



F600 Series – EtherCAT 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 information 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

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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 \pm 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 F600 device on the EtherCAT network.

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



BASIC NOTIONS

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.

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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 Byte
0 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 Byte Byte Byte
0 1 2 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 Byte Byte Byte
0 1 2 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:

$$- 207.055 = 207055 \div 1000$$

Example – Pressure:

On network:

E3	28	03	00
Byte	Byte	Byte	Byte
0	1	2	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	Byte	Byte	Byte
0	1	2	3

- Word 1 = FF94h

- Word 2 = FFFFh

- Value = FFFFFFFF94h = - 108(d) = - 108 of thousandths of unit

- Real value = - 108 ÷ 1000 = - 0.108 expressed in units



Hardware installation

HARDWARE CONFIGURATION

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Connect your ATEQ equipment to the EtherCAT fieldbus using its EtherCAT connectors and compatible cables.

Your device has an EtherCAT internal board and two EtherCAT connectors.

The EtherCAT internal board is located inside your device. Only one version is available:

— **COMX 51**



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

Your device has two RJ45 type connectors.

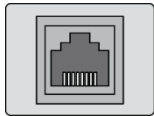


For more information on your ATEQ equipment, refer to the Quick Start Manual.

EtherCAT connector

Standard connection Ethernet TCP / IP protocol.

RJ45 connector





Wiring instructions

General notes on wiring in EtherCAT

- Use shielded Ethernet cables that meet the requirements of at least category 5 (Cat 5) according to EN 50173 or ISO/IEC 11801.
- Do not use hubs in an EtherCAT network.
- Use switches only between EtherCAT master and first EtherCAT slave device (100 MBit/s, Full Duplex).
- The cable length between two EtherCAT devices must not exceed 100 meters.

Standard wiring (without redundancy)

Standard wiring in EtherCAT connects channel 0 (also known as Port 0 or Main Port) of the master device to the IN Port of the first slave device. The OUT Port of the first slave device is connected to the IN Port of the next slave device, and so forth. The OUT Port of the last slave device and channel 1 of the master device remain unused.

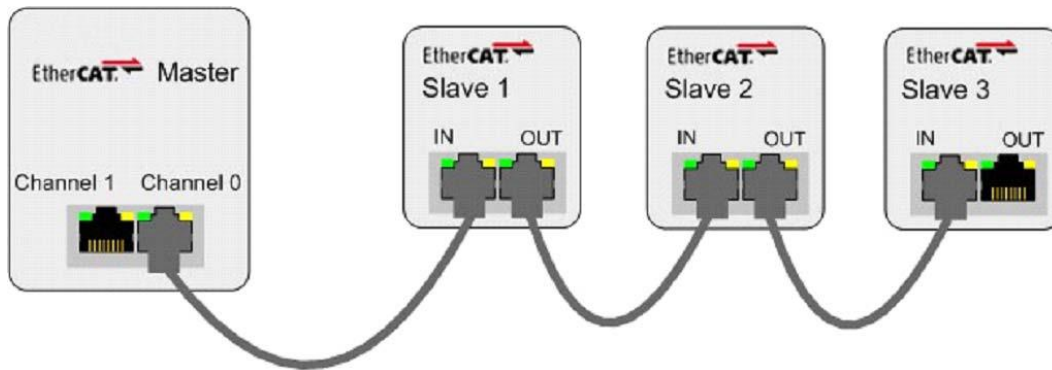


Figure 1: Standard Wiring in EtherCAT Network

Redundant wiring

EtherCAT master firmware version $\geq 2.5.x$ supports redundant wiring. In redundant wiring, the OUT Port of the last slave device is connected to channel 1 (Port 1) of the master device in addition to the standard wiring, thus creating a "ring topology" with the master channel 1 serving as "redundancy port".

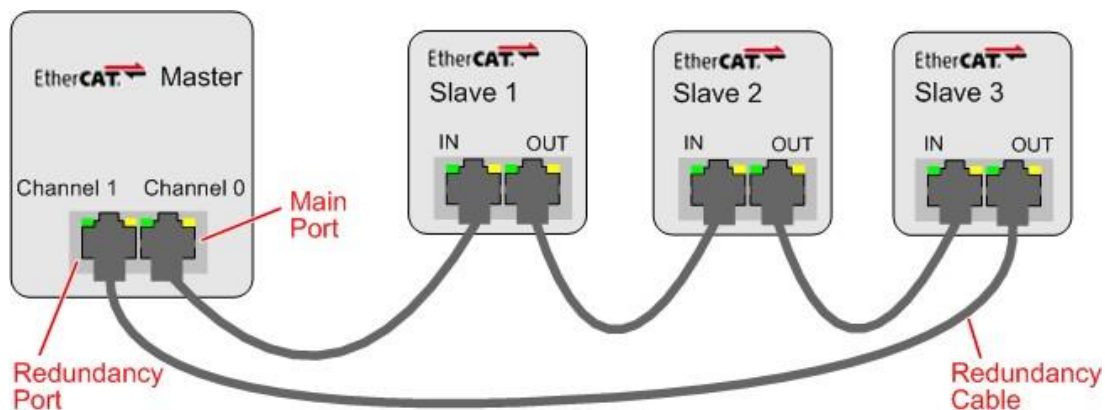


Figure 2: Redundant Wiring in EtherCAT Network



In case of an interrupted cable connection between two EtherCAT slaves or in case of a defective slave device, the redundant cable maintains the communication between the master and the other slaves, which otherwise would be cut-off from the bus.

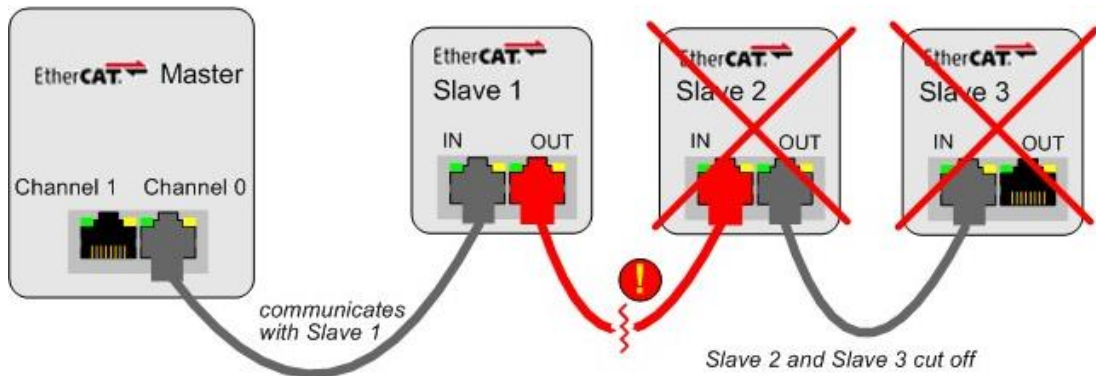


Figure 3: Cable Interrupt in Standard Wiring in EtherCAT Network

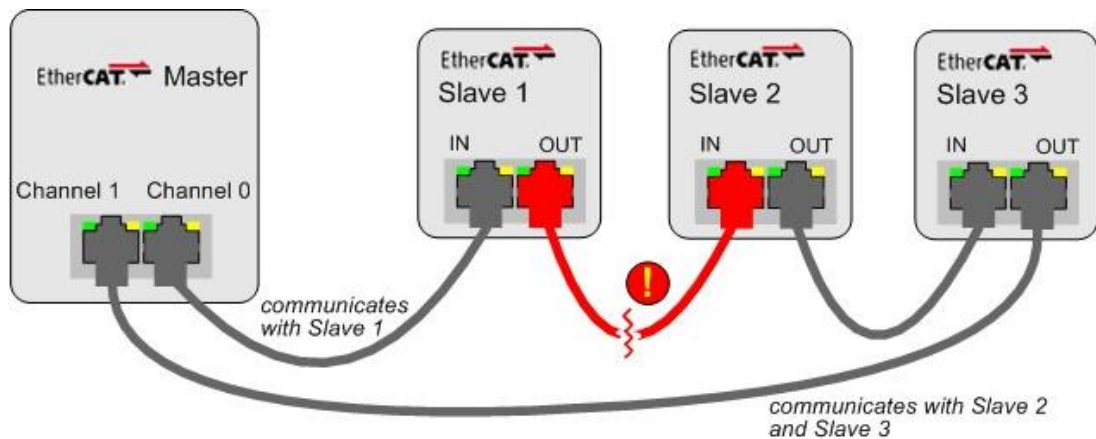


Figure 4: Cable Interrupt in Redundant Wiring in EtherCAT Network

Prerequisites for using redundant wiring in EtherCAT: Redundancy function has been enabled in configuration of master.



Redundancy function and Distributed Clocks function cannot be used at the same time.



Firmware version 2.5.x.x does not support Distributed Clocks.
Firmware version 3.0.x supports either Redundancy or Distributed Clocks, but never both functions at once.



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 ETHERCAT 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) 200 bytes	(4) 96 bytes	(3) 64 bytes	(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-C8h	X					Exchange zone: cycle result reading or 20 parameters management

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

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

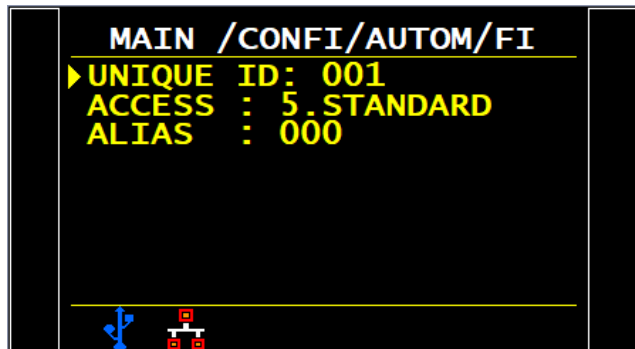




SETUP OF THE UNIQUE ID

i | The **Unique ID** must be the different for each device on the EtherCAT network.

