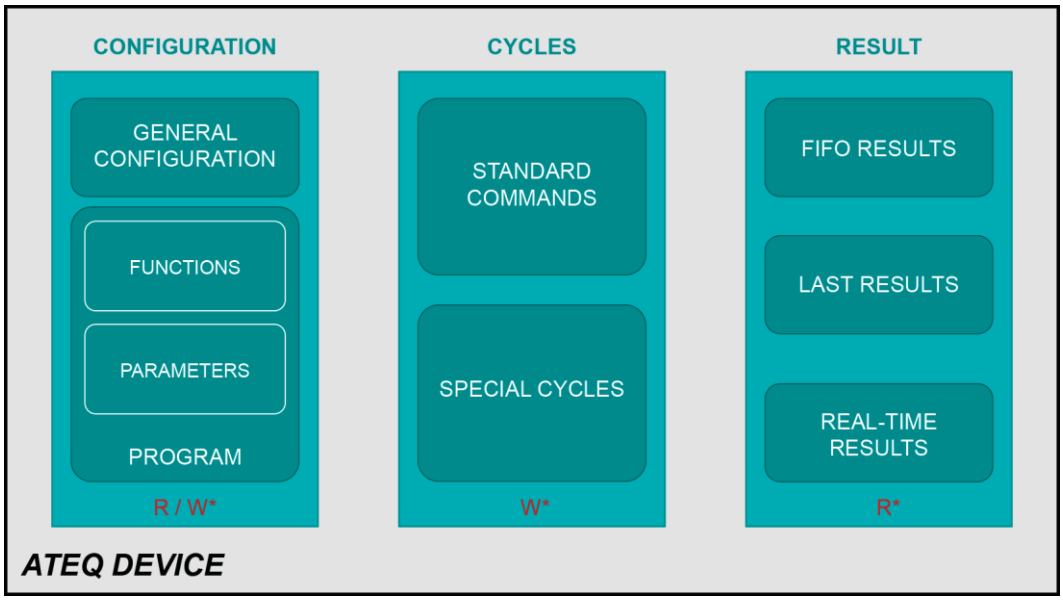
Setup of the Light mode

The parameters configuration must be like the following ones:

- 16 bytes input con (IB) : module 1.
- 16 bytes output con (OB) : module 2.



Functional description of an ATEQ device



- R/W*: reading and writing
- W*: writing only
- R*: reading only

Write table

Writing table structure

0x00 0x01		Commands
0x02 0x04		Reserved
0x06 0x09		The program number (Running and Edit) Special cycle
0x0A 0x1F		Reserved
0x20		Exchange table: Config Bits or Functions Bits or Parameters

Details writing table structure

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 configuration / extended menu bits.
	Bit 2 = 1 > Read of the function bits.
	Bit 3 = 1 > Write of the configuration / extended menu bits.
	Bit 4 = 1 > Write of the function bits.
	Bit 5 = 1 > Read of the program name.
	Bit 6 = 1 > Write of the program name.
	Bit 7 = 1 > Read last result.
02h – 05h	*Reserved*.
06h – 07h	Address 06h: Number of the program to be selected. Address 07h = 0.
08h – 09h	Address 08h: Special cycle. Address 09h=0.
0Ah – 0Fh	*Reserved*.

Read table

Reading table structure

0x00 0x0F		State of the unit: Echo / Error code command Status Current program Number of results available Program step
0x10 0x1F		Real time measurements.
0x20		Exchange table: FIFO Results or Last Result or Parameters

Results status: (@: 00h – 0Fh)

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.

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 configuration / extended menu bits.
	Bit 2 = 1 > Echo reading of the function bits.
	Bit 3 = 1 > Echo writing of the configuration / extended menu bits.
	Bit 4 = 1 > Echo writing of the function bits.
	Bit 5 = 1 > Echo reading of the program name.
	Bit 6 = 1 > Echo writing of the program name.
	Bit 7 = 1 > Echo reading last result.
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 configuration bits error.
	Bit 2 = 1 > Reading of the function bits error.
	Bit 3 = 1 > Writing of the configuration bits error.
	Bit 4 = 1 > Writing of the function bits error.
	Bit 5 = 1 > Reading of the program name error.
	Bit 6 = 1 > Writing of the program name error.
	Bit 7 = 1 > Reading last result error.
04h – 05h	*Reserved*.
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.

Address (bytes)	Description
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 > *Not used*.
	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 (7FEE0h) = 524 x 1000, thus the real value is 524.
14h – 17h	Pressure unit code Example: reading 6000 (1770h) = 6 x 1000, thus the value is 6 which corresponds to Pa (see Unit table).
18h – 1Bh	Flow current value Examples: reading 20000 (4E20h) = 20 x 1000, thus the real value is 20 reading - 108 (FFFFFF94h) = - 0.108 x 1000, thus the real value is - 0.108 (see Basic notions)
1Ch – 1Fh	Flow unit code Example: reading 8000 (1F40h) = 8 x 1000 thus the value is 8, which corresponds to the Pa/s unity.

Exchange zone: (@: 20h – 9Fh)

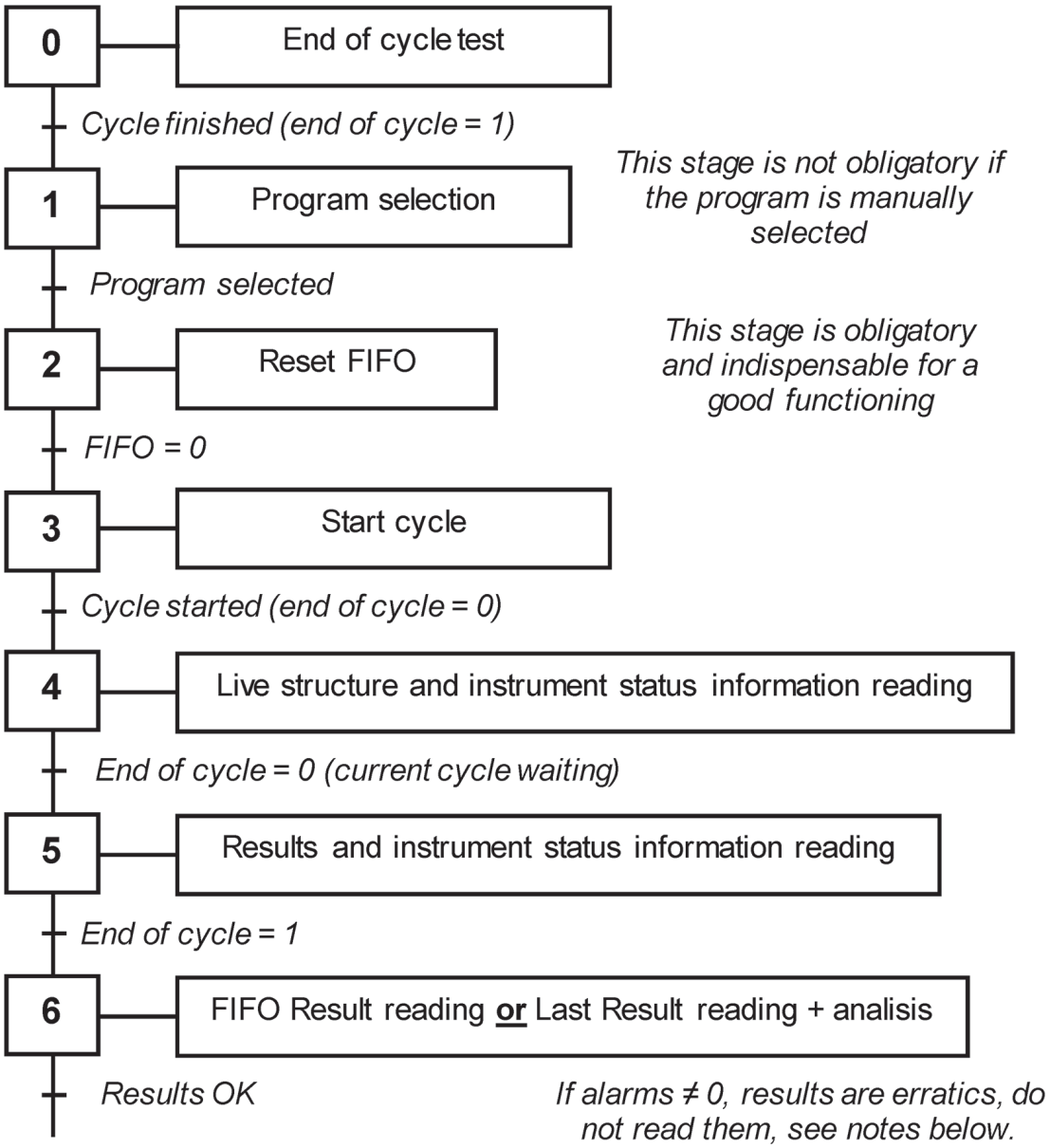
Address (bytes)	Description
20h – 9Fh	Cycle results exchange zone. Parameters reading and writing exchange zone.

