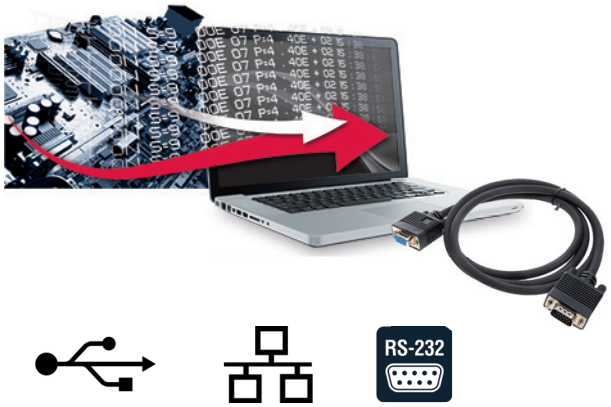


OPERATING INSTRUCTIONS

EN

Translation of the Original

COMMUNICATION INTERFACES

Leak detection

PFEIFFER VACUUM

Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

Copyright

Table of contents

1 About this manual

IMPORTANT
Read carefully before use.
Keep the manual for future consultation.

1.1 Validity

These operating instructions are a customer document of Pfeiffer Vacuum. The operating instructions describe the functions of the named product and provide the most important information for the safe use of the device. The description is written in accordance with the valid directives. The information in these operating instructions refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

1.1.1 Products concerned

This document applies to products with the following part numbers:

ASI 35

Description	Part number
ASI 35 electronic box equipped - 37-pin I/O - RS-232 - USB [1)]	123057S
ASI 35 electronic box equipped - 37-pin I/O - RS-232 - USB - Ethernet [1)]	123058S
ASI 35 electronic box equipped - 15-pin I/O - RS-232 - Profinet [1)]	126914S
ASI 35 electronic box equipped - 15-pin I/O - RS-232 - Profibus [1)]	126915S
ASI 35 electronic box equipped - 15-pin I/O - RS-232 - EtherCAT - Consult us [1)]	129996S
ASI 35 electronic box equipped - 15-pin I/O - RS-232 - EtherNet/IP - Consult us [1)]	129997S
Accessory - ASI 35 communication interface kit - 15-pin I/O - RS-232 - EtherCAT - Consult us	130190
Accessory - ASI 35 communication interface kit - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	130191
Accessory - ASI 35 communication interface kit - 15-pin I/O - RS-232 - Profinet	130192
Accessory - ASI 35 communication interface kit - 15-pin I/O - RS-232 - Profibus	130193
Accessory - ASI 35 communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	130195
Accessory - ASI 35 communication interface kit - 37-pin I/O - RS-232 - USB	130196
ASI 35 - 37-pin I/O - RS-232 - USB	Sxxx0x02MM9A
ASI 35 - 37-pin I/O - RS-232 - USB - Ethernet	Sxxx0x04MM9A
ASI 35 - 15-pin I/O - RS-232 - Profibus	Sxxx0x08MM9A
ASI 35 - 15-pin I/O - RS-232 - Profinet	Sxxx0x09MM9A
ASI 35 - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	Sxxx0x0AMM9A
ASI 35 - 15-pin I/O - RS-232 - EtherCAT - Consult us	Sxxx0x0CMM9A
1) Contact us to check the compatibility of your leak detector with this accessory	

ASM 310

Description	Part number
ASM 310 - 15-pin I/O - RS-232	BSAA0200MM9A

ASM 306S

Description	Part number
ASM 306S - 15-pin I/O - RS-232	RSAS0xA0MM9A
ASM 306S - 37-pin I/O - RS-232 - USB	RSAS00A2MM9A
ASM 306S - 37-pin I/O - RS-232 - USB - Ethernet	RSAS00A4MM9A
ASM 306S - 15-pin I/O - RS-232 - Profibus	RSAS0xA8MM9A
ASM 306S - 15-pin I/O - RS-232 - Profinet	RSAS0xA9MM9A
Accessory - ASM 306S communication interface kit - 37-pin I/O - RS-232 - USB	127258S
Accessory - ASM 306S communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	127256S
Accessory - ASM 306S communication interface kit - 15-pin I/O - RS-232	127254S
Accessory - ASM 306S communication interface kit - 15-pin I/O - RS-232 - Profibus	127257S
Accessory - ASM 306S communication interface kit - 15-pin I/O - RS-232 - Profinet	127255S

ASM 340 Wet

Description	Part number
ASM 340 Wet - 15-pin I/O - RS-232	JSVA02A0Mx9x
ASM 340 Wet - 37-pin I/O - RS-232 - USB	JSVA02A2Mx9x
ASM 340 Wet - 37-pin I/O - RS-232 - USB - Ethernet	JSVA02A4Mx9x
ASM 340 Wet - 15-pin I/O - RS-232 - Profibus	JSVA02A8Mx9x
ASM 340 Wet - 15-pin I/O - RS-232 - Profinet	JSVA02A9Mx9x
ASM 340 Wet - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	JSVA02AAMx9x
ASM 340 Wet - 15-pin I/O - RS-232 - EtherCAT - Consult us	JSVA02ACMx9x
Accessory - ASM 340 communication interface kit - 37-pin I/O - RS-232 - USB	121350S
Accessory - ASM 340 communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	121352S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232	121349S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - EtherCAT - Consult us	129995S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	129994S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - Profibus	127447S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - Profinet	127448S

ASM 340 Dry

Description	Part number
ASM 340 Dry - 15-pin I/O - RS-232	KSBA00A0MM9A
ASM 340 Dry - 37-pin I/O - RS-232 - USB	KSBA0xA2MM9A
ASM 340 Dry - 37-pin I/O - RS-232 - USB - Ethernet	KSBA00A4MM9A
ASM 340 Dry - 15-pin I/O - RS-232 - Profibus	KSBA00A8MM9A
ASM 340 Dry - 15-pin I/O - RS-232 - Profinet	KSBA00A9MM9A
ASM 340 Dry - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	KSBA00AAMM9A
ASM 340 Dry - 15-pin I/O - RS-232 - EtherCAT - Consult us	KSBA00ACMM9A
Accessory - ASM 340 communication interface kit - 37-pin I/O - RS-232 - USB	121350S
Accessory - ASM 340 communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	121352S

Description	Part number
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232	121349S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - EtherCAT - Consult us	129995S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	129994S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - Profibus	127447S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - Profinet	127448S

ASM 340 Integrable

Description	Part number
ASM 340 Integrable - 15-pin I/O - RS-232	MSXA02A0MM9A
ASM 340 Integrable - 37-pin I/O - RS-232 - USB	MSXA02A2MM9A
ASM 340 Integrable - 37-pin I/O - RS-232 - USB - Ethernet	MSXA02A4MM9A
ASM 340 Integrable - 15-pin I/O - RS-232 - Profibus	MSXA02A8MM9A
ASM 340 Integrable - 15-pin I/O - RS-232 - Profinet	MSXA02A9MM9A
ASM 340 Integrable - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	MSXA02AAMM9A
ASM 340 Integrable - 15-pin I/O - RS-232 - EtherCAT - Consult us	MSXA02ACMM9A
Accessory - ASM 340 communication interface kit - 37-pin I/O - RS-232 - USB	121350S
Accessory - ASM 340 communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	121352S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232	121349S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - EtherCAT - Consult us	129995S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	129994S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - Profibus	127447S
Accessory - ASM 340 communication interface kit - 15-pin I/O - RS-232 - Profinet	127448S

ASM 390

Description	Part number
ASM 390 - 15-pin I/O - RS-232	CSGB01G0MM9x
ASM 390 - 37-pin I/O - RS-232 - USB	CSGB01G2MM9x
ASM 390 - 37-pin I/O - RS-232 - USB - Ethernet	CSGB01G4MM9x
Accessory - ASM 390/392 communication interface kit - RS-232 - 37-pin I/O - USB	126254S
Accessory - ASM 390/392 communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	126255S
Accessory - ASM 390/392 communication interface kit - 15-pin I/O - RS-232	126253S

ASM 392

Description	Part number
ASM 392 - 15-pin I/O - RS-232	ESGB02G0MM9x
ASM 392 - 37-pin I/O - RS-232 - USB	ESGB02G2MM9x
ASM 392 - 37-pin I/O - RS-232 - USB - Ethernet	ESGB02G4MM9x
Accessory - ASM 390/392 communication interface kit - 37-pin I/O - RS-232 - USB	126254S

Description	Part number
Accessory - ASM 390/392 communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	126255S
Accessory - ASM 390/392 communication interface kit - 15-pin I/O - RS-232	126253S

1.1.2 Applicable documents

Useful documents for the using the options and/or accessories, and for product maintenance are as follows:

Document	Part number [1)]
User manual - ASI 35 leak detector	127801
User manual - ASM 310 leak detector	114916 (ASM 310 model V1/V2) 128864 (ASM 310 model V3)
User manual - ASM 306S leak detector	127443
User manual - ASM 340 leak detector	121762 (ASM 340 model V1) 128863 (ASM 340 model V2)
User manual - ASM 390/392 leak detector	126348
User manual - I/O module type HLT	122864
User manual - I/O module type ASI 20 MD	123358
User manual - I/O module type 2xxx or 3xxx	123359
1) also available at www.pfeiffer-vacuum.com	

1.2 Target group

This user manual is intended for all persons in charge of transport, installation, commissioning/decommissioning, use, maintenance or storage of the product.

The work described in this document must only be carried out by persons with suitable technical training (specialized staff) or persons who have undergone Pfeiffer Vacuum training.

1.3 Conventions

1.3.1 Instructions in the text

Usage instructions in the document follow a general structure that is complete in itself. The required action is indicated by an individual step or multi-part action steps.

Individual action step

A horizontal, solid triangle indicates the only step in an action.

► This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

1. Step 1
2. Step 2
3. ...

1.3.2 Abbreviations

I/O Input/Output

[XXXXXX] The control panel menus and parameters are shown in bold between square brackets. Example: **[Advanced] [Input/Output]** to select the Input/Output menu.

The screenshots are given as an example only. They can vary according to the user setting.

1.3.3 Proof of trademark

- Profibus® is a registered trademark of Profibus Nutzerorganisation e.V.
- Profinet® is a registered trademark of Profibus Nutzerorganisation e.V.
- EtherCAT® is a registered trademark of Beckhoff Automation GmbH, Germany.
- EtherNet/IP™ is a registered trademark licensed by ODVA, Inc.

2 Safety

2.1 General safety information

The following 4 risk levels and 1 information level are taken into account in this document.

⚠ DANGER

Immediately pending danger

Indicates an immediately pending danger that will result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

Indicates a pending danger that could result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

Indicates a pending danger that could result in minor injuries if not observed.

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

Is used to highlight actions that are not associated with personal injury.

► Instructions to avoid damage to property

Notes, tips or examples indicate important information about the product or about this document.

2.1.1 Safety instructions

All safety instructions in this document are based on the results of the risk assessment carried out in accordance with Low-Voltage Directive 2014/35/EU regarding electrical safety. Where applicable, all life cycle phases of the product were taken into account.

⚠ WARNING

Risk of electric shock in case of contact with products that are not electrically isolated

When powering off _mains switch to **O**_, certain components located between the mains connection and the circuit breaker will still contain an electric charge (live). There is a risk of electric shock in case of contact.

► Make sure that the mains connection is always visible and accessible so that it can be unplugged at any time.
► Disconnect the mains cable from the electrical network before working on the product.
► Wait for the control panel screen to turn off completely before working on the product and/or removing the cover(s).

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

► Use shielded cables and connections for the interfaces in interference-prone environments.

NOTICE

Safety extra-low voltage circuits

The remote control circuits are equipped with dry contact outputs (30 V - 40 A max). Overvoltages and overcurrents can result in internal electrical damage. Users must observe the following wiring conditions:

- ► Connect these outputs in compliance with safety extra-low voltage (SELV) circuit rules and safety standards.
- ► The voltage applied to these contacts should be less than 30 V and the current less than 40 A.

2.1.2 Precautions

Duty to provide information on potential dangers

The product holder or user is obliged to make all operating personnel aware of dangers posed by this product.

Every person who is involved in the installation, operation or maintenance of the product must read, understand and adhere to the safety-related parts of this document.

Infringement of conformity due to modifications to the product

The Declaration of Conformity from the manufacturer is no longer valid if the operator changes the original product or installs additional equipment.

- Following the installation into a system, the operator is required to check and re-evaluate the conformity of the overall system in the context of the relevant European Directives, before commissioning that system.

Only qualified personnel trained in safety regulations (EMC, electrical safety, chemical pollution) are authorized to carry out the installation and maintenance described in this manual. Our service centers can provide the necessary training.

- ► Follow the safety and accident prevention requirements (see chapter “Safety instructions”).
- ► Do not turn on the product if the cover is not in place.

2.2 Intended use

The communication interface is intended to be integrated into a leak detector from the manufacturer Pfeiffer Vacuum (see chapter “Products concerned”).

The communication interface enables the leak detector to communicate with a PLC (at the customer's expense).

The communication interface must be used in conjunction with the leak detector operating instructions (see chapter "Applicable documents").

2.3 Foreseeable misuse

Misuse of the product will render the warranty and any claims void.

Any use, whether intended or not, that diverges from the uses already mentioned will be treated as non-compliant.

2.4 Electrostatic Discharge (ESD) Information

Electrostatic discharge (ESD) is recognized as a potential hazard to semiconductors and integrated circuits.

This is to avoid faults in the electronic boards integrated into our products.

ESDs reduce the useful life of electronic boards. There are no immediate consequences when assembling the products, but premature aging of the components can be observed.

To protect products against the adverse effects of ESD, measures must be taken and applied at all times.

- ► Only handle devices in an EPA.
  - – An EPA is an ESD protected area. In an EPA, all surfaces, objects, people and devices are held at the same potential.
- ► Equip anyone handling a product during maintenance with ESD protection.
- ► Store the electronic boards before integration on an ESD vinyl surface until it is transferred to the EPA.
- ► Move a device from one EPA to another only in ESD protective packaging.
- ► Unpack and integrate the cable harnesses in direct contact with the electronic boards by a person equipped with a closed ESD gown and a bracelet connected to the EPA.

3 Profibus

3.1 Connection

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

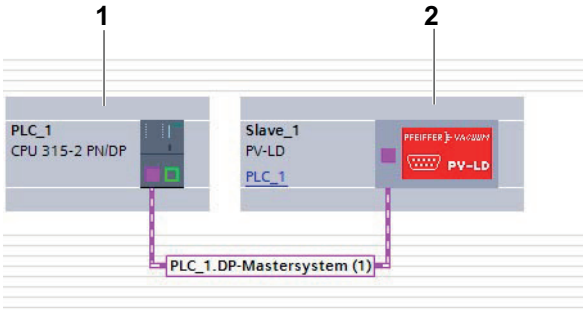
► Use shielded cables and connections for the interfaces in interference-prone environments.

3.1.1 Features of the Profibus cable

► Use a cable (not included) that meets Profibus DP cable standards.
- 9-pin male D-Sub connector for IP 20
- Impedance: 135–165 Ω
- Capacity: < 30 pF/m
- Resistance per unit length: 110 Ω /km
- Diameter: 0.64 mm
- Section > 0.34 mm^2
- Type of cable: Shielded twisted pair

3.1.2 Profibus connection of the detector to the PLC

1. Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).
2. Connect the cable:
   - to the leak detector
   - to the customer’s installation.
3. Power on the detector.
4. Create the digital connection, using the PLC software used, between the leak detector and the PLC.

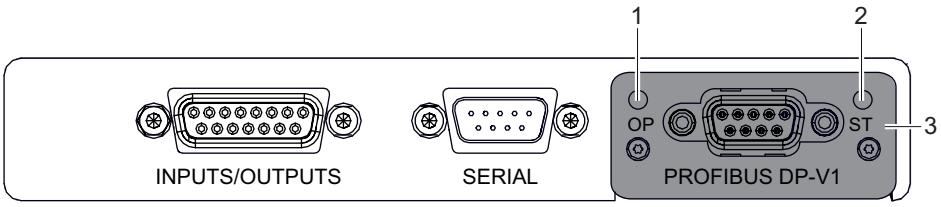


Example of Profibus connection with Siemens TIA Portal software

1 PLC_1: PLC 2 PV-LD: Name of the default leak detector

3.1.3 Profibus connection interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 OP indicator: network status (see details below)

2 ST indicator: AnyBus module status (see details below)

3 9-pin female D-Sub Profibus connector

Details of OP indicator (network status)

Indicator state	Indication
Off	Not online / No power
Green	Online, data exchange
Flashing Green	Online, clear
Flashing Red (1 flash)	Parameterization error
Flashing Red (2 flashes)	PROFIBUS Configuration error

Details of ST indicator (AnyBus module status)

Indicator state	Indication	Comments
Off	Not initialized	Anybus state = SETUP or NW_INIT
Green	Initialized	Anybus module has left the NW_INIT state
Flashing Green	Initialized, diagnostic event(s) present	Extended diagnostic bit is set
Red	Exception error	Anybus state = EXCEPTION

3.2 Setting

Depending on the leak detector model, some functions are not available.

The functions available depend on the leak detector model.

3.2.1 Set the leak detector

On the Settings screen, press [Advanced] [Input/Output] [Serial link #2].	
Type	Set the type of ‘AnyBus’ connection.

On the Settings screen, press [Advanced] [Input/Output] [Serial link #2] [Settings].			
Mode	Indicate the type of bus.	-	Profibus
Status	Indicate the Fieldbus module status	Setup	Initialization of the Fieldbus module.
		Nw Init	Initialization of the Fieldbus network.
		Wait Process	Wait for connections to the PLC.
		Proc. Active	In communication with the PLC.
		IDLE	Placed in a safe state following a non-compliant action.
		Error	Problem occurred on the network.
		Exception	Critical error with the Fieldbus module. The leak detector must be restarted to reinitialize the module.
Address	● Set the address between 2 and 126. – This address can be configured, in this menu, only if the code wheels of the interface board are at "zero".		

On the Settings screen, press [Advanced] [Input/Output] [Profibus].	
Type	Set the ‘Adixen’ type.
Connected	Indicates the module status (yes).

On the Settings screen, press [Advanced] [Input/Output] [Profibus].	
Address	Indicates the hexadecimal address of the module.
Dx/Det	• Dx (OP indicator): indicates the network status (yes/no). • Det (ST indicator): indicates the Fieldbus module (yes).

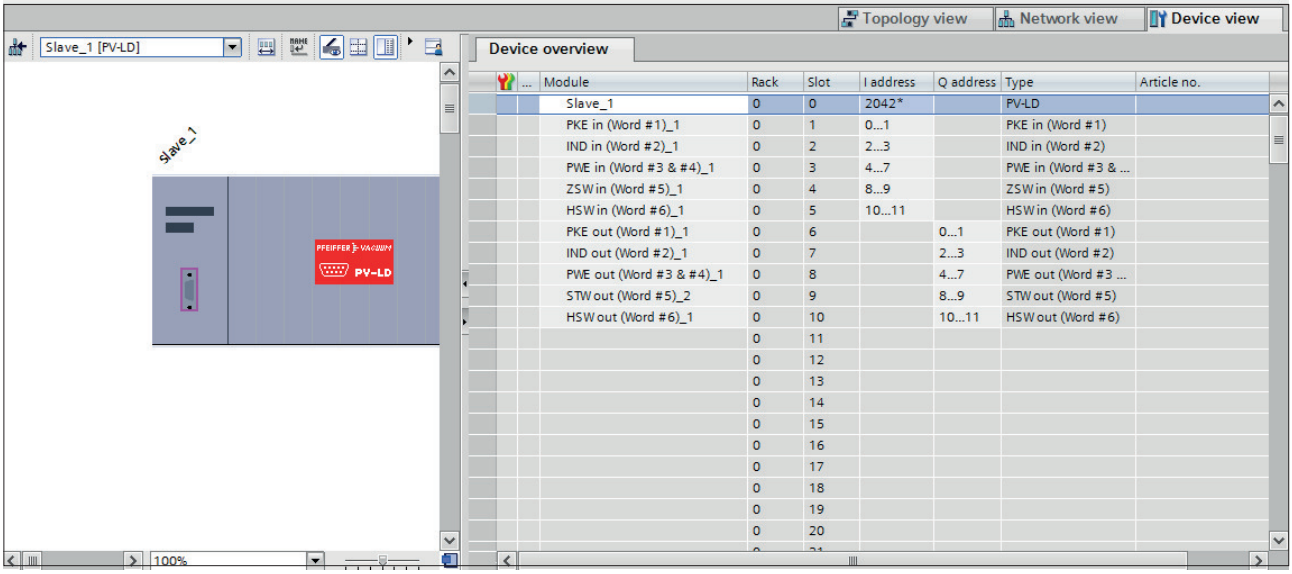
3.2.2 GSD file

This file must be used with the PLC software. It defines the functions of the leak detector using the Profibus.

The Profibus file “PVSM10F5.gsd” is provided in the leak detector user manual (USB drive).

3.2.3 PLC configuration

► Configure all I/Os, as in the example below.



Configuration example with Siemens TIA Portal software

3.3 Use

3.3.1 Reading data (from the leak detector to the PLC)

Slot	Word	Byte [1]	Parameter	Description
1	1	0 – 1	PKE	Parameters identified • Bit 0 – 10: Parameter number (see chapter « List of parameters ») • Bit 11: Reserved • Bit 12 – 15: Type of command — 0: No response — 1: Value of the parameter transmitted (word) — 2: Value of the parameter transmitted (double word) — 7: The command cannot be executed (with a number error) — 8: Not authorized for the PKW interface — 15: Depending on the order index, only certain reply indexes are possible.
2	2	2 – 3	IND	Not used
3	3 – 4	4 – 5 – 6 – 7	PWE	Value of the parameter • Value requested

1) Coding with the Little-Endian convention

Slot	Word	Byte [1]	Parameter	Description
4	5	8 – 9	ZSW	Status word ● (see chapter « ZSW status word (Input) »)
5	6	10 – 11	HSW	Leak rate value ● (see chapter « Special format details ») Current leak rate value read by the leak detector

1) Coding with the Little-Endian convention

3.3.2 Writing data (from PLC to leak detector)

Slot	Word	Byte [1]	Parameter	Description
6	1	0 – 1	PKE	Parameters identified ● Bit 0 – 10: Parameter number (see chapter « List of parameters ») ● Bit 11: Reserved ● Bit 12 – 15: Type of command — 1: Querying of the parameter — 2: Change to the parameter value (word) — 3: Change to the parameter value (double word)
7	2	2 – 3	IND	Not used
8	3 – 4	4 – 5 – 6 – 7	PWE	Value of the parameter To be sent to the detector if the type of PKE parameter is 2 or 3.
9	5	8 – 9	STW	Status word ● (see chapter « STW command word (Output) »)
10	6	10 – 11	HSW	Not used

1) Coding with Little-Endian convention

3.3.3 List of parameters

The parameters available depend on the leak detector model and interface installed.

No.	Parameter	Type	Access [2]
1	Status 0: **see details of status 0**	U16	R
2	Status 2: not used	-	-
3	Status 1: **see details of status 1**	U16	R
4	Error 1	U8	R
5	Error 2	U8	R
6	Error 3	U8	R
7	Warning 1	U8	R
8	Warning 2	U8	R
9	Leak rate [1]	U16	R
10	Inlet pressure [1]	U16	R
11	Triode Pressure [1]	U16	R
12	Not used	-	-
13	Number of hours of the leak detector	U16	R
14	Number of hours of filament #1	U16	R
15	Number of hours of filament #2	U16	R

1) See chapter « Special format details »

2) Access:

- R: Read only
- W: Write only
- R/W: Read and write

No.	Parameter	Type	Access [2]
16	Cycles counter [1]	U16	R
17	Number of hours of backing pump	U16	R
18	Number of hours of secondary pump #1	U16	R
19	Number of hours of secondary pump #2	U16	R
20	Number of hours of secondary pump #3	U16	R
21	Status 3: **see details of status 3**	U32	R
50	Reject set point in hard vacuum test [1]	U16	RW
51	Reject point #2 [1]	U16	RW
52	Reject point #3 [1]	U16	RW
53	Reject point #4 [1]	U16	RW
54	Reject point #5 [1]	U16	RW
55	Pressure set point #1 [1]	U16	RW
56	Pressure set point #2 [1]	U16	RW
57	Sniffing reject point [1]	U16	RW
58	Probe clogged threshold [1]	U16	RW
59	Correction coefficient in hard vacuum test [1]	U16	RW
60	Sniffing correction coefficient [1]	U16	RW
61	Sensitivity coefficient (in progress)	U16	R
62	External pressure [1]	U16	R
63	Command 0: **see details of command 0**	U16	W
65	Tracer gas (Helium 4/Helium, Helium 3/3-mass or Hydrogen)	U16	RW
918	Profibus address active	-	-

1) See chapter « Special format details »

2) Access:

- R: Read only
- W: Write only
- R/W: Read and write

Details of status 0 (No. 1 in the list of parameters)
Bit 0: Threshold #4
Bit 1: Threshold #5
Bit 2: Filament #2 on
Bit 3: Maintenance required
Bit 4: Correction in hard vacuum test mode
Bit 5: Test in Gross Leak mode
Bit 6: Test in Normal mode
Bit 7: Test in High Sensitivity mode
Bit 8: General error
Bit 9: Test mode reached
Bit 10: Bypass valve
Bit 11: Acknowledgement request during calibration
Bit 12: Leak detector in Stand-by
Bit 13: Leak detector in hard vacuum test or sniffing
Bit 14: Leak detector temperature close to limit
Bit 15: Stand-by for HLT type calibration compatibility

Details of status 1 (No. 3 in the list of parameters)		
	Value = 0	**Value = 1**
Bit 0: Filament used (1/2)	Filament 1	Filament 2
Bit 1: Filament on	Off	On
Bit 2: Cycle	No hard vacuum test	In hard vacuum test
Bit 3 and 4: Test mode	00: Roughing	
	01: Gross Leak [1)]	
	10: Normal [1)]	
	11: High Sensitivity [1)]	
Bit 5: Sniffing	No sniffing	In sniffing
Bit 6: Calibration result	Not OK	OK
Bit 7: Not used	-	-
Bit 8: Warning/Error	Warning/Error	No warning/Error
Bit 9: Air inlet [1)]	Closed	Open
Bit 10: Leak detector ready for test	Yes	No
Bit 11: Secondary pump status	Not synchronized	Synchronized
Bit 12: Not used	-	-
Bit 13: Not used	-	-
Bit 14: Sniffer probe status	Probe Clogged	Probe not clogged
Bit 15: Not used	-	-
1) According to leak detector model		

Details of status 3 (No. 21 in the list of parameters)
Bit 0: Threshold #4
Bit 1: Threshold #5
Bit 2: Filament #2 on
Bit 3: Maintenance required
Bit 4: Correction in hard vacuum test mode
Bit 5: Test in Gross Leak mode
Bit 6: Test in Normal mode
Bit 7: Test in High Sensitivity mode
Bit 8: General error
Bit 9: Test mode reached
Bit 10: Bypass valve
Bit 11: Acknowledgement request during calibration
Bit 12: Leak detector in Stand-by
Bit 13: Leak detector in hard vacuum test or sniffing
Bit 14: Leak detector temperature close to limit
Bit 15: Stand-by for HLT type calibration compatibility
Bit 16: Pressure set point #3
Bit 17: Roughing valve

Details of command 0 (No. 63 in the list of parameters)
Bit 0: HLT type calibration
Bit 1: Internal calibration
Bit 2: External calibration
Bit 3: Machine calibration

3.3.4 Special format details

The special format applies to all logarithmic values.

Structure

U16 type 16 bits unit: mmmmmmmmmmeeeeee	
Mantissa = 10 bits 10 bits = **mmmmmmmmmm**eeeeee	Exponent = 6 bits 6 bits = mmmmmmmmmm**eeeeee** 0eeeee -> 0 = + 1eeeee -> 1 = -
Value range: 0.00 – 9.99	Value range: -30 – +30

Example 1

U16 type = 0111101010000010	
Mantissa: **0111101010**000010 Mantissa: **0111101010** -> 490 [1] -> **4.9**	Exponent: 011110101**000010** Exponent: **000010** -> **+2**
Decoded value: $4.9 \cdot 10^{+2}$	

1) In order to read the real leak rate, divide the mantissa value by 100 (in the example, 490/100 = 4.9).