From the ATEQ device

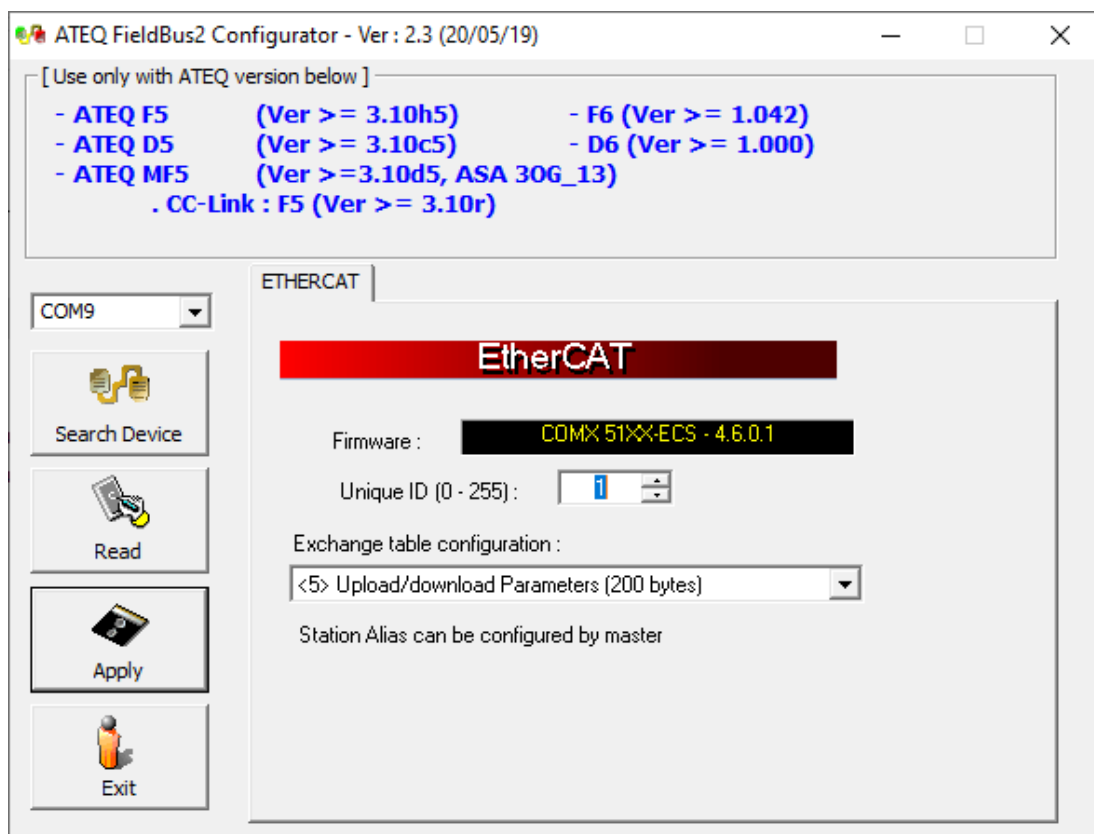


From the **MAIN MENU** screen of your ATEQ device:

- > CONFIGURATION
- > AUTOMATISM
- > FIELDBUS
- > UNIQUE ID

From the ATEQ Fieldbus Configurator software

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



i | The **Alias** is set only by the master (no access by the slave).



Configuration of the master

INSTALLATION OF THE ETHERCAT MODULE

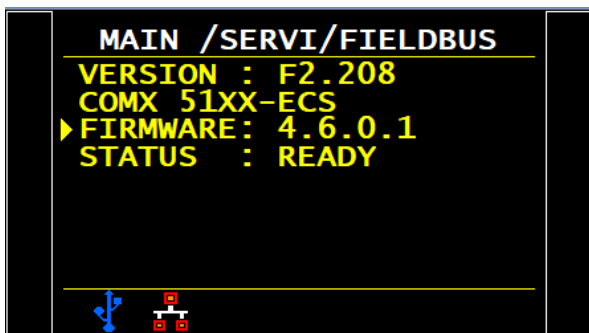
Identification of the version of the EtherCAT module

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



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

From the ATEQ device



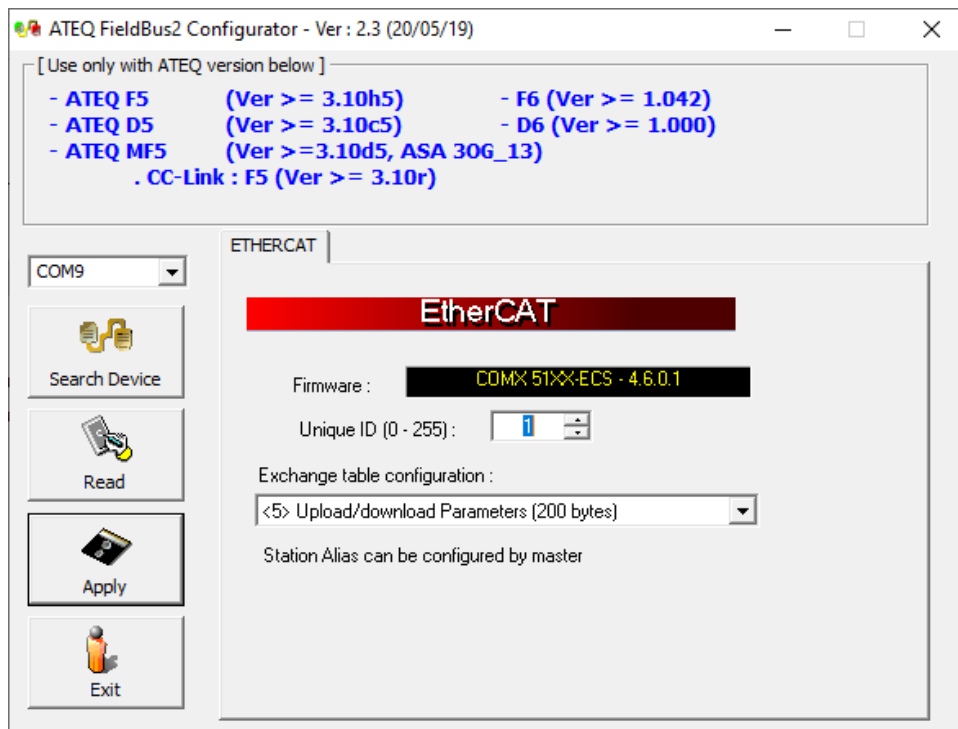
From the **MAIN MENU** screen of your ATEQ device:

- 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.

EtherCAT hardware and software compatibilities

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

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EtherCAT Specs	Device software	Fieldbus Software	Hilscher Firmware	Config Files	Hilscher Hardware Ref
V4.6	F6: ≥ 1.322 Others: ≥ 1.000	> 2.104	4.6.0.1	HILSCHER COMX 51XX RE ECS V4.6.X.xml (15/06/2018)	COMX 51



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:

Device	Hardware Ports 0/1/...	Slot nu...	Serial nu...	Driver	Channel Protocol	Access path	
<input checked="" type="checkbox"/>	NHST-T100-EN	Ethernet/Ethernet/E...	n/a	26990	netX Driver	Undefined Gateway	... \192.168.10...
<input type="checkbox"/>							
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MASTER DEVICES INSTALLATION

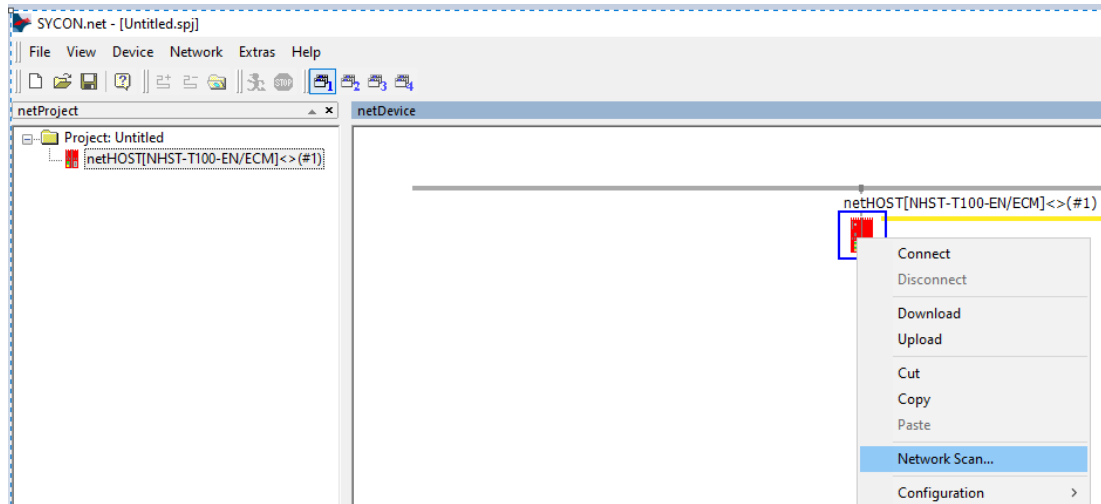


The screenshot used in this section correspond to the Sycon.net from Hilscher software. Nevertheless, you may use your own software to configure the master.

Scan the devices

To have connection and communication with EtherCAT, you must follow the instruction displayed in the examples below.

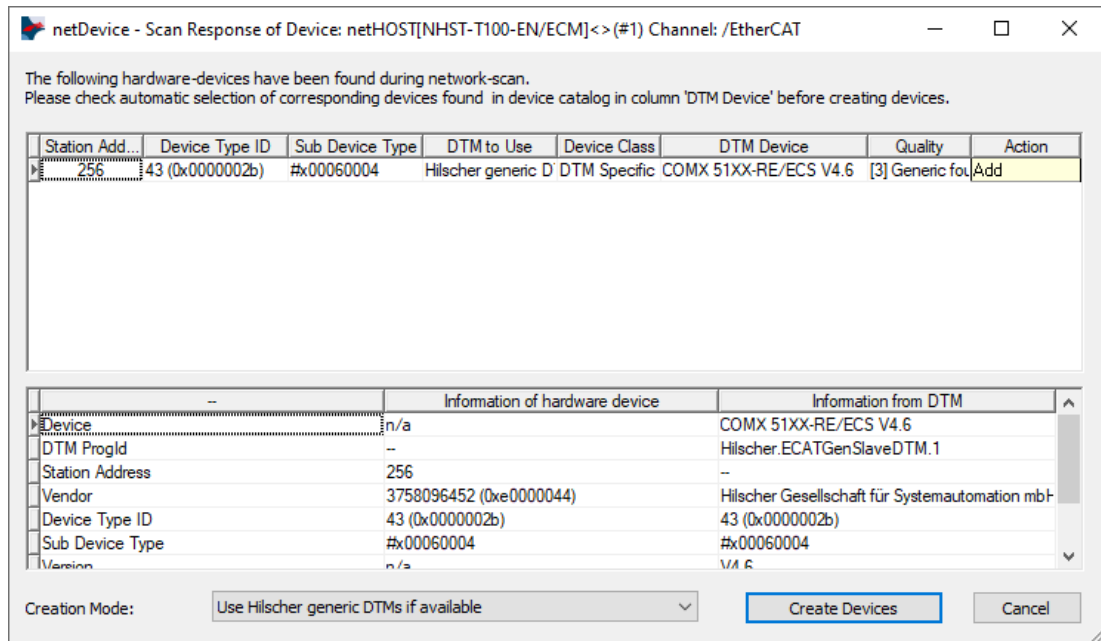
Right click on the master and select **Network Scan...** to detect slaves on the network:



Devices configuration

Once devices are detected, a window containing the information of these devices appears.