Treatment of the commands

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

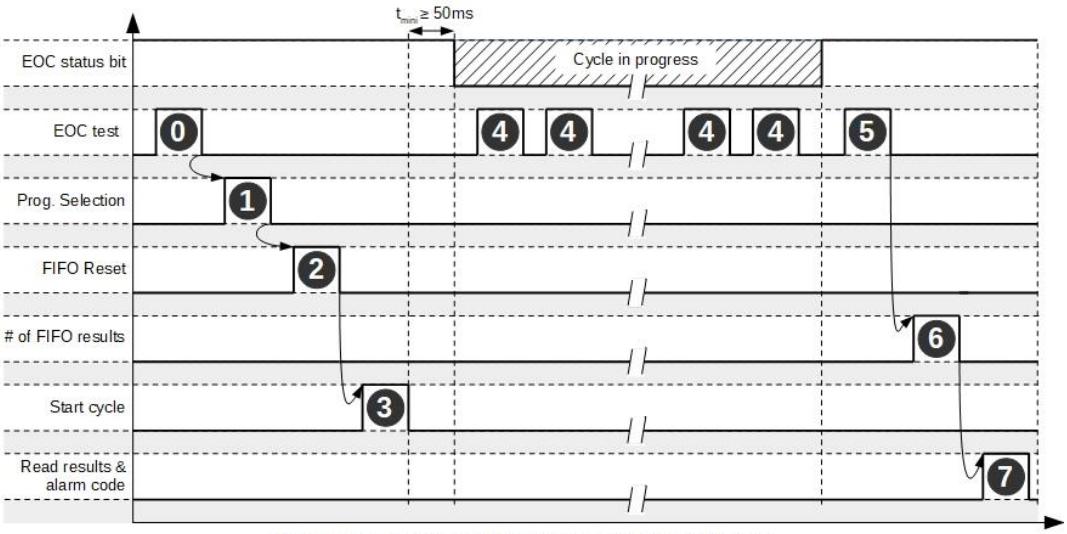
ATEQ device using

Base procedure for using an ATEQ instrument.



If the number of results in the FIFO = 0, the results are erratic, **do not read them.**
If there's an alarm bit, read the alarm code and **do not use the measurements results (erratic results).**

Fieldbus progress chart



WARNING : The status bits update rate is about 50ms

0 : Read @0Ch – 0Dh : Status bit 5 = 1 (EOC status bit)

1 : Write @06h : 1 word = n° prog (0001h = prog 2)
Write @00h : bit 3 = 1 (command « Prog. Selection »)

2 : **ALWAYS RESET THE FIFO**
Write @00h : bit 7 = 1 (command « Reset FIFO »)

3 : Write @00h : bit 1 = 1 (command « Start »)
t_{mini} ≥ 50ms

4 : Read @0Ch – 0Dh : Status bit 5 = 0 (EOC status bit)

5 : Read @0Ch – 0Dh : Status bit 5 = 1 (EOC status bit)

Use of FIFO Results

6 : Read the number of results in FIFO :
Read @08h – 09h : **if > 0** go to step 7, **else** END

7 : Write @00h : bit 4 = 1 (command « Read FIFO results »)
Read @20h : 12 words (size of standard results)
if Alarm Code = 0 go to step 8, **else** END

8 : Use the results recovered at step 7 (if Alarm code was equal to 0)

Use of Last Results

6 : *Read the number of results in FIFO :*
Read @08h – 09h : **if ≥ 1** go to step 7, **else** END

7 : Write @01h : bit 7 = 1 (command « Read Last results »)
Read @20h : 12 words (size of standard results)
if Alarm Code = 0 go to step 8, **else** END

8 : Use the results recovered at step 7 (if Alarm code was equal to 0)

General configuration

Table of the configuration / extended menus bits

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

The bits below are mostly present in the **CONFIGURATION** or **More functions...** 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.

Acronyms used in the "Menu" column:

- Conf: CONFIGURATION
- +Func: FUNCTIONS > More functions...
- RS232: CONFIGURATION > RS232

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
1	0	0001	1	Fill type.	+Funct
	1	0002	2	Recovery thresholds.	+Funct
	2	0004	4	End of cycle.	+Funct
	3	0008	8	Mini valve.	+Funct
	4	0010	16	Peak hold.	+Funct
	5	0020	32	ATR1.	+Funct
	6	0040	64	ATR2.	+Funct
	7	0080	128	Personalization of the program name.	+Funct
	8	0100	256	Sequence.	+Funct
	9	0200	512	Automatic connector.	+Funct
	10	0400	1024	Valves codes (outputs codes).	+Funct
	11	0800	2048	Offset.	+Funct
	12	1000	4096	Filtering.	+Funct
	13	2000	8192	Automatic mode.	+Funct
	14	4000	16384	Stamping.	+Funct
	15	8000	32768	Reserved.	

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
2	16	0001	1	N test.	+Funct
	17	0002	2	Unit type.	+Funct
	18	0004	4	Pressure correction.	+Funct
	19	0008	8	Reserved.	
	20	0010	16	Piezo auto zero.	
	21	0020	32	Reserved.	
	22	0040	64	Sending condition: pass part.	RS232
	23	0080	128	Sending condition: fail part maximum flow.	RS232
	24	0100	256	Sending condition: fail part minimum flow.	RS232
	25	0200	512	Sending condition: presence of an alarm.	RS232
	26	0400	1024	Sending condition: pressure defect.	RS232
	27	0800	2048	Sending condition: end of cycle.	RS232
	28	1000	4096	Sending condition: recoverable.	RS232
	29	2000	8192	Content of the frame: time.	RS232
	30	4000	16384	Content of the frame: personalization.	RS232
	31	8000	32768	Content of the frame: pressure.	RS232
3	32	0001	1	Security.	Conf
	33	0002	2	Exportation.	RS232
	34	0004	4	Automatic piezo reset.	
	35	0008	8	Placing in stand-by.	Main
	36	0010	16	Return to operation from stand-by.	Main
	37	0020	32	Unused.	
	38	0040	64	Bar graph displaying.	Conf
	39	0080	128	Presence of a second piezo sensor.	
	40	0100	256	Reserved.	
	41	0200	512	Reserved.	
	42	0400	1024	Reserved.	
	43	0800	2048	Reserved.	
	44	1000	4096	Reserved.	
	45	2000	8192	Reserved.	
	46	4000	16384	Reserved.	
	47	8000	32768	Reserved.	