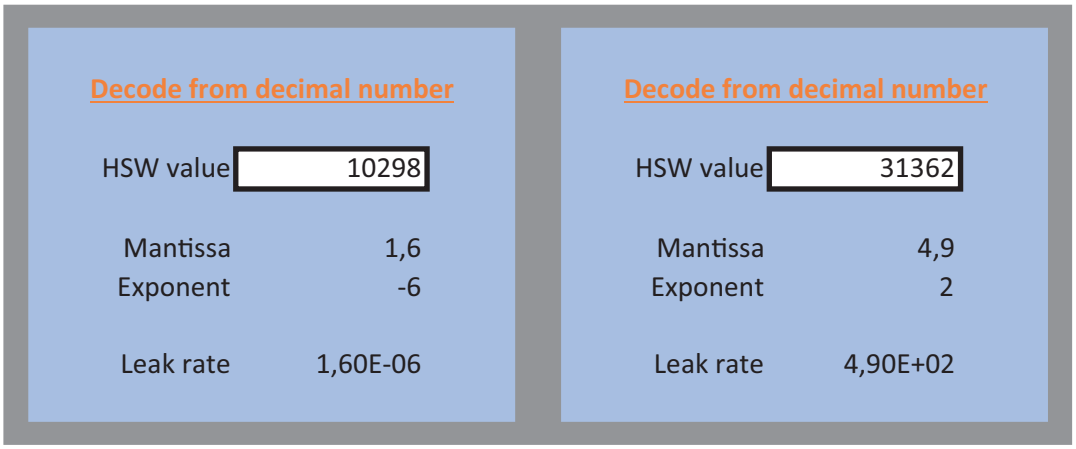
Example 2

U16 type = 0010100000111010	
Mantissa : **0010100000**111010 Mantissa : **0010100000** -> 150 [1] -> **1,6**	Exponent : 001010000**111010** Exponent : **111010** -> **-6**
Decoded value: $1.6 \cdot 10^{-6}$	

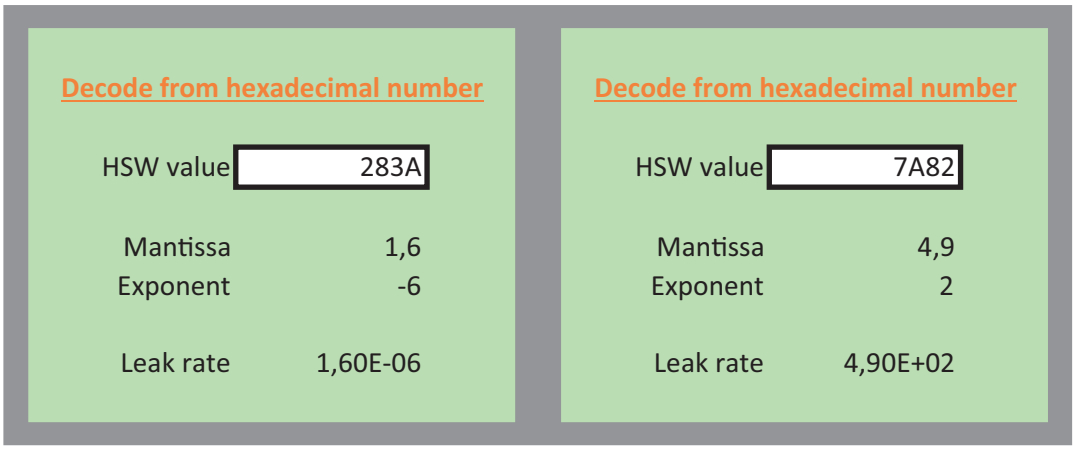
1) In order to read the real leak rate, divide the mantissa value by 100 (in the example, 160/100 = 1.6).

Leak rate decoding

The "HSW code" file provided with the operating instructions (USB key) is used to decode a decimal/ hexadecimal number of a leak rate.



Example: leak rate value from a decimal number



Example: leak rate value from a hexadecimal number

Programming examples: Function in C of decoding of HSW

```
float decode_HSW_1(unsigned int hsw)
{
    // HSW decode struct
    typedef union {
        unsigned int value;
        struct {
            signed   exponent : 6;
            unsigned mantisse : 10;
        } sub;
    }T_HSW_struct;

    float leak_rate_value;
    T_HSW_struct hsw_data;

    // Enter HSW in the decode struct
    hsw_data.value = hsw;

    // Calcul of the leak rate value
    // (mantissa * 10^exponant)
    leak_rate_value = hsw_data.sub.mantissa * pow(10, hsw_data.sub.exponant);

    //
    return leak_rate_value;
}
```

```
Example #1 HSW = 31362 (0x7A82)

hsw_data.value = 31362

4.90 * pow(10, 2) = 4.90E+02

Leak rate = 4.90E+02
```

```
Example #2 HSW = 10298 (0x283A)

hsw_data.value = 10298

1.60 * pow(10, -6) = 1.60E-06

Leak rate = 1.60E-06
```

```
float decode_HSW_2(unsigned int hsw)
{
    float leak_rate_value;
    float mantissa;
    signed char exponent;

    // Extract mantissa from HSW data
    // (extract the 10 most significative bits and divide by 100)
    mantissa = ((hsw >> 6) & 0x03FF) / 100.0;

    // Extract exponant from HSW data
    // (extract the 6 less significative bits inside a signed integer)
    exponant = (signed char)(hsw & 0x003F);
    // If value need to be converted in signed
    if(exponant > 31)
    {
        // Add the minus signed
        exponant = exponant - 64;
    }

    // Calcul of the leak rate value
    // (mantissa * 10^exponant)
    leak_rate_value = mantissa * pow(10, exponant);

    //
    return leak_rate_value;
}
```

```
Example #1 HSW = 31362 (0x7A82)

31362 = 0111101010000010b
0111101010b = 490
490 / 100 = 4.90

31362 = 0111101010000010b
000010b = 2

4.90 * pow(10, 2) = 4.90E+02

Leak rate = 4.90E+02
```

```
Example #2 HSW = 10298 (0x283A)

10298 = 0010100000111010b
0010100000b = 160
160 / 100 = 1.60

10298 = 0010100000111010b
111010b = 58

58 is over 31

58 - 64 = -6

1.60 * pow(10, -6) = 1.60E-06

Leak rate = 1.60E-06
```

3.3.5 ZSW status word (Input)

From the leak detector to the PLC

The parameters available depend on the leak detector model.

Bit	Parameter
0	Warning/Error
1	Hard vacuum test
2	Sniffing test
3	Detector ready
4	Detector busy

Bit	Parameter
5	Reject point
6	Threshold #2
7	Threshold #3
8	Zero
9	Synchronized secondary pump
10	Sniffing valve
11	Filament on
12	Calibration fault
13	Hard vacuum test #1
14	Hard vacuum test #2
15	Probe Clogged

3.3.6 STW command word (Output)

From PLC to the leak detector

The parameters available depend on the leak detector model.

Bit	Parameter
0	Hard vacuum test
1	Calibration
2	Zero
3	Memo
4	Dynamic calibration
5	Sniffing test
6	Warning/Error reset
7	Filament
8	Gross Leak mode
9	Normal mode
10	High Sensitivity mode
11	Air inlet
12	Record a graph
13	Save a graph
14	Calibration checking
15	By-pass available

3.3.7 Use examples

Reading data (from the leak detector to the PLC)

Parameter	Word	Byte [1)]	Bits	Function	Value example	Function example
PKE	1	0	15 – 12	Request Index	1 or 2	Demand request
			11	Not used	0	-
		0 – 1	10 – 0	Parameter number	0x0B	Triode pressure
IND	2	2	-	Not used	0	-
		3	-	Not used	0	-
PWE	3	4	-	Most significant word of parameter	0	-
		5	-			
	4	6	-	Less significant word of parameter	0x4B	Triode pressure: 0x4B3B = $3.0 \cdot 10^{-5}$
		7	-		0x3B	

1) Coding with Little-Endian convention

Param-eter	Word	Byte [1]	Bits	Function	Value ex-ample	Function example
ZSW	5	8	15	Probe Clogged	0 or 1	-
			14	Pressure threshold #2	0 or 1	-
			13	Pressure threshold #3	0 or 1	-
			12	Calibration fault	0 or 1	-
			11	Filament on	0 or 1	-
			10	Sniffing valve	0 or 1	-
			9	Synchronized secon-dary pump	0 or 1	-
			8	Zero	0 or 1	-
		9	7	Threshold #3	0 or 1	-
			6	Threshold #2	0 or 1	-
			5	Threshold #1	0 or 1	-
			4	Detector busy	0 or 1	-
			3	Detector ready	0 or 1	-
			2	Sniffing test	0 or 1	-
			1	Hard vacuum test	1	-
			0	Warning/Error	0 or 1	-
HSW	6	10	15 – 8	Leak Rate	0xAF	Leak rate: 0xAF36 = $7.0 \cdot 10^{-10}$
		11	7 – 0		0x36	

1) Coding with Little-Endian convention

Writing data (from PLC to leak detector)

Parameter	Word	Byte [1]	Bits	Function	Value example	Function example
PKE	1	0	15 – 12	Request Index	1	Demand request
			11	Not used	0	-
		0 – 1	10 – 0	Parameter number	0x0B	Triode pressure
IND	2	2	-	Not used	0	-
		3	-	Not used	0	-
PWE	3	4	-	Not used	0	-
		5	-	Not used	0	-
	4	6	-	Not used	0	-
		7	-	Not used	0	-

1) Coding with Little-Endian convention

Parameter	Word	Byte [1)]	Bits	Function	Value example	Function example
STW	5	8	15	Not used	0	-
			14	Not used	0	-
			13	Not used	0	-
			12	Not used	0	-
			11	Not used	0	-
			10	Not used	0	-
			9	Not used	0	-
			8	Not used	0	-
		9	7	Not used	0	-
			6	Not used	0	-
			5	Sniffing test	0	-
			4	Dynamic calibration	0	-
			3	Memo	0	-
			2	Zero	0	-
			1	Calibration	0	-
			0	Hard vacuum test	1	Test start
HSW	6	10	15 – 8	Not used	0	-
		11	7 – 0	Not used	0	-

1) Coding with Little-Endian convention

4 Profinet

4.1 Connection

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

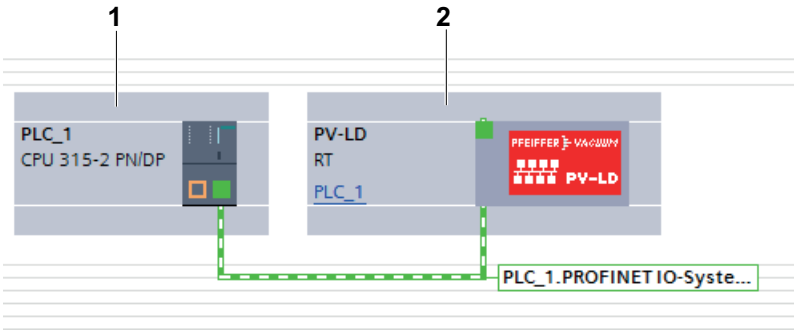
► Use shielded cables and connections for the interfaces in interference-prone environments.

4.1.1 Features of the Profinet cable

► Use a cable (not included) that meets Profinet cable standards.
  – RJ45 connector

4.1.2 Profinet connection of the detector to the PLC

1. Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).
2. Connect the cable:
   – to the leak detector
   – to the customer’s installation.
3. Power on the detector.
4. Create the digital connection, using the PLC software used, between the leak detector and the PLC.

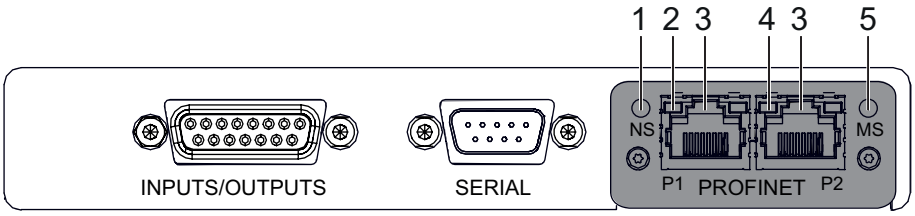


Example of Profinet connection with Siemens TIA Portal software

1 PLC_1: PLC 2 PV-LD: Name of the default leak detector

4.1.3 Profinet connection interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 NS indicator: network status (see details below)

2 P1 connection/activity indicator (see details below)

3 RJ-45 Profinet connector
- P1: inlet port (recommended)
- P2: output port (recommended)

4 P2 connection/activity indicator (see details below)

5 MS indicator: AnyBus module status (see details below)

Details of NS indicator (network status)

Indicator state	Description	Comments
Off	Offline	No power
		No connection with IO Controller (PLC example)
Green	Online (RUN)	Connection with IO Controller (PLC example) established
		IO Controller (PLC example) in RUN state
Green, 1 flash	Online (STOP)	Connection with IO Controller (PLC example) established
		IO Controller (PLC example) in STOP state or IO data bad
		IRT synchronization not finished
Green, blinking	Blink	Used by engineering tools to identify the node on the network
Red	Fatal event	Major internal error (this indication is combined with a red module status LED)
Red, 1 flash	Station Name error	Station Name not set
Red, 2 flashes	IP address error	IP address not set
Red, 3 flashes	Configuration error	Expected Identification differs from Real Identification

Details of MS indicator (AnyBus module status)

Indicator state	Description	Comments
Off	Not Initialized	No power OR Module in SETUP or NW_INIT state.
Green	Normal Operation	Module has shifted from the NW_INIT state.
Green, 1 flash	Diagnostic Event(s)	Diagnostic event(s) present
Red	Exception error	Device in state EXCEPTION.
	Fatal event	Major internal error (this indication is combined with a red network status LED)
Alternating Red/ Greed	Firmware update	Do NOT power off the module. Turning the module off during this phase could cause permanent damage.

Details of P1/P2 connection/activity indicator

Indicator state	Description	Comments
Off	No Link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

4.2 Setting

Depending on the leak detector model, some functions are not available.

The functions available depend on the leak detector model.

4.2.1 Set the leak detector

On the Settings screen, press [Advanced] [Input/Output] [Serial link #2].	
Type	Set the type of ‘AnyBus’ connection.

On the Settings screen, press [Advanced] [Input/Output] [Serial link #2] [Settings].			
Mode	Indicate the type of bus.	-	Profinet.
Status	Indicate the Fieldbus module status	Setup	Initialization of the Fieldbus module.
		Nw Init	Initialization of the Fieldbus network.
		Wait Process	Wait for connections to the PLC.
		Proc. Active	In communication with the PLC.
		IDLE	Placed in a safe state following a non-compliant action.
		Error	Problem occurred on the network.
		Exception	Critical error with the Fieldbus module. The leak detector must be restarted to reinitialize the module.
Address	• Indicates the IP address of the leak detector given by the network.		
Name	• Indicates the name given by the user.		

On the Settings screen, press [Advanced] [Input/Output] [Profinet].	
Type	Set the ‘Adixen’ type.
Connected	Indicates the module status (yes).
Address	Indicates the hexadecimal address of the module.
Dx/Det	• Dx (NS indicator): indicates the network status (yes/no). • Det (MS indicator): indicates the Fieldbus module status (yes).

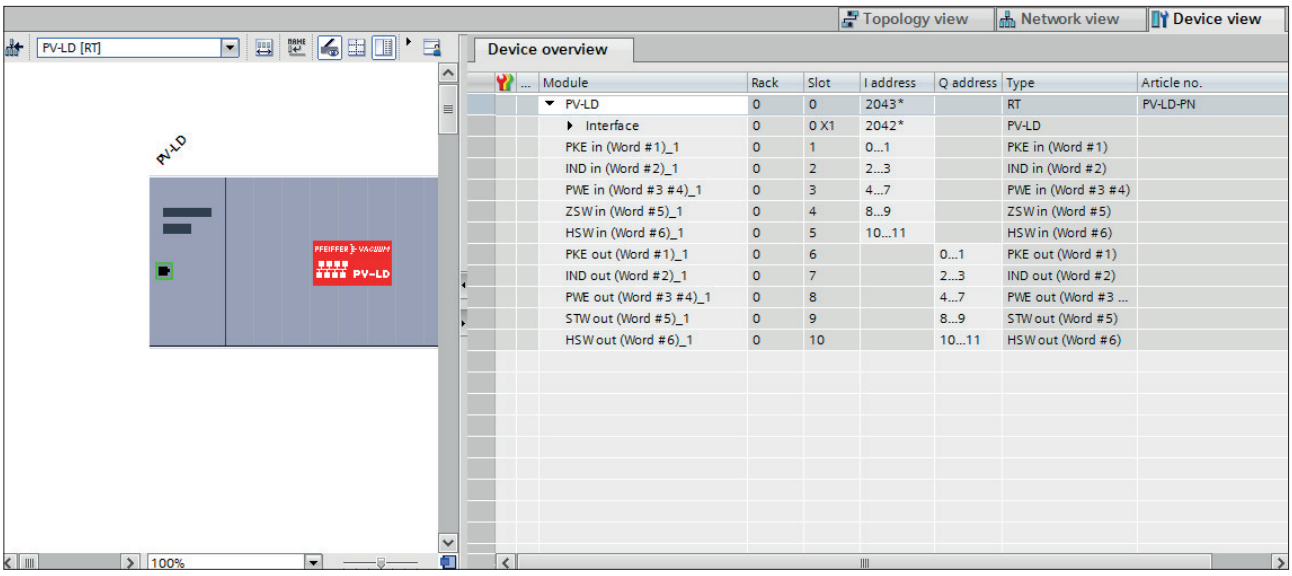
4.2.2 GSDML file

This file must be used with the PLC software. It defines the functions of the leak detector using the Profinet.

The Profinet file ”GSDML-V2.3-PV-LD_PROFINET.xml” is provided in the leak detector user manual (USB drive).

4.2.3 PLC configuration

► Configure all I/Os, as in the example below.



Configuration example with Siemens TIA Portal software

4.3 Use

Use of Profibus, Profinet, EtherNet/IP and EtherCAT interfaces is identical.

- Reading data (from the leak detector to the PLC)
- Writing data (from PLC to leak detector)
- List of parameters
- Special format details
- ZSW status word (Input)
- STW command word (Output)
- Use examples

See chapter “Profibus” to consult these chapters.

5 EtherNet/IP

5.1 Connection

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

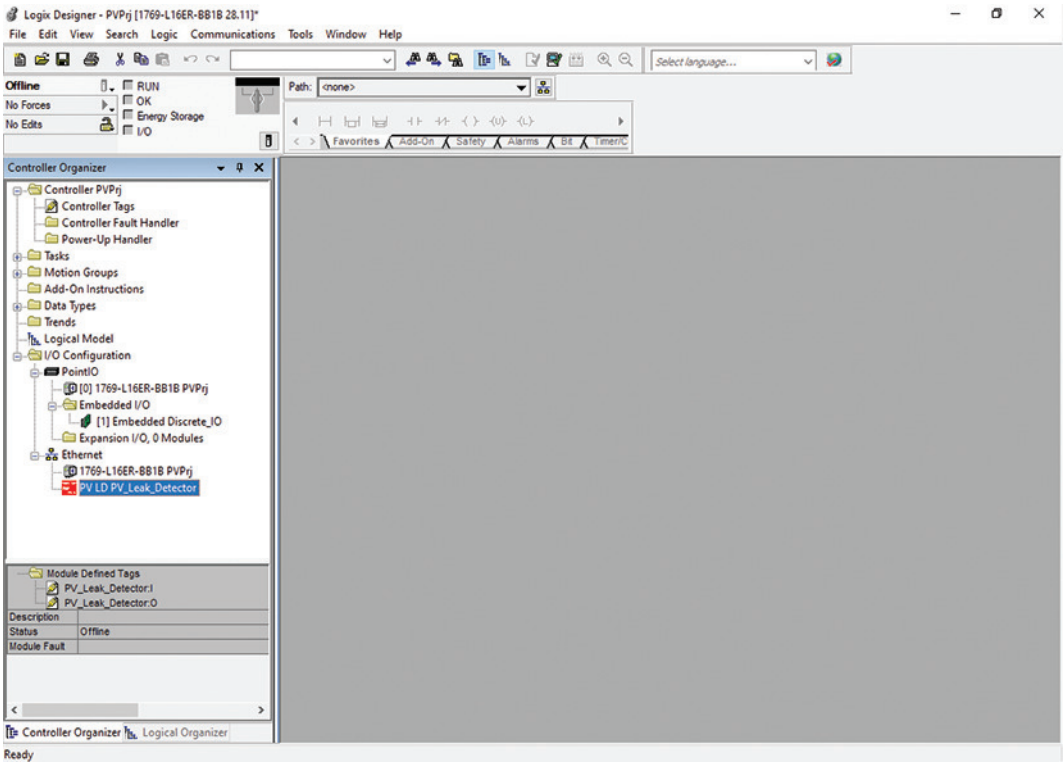
► Use shielded cables and connections for the interfaces in interference-prone environments.

5.1.1 EtherNet/IP cable characteristics

► Use a cable (not supplied) that conforms to EtherNet/IP cable standards.
  – RJ-45 connector

5.1.2 EtherNet/IP connection from detector to the PLC

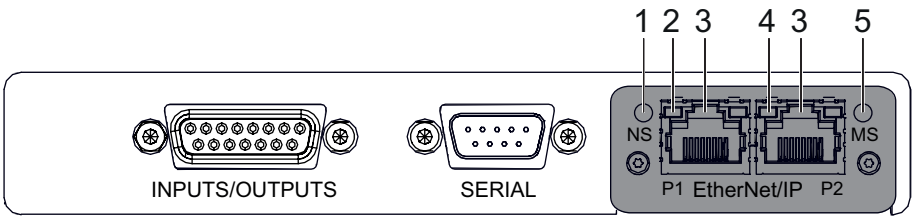
1. Before connecting the cable, switch off the leak detector (see chapter "Powering off" in the leak detector maintenance instructions).
2. Connect the cable:
   – to the leak detector
   – on the customer installation.
3. Switch on the detector.
4. Create the digital connection using the PLC software used, between the leak detector and the PLC.



Example of connection with Logix Designer software

5.1.3 EtherNet/IP connection interface

Before connecting the cable, switch off the leak detector (see chapter "Powering off" in the leak detector maintenance instructions).



1 NS indicator: Network status (see details below)
2 P1 connection/activity indicator (see details below)
3 RJ-45 EtherNet/IP connector
   – P1: input port (advised)
   – P2: output port (advised)
4 P2 connection/activity indicator (see details below)
5 MS indicator: AnyBus module status (see details below)

Details of NS indicator (Network status)

Indicator state	Description
Off	No power or no IP address
Green	Online, one or more connections established (CIP Class 1 or 3)
Green, flashing	Online, no connections established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)

Details of MS indicator (AnyBus module status)

Indicator state	Description
Off	No power
Green	Controlled by a Scanner in Run state and, if CIP Sync is enabled, time is synchronized to a Grandmaster clock
Green, flashing	Not configured, Scanner in Idle state, or, if CIP Sync is enabled, time is synchronized with Grandmaster clock
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Red, flashing	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters

Details of P1/P2 connection/activity indicator

Indicator state	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

5.2 Setting

Depending on the leak detector model, some functions are not available.

The functions available depend on the leak detector model.

5.2.1 Leak detector parameters

From the "Settings" screen, press [Advanced] [Input/Output] [Serial Link 2].	
Type	Set the ‘AnyBus’ link type.

From the "Settings" screen, press [Advanced] [Input/Output] [Serial Link 2] [Settings].			
Mode	Indicates the type of bus.	-	EtherNet/IP.
Status	Indicates the status of the Fieldbus module	Setup	Initialization of the Fieldbus module.
		Nw Init	Initialization of the Fieldbus network.
		Wait Process	Wait for PLC connections.
		Proc. Active	In communication with the PLC.
		IDLE	Put in a safe state following a non-conforming action.
		Error	There was a problem with the network.
		Exception	Critical error with the Fieldbus module. The leak detector must be restarted to reset the module.
Address	Indicates the IP address of the leak detector given by the network.		
Name	Indicates the name given by the user.		

From the “Settings” screen, press [Advanced] [Input/Output] [Profibus]/[Profinet].	
Type	Set the 'Adixen' type.
Connected	Indicates the module status (yes).
Address	Indicates the modul hexadecimal address.
Dx/Det	Dx (NS indicator light): indicates the network status (yes/no). Det (MS indicator light): indicates the Fieldbus module status (yes).

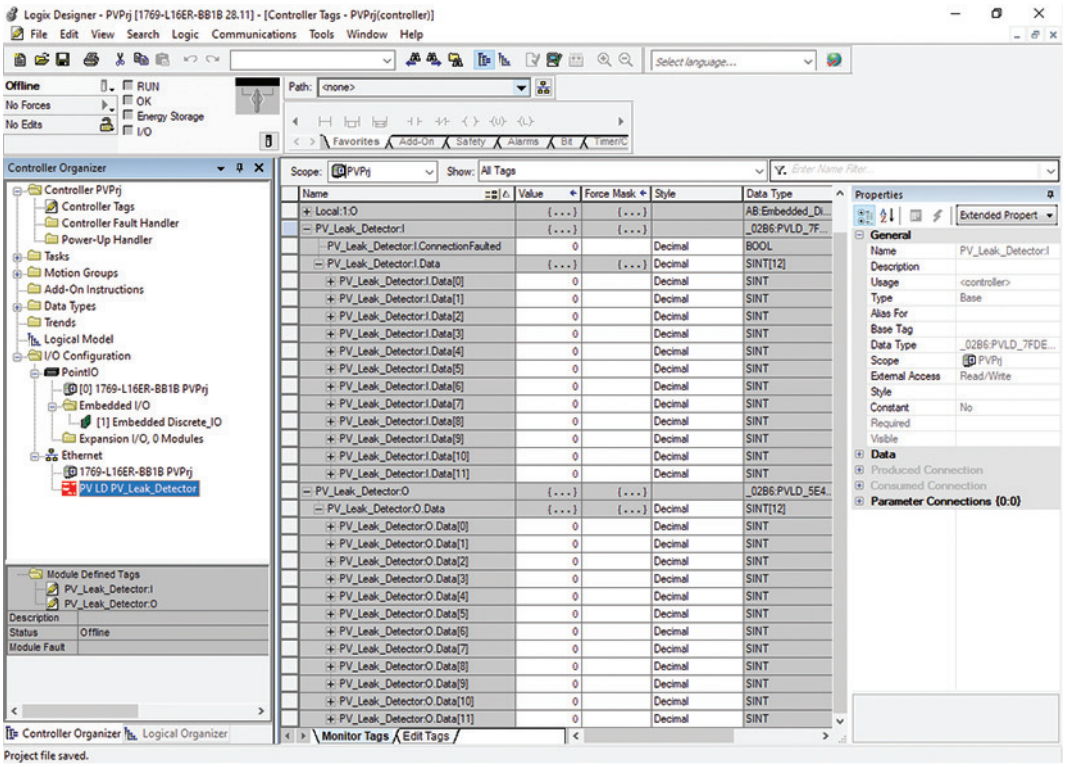
5.2.2 EDS file

This file must be used with the PLC software. It defines the leak detector functions using EtherNet/IP protocol.

The EtherNet/IP file « 02B6002B00100100.eds » is provided in the leak detector operating instructions (USB key).

5.2.3 PLC configuration

► Configure all I/O as shown in the example below.



Example of configuration with Logix Designer software

5.3 Use

Use of Profibus, Profinet, EtherNet/IP and EtherCAT interfaces is identical.

- Reading data (from the leak detector to the PLC)
- Writing data (from PLC to leak detector)
- List of parameters
- Special format details
- ZSW status word (Input)
- STW command word (Output)
- Use examples

See chapter “Profibus” to consult these chapters.

5.3.1 Coding

In these instructions, all codings shown use the Little-Endian convention.

However, EtherNet/IP allows the use of 2 conventions for coding

- Little-Endian
- Big-Endian

It is up to the user to transpose Little-Endian coding into Big-Endian coding.

6 EtherCAT

6.1 Connection

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

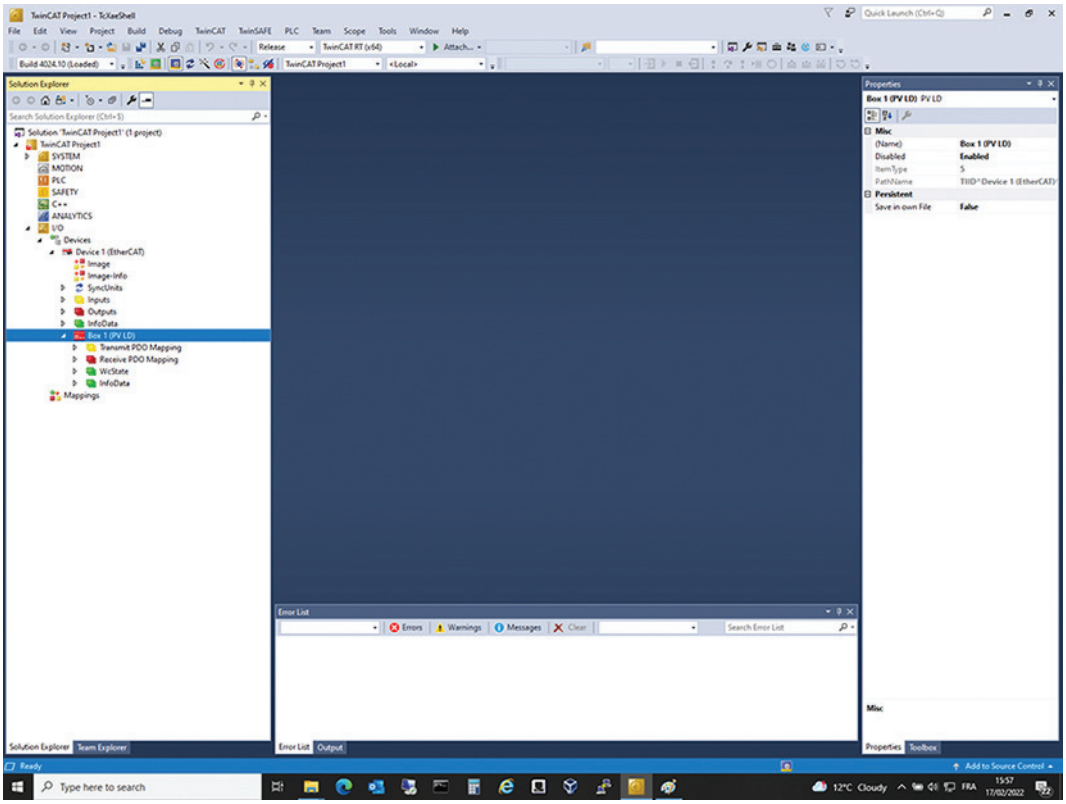
► Use shielded cables and connections for the interfaces in interference-prone environments.