You can click on the **Create Devices** button and the software will create the corresponding slaves.





CHECKING OF THE ETHERCAT CONFIGURATION MODES

- i** Five configuration modes are available according to the bytes number available (see Configuration of the ATEQ device (slave)).
- i** As you can see with the Sycon example below, the outputs must be at the 0x1A00 index (TxPDO) and the inputs must be at the 0x1600 index (RxPDO).

Setup of the Standard mode (normal)

The parameters configuration must be like the following ones:

- Input_Data: IB = 200 bytes
- Output_Data: QB = 200 bytes

netDevice - Configuration COMX 51XX-RE/ECS V6.4-001[COMX 51XX-RE/ECS V6.4]<257>

IO Device: COMX 51XX-RE/ECS Device ID: 0x0000002B
Vendor: Hilscher Gesellschaft für Systemautomation mbH Vendor ID: 0xE0000044

Process Data

Sync Manager:

SM	Byte length	Type	Flags
2	200	Outputs	
3	200	Inputs	

PDO Assignment (0x1C12):

Name	Activ...	Index	Byte length	Flags	Description
COMX 51XX-RI					
1. RxPDO	<input checked="" type="checkbox"/>	0x1600	200		
2. RxPDO	<input type="checkbox"/>	0x1601	200		
3. RxPDO	<input type="checkbox"/>	0x1602	200		
4. RxPDO	<input type="checkbox"/>	0x1603	200		
5. RxPDO	<input type="checkbox"/>	0x1604	200		
6. RxPDO	<input type="checkbox"/>	0x1605	24		

PDO content (0x1600):

Index	Sub I...	Byte...	Offset	Name	Type
0x2000	1	1	0	1 Byte Out (0)	BYTE
0x2000	2	1	1	1 Byte Out (1)	BYTE
0x2000	3	1	2	1 Byte Out (2)	BYTE
0x2000	4	1	3	1 Byte Out (3)	BYTE
0x2000	5	1	4	1 Byte Out (4)	BYTE
0x2000	6	1	5	1 Byte Out (5)	BYTE
0x2000	7	1	6	1 Byte Out (6)	BYTE
0x2000	8	1	7	1 Byte Out (7)	BYTE

Download

PDO Assignment PDO Configuration

OK Cancel Apply Help

Disconnected Data Set





Setup of the Standard less mode

The parameters configuration must be like the following ones:

- Input_Data: IB = 96 bytes
- Output_Data: QB = 96 bytes

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The screenshot shows the netDevice Configuration window for a COMX 51XX-RE/ECS V6.4-001 device. The interface includes a navigation area on the left with options like Configuration, General, Behavior, Distributed Clock, Process Data, MailBox, CoE, Description, and XML DDF Viewer. The main area is titled 'Process Data' and contains two tables: 'Sync Manager' and 'PDO Assignment (0x1C13)'. The 'Sync Manager' table shows two entries: SM 2 with a byte length of 96 and type 'Outputs', and SM 3 with a byte length of 96 and type 'Inputs'. The 'PDO Assignment' table lists six TxPDO entries with indices 0x1A00 to 0x1A05 and byte lengths of 96, 200, 200, 200, 200, and 24 respectively. Below these tables is a 'PDO content (0x1A00)' table showing input data for indices 0x3000 to 0x3006, each with a sub-index of 1 and a byte length of 1. The 'Download' section at the bottom has checkboxes for 'PDO Assignment' and 'PDO Configuration', both of which are unchecked. The window also features 'OK', 'Cancel', 'Apply', and 'Help' buttons.

SM	Byte length	Type	Flags
2	96	Outputs	
3	96	Inputs	

Name	Activ...	Index	Byte length	Flags	Description
COMX 51XX-RI					
1. TxPDO	<input checked="" type="checkbox"/>	0x1A00	96		
2. TxPDO	<input type="checkbox"/>	0x1A01	200		
3. TxPDO	<input type="checkbox"/>	0x1A02	200		
4. TxPDO	<input type="checkbox"/>	0x1A03	200		
5. TxPDO	<input type="checkbox"/>	0x1A04	200		
6. TxPDO	<input type="checkbox"/>	0x1A05	24		

Index	Sub I...	Byte...	Offset	Name	Type
0x3000	89	1	88	1 Byte In (88)	BYTE
0x3000	90	1	89	1 Byte In (89)	BYTE
0x3000	91	1	90	1 Byte In (90)	BYTE
0x3000	92	1	91	1 Byte In (91)	BYTE
0x3000	93	1	92	1 Byte In (92)	BYTE
0x3000	94	1	93	1 Byte In (93)	BYTE
0x3000	95	1	94	1 Byte In (94)	BYTE
0x3000	96	1	95	1 Byte In (95)	BYTE



Setup of the Medium more mode

The parameters configuration must be like the following ones:

- Input_Data: IB = 64 bytes
- Output_Data: QB = 64 bytes

The screenshot shows the netDevice configuration window for a COMX 51XX-RE/ECS V6.4-001 device. The interface includes a navigation area on the left with options like Configuration, MailBox, and Description. The main area is titled 'Process Data' and contains two tables: 'Sync Manager' and 'PDO Assignment (0x1C13)'. The 'Sync Manager' table shows two entries: SM 2 with a byte length of 64 and type 'Outputs', and SM 3 with a byte length of 64 and type 'Inputs'. The 'PDO Assignment' table lists six TxPDO entries with indices from 0x1A00 to 0x1A05 and byte lengths of 64, 200, 200, 200, 200, and 24 respectively. The 'PDO content (0x1A00)' table shows a list of 8 entries, each representing a 1-byte input (Byte In) at indices 0x3000 to 0x3007, with offsets from 56 to 63. The status bar at the bottom indicates 'Disconnected' and 'Data Set'.

SM	Byte length	Type	Flags
2	64	Outputs	
3	64	Inputs	

Name	Activ...	Index	Byte length	Flags	Description
COMX 51XX-RI					
1. TxPDO	<input checked="" type="checkbox"/>	0x1A00	64		
2. TxPDO	<input type="checkbox"/>	0x1A01	200		
3. TxPDO	<input type="checkbox"/>	0x1A02	200		
4. TxPDO	<input type="checkbox"/>	0x1A03	200		
5. TxPDO	<input type="checkbox"/>	0x1A04	200		
6. TxPDO	<input type="checkbox"/>	0x1A05	24		

Index	Sub I...	Byte...	Offset	Name	Type
0x3000	57	1	56	1 Byte In (56)	BYTE
0x3000	58	1	57	1 Byte In (57)	BYTE
0x3000	59	1	58	1 Byte In (58)	BYTE
0x3000	60	1	59	1 Byte In (59)	BYTE
0x3000	61	1	60	1 Byte In (60)	BYTE
0x3000	62	1	61	1 Byte In (61)	BYTE
0x3000	63	1	62	1 Byte In (62)	BYTE
0x3000	64	1	63	1 Byte In (63)	BYTE



Setup of the Medium mode

The parameters configuration must be like the following ones:

- Input_Data: IB = 32 bytes
- Output_Data: QB = 32 bytes

The screenshot shows the netDevice configuration window for a COMX 51XX-RE/ECS V6.4-001 device. The interface is divided into several sections:

- Navigation Area:** A tree view on the left with options like Configuration, Behavior, Distributed Clock, Process Data (selected), MailBox, CoE, and Description.
- Process Data:** The main configuration area, containing:
 - Sync Manager:** A table with columns SM, Byte length, Type, and Flags. It shows two entries: SM 2 with 32 bytes for Outputs, and SM 3 with 32 bytes for Inputs.
 - PDO Assignment (0x1C12):** A table with columns Name, Activ..., Index, Byte length, Flags, and Description. It lists six RxPDO entries from index 1 to 6, with index 1 (0x1600) checked.
 - PDO content (0x1600):** A table with columns Index, Sub I..., Byte..., Offset, Name, and Type. It lists 32 entries from index 25 to 32, all of type BYTE.
- Download:** Checkboxes for PDO Assignment and PDO Configuration.
- Buttons:** OK, Cancel, Apply, and Help buttons at the bottom.





Setup of the Light mode

The parameters configuration must be like the following ones:

- Input_Data: IB = 16 bytes
- Output_Data: QB = 16 bytes

The screenshot shows the netDevice configuration window for a COMX 51XX-RE/ECS V6.4-001 device. The interface includes a navigation area on the left with options like Configuration, MailBox, and Description. The main area is titled 'Process Data' and contains several tables and controls.