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
4	48	0001	1	Reserved.	
	49	0002	2	Reserved.	
	50	0004	4	Sequence.	
	51	0008	8	Bar code.	
	52	0010	16	Program selection bar code.	
	53	0020	32	Single calibration.	+Funct
	54	0040	64	No negative.	+Funct
	55	0080	128	Reserved.	Conf
	56	0100	256	Reserved.	RS232
	57	0200	512	Rest mode, blow on test side or reference side.	Conf
	58	0400	1024	Remote control activation.	
	59	0800	2048	Auxiliary codes activation.	
	60	1000	4096	Gas option (not available).	
	61	2000	8192	Pre Fill activation.	
	62	4000	16384	Sign change activation.	
	63	8000	32768	Display mode activation.	
5	64	0001	1	Flow regulation activation.	
	65	0002	2	Bar code reset on end of cycle.	
	66	0004	4	Reserved.	
	67	0008	8	Reserved.	
	68	0010	16	Reserved.	
	69	0020	32	Reserved.	
	70	0040	64	Reserved.	
	71	0080	128	Reserved.	
	72	0100	256	Reserved.	
	73	0200	512	Reserved.	
	74	0400	1024	Reserved.	
	75	0800	2048	Reserved.	
	76	1000	4096	Reserved.	
	77	2000	8192	Reserved.	
	78	4000	16384	Reserved.	
	79	8000	32768	Page feed.	

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
6	80	0001	1	Service cycles activation.	
	81	0002	2	Buzzer.	
	82	0004	4	Sequences activation.	
	83	0008	8	Reserved.	
	84	0010	16	Standard conditions.	
	85	0020	32	Bar graph display.	
	86	0040	64	Up Contact *	+Funct
	87	0080	128	Down Contact *	+Funct
	88	0100	256	Pressure Up *	+Funct
	89	0200	512	Pressure Down *	+Funct
	90	0400	1024	Step Flow *	+Funct
	91	0800	2048	Start Press *	+Funct
	92	1000	4096	Short Cycle *	+Funct
	93	2000	8192	Sending condition: Fail up ERD *	RS232
	94	4000	16384	Sending condition: Fail step ERD *	RS232
	95	8000	32768	Sending condition: Fail down ERD *	RS232
7	96	0001	1	Regulation mode.	+Funct
	97	0002	2	Analog output.	+Funct
	98	0004	4	Measure delay *	+Funct

Example: bit number 13 (automatic mode) activated to 1, will place to "2000h" the value in the first word.
2000h 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.

Reading of the configuration / extended menu bits

Master	Slave
— Activate the “Read extended menu bits” command: Write at the address 00(h), the value **0200(h)** Byte 0 = 00(h) Byte 1 = 02(h) (Bit 1 = 1)	
	Acknowledgement Command echo: — Byte 0 = 00(h) — Byte 1 = 02(h) (Bit 1 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Read extended menu bits” command
	Command finished Command echo: — Byte 0 = 00(h) — Byte 1 = 02(h) (Bit 1 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 02(h) (Bit 1 = 1)
— Wait the end of the command: command echo = 0200(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Read extended menu bits” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 1 = 0)	
— Read the configuration bits at the address 20h of X Words or read the function bits at the address 20h of X Words.	

The configuration / extended menu bits are defined in the table above for the “Extended menus” of each specific chapter for the instruments.

The configuration / extended menu bits are independents of the program number.

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Writing of the configuration / extended menu bits

Master	Slave
— Write the extended menu bits at the address 20(h) — Activate the “Write extended menu bits” command: Write at the address 00(h), the value **0800(h)** Byte 0 = 00(h) Byte 1 = 08(h) (Bit 3 = 1)	
	<u>Acknowledgement</u> Command echo: — Byte 0 = 00(h) — Byte 1 = 08(h) (Bit 3 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Write extended menu bits” command
	<u>Command finished</u> Command echo: — Byte 0 = 00(h) — Byte 1 = 08(h) (Bit 3 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 08(h) (Bit 3 = 1)
— Wait the end of the command: command echo = 0800(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Write extended menu bits” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 3 = 0)	

The configuration / extended menu bits are defined in the table above for the “Extended menus” of each specific chapter for the instruments.

The configuration / extended menu bits are independents of the program number.

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Program

Program selection command on the ATEQ device

Master	Slave
— Write 1 word at the address 06(h) corresponding to the program number to be selected: @06(h) = 0001(h) (= program n°2) — Activate the “Program selection” command: Write at the address 00(h), the value **0008(h)** Byte 0 = 08(h) (Bit 3 = 1) Byte 1 = 00(h)	
	Acknowledgement Command echo: — Byte 0 = 08(h) (Bit 3 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Program selection” command
	Command finished Command echo: — Byte 0 = 08(h) (Bit 3 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 08(h) (Bit 3 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0008(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Program selection” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 3 = 0) Byte 1 = 00(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Function

Table of the function bits

Table of the function 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 **More functions...** menu.

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
1	0	0001	1	Automatic mode.	Funct
	1	0002	2	Reserved.	
	2	0004	4	Fill type activation.	Funct
	3	0008	8	Recovery thresholds activation.	Funct
	4	0010	16	Cycle end activation.	Funct
	5	0020	32	End of cycle with reset and piezo reset Activation.	Funct
	6	0040	64	Cycle end with dump and reset activation.	Funct
	7	0080	128	Cycle end with fill activation.	Funct
	8	0100	256	Peak hold activation.	Funct
	9	0200	512	Pressure correction.	
	10	0400	1024	ΔP correction.	
	11	0800	2048	ATR1 activation.	Funct
	12	1000	4096	ATR2 activation.	Funct
	13	2000	8192	Chaining activation.	Funct
	14	4000	16384	Pass part chaining activation.	Funct
	15	8000	32768	Fail part maximum flow chaining activation.	
2	16	0001	1	Fail part minimum flow chaining activation.	
	17	0002	2	Chaining with alarm activation.	Funct
	18	0004	4	Pressure switch error chaining activation.	Funct
	19	0008	8	Cycle end chaining activation.	Funct
	20	0010	16	Recovery chaining activation.	Funct
	21	0020	32	Mini valve Activation.	
	22	040	64	Automatic connector activation.	Funct
	23	0080	128	Valve codes activation.	
	24	0100	256	Valve 1 activation (external).	
	25	0200	512	Valve 2 activation (external).	
	26	0400	1024	Valve 3 activation (external).	
	27	0800	2048	Valve 4 activation (external).	
	28	1000	4096	Valve 5 activation (external).	
	29	2000	8192	Valve 6 activation (external).	
	30	4000	16384	Valve 7 activation (internal).	
	31	8000	32768	Valve 8 activation (internal).	