6.1.1 Features of the EtherCAT cable

► Use a cable (not included) that meets EtherCAT cable standards.
  – RJ45 connector

6.1.2 EtherCAT connection from the detector to the PLC

1. Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).
2. Connect the cable:
   – to the leak detector
   – to the customer’s installation.
3. Power on the detector.
4. Create the digital connection, using the PLC software used, between the leak detector and the PLC.

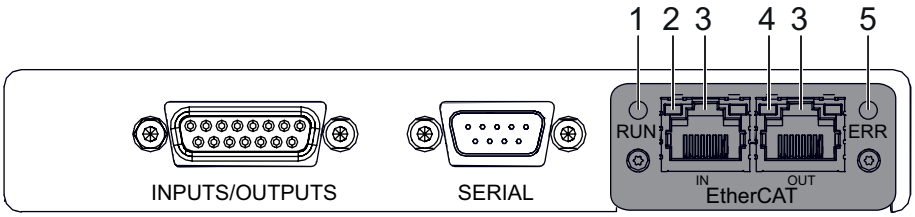


Configuration example with Berckhoff TwinCat 3 software

6.1.3 EtherCAT connection interface

Refer to the leak detector user manual to locate the connection interface.

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 RUN indicator: network status (see details below)

2 P1 connection/activity indicator (see details below)

3 RJ-45 EtherCAT connector
- IN: inlet port (recommended)
- OUT: output port (recommended)

4 P2 connection/activity indicator (see details below)

5 ERR indicator: AnyBus module status (see details below)

Details of RUN indicator (network status)

Indicator state	Indication	Description
Off	INIT	EtherCAT device in 'INIT'-state (or no power)
Green	OPERATIONAL	EtherCAT device in 'OPERATIONAL'-state
Green, blinking	PRE-OPERATION-AL	EtherCAT device in 'PRE-OPERATIONAL'-state
Green, single flash	SAFE-OPERATION-AL	EtherCAT device in 'SAFE-OPERATIONAL'-state
Flickering	BOOT	The EtherCAT device is in 'BOOT' state
Red	(Fatal Event)	If RUN and ERR turn red, this indicates a fatal event, forcing the bus interface to a physically passive state.

Details of ERR indicator (AnyBus module status)

Indicator state	Indication	Description
Off	No error	No error (or no power)
Red, blinking	Invalid configuration	State change received from master is not possible due to invalid register or object settings.
Red, single flash	Unsolicited state change	Controlled device application has changed the EtherCAT state autonomously.
Red, double flash	Sync Manager watchdog timeout	-
Red	Application controller failure	Anybus module in EXCEPTION.
		If RUN and ERR turn red, this indicates a fatal event, forcing the bus interface to a physically passive state.
Flickering	Booting error detected	E.g. due to firmware download failure.

Details of P1/P2 connection/activity indicator

Indicator state	Indication	Description
Off	No link	Link not sensed (or no power)
Green	Link sensed, no activity	Link sensed, no traffic detected
Green, flickering	Link sensed, activity	Link sensed, traffic detected

6.2 Setting

Depending on the leak detector model, some functions are not available.

The functions available depend on the leak detector model.

6.2.1 Set the leak detector

On the Settings screen, press [Advanced] [Input/Output] [Serial link #2].	
Type	Set the type of ‘AnyBus’ connection.

On the Settings screen, press [Advanced] [Input/Output] [Serial link #2] [Settings].			
Mode	Indicate the type of bus.	-	EtherCAT
Status	Indicate the Fieldbus module status	Setup	Initialization of the Fieldbus module.
		Nw Init	Initialization of the Fieldbus network.
		Wait Process	Wait for connections to the PLC.
		Proc. Active	In communication with the PLC.
		IDLE	Placed in a safe state following a non-compliant action.
		Error	Problem occurred on the network.
		Exception	Critical error with the Fieldbus module. The leak detector must be restarted to reinitialize the module.
ID	• Indicates the ID address of the leak detector given: – either by the network – or by the leak detector with the code wheels		
Name	• Indicates the name given by the user.		

On the Settings screen, press [Advanced] [Input/Output] [EtherCAT].	
Type	Set the ‘Adixen’ type.
Connected	Indicates the module status (yes).
Address	Indicates the hexadecimal address of the module.
Dx/Det	• Dx (RUN): indicates the network status (yes/no). • Det (ERR): indicates the Fieldbus module (yes).

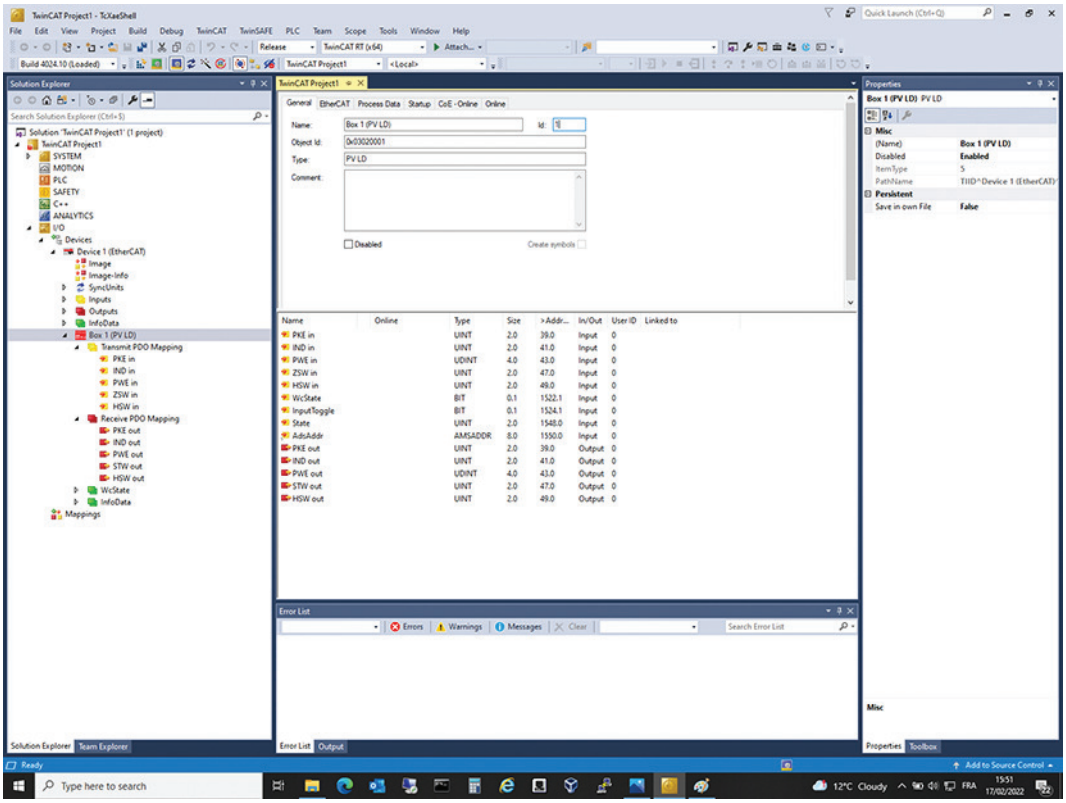
6.2.2 ESI file

This file must be used with the PLC software. It defines the functions of the leak detector using EtherCAT.

The EtherCAT file “ESI_PV_Leak_detector_v1.0.xml” is provided in the leak detector user manual (USB drive).

6.2.3 PLC configuration

► Configure all I/Os, as in the example below.



EtherCAT configuration example with Berckhoff TwinCat 3 software

6.3 Use

Use of Profibus, Profinet, EtherNet/IP and EtherCAT interfaces is identical.

- Reading data (from the leak detector to the PLC)
- Writing data (from PLC to leak detector)
- List of parameters
- Special format details
- ZSW status word (Input)
- STW command word (Output)
- Use examples

See chapter “Profibus” to consult these chapters.

7 37-pin inputs/outputs

On the Settings screen, press **[Advanced] [Input/Output] [I/O Connector]**.

7.1 Connection

NOTICE

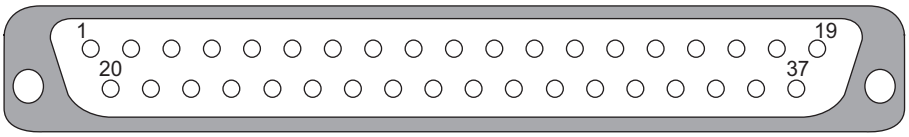
Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

► Use shielded cables and connections for the interfaces in interference-prone environments.

7.1.1 Features of the 37-pin I/O cable

► Use a cable (not included) that meets I/O cable standards.
  – 37-pin male D-Sub connector and its cover supplied with the leak detector
  – Cable not supplied - must be purchased by the customer.



37-pin male D-Sub I/O cable connector

I/O		Pin	Function
Input	Digital	11 - 12 - 13 - 30 - 31 - 32	According to setting
	Accessory	34 - 35 - 15 - 16	Reserved
Output	Digital	1 to 9 - 20 to 28	According to setting
	Analog	19 - 36 - 37	According to setting
		17 - 18	Ground
	Other	29	+24 VDC internal or external [1]
		10	Internal or external ground [1]
		33 - 14	Headset (8 Ω) [2]

1) Depending on the SW1 switch configuration

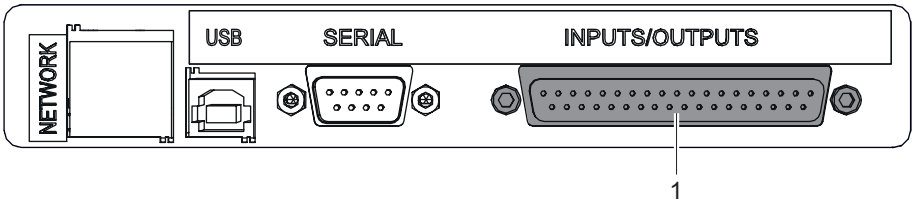
2) Activation/Deactivation of the audio/headset output (see below)

Activation/Deactivation of the audio/headset output

1. Speaker activation: send the RS-232 command "=HPE" to the detector.
2. Speaker deactivation: send the RS-232 command "=HPD" to the detector.

7.1.2 37-pin I/O connection interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



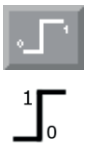
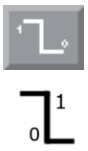
1 37-pin female D-Sub I/O communication interface connector

7.2 Setting

Depending on the leak detector model, some functions are not available.

The functions available depend on the leak detector model.

7.2.1 Types of contact: activation mode

Activation mode	Pictogram		Description
0 > 1 / NO			• Normally open (output not switched when inoperative) • Activation on rising edge (closing) • Deactivation on falling edge (opening) • This mode of activation is generally recommended.
1 > 0 / NC			• Normally closed (output switched when inoperative) • Activation on falling edge (opening) • Deactivation on rising edge (closing) • This activation mode is recommended for a function which must be enabled in positive safety.
Impulsion			• Activation/Deactivation by pulse • This activation mode is recommended for starting/stopping a test by a user, an external pushbutton or a test pedal.

7.2.2 Selection of the default configuration (Select Default Config.)

► On the Settings screen, press **[Advanced] [Input/Output] [I/O Connector] [Select default config.]**.

This is the default I/O configuration when the detector is delivered. It is specific to a leak detector model.

Detector ASM 340							
Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	Bypass	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	Detector ready	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	Filament #2	**0 > 1 / NO**
Digital Input	11-gnd	Inlet Vent	**0 > 1 / NO**		6-25	Warning/ Error	**0 > 1 / NO**
	30-gnd	Zero	**0 > 1 / NO**	Digital Relay Output	5-24	GL test	**0 > 1 / NO**
	12-gnd	Calibration	**Impulsion**		4-23	N test	**0 > 1 / NO**
	31-gnd	Filament	**0 > 1 / NO**		3-22	Filament on	**0 > 1 / NO**
	13-gnd	HV Test	**0 > 1 / NO**		2-21	Reject point	**0 > 1 / NO**
	32-gnd	By-pass option	**0 > 1 / NO**		1-20	HV Test	**0 > 1 / NO**

Detector ASM 390/392							
Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	Filament on	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	Warning/ Error	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	Detector ready	**0 > 1 / NO**
Digital Input	11-gnd	Calibration	**Impulsion**		6-25	Filament #2	**0 > 1 / NO**
	30-gnd	Sniffer test	**0 > 1 / NO**	Digital Relay Output	5-24	Sniffer Test	**0 > 1 / NO**
	12-gnd	Filament	**0 > 1 / NO**		4-23	GL Test	**0 > 1 / NO**
	31-gnd	GL Mode	**0 > 1 / NO**		3-22	HS Test	**0 > 1 / NO**
	13-gnd	HV Test	**Impulsion**		2-21	HV Test	**0 > 1 / NO**
	32-gnd	Inlet Vent	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

Detector ASM 390/392							
Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	-None-	**0 > 1 / NO**
	36-gnd	Exponent	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	-	-		7-26	-None-	**0 > 1 / NO**
Digital Input	11-gnd	Sniffer test	**0 > 1 / NO**		6-25	-None-	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Sniffer method	**0 > 1 / NO**
	12-gnd	Zero	**0 > 1 / NO**		4-23	Sniffer test	**0 > 1 / NO**
	31-gnd	-None-	**0 > 1 / NO**		3-22	Warning/ Error	**0 > 1 / NO**
	13-gnd	-None-	**0 > 1 / NO**		2-21	Calibration	**0 > 1 / NO**
	32-gnd	-None-	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

Detector ASI 35							
Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	Detector Ready	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	Reject point	**1 > 0 / NC**
	19-gnd	Exponent	-		7-26	Calibration fail	**0 > 1 / NO**
Digital Input	11-gnd	Memo	**0 > 1 / NO**		6-25	Detector Busy	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Press s. pt #1	**0 > 1 / NO**
	12-gnd	Dynamic Cal.	**0 > 1 / NO**		4-23	Set point #4	**1 > 0 / NC**
	31-gnd	Sniffer Test	**0 > 1 / NO**		3-22	Set point #3	**1 > 0 / NC**
	13-gnd	Zero	**0 > 1 / NO**		2-21	Set point #5	**1 > 0 / NC**
	32-gnd	HV Test	**0 > 1 / NO**		1-20	General Failure	**1 > 0 / NC**

7.2.3 Other Configurations (Other Configurations)

1. On the Settings screen, press **[Advanced] [Input/Output] [I/O Connector] [Other configurations] [xxx configuration]**.
2. Select the predefined configuration to use.

Each I/O can be parameterized as needed. 3 predefined configurations are available.

3 predefined configurations - ASM 340 detector

- ASM 142 configuration
  Requires the use of an ASM 142 I/O cable (see chapter "Spare parts - ASM 340")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	-None-	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	-None-	**0 > 1 / NO**
Digital input	11-gnd	HV Test	**0 > 1 / NO**		6-25	-None-	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Sniffer Test	**0 > 1 / NO**
	12-gnd	Zero	**0 > 1 / NO**		4-23	Test mode ok	**1 > 0 / NC**
	31-gnd	Inlet Vent	**0 > 1 / NO**		3-22	Warning/ Error	**0 > 1 / NO**
	13-gnd	-None-	**0 > 1 / NO**		2-21	HV Test	**0 > 1 / NO**
	32-gnd	-None-	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

- ASM 182 configuration
  Requires the use of an ASM 182 I/O cable (see chapter "Spare parts - ASM 340")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	Filament on	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	-None-	**0 > 1 / NO**
Digital input	11-gnd	Calibration	**Impulsion**		6-25	-None-	**0 > 1 / NO**
	30-gnd	HV Test	**Impulsion**	Digital Relay Output	5-24	Sniffer Test	**0 > 1 / NO**
	12-gnd	Filament	**0 > 1 / NO**		4-23	GL Test	**0 > 1 / NO**
	31-gnd	GL Mode	**0 > 1 / NO**		3-22	HS Test	**0 > 1 / NO**
	13-gnd	Sniffer test	**0 > 1 / NO**		2-21	HV Test	**0 > 1 / NO**
	32-gnd	Inlet Vent	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

- HLT 5xx configuration (HLT 2xx compatible)
  Requires the use of an HLT I/O cable (see chapter "Spare parts - ASM 340")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	HLT Stand-By	**0 > 1 / NO**
	36-gnd	Exponent	-		8-27	Test	**0 > 1 / NO**
	19-gnd	-None-	-		7-26	Reject point	**0 > 1 / NO**
Digital input	11-gnd	HV Test	**Impulsion**		6-25	Warning/ Error	**0 > 1 / NO**
	30-gnd	Inlet Vent	**Impulsion**	Digital Relay Output	5-24	Calib. Ack.	**0 > 1 / NO**
	12-gnd	Zero	**Impulsion**		4-23	Bypass	**0 > 1 / NO**
	31-gnd	HLT Calib.	**Impulsion**		3-22	Reject point	**1 > 0 / NC**
	13-gnd	-None-	**0 > 1 / NO**		2-21	-None-	**0 > 1 / NO**
	32-gnd	Bypass option	**0 > 1 / NO**		1-20	-None-	**0 > 1 / NO**

3 predefined configurations - ASM 390/392 detector

- ASM 142 configuration
  Requires the use of an ASM 142 I/O cable (see chapter "Spare parts - ASM 390/392")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	-None-	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	-None-	**0 > 1 / NO**
Digital input	11-gnd	HV Test	**0 > 1 / NO**		6-25	-None-	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Sniffer Test	**0 > 1 / NO**
	12-gnd	Zero	**0 > 1 / NO**		4-23	Test mode ok	**1 > 0 / NC**
	31-gnd	Inlet Vent	**0 > 1 / NO**		3-22	Warning/ Error	**0 > 1 / NO**
	13-gnd	-None-	**0 > 1 / NO**		2-21	HV Test	**0 > 1 / NO**
	32-gnd	-None-	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

- ASM 182 configuration
  Requires the use of an ASM 182 I/O cable (see chapter "Spare parts - ASM 390/392")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	Filament on	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	-None-	**0 > 1 / NO**
Digital input	11-gnd	Calibration	**Impulsion**		6-25	-None-	**0 > 1 / NO**
	30-gnd	HV Test	**Impulsion**	Digital Relay Output	5-24	Sniffer Test	**0 > 1 / NO**
	12-gnd	Filament	**0 > 1 / NO**		4-23	GL Test	**0 > 1 / NO**
	31-gnd	GL Mode	**0 > 1 / NO**		3-22	HS Test	**0 > 1 / NO**
	13-gnd	Sniffer test	**0 > 1 / NO**		2-21	HV Test	**0 > 1 / NO**
	32-gnd	Inlet Vent	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

- HLT 5xx configuration (HLT 2xx compatible)
  Requires the use of an HLT I/O cable (see chapter "Spare parts - ASM 390/392")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	HLT Stand-By	**0 > 1 / NO**
	36-gnd	Exponent	-		8-27	Test	**0 > 1 / NO**
	19-gnd	-None-	-		7-26	Set point	**0 > 1 / NO**
Digital input	11-gnd	HV Test	**Impulsion**		6-25	Warning/ Error	**0 > 1 / NO**
	30-gnd	Inlet Vent	**Impulsion**	Digital Relay Output	5-24	Calib. Ack.	**0 > 1 / NO**
	12-gnd	Zero	**Impulsion**		4-23	Bypass	**0 > 1 / NO**
	31-gnd	HLT Calib.	**Impulsion**		3-22	Reject point	**1 > 0 / NC**
	13-gnd	-None-	**0 > 1 / NO**		2-21	-None-	**0 > 1 / NO**
	32-gnd	Bypass option	**0 > 1 / NO**		1-20	-None-	**0 > 1 / NO**

3 predefined configurations - ASM 306S detector

- ASM 142S configuration

  Requires the use of an ASM 142 I/O cable (see chapter "Spare parts - ASM 306S")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	-None-	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	-None-	**0 > 1 / NO**
Digital input	11-gnd	Sniffer test	**0 > 1 / NO**		6-25	-None-	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Sniffer method	**0 > 1 / NO**
	12-gnd	Zero	**0 > 1 / NO**		4-23	Sniffer test	**0 > 1 / NO**
	31-gnd	-None-	**0 > 1 / NO**		3-22	Warning/ Error	**0 > 1 / NO**
	13-gnd	-None-	**0 > 1 / NO**		2-21	Calibration	**0 > 1 / NO**
	32-gnd	-None-	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

- ASM 340 configuration

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	-None-	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	Detector ready	**0 > 1 / NO**
	19-gnd	Exponent	-		7-26	Filament #2	**0 > 1 / NO**
Digital input	11-gnd	-None-	**0 > 1 / NO**		6-25	Warning/ Error	**0 > 1 / NO**
	30-gnd	Zero	**0 > 1 / NO**	Digital Relay Output	5-24	-None-	**0 > 1 / NO**
	12-gnd	Calibration	**Impulsion**		4-23	-None-	**0 > 1 / NO**
	31-gnd	Filament	**0 > 1 / NO**		3-22	Filament on	**0 > 1 / NO**
	13-gnd	-None-	**0 > 1 / NO**		2-21	Reject point	**0 > 1 / NO**
	32-gnd	-None-	**0 > 1 / NO**		1-20	-None-	**0 > 1 / NO**

- ASM 142 configuration

  Requires the use of an ASM 142 I/O cable (see chapter "Spare parts - ASM 306S")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	-None-	**0 > 1 / NO**
	36-gnd	Exponent	-		8-27	-None-	**0 > 1 / NO**
	19-gnd	-None-	-		7-26	-None-	**0 > 1 / NO**
Digital input	11-gnd	-None-	**0 > 1 / NO**		6-25	-None-	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Sniffer test	**0 > 1 / NO**
	12-gnd	Zero	**0 > 1 / NO**		4-23	Test mode ok	**1 > 0 / NC**
	31-gnd	-None-	**0 > 1 / NO**		3-22	Warning/ Error	**0 > 1 / NO**
	13-gnd	-None-	**0 > 1 / NO**		2-21	-None-	**0 > 1 / NO**
	32-gnd	-None-	**0 > 1 / NO**		1-20	Reject point	**0 > 1 / NO**

3 predefined configurations - ASI 35 detector

- ASI 20 MD configuration

  Requires the use of an ASI 20 MD I/O module (see chapter "Spare parts - ASI 35")

Analog output	37-gnd	Mantissa	-	Digital Transistor Output	9-28	Detector Ready	**0 > 1 / NO**
	36-gnd	Logarithmic	-		8-27	Reject point	**1 > 0 / NC**
	19-gnd	Exponent	-		7-26	Calibration fail	**0 > 1 / NO**
Digital input	11-gnd	Memo	**0 > 1 / NO**		6-25	Detector Busy	**0 > 1 / NO**
	30-gnd	Calibration	**Impulsion**	Digital Relay Output	5-24	Press s. pt #1	**0 > 1 / NO**
	12-gnd	Dynamic Cal.	**0 > 1 / NO**		4-23	Set point #4	**1 > 0 / NC**
	31-gnd	Sniffer test	**0 > 1 / NO**		3-22	Set point #3	**1 > 0 / NC**
	13-gnd	Zero	**0 > 1 / NO**		2-21	Set point #5	**1 > 0 / NC**
	32-gnd	HV Test	**0 > 1 / NO**		1-20	General Failure	**1 > 0 / NC**

- Configuration 2xx

  Requires the use of a 2xxx I/O module (see chapter "Spare parts - ASI 35")

Analog output	37-gnd	Mantissa	-	Digital input	9-gnd	Clear	**0 > 1 / NO**
	36-gnd	Expo. 0.5 V/dec	-	Digital Transistor Output	8-27	Set point	**1 > 0 / NC**
	19-gnd	-None-	-		7-26	Set point #2	**1 > 0 / NC**
Digital input	11-gnd	-None-	**0 > 1 / NO**		6-25	Set point #3	**1 > 0 / NC**
	30-gnd	Sniff./Vac.	**0 > 1 / NO**	Digital Relay Output	5-24	Set point #4	**1 > 0 / NC**
	12-gnd	Start/Stop	**1 > 0 / NC**		4-23	Detector Ready	**0 > 1 / NO**
	31-gnd	Zero	**0 > 1 / NO**		3-22	Warning/ Error	**1 > 0 / NC**
	13-gnd	External Cal.	**0 > 1 / NO**		2-21	Calib. Ack.	**1 > 0 / NC**
	32-gnd	Internal Cal.	**0 > 1 / NO**		1-20	-None-	**0 > 1 / NO**

- 3xx configuration

  Requires the use of a 3xxx I/O module (see chapter "Spare parts - ASI 35")

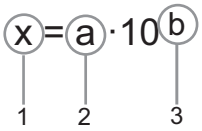
Analog output	37-gnd	Mantissa	-	Digital input	9-gnd	Clear	**0 > 1 / NO**
	36-gnd	Expo. 0.5 V/dec	-	Digital Transistor Output	8-27	Set point	**1 > 0 / NC**
	19-gnd	-None-	-		7-26	Set point #2	**1 > 0 / NC**
Digital input	11-gnd	-None-	**0 > 1 / NO**		6-25	Set point #3	**1 > 0 / NC**
	30-gnd	Sniff./Vac.	**0 > 1 / NO**	Digital Relay Output	5-24	Set point #4	**1 > 0 / NC**
	12-gnd	Start/Stop	**1 > 0 / NC**		4-23	Detector ready	**0 > 1 / NO**
	31-gnd	Zero	**0 > 1 / NO**		3-22	Warning/ Error	**1 > 0 / NC**
	13-gnd	External Cal.	**0 > 1 / NO**		2-21	Calib. Ack.	**1 > 0 / NC**
	32-gnd	Internal Cal.	**0 > 1 / NO**		1-20	-None-	**0 > 1 / NO**

7.3 Use

7.3.1 Analog Output

Quantity	Pin
3	37-gnd 36-gnd 19-gnd

Leak rate writing



1 Leak Rate
2 Mantissa
3 Exponent

Setting

Pin	Action
37-gnd	1. Select the value to be allocated. [1)] 2. Depending on the value, set the low decade. [2)]
36-gnd	1. Select the value to be allocated. [1)] 2. Depending on the value, set the low decade. [2)]
19-gnd	Output always allocated to the “Exponent” value. 1. Set the exponent.

1) See table below
2) The low decade is the decade corresponding to 0 V.