Sync Manager:

SM	Byte length	Type	Flags
2	16	Outputs	
3	16	Inputs	

PDO Assignment (0x1C13):

Name	Activ...	Index	Byte length	Flags	Description
COMX 51XX-RI					
1. TxPDO	<input checked="" type="checkbox"/>	0x1A00	16		
2. TxPDO	<input type="checkbox"/>	0x1A01	200		
3. TxPDO	<input type="checkbox"/>	0x1A02	200		
4. TxPDO	<input type="checkbox"/>	0x1A03	200		
5. TxPDO	<input type="checkbox"/>	0x1A04	200		
6. TxPDO	<input type="checkbox"/>	0x1A05	24		

PDO content (0x1A00):

Index	Sub I...	Byte...	Offset	Name	Type
0x3000	9	1	8	1 Byte In (8)	BYTE
0x3000	10	1	9	1 Byte In (9)	BYTE
0x3000	11	1	10	1 Byte In (10)	BYTE
0x3000	12	1	11	1 Byte In (11)	BYTE
0x3000	13	1	12	1 Byte In (12)	BYTE
0x3000	14	1	13	1 Byte In (13)	BYTE
0x3000	15	1	14	1 Byte In (14)	BYTE
0x3000	16	1	15	1 Byte In (15)	BYTE

Download: PDO Assignment PDO Configuration

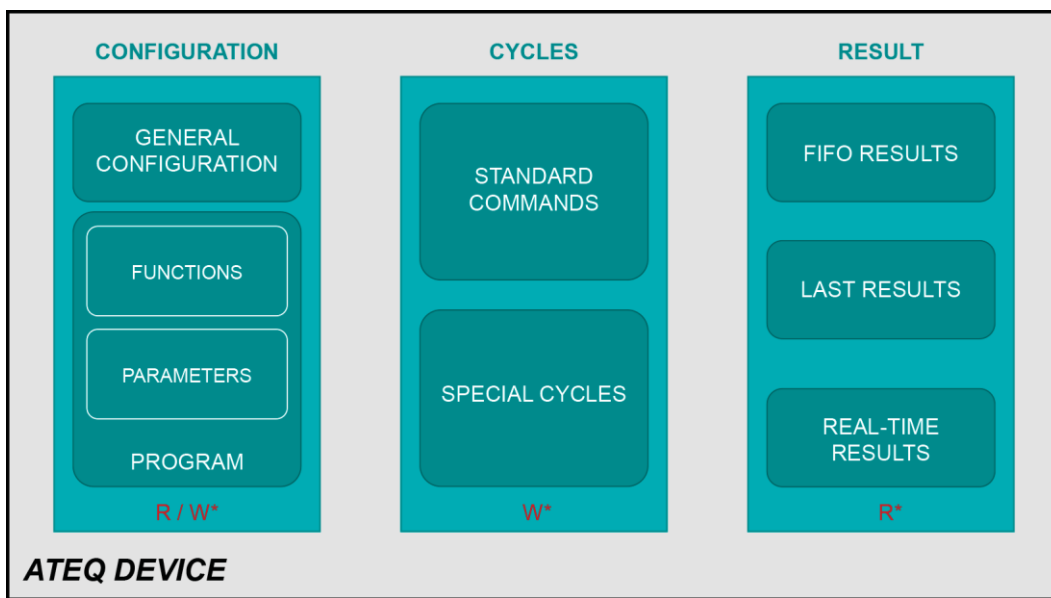
Buttons: OK, Cancel, Apply, Help

Status bar: Disconnected, Data Set



Functional description of an ATEQ device

INTRODUCTION



- 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

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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	<i>Reserved.</i>
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	<i>Reserved.</i>



Read table

Reading table structure

0x00		State of the unit: Echo / Error code command Status Current program Number of results available Program step
0x0F		
0x10		Real time measurements.
0x1F		
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	<i>Reserved.</i>
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 > Calibration check error.
	Bit 1 = 1 > ATR fault.
Bit 2 to 7 > <i>Not used, all always at 0.</i>	
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	Leak 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	Leak 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.

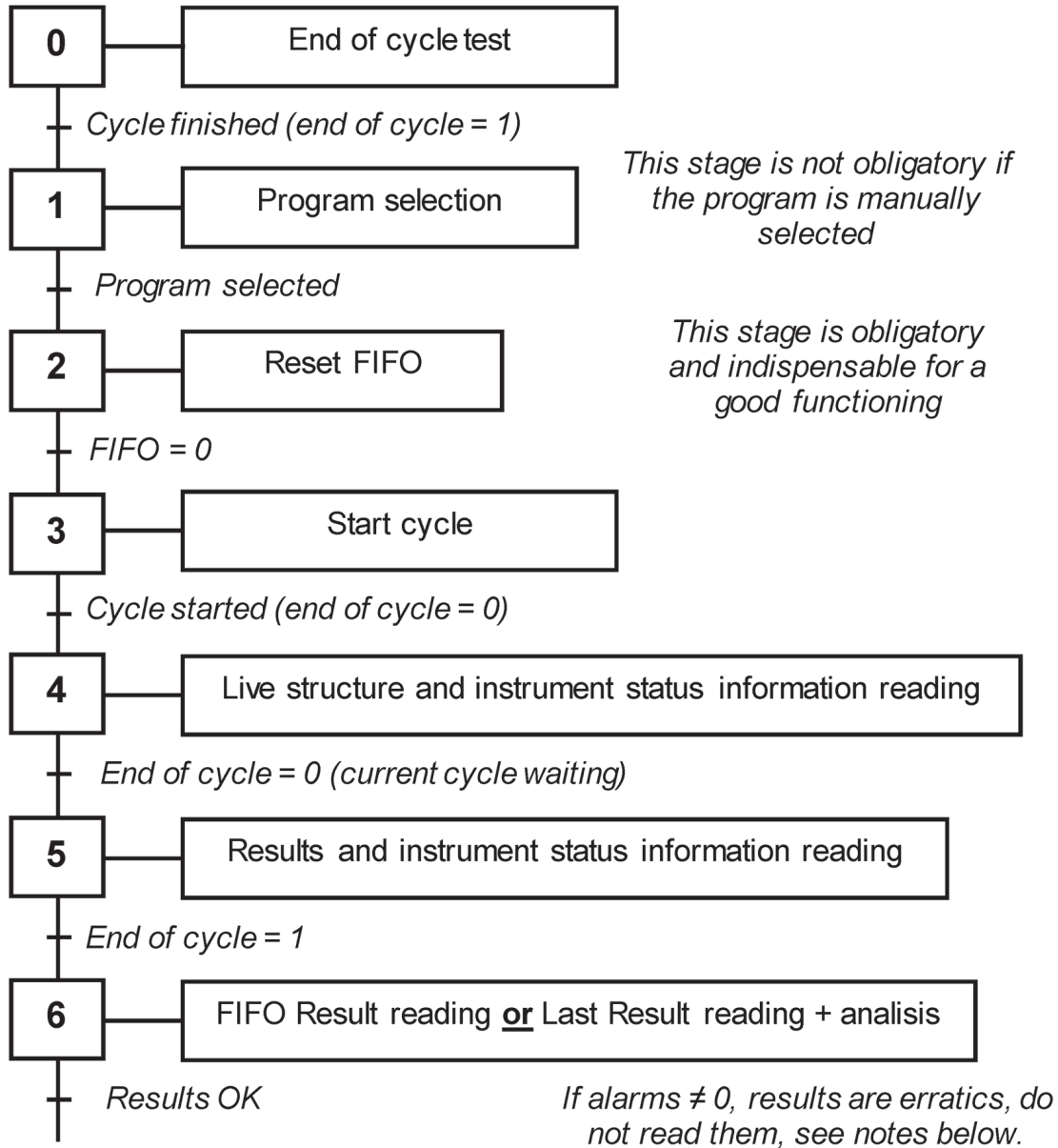


Treatment of the commands

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

ATEQ device using

Base procedure for using an ATEQ instrument.

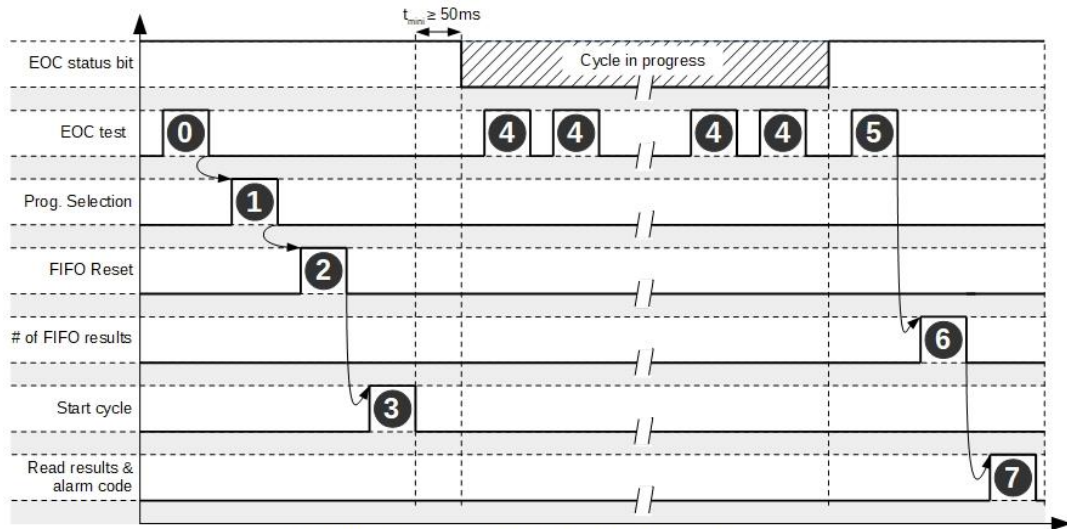


i | If the number of results in the FIFO = 0, the results are erratic, **do not read them**.
If there's an alarm bit, read the alarm code and **do not use the measurements results (erratic results)**.



Fieldbus progress chart

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WARNING : The status bits update rate is about 50ms

<p>0 : Read @0Ch - 0Dh : Status bit 5 = 1 (EOC status bit)</p> <p>1 : Write @06h : 1 word = n° prog (0001h = prog 2) Write @00h : bit 3 = 1 (command « Prog. Selection »)</p> <p>2 : ALWAYS RESET THE FIFO Write @00h : bit 7 = 1 (command « Reset FIFO »)</p> <p>3 : Write @00h : bit 1 = 1 (command « Start ») $t_{min} \geq 50ms$</p> <p>4 : Read @0Ch - 0Dh : Status bit 5 = 0 (EOC status bit)</p> <p>5 : Read @0Ch - 0Dh : Status bit 5 = 1 (EOC status bit)</p>	<p>6 : Read the number of results in FIFO : Read @08h - 09h : if > 0 go to step 7, else END</p> <p>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</p> <p>8 : Use the results recovered at step 7 (if Alarm code was equal to 0)</p>	<p><i>Use of FIFO Results</i></p>
	<p>6 : Read the number of results in FIFO : Read @08h - 09h : if $\neq 1$ go to step 7, else END</p> <p>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</p> <p>8 : Use the results recovered at step 7 (if Alarm code was equal to 0)</p>	<p><i>Use of Last Results</i></p>



CONFIGURATION

General configuration

Table of the configuration / extended menus bits

i 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.