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
3	32	0001	1	Stamping activation.	
	33	0002	2	Pass part stamping Activation.	
	34	0004	4	Fail part maximum flow stamping activation.	
	35	0008	8	Fail part minimum flow stamping activation.	
	36	0010	16	Alarm stamping activation.	
	37	0020	32	Pressure switch error stamping activation.	
	38	0040	64	Cycle end stamping activation.	
	39	0080	128	Recovery stamping activation.	
	40	0100	256	Standard conditions activation.	Funct
	41	0200	512	Reserved.	
	42	0400	1024	Reserved.	
	43	0800	2048	Reserved.	
	44	1000	4096	Filtering Activation.	Funct
	45	2000	8192	Piezo automatic reset.	Funct
	46	4000	16384	Offset.	Funct
	47	8000	32768	Reserved.	Funct
4	48	0001	1	Reserved.	
	49	0002	2	Negative flow displaying activation.	Funct
	50	0004	4	Reserved.	
	51	0008	8	Reserved.	
	52	0010	16	Auto zero differential sensor 2.	
	53	0020	32	Auxiliary codes function.	Funct
	54	0040	64	Auxiliaries codes 1 function.	Funct
	55	0080	128	Auxiliaries codes 2 function.	Funct
	56	0100	256	Auxiliaries codes 3 function.	Funct
	57	0200	512	Auxiliaries codes 4 function.	Funct
	58	0400	1024	Gas option function (not available).	Funct
	59	0800	2048	Pre fill function.	Funct
	60	1000	4096	Sign change function.	Funct
	61	2000	8192	Bar code function.	Funct
	62	4000	16384	Start after reading bar code.	Funct
	63	8000	32768	Reserved.	Funct

Word	Bit n°	Mask		Meaning *ERD Only	Menu
		Hexa	Dec		
5	64	0001	1	Flow regulation function.	
	65 >79			Reserved.	
6	80 > 92			Reserved.	
	93	2000	8192	Buzzer function.	
	94	4000	16384	Buzzer function Pass Part.	
	95	8000	32768	Buzzer function Fail Part.	
7	96	0001	1	Buzzer function.	Funct
	97	0002	2	Long test (x100) function.	Funct
	98	0004	4	Up Contact *	Funct
	99	0008	8	Down Contact *	Funct
	100	0010	16	Pressure Up *	Funct
	101	0020	32	Pressure Down *	Funct
	102	0040	64	Step Flow *	Funct
	103	0080	128	Start Press *	Funct
	104	0100	256	Short Cycle *	Funct
	105	0200	512	Fail up ERD chaining activation *	
	106	0400	1024	Fail step ERD chaining activation *	
	107	0800	2048	Fail down ERD chaining activation *	
	108	1000	4096	Fail up ERD stamping activation *	
	109	2000	8192	Fail step ERD stamping activation *	
	110	4000	16384	Fail down ERD stamping activation *	
	111	8000	32768	Analog output.	Funct
8	112	0001	1	Measure delay *	Funct

Example: bit number 46 (Offset function) activated on 1, will put to "4000h" the value in the third word.
4000h 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.

Reading of the function bits

Master	Slave
— Select the program number on which the functions bits have to be read — Activate the “Read functions bits” command: Write at the address 00(h), the value **0400(h)** Byte 0 = 00(h) Byte 1 = 04(h) (Bit 2 = 1)	
	Acknowledgement Command echo: — Byte 0 = 00(h) — Byte 1 = 04(h) (Bit 2 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Read functions bits” command
	Command finished Command echo: — Byte 0 = 00(h) — Byte 1 = 04(h) (Bit 2 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 04(h) (Bit 2 = 1)
— Wait the end of the command: command echo = 0400(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Read functions bits” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 2 = 0)	
— Read the functions bits at the address 20(h) of X words.	

The functions bits are dependents of the program number.
A program selection has to be realised before executing command.

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Writing of the function bits

Master	Slave
— Select the program number on which the functions bits have to be read. — Write the functions bits at the address 20(h) — Activate the “Write functions bits” command: Write at the address 00(h), the value **1000(h)** Byte 0 = 00(h) Byte 1 = 10(h) (Bit 4 = 1)	
	Acknowledgement Command echo: — Byte 0 = 00(h) — Byte 1 = 10(h) (Bit 4 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Write functions bits” command
	Command finished Command echo: — Byte 0 = 00(h) — Byte 1 = 10(h) (Bit 4 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 10(h) (Bit 4 = 1)
— Wait the end of the command: command echo = 1000(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Write functions bits” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 4 = 0)	

The functions bits are dependents of the program number.
A program selection has to be realised before executing command.

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Parameters

Downloading of the parameters

All the parameters values below have a tratment by the ATEQ device as **Long** format with fixed comma (10^{-3}). A **Long** is a two words set.

Identifier N°		Meaning *ERD Only	Value	
Dec	Hexa			
1	0001	"FILL TIME" Fill time	0 > 650 seconds	
2	0002	"STAB TIME": Stabilization time	0 > 650 seconds	
3	0003	"TEST TIME" Test time	0 > 650 seconds	
4	0004	"P.UP TIME" * Rise time	0 > 650 seconds	
5	0005	"P.DOWN TIME" * Drop time	0 > 650 seconds	
9	0009	"DUMP TIME" Dump time	0 > 650 seconds	
10	000A	"COUPL. A": Coupling time 1	0 > 650 seconds	
11	000B	"COUPL. B": Coupling time 2	0 > 650 seconds	
21	0015	"TYPE": Test type	Invalid Direct flow Indirect Operator Direct ERD * Indirect ERD * Quick test	0000 1000 2000 3000 4000 5000 6000
29	001D	"Inter-Cycle": Time between 2 chained cycles	0 > 650 seconds	
48	0030	"DURATION" Maintain time of the result during stamp	0 > 650 seconds	
50	0032	"Min Press" Minimum pressure value	- 9999 > 9999	
51	0033	"Max Press" Maximum pressure value	- 9999 > 9999	
53	0035	"Press. UNIT" Pressure unit.	Refer to the "Unit" table.	
60	003C	"Max Flow" Maximum reject value	- 9999 > 9999	
61	003D	"Max Rework" Maximum reject value in recovery	- 9999 > 9999	
62	003E	"Min Flow" Minimum reject value	- 9999 > 9999	
63	003F	"Min Rework" Minimum reject value in recovery	- 9999 > 9999	

Identifier N°		Meaning	Value	
Dec	Hexa	*ERD Only		
66	0042	“Instruct.” Fill instruction value	- 9999 > 9999	
72	0048	“Drift Unit” Calibration drifts percent.	0 > 100%	
80	0050	“Diff A-Z” Differential auto reset time.	0 > 650 seconds	
103	0067	“FILL MODE” Type of fill.	Standard Ballistic	0000 1000
107	006B	“% Drift” ATR absorption tolerance.	0 > 100%	
108	006C	“Start” Start value of the transient (ATR).	- 9999 > 9999	
112	0070	‘IN7:” Function attributed to the entry of the special cycles (input 7)	Refer to the “Configurable input values” table at the end of this chapter	
123	007B	“LANGUAGE” Choice of the language.	Default language 2nd predefined language	0000 1000
126	007E	“Max PreFILL” Maximum pressure value in pre-fill.	- 9999 > 9999	
127	007F	“Flow Unit” Reject unit.	Refer to the “Unit” table.	
128	0080	“Leak Rate” Instruction value during a calibration.	- 9999 > 9999	
148	0094	“FILTER” Filtering.	0 > 650 seconds	
149	0095	“UNITS” Unit type	SI SAE CUSTOM	0000 1000 2000
151	0097	“OFFSET” Offset on a flow.	- 9999 > 9999	
154	009A	“PRESS. AZ” Piezo reset type.	Before cycle After cycle Without auto reset	0000 1000 2000
158	009E	“Max rej.” Percents of the bar graph.	70% 50% 30%	0000 1000 2000
159	009F	“Min P1-P2” DP Min	- 9999 > 9999	
160	00A0	“Max P1-P2” DP Max	- 9999 > 9999	