Value	Function
Mantissa	1–10 V [1)]
Exponent	1–10 V [1)]
Logarithmic	1–10 V [1)]
Inlet pressure	See details below
He compound	0–10 V (compound exponent, mantissa) [1)]
Ext. pressure	External pressure gauge 0-10 V Formula: see the connected gauge operating instructions

1) See chapter “Formulas”

'Inlet pressure' analogic output detail

Connected gauge(s)	Detector	Control of the detector
None	ASM 306S	No gauge for control of the detector Inlet pressure = 1000 hPa = 8.5 V
Internal gauge	ASM 340 [1] ASM 390 [1] ASM 392 [1] ASI 35 [2]	Control of the detector with the detector internal gauge ● Range: 2.5–8.5 V (10^{-3} – 10^{+3} hPa) ● Formula [4] Setting: see below depending on the detector **ASM 340/390/392** No Setting **ASI 35** From the "Settings" screen, press **[Advanced] [Leak Detection] [Detector pressure gauge]**. ● Pirani gauge connected — Gauge = "TPR/PCR" ● Linear gauge connected — Gauge = 'Linear' — Max scale: to be set
Internal gauge + External gauge	ASM 340 [1] [3] ASM 390 [1] [3] ASM 392 [1] [3] ASI 35 [2] [3]	Control of the detector with the detector internal gauge ● Range: 2.5–8.5 V (10^{-3} – 10^{+3} hPa) ● Formula [4] Setting: From the "Settings" screen, press **[Advanced] [Leak Detection] [External gauge]**. ● Pump inlet source pressure = 'Internal'
		Control of the detector with an external gauge (at the customer's expense) ● Range: 0–10 V ● Formula: see the connected gauge operating instructions Setting: From the "Settings" screen, press **[Advanced] [Leak Detection] [External gauge]**. ● Pirani gauge connected — Gauge = "TPR/PCR" — Pump inlet source pressure = 'External' ● Linear gauge connected — Gauge = 'Linear' — Pump inlet source pressure = 'External' — Max scale: to be set
External gauge	ASI 35 [3]	Control of the detector with an external gauge (at the customer's expense) ● Range: 0–10 V ● Formula: see the connected gauge operating instructions Setting: From the "Settings" screen, press **[Advanced] [Leak Detection] [External gauge]**. ● Pirani gauge connected — Gauge = "TPR/PCR" — Pump inlet source pressure = 'External' ● Linear gauge connected — Gauge = 'Linear' — Pump inlet source pressure = 'External' — Max scale: to be set

1) Internal gauge PI1/PI3

2) Gauge at the customer's expense: see chapter "Leak detection: Detector pressure gauge" of the leak detector operating instructions

3) Gauge at the customer's expense: see chapter "Leak detection: External gauge" for the leak detector operating instructions

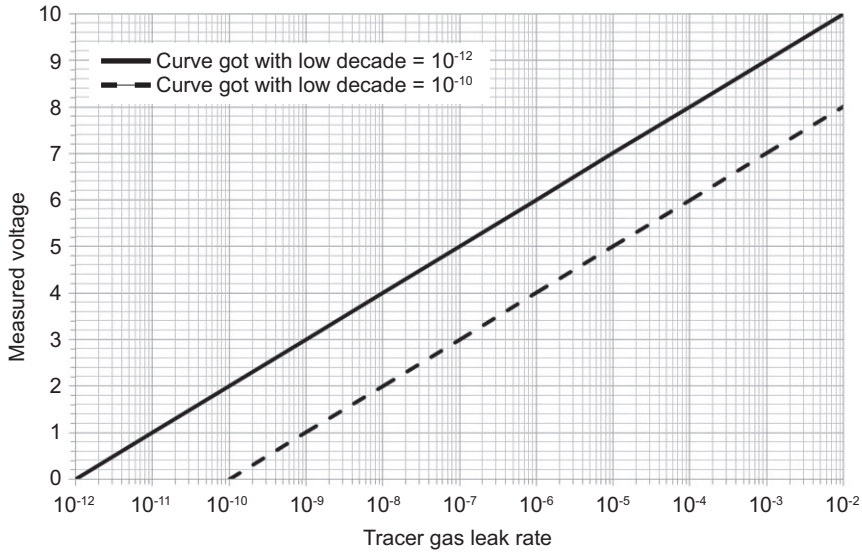
4) See chapter "Formulas"

7.3.2 Formulas

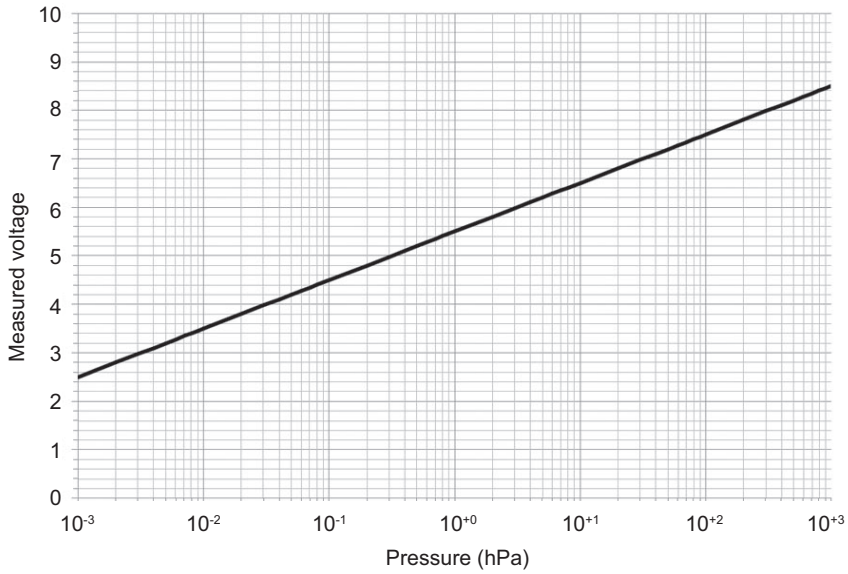
Mantissa (1–10 V)	
The “Mantissa” output corresponds to the leak rate mantissa.	
Formula	**Mantissa = U** U = Voltage measured (V) on analog output
Examples	• U = 3.5 V -> Mantissa = 3.5 • U = 6.9 V -> Mantissa = 6.9

Exponent (0–10 V)	
The “Exponent” output corresponds with the leak rate exponent. • The exponent changes by 1 V per decade. • The starting decade corresponds with 0 V.	
Formula	**Exponent = 10 - U + D_0** U = Voltage measured (V) on analog output D_0 = Low decade for 0 V
Examples	• Example 1 Low decade at 10^{-12} (10 V = -12) -> D_0 = -12 — U = 7 V -> Exponent = 10 - 7 - 12 -> Exponent = -9 — U = 2 V -> Exponent = 10 - 2 - 12 -> Exponent = -4 • Example 2 Low decade at 10^{-10} (10 V = -10) -> D_0 = -10 — U = 7 V -> Exponent = 10 - 7 - 10 -> Exponent = -7 — U = 2 V -> Exponent = 10 - 2 - 10 -> Exponent = -2

Logarithmic (0–10 V)	
The “Logarithmic” output corresponds to the leak rate value. • The leak rate changes by 1 V per decade. • The starting decade corresponds with 0 V.	
Formula	**Mantissa = $10^{(U\text{- Integer value (U)})}$** **Exponent = Integer value (U) + D_0** **Leak rate = Mantissa x $10^{Exponent}$** U = Voltage measured (V) on analog output D_0 = Low decade for 0 V

Logarithmic (0–10 V)	
Examples	• Example 1 Low decade at 10^{-12} (0 V = 1 · 10^{-12}) -> D_0 = -12 — U = 3.91 V -> Leak rate = $10^{(3.91 - 3)}$ x $10^{(3 - 12)}$ = 8.13 · 10^{-9} — U = 8.25 V -> Leak rate = $10^{(8.25 - 8)}$ x $10^{(8 - 12)}$ = 1.78 · 10^{-4} • Example 2 Low decade at 10^{-10} (0 V = 1 · 10^{-10}) -> D_0 = -10 — U = 3.91 V -> Leak rate = $10^{(3.91 - 3)}$ x $10^{(3 - 10)}$ = 8.13 · 10^{-7} — U = 8.25 V -> Leak rate = $10^{(8.25 - 8)}$ x $10^{(8 - 10)}$ = 1.78 · 10^{-2}
Graph	

Inlet pressure	
The "Inlet Pressure" output corresponds to the value of the inlet pressure. Source of inlet pressure measurement: • ASM 340/390/392: internal leak detector gauge • ASM 306S: no gauge • ASI 35: external gauge (at the customer's expense)	
Formula	**ASM 340/390/392 (2.5–8.5 V)** **Inlet pressure = 10 $^{(U- 5.5)}$ hPa** U = Voltage measured (V) on analog output
	ASI 35 (0–10 V) See the connected gauge operating instructions

Inlet pressure	
Graph	**ASM 340/390/392 (2.5–8.5 V)**  **ASI 35 (0–10 V)** See the connected gauge operating instructions

He Compound (0–10 V)	
The “He Compound” output is a combination of the mantissa and the exponent. ● The integer part represents the exponent. ● The decimal part represents the mantissa.	
Formula	**Mantissa = 10 x (U - Integer value (U))** **Exponent = Integer value (U) - 12** **He Compound = Mantissa x $10^{Exponent}$** U = Voltage measured (V) on analog output
Examples	● U = 3.91 V -> He Compound = 10 x (3.91 - 3) x $10^{(3 - 12)}$ = 9.10 · 10^{-9} ● U = 8.25 V -> He Compound = 10 x (8.25 - 8) x $10^{(8 - 12)}$ = 2.50 · 10^{-4}

7.3.3 Digital input

Type	Quantity	Pins
Optocoupled	6	11-gnd 30-gnd 12-gnd 31-gnd 13-gnd 32-gnd

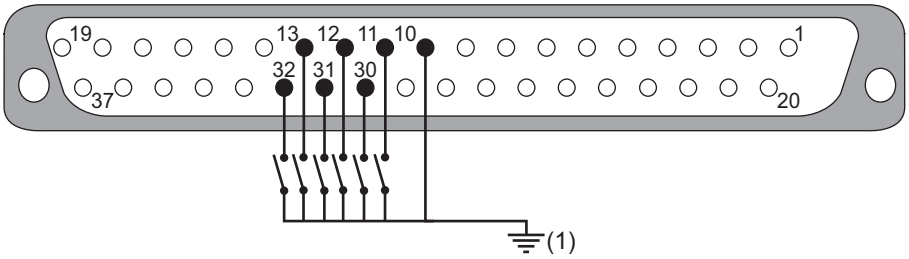
Setting

Pins	Description
xx-gnd	1. Select the value to be allocated. [1)] 2. Select the activation mode. [1)]
1) See table below	

Value [1)]	Function
None	-
HV test	Start/Stop a hard vacuum test
1) Depending on the leak detector model, some values are not available.	

Value [1]	Function
Calibration	Start an automatic calibration
Zero	Activate/Deactivate Zero function
He memo	Activate/Deactivate Memo function
Dynamic cal.	Start a dynamic calibration
Sniffing test	Start/Stop a sniffing test
Filament	Force filament on/off
GL mode	Force detector in Gross Leak test mode
NR mode	Force detector in Normal test mode
HS mode	Force detector in High Sensitivity test mode
Inlet vent	Open/Close the inlet vent valve
Rec. Graph	Start/Stop data recording
Save Graph	Save recorded data to an SD card
Bypass option	Activate/Deactivate Bypass (accessory)
HLT Calib	Calibrate for HLT 5xx/HLT 2xx compatibility
Check Cal	Start a calibration check
Internal Cal	Start an internal calibration
External Cal	Start an external calibration
Machine Cal	Start a machine calibration
Clear	Reset warning and error messages
Sniff./Vac.	Select test method
Start/Stop	Start/Stop a test (hard vacuum or sniffing)
1) Depending on the leak detector model, some values are not available.	

Leak detector 37-pin female D-Sub I/O connector



1 Internal ground and +24 VDC: switch SW1 = ON
External ground and +24 VDC: switch SW1 = OFF

Examples

The examples given below illustrate 3 standard uses of digital inputs for which we recommend setting the 24 VDC and the activation mode described in the example.

The 24 VDC and the activation modes can be set by the user.

Type	24 VDC	Diagram	Mode	Logical status
Push button	Internal	29 + 24 VDC 10 Gnd 11 HV Test		Test Push button (O: opened, C: closed)
Switch	Internal	29 + 24 VDC 10 Gnd 11 HV Test		Test Switch (O: opened, C: closed)
				Test Switch (O: opened, C: closed)
External contol device	External	+ 24 VDC 29 Gnd 10 Gnd ext External control device 11 HV Test		Test External control device 11 +24VDC Gnd
				Test External control device 11 +24VDC Gnd

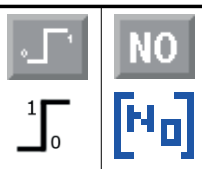
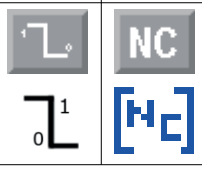
7.3.4 Digital outputs (Digital Output)

Type		Quantity	Pins	Detail
MOSFET transistor		4	6-25 7-26 8-27 9-28	See chapter ”Digital transistor outputs (Digital Transistor Output)”
Relay	DS-P relay	2	1-20 2-21	See chapter ”DS-P Digital relay outputs (Digital Relay Output)”
	TX relay	3	3-22 4-23 5-24	See chapter ”TX Digital relay outputs (Digital Relay Output)”

Setting

Pin	Description
x-xx	1. Select the value to be assigned. 1) 2. Select the activation mode. 1)

1) See table below

Activation mode	Pictogram	Description
0 > 1 / NO		• Normally open (output not switched when inoperative) • Activation on rising edge (closing) • Deactivation on falling edge (opening) • This mode of activation is generally recommended.
1 > 0 / NC		• Normally closed (output switched when inoperative) • Activation on falling edge (opening) • Deactivation on rising edge (closing) • This activation mode is recommended for a function which must be enabled in positive safety.

Value [4]	Function	Setting	
		0 > 1 / NO Mode enabled	**1 > 0 / NC Mode enabled**
None	Not assigned	-	-
Stand-by	Detector in 'Standby' mode	C	O
HLT Stand-by	Detector in 'Standby' mode awaiting calibration acknowledgment for HLT compatibility	C	O
Test	Detector in test mode	C	O
Temp limit	Detector close to the max. use temperature	C	O
Reject point	Detector reject threshold [1]	C	O
Set point #2	Leak rate No. 2 threshold [1]	C	O
Set point #3	Leak rate No. 3 threshold [1]	C	O
Set point #4	Leak rate No. 4 threshold [1]	C	O
Set point #5	Leak rate No. 5 threshold [1]	C	O
Warning/Error	Warning message displayed	C	O
HV Test	Detector in hard vacuum test mode	C	O
Sniffer test	Detector in sniffer test mode	C	O
Detector ready	Detector ready to perform a test	C	O
Calibration fail	Calibration failure	C	O
Detector busy	Detector starting up, testing or calibrating	C	O
Filament #2 on	Filament #2 selected	C	O
TMP synchro	Secondary vacuum pump is at synchronism	C	O
Filament on	Selected filament on	C	O
Snif. Clogged	Sniffer probe clogged	C	O
Press s. pt #1	Threshold on pressure no. 1 [2] [3]	O	C
Press s. pt #2	Threshold on pressure no. 2 [2] [3]	O	C
Press s. pt #3	Threshold on pressure no. 3 [2] [3]	O	C
HV Cor	Corrected hard vacuum leak rate	C	O
Maint. Required	Maintenance required	C	O
Sniffer valve	Sniffer valve command	C	O
GL test	Detector in Gross Leak test mode	C	O
N test	Detector in Normal test mode	C	O
HS test	Detector in High Sensitivity test mode	C	O
General failure	Detector in critical failure	C	O
Test mode ok	Target test mode reached	C	O

O = Open - C = Closed

1) Measured leak rate > reject threshold/leak value set.

2) Measured pressure ≤ pressure threshold set.

3) Does not apply to ASI 35 unless the pressure gauge is installed at the customer's facility.

4) Depending on the leak detector model, some values are not available.

Value [4]	Function	Setting	
		0 > 1 / NO Mode enabled	1 > 0 / NC Mode enabled
Zero	Zero function enabled	C	O
Bypass	Bypass valve opening command	C	O
Calib. ack.	Request for validation of a calibration step	C	O
Roughing valve	Switch to roughing mode	O	C

O = Open - C = Closed

1) Measured leak rate > reject threshold/leak value set.

2) Measured pressure ≤ pressure threshold set.

3) Does not apply to ASI 35 unless the pressure gauge is installed at the customer's facility.

4) Depending on the leak detector model, some values are not available.

7.3.5 Digital transistor outputs (Digital Transistor Output)

Characteristics

- DC digital outputs: MOSFET transistor
- Quantity: 4 (6-25; 7-26; 8-27; 9-28 pins)
- Functions: according to the user setting
- Open collector
- Direct current: 30 V DC - 1 A max - 30 W

NOTICE

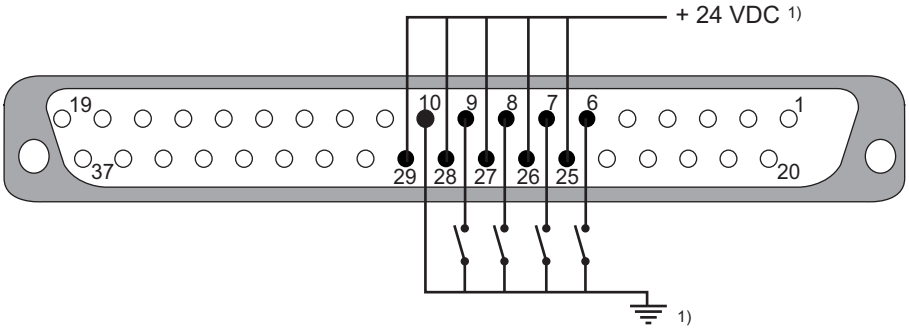
Safety of very low voltage circuits

The remote control circuits are equipped with dry contact outputs. Any overvoltage or overcurrent can cause internal electrical damage. The user must adhere to the following wiring conditions:

► Connect these outputs in accordance with the rules and protection of safety extra low voltage (SELV).

► Supply these contacts with a voltage lower than 30 V DC and a current lower than 1 A max

Diagram



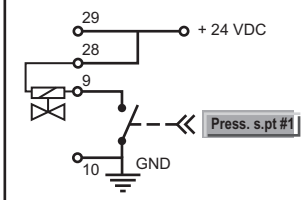
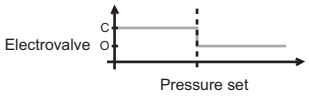
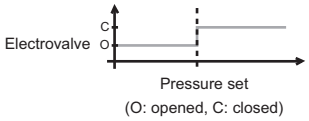
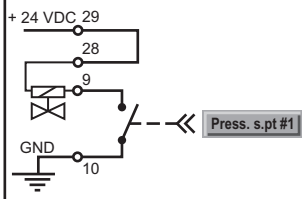
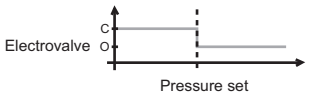
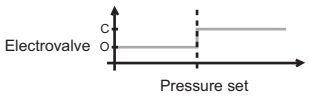
Leak detector 37-pin female D-Sub I/O connector

1 Internal ground and +24 V DC: switch SW1 = ON
External ground and +24 V DC: switch SW1 = OFF

- The supply of an external 24 V DC (±10%) power supply is essential to benefit from the opto-coupling barrier (noise environment) and/or to supply the 4 transistor digital outputs. In this case, switch SW1 on the supervisor board must be in the OFF position to avoid any damage to the detector.
- For occasional use, it is possible to use the detector's internal 24 V DC if the overall current on outputs 25 to 28 is less than 2 A.

These outputs can be used to power a solenoid valve (24 V DC – 24 W max).

For example:
The example given below represents a typical use of digital outputs.

Type	24 VDC	Diagram	Mode	Logical status
Electrovalve	Internal		NO	
	ON SW1		NC	
	External		NO	
	OFF SW1		NC	

7.3.6 DS-P Digital relay outputs (Digital Relay Output)

Characteristics

- DC/AC digital outputs: DS-P relay
- Quantity: 2 (1-20; 2-21 pins)
- Functions: according to the user setting
- Dry contact
- Direct current: 60 V DC - 2.5 A max; 30 V DC - 5 A max
- Alternating current: 60 V AC - 5 A max

NOTICE

Safety of very low voltage circuits

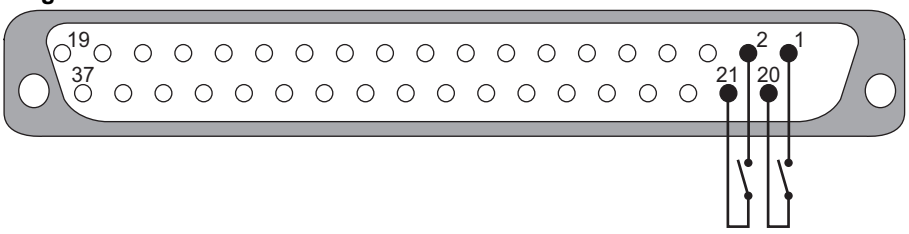
The remote control circuits are equipped with dry contact outputs. Any overvoltage or overcurrent can cause internal electrical damage. The user must adhere to the following wiring conditions:

► Connect these outputs in accordance with the rules and protection of safety extra low voltage (SELV).

► Supply these contacts with one of the voltages indicated below:

- voltage less than 60 V DC and current less than 2.5 A max
- voltage less than 30 V DC and current less than 5 A max

Diagram



Leak detector 37-pin female D-Sub I/O connector

7.3.7 TX Digital relay outputs (Digital Relay Output)

Characteristics

- DC digital outputs: TX relay
- Quantity: 3 (3-22; 4-23; 5-24 pins)
- Functions: according to the user setting

- Dry contact
- Direct current: 60 V DC - 1 A max; 30 V DC - 2 A max

NOTICE

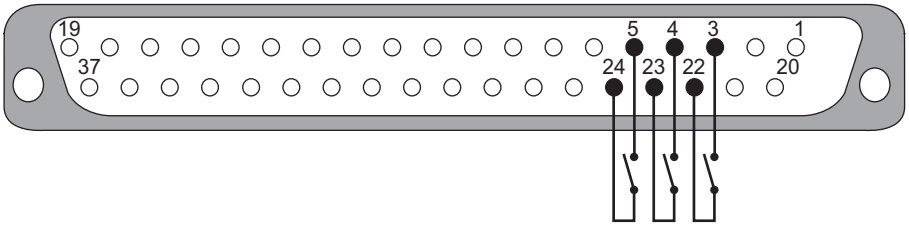
Safety of very low voltage circuits

The remote control circuits are equipped with dry contact outputs. Any overvoltage or overcurrent can cause internal electrical damage. The user must adhere to the following wiring conditions:

► Connect these outputs in accordance with the rules and protection of safety extra low voltage (SELV).

► Supply these contacts with one of the voltages indicated below:
- voltage less than 60 V DC and current less than 1 A max
- voltage less than 30 V DC and current less than 2 A max

Diagram

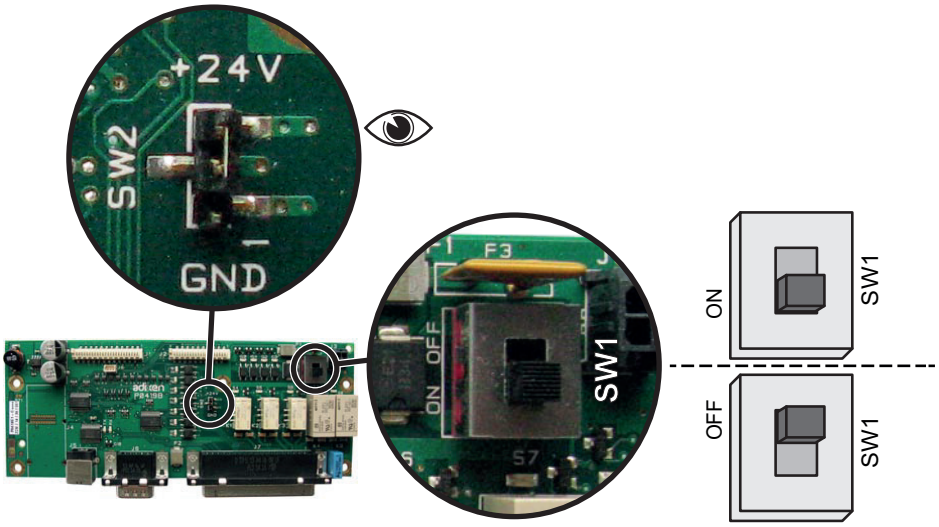


Leak detector 37-pin female D-Sub I/O connector

For example:
The example given below represents a typical use of digital outputs.

Type	24 V	Diagram	Mode	Logical status
Light	Internal or External	5, 24 VDC, 24, Reject point	NO	Light 1/0, Reject point
			NC	Light 1/0, Reject point

7.3.8 Internal 24 VDC or external 24 VDC power supply

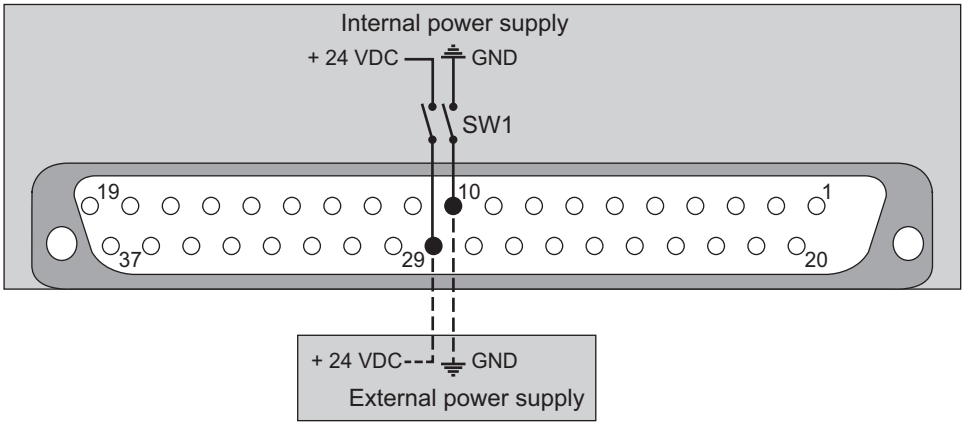


Localization of SW1 and SW2 switches on the I/O board (P0419)

The SW2 switch should always be set to 24 VDC.

► Configure the SW1 switch according to power supply type.

ON	Internal power supply Internal 24 VDC ± 10 % + internal ground
OFF	External power supply External 24 VDC ±10 % + external ground Configuration by default from factory

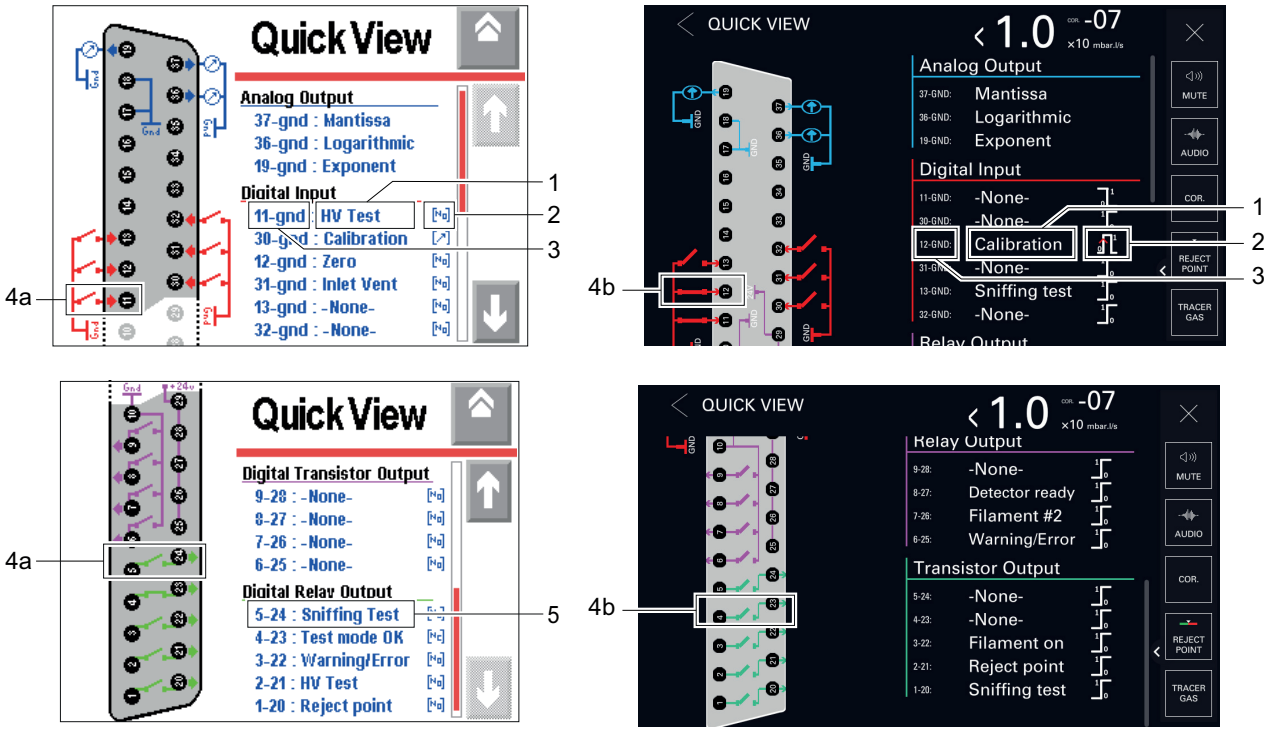


7.4 Quick View

► From the “Settings” screen, press **[Advanced] [Input/Output] [I/O Connector] [Quick View]**.

Quick view makes it possible to view, for each I/O:

- connection pins
- allocation (function, setting, order)
- status (allocation and contact)
- activation mode.



Quick View description (example)

1	Allocated value	4a	Contact dynamic status
2	Activation mode	4b	Initial status of contact
3	Connection pins	5	Status
			— blue display = inactive
			— green display = active

7.5 Save

Saving all of the configured I/O is automatically suggested when exiting the menu if a parameter has been modified.

► Enter the name of the file and validate the save (“.IOP” file).

7.6 Loading a configuration (Load Config from SD Card)

During loading, the user loads a file for an I/O configuration (values + activation modes) that has previously been saved on the SD card.

► From the “Settings” screen, press on **[Advanced] [Input/Output] [I/O Connector] [Load Config. from SD card]**.

8 USB

When the RS-232 serial link is already occupied by another use, the USB enables the detector to be controlled by RS commands by recreating a serial port, as if the RS-232 serial link were being used.

8.1 Connection

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

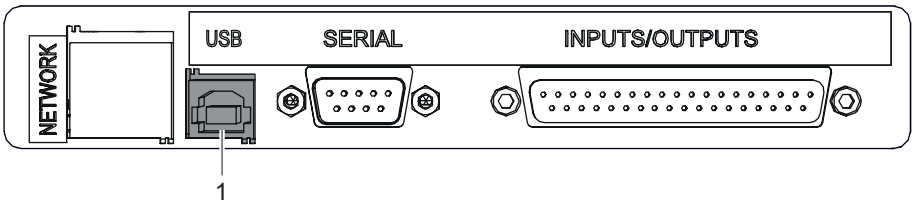
► Use shielded cables and connections for the interfaces in interference-prone environments.

8.1.1 Features of the USB cable

► Use a USB type A-B cable.
  – Cable not supplied - must be purchased by the customer.

8.1.2 USB connection interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 USB connector

8.2 Setting

8.2.1 Set the leak detector

Possible assignment of the 'USB' to serial link 1 or serial link 2.

On the Settings screen, press [Advanced] [Input/Output] [Serial link 1] or [Serial link 2].	
Type	USB
Settings	To be configured [1)]
1) See details below	

Settings

► On the Settings screen, press **[Advanced] [Input/Output]**then **[Serial link 1]** or **[Serial link 2]**, and then **[Parameters]**.