- i** Acronyms used in the “Menu” column:
- Conf: CONFIGURATION
 - +Func: FUNCTIONS > More functions...
 - RS232: CONFIGURATION > RS232

Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
1	0	0001	1	Permanent blowing activation.	Conf
	1	0002	2	Reserved.	
	2	0004	4	Fill type.	+Funct
	3	0008	8	Pre-fill type.	+Funct
	4	0010	16	Recovery thresholds.	+Funct
	5	0020	32	Cycle end.	+Funct
	6	0040	64	Reserved.	
	7	0080	128	Peak meter.	+Funct
	8	0100	256	Reserved.	
	9	0200	512	Reference volume.	+Funct
	10	0400	1024	ATR 0.	+Funct
	11	0800	2048	ATR 1.	+Funct
	12	1000	4096	ATR 2.	+Funct
	13	2000	8192	Program name.	+Funct
	14	4000	16384	Chaining.	+Funct
15	8000	32768	Automatic connector.	+Funct	





Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
2	16	0001	1	Calibration check.	+Funct
	17	0002	2	Valve codes (output codes).	+Funct
	18	0004	4	Reserved.	
	19	0008	8	Stamping.	+Funct
	20	0010	16	Reserved.	
	21	0020	32	N test.	+Funct
	22	0040	64	Reserved.	
	23	0080	128	Sending cond.: pass part.	RS232
	24	0100	256	Sending cond.: fail test part.	RS232
	25	0200	512	Sending cond.: fail ref. part.	RS232
	26	0400	1024	Sending cond.: alarm presence.	RS232
	27	0800	2048	Sending cond.: pressure error.	RS232
	28	1000	4096	Sending cond.: end of cycle.	RS232
	29	2000	8192	Sending cond.: recoverable.	RS232
	30	4000	16384	Sending cond.: calibration.	RS232
	3	31	8000	32768	Frame content: time stamp.
32		0001	1	Frame content: name.	RS232
33		0002	2	Content of the frame: pressure.	RS232
34		0004	4	Security.	Conf
35		0008	8	External dump.	Conf
36		0010	16	Exportation.	RS232
37		0020	32	Automatic reset.	Conf
38		0040	64	Reserved.	
39		0080	128	Reserved.	
40		0100	256	Reserved.	
41		0200	512	Reserved.	
42		0400	1024	Reserved.	
43		0800	2048	Parameters automatic setting.	Conf
44		1000	4096	Reserved.	
45		2000	8192	Page feed.	RS232
46		4000	16384	Sign change.	+Funct
47		8000	32768	After sale service cycle.	+Funct



Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
4	48	0001	1	Unit type.	+Funct
	49	0002	2	Automatic reset piezo 2.	Conf
	50	0004	4	Reserved.	
	51	0008	8	Electronic regulator mode.	Conf
	52	0010	16	Auxiliary codes activation.	+Funct
	53	0020	32	Filtering.	+Funct
	54	0040	64	Reserved.	
	55	0080	128	Quick automatic reset activation.	Conf
	56	0100	256	Permanent electronic regulator.	Conf
	57	0200	512	Bar code.	Conf
	58	0400	1028	Flow reject.	+Funct
	59	0800	2048	No negative.	+Funct
	60	1000	4096	Dump threshold.	+Funct
	61	2000	8192	ATR 3.	+Funct
	62	4000	16384	In 7 test configuration.	Conf
5	63	8000	32768	Reserved.	
	64	0001	1	Absolute value.	Conf
	65	0002	2	Leak display mode.	+Funct
	66	0004	4	By pass valve.	Conf
	67	0008	8	Reserved.	
	68	0010	16	Reserved.	
	69	0020	32	Reserved.	
	70	0040	64	Reserved.	
	71	0080	128	Dump Off.	+Funct
	72	0100	256	Program selection on bar code reading.	+Funct
	73	0200	512	Bar code reset on end of cycle.	+Funct
	74	0400	1024	Cut Off.	+Funct
	75	0800	2048	ATF.	+Funct
6	76	1000	4096	Reserved.	
	77	2000	8192	Reserved.	
	78	4000	16384	Reserved.	
	79	8000	32768	Reserved.	
6	80 > 95			Word Reserved.	



Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
7	96	0001	1	Buzzer function.	+Funct
	97	0002	2	Long test (x100) function.	+Funct
	98	0004	4	Permanent blowing.	Conf
	99	0008	8	Reserved.	
	100	0010	16	Reserved.	
	101	0020	32	Display optional.	+Funct
	102	0040	64	Pressure Drop.	+Funct
	103	0080	128	Pressure correction ($\geq v1.400$).	+Funct
	104	0100	256	Standard conditions ($\geq v1.400$).	+Funct
	105	0200	512	Ref No Dump.	+Funct
	106	0400	1024	Reserved.	
	107	0800	2048	Offset.	+Funct
	108	1000	4096	Reserved.	
	109	2000	8192	Reserved.	
	110	4000	16384	Auto Selection Prog.	Conf
111	8000	32768	Save Volume Selection.	Conf	

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
<ul style="list-style-type: none"> — 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 02(h) (Bit 1 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	Running “Read extended menu bits” command
	<p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 02(h) (Bit 1 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 02(h) (Bit 1 = 1)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 0200(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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) 	
<ul style="list-style-type: none"> — Read the configuration bits at the address 20h of X Words or read the function bits at the address 20h of X Words. 	

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

i The configuration / extended menu bits are independent 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

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Master	Slave
<ul style="list-style-type: none"> — 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 08(h) (Bit 3 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	Running “Write extended menu bits” command
	<p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 08(h) (Bit 3 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 08(h) (Bit 3 = 1)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 0800(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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
<ul style="list-style-type: none">— 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)	
	<p style="text-align: center;"><u>Acknowledgement</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 08(h) (Bit 3 = 1)— Byte 1 = 00(h) Command error code: <ul style="list-style-type: none">— Byte 2 = FF(h)— Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	Running “Program selection” command
	<p style="text-align: center;"><u>Command finished</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 08(h) (Bit 3 = 1)— Byte 1 = 00(h) Command error code if the command is correctly carried out: <ul style="list-style-type: none">— Byte 2 = 00(h)— Byte 3 = 00(h) OR if an error occurred during the command: <ul style="list-style-type: none">— Byte 2 = 08(h) (Bit 3 = 1)— Byte 3 = 00(h)
<ul style="list-style-type: none">— Wait the end of the command: command echo = 0008(h) command error code ≠ FFFF(h) (end of command)	
<ul style="list-style-type: none">— 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	Menu
		Hexa	Dec		
1	0	0001	1	Fill regulator Number.	Funct
	1	0002	2	Pre-fill regulator Number.	Funct
	2	0004	4	Fill type function.	Funct
	3	0008	8	Pre-fill type function.	Funct
	4	0010	16	Recovery level function.	Funct
	5	0020	32	End of cycle function.	Funct
	6	0040	64	Automatic reset end cycle function.	Funct
	7	0080	128	Reset and dump end of cycle function.	Funct
	8	0100	256	Fill mode end of cycle function.	Funct
	9	0200	512	Peak hold function.	Funct
	10	0400	1024	Reference volume function.	Funct
	11	0800	2048	ATR0 function.	Funct
	12	1000	4096	ATR1 function.	Funct
	13	2000	8192	ATR2 function.	Funct
	14	4000	16384	Sequencing function.	Funct
2	15	8000	32768	Pass part sequencing function.	Funct
	16	0001	1	Fail test part sequencing function.	Funct
	17	0002	2	Fail reference part sequencing function.	Funct
	18	0004	4	Alarm sequencing function.	Funct
	19	0008	8	Pressure fault sequencing function.	Funct
	20	0010	16	End of cycle sequencing function.	Funct
	21	0020	32	Reserved.	
	22	0040	64	Recovery part sequencing function.	Funct
	23	0080	128	Calibration check sequencing function.	Funct
	24	0100	256	Automatic connector function.	Funct
	25	0200	512	Calibration check function.	Funct
	26	0400	1024	Valve code function.	Funct
	27	0800	2048	External valve code 1 function.	Funct
	28	1000	4096	External valve code 2 function.	Funct
	29	2000	8192	External valve code 3 function.	Funct
	30	4000	16384	External valve code 4 function.	Funct
	31	8000	32768	External valve code 5 function.	Funct





Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
3	32	0001	1	External valve code 6 function.	Funct
	33	0002	2	Internal valve code 1 function.	Funct
	34	0004	4	Internal valve code 2 function.	Funct
	35	0008	8	Stamp function.	Funct
	36	0010	16	Pass part stamp function.	Funct
	37	0020	32	Fail test part stamp function.	Funct
	38	0040	64	Fail reference part stamp function.	Funct
	39	0080	128	Alarm stamp function.	Funct
	40	0100	256	Pressure fault stamp function.	Funct
	41	0200	512	End of cycle stamp function.	Funct
	42	0400	1024	Recovery part stamp function.	Funct
	43	0800	2048	Calibration check stamp function.	Funct
	44	1000	4096	N test function.	Funct
	45	2000	8192	Reserved.	
	46	4000	16384	Reserved.	
47	8000	32768	Reserved.		
4	48	0001	1	External dump function.	Funct
	49	0002	2	Reserved.	
	50	0004	4	Reserved.	
	51	0008	8	Reserved.	
	52	0010	16	Sign change function.	Funct
	53	0020	32	Obligatory reset on end of cycle.	Funct
	54	0040	64	Auxiliaries codes function.	Funct
	55	0080	128	Auxiliaries codes 1 function.	Funct
	56	0100	256	Auxiliaries codes 2 function.	Funct
	57	0200	512	Auxiliaries codes 3 function.	Funct
	58	0400	1024	Auxiliaries codes 4 function.	Funct
	59	0800	2048	Reserved.	
	60	1000	4096	Filtering function.	Funct
	61	2000	8192	Bar code function.	Funct
	62	4000	16384	Flow reject function.	Funct
	63	8000	32768	No negative function.	Funct



Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
5	64	0001	1	Start after reading bar code function.	Funct
	65	0002	2	ATR3 function.	Funct
	66	0004	4	Absolute value function.	Funct
	67	0008	8	Bypass valve function.	Funct
	68	0010	16	Reserved.	
	69	0020	32	Reserved.	
	70	0040	64	Reserved.	
	71	0080	128	Dump off function.	Funct
	72	0100	256	Cut off function.	Funct
	73	0200	512	ATF function.	Funct
	74	0400	1024	Reserved.	
	75 > 79			Reserved.	
6	80 > 95			Word Reserved.	
7	96	0001	1	Optional auxiliaries codes function.	Funct
	97	0002	2	Optional auxiliaries codes 1 function.	Funct
	98	0004	4	Optional auxiliaries codes 2 function.	Funct
	99	0008	8	Optional auxiliaries codes 3function.	Funct
	100	0010	16	Optional auxiliaries codes 4 function.	Funct
	101	0020	32	Optional valves codes function.	Funct
	102	0040	64	Optional external valves codes 1.	Funct
	103	0080	128	Optional external valves codes 2.	Funct
	104	0100	256	Optional external valves codes 3.	Funct
	105	0200	512	Optional external valves codes 4.	Funct
	106	0400	1024	Optional external valves codes 5.	Funct
	107	0800	2048	Optional external valves codes 6.	Funct
	108	1000	4096	Optional internal valves codes 1.	Funct
	109	2000	8192	Optional internal valves codes 2.	Funct
110	4000	16384	Buzzer function.	Funct	
111	8000	32768	Pass part buzzer function.	Funct	
8	112	0001	1	Fail part buzzer function.	Funct
	113	0002	2	Alarm buzzer function.	Funct
	114	0004	4	End of cycle buzzer function.	Funct
	115	0008	8	Long Test Time function.	Funct
	116	0010	16	Permanent dump function.	Funct
	117	0020	32	Input 7 test function.	Funct
	118	0040	64	Reserved.	
	119	0080	128	Reserved.	
	120	0100	256	Reserved.	
	121	0200	512	Pressure Drop.	Funct
	122	0400	1024	Auto Verif Etal.	Funct
	123	0800	2048	Pressure correction (≥v1.400).	Funct
	124	1000	4096	Standard conditions (≥v1.400).	Funct
	125	2000	8192	Ref No Dump.	Funct
	126	4000	16384	Offset.	Funct
	127	8000	32768	Permanent Fill.	Funct



Word	Bit n°	Mask		Meaning	Menu
		Hexa	Dec		
9	128	0001	1	Reserved.	
	129>143			Reserved.	

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

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Master	Slave
<ul style="list-style-type: none"> — 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 04(h) (Bit 2 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p style="text-align: center;">Running “Read functions bits” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 04(h) (Bit 2 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 04(h) (Bit 2 = 1)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 0400(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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) 	
<ul style="list-style-type: none"> — 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
<ul style="list-style-type: none"> 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 10(h) (Bit 4 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> Byte 2 = FF(h) Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running "Write functions bits" command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 10(h) (Bit 4 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 10(h) (Bit 4 = 1)
<ul style="list-style-type: none"> Wait the end of the command: command echo = 1000(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> 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 treatment by the ATEQ device as **Long** format with fixed comma (10^{-3}). A **Long** is a two words set.

Identifier N°		Meaning	Value	
Dec	Hexa			
01	0001	"FILL TIME" Fill time	0 > 650 seconds	
02	0002	"STAB TIME": Stabilization time	0 > 650 seconds	
03	0003	"TEST TIME" Test time	0 > 650 seconds	
06	0006	"PRE FILL" Pre fill time	0 > 650 seconds	
07	0007	"PRE DUMP" Pre dump time	0 > 650 seconds	
09	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	
17	0011	"Min Vol." Minimum volume reject level (volume test type measure)	0 > 9999	
18	0012	"Max. Vol." Maximum volume reject level (volume test type measure).	0 > 9999	
20	0014	"VOLUME" Part volume.	0 > 9999	
21	0015	"TYPE": Test type	Invalid Leak Desensitized Blockage Operator	0000 1000 2000 3000 4000
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 FILL" Minimum pressure value	- 9999 > 9999	
51	0033	"Max FILL" Maximum pressure value	- 9999 > 9999	



Identifier N°		Meaning	Value	
Dec	Hexa			
53	0035	“Press. UNIT” Pressure unit.	Refer to Unit table.	
60	003C	“Test FAIL” Natural reject value of the test part	0 > 9999	
61	003D	“TestREWORK” Natural reject level of the test part in recovery	0 > 9999	
62	003E	“Ref. FAIL” Natural reject level of the reference part	0 > 9999	
63	003F	“Ref.REWORK” Natural reject value of the ref. part in recovery	0 > 9999	
66	0042	“Set FILL” Fill instruction value:	- 9999 > 9999	
67	0043	“Set PreFILL” Pre-fill instruction value:	- 9999 > 9999	
68	0044	Reserved.		
72	0048	“Drift Unit” Calibration drifts percent.	0 > 100%	
80	0050	“Diff A-Z” Differential auto reset time.	0 > 650 seconds	
102	0066	“BLOW MODE” Type of permanent blowing	Regulator 2 Regulator 1	0000 1000
103	0067	“FILL MODE” Type of fill.	Standard Instruction Ballistic EASY EASY Auto	0000 1000 2000 7000 8000
104	0068	“PreFILL” Type of pre-fill.	Standard Instruction Ballistic EASY EASY Auto	0000 1000 2000 4000 5000
106	006A	“CheckTime” Commutation time of the equalization valve calibration check.	0 > 650 seconds	
107	006B	“% Drift” ATR absorption tolerance.	0 > 100%	
108	006C	“Start” Start value of the transient (ATR).	- 9999 > 9999	
110	006E	“EXT. DUMP” Type of external dump.	Normally close Normally open	0000 1000
111	006F	Reserved.		



Identifier N°		Meaning	Value	
Dec	Hexa			
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	
117	0075	“Set Blow” Permanent blowing pressure instruction.	- 9999 > 9999	
118	0076	“REJECT CALC.” Original unit for the calculation of rejects in cm3/ min (Pa, Pa/s...).	Refer to Unit table.	
119	0077	Reserved.		
120	0078	Reserved.		
121	0079	Reserved.		
122	007A	Reserved.		
123	007B	“LANGUAGE” Choice of the language.	Default language 2 nd predefined language	0000 1000
124	007C	“Max Value” Reject in calibration check.	0 > 9999	
125	007D	“% Drift” Percentage of the calibration check.	0 > 100%	
126	007E	“Max PreFILL” Maximum pressure value in pre-fill.	- 9999 > 9999	
127	007F	“LeakUnit” Reject unit.	Refer to Unit table	
128	0080	“Leak Rate” Instruction value during a calibration.	0 > 9999	
135	0087	“% of T FAIL” Reject level percent of the auto parameter function	0 > 100%	
138	008A	“FILL REG” Regulator number selection for the fill.	Regulator 1 Regulator 2	0000 1000
139	008B	“PRE FILL REG” Regulator number selection for the pre-fill.	Regulator 1 Regulator 2	0000 1000
140	008C	Reserved.		
141	008D	Reserved.		
142	008E	Reserved.		
143	008F	Reserved.		
144	0090	“OUTPUTS CONFIG.” Setup of the outputs (standard or compact).	Standard Compact	0000 1000
148	0094	“FILTER” Filtering.	0 > 650 seconds	
149	0095	“UNITS” Unit type	SI SAE CUSTOM	0000 1000 2000



Identifier N°		Meaning	Value	
Dec	Hexa			
161	00A1	“Volume UNIT” Volume unit.	Refer to Unit table.	
164	00A4	“NEXT PROG.” Number of the following program in sequencing.	1 > 128	
165	00A5	“N. OF CYCLES”(PIEZO AUTO AZ menu) Number of cycles between two automatic reset.	0 > 9999	
166	00A6	“N. OF MINUTES”(PIEZO AUTO AZ menu) Time between two automatic reset.	0 > 999 minutes	
175	00AF	“REGUL. CTRL.” Regulator check during its learning.	Automatic Ext	0000 1000
203	00CB	“ELEC. REG.” Activation or not of the built in electronics regulators.	None Reg 1 Reg 2 ALL Reg	0000 1000 2000 3000
232	00E8	“ATR DRIFT” Drift transient (ATR).	0 > 100%	
233	00E9	“AZ SHORT” Quick auto-zero time.	0 > 650 seconds	
273	0111	“DUMP” Dump time in calibration check mode	0 > 650 seconds	
291	0123	“T.ATR2” Stabilization time for the ATR 2 function	0 > 650 seconds	
295	0127	“DUMP LEVEL” Minimum dump pressure level to reach	- 9999 > 9999	
297	0129	“MAX BLOW” Blowing maximum pressure level	- 9999 > 9999	
298	012A	“MIN BLOW” Blowing minimum pressure level	- 9999 > 9999	
315	013B	Reserved.		
334	014E	Reserved.		
335	014F	Reserved.		
336	0150	Reserved.		
340	0154	“Transient” ATR transient value.	- 9999 > 9999	
349	015D	Reserved.		
353	0161	“Press. UNIT” (configuration/pneumatic menu) General pressure unit	Refer to Unit table.	
354	0162	“LINE P. MIN” Minimum line pressure level	- 9999 > 9999	
355	0163	Reserved.		
356	0164	Reserved.		



Identifier N°		Meaning	Value	
Dec	Hexa			
357	0165	Reserved.		
358	0166	Reserved.		
359	0167	Reserved.		
360	0168	Reserved.		
361	0169	Reserved.		
362	016A	Reserved.		
363	016B	Reserved.		
364	016C	“DISPLAY MODE” Leak display management	xxxx xxx.x xx.xx x.xxx	0000 1000 2000 3000
366	016E	“MODE” (EXT DUMP menu) Dump mode	Continuous Time	0000 1000
367	016F	“Program” (DUMP OFF menu) Program number of the dump of function	0 > 128	
368	0170	“Tolerance A” Tolerance level A for ntest cycle	0 > 100%	
369	0171	“Tolerance B” Tolerance level B for ntest cycle	0 > 100%	
370	0172	Reserved.		
371	0173	“NAME:”(Units menu) CAL unit personalization	CHAR[5]	
372	0174	“BYPASS” Bypass valve mode selection	Pre-Fill + Fill Pre-Fill Fill	0000 1000 2000
373	0175	“% Cut OFF” Cut off function Percent	0 > 100%	
374	0176	“ATF TIME” Divisor time of ATF function	0 > 650 seconds	
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	
377	0179	“MEAS. START” Waiting time for starting the measurement in burst test	0 > 650 seconds	
378	017A	“Time Adj” Adjusting fill time (electronic regulator)	0 > 650 seconds	