Identifier N°		Meaning *ERD Only	Value	
Dec	Hexa			
162	00A2	“INSTRUCT. “ DP Instruction	- 9999 > 9999	
164	00A4	“NEXT PROG.” Number of the following program in sequencing.	1 > 128	
185	00 B9	“INIT PRESS” * Initial pressure	- 9999 > 9999	
186	00 BA	“STEP PRESS” * Step pressure	- 9999 > 9999	
187	00 BB	“STEP TIME” * Step time	0 > 650 seconds	
188	00 BC	“END PRESS” * Final pressure	- 9999 > 9999	
189	00 BD	“STP MIN P” * Step minimum pressure	- 9999 > 9999	
190	00 BE	“STP MAX P” * Step maximum pressure	- 9999 > 9999	
191	00 BF	“S.MIN FLOW” * Step minimum flow	- 9999 > 9999	
192	00 C0	“S.MAX FLOW” * Step maximum flow	- 9999 > 9999	
193	00 C1	“CONTACT” (Up contact menu) * Up contact type	Opened Closed	0000 1000
194	00 C2	“CONTACT” (Down contact menu) * Down contact type	Opened Closed	0000 1000
195	00 C3	“UP.MIN FL” * Up minimum flow parameter	- 9999 > 9999	
196	00 C4	“DN.MAX FL” * Down maximum flow parameter	- 9999 > 9999	
197	00 C5	“UP P.MIN” * Up minimum pressure	- 9999 > 9999	
198	00 C6	“UP P.MAX” * Up maximum pressure	- 9999 > 9999	
199	00 C7	“DN P.MIN” * Down minimum pressure	- 9999 > 9999	
200	00 C8	“DN P.MAX” * Down maximum pressure	- 9999 > 9999	
231	00E7	“START PRESS” * Instruction the pressure begin to be measured	- 9999 > 9999	
232	00E8	“ATR DRIFT” Drift transient (ATR).	0 > 100%	
249	00F9	“DELAY EXT1” Programmed external output 1 delay time.	0 > 650 seconds	
250	00FA	“DELAY EXT2” Programmed external output 2 delay time.	0 > 650 seconds	
251	00FB	“DELAY EXT3” Programmed external output 3 delay time.	0 > 650 seconds	
252	00FC	“DELAY EXT4” Programmed external output 4 delay time.	0 > 650 seconds	
253	00FD	“DELAY EXT5” Programmed external output 5 delay time.	0 > 650 seconds	

Identifier N°		Meaning	Value	
Dec	Hexa	*ERD Only		
254	00FE	“DELAY EXT6” Programmed external output 6 delay time.	0 > 650 seconds	
255	00FF	“DELAY INT2” Programmed internal output 2 delay time.	0 > 650 seconds	
256	0100	“DELAY INT1” Programmed internal output 1 delay time.	0 > 650 seconds	
257	0101	“DELAY AUX1” Programmed auxiliary output 1 delay time.	0 > 650 seconds	
258	0102	“DELAY AUX2” Programmed auxiliary output 2 delay time.	0 > 650 seconds	
259	0103	“DELAY AUX3” Programmed auxiliary output 3 delay time.	0 > 650 seconds	
260	0104	“DELAY AUX4” Programmed auxiliary output 4 delay time.	0 > 650 seconds	
261	0105	“TIME EXT1” Programmed external output 1 duration time.	0 > 650 seconds	
262	0106	“TIME EXT2” Programmed external output 2 duration time.	0 > 650 seconds	
263	0107	“TIME EXT3” Programmed external output 3 duration time.	0 > 650 seconds	
264	0108	“TIME EXT4” Programmed external output 4 duration time.	0 > 650 seconds	
265	0109	“TIME EXT5” Programmed external output 5 duration time.	0 > 650 seconds	
266	010A	“TIME EXT6” Programmed external output 6 duration time.	0 > 650 seconds	
267	010B	“TIME INT2” Programmed internal output 2 duration time.	0 > 650 seconds	
268	010C	“TIME INT1” Programmed internal output 1 duration time.	0 > 650 seconds	
269	010D	“TIME AUX1” Programmed auxiliary output 1 duration time.	0 > 650 seconds	
270	010E	“TIME AUX2” Programmed auxiliary output 2 duration time.	0 > 650 seconds	
271	010F	“TIME AUX3” Programmed auxiliary output 3 duration time.	0 > 650 seconds	
272	0110	“TIME AUX4” Programmed auxiliary output 4 duration time.	0 > 650 seconds	
274	0112	“FILTER” Pressure filtering.	0 > 650 seconds	
275	0113	“FILTER” Flow filtering.	0 > 650 seconds	
276	0114	“INSTRUCT.” Fill percent.	0 > 100%	
278	0116	“ELEC REG” Electronic regulator state during the rest phase.	Regulator on instruction Regulator set to 0	0000 1000

Identifier N°		Meaning	Value	
Dec	Hexa	*ERD Only		
281	0119	“RANGE” Capillary number with dual capillaries option only.	Capillary 1 Capillary 2	0000 1000
284	011C	NOT AVAILABLE FOR THE MOMENT “GAS” Type of gas.	Nitrogen Natural gas Propane Butane G110	0000 1000 2000 3000 4000
285	011D	NOT AVAILABLE FOR THE MOMENT “VISCOSITY” Gas viscosity.	0 > 9999	
287	011F	“First Char.” Start on bar code.	0 > 40	
288	0120	“Char. Number” Number of character of bar code.	0 > 40	
289	0121	“Pr “ Program bar code.	1 > 128	
290	0122	NOT AVAILABLE FOR THE MOMENT “% / deg C” Gaz percent.	0 > 100%	
291	0123	“T.ATR2” Stabilization time for the ATR 2 function	0 > 650 seconds	
321	0141	“AZ PIEZO” Auto zero piezo time.	0 > 10000 seconds	
340	0154	“Transient” ATR transient value.	- 9999 > 9999	
352	0160	“VALVE TYPE” *	Opened Closed	0000 1000
353	0161	“Press. UNIT” (config/pneumatic menu) General pressure unit	Refer to the “Unit” table.	
354	0162	“LINE P. MIN” Minimum line pressure level	- 9999 > 9999	
364	016C	“DISPLAY MODE“ Leak display management	XXXX XXX.X XX.XX X.XXX	0000 1000 2000 3000
375	0177	‘IN8:” Function attributed to the entry of the special cycles (input 8)	Refer to the “Configurable input values” table at the end of this chapter	
376	0178	‘IN9:” Function attributed to the entry of the special cycles (input 9)	Refer to the “Configurable input values” table at the end of this chapter	
379	017B	“USB:” USB mode (printer or supervision)	Supervision Printer Bar code Auto None	0000 1000 2000 3000 4000
412	019C	“SAVE ON” Mode of Results stocking.	None Internal USB	0000 1000 2000
413	019D	“ACCESS” Access parameters mode.	None USB Password	0000 1000 2000