Mode [1)]	Description
Basic	Permanent data acquisition according to a defined sample A command can be sent to the detector at any time 5 V DC power supply available
Spreadsheet	Variation of Basic mode. Permanent data acquisition, formatted into a Microsoft® Office Excel spreadsheet or other equivalent software 5 V DC power supply available
Advanced	Full inspection of the detector by a supervisor The detector sends information at the supervisor's request 5 V DC power supply available **Recommended mode for automated systems**
Export Data	Export, via a PC, of tickets issued by the detector following: ● a calibration with an internal/external calibrated leak ● a calibration check with an internal calibrated leak ● a test 5 V DC power supply available **Serial 1 and 2 connections cannot both be in Export Data mode at the same time.**
HLT 5xx	Compatibility protocol with the HLT 5xx detector protocol Available only for ASM 340/ASI 35 5 V DC power supply available
HLT 2xx	Compatibility protocol with the HLT 2xx detector protocol Available only for ASM 340/ASI 35 5 V DC power supply available

1) Depending on the leak detector model, some modes are not available.

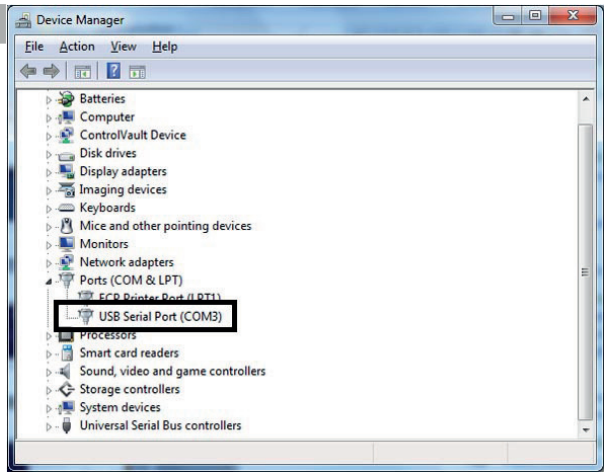
8.2.2 Driver installation

Screens are given as examples (Windows 7). They can vary depending on the computer system.

Do not connect the USB cable before driver installation.

1. Insert the USB stick supplied with the leak detector operating instructions into your player.
2. Install the 'Driver_FTDI_VPC' saved in the "Driver" folder on the USB stick.
3. Press **[Extract]** to launch driver installation.
   – Windows 8: Run program in compatibility mode for Windows 7.
4. Validate the different steps.
5. Press **[Finish]**.
6. Press **[Next]** to extract the driver.
7. Validate the different steps.
8. Press **[Finish]**.
9. Connect a cable between the detector USB port and your computer. As soon as the cable is connected, the USB module is detected.
10. To know which USB port is allocated, consult your computer device manager: Device Manager > Ports (COM & LPT).
    – In example **[A]**, the USB port is on COM 3. Use this COM port as an RS-232 serial link.

A


Device Manager
File Action View Help
Batteries
Computer
ControlVault Device
Disk drives
Display adapters
Imaging devices
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
USB Serial Port (COM3)
Processors
Smart card readers
Sound, video and game controllers
Storage controllers
System devices
Universal Serial Bus controllers

9 Ethernet

Available on any detector equipped with the Ethernet 37-pin I/O board.

Once the driver has been installed and configured, the user has a virtual RS-232 serial link enabling the leak detector to be controlled from a compatible computer.

The detector can be controlled using the RS-232 serial link commands (see chapter “RS-232 Serial link”).

9.1 Connection

NOTICE

Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

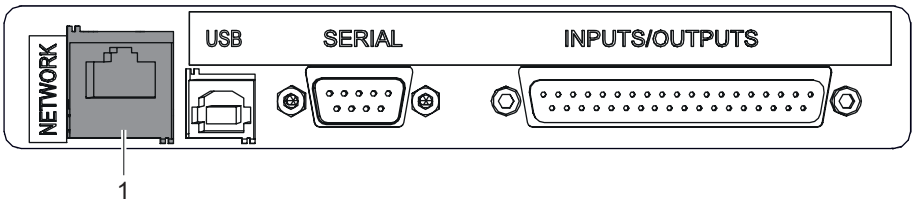
► Use shielded cables and connections for the interfaces in interference-prone environments.

9.1.1 Features of the Ethernet cable

► Use a cable to connect the detector Ethernet port and the computer.
  – Cable not supplied - must be purchased by the customer.
  – The Ethernet module is detected via the cable connection.

9.1.2 Ethernet connection interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 Ethernet connector

9.2 Setting

9.2.1 Set the leak detector

Possible assignment of the 'Ethernet' only to serial link 2.
No possible assignment of the 'Ethernet' to serial link 1.

On the Settings screen, press [Advanced] [Input/Output] [Serial link 2].	
Type	Ethernet
Settings	To be configured [1)]

1) See details below

Settings

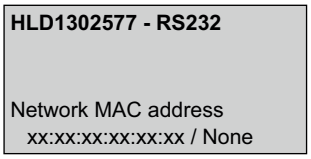
► On the Settings screen, press **[Advanced] [Input/Output] [Serial link 2] [Settings]**.

Mode [1)]	Description
Basic	Permanent data acquisition according to a defined sample A command can be sent to the detector at any time 5 V DC power supply available
Spreadsheet	Variation of Basic mode. Permanent data acquisition, formatted into a Microsoft® Office Excel spreadsheet or other equivalent software 5 V DC power supply available
Advanced	Full inspection of the detector by a supervisor The detector sends information at the supervisor's request 5 V DC power supply available **Recommended mode for automated systems**
Export Data	Export, via a PC, of tickets issued by the detector following: ● a calibration with an internal/external calibrated leak ● a calibration check with an internal calibrated leak ● a test 5 V DC power supply available **Serial 1 and 2 connections cannot both be in Export Data mode at the same time.**
HLT 5xx	Compatibility protocol with the HLT 5xx detector protocol Available only for ASM 340/ASI 35 5 V DC power supply available
HLT 2xx	Compatibility protocol with the HLT 2xx detector protocol Available only for ASM 340/ASI 35 5 V DC power supply available

1) Depending on the leak detector model, some modes are not available.

9.2.2 MAC address

The MAC address, which is required for the installation of the Ethernet module drivers, is available on the label attached to the detector or on the accessory.



Example MAC address label

9.2.3 Program and driver installation

Installation takes place in 4 steps:

- Step 1: program installation
- Step 2: change in the IP address of the Ethernet module
- Step 3: allocation of a serial port to the Ethernet module
- Step 4: visualization of the port created for the Ethernet module

Screens are given as examples (Windows). They can vary depending on the computer system.

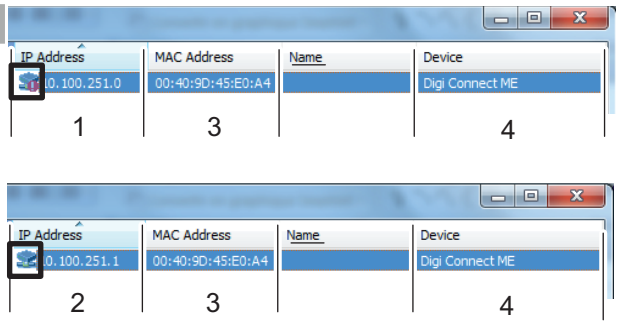
Step 1: program installation

1. Insert the USB stick supplied with the leak detector operating instructions into your player.
2. Install the "Device Discovery" program saved in the "Driver" folder on the USB stick.
3. Press **[Next]** to launch the program installation.
   – Windows 8: Run program in compatibility mode for Windows 7.
4. Validate the different steps.
5. Press **[Finish]**

Step 2: change in the IP address of the Ethernet module

1. Launch the “Digi Discovery” program: the Ethernet module is automatically detected.
   - The module is not automatically detected if the sub-network is not correctly configured.
   - The default address of the sub-network is 192.168.x.x.
     - Contact your network administrator for the IP addresses to be configured.
   - Display of the detected and non-detected Ethernet module: see example **[A]**.
2. If the Ethernet module is not automatically detected: press **[Refresh view]** to relaunch detection.
   - Display of the detected and non-detected Ethernet module: see example **[A]**.
3. Change the module IP address to be in the same sub-network as your computer.
4. Change and save the addresses: see example **[B]**.
   - Contact your network administrator for the IP addresses to be configured.
5. Press **[OK]** to relaunch the connection to the module and to finalize the IP address update.

A



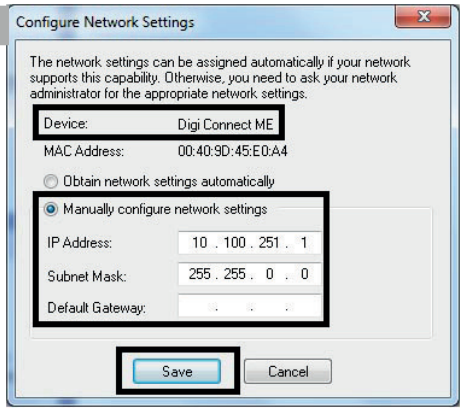
1 “Not properly configured” message displayed in the details.

2 Module detected: IP address correct (icon OK)

3 Module identification MAC address. The MAC address is unique and specific to each Ethernet module.
It is indicated on the module and the identification label sticked to the detector frame.
To select a detector from several detected, select the MAC address of the desired detector.

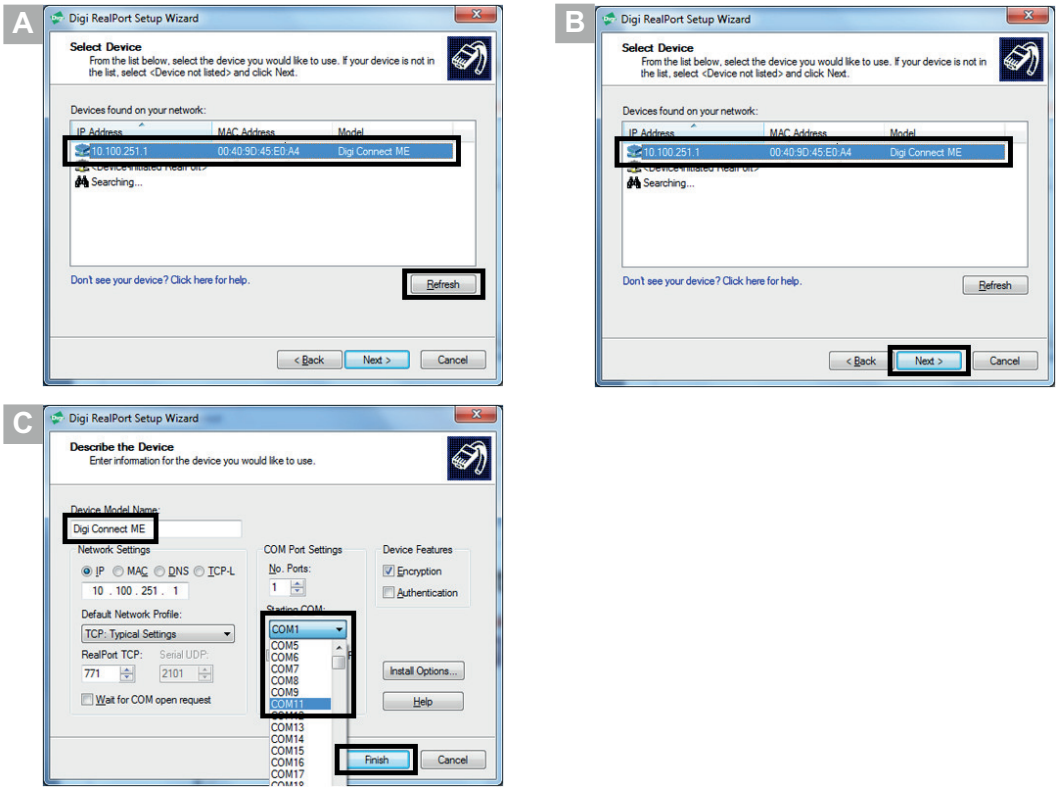
4 Type of module: “Digi Connect ME”

B



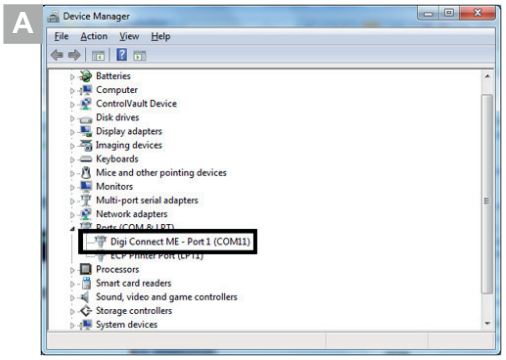
Step 3: allocation of a serial port to the Ethernet module

1. Install the "Digi Real Port" driver supplied in the "Driver" folder of the USB stick supplied with your leak detector operating instructions.
2. Validate the different steps.
3. Press **[Finish]**.
4. Launch the "Digit Real Port" driver: the Ethernet module is automatically detected.
5. If the Ethernet module is not automatically detected: press **[Refresh]** to relaunch detection (see **[A]**).
6. Select the Ethernet module to be allocated to a PC serial port: see example **[B]**.
7. Press **[Next]**.
8. Select the Ethernet module.
9. Select a serial port number from the list.
   – In example **[C]**, the Ethernet port is allocated to COM 11.
10. Press **[Finish]**.
    – The virtual port is created.



Step 4: visualization of the port created for the Ethernet module

- ► View the new port created in your device manager: Manager -> Ports (COM and LPT) (see example **[A]**).
- ► Use this COM port as an RS-232 serial link.



9.2.4 Uninstall

- ► Select the Ethernet module allocated to a PC serial port to be uninstalled.
- ► Press **[Uninstall]**.

10 15-pin inputs/outputs

On the Settings screen, press **[Advanced] [Input/Output] [I/O Connector]**.

10.1 Connection

NOTICE

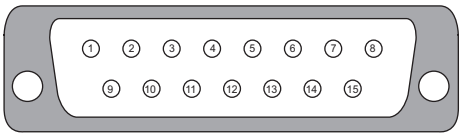
Risk of electromagnetic disturbance

Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

► Use shielded cables and connections for the interfaces in interference-prone environments.

10.1.1 Features of the 15-pin I/O cable

► Use a cable (not included) that meets I/O cable standards.
  – 15-pin male D-Sub connector for IP 20 and its cover supplied with the leak detector
  – Cable not supplied - must be purchased by the customer.



15-pin male D-Sub I/O cable connector

I/O		Pin	Function
Input	Digital	14	Test launch
	Analog	5	Not enabled
Output	Digital	6	Test threshold crossed
		7	ASM xxx: Selected test mode reached ASI xx: Detector ready
	Analog	9	Mantissa (0–10 V) [1]
		10	Leak rate (logarithmic) [1]
		11	5 VDC - 750 mA max
		12	Exponent (0–10 V)
Ground		1 - 2 - 3 - 4 - 13	-
Headset (8 Ω)		8	Headset+ [2]
		15	Headset- [2]

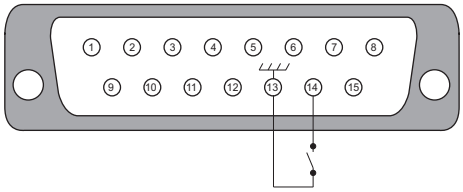
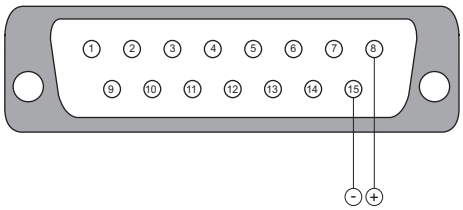
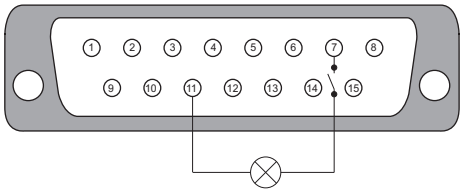
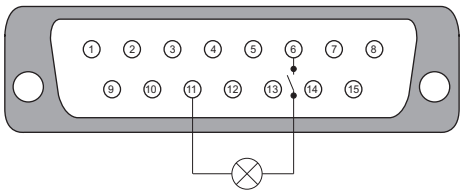
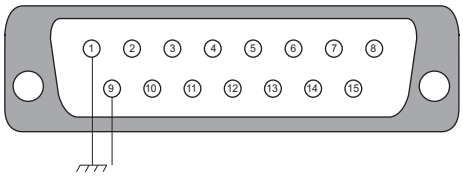
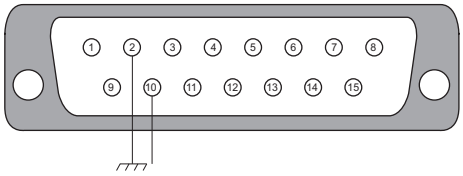
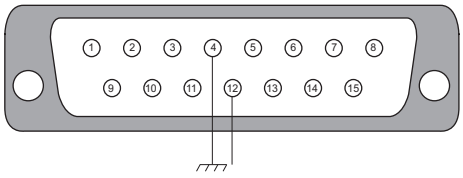
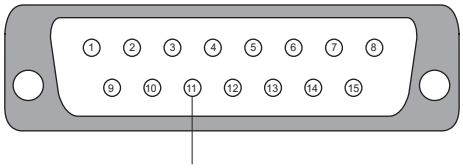
1) Default: user configurable
2) Activation/Deactivation of the audio/headset output (see below)

NOTICE

Safety of very low voltage circuits

The remote control circuits are equipped with dry contact outputs. Any overvoltage or overcurrent can cause internal electrical damage. The user must adhere to the following wiring conditions:

► Connect these outputs in accordance with the rules and protection of safety extra low voltage (SELV).
► Supply these contacts with a voltage lower than 30 V DC and a current lower than 40 mA max

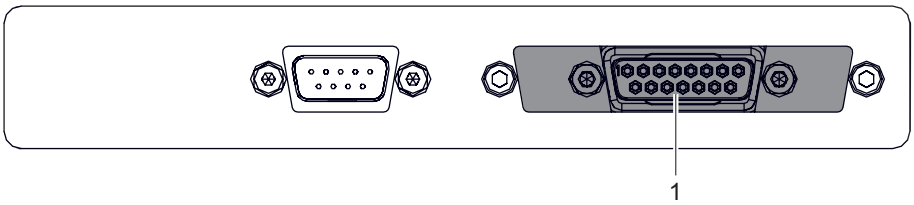
I/O	Connector	Pins
Digital input	 Pushbutton - Impulse switch	**13**: Internal ground **14**: Test launch
Headset Speaker	 Activation/Deactivation of the audio/headset output (see below)	**8**: Speaker - Headset 8 Ω (+) **15**: Speaker - Headset 8 Ω (-)
Digital output	For external power supply: 30 V DC max - 40 mA max  • Selected test mode reached indicator	**7**: Internal transistor - Selected test mode reached **7**: Internal transistor- Detector ready (ASI 35 only) **11**: Internal 5 VDC - 750 mA
	For external power supply: 30 V DC max - 40 mA max  • Internal 5 VDC indicator - 750 mA • Test threshold set crossed indicator	**6**: Internal transistor - Test threshold crossed **11**: Internal 5 VDC - 750 mA
Analog output		**1**: Internal ground **9**: 0–10 V - Mantissa
		**2**: Internal ground **10**: 0–10 V - Logarithmic
		**4**: Internal ground **12**: 0–10 V - Exponent
		**11**: Internal 5 VDC - 750 mA

Activation/Deactivation of the audio/headset output

1. Speaker activation: send the RS-232 command "=HPE" to the detector.
2. Speaker deactivation: send the RS-232 command "=HPD" to the detector.

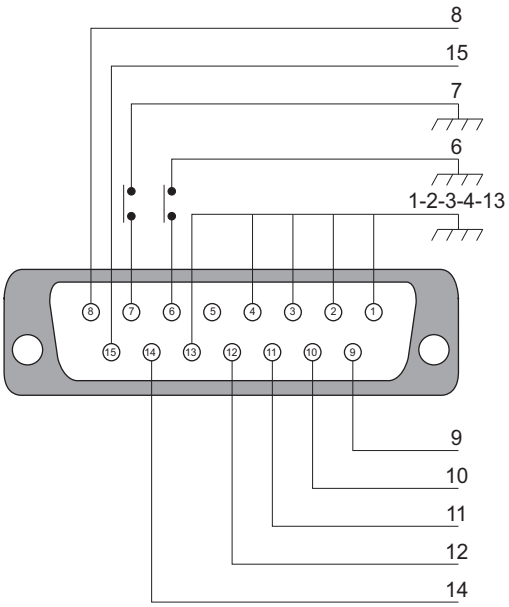
10.1.2 15-pin I/O connection interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 15-pin female D-Sub I/O communication interface connector

Leak detector 15-pin female D-Sub I/O connector

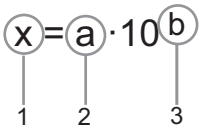


8	Speaker - Headset 8 Ω (+)	9	0–10 V - Mantissa
15	Speaker - Headset 8 Ω (-)	10	0–10 V - Logarithmic
7	Internal transistor - Selected test mode reached Internal transistor- Detector ready (ASI 35 only)	11	Internal 5 VDC - 750 mA
6	Internal transistor - Test threshold crossed	12	0–10 V - Exponent
1-2-3-4-13	Internal ground	14	Test launch

10.2 Setting

3 analog outputs (Analog Output)

9-gnd	1. Select the value to be allocated. [1)] 2. Depending on the value, configure the low decade.
10-gnd	1. Select the value to be allocated. [1)] 2. Depending on the value, configure the low decade.
12-gnd	Output allocated to ‘Exponent’
1) See table below	



Leak rate formula

1 Leak rate
2 Mantissa
3 Exponent

The low decade is the decade corresponding with 0 V.

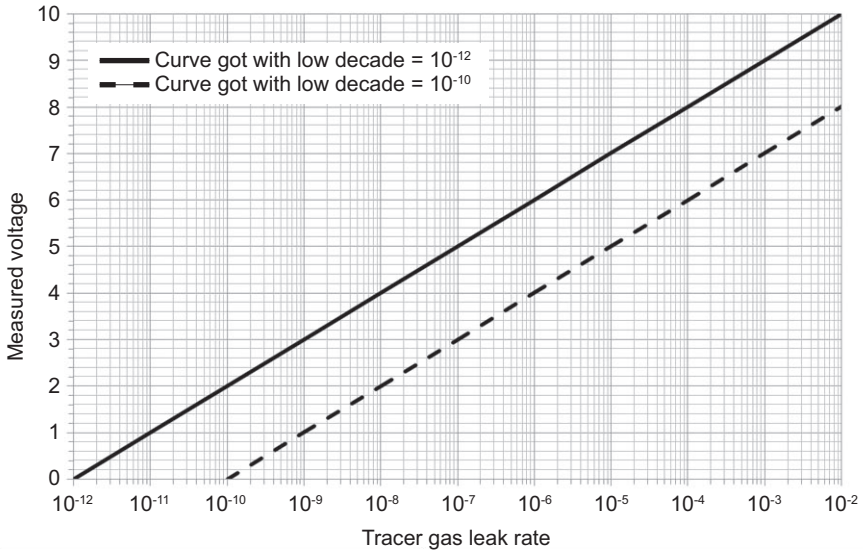
Value	Function
Mantissa	1/10 V [1)]
Exponent	1/10 V [1)]
Logarithmic	1/10 V [1)]
He compound	0/10 V (compound exponent, mantissa) [1)]
1) See chapter 'Formulas'	

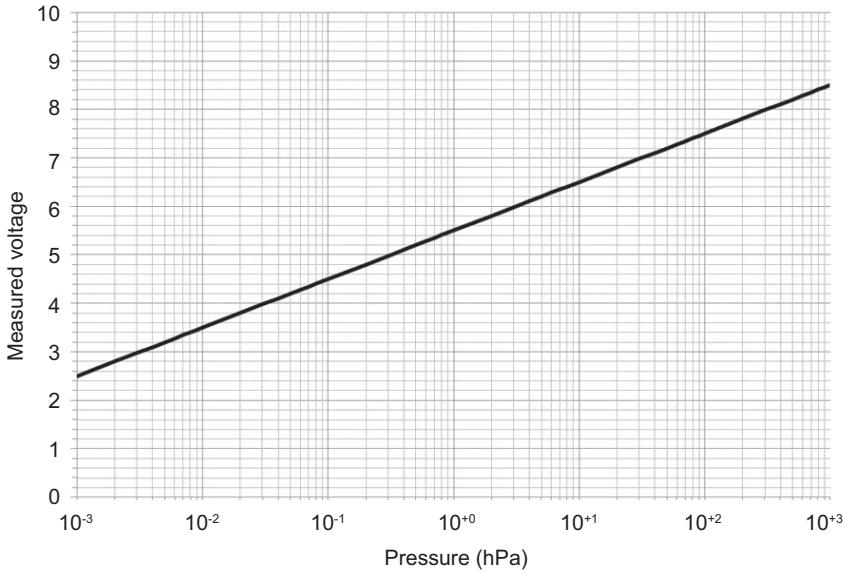
10.3 Formulas

Mantissa (1/10 V)	
The "Mantissa" output corresponds with the leak rate mantissa.	
Formula	U = Voltage measured (V) on analog output Mantissa = U
Examples	• U = 3.5 V -> Mantissa = 3.5 • U = 6.9 V -> Mantissa = 6.9

Exponent (0/10 V)	
The "Exponent" output coresponds with the leak rate exponent. • The Exponent increases by 1 V per decade. • The starting decade corresponds withe 10 V.	
Formula	U = Voltage measured (V) on analog output D_0 = Low decade for 0 V Exponent = 10 - U + D_0
Examples	Example 1 Low decade at 10^{-12} (10 V = -12) -> D_0 = -12 • U = 7 V -> Exposant = 10 - 7 - 12 -> Exposant = -9 • U = 2 V -> Exposant = 10 - 2 - 12 -> Exposant = -4 Example 2 Low decade at 10^{-10} (10 V = -10) -> D_0 = -10 • U = 7 V -> Exponent = 10 - 7 - 10 -> Exponent = -7 • U = 2 V -> Exponent = 10 - 2 - 10 -> Exponent = -2

Logarithmic (0/10 V)	
The "Logarithmic" output corresponds with the leak rate value. • The leak rate increases by 1 V per decade. • The starting decade corresponds with 0 V.	
Formula	U = Voltage measured (V) on analog output D_0 = Low decade for 0 V Mantissa = $10^{(U - Valeur entière (U)}$ Exponent = Integer value (U) + D_0 Leak rate = Mantissa x $10^{Exposant}$

Logarithmic (0/10 V)	
Examples	Example 1 Low decade at 10^{-12} (0 V = 1 · 10^{-12}) -> D_0 = -12 • V = 3.91 V -> Leak rate = $10^{(3,91 - 3)}$ x $10^{(3 - 12)}$ = 8.13 · 10^{-9} • V = 8.25 V -> Leak rate = $10^{(8,25 - 8)}$ x $10^{(8 - 12)}$ = 1.78 · 10^{-4} Example 2 Low decade at 10^{-10} (0 V = 1 · 10^{-10}) -> D_0 = -10 • V = 3.91 V -> Leak rate = $10^{(3,91 - 3)}$ x $10^{(3 - 10)}$ = 8.13 · 10^{-7} • V = 8.25 V -> Leak rate = $10^{(8,25 - 8)}$ x $10^{(8 - 10)}$ = 1.78 · 10^{-2}
Graph	

Inlet pressure	
The “Inlet Pressure” output corresponds with the inlet pressure source. The leak detector is equipped with an internal gauge (2.5 V/8.5 V).	
Formula	U = Voltage measured (V) on analog output Inlet pressure = $10^{(U -5,5)}$ hPa
Graph	

11 RS-232 serial link

The RS-232 serial link is used to control the leak detector with a compatible computer.

11.1 Connection

NOTICE

Risk of electromagnetic disturbance

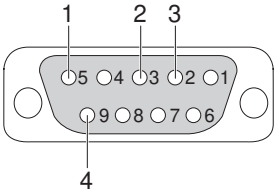
Voltages and currents can induce a multitude of electromagnetic fields and interference signals. Installations that do not comply with the EMC regulations can interfere with other equipment and the environment in general.

► Use shielded cables and connections for the interfaces in interference-prone environments.

11.1.1 Features of the RS-232 serial link cable

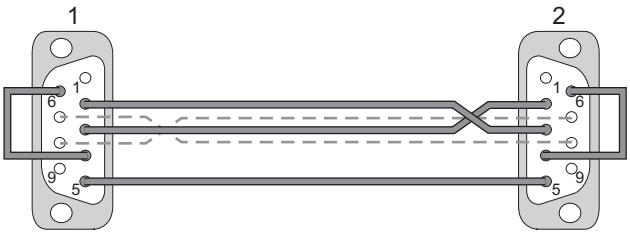
► Use a cable (not included) that meets RS-232 cable standards.
  – 9-pin female D-Sub connector

Pins used



1 **GND**: ground
2 **TX**: transmission of data
3 **RX**: receipt of data
4 +5 V or +24 V

Connection cable

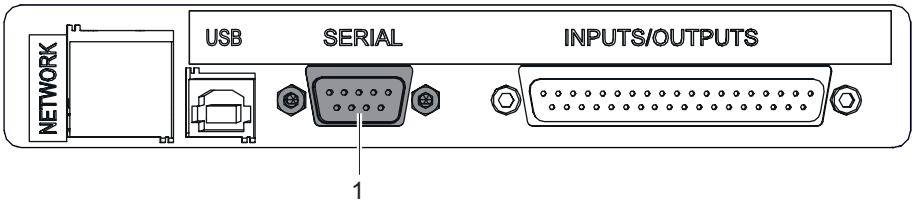


1 Computer 2 Leak detector

Pins 7 and 8 are only needed if RTS and CTS signals are used in user software.