Identifier N°		Meaning	Value	
Dec	Hexa			
379	017B	“USB:” USB mode (printer or supervision)	Supervision Printer Bar code Auto None	0000 1000 2000 3000 4000
380	017C	Reserved.	Refer to Unit table	
405	0195	Reserved.		
406	0196	Reserved.		
407	0197	Reserved.		
408	0198	Reserved.		
409	0199	Reserved.		
410	019A	Reserved.		
455	01C7	“DROP PRESS.%” Drop Press function Percent	0 > 100%	
456	01C8	“ATM PRESS.” Atmospheric Pressure	900 > 1100	
457	01C9	“TEMP.” Temperature	0 > 800	
458	01CA	“DISP. OPT.” Display Option in flow reject	None Pa Display Ambient Temp. Object Temp. Test check ATR Temp. correction Leak offset learning PATM correction	0000 1000 2000 3000 4000 5000 6000 7000 8000
459	01CB	“N. OF CYCLES” Number of learning cycle	2 > 9999	
460	01CC	“INTER-CYCLE” Time between 2 learning cycle	0 > 650 seconds	
461	01CD	“MAX OFFSET” Offset max for learning cycle	0 > 9999	
462	01CE	“FLOW MASTER” Value of Flow master for learning cycle	0 > 9999	
463	01CF	“PRESS MASTER” Value of Pressure master for learning cycle	- 9999 > 9999	
464	01D0	“Min. Vol.” Minimum Volume for learning	0 > 9999	
465	01D1	“Max. Vol.” Maximum Volume for learning	0 > 9999	



Identifier N°		Meaning	Value	
Dec	Hexa			
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	

Regulator selection

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

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

Configurable input values

F6 V1.3XX			
Input value	Value code	Input value	Value code
Program Selection	0000	Atr Learning Cycle	17000
P1 Sensor Check (*)	4000	Sd Prt Pass Learn	18000
P1 Reg1 Check (*)	5000	Sd Prt Fail Learn	19000
P2 Sensor Check (*)	6000	Volume Comp.	20000
Leak Sensor Check (*)	7000	Test Check Result	21000
Auto Test (*)	8000	Step By Step	22000
Regul. 2 Adjust	9000	Auto Setup	23000
Regul. 1 Adjust	10000	Atr+Custom Learn.	24000
Part Regulator	11000	Code Reader	25000
Infinite Fill	12000	Auto Vol	26000
Piezo Auto Zero	13000	Test On Caps	27000
Custom Unit Learn	14000	Temp.2 Corr. Learn	30000
Custom Unit Check	15000	Temp.2 Sensor Read	31000
Chck+Lrn Cust. Unit	16000		

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



F6 V2.XXX			
Input value	Value code	Input value	Value code
Program Selection	0000	Chck+Lrn Cust. Unit	24000
Diff Temp. Check (*)	8000	Atr Learning Cycle	25000
Direct P. Check (*)	9000	Sd Prt Pass Learn	26000
P1 Reg1 Check (*)	10000	Sd Prt Fail Learn	27000
Indirect P. Check (*)	11000	Volume Comp.	28000
Leak Sensor Check (*)	12000	Test Check Result	29000
Line P. Sensor Check (*)	13000	Atr+Custom Learn.	30000
Temperature Check (*)	14000	Code Reader	31000
Atm Pressure Check (*)	15000	Auto Vol	32000
Auto Test (*)	16000	Test On Caps	33000
Regul. 2 Adjust	17000	Temp.2 Corr. Learn	36000
Regulator Adj.	18000	Temp.2 Sensor Read	37000
Part. Regulator Adj.	19000	Leak Offset Learn	38000
Infinite Fill	20000	Offset+Vol. Learn	39000
Piezo Auto Zero	21000	N Start	40000
Custom Unit Learn	22000	Sync Test	41000
Custom Unit Check	23000		

(*) 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	
0000	0000	cm ³ /s
1000	03E8	cm ³ /min
2000	07D0	cm ³ /h
3000	0BB8	mm ³ /s
4000	0FA0	Calibrated Pascal (Pa)
5000	1388	Calibrated Pascal/second (Pa/s)
6000	1770	Pascal (Pa)
7000	1B58	High resolution Pascal (Pa HR)
8000	1F40	Pascal/second (Pa/s)
9000	2328	High resolution Pascal/second (Pa/s HR)
10000	2710	Second (s)
11000	2AF8	Bar
12000	2EE0	KiloPascal (kPa)
13000	32C8	PSI
14000	36B0	Millibar (mbar)
15000	3A98	Mega Pascal (MPa)
16000	3E80	Liter (l)
17000	4268	Calibration check unit
18000	4650	KiloPascal/second (kPa/s)
19000	4A38	Millimeter (mm)
30000	7530	Liter/hour (l/h)
43000	A7F8	D mode Pascal (Pa)
44000	ABE0	Low resolution Pascal (Pa LR)
45000	AFC8	Low resolution Pascal/second (Pa/s LR)
46000	B3B0	Inch ³ /s
47000	B798	Inch ³ /min
48000	BB80	Inch ³ /hour
49000	BF68	Feet ³ /hour
50000	C350	Milliliter/second (mm/s)
51000	C738	Milliliter/minute (mm/min)
52000	CB20	Milliliter/hour (mm/h)
53000	CF08	Liter/minute (l/min)
54000	D2F0	Meter ³ /hour (m ³ /h)
55000	D6D8	Millimeter ³ (mm ³)
56000	DAC0	Centimeter ³ (cm ³)
57000	DEA8	Microsecond (μs)
58000	E290	USA cm ³ /s same as the cm ³ /s
59000	E678	USA cm ³ /min same as the cm ³ /min
60000	EA60	USA cm ³ /h same as the cm ³ /h
61000	EE48	Milliliter (ml)



Unit code		Unit
Decimal	Hexadecimal	
62000	F230	Liter (l)
63000	F618	Inch ³
64000	FA00	Feet ³
68000	01 09A0	oz(US)/s
69000	01 0D88	oz(US)/mn
70000	01 1170	oz(US)/h
71000	01 1558	oz(UK)/s
72000	01 1940	oz(UK)/mn
73000	01 1D28	oz(UK)/h
74000	01 2110	US gallon
75000	01 24F8	UK gallon
76000	01 28E0	PPM
77000	01 2CC8	PPM HR
78000	01 30B0	Calibrated PPM
80000	01 3880	mmCE
81000	01 3C68	mmCE/s
84000	01 4820	SCCM
92000	01 6760	Points
93000	01 6B48	Feet ³ /s F620
94000	01 6F30	Feet ³ /min F620
95000	01 7318	ACCM MF
96000	01 7700	Inch Mercure (inHg)
99000	01 82B8	Millimeter Mercure (mmHg)
100000	01 86A0	µg H ₂ O/min
102000	01 8E70	No unit



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						
<ul style="list-style-type: none"> — 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: <p>On network:</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="padding: 2px;">02</td> <td style="padding: 2px;">00</td> <td style="padding: 2px;">03</td> <td style="padding: 2px;">00</td> <td style="padding: 2px;">02</td> <td style="padding: 2px;">00</td> </tr> </table> <p>0002(h) 0003(h) 0002(h) 0002(h) = two parameters 0003(h) = test time identifier 0002(h) = stabilization time identifier</p> <ul style="list-style-type: none"> — 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) 	02	00	03	00	02	00	
02	00	03	00	02	00		
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 20(h) (Bit 5 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>						
	<p style="text-align: center;">Running “Read parameters” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 20(h) (Bit 5 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 20(h) (Bit 5 = 1) — Byte 3 = 00(h) 						
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 0020(h) command error code ≠ FFFF(h) (end of command) 							
<ul style="list-style-type: none"> — 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												
<p>— Read the parameters at the address 20(h):</p> <p>Word 1 = identifier number of the first read parameter.</p> <p>Word 2 and Word 3 = first parameter value x1000 (long format).</p> <p>Word 4 = second identifier number of the read parameter.</p> <p>Word 5 and Word 6 = second parameter value x1000 (long format).</p> <p>Example:</p> <p>On network:</p> <table border="1"><tr><td>03</td><td>00</td><td>E8</td><td>03</td><td>00</td><td>00</td><td>02</td><td>00</td><td>F4</td><td>01</td><td>00</td><td>00</td></tr></table> <p>@20h = 0003h 03E8h 0000h 0002h 01F4h 0000h.</p> <ul style="list-style-type: none">- 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.	03	00	E8	03	00	00	02	00	F4	01	00	00	
03	00	E8	03	00	00	02	00	F4	01	00	00		



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														
<ul style="list-style-type: none"> — 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: <p>Example: On network:</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td>02</td><td>00</td><td>03</td><td>00</td><td>E8</td><td>03</td><td>00</td><td>00</td><td>02</td><td>00</td><td>D0</td><td>07</td><td>00</td><td>00</td> </tr> </table> <p>0002(h) 0003(h) 03E8(h) 0000(h) 0002(h) 07D0(h) 0000(h)</p> <p>0002(h) = two parameters 0003(h) = test time identifier 000003E8(h) = 1000 => 1 second 0002(h) = stabilization time identifier 000007D0(h) = 2000 => 2 second</p> <ul style="list-style-type: none"> — 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) 	02	00	03	00	E8	03	00	00	02	00	D0	07	00	00	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 40(h) (Bit 6 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p> <p style="text-align: center;">Running “Write parameters” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 40(h) (Bit 6 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 40(h) (Bit 6 = 1) — Byte 3 = 00(h)
02	00	03	00	E8	03	00	00	02	00	D0	07	00	00		



Master	Slave
<ul style="list-style-type: none">— Wait the end of the command: command echo = 0040(h) command error code ≠ FFFF(h) (end of command)	
<ul style="list-style-type: none">— 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

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Master	Slave
<ul style="list-style-type: none"> 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 20(h) (Bit 5 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> Byte 2 = FF(h) Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running "Read program name" command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 00(h) Byte 1 = 20(h) (Bit 5 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 20(h) (Bit 5 = 1)
<ul style="list-style-type: none"> Wait the end of the command: command echo = 2000(h) command error code \neq FFFF(h) (end of command) 	
<ul style="list-style-type: none"> 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) 	
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> — 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 40(h) (Bit 6 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running “Write program name” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 40(h) (Bit 6 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 40(h) (Bit 6 = 1)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 4000(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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).