Identifier N°		Meaning *ERD Only	Value	
Dec	Hexa			
414	019E	“YEAR” Year configuration.	2000 > 9999	
415	019F	“MONTH” Month configuration.	1 > 12	
416	01A0	“DAY” Day configuration.	1 > 31	
417	01A1	“HOUR” Hour configuration.	0 > 59	
418	01A2	“MINUTE” Minute configuration.	0 > 59	
419	01A3	“SECOND” Second configuration.	0 > 59	
477	01 DD	“REG. MODE” Regulation mode	None P(Auto) P(Manu) Flow	0000 1000 2000 3000
478	01 DE	“START INST.” (Reg mode menu) Start pressure instruction in percent	0 > 1000	
479	01 DF	“CONTINUOUS” (Reg mode menu) Enable the permanent regulation during cycle	OFF ON	
480	01 E0	“INSTRUCT.” (Reg mode menu) Flow instruction	- 9999 > 9999	
481	01 E1	“GAIN” (Reg mode menu) Coefficient of regulation	- 9999 > 9999	
482	01 E2	“OFFSET UP” * Flow offset during the “UP” step of an ERD program	- 9999 > 9999	
483	01 E3	“OFFSET DOWN” * Flow offset during the “DOWN” step of an ERD program	- 9999 > 9999	
484	01 E4	“OVERSHOOT” Enable overshoot on the regulation mode	OFF ON	0000 1000
485	01 E5	“EXT. ACCES” Security by external access (Fieldbus/Modbus) Reset value with Modbus: → Writing at address 0xC1E5 Reset value with Fieldbus: → Writing one word with ID = 0xC1E5	Read/Write Read Only No Access	0000 1000 2000
486	01 E6	“OFFSET” Offset Learning	- 9999 > 9999	
487	01 E7	“MEAS. DELAY” * Time to wait before launch measurement	0 > 650 seconds	
488	01 E8	“PRESSURE” (Analog output menu) Type of analog output for pressure	NONE F.S.	0000 1000
489	01 E9	“FLOW” (Analog output menu) Type of analog output for flow	NONE F.S. WINDOW	0000 1000 2000
490	01 EA	“TARGET” (Analog output menu) Target flow value, middle value of the WINDOW mode	- 9999 > 9999	
491	01 EB	“EXTENDED” (Analog output menu) Used to calculate the max and min flow value of the WINDOW mode depending on the TARGET value	- 9999 > 9999	

Configurable input values

Input value	Value code
Program Selection	0000
Capil. Temp. Check (*)	10000
Temperature Check (*)	11000
Atm Pressure Check (*)	12000
Flow Check (*)	14000
Line P. Sensor Check (*)	15000
Regulator Adjust.	16000
Infinite Fill	17000
Piezo Az	18000
Custom Unit Learn	19000
Custom Unit Check	20000
ATR Learning Cycle	21000
Code Reader	22000
Pre-Regul. Adjust.	23000
Print Results	24000
Code Reader Sequence	25000

(*) Available when the **Service special cycle** function is checked.

Unit table

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

Unit code		Unit
Decimal	Hexadecimal	
6000	1770	Pascal
11000	2AF8	Bar
12000	2EE0	Kilopascal
13000	32C8	PSI
14000	36B0	Millibar
15000	3A98	Megapascal
30000	7530	Liter/hour
33000	80E8	CAL.
46000	B3B0	$Inch^3/s$
47000	B798	$Inch^3/min$
48000	BB80	$Inch^3/hour$
49000	BF68	$Feet^3/hour$
50000	C350	Milliliter/second
51000	C738	Milliliter/minute
52000	CB20	Milliliter/hour
53000	CF08	Liter/minute
54000	D2F0	$Meter^3/hour$
84000	01 4820	SCCM
92000	01 6760	Points

Reading of the parameters

The reading of the parameters is carried out by data exchange in the corresponding area depending on the configuration mode of the slave. Each parameter is identified by one identifier. See identifiers tables.

This table is an example based on the reading of two parameters:

- **Test time** (identifier number 3)
- **Stabilization time** (identifier number 2)

Master	Slave
— Select the program on which parameters has to be read — Write in the parameter area at the address 20(h), the number of parameters followed by their identifiers: On network: 02 00 03 00 02 00 0002(h) 0003(h) 0002(h) 0002(h) = two parameters 0003(h) = test time identifier 0002(h) = stabilization time identifier — Activate the “Read parameters” command: Write at the address 00(h), the value **0020(h)** Byte 0 = 20(h) (Bit 5 = 1) Byte 1 = 00(h)	
	<u>Acknowledgement</u> Command echo: — Byte 0 = 20(h) (Bit 5 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Read parameters” command
	<u>Command finished</u> Command echo: — Byte 0 = 20(h) (Bit 5 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 20(h) (Bit 5 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0020(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Read parameters” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 5 = 0) Byte 1 = 00(h)	

Master	Slave
— Read the parameters at the address 20(h): 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**: On network: 03 00 E8 03 00 00 02 00 F4 01 00 00 @20h = 0003h 03E8h 0000h 0002h 01F4h 0000h. - 0003h: test time identifier. - 000003E8h: test time value 1000(d)/1000 → 1 sec. - 0002h: fill time identifier. - 000001F4h: stabilization time value 500(d)/1000 → 0,5 sec.	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Writing of the parameters

The writing of the parameters is carried out by data exchange in the corresponding area depending on the configuration mode of the slave. Each parameter is identified by one identifier. See identifiers tables.

This table is an example based on the reading of two parameters:

- **Test time** (identifier number 3)
- **Stabilization time** (identifier number 2)

Master	Slave
— Select the program on which the parameters have to be modified — Write in the parameter area at address 20(h), the number of parameters followed by their identifiers and their wanted value: **Example:** On network: 02 00 03 00 E8 03 00 00 02 00 D0 07 00 00 0002(h) 0003(h) 03E8(h) 0000(h) 0002(h) 07D0(h) 0000(h) 0002(h) = two parameters 0003(h) = test time identifier 000003E8(h) = 1000 => 1 second 0002(h) = stabilization time identifier 000007D0(h) = 2000 => 2 second — Activate the “Write parameters” command: Write at the address 00(h), the value **0040(h)** Byte 0 = 40(h) (Bit 6 = 1) Byte 1 = 00(h)	
	Acknowledgement Command echo: — Byte 0 = 40(h) (Bit 6 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Write parameters” command
	Command finished Command echo: — Byte 0 = 40(h) (Bit 6 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 40(h) (Bit 6 = 1) — Byte 3 = 00(h)

Master	Slave
— Wait the end of the command: command echo = 0040(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Write parameters” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 6 = 0) Byte 1 = 00(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Reading of the program name

Master	Slave
— Select the program whose name you want to read — Activate the “Read program name” command: Write at the address 00(h), the value **2000(h)** Byte 0 = 00(h) Byte 1 = 20(h) (Bit 5 = 1)	
	Acknowledgement Command echo: — Byte 0 = 00(h) — Byte 1 = 20(h) (Bit 5 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Read program name” command
	Command finished Command echo: — Byte 0 = 00(h) — Byte 1 = 20(h) (Bit 5 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 20(h) (Bit 5 = 1)
— Wait the end of the command: command echo = 2000(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Read program name” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 5 = 0)	
— Read the program name of 12 characters/bytes maximum at the address 20(h):	

The program name is dependant of the program number in edition, a program selection has to be realized.

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Writing of the program name

Master	Slave
— Select the program whose name you want to modify — Write the program name of 12 characters/bytes maximum at the address 20(h). — Activate the “Write program name” command: Write at the address 00(h), the value **4000(h)** Byte 0 = 00(h) Byte 1 = 40(h) (Bit 6 = 1)	
	<u>Acknowledgement</u> Command echo: — Byte 0 = 00(h) — Byte 1 = 40(h) (Bit 6 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Write program name” command
	<u>Command finished</u> Command echo: — Byte 0 = 00(h) — Byte 1 = 40(h) (Bit 6 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 40(h) (Bit 6 = 1)
— Wait the end of the command: command echo = 4000(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Write program name” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 6 = 0)	

The program name is dependant of the program number in edition, a program selection has to be realized.