11.1.2 RS-232 serial link interface

Switch off the leak detector before connecting the cable (see chapter “Power down” in the leak detector maintenance instructions).



1 Connector for 9-pin male D-Sub RS-232 serial link (example)

11.2 RS-232

From the "Settings" screen, press [Advanced] [Input/Output], then [Serial Link 1] or [Serial Link 2].	
Type	Set the 'Serial' link type. 1)
Parameters	Set the serial link mode. 1)
1) See details below	

Type

► Set the serial link according to its use.

Use	ASM 306S	ASM 310	ASM 340	ASM 390 - ASM 392	ASI 35	Possible allocation		Type to select
						Serial Link 1	Serial Link 2	
RS-232	x	x	x	x	x	Yes	No	Serial
Remote control RC 10 1)	x	x	x	x	x	Yes	No	Serial
ECB WiFi unit 1)	-	x	x	x	x	Yes	No	Serial
1) Accessory								

Parameters

From the "Settings" screen, press [Advanced] [Input/Output], [Serial Link 1] or [Serial Link 2], [Parameters].	
Parameters	Set the serial link mode.

List of modes: depending on the leak detector model, some modes will not be available.

Mode	Description
Basic	Continuous acquisition of data based on defined sampling. At any time, a command can be sent to the leak detector. 5 V power supply available.
Spreadsheet	Variation of the Basic mode. Continuous data acquisition, formatted in a spreadsheet such as Excel Microsoft® Office or other similar software. 5 V power supply available.
Advanced	Full control of the detector by a supervisor. The detector sends information at the supervisor request. 5 V power supply available. Use of a wireless remote control (model RC 10). **Recommended mode for automatic systems**.
Export Data	Export, via computer, of "tickets" issued by the detector after: ● calibration with an internal/external calibrated leak ● calibration control with an internal leak ● a test 5 V power supply available. **Serial links 1 and 2 must not be in "Export Data" mode at the same time.**
RC 500 WL	Use of a wireless remote control (model RC 500 WL). 5 V power supply available.
RC 500	Use of a wired remote control (model RC 500). 24 V power supply available.

Mode	Description
HLT 5xx	Protocol for compatibility with the HLT 5xx detector protocol. 5 V power supply available. List of orders for the protocol compatible with ASM 340/ASI 35.
HLT xx	Protocol for compatibility with the HLT 2xx.detector protocol. 5 V power supply available. List of orders for the protocol compatible with ASM 340/ASI 35.
Ext. module	Full control of the detector by a supervisor. The detector sends information at the supervisor request. 24 V power supply available. **A 24 V power supply is required for using an external module (example: Profibus).**

11.3 Basic mode

11.3.1 Standard basic mode

A string of parameters is continually sent to the terminal approximately every second.

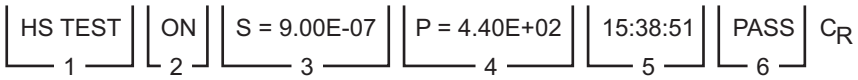
Standard basic mode is often used in the adjustment, finalization or debugging stages during a leak detection test.

At any time, a command can be sent to the detector (see chapters "Short commands" and "Long commands").

Composition of the string of parameters
/Test Status/Emission Status/Leak Rate/Inlet Pressure/Time/Test Result (Pass-Fail)

This string of parameters is sent without the character $^{L}_{F}$ (line break).

For example:



Item	Name	Message	Description
1	Test status	STAND BY	The product is in Standby mode.
		ROUGHING	The product is in Roughing mode.
		GL TEST	The product is in Gross Leak test mode.
		NORMAL TEST	The product is in Normal mode.
		HS Test	The product is in High Sensitivity mode.
		REFRESH	Secondary pump roughing (internal use only)
		SNIFFING	The product is in Sniffer mode.
		CALIBRATION	The product is in Calibration mode.
		WARMING UP	The product is starting up.
		PLEASE WAIT	-
		EXHAUST	-
		SNIF PROBE ON	-
		SNIF PROBE OFF	-
2	Emission status	ON	The filament is on.
		OFF	The filament is off.
3	Leak rate	S = 9.00E-07	Leak rate in mbar l/s
4	Input pressure	P = 4.40E+02	Input pressure in mbar
5	Time	15:38:51	Time at which the test was performed
6	Test result (Pass-Fail)	PASS	Test OK (PASS)
		FAIL	Test fail (FAIL)

Exceptional messages
In case of exceptional events, a line describing this status is sent by the detector with a character $^{L}_{F}$ (line break).

The row will not be deleted with future status messages.

Function	Message
Fault	Fault detected + all fault messages that may be displayed on the control panel Critical fault + all fault messages that may be displayed on the control panel
Warning	Warning + all messages that may be displayed on the control panel
Automatic electronic zero	Electronic zero complete (Electronic zero complete) Electronic zero failure (Electronic zero failure) Electronic zero end (Electronic zero end) Electronic zero in progress (Electronic zero in progress)
Calibration	Calibration complete (Calibration complete) Autocal error (Error autocal) Calibration failure (Calibration failure) Calibration in progress (Calibration in progress)
Memo	Memo ON (Memo function enabled) Memo OFF (Memo function disabled)
Voice synthesis level	Digital voice adjustment start (Voice synthesis adjustment start) Digital voice adjustment end (Voice synthesis adjustment stop)
Sound level	Audio adjustment start (Audio adjustment start) Audio adjustment end (Audio adjustment stop)
Automatic cycle end	Automatic cycle end mode ON (Automatic cycle end mode enabled) Manual cycle end mode ON (Automatic cycle end mode disabled)
Emission adjustment	Emission adjustment start (Emission adjustment start) Emission adjustment end (Emission adjustment stop)
Collector voltage adjustment	Voltage adjustment start (Voltage adjustment start) Voltage adjustment end (Voltage adjustment stop)
Inlet vent	Inlet vent ON (Inlet vent opened) Inlet vent OFF (Inlet vent closed)
Internal calibrated leak valve	Calibrated leak valve opened (Calibrated leak valve opened) Calibrated leak valve closed (Calibrated leak valve closed) Calibrated leak valve opening (Calibrated leak valve opening)
Electronic zero	Elec. zero adjustment start (Electronic zero adjustment start) Elec. zero adjustment end (Electronic zero adjustment stop)
Zero	Zero function ON (Zero function enabled) Zero function OFF (Zero function disabled)
Start-up	Unit warming up (Unit start-up) Language (Language)
Sniffer	Snif. probe ON (Sniffer probe enabled) Snif. probe OFF (Sniffer probe disabled)

11.3.2 Spreadsheet basic mode

The spreadsheet basic mode is a variant of the standard basic mode.

It offers the option of data acquisition and formatting the data on a spreadsheet such as Excel or any equivalent software (see below). This can be used to draw curves, for example.

Composition of the string of parameters
The string of parameters is the same in both standard and spreadsheet basic mode, but the string of parameters is sent **with** the character $^{L}_{F}$ (line break). Thus, all rows are displayed.

Examples:

HS TEST ON S=9.00E-07 P=4.40E+02 15:38:51 PASS $^{L}_{F}$

HS TEST ON S=9.40E-07 P=4.40E+02 15:38:53 PASS $^{L}_{F}$

HS TEST ON S=9.20E-07 P=4.40E+02 15:48:54 PASS $^{L}_{F}$

etc

Exceptional messages
There are no exceptional messages in spreadsheet mode.

11.3.3 Available commands

In basic mode, all commands (long and short) are available (see chapters "List of short commands" and "List of long commands").

11.4 Advanced mode (Advanced)

11.4.1 Protocol

The XON-XOFF protocol can be used in this mode.

It is disabled by default.

11.4.2 Available commands

In advanced mode, only long commands are available (see chapter "List of long commands").

11.5 Short commands

Activation command	Description of the activation command	Cancel command	Description of the cancel command
A	Launch a calibration	a	Stop a calibration
B	Sniffer mode activation	b	Sniffer mode deactivation
C	Test launch	C	Stop a test
D	Dynamic calibration enabled (ON)	D	Dynamic calibration disabled (OFF)
E	Electronic zero adjustment 1)	H	End of electronic zero adjustment
F	Filament on (ON)	f	Filament off (OFF)
G	Dynamic calibration coefficient calculation	-	-
I	Selection of the language from the control panel	-	-
J	Activation of memorization	J	Deactivation of memorization
K	Sound level adjustment 1)	k	End of sound level adjustment
M	Calibration disabled (OFF)	m	Calibration enabled (ON)
N	Activation of Normal test mode	n	Activation of High Sensitivity test mode
O	Zoom function enabled (ON)	o	Zoom function disabled (OFF)
P	Disable the discrete I/O interface of the PLC	p	Enable the discrete I/O interface of the PLC
Q	Emission adjustment 1)	q	End of emission adjustment
S	Voice synthesis sound level adjustment1)	s	End of voice synthesis sound level adjustment
T	Peak adjustment 1)	t	End of peak adjustment
U	Activation of Gross Leak test mode	u	Not valid
V	Inlet vent enabled (ON)	V.	Inlet vent disabled (OFF)

1) with **+** and **-**

Activation command	Description of the activation command	Cancel command	Description of the cancel command
W	Open the internal calibrated leak valve To validate this command, the user must also validate the "T" and "Q" commands.	w	Close the internal calibrated leak valve
Y	Control panel key lock by password	y	Control panel key unlock by password
Z	Automatic electronic zero adjustment (valid if the filament is turned OFF)	]	End of automatic electronic zero adjustment (valid if the filament is turned OFF)
+	Increase the value of a parameter	-	Decrease the value of a parameter
space	Display the commands menu	-	-
1) with **+** and **-**			

11.6 Long commands

11.6.1 Different types of long commands

There are 3 types of long commands:

- immediate: an immediate command is a command without parameters that can be executed immediately.
- on request: a command on request requires a response from the leak detector.
- with parameters: a command with parameters is a command that adjusts a parameter. Only the discharge protocol confirms the correct transmission and correct interpretation of the commands.

All long commands end with a $^{C}{}_{R}$ (carriage return) character.

If there is a response to this command, this response also ends with a $^{C}{}_{R}$ (carriage return) character.

11.6.2 Discharge protocol for long commands

For long commands, this mode returns a discharge value.

Examples of discharge value:

- **A_K** for 0x06
  - **A_K** = correct command / acknowledgment of receipt
- **N_K** for 0x15
  - **N_K** = command not recognized / no acknowledgment (message header, message length)

All long commands end with a $^{C}{}_{R}$ (carriage return) character.

If there is a response to this command, this response also ends with a $^{C}{}_{R}$ (carriage return) character.

For example:

For example: **C = command - R = response**		
C	?ST $^{C}{}_{R}$	Detector status request
R	64596 $^{C}{}_{R}$ A_K	Detector response
C	?UU $^{C}{}_{R}$	Command not recognized
R	N_K	Detector response - No detector action
C	=FE $^{C}{}_{R}$	Command incorrect
R	N_K	Detector response - Detector action

Symbol CF

The symbol **CF** means **C**ompressed **F**ormat (**C**ompressed **F**ormat) and is used for any value using an exponent such as leak rate, inlet pressure, etc.

The **CF** format uses a mantissa with 3 significant digits plus a signed exponent.

Examples

- For a leak rate of $4.23 \cdot 10^{-07}$, the **CF** code corresponds to 423-09.
- For an inlet pressure of 3.00, the **CF** code corresponds to 300-00.

11.6.3 Quick list of commands

Immediate commands
Detail: see chapter “List of immediate commands”

Menu	Description	Command
Measurement	Calculation of the external correction coefficient and validation [1]	!AE $^{C}_{R}$
Test	Zero reference point capture [2][8]	!CPZ $^{C}_{R}$
Test	Calibration check [3]	!CKC $^{C}_{R}$
Test	Launch a calibration [4]	!AC $^{C}_{R}$
Test	Opening the connected external calibrated leak [4]	!AC1 $^{C}_{R}$
Test	Closing the connected external calibrated leak [4]	!AC2 $^{C}_{R}$
Test	Stability of external calibrated leak rate [4]	!AC3 $^{C}_{R}$
Test	Stability of background [4]	!AC4 $^{C}_{R}$
Test menu	Stop a calibration [4]	!AS $^{C}_{R}$
Configuration	Mute sound [5]	!MUT $^{C}_{R}$
Configuration	Enable sound [5]	!UMU $^{C}_{R}$
Maintenance	Selection of filament (switch to the other filament) [6]	!SW $^{C}_{R}$
Maintenance	Reset of memorized faults [7]	!RE $^{C}_{R}$
Advanced	Reset of default parameters [7]	!DE $^{C}_{R}$
Advanced	Reset of warnings [7]	!WA $^{C}_{R}$

1) Correction factor
2) Zero activation
3) Calibration check
4) Calibration
5) Sound volume
6) Turbo and cell maintenance
7) Service
8) ASM 306S only

Commands on request
Detail: see chapter “List of commands on request”

Use

Description	Command [C]
Requests the current status of the detector	**[C]** ?CY $^{C}_{R}$
Requests visual information from the control panel	**[C]** ?HMI $^{C}_{R}$
Requests the leak rate without correction coefficient enabled	**[C]** ?LE2 $^{C}_{R}$
Requests the status of the automatic launch function of a test at start-up	**[C]** ?LTD $^{C}_{R}$
Asks if the detector is ready for the test	**[C]** ?RDY $^{C}_{R}$
Requests the status of the graph	**[C]** ?REC $^{C}_{R}$
Requests the status of the detector	**[C]** ?SHD $^{C}_{R}$
Requests the status of the detector	**[C]** ?ST $^{C}_{R}$
Requests the time of the last stop	**[C]** ?TIA $^{C}_{R}$

Description	Command [C]
Requests the time of the last start-up	**[C]** ?TIM $^{C}_{R}$
Requests the string digits of the detector status	**[C]** ?TR $^{C}_{R}$

Measurement menu

Description	Command [C]
Requests the target value for the automatic calculation of the correction using the hard vacuum test method [1]	**[C]** ?AEH $^{C}_{R}$
Requests the leak value for the automatic calculation of the correction using the vacuum test method [1]	**[C]** ?AES $^{C}_{R}$
Requests the hard vacuum correction coefficient [1]	**[C]** ?HV $^{C}_{R}$
Requests the sniffer correction coefficient [1]	**[C]** ?SN $^{C}_{R}$
Requests the tracer gas used [2]	**[C]** ?GZ $^{C}_{R}$
Requests the leak rate [2]	**[C]** ?LE $^{C}_{R}$
Requests the internal calibrated leak information indicated on the label [3]	**[C]** ?FE $^{C}_{R}$
Requests the selected Master calibrated leak [3][5]	**[C]** ?FEC $^{C}_{R}$
Requests the parameters of the calibrated leak used for internal calibration (internal or external leak) [3]	**[C]** ?FEMT $^{C}_{R}$
Requests the information of Master 1 calibrated leak [3][5]	**[C]** ?FES1 $^{C}_{R}$
Requests the information of Master 2 calibrated leak [3][5]	**[C]** ?FES2 $^{C}_{R}$
Requests the information of Master 3 calibrated leak [3][5]	**[C]** ?FES3 $^{C}_{R}$
Requests the information of Master 4 calibrated leak [3][5]	**[C]** ?FES4 $^{C}_{R}$
Requests the information of Master 5 calibrated leak [3][5]	**[C]** ?FES5 $^{C}_{R}$
Request the 'code for PV leak' of the Master 1 calibrated leak [3][5]	**[C]** ?FESC1 $^{C}_{R}$
Request the 'code for PV leak' of the Master 2 calibrated leak [3][5]	**[C]** ?FESC2 $^{C}_{R}$
Request the 'code for PV leak' of the Master 3 calibrated leak [3][5]	**[C]** ?FESC3 $^{C}_{R}$
Request the 'code for PV leak' of the Master 4 calibrated leak [3][5]	**[C]** ?FESC4 $^{C}_{R}$
Request the 'code for PV leak' of the Master 5 calibrated leak [3][5]	**[C]** ?FESC5 $^{C}_{R}$
Requests the type of setting used for Master 1 calibrated leak [3][5]	**[C]** ?FEST1 $^{C}_{R}$
Requests the type of setting used for Master 2 calibrated leak [3][5]	**[C]** ?FEST2 $^{C}_{R}$
Requests the type of setting used for Master 3 calibrated leak [3][5]	**[C]** ?FEST3 $^{C}_{R}$
Requests the type of setting used for Master 4 calibrated leak [3][5]	**[C]** ?FEST4 $^{C}_{R}$
Requests the type of setting used for Master 5 calibrated leak [3][5]	**[C]** ?FEST5 $^{C}_{R}$
Requests the temperature [3]	**[C]** ?TE $^{C}_{R}$
Requests the time of the last calibration [3]	**[C]** ?TIC $^{C}_{R}$
Requests the parameters of the depollution function [4]	**[C]** ?AA $^{C}_{R}$
Requests the maximum background settings [4]	**[C]** ?AR $^{C}_{R}$
Requests pressure threshold 1 [4]	**[C]** ?NP1 $^{C}_{R}$
Requests pressure threshold 2 [4]	**[C]** ?NP2 $^{C}_{R}$

1) Correction factor
2) Tracer gas
3) Leak setting calibrated
4) Threshold
5) ASM 306S only

Description	Command [C]
Requests pressure threshold 3 [4)]	**[C]** ?NP3 $^{C}_{R}$
Requests the reject threshold using the current test method [4)]	**[C]** ?S1 $^{C}_{R}$
Requests the reject threshold using the hard vacuum test method [4)]	**[C]** ?S1H $^{C}_{R}$
Requests the reject threshold using the sniffer test method [4)]	**[C]** ?S1S $^{C}_{R}$
Requests the alarm threshold in % of the reject threshold using the current test method [4)]	**[C]** ?S1W $^{C}_{R}$
Requests the alarm threshold in % of the reject threshold using the hard vacuum test method [4)]	**[C]** ?S1WH $^{C}_{R}$
Requests the alarm threshold in % of the reject threshold using the sniffer test method [4)]	**[C]** ?S1WS $^{C}_{R}$
Requests the clogged probe threshold [4)]	**[C]** ?S6 $^{C}_{R}$
Request the clogged probe threshold of the Smart probe [4) 4)]	**[C]** ?SSS $^{C}_{R}$
Requests the status of the bargraph display centered on the reject threshold [4)]	**[C]** ?ZR $^{C}_{R}$
1) Correction factor 2) Tracer gas 3) Leak setting calibrated	4) Threshold 5) ASM 306S only

Test menu

Description	Command [C]
Requests the Massive mode parameters [1)]	**[C]** ?MAS $^{C}_{R}$
Requests the zero function status [2)]	**[C]** ?AUZ $^{C}_{R}$
Requests the zero function status [2)]	**[C]** ?AZ $^{C}_{R}$
Requests the reference zero status [2)]	**[C]** ?SZ $^{C}_{R}$
Requests the parameters of the zero function [2)]	**[C]** ?ZB $^{C}_{R}$
Requests the reference electronic zero [2)]	**[C]** ?ZE $^{C}_{R}$
Requests the parameters of the dynamic calibration [14)]	**[C]** ?CV $^{C}_{R}$
Request the parameters of the automatic calibration requirement [13)]	**[C]** ?ACA $^{C}_{R}$
Requests the status of the inlet vent valve [3)]	**[C]** ?IV $^{C}_{R}$
Requests the parameters of the inlet vent function [3)]	**[C]** ?IVP $^{C}_{R}$
Requests the number of 'Refreshes' (involuntary inlet vent during a test) undergone by the detector [3)]	**[C]** ?RFH $^{C}_{R}$
Asks if the inlet vent is automatic or manual at the cycle end [3)]	**[C]** ?VT $^{C}_{R}$
Requests the parameters of the automatic cycle end function [4)]	**[C]** ?CA $^{C}_{R}$
Requests the parameters of the automatic cycle end function using the sniffer test method [4)]	**[C]** ?CAS $^{C}_{R}$
Requests the parameters of the Memo function [5)]	**[C]** ?ME $^{C}_{R}$
Requests the result of the last test [5)16)]	**[C]** ?RE $^{C}_{R}$
Requests the test method used [6)]	**[C]** ?TST $^{C}_{R}$
Requests the selected test mode [7)]	**[C]** ?CYT $^{C}_{R}$
Requests the calibration mode [15)]	**[C]** ?AC $^{C}_{R}$
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end	5) Memo function 6) Method 7) Mode 8) Regeneration

Description	Command [C]
Requests the target value for a calibration [15)]	**[C]** ?AC3 $^{C}_{R}$
Requests confirmation of the current calibration step (HLTxxx) [15)]	**[C]** ?CAK $^{C}_{R}$
Requests the calibrated leak used for calibration [15)]	**[C]** ?FEP $^{C}_{R}$
Requests the pressure threshold in Gross Leak mode in the current unit [12)]	**[C]** ?P1U $^{C}_{R}$
Requests the pressure threshold in Normal mode in the current unit [12)]	**[C]** ?P2U $^{C}_{R}$
Requests the pressure threshold in High Sensitivity mode in the current unit [12)]	**[C]** ?P3U $^{C}_{R}$
Requests the status of the Regeneration or Burn-in function [8)]	**[C]** ?REG $^{C}_{R}$
Requests the type of probe [9)]	**[C]** ?SPR $^{C}_{R}$
Requests the status of the purge valve [1)]	**[C]** ?VPU $^{C}_{R}$
Requests the parameters of the Bypass function [11)]	**[C]** ?PAD $^{C}_{R}$
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end	5) Memo function 6) Method 7) Mode 8) Regeneration

Probe menu

Description	Command [C]
Requests the initial flow of the probe in sccm [1)2)]	**[C]** ?FLQ $^{C}_{R}$
Requests the flow of the probe in sccm [1)2)]	**[C]** ?FLU $^{C}_{R}$
1) Probe flow unit	2) ASM 306S only

Configuration menu

Description	Command [C]
Requests the date [1)]	**[C]** ?DA $^{C}_{R}$
Request the current time [1)]	**[C]** ?TI $^{C}_{R}$
Requests the language [1)]	**[C]** ?SP $^{C}_{R}$
Requests the current measurement unit [1)]	**[C]** ?UN $^{C}_{R}$
Requests the lower display limit for the leak rate [2)]	**[C]** ?LDL $^{C}_{R}$
Requests the pressure inside the analysis cell [2)]	**[C]** ?PS $^{C}_{R}$
Request the status of the speaker and external headphones [3)]	**[C]** ?HP $^{C}_{R}$
Requests the status of the sound [3)]	**[C]** ?SO $^{C}_{R}$
Requests the status of the voice synthesis [3)]	**[C]** ?SY $^{C}_{R}$
Requests the status of the Paging function [4)]	**[C]** ?PAG $^{C}_{R}$
1) Date - Time - Language - Unit 2) Minimum value displayed	3) Sound volume 4) Screen adjustment

Maintenance menu

Description	Command [C]
Requests the access level of the control panel [1)]	**[C]** ?IL $^{C}_{R}$
Requests the password [1)]	**[C]** ?PW $^{C}_{R}$
Requests the internal gauge information [2)]	**[C]** ?GAU $^{C}_{R}$
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance	4) Last maintenance operation 5) History

Description	Command [C]
Requests the full range of the external gauge [2]	**[C]** ?GAUS $^{C}_{R}$
Requests the voltage output of the external gauge [2]	**[C]** ?GAUT $^{C}_{R}$
Requests the internal pressure [2]	**[C]** ?PE $^{C}_{R}$
Requests the value of the hour counters [3]	**[C]** ?CH $^{C}_{R}$
Requests the backing pump hour counter [3]	**[C]** ?MC0 $^{C}_{R}$
Requests the turbomolecular pump hour counter [3]	**[C]** ?MC1 $^{C}_{R}$
Requests the turbomolecular pump no. 2 hour counter [2 3]	**[C]** ?MC2 $^{C}_{R}$
Requests the hour counter [3]	**[C]** ?MCC $^{C}_{R}$
Requests the date, time and result of the last internal calibration [5]	**[C]** ?DTC $^{C}_{R}$
Requests memorized faults [5]	**[C]** ?ER $^{C}_{R}$
Requests the total number of faults saved [5]	**[C]** ?HDE $^{C}_{R}$
Requests the memorized warnings [5]	**[C]** ?WA $^{C}_{R}$
Requests the sensitivity coefficient of the 2 filaments [6]	**[C]** ?CF $^{C}_{R}$
Requests the status of backing pump no. 1 [6]	**[C]** ?T01 $^{C}_{R}$
Requests the status of backing pump no. 2 [6]	**[C]** ?T02 $^{C}_{R}$
Requests information related to turbomolecular pump no. 1 [6]	**[C]** ?T1 $^{C}_{R}$
Requests information related to turbomolecular pump no. 2 [6]	**[C]** ?T2 $^{C}_{R}$
Requests the turbomolecular pump speed (analysis cell) [6]	**[C]** ?V1 $^{C}_{R}$
Requests the turbomolecular pump no. 2 speed [6]	**[C]** ?V2 $^{C}_{R}$
Requests the turbomolecular pump target speed in hard vacuum test mode [6]	**[C]** ?VITH $^{C}_{R}$
Requests the turbomolecular pump target speed in sniffer test mode [6]	**[C]** ?VITS $^{C}_{R}$
Requests the turbomolecular pump nominal speed (analysis cell) [6]	**[C]** ?VITN $^{C}_{R}$
Requests the external gauge information [7]	**[C]** ?GAUM $^{C}_{R}$
Requests the full range of the external gauge [7]	**[C]** ?GAUMS $^{C}_{R}$
Requests the voltage of the external gauge [7]	**[C]** ?GAUMT $^{C}_{R}$
Requests the pressure of the external gauge [7]	**[C]** ?PEM $^{C}_{R}$
Requests the availability of the filaments [8]	**[C]** ?FM $^{C}_{R}$
Requests the active filament [8]	**[C]** ?SW $^{C}_{R}$
Requests the emission current of the filament [9]	**[C]** ?IE $^{C}_{R}$
Requests the CPU software version [9]	**[C]** ?MD $^{C}_{R}$
Requests additional information related to the turbomolecular pump [9]	**[C]** ?T1M $^{C}_{R}$
Requests the current collector voltage [9]	**[C]** ?VO $^{C}_{R}$
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance	4) Last maintenance operation 5) History

Advanced menu

Description	Command [C]
Requests the status of analog output 1 of the interface board [1]	**[C]** ?AO1 $^{C}_{R}$
Requests the status of analog output 2 of the interface board [1]	**[C]** ?AO2 $^{C}_{R}$
Requests the status of analog output 3 of the interface board [1]	**[C]** ?AO3 $^{C}_{R}$
Requests the status of digital inputs [1]	**[C]** ?IN $^{C}_{R}$
Requests the status of digital outputs [1]	**[C]** ?OU $^{C}_{R}$
Requests additional threshold 2 [1]	**[C]** ?S2 $^{C}_{R}$
Requests additional threshold 3 [1]	**[C]** ?S3 $^{C}_{R}$
Requests additional threshold 4 [1] [1]	**[C]** ?S4 $^{C}_{R}$
Requests additional threshold 5 [1]	**[C]** ?S5 $^{C}_{R}$
1) Input/Output	2) Service

Commands with parameters

Detail: see chapter “List of commands with parameters”.