CYCLE

Standard command cycle

Start cycle command on the ATEQ device

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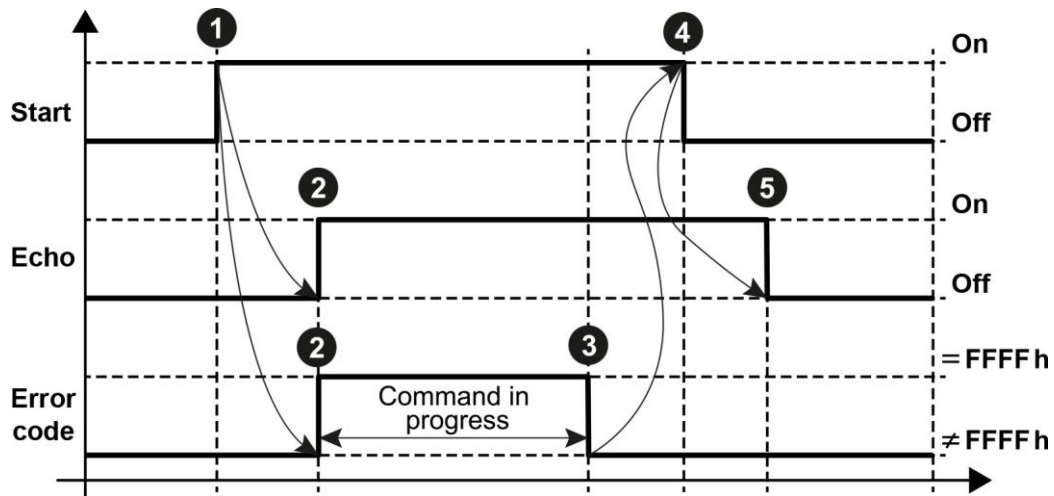
Master	Slave
<ul style="list-style-type: none"> — Select the program you want to start — Activate the “Start” command: Write at the address 00(h), the value 0002(h) Byte 0 = 02(h) (Bit 1 = 1) Byte 1 = 00(h) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 02(h) (Bit 1 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running “Start” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 02(h) (Bit 1 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 02(h) (Bit 1 = 1) — Byte 3 = 00(h)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 0002(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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)

i 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

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Master	Slave
<ul style="list-style-type: none">— 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)	
	<p style="text-align: center;"><u>Acknowledgement</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 01(h) (Bit 0 = 1)— Byte 1 = 00(h) Command error code: <ul style="list-style-type: none">— Byte 2 = FF(h)— Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	<p style="text-align: center;">Running “Reset” command</p> <p style="text-align: center;"><u>Command finished</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 01(h) (Bit 0 = 1)— Byte 1 = 00(h) Command error code if the command is correctly carried out: <ul style="list-style-type: none">— Byte 2 = 00(h)— Byte 3 = 00(h) OR if an error occurred during the command: <ul style="list-style-type: none">— Byte 2 = 01(h) (Bit 0 = 1)— Byte 3 = 00(h)
<ul style="list-style-type: none">— Wait the end of the command: command echo = 0001(h) command error code ≠ FFFF(h) (end of command)	
<ul style="list-style-type: none">— 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	Numb	Special cycle
1	ATR Learning Cycle	17	Sd Prt FAIL Learn
2	Test Check Result	18	Direct P. Check (*) (**)
3	AUTO TEST	19	Leak Sensor Check (*) (**)
4	Custom Unit Learn	20	Reserved
5	Custom Unit Check	21	Reserved
6	ATR+Custom Learn	22	Reserved
7	Piezo auto zero Reg 1	23	No special cycle
8	Piezo auto zero Reg 2	24	Reserved
9	Regul. 2 adjust	25	Line P. Sensor Check (*) (**)
10	Regulator Adj	26	No special cycle
11	Infinite fill	27	Reserved
12	Volume Comp	28	Reserved
13	Auto Vol	29	Temperature check (*) (**)
14	No special cycle	30	Atm Pressure Check (*) (**)
15	No special cycle	31	No special cycle
16	Sd Prt PASS Learn		

To activate a special cycle, you must send a **Start** command (Bit 1) and a **Start special cycle** command (Bit 2).

(*) For version ≥ 1.400 only.

(**) Appears with the **Service special cycle** function checked.



Auto-zero on the ATEQ device

Master	Slave
<ul style="list-style-type: none"> 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: <p>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)</p>	
	<p align="center"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> Byte 2 = FF(h) Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running "Start" and "Start special cycle" commands</p> <p align="center"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> Byte 0 = 06(h) (Bit 1 = 1 and Bit 2 = 1) Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> Byte 2 = 00(h) Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> Byte 2 = 06(h) (Bit 1 = 1 and Bit 2 = 1) Byte 3 = 00(h)
<ul style="list-style-type: none"> Wait the end of the command: command echo = 0006(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> Deactivate the "Start" and "Start special cycle" commands: <p>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)</p>	



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).





RESULTS

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	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	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).			
13	Pressure piezo 2 low part word.	Long	4	x1000
14	Pressure piezo 2 high part word.			
15	Pressure piezo 2 unit code low part word (refer to units table).	Long	4	x1000
16	Pressure piezo 2 unit code high part word (refer to units table).			
17	Test check result low part word.	Long	4	x1000
18	Test check result high part word.			
19	Test check result unit code low part word (refer to units table).	Long	4	x1000
20	Test check result unit code high part word (refer to units table).			
21	Large Leak low part word.	Long	4	x1000
22	Large Leak high part word.			
23	Large Leak unit code low part word (refer to units table).	Long	4	x1000
24	Large Leak unit code high part word (refer to units table).			



Words	Meaning	Type	Bytes	Coeff
V2.xxx Only				
25	Pa – Pa/s Leak result low part word	Long	4	x1000
26	Pa – Pa/s Leak result high part word			
27 - 36	<i>Unused</i>			
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
Decimal	Hexadecimal	
0	0000	Pre-fill.
1	0001	Pre-dump.
2	0002	Sealed component fill.
3	0003	Sealed component stabilization.
4	0004	Fill.
5	0005	Stabilization.
6	0006	Test.
7	0007	Dump.
65535	FFFF	No steps 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	CAL error.
11	000B	Volume too small (sealed component).
12	000C	Volume too large (sealed component).
14	000E	Equalization valve switching error.
43	002B	Pressure too high.
44	002C	Pressure too low.
45	002D	Piezo sensor out of order.
46	002E	Dump error.
47	002F	CAL drift error.
48	0030	Calibration check error.
49	0031	Leak in calibration check too high.
50	0032	Leak in calibration check too low.
51	0033	Sealed component learning error.
64	0040	Piezo sensor 2 out of order.
65	0041	Pressure Piezo 2 too high.
66	0042	Pressure Piezo 2 too low.
68	0044	Pressure Piezo 2 switched alarm (test pressure too high).
69	0045	Pressure Piezo 2 switch (test pressure too small).
72	0048	Learning Electrical Regulator Default.



Cycle results reading (last 8 results in FIFO)

Master	Slave
<ul style="list-style-type: none"> — 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 10(h) (Bit 4 = 1) — Byte 1 = 00(h) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running “Read FIFO results” command</p> <p style="text-align: center;"><u>Command finished</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 10(h) (Bit 4 = 1) — Byte 1 = 00(h) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 10(h) (Bit 4 = 1) — Byte 3 = 00(h)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 0010(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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) 	
<ul style="list-style-type: none"> — 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.

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Master	Slave
<ul style="list-style-type: none">— 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)	
	<p style="text-align: center;"><u>Acknowledgement</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 80(h) (Bit 7 = 1)— Byte 1 = 00(h) Command error code: <ul style="list-style-type: none">— Byte 2 = FF(h)— Byte 3 = FF(h) (if command error code = FFFF(h), command is in progress)
	<p style="text-align: center;">Running “Reset FIFO results” command</p> <p style="text-align: center;"><u>Command finished</u></p> Command echo: <ul style="list-style-type: none">— Byte 0 = 80(h) (Bit 7 = 1)— Byte 1 = 00(h) Command error code if the command is correctly carried out: <ul style="list-style-type: none">— Byte 2 = 00(h)— Byte 3 = 00(h) OR if an error occurred during the command: <ul style="list-style-type: none">— Byte 2 = 80(h) (Bit 7 = 1)— Byte 3 = 00(h)
<ul style="list-style-type: none">— Wait the end of the command: command echo = 0080(h) command error code ≠ FFFF(h) (end of command)	
<ul style="list-style-type: none">— 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	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	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).			
13	Pressure piezo 2 low part word.	Long	4	x1000
14	Pressure piezo 2 high part word.			
15	Pressure piezo 2 unit code low part word (refer to units table).	Long	4	x1000
16	Pressure piezo 2 unit code high part word (refer to units table).			
17	Test check result low part word.	Long	4	x1000
18	Test check result high part word.			
19	Test check result unit code low part word (refer to units table).	Long	4	x1000
20	Test check result unit code high part word (refer to units table).			
21	Large Leak low part word.	Long	4	x1000
22	Large Leak high part word.			
23	Large Leak unit code low part word (refer to units table).	Long	4	x1000
24	Large Leak unit code high part word (refer to units table).			



Words	Meaning	Type	Bytes	Coeff
V2.xxx Only				
25	Pa – Pa/s Leak result low part word	Long	4	x1000
26	Pa – Pa/s Leak result high part word			
27 - 36	<i>Unused</i>			
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
<ul style="list-style-type: none"> — 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) 	
	<p style="text-align: center;"><u>Acknowledgement</u></p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 80(h) (Bit 7 = 1) <p>Command error code:</p> <ul style="list-style-type: none"> — Byte 2 = FF(h) — Byte 3 = FF(h) <p>(if command error code = FFFF(h), command is in progress)</p>
	<p>Running “Read Last result” command</p> <p>Command finished</p> <p>Command echo:</p> <ul style="list-style-type: none"> — Byte 0 = 00(h) — Byte 1 = 80(h) (Bit 7 = 1) <p>Command error code if the command is correctly carried out:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 00(h) <p>OR if an error occurred during the command:</p> <ul style="list-style-type: none"> — Byte 2 = 00(h) — Byte 3 = 80(h) (Bit 7 = 1)
<ul style="list-style-type: none"> — Wait the end of the command: command echo = 8000(h) command error code ≠ FFFF(h) (end of command) 	
<ul style="list-style-type: none"> — 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	
4	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. Bits 10 / 11 / 12 / 13 / 14 = 1: <i>Unused</i> . 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

Leak value = -0.108

Leak: Words 10 and 11

On network:

94 FF FF FF

FFFFFF94h → -108(d)/1000 → -0.108