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

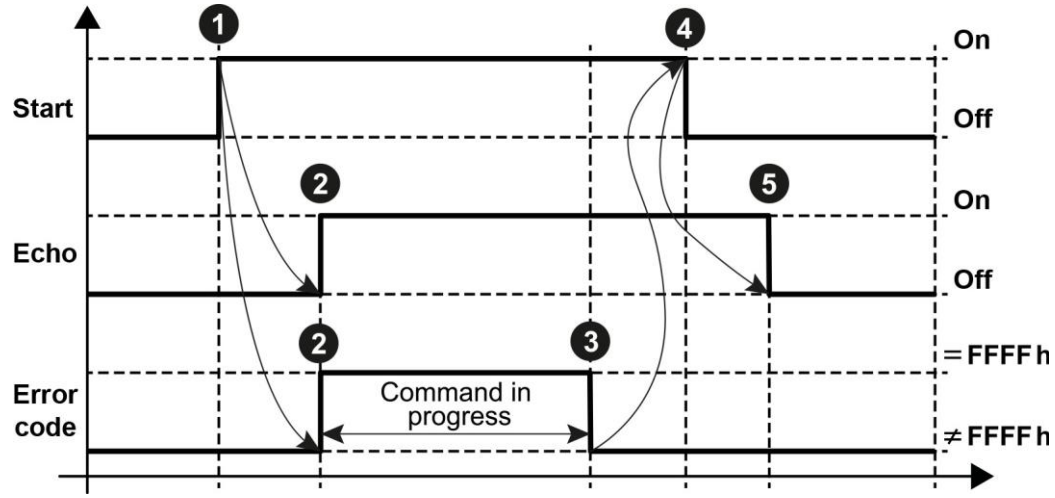
Standard command cycle

Start cycle command on the ATEQ device

Master	Slave
— Select the program you want to start — Activate the “Start” command: Write at the address 00(h), the value **0002(h)** Byte 0 = 02(h) (Bit 1 = 1) Byte 1 = 00(h)	
	Acknowledgement Command echo: — Byte 0 = 02(h) (Bit 1 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Start” command
	Command finished Command echo: — Byte 0 = 02(h) (Bit 1 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 02(h) (Bit 1 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0002(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Start” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 1 = 0) Byte 1 = 00(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Start command diagram



1	**Start** command = On
2	Acknowledge by ATEQ = (**Echo** command = On) and (**Error code** command = FFFFh)
3	Wait end of **Start** command = (**Echo** command = On) and (**Error code** command ≠ FFFFh)
4	**Start** command = Off
5	Acknowledge by ATEQ = (**Echo** command = Off) and (**Error code** command ≠ FFFFh)

The Echo command is a copy of the Start command. The Start signal must be maintained (ON) till the end of the Start command condition is reached.

Reset command on the ATEQ device

Master	Slave
— Activate the “Reset” command: — Write at the address 00(h), the value **0001(h)** Byte 0 = 01(h) (Bit 0 = 1) Byte 1 = 00(h)	
	<u>Acknowledgement</u> Command echo: — Byte 0 = 01(h) (Bit 0 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Reset” command
	<u>Command finished</u> Command echo: — Byte 0 = 01(h) (Bit 0 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 01(h) (Bit 0 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0001(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Reset” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 0 = 0) Byte 1 = 00(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Special cycles

Special cycle table

Write the identifier number of the wanted special cycle at the address 04(h) and its instruction if necessary.
@08(h) = identifier number of the special cycle
@09(h) = instruction for the special cycle

Numb	Special cycle
1	ATR learning Cycle.
4	Custom Unit Learn.
5	Custom Unit Check.
9	Piezo auto zero.
13	Regulator adjust.
25	Capil. Temp. Check (*)
26	Temperature Check (*)
27	Atm Pressure Check (*)
29	Line P. Sensor Check (*)
30	Flow Check (*)

To activate a special cycle, you must send a **Start** command (Bit 1) and a **Start special cycle** command (Bit 2).
(*) Appears with the **Service special cycle** function checked.

Auto-zero on the ATEQ device

Master	Slave
— Select the program on which you want to make the auto zero — Write at the address 08(h) the identifier number of the special cycle for an auto zero — Activate the “Start” and the “Start special cycle” commands: Write at the address 00(h), the value **0006(h)** Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) Byte 1 = 00(h)	
	<u>Acknowledgement</u> Command echo: — Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Start” and “Start special cycle” commands
	<u>Command finished</u> Command echo: — Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 06(h) (Bit 1 = 1 and Bit 2 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0006(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Start” and “Start special cycle” commands: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 1 = 0 and Bit 2 = 0) Byte 1 = 00(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

FIFO results

FIFO list results structure

At the end of each cycle, a result is stored as an array of 40 words contained in a FIFO of 8 results. This result includes the final state of the instrument (relays position, alarm signal, indicators state…), but also of the test (units, values measured for pressure and flow).
The results are in the memory of the instrument. To obtain them, it is necessary to carry out a “Read FIFO results” request.

Words	Meaning *ERD Only	Type	Bytes	Coeff
1	Program number.	Word	2	
2	Test type.	Word	2	
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.	Word	2	
4	Alarm code (refer to the alarm codes table).	Word	2	
5	Pressure low part word.	Long	4	x1000
6	Pressure high part word.			
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	Flow low section word.	Long	4	x1000
10	Flow high section word.			
11	Flow unit code low part word (refer to. Units table).	Long	4	x1000
12	Flow unit code high part word (refer to. Units table).			
13	Step pressure low part word *	Long	4	x1000
14	Step pressure high part word *			
15	Step pressure unit code low part word (refer to units table) *	Long	4	x1000
16	Step pressure unit code high part word (refer to units table) *			
17	Step flow low part word *	Long	4	x1000
18	Step flow high part word *			
19	Step flow unit code low part word (refer to units table) *	Long	4	x1000
20	Step flow unit code high part word (refer to units table) *			
21	Drop pressure low part word *	Long	4	x1000
22	Drop pressure high part word *			
23	Drop pressure unit code low part word (refer to units table) *	Long	4	x1000
24	Drop pressure unit code high part word (refer to units table) *			
25	Pa – Pa/s Leak result low part word	Long	4	x1000
26	Pa – Pa/s Leak result high part word			
27	Drop flow unit code low part word (refer to units table) *	Long	4	x1000
28	Drop flow unit code high part word (refer to units table) *			

Words	Meaning *ERD Only	Type	Bytes	Coeff
29	Rise contact pressure low part word *	Long	4	x1000
30	Rise contact pressure high part word *			
31	Rise contact pressure unit code low part word (refer to units table) *	Long	4	x1000
32	Rise contact pressure unit code high part word (refer to units table) *			
33	Drop contact flow low part word *	Long	4	x1000
34	Drop contact flow high part word *			
35	Drop contact flow unit code low part word (refer to units table) *	Long	4	x1000
36	Drop contact flow unit code high part word (refer to units table) *			
37	Atmospheric pressure in hPa low part word	Long	4	x1000
38	Atmospheric pressure in hPa high part word			
39	Temperature in °C low part word	Long	4	x1000
40	Temperature in °C high part word			

All the numerical values are treated with **Long** format with fixed comma (10^{-3}). Thus, they must be multiplied by 1000 to get the value in units (see examples in “Basic notions” section).

Step table

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

Code		Steps *ERD Only
Decimal	Hexadecimal	
0	0000	Pre-fill.
1	0001	Fill
2	0002	Zero Diff.
3	0003	Stabilization
4	0004	Test
5	0005	Dump
7	0007	Up*
8	0008	Step*
9	0009	Down*
65535	FFFF	No step in progress

Alarm codes table

This list gives all the alarms in hexadecimal code.

Identifier n°		Alarm
Decimal	Hexadecimal	
0	0000	No alarm.
1	0001	Pressure switched alarm (test pressure too high).
2	0002	Pressure switch (test pressure too small).
3	0003	Large leak on TEST (EEEE).
4	0004	Large leak on REF (MMMM).
7	0007	Sensor out of order (overrun).
8	0008	ATR error.
9	0009	ATR drift.
10	000A	Calibration drift.
43	002B	Pressure too high.
44	002C	Pressure too low.
45	002D	Piezo sensor out of order.
46	002E	Dump error.
47	002F	Calibration drift.
72	0048	Electronical regulator learning error.
73	0049	Atmospheric pressure error.
74	004A	Temperature error.