Use

Description	Command [C]
Start or stop a test with the hard vacuum test method	**[C]** =CYx $^{C}_{R}$

Measurement menu

Description	Command [C]
Setting the external calibrated leak values for calculating the correction factor (hard vacuum or sniffer test method) [1]	**[C]** =AExCF $^{C}_{R}$
Configuring the hard vacuum correction coefficient [1]	**[C]** =HVCFx $^{C}_{R}$
External coefficient calibration in sniffer [1]	**[C]** =SNCFx $^{C}_{R}$
Selection of tracer gas used [2]	**[C]** =GZx $^{C}_{R}$
Selection of Master calibrated leak [3][5]	**[C]** =FECx $^{C}_{R}$
Setting the calibrated leak used for internal calibration (internal or external calibrated leak) [3]	**[C]** =FEMxyCFzaabbccddddeeff $^{C}_{R}$
Setting the Master 1 calibrated leak information [3][5]	**[C]** =FES1xCFyzaabbccddddeeffgggggggggg $^{C}_{R}$
Setting the Master 2 calibrated leak information [3][5]	**[C]** =FES2xCFyzaabbccddddeeffgggggggggg $^{C}_{R}$
Setting the Master 3 calibrated leak information [3][5]	**[C]** =FES3xCFyzaabbccddddeeffgggggggggg $^{C}_{R}$
Setting the Master 4 calibrated leak information [3][5]	**[C]** =FES4xCFyzaabbccddddeeffgggggggggg $^{C}_{R}$
Setting the Master 5 calibrated leak information [3][5]	**[C]** =FES5xCFyzaabbccddddeeffgggggggggg $^{C}_{R}$
Setting the code for the PV leak of the Master 1 calibrated leak [3][5]	**[C]** =FESC1xxxxxxxxxxx $^{C}_{R}$
Setting the code for the PV leak of the Master 2 calibrated leak [3][5]	**[C]** =FESC2xxxxxxxxxxx $^{C}_{R}$
Setting the code for the PV leak of the Master 3 calibrated leak [3][5]	**[C]** =FESC3xxxxxxxxxxx $^{C}_{R}$
Setting the code for the PV leak of the Master 4 calibrated leak [3][5]	**[C]** =FESC4xxxxxxxxxxx $^{C}_{R}$
Setting the code for the PV leak of the Master 5 calibrated leak [3][5]	**[C]** =FESC5xxxxxxxxxxx $^{C}_{R}$
Selection of the type of setting used for the Master 1 calibrated leak [3][5]	**[C]** =FEST1x $^{C}_{R}$
1) Correction factor 2) Tracer gas 3) Leak setting calibrated	4) Threshold 5) ASM 306S only

Description	Command [C]
Selection of the type of setting used for the Master 2 calibrated leak [3)5)]	**[C]** =FEST2x $^{C}_{R}$
Selection of the type of setting used for the Master 3 calibrated leak [3)5)]	**[C]** =FEST3x $^{C}_{R}$
Selection of the type of setting used for the Master 4 calibrated leak [3)5)]	**[C]** =FEST4x $^{C}_{R}$
Selection of the type of setting used for the Master 5 calibrated leak [3)5)]	**[C]** =FEST5x $^{C}_{R}$
Selection of the internal temperature sensor for the calibration [3)]	**[C]** =TES $^{C}_{R}$
Selection of the preset temperature for the calibration [3)]	**[C]** =TEV $^{C}_{R}$
Setting the temperature for the calibration with an internal or external calibrated leak [3)]	**[C]** =TEVxx $^{C}_{R}$
Setting the depollution function [4)]	**[C]** =AACFx $^{C}_{R}$
Setting depollution with selection of the Gross Leak test mode [4)]	**[C]** =APCFx $^{C}_{R}$
Setting the maximum background [4)]	**[C]** =ARCFx $^{C}_{R}$
Selection of the maximum background [4)]	**[C]** =ARx $^{C}_{R}$
Setting pressure threshold 1 [4)]	**[C]** =NP1CF $^{C}_{R}$
Setting pressure threshold 2 [4)]	**[C]** =NP2CF $^{C}_{R}$
Setting pressure threshold 3 [4)]	**[C]** =NP3CF $^{C}_{R}$
Setting the current reject threshold using the current test method and with the current measurement unit [4)]	**[C]** =S1CF $^{C}_{R}$
Setting the reject threshold to the current measurement unit [4)]	**[C]** =S1CFx $^{C}_{R}$
Setting the clogged probe threshold [4)]	**[C]** =S6CF $^{C}_{R}$
Setting the clogged probe threshold of the Smart probe [4)]	**[C]** =SSSxxxx $^{C}_{R}$
1) Correction factor 2) Tracer gas 3) Leak setting calibrated	4) Threshold 5) ASM 306S only

Test menu

Description	Command [C]
Massive mode status selection [1)]	**[C]** =MASxy $^{C}_{R}$
Setting the zero function [2)]	**[C]** =AUZxy $^{C}_{R}$
Launch or stop zero function [2)]	**[C]** =AZx $^{C}_{R}$
Setting the advanced zero function [2)]	**[C]** =ZBxyzzzzCF $^{C}_{R}$
Setting the zero function [2)]	**[C]** =ZBxy $^{C}_{R}$
Setting the dynamic calibration function [14)]	**[C]** =CDx $^{C}_{R}$
Setting the dynamic calibration function target value [14)]	**[C]** =CVCF $^{C}_{R}$
Setting the 'Autocal requested' warning [13)]	**[C]** =ACAabbbbbccccc $^{C}_{R}$
Inlet vent selection at the end of the cycle [3)]	**[C]** =IVx $^{C}_{R}$
Setting the inlet vent function [3)]	**[C]** =IVPxyzmmss $^{C}_{R}$
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end 5) Memo function 6) Method 7) Mode 8) Regeneration	9) Type of probe 10) Purge valve 11) Bypass 12) Crossover pressure 13) Calibration check 14) Dynamic calibration 15) Calibration

Description	Command [C]
Selection of the inlet vent valve status in standby mode [3]	**[C]** =VTx $^{C}_{R}$
Setting the automatic cycle end function [4]	**[C]** =CAabccccdddd $^{C}_{R}$
Setting the Memo function [5]	**[C]** =MExbmmss $^{C}_{R}$
Selection of the Memo function [5]	**[C]** =MEx $^{C}_{R}$
Start or stop a test with the sniffer test method [6]	**[C]** =SFx $^{C}_{R}$
Selection of the test method used [6]	**[C]** =TSTx $^{C}_{R}$
Selection of the test mode [7]	**[C]** =CYTx $^{C}_{R}$
Selection of the calibration type [15]	**[C]** =ACx $^{C}_{R}$
Selection of the calibrated leak used for calibration [15]	**[C]** =FEPx $^{C}_{R}$
Setting the pressure threshold in Gross Leak mode in the current unit [12]	**[C]** =P1UCF $^{C}_{R}$
Setting the pressure threshold in Normal mode in the current unit[12]	**[C]** =P2UCF $^{C}_{R}$
Setting the pressure threshold in High Sensitivity mode in the current unit[12]	**[C]** =P3UCF $^{C}_{R}$
Selection of the probe type [9]	**[C]** =SPRx $^{C}_{R}$
Selection of the purge valve status [10]	**[C]** =VPUx $^{C}_{R}$
Setting the Bypass function [11]	**[C]** =PADxyz $^{C}_{R}$
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end 5) Memo function 6) Method 7) Mode 8) Regeneration	9) Type of probe 10) Purge valve 11) Bypass 12) Crossover pressure 13) Calibration check 14) Dynamic calibration 15) Calibration

Configuration menu

Description	Command [C]
Setting the date [1]	**[C]** =DAmmddyy $^{C}_{R}$
Setting the time [1]	**[C]** =TIhhmmss $^{C}_{R}$
Selection of the language from the control panel[1]	**[C]** =SPx $^{C}_{R}$
Selection of the unit of measurement [1]	**[C]** =UNx $^{C}_{R}$
Setting the display lower limit displayed for the leak rate (current test method) [2]	**[C]** =LDLCF $^{C}_{R}$
Setting the display lower limit displayed for the leak rate (hard vacuum test method) [2]	**[C]** =LDLHCF $^{C}_{R}$
Setting the display lower limit displayed for the leak rate (sniffer test method) [2]	**[C]** =LDLSCF $^{C}_{R}$
Setting the status of the speaker and external headphones [3]	**[C]** =HPx $^{C}_{R}$
Setting the sound level [3]	**[C]** =SOxy $^{C}_{R}$
Setting the voice synthesis level[3]	**[C]** =SYxy $^{C}_{R}$
1) Date - Time - Language - Unit 2) Minimum value displayed	3) Sound volume

Maintenance menu

Description	Command [C]
Setting the password [1]	**[C]** =PWxxxxy $^{C}_{R}$
Selection of the external gauge[2]	**[C]** =GAUExxx $^{C}_{R}$
Selection of the internal gauge [2]	**[C]** =GAUIxxx $^{C}_{R}$
Setting the full range of the internal gauge [2]	**[C]** =GAUSxxxxx $^{C}_{R}$
Setting the full range of the external gauge [4]	**[C]** =GAUMSxxxxx $^{C}_{R}$
Reset of the selected filament hour counter [3]	**[C]** =CHx $^{C}_{R}$
Setting the initial value of the cycle counter [3]	**[C]** =MCCICF $^{C}_{R}$
Reset of the initial value of the cycle counter [3]	**[C]** =MCCZ $^{C}_{R}$
Selection of filament (1 or 2) [5]	**[C]** =SWx $^{C}_{R}$
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance	4) External gauge 5) Turbo and cell maintenance

Advanced menu

Description	Command [C]
Assigns analog output 1 [1]	**[C]** =AO1y $^{C}_{R}$
Assigns analog output 2 [1]	**[C]** =AO2y $^{C}_{R}$
Assigning analog output 1 and setting the range start value [1]	**[C]** =AO1yCF $^{C}_{R}$
Assigning analog output 2 and setting the range start value [1]	**[C]** =AO2yCF $^{C}_{R}$
Setting the initial value of the backing pump counter [2]	**[C]** =MC0Iyyyyy $^{C}_{R}$
Setting the initial value of the turbomolecular pump counter [2]	**[C]** =MC1Iyyyyy $^{C}_{R}$
Reset of the backing pump hour counter [2]	**[C]** =MC0Z $^{C}_{R}$
Reset of the turbomolecular pump hour counter [2]	**[C]** =MC1Z $^{C}_{R}$
Select the status of the background suppression function [2]	**[C]** =RBFx $^{C}_{R}$
1) Input/Output	2) Service

11.6.4 List of immediate commands

The format of immediate commands does not exceed 3 characters: **!xxx** $^{C}_{R}$.

- HV: hard vacuum method
- S = Sniffer method

Menu	Description	Command
Measurement	Calculation of the external correction coefficient and validation (HV/S) [1]	!AE $^{C}_{R}$
Test	Zero reference point capture (S) [2][8]	!CPZ $^{C}_{R}$
Test	Calibration check (HV) [3]	!CKC $^{C}_{R}$
Test	Calibration launch (HV/S) [4]	!AC $^{C}_{R}$
1) Correction factor 2) Zero activation 3) Calibration check 4) Calibration		5) Sound volume 6) Turbo and cell maintenance 7) Service 8) ASM 306S only

Menu	Description	Command
Test	Opening of a connected external calibrated leak (HV/S) [4]	!AC1 $^{C}_{R}$
Test	Closing of a connected external calibrated leak (HV/S) [4]	!AC2 $^{C}_{R}$
Test	Stability of external calibrated leak rate (S) [4]	!AC3 $^{C}_{R}$
Test	Stability of background (S) [4]	!AC4 $^{C}_{R}$
Test menu	Stop a calibration (HV/S) [4]	!AS $^{C}_{R}$
Configuration	Mute sound (HV/S) [5]	!MUT $^{C}_{R}$
Configuration	Enable sound (HV/S) [5]	!UMU $^{C}_{R}$
Maintenance	Selection of filament (switch to the other filament) (HV/S) [6]	!SW $^{C}_{R}$
Maintenance	Reset of memorized faults (HV/S) [7]	!RE $^{C}_{R}$
Advanced	Reset of default parameters (HV/S) [7]	!DE $^{C}_{R}$
Advanced	Reset of warnings (HV/S) [7]	!WA $^{C}_{R}$
1) Correction factor 2) Zero activation 3) Calibration check 4) Calibration		5) Sound volume 6) Turbo and cell maintenance 7) Service 8) ASM 306S only

11.6.5 List of commands on request

A command on request requires a response from the leak detector: **?command $^{C}_{R}$**.

Quick list of commands: see chapter “Quick list of commands”.

- HV: hard vacuum method
- S = Sniffer method
- Command [C]: the "-" is not part of the command.
- Command [R]: the "-" is not part of the response.

Use		
Description	**Command [C]** **Response [R]**	**Detail**
Requests the current status of the detector (HV/S)	**[C]** ?CY $^{C}_{R}$ **[R]** aa $^{C}_{R}$	**aa** = ST: start-up stage **aa** = HV: test cycle using the hard vacuum test method **aa** = SN: cycle using the sniffer test method **aa** = ST: start-up stage **aa** = CZ: calibration of electronic zero **aa** = CM: other calibration using the hard vacuum test method **aa** = CS: calibration using the sniffer test method **aa** = HV: test using the hard vacuum test method **x**: *Example [R]: HV $^{C}_{R}$* *A test with the hard vacuum test method is launched.*
Requests visual information from the control panel (HV/S)	**[C]** ?HMI $^{C}_{R}$ **[R]** CF1xCF2CF3ussssr-za $^{C}_{R}$	**CF1**: signal measured by the cell in the current unit **x** = R: uncorrected signal from the analysis cell (idem ?LE $^{C}_{R}$) **x** = C: corrected signal from the analysis cell (idem ?LE $^{C}_{R}$) **CF2**: reject threshold in the current unit (idem ?S1 $^{C}_{R}$) **CF3**: input pressure in the current unit (idem ?PE $^{C}_{R}$) **u** = 1: unit in mbar (idem ?UN $^{C}_{R}$) **u** = 2: unit in Pa (idem ?UN $^{C}_{R}$) **u** = 3: unit in Torr (idem ?UN $^{C}_{R}$) **u** = 4: unit in atm (idem ?UN $^{C}_{R}$) **u** = 5: unit in ppm (idem ?UN $^{C}_{R}$) **u** = 6: unit in sccm (idem ?UN $^{C}_{R}$) **u** = 7: unit in sccs (idem ?UN $^{C}_{R}$) **sssss**: detector status (idem ?ST $^{C}_{R}$) **r** = E: reject threshold crossed (idem ?RJT $^{C}_{R}$) **r** = D: reject threshold not crossed (idem ?RJT $^{C}_{R}$) **z** = E: zero function enabled (idem ?AZ $^{C}_{R}$) **z** = D: zero function disabled (idem ?AZ $^{C}_{R}$) **a** = E: calibration in progress **a** = D: calibration not triggered *Example [R]: 490-12R100-09220-04123810DED $^{C}_{R}$* *The signal from the analysis cell is not corrected. The reject threshold is $1 \cdot 10^{-7}$ and is not crossed. The inlet pressure is $2.2 \cdot 10^{-2}$ mbar. Zero function is enabled. Calibration is not triggered.*
Requests the leak rate without correction coefficient enabled (HV/S)	**[C]** ?LE2 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: leak rate without correction coefficient enabled *Example [R]: 735-09 $^{C}_{R}$* *The leak rate without the correction coefficient enabled is $7.35 \cdot 10^{-7}$.*
Requests the status of the automatic launch function of a test at start-up (HV/S)	**[C]** ?LTD $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 0: automatic launch function disabled for testing at start-up **x** = 1: automatic launch function enabled for testing at start-up *Example [R]: 0 $^{C}_{R}$* *The automatic launch function is disabled for testing at start-up.*
Asks if the detector is ready for the test (HV/S)	**[C]** ?RDY $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: detector ready for testing **x** = D: detector not ready for testing *Example [R]: E $^{C}_{R}$* *The detector is ready for testing.*

Description	Command [C] Response [R]	Detail
Requests the status of the graph (HV/S)	**[C]** ?REC $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: graph recording in progress **x** = D: graph recording stopped **x** = S: graph saving in progress **x** = N: recording disabled *Example [R]: E $^{C}_{R}$* *Graph recording is in progress.*
Requests the status of the detector (HV/S)	**[C]** ?SHD $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 0: detector operational (On) **x** = 1: detector shutting down *Example [R]: 0 $^{C}_{R}$* *The detector is operational (On)*
Requests the status of the detector (HV/S)	**[C]** ?ST $^{C}_{R}$ **[R]** xxxx $^{C}_{R}$	**xxxx**: detector status as a 5-digit integer See chapter “Additional information”
Requests the time of the last stop (HV/S)	**[C]** ?TIA $^{C}_{R}$ **[R]** hhmmss $^{C}_{R}$	**hh**: hour **mm**: minutes **ss**: seconds *Example [R]: 105336 $^{C}_{R}$* *The last stop was at 10:53:36*
Requests the time of the last start-up (HV/S)	**[C]** ?TIM $^{C}_{R}$ **[R]** hhmmss $^{C}_{R}$	**hh**: hour **mm**: minutes **ss**: seconds *Example [R]: 082602 $^{C}_{R}$* *The last start-up was at 08:26:02*
Requests the string digits of the detector status (HV/S)	**[C]** ?TR $^{C}_{R}$ **[R]** -	See chapter “Additional information”

Measurement menu

Description	Command [C] Response [R]	Detail
Requests the target value for the automatic calculation of the correction using the hard vacuum test method (HV) [1]	**[C]** ?AEH $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: target value *Example [R]: 235-09 $^{C}_{R}$* *The target value using the hard vacuum test method is $2.35 \cdot 10^{-7}$.*
Requests the leak value for the automatic calculation of the correction using the vacuum test method (S) [1]	**[C]** ?AES $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: leak value *Example [R]: 633-08 $^{C}_{R}$* *The leak value using the sniffer test method is $6.33 \cdot 10^{-6}$.*
Requests the hard vacuum correction coefficient (HV) [1]	**[C]** ?HV $^{C}_{R}$ **[R]** CFx $^{C}_{R}$	**CF**: correction coefficient **x** = E: coefficient enabled **x** = D: coefficient disabled *Example [R]: 100+00E $^{C}_{R}$* *The correction coefficient is enabled and is 100.*
Requests the sniffer correction coefficient (S) [1]	**[C]** ?SN $^{C}_{R}$ **[R]** CFx $^{C}_{R}$	**CF**: correction coefficient in sniffer **x** = E: coefficient enabled **x** = D: coefficient disabled *Example [R]: 240-01E $^{C}_{R}$* *The signal using the sniffer test method is multiplied by 24.*
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the tracer gas used (HV/S) (HV/S) [2]	**[C]** ?GZ $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 2: hydrogen **x** = 3: helium 3/3-mass **x** = 4: helium 4/helium *Example [R]: 4 $^{C}_{R}$* *The tracer gas selected is helium 4/helium.*
Requests the leak rate (HV/S) [2]	**[C]** ?LE $^{C}_{R}$ **[R]** CFx $^{C}_{R}$	**CF**: leak rate measured in the current detector status **x** = R: uncorrected leak rate **x** = C: corrected leak rate *Example [R]: 400-07C $^{C}_{R}$* *The leak rate measured is 4 · 10^{-5}. The leak rate is uncorrected.*
Requests the internal calibrated leak information indicated on the label (HV) [3]	**[C]** ?FE $^{C}_{R}$ **[R]** CFabccccdd $^{C}_{R}$	**CF**: internal calibrated leak value **a**: temperature coefficient **b**: loss per year (%) **cccc**: year of calibration **dd**: reference temperature (°C) *Example [R]: 100-0923202026 $^{C}_{R}$* *The leak value is 1 · 10^{-7} mbar·l/s: it varies by 2 %/°C, with a reference temperature of 26°C. It loses 3%/year. It was calibrated in 2020.*
Requests the selected Master calibrated leak (S) [3][5]	**[C]** ?FEC $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 1: Master 1 calibrated leak **x** = 2: Master 2 calibrated leak **x** = 3: Master 3 calibrated leak **x** = 4: Master 4 calibrated leak **x** = 5: Master 5 calibrated leak *Example [R]: 2 $^{C}_{R}$* *Master 2 calibrated leak is selected.*
Requests the parameters of the calibrated leak used for internal calibration (internal or external leak) (HV/S) [3]	**[C]** ?FEMT $^{C}_{R}$ **[R]** xCFyzaabbccddd-deeff $^{C}_{R}$	**x** = 2: hydrogen **x** = 3: helium 3/3-mass **x** = 4: helium 4/helium **CF**: calibrated leak value **y**: unit (idem ?UN $^{C}_{R}$) **z** = D: 'external' leak position **z** = E: 'internal' leak position with closed valve **z** = O: 'internal' leak position with open valve **z** = N: no calibrated leak **z** = S: 'ext. sniffer' leak position **z** = C: 'concentration' leak position **z** = M: 'machine' leak position **aa**: temperature coefficient (1/10 of %) **bb**: reference temperature (°C) **cc**: loss per year (%) **dddd**: year of calibration **ee**: internal or external calibration leak temperature (°C) **ff**: month of calibration *Example [R]: 4100-091E30200220192201 $^{C}_{R}$* *The calibrated leak used is an internal calibrated helium 4/ helium leak with the valve closed. The leak value is 1 · 10^{-7} mbar·l/s: it varies by 3 %/°C, with a reference temperature of 20°C. It loses 2%/year. The ambient temperature is 22°C. It was calibrated in January 2019.*
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the information of Master 1 calibrated leak (S) 3)5)	**[C]** ?FES1 $^{C}_{R}$ **[R]** xCFyzaabbccddd-deeffgggggggggg $^{C}_{R}$	**x** = 2: hydrogen **x** = 3: helium 3/3-mass **x** = 4: helium 4/helium **CF**: calibrated leak value **y**: unit (idem ?UN $^{C}_{R}$) **z** = D: 'external' leak position **z** = E: 'internal' leak position with closed valve **z** = O: 'internal' leak position with open valve **z** = N: no calibrated leak **z** = S: 'ext. sniffer' leak position **z** = C: 'concentration' leak position **z** = M: 'machine' leak position **aa**: temperature coefficient (1/10 of %) **bb**: reference temperature (°C) **cc**: loss per year (%) **dddd**: year of calibration **ee**: internal or external calibration leak temperature (°C) **ff**: month of calibration **ggggggggg**: name of the Master calibrated leak (10 characters obligatory) *Example [C]: ?FES1 $^{C}_{R}$* *Example [R]: 4100-091E30200220192201Master 1 $^{C}_{R}$* *The calibrated leak used is an internal calibrated helium 4/ helium leak with the valve closed. The leak value is $1 \cdot 10^{-7}$ mbar·l/s: it varies by 3 %/°C, with a reference temperature of 20°C. It loses 2%/year. The ambient temperature is 22°C. It was calibrated in January 2019. It is called Master 1.*
Requests the information of Master 2 calibrated leak (S) 3)5)	**[C]** ?FES2 $^{C}_{R}$ **[R]** xCFyzaabbccddd-deeffgggggggggg $^{C}_{R}$	
Requests the information of Master 3 calibrated leak (S) 3)5)	**[C]** ?FES3 $^{C}_{R}$ **[R]** xCFyzaabbccddd-deeffgggggggggg $^{C}_{R}$	
Requests the information of Master 4 calibrated leak (S) 3)5)	**[C]** ?FES4 $^{C}_{R}$ **[R]** xCFyzaabbccddd-deeffgggggggggg $^{C}_{R}$	
Requests the information of Master 5 calibrated leak (S) 3)5)	**[C]** ?FES5 $^{C}_{R}$ **[R]** xCFyzaabbccddd-deeffgggggggggg $^{C}_{R}$	
Request the 'code for PV leak' of the Master 1 calibrated leak (S) 3)5)	**[C]** ?FESC1 $^{C}_{R}$ **[R]** xxxxxxxxxxx $^{C}_{R}$	**xxxxxxxxxxx**: code for PV leak of the Master calibrated leak *Example [C]: ?FESC1 $^{C}_{R}$* *Example [R]: 145222ZIUM80 $^{C}_{R}$* *The code for the PV leak of the Master 1 calibrated leak is 145222ZIUM80.*
Request the 'code for PV leak' of the Master 2 calibrated leak (S) 3)5)	**[C]** ?FESC2 $^{C}_{R}$ **[R]** xxxxxxxxxxx $^{C}_{R}$	
Request the 'code for PV leak' of the Master 3 calibrated leak (S) 3)5)	**[C]** ?FESC3 $^{C}_{R}$ **[R]** xxxxxxxxxxx $^{C}_{R}$	
Request the 'code for PV leak' of the Master 4 calibrated leak (S) 3)5)	**[C]** ?FESC4 $^{C}_{R}$ **[R]** xxxxxxxxxxx $^{C}_{R}$	
Request the 'code for PV leak' of the Master 5 calibrated leak (S) 3)5)	**[C]** ?FESC5 $^{C}_{R}$ **[R]** xxxxxxxxxxx $^{C}_{R}$	
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the type of setting used for Master 1 calibrated leak (S) [3)5)]	**[C]** ?FEST1 $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 0: Setting the Master calibrated leak using the code for the PV leak **x** = 1: Setting the Master calibrated leak without using the code for the PV leak *Example [C]: ?FEST1* $^{C}_{R}$ *Example [R]: 1* $^{C}_{R}$ *Setting the Master 1 calibrated leak without using the code for the PV leak.*
Requests the type of setting used for Master 2 calibrated leak (S) [3)5)]	**[C]** ?FEST2 $^{C}_{R}$ **[R]** x $^{C}_{R}$	
Requests the type of setting used for Master 3 calibrated leak (S) [3)5)]	**[C]** ?FEST3 $^{C}_{R}$ **[R]** x $^{C}_{R}$	
Requests the type of setting used for Master 4 calibrated leak (S) [3)5)]	**[C]** ?FEST4 $^{C}_{R}$ **[R]** x $^{C}_{R}$	
Requests the type of setting used for Master 5 calibrated leak (S) [3)5)]	**[C]** ?FEST5 $^{C}_{R}$ **[R]** x $^{C}_{R}$	
Requests the temperature (HV/S) [3)]	**[C]** ?TE $^{C}_{R}$ **[R]** xxy $^{C}_{R}$	**xx**: temperature of the calibrated leak (°C) **y** = S: temperature sensor measurement **y** = V: preset value *Example [R]: 22S* $^{C}_{R}$ *The temperature of the calibrated leak is 22°C (TEMP2 sensor measurement).*
Requests the time of the last calibration (HV/S) [3)]	**[C]** ?TIC $^{C}_{R}$ **[R]** hhmmss $^{C}_{R}$	**hh**: hour **mm**: minutes **ss**: seconds *Example [R]: 183050* $^{C}_{R}$ *The last calibration was performed at 18:30:50.*
Requests the parameters of the depollution function (HV) [4)]	**[C]** ?AA $^{C}_{R}$ **[R]** CFx $^{C}_{R}$	**CF**: depollution function start threshold by test stop **x** = E: depollution function enabled **x** = D: depollution function disabled *Example [R]: 500-07E* $^{C}_{R}$ *The depollution function start threshold is 5 · 10^{-5}. The depollution function is enabled.*
Requests the maximum background settings (HV/S) [4)]	**[C]** ?AR $^{C}_{R}$ **[R]** CFx $^{C}_{R}$	**CF**: maximum background **x** = E: maximum background enabled **x** = D: maximum background disabled *Example [R]: 100-10* $^{C}_{R}$ *The maximum background is enabled and is 1 · 10^{-8}.*
Requests pressure threshold 1 (HV/S) [4)]	**[C]** ?NP1 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: pressure threshold *Example [C]: ?NP1* $^{C}_{R}$ *Example [R]: 100-02* $^{C}_{R}$ *The 'Pressure threshold 1' output is enabled if the pressure threshold 1 is less than 1.*
Requests pressure threshold 2 (HV/S) [4)]	**[C]** ?NP2 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	
Requests pressure threshold 3 (HV/S) [4)]	**[C]** ?NP3 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the reject threshold using the current test method (HV/S) [4]	**[C]** ?S1 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: threshold in the current measurement unit *Example [R]: 200-09 $^{C}_{R}$* *The reject threshold using the current test method is $2 \cdot 10^{-7}$.*
Requests the reject threshold using the hard vacuum test method (HV) [4]	**[C]** ?S1H $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: threshold in the current measurement unit *Example [R]: 600-09 $^{C}_{R}$* *The reject threshold using the hard vacuum test method is $6 \cdot 10^{-7}$.*
Requests the reject threshold using the sniffer test method (S) [4]	**[C]** ?S1S $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: threshold in the current measurement unit *Example [R]: 635-07 $^{C}_{R}$* *The reject threshold using the sniffer test method is $3.5 \cdot 10^{-5}$.*
Requests the alarm threshold in % of the reject threshold using the current test method (HV/S) [4]	**[C]** ?S1W $^{C}_{R}$ **[R]** xxxy $^{C}_{R}$	**x**: alarm threshold as a percentage of the reject threshold **y** = D: alarm threshold enabled **y** = E: alarm threshold disabled *Example [R]: 050E $^{C}_{R}$* *The alarm threshold is 50% of the reject threshold. The alarm threshold is enabled.*
Requests the alarm threshold in % of the reject threshold using the hard vacuum test method (HV) [4]	**[C]** ?S1WH $^{C}_{R}$ **[R]** xxxy $^{C}_{R}$	**x**: alarm threshold as a percentage of the reject threshold **y** = D: alarm threshold enabled **y** = E: alarm threshold disabled *Example [R]: 050E $^{C}_{R}$* *The alarm threshold is 50% of the reject threshold. The alarm threshold is enabled.*
Requests the alarm threshold in % of the reject threshold using the sniffer test method (S) [4]	**[C]** ?S1WS $^{C}_{R}$ **[R]** xxxy $^{C}_{R}$	**x**: alarm threshold as a percentage of the reject threshold **y** = D: alarm threshold enabled **y** = E: alarm threshold disabled *Example [R]: 050E $^{C}_{R}$* *The alarm threshold is 50% of the reject threshold. The alarm threshold is enabled.*
Requests the clogged probe threshold (S) [4]	**[C]** ?S6 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: clogged probe threshold in the current unit *Example [R]: 300-07 $^{C}_{R}$* *The clogged probe threshold is $3 \cdot 10^{-5}$.*
Requests the clogged probe threshold of the Smart probe (S) [4]	**[C]** ?SSS $^{C}_{R}$ **[R]** xxxx $^{C}_{R}$	**xxxx**: clogged probe threshold of the Smart probe (sccm) *Example [R]: 0020 $^{C}_{R}$* *The clogged probe threshold is 20 sccm.*
Requests the status of the bargraph display centered on the reject threshold (HV/S) [4]	**[C]** ?ZR $^{C}_{R}$ **[R]** x $^{C}_{R}$	**y** = D: displays the bargraph display centered on the disabled reject threshold **y** = E: displays the bargraph display centered on the enabled reject threshold *Example [R]: E $^{C}_{R}$* *The bargraph display is centered on the reject threshold.*
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Test menu

Description	Command [C] Response [R]	Detail
Requests the Massive mode parameters (HV) [1]	**[C]** ?MAS $^{C}_{R}$ **[R]** xyz $^{C}_{R}$	**x** = E: Massive mode enabled **x** = D: Massive mode disabled **y** = E: Massive mode in progress **y** = D: Massive mode not triggered **z** = E: massive leak detected **z** = D: massive leak not detected *Example [R]: EDD $^{C}_{R}$* *Massive mode is enabled but not triggered. A massive leak is not detected.*
Requests the zero function status (HV/S) [2]	**[C]** ?AUZ $^{C}_{R}$ **[R]** xy $^{C}_{R}$	**x** = E: zero function enabled **x** = D: zero function disabled **y** = 1: exit zero function by pressing the **ZERO** key once **y** = 2: exit zero function by pressing and holding the **ZERO** key for at least 3 seconds **y** = 0: **ZERO** key disabled *Example [R]: E2 $^{C}_{R}$* *Zero function is enabled. The user must press and hold the ZERO key for at least 3 seconds to exit zero function.*
Requests the zero function status (HV/S) [2]	**[C]** ?AZ $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: zero function enabled **x** = D: zero function disabled *Example [R]: E $^{C}_{R}$* *Zero function is enabled.*
Requests the reference zero status (HV/S) [2]	**[C]** ?SZ $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: zero reference leak rate *Example [R]: 300-07 $^{C}_{R}$* *The reference leak rate is 3 · 10^{-5}.*
Requests the parameters of the zero function (HV/S) [2]	**[C]** ?ZB $^{C}_{R}$ **[R]** xyzzzzCF $^{C}_{R}$	**x** = A: automatic function **x** = O: manual function (managed by operator) **y** = T: trigger on counter **y** = S: trigger on threshold crossed **y** = -: if 'x = O' (manual function (managed by operator)) **z** = mmss: zero frequency in min and sec **CF**: zero trigger threshold *Example [R]: AT0230200-09 $^{C}_{R}$* *Zero function is triggered automatically. A new zero capture is made every 2 min 30 sec. The zero trigger threshold is 2 · 10^{-7}.*
Requests the reference electronic zero (HV/S) [2]	**[C]** ?ZE $^{C}_{R}$ **[R]** xxx $^{C}_{R}$	**xxx**: reference electronic zero *Example [R]: 100 $^{C}_{R}$* *The reference electronic zero value is 110.*
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end 5) Memo function 6) Method 7) Mode 8) Regeneration		9) Type of probe 10) Purge valve 11) Bypass 12) Crossover pressure 13) Calibration check 14) Dynamic calibration 15) Calibration 16) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the parameters of the dynamic calibration (HV/S) [14]	**[C]** ?CV $^{C}_{R}$ **[R]** CF1CF2xy $^{C}_{R}$	**CF1**: leak value in mbar·l/s **CF2**: coefficient **x** = E: dynamic calibration coefficient enabled **x** = D: dynamic calibration coefficient disabled **y** = C: calculation in progress **y** = S: calculation stopped *Example [R]: 100-07100-02EC* $^{C}_{R}$ *The leak value is 1 · 10^{-5} mbar·l/s. The dynamic calibration coefficient is enabled and is 1. The calculation is in progress.*
Request the parameters of the automatic calibration requirement (HV/S) [13]	**[C]** ?ACA $^{C}_{R}$ **[R]** xyyyyyzzzzz $^{C}_{R}$	**x** = E: warning is automatic **x** = D: warning is not automatic **y** = yyyyy: cycle interval (test) between each calibration check **z** = zzzzz: time interval between each calibration check *Example [R]: E1000022500* $^{C}_{R}$ *Automatic calibration is enabled. The operator is warned that the cycle counter or the hour counter is enabled (calibration message requested). The cycle counter is 10,000 cycles. The hour counter is 22,500 hours.*
Requests the status of the inlet vent valve (HV) [3]	**[C]** ?IV $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: valve open **x** = D: valve closed *Example [R]: D* $^{C}_{R}$ *The inlet vent valve is closed.*
Requests the parameters of the inlet vent function (HV) [3]	**[C]** ?IVP $^{C}_{R}$ **[R]** xyzmmss $^{C}_{R}$	**x** = M: manual opening by user **x** = A: automatic opening **y**: = 0: opening delay of 0 seconds **y**: = 1: opening delay of 1 second **y**: = 2: opening delay of 2 seconds **z** = E: counter that holds the valve open is enabled **z** = D: counter that holds the valve open is disabled **mm**: value of the counter that holds the valve open (min) **ss**: value of the counter that holds the valve open (sec) *Example [R]: A2E0130* $^{C}_{R}$ *The inlet vent valve opens automatically, with an opening delay of 2 second. The valve remains open for 1 minute 30 seconds.*
Requests the number of 'Refreshes' (involuntary inlet vent during a test) undergone by the detector (HV) [3]	(**[C]** ?RFH $^{C}_{R}$ **[R]** xxxxx $^{C}_{R}$	**xxxxx**: number of 'Refreshes' undergone by the detector *Example [R]: 00014* $^{C}_{R}$ *The detector has undergone 14 'Refreshes'*
Asks if the inlet vent is automatic or manual at the cycle end (HV) [3]	**[C]** ?VT $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: automatic inlet vent at the cycle end **x** = D: manual inlet vent at the end of the cycle *Example [R]: E* $^{C}_{R}$ *There is an automatic inlet vent at the end of the cycle.*

1) Massive mode	9) Type of probe
2) Zero activation	10) Purge valve
3) Inlet vent	11) Bypass
4) Cycle end	12) Crossover pressure
5) Memo function	13) Calibration check
6) Method	14) Dynamic calibration
7) Mode	15) Calibration
8) Regeneration	16) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the parameters of the automatic cycle end function (HV) [4]	**[C]** ?CA $^{C}_{R}$ **[R]** abcccdddd $^{C}_{R}$	**a** = E: automatic cycle end function enabled **a** = D: automatic cycle end function disabled (manual cycle end) **b** = E: roughing time used **b** = D: no roughing time used **cccc** = maximum roughing time set (mmss format). No 'cccc' in the response if 'b = D'. **dddd** = measurement time set (mmss format). *Example [R]: EE01000015 $^{C}_{R}$* *The cycle end function is automatic. Roughing time is used and is 1 minute. The measurement time is 15 seconds.*
Requests the parameters of the automatic cycle end function using the sniffer test method (S) [4]	**[C]** ?CAS $^{C}_{R}$ **[R]** abccccccdddddd $^{C}_{R}$	**a** = E: automatic cycle end function using the sniffer test method is enabled **a** = D: manual cycle end function using the sniffer test method is enabled **b** = E: counter before checking the measured leak (hhmmss format) **b** = D: no counter before checking the measured leak **ccccc**: counter for checking the measured leak (hhmmss format) No 'ccccc' in the response if 'b = D'. **ddddd**: duration of measurement (hhmmss format). *Example [R]: EE000100 $^{C}_{R}$* *The automatic cycle end function using the sniffer test method is enabled. The counter for controlling the measured leak is used and is 1 min. The measurement duration is 15 seconds.*
Requests the parameters of the Memo function (HV) [5]	**[C]** ?ME $^{C}_{R}$ **[R]** xyzzzzCF $^{C}_{R}$	**x** = E: Memo function in progress **x** = M: Memo function enabled **x** = A: Memo function disabled **y** = E: Memo on counter **y** = D: Memo between 2 cycles **zzzz**: memorization time (mn ss) **CF**: memorized leak rate displayed *Example [R]: ME0130642-09 $^{C}_{R}$* *The Memo function is enabled, on the counter. The leak rate is memorized for 1 minute 30 seconds. The memorized leak rate displayed is $6.42 \cdot 10^{-7}$.*
Requests the result of the last test (S) [5][16]	**[C]** ?RE $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: part OK **x** = D: part NOK *Example [R]: E $^{C}_{R}$* *The last part tested is OK.*
Requests the test method used (HV/S) [6]	**[C]** ?TST $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 0: hard vacuum test method **x** = 2: sniffer test method *Example [R]: 0 $^{C}_{R}$* *The hard vacuum test method is selected.*

1) Massive mode	9) Type of probe
2) Zero activation	10) Purge valve
3) Inlet vent	11) Bypass
4) Cycle end	12) Crossover pressure
5) Memo function	13) Calibration check
6) Method	14) Dynamic calibration
7) Mode	15) Calibration
8) Regeneration	16) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the selected test mode (HV) [7)]	**[C]** ?CYT $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 2: Gross Leak mode **x** = 3: Normal mode **x** = 4: High Sensitivity mode *Example [R]: 3 $^{C}_{R}$* *Normal mode is selected.*
Requests the calibration mode (HV/S) [15)]	**[C]** ?AC $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: calibration in start-up mode **x** = D: calibration in manual mode **x** = S: calibration in operator mode **x** = V: calibration check on start-up *Example [R]: E $^{C}_{R}$* *The calibration function is in start-up mode.*
Requests the target value for a calibration (HV/S) [15)]	**[C]** ?AC3 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: calibration target value (internal calibrated leak corrected) *Example [R]: 125-09 $^{C}_{R}$* *The current target value is 1.25 · 10^{-7}.*
Requests confirmation of the current calibration step (HLTxxx) (HV/S) [15)]	**[C]** ?CAK $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: confirmation requested of the current calibration step **x** = D: no confirmation requested of the current calibration step *Example [R]: E $^{C}_{R}$* *Confirmation is requested for the current calibration step.*
Requests the calibrated leak used for calibration (HV/S) [15)]	**[C]** ?FEP $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = D: 'external' leak position **x** = E: 'internal' leak position with closed valve **x** = O: 'internal' leak position with open valve **x** = N: no calibrated leak **x** = S: 'ext. sniffer ' leak position **x** = C: 'concentration' leak position **x** = M: 'machine' leak position *Example [R]: D $^{C}_{R}$* *Calibration is performed with an external calibrated leak.*
Requests the pressure threshold in Gross Leak mode in the current unit (HV) [12)]	**[C]** ?P1U $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: threshold in the current unit *Example [R]: 150-02 $^{C}_{R}$* *The threshold is 1.5 mbar (if the current unit is mbar·l/s).*
Requests the pressure threshold in Normal mode in the current unit (HV) [12)]	**[C]** ?P2U $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: threshold in the current unit *Example [R]: 500-03 $^{C}_{R}$* *The threshold is 5 · 10^{-1} mbar (if the current unit is mbar·l/s).*
Requests the pressure threshold in High Sensitivity mode in the current unit (HV) [12)]	**[C]** ?P3U $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: threshold in the current unit *Example [R]: 400-04 $^{C}_{R}$* *The threshold is 4 · 10^{-2} mbar (if the current unit is mbar·l/s).*

1) Massive mode	9) Type of probe
2) Zero activation	10) Purge valve
3) Inlet vent	11) Bypass
4) Cycle end	12) Crossover pressure
5) Memo function	13) Calibration check
6) Method	14) Dynamic calibration
7) Mode	15) Calibration
8) Regeneration	16) ASM 306S only

Description	Command [C] Response [R]	Detail
Requests the status of the Regeneration or Burn-in function (HV/S) [8]	**[C]** ?REG $^{C}_{R}$ **[R]** xyzzzz $^{C}_{R}$	**x** = 0: no information on the status of the Regeneration or Burn-in function **x** = 1: status of the Regeneration function **x** = 2: status of the Burn-in function without calibration **x** = 3: status of the Burn-in function with calibration **y** = 0: the Regeneration or Burn-in function can be enabled **y** = V: the Regeneration or Burn-in function cannot be enabled because the inlet vent is not automatic **y** = S: the Regeneration or Burn-in function cannot be enabled because a sniffer test is in progress **y** = C: the Regeneration or Burn-in function cannot be enabled because a hard vacuum test is in progress **zzzz**: duration since the start of the Regeneration or Burn-in function (hh:mm) *Example [R]: 100023* $^{C}_{R}$ *The Regeneration function is enabled from 0 h 23 min.*
Requests the type of probe (HV/S) [9]	**[C]** ?SPR $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 1: standard probe **x** = 2: Smart probe *Example [R]: 2* $^{C}_{R}$ *The probe is a Smart probe.*
Requests the status of the purge valve (HV/S) [1]	**[C]** ?VPU $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: purge valve set to ‘open’ **x** = A: purge valve set to ‘automatic’ **x** = D: purge valve set to ‘closed’ *Example [R]: E* $^{C}_{R}$ *The purge valve set to ‘open’.*
Requests the parameters of the Bypass function (HV) [11]	**[C]** ?PAD $^{C}_{R}$ **[R]** abcd $^{C}_{R}$	**a** = 0: Bypass not connected **a** = E: Bypass connected and Bypass function enabled **a** = D: Bypass connected and Bypass function disabled **b** = 0: Bypass mode: no Bypass **b** = 1: Bypass mode: rapid pumping **b** = 2: Bypass mode: partial flow **c** = 1: internal pumping not delayed **c** = 2: internal pumping delayed **d** = 0: Bypass valve closed **d** = 1: Bypass valve open *Example [R]: E211* $^{C}_{R}$ *The Bypass is connected. The Bypass function is set to partial flow without delayed internal pumping. The Bypass valve is open.*
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end 5) Memo function 6) Method 7) Mode 8) Regeneration		9) Type of probe 10) Purge valve 11) Bypass 12) Crossover pressure 13) Calibration check 14) Dynamic calibration 15) Calibration 16) ASM 306S only

Probe menu

Description	Command [C] Response [R]	Detail
Requests the initial flow of the probe in sccm (S) [1)2)]	**[C]** ?FLQ $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: initial flow of the probe in sccm *Example [R]: 279+00 $^{C}_{R}$* *The probe flow is 279 sccm.*
Requests the flow of the probe in sccm (S) [1)2)]	**[C]** ?FLU $^{C}_{R}$ **[R]** xxxxxx $^{C}_{R}$	**xxxxxx**: current probe flow (1/10 sccm) *Example [R]: 002779 $^{C}_{R}$* *The current probe flow is 277.9 sccm.*
1) Probe flow unit		2) ASM 306S only

Configuration menu

Description	Command [C] Response [R]	Detail
Requests the date (HV/S) [1)]	**[C]** ?DA $^{C}_{R}$ **[R]** mmddyy $^{C}_{R}$	**mm**: month **dd**: day **yy**: year *Example [R]: 122121 $^{C}_{R}$* *The date is December 21, 2021.*
Requests the current time (HV/S) [1)]	**[C]** ?TI $^{C}_{R}$ **[R]** hhmmss $^{C}_{R}$	**hh**: hour **mm**: minutes **ss**: seconds *Example [R]: 123456 $^{C}_{R}$* *The current time is 12:34:56.*
Requests the language (HV/S) [1)]	**[C]** ?SP $^{C}_{R}$ **[R]** xxx $^{C}_{R}$	**xxx** = ANG: English **xxx** = JAP: Japanese **xxx** = FRA: French **xxx** = ALL: German **xxx** = ESP: Spanish **xxx** = CHI: Chinese **xxx** = COR: Korean **xxx** = RUS: Russian **xxx** = POR: Portuguese *Example [R]: FRA $^{C}_{R}$* *French is selected.*
Requests the current measurement unit (HV/S) [1)]	**[C]** ?UN $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 1: mbar·l/s **x** = 2: Pa·m^3/s **x** = 3: Torr·l/s **x** = 4: atm·cm^3/s **x** = 5: ppm **x** = 6: sccm **x** = 7: sccs **x** = 8: mTorr·l/s **x** = 9: gr/yr **x** = A: oz/yr **x** = B: lb/yr *Example [R]: 1 $^{C}_{R}$* *The current measurement unit is mbar·l/s.*
Requests the lower display limit for the leak rate (HV/S) [2)]	**[C]** ?LDL $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: lower display limit in current unit *Example [R]: 100-11 $^{C}_{R}$* *The value displayed for the leak rate cannot be less than 1 · 10^{-9} mbar·l/s (if the current unit is mbar·l/s).*
1) Date - Time - Language - Unit 2) Minimum value displayed		3) Sound volume 4) Screen adjustment

Description	Command [C] Response [R]	Detail
Requests the pressure inside the analysis cell (HV/S) [2]	**[C]** ?PS $^{C}_{R}$	**CF**: pressure inside the analysis cell in the current unit *Example [R]: 100-07* $^{C}_{R}$ *The pressure inside the analysis cell is 1 · 10^{-5} mbar·l/s (if the current unit is mbar·l/s).*
Request the status of the speaker and external headphones (HV/S) [3]	**[C]** ?HP $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: active speaker and inactive external headphones **x** = D: inactive speaker and active external headphones *Example [R]: E* $^{C}_{R}$ *The speaker is active and the external headphones are inactive.*
Requests the status of the sound (HV/S) [3]	**[C]** ?SO $^{C}_{R}$ **[R]** xy $^{C}_{R}$	**x**: sound volume **y** = E: sound enabled **y** = D: sound disabled *Example [R]: 5E* $^{C}_{R}$ *The sound is enabled and the volume is 5.*
Requests the status of the voice synthesis (HV/S) [3]	**[C]** ?SY $^{C}_{R}$ **[R]** xy $^{C}_{R}$	**x**: voice synthesis volume **y** = E: voice synthesis enabled **y** = D: voice synthesis disabled *Example [R]: 4E* $^{C}_{R}$ *Voice synthesis is enabled and the volume is 4.*
Requests the status of the Paging function (HV/S) [4]	**[C]** ?PAG $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = E: Paging function enabled **x** = D: Paging function disabled *Example [R]: E* $^{C}_{R}$ *Paging function is enabled.*
1) Date - Time - Language - Unit 2) Minimum value displayed		3) Sound volume 4) Screen adjustment

Maintenance menu

Description	Command [C] Response [R]	Detail
Requests the access level of the control panel (HV/S) [1]	**[C]** ?IL $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 1: access level restricted **x** = 2: intermediate access level **x** = 3: full access level *Example [R]: 1* $^{C}_{R}$ *The control panel has a restricted access level.*
Requests the password (HV/S) [1]	**[C]** ?PW $^{C}_{R}$ **[R]** xxxxy $^{C}_{R}$	**xxxx**: password **y**= E: password enabled **y**= D: password disabled *Example [R]: 1998E* $^{C}_{R}$ *The password is 1998 and it is enabled.*
Requests the internal gauge information (HV) [2]	**[C]** ?GAU $^{C}_{R}$ **[R]** lyyy $^{C}_{R}$	**l**: gauge used as internal gauge **yyy**: name of the gauge • AP-: Pirani 0–10 V gauge • Pi3: Pi3C gauge • P-C: Piezo-capacitive gauge *Example [R]: IAP-* $^{C}_{R}$ *The internal gauge is a Pirani 0–10 V gauge.*
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance 4) Last maintenance operation 5) History		6) Information 7) External gauge 8) Turbo and cell maintenance 9) Service

Description	Command [C] Response [R]	Detail
Requests the full range of the external gauge (HV) [2]	**[C]** ?GAUS $^{C}_{R}$ **[R]** xxxxx $^{C}_{R}$	**xxxxx**: full range of the Piezo-capacitive gauge (mbar) *Example [R]: 50000 $^{C}_{R}$* *The full range of the gauge is 50,000 mbar.*
Requests the voltage output of the external gauge (HV) [2]	**[C]** ?GAUT $^{C}_{R}$ **[R]** xx.xxxxx $^{C}_{R}$	**xx.xxxxx**: voltage output of the external gauge *Example [R]: 05.21402 $^{C}_{R}$* *The voltage output of the external gauge is 5.21402 V.*
Requests the internal pressure (HV) [2]	**[C]** ?PE $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: input pressure in the current detector status and in the current measurement unit *Example [R]: 400-02 $^{C}_{R}$* *The inlet pressure is 4.*
Requests the value of the hour counters (HV/S) [3]	**[C]** ?CH $^{C}_{R}$ **[R]** aaaaabbbbbccccc $^{C}_{R}$	**aaaaa**: total number of hours the leak detector has been used **bbbbb**: total hours of filament 1 usage **ccccc**: total hours of filament 2 usage *Example [R]: 012000115000050 $^{C}_{R}$* *Total number of hours the leak detector has been used: 1200 h* *Total hours of filament 1 usage: 1150 h* *Total hours of filament 2 usage: 50 h*
Requests the backing pump hour counter (HV/S) [3]	**[C]** ?MC0 $^{C}_{R}$ **[R]** xxxxxyyyyy $^{C}_{R}$	**xxxxx**: number of hours of operation **yyyyy**: number of hours before maintenance *Example [C]: ?MC0 $^{C}_{R}$* *Example [R]: 0025603000 $^{C}_{R}$* *The backing pump counter is at 256 hours. The reset value is 3,000 hours.*
Requests the turbomolecular pump hour counter (HV/S) [3]	**[C]** ?MC1 $^{C}_{R}$ **[R]** xxxxxyyyyy $^{C}_{R}$	
Requests the turbomolecular pump no. 2 hour counter (HV/S) [3]	**[C]** ?MC2 $^{C}_{R}$ **[R]** xxxxxyyyyy $^{C}_{R}$	
Requests the hour counter (HV/S) [3]	**[C]** ?MCC $^{C}_{R}$ **[R]** CF1CF2 $^{C}_{R}$	**CF1**: current number of cycles **CF2**: number of cycles before maintenance *Example [R]: 436-00500-00 $^{C}_{R}$* *The cycle counter is 436 cycles. The reset value is 500 cycles.*
Requests the date, time and result of the last internal calibration (HV) [5]	**[C]** ?DTC $^{C}_{R}$ **[R]** jjmmaahhmmssx $^{C}_{R}$	**dd**: day **mm**: month **yy**: year **hh**: hour **mm**: minute **ss**: second **x** = E: calibration successful **x** = D: calibration fail *Example [R]: 060123141936E $^{C}_{R}$* *The last calibration was performed on January 6, 2023 at 14:19:36: the calibration was successful.*
Requests memorized faults (HV/S) [5]	**[C]** ?ER $^{C}_{R}$ **[R]** xaaaabbbb… $^{C}_{R}$	**x**: current number of faults **aaaa, bbbb, ...**: fault code for each fault See chapter “List of messages” *Example [R]: 10019 $^{C}_{R}$* *1 fault has been memorized: filament problem (code 0019).*

1) Access/Password
2) Pirani internal calibration
3) Counter before next maintenance
4) Last maintenance operation
5) History
6) Information
7) External gauge
8) Turbo and cell maintenance
9) Service

Description	Command [C] Response [R]	Detail
Requests the total number of faults saved (HV/S) [5]	**[C]** ?HDE $^{C}_{R}$ **[R]** xxx $^{C}_{R}$	**xxx**: total number of faults saved *Example [R]: 030 $^{C}_{R}$* *30 faults have been saved.*
Requests the memorized warnings (HV/S) [5]	**[C]** ?WA $^{C}_{R}$ **[R]** xaaaabbbb… $^{C}_{R}$	**x**: current number of warnings **aaaa, bbbb, ...**: fault code for each warning See chapter “List of messages” *Example [R]: 10211 $^{C}_{R}$* *1 warning has been stored: manual calibration (0211).*
Requests the sensitivity coefficient of the 2 filaments (HV/S) [6]	**[C]** ?CF $^{C}_{R}$ **[R]** CF1CF2 $^{C}_{R}$	- **CF1**: sensitivity coefficient of filament 1 **CF2**: sensitivity coefficient of filament 2 *Example [R]: 132-02120-02 $^{C}_{R}$* *The sensitivity coefficient of filament 1 is set to 1.32. The sensitivity coefficient of filament 2 is set to 1.20.*
Requests the status of backing pump no. 1 (HV/S) [6]	**[C]** ?T01 $^{C}_{R}$ **[R]** xyyy $^{C}_{R}$	**x** = D: backing pump not used **x** = 2: pump synchronized **x** = 1: backing pump running **x** = S: backing pump stopped or faulty **yyy**: current speed With ACP backing pump **yyy** = 000: max. speed **yyy** = 001 nominal speed **yyy** = 002: slow speed **yyy** = 003: run-in speed **yyy** = 004: intermediate speed With MD1 backing pump **yyy** = 127: max. speed **yyy** = 127: nominal speed **yyy** = 013: reduced speed **yyy** = 013: slow speed **yyy** = 064: intermediate speed With KNF backing pump **yyy** = 205: max. speed **yyy** = 205: nominal speed **yyy** = 085: reduced speed **yyy** = 085: slow speed **yyy** = 128: intermediate speed *Example [C]: ?T01 $^{C}_{R}$* *Backing pump: ACP* *Example [R]: 2002 $^{C}_{R}$* *The ACP backing pump 1 is synchronized and running at low speed.*
Requests the status of backing pump no. 2 (HV/S) [6]	**[C]** ?T02 $^{C}_{R}$ **[R]** xyyy $^{C}_{R}$	
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance 4) Last maintenance operation 5) History		6) Information 7) External gauge 8) Turbo and cell maintenance 9) Service

Description	Command [C] Response [R]	Detail
Requests information related to turbomolecular pump no. 1 (HV/S) [6]	**[C]** ?T1 $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 0: pump fault **x** = 1: pump in rotation **x** = 2: pump synchronism (full speed) **x** = 3: pump in operation **x** = S: pump stopped *Example [C]: ?T1 $^{C}_{R}$* *Example [R]: 2 $^{C}_{R}$* *Turbomolecular pump no. 1 is at synchronism (full speed).*
Requests information related to turbomolecular pump no. 2 (HV/S) [6]	**[C]** ?T2 $^{C}_{R}$ **[R]** x $^{C}_{R}$	
Requests the turbomolecular pump speed (analysis cell) (HV/S) [6]	**[C]** ?V1 $^{C}_{R}$ **[R]** xxxxxy $^{C}_{R}$	xxxxx: speed (rpm) y = E: valid speed measurement y = D: invalid speed measurement *Example [C]: ?V1 $^{C}_{R}$* *Example [R]: 90000E $^{C}_{R}$* The turbomolecular pump no. 1 speed is 90,000 rpm. The speed measurement is valid.
Requests the turbomolecular pump no. 2 speed (HV/S) [6]	**[C]** ?V2 $^{C}_{R}$ **[R]** xxxxxy $^{C}_{R}$	
Requests the turbomolecular pump target speed in vacuum test mode (HV/S) [6]	**[C]** ?VITH $^{C}_{R}$ **[R]** xxxxyyyy $^{C}_{R}$	xxxx: target speed (Hz) yyyy: current speed (Hz) *Example [R]: 15001422 $^{C}_{R}$* *The target speed is 1500 Hz. The current speed is 1422 Hz.*
Requests the turbomolecular pump target speed in sniffer test mode (HV/S) [6]	**[C]** ?VITS $^{C}_{R}$ **[R]** xxxxyyyy $^{C}_{R}$	xxxx: target speed (Hz) yyyy: current speed (Hz) *Example [R]: 15001422 $^{C}_{R}$* *The target speed is 1500 Hz. The current speed is 1422 Hz.*
Requests the turbomolecular pump nominal speed (analysis cell) (HV/S) [6]	**[C]** ?VITN $^{C}_{R}$ **[R]** xxxxyyyy $^{C}_{R}$	xxxx: nominal speed (Hz) yyyy: current speed (Hz) *Example [R]: 15001422 $^{C}_{R}$* *The nominal speed is 1500 Hz. The current speed is 1422 Hz.*
Requests the external gauge information (HV) [7]	**[C]** ?GAUM $^{C}_{R}$ **[R]** xxx_yy $^{C}_{R}$	**xxx**: name of the external gauge • NoG: no gauge • AP-: Pirani gauge • P-C: capacitive gauge **yy**: external gauge identifier *Example [R]: AP-_03 $^{C}_{R}$* *The external gauge is a Pirani gauge and its identifier is 03.*
Requests the full range of the external gauge (HV) [7]	**[C]** ?GAUMS $^{C}_{R}$ **[R]** xxxxx $^{C}_{R}$	**xxxxx**: full range of the Piezo-capacitive external gauge *Example [R]: 50000 $^{C}_{R}$* *The full range of the external gauge is 50,000 mbar.*
Requests the voltage of the external gauge (HV) [7]	**[C]** ?GAUMT $^{C}_{R}$ **[R]** xx.xxxxx $^{C}_{R}$	**xx.xxxxx**: voltage output of the external gauge *Example [R]: 05.21402 $^{C}_{R}$* *The voltage of the external gauge is 5.21402 V.*
Requests the pressure of the external gauge (HV) [7]	**[C]** ?PEM $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: external gauge pressure in the current unit *Example [R]: 100-01 $^{C}_{R}$* *The external gauge pressure is 10.*

1) Access/Password
2) Pirani internal calibration
3) Counter before next maintenance
4) Last maintenance operation
5) History
6) Information
7) External gauge
8) Turbo and cell maintenance
9) Service

Description	Command [C] Response [R]	Detail
Requests the availability of the filaments (HV/S) [8]	**[C]** ?FM $^{C}_{R}$ **[R]** xy $^{C}_{R}$	**x** = 1: filament 1 available **x** = 0: filament 1 not available **y** = 1: filament 2 available **y** = 0: filament 2 not available *Example [R]: 01* $^{C}_{R}$ *Filament 1 is not available. Filament 2 is available.*
Requests the active filament (HV/S) [8]	**[C]** ?SW $^{C}_{R}$ **[R]** x $^{C}_{R}$	**x** = 1: filament 1 enabled **x** = 2: filament 2 enabled *Example [R]: 1* $^{C}_{R}$ *Filament 1 is enabled.*
Requests the emission