Cycle results reading (last 8 results in FIFO)

Master	Slave
— Read the number of available results in the FIFO at the address 08(h): 08(h) = 0000(h) → no results 08(h) > 0000(h) → results available — Activate the “Read FIFO results” command: Write at the address 00(h), the value **0010(h)** Byte 0 = 10(h) (Bit 4 = 1) Byte 1 = 00(h)	
	Acknowledgement Command echo: — Byte 0 = 10(h) (Bit 4 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Read FIFO results” command
	Command finished Command echo: — Byte 0 = 10(h) (Bit 4 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 10(h) (Bit 4 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0010(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Read FIFO results” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 4 = 0) Byte 1 = 00(h)	
— Read the result of 40 words at the address 20(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Reset FIFO results

This command resets the 8 last cycle's results available in the FIFO.

Master	Slave
— Activate the "Reset FIFO results" command: Write at the address 00(h), the value **0080(h)** Byte 0 = 80(h) (Bit 7 = 1) Byte 1 = 00(h)	
	<u>Acknowledgement</u> Command echo: — Byte 0 = 80(h) (Bit 7 = 1) — Byte 1 = 00(h) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running "Reset FIFO results" command
	<u>Command finished</u> Command echo: — Byte 0 = 80(h) (Bit 7 = 1) — Byte 1 = 00(h) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 80(h) (Bit 7 = 1) — Byte 3 = 00(h)
— Wait the end of the command: command echo = 0080(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the "Reset FIFO results" command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) (Bit 7 = 0) Byte 1 = 00(h)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Last results

Last results structure

At the end of each cycle, the last result is as an array of 40 words. This result includes the final state of the instrument (relays position, alarm signal, indicators state…), but also of the test (units, values measured for the pressure and the flow).
The last result is in the memory of the instrument. To obtain them, it is necessary to carry out a “Read last results” request.

Words	Meaning *ERD Only	Type	Bytes	Coeff
1	Program number.	Word	2	
2	Test type.	Word	2	
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.	Word	2	
4	Alarm code (refer to the alarm codes table).	Word	2	
5	Pressure low part word.	Long	4	x1000
6	Pressure high part word.			
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	Flow low section word.	Long	4	x1000
10	Flow high section word.			
11	Flow unit code low part word (refer to. Units table).	Long	4	x1000
12	Flow unit code high part word (refer to. Units table).			
13	Step pressure low part word *	Long	4	x1000
14	Step pressure high part word *			
15	Step pressure unit code low part word (refer to units table) *	Long	4	x1000
16	Step pressure unit code high part word (refer to units table) *			
17	Step flow low part word *	Long	4	x1000
18	Step flow high part word *			
19	Step flow unit code low part word (refer to units table) *	Long	4	x1000
20	Step flow unit code high part word (refer to units table) *			
21	Drop pressure low part word *	Long	4	x1000
22	Drop pressure high part word *			
23	Drop pressure unit code low part word (refer to units table) *	Long	4	x1000
24	Drop pressure unit code high part word (refer to units table) *			
25	Pa – Pa/s Leak result low part word	Long	4	x1000
26	Pa – Pa/s Leak result high part word			
27	Drop flow unit code low part word (refer to units table) *	Long	4	x1000
28	Drop flow unit code high part word (refer to units table) *			

Words	Meaning *ERD Only	Type	Bytes	Coeff
29	Rise contact pressure low part word *	Long	4	x1000
30	Rise contact pressure high part word *			
31	Rise contact pressure unit code low part word (refer to units table) *	Long	4	x1000
32	Rise contact pressure unit code high part word (refer to units table) *			
33	Drop contact flow low part word *	Long	4	x1000
34	Drop contact flow high part word *			
35	Drop contact flow unit code low part word (refer to units table) *	Long	4	x1000
36	Drop contact flow unit code high part word (refer to units table) *			
37	Atmospheric pressure in hPa low part word	Long	4	x1000
38	Atmospheric pressure in hPa high part word			
39	Temperature in °C low part word	Long	4	x1000
40	Temperature in °C high part word			

All the numerical values are treated with **Long** format with fixed comma (10^{-3}). Thus, they must be multiplied by 1000 to get the value in units (see examples in “Basic notions” section).

Last results reading

For using this function, it is important to:
— Having done a start on the instrument before (“End of cycle” bit on in the relay status)
— Not having done a reset of the FIFO

Master	Slave
— Activate the “Read Last result” command: Write at the address 00(h), the value **8000(h)** Byte 0 = 00(h) Byte 1 = 80(h) (Bit 7 = 1)	
	Acknowledgement Command echo: — Byte 0 = 00(h) — Byte 1 = 80(h) (Bit 7 = 1) Command error code: — Byte 2 = FF(h) — Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Read Last result” command
	Command finished Command echo: — Byte 0 = 00(h) — Byte 1 = 80(h) (Bit 7 = 1) Command error code if the command is correctly carried out: — Byte 2 = 00(h) — Byte 3 = 00(h) OR if an error occurred during the command: — Byte 2 = 00(h) — Byte 3 = 80(h) (Bit 7 = 1)
— Wait the end of the command: command echo = 8000(h) command error code ≠ FFFF(h) (end of command)	
— Deactivate the “Read Last result” command: Write at the address 00(h) the value **0000(h)** Byte 0 = 00(h) Byte 1 = 00(h) (Bit 7 = 0)	

The master instrument must always set to zero the command bit. If it is not done, the slave instrument will not detect the following command on this bit. It has detection on the rising edge (when the bit state goes from 0 to 1).

Real time

Status and real time measures

The real time measurement is used for display curve or values during the cycle and not for the final measurement.

Do not take or use the final results in this section, it is just to see the status of the device for the “Cycle end” (bit 5) and “Key presence” (bit 15) information.
For the results, use only the FIFO list results structure or the Last results structure (see above)

Words	Meaning	Type	Bytes	Coeff
1	Program number.	Word	2	
2	Number of results waiting in the results FIFO memory.	Word	2	
3	Test type.	Word	2	
4	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.	Do not use these results while the Bit 5 (cycle end is not 1). Use only Bit 5 (cycle end) and Bit 15 (key presence).		
	Bit 5 = 1: cycle end.	Word	2	
	Bit 6 = 1: recoverable part. Bit 7 = 1: CAL error or drift. Bit 8 = 1: *Unused*. Bit 9 = 1: ATR error or drift. Bits 10 / 11 / 12 / 13 / 14 = 1: *Unused*. Bit 15 = 1: key presence.	Do not use these results while the Bit 5 (cycle end is not 1). Use only Bit 5 (cycle end) and Bit 15 (key presence).		
5	Step code (refer to steps table).	Word	2	
6	Low pressure section word.	Long	4	x1000
7	High pressure section word.			
8	Pressure unit code low part word (see units table).	Long	4	x1000
9	Pressure unit code high part word (see units table).			
10	Flow low section word.	Long	4	x1000
11	Flow high section word.			
12	Flow unit code low part word (refer to. Units table).	Long	4	x1000
13	Flow unit code high part word (refer to. Units table).			

Examples

Pressure value = 207
Pressure: Words 6 and 7
On network:

98	28	03	00

00032898h → 207000(d)/1000 → **207**

Flow value = -0.108
Flow: Words 10 and 11
On network:

94	FF	FF	FF

FFFFFF94h → -108(d)/1000 → **-0.108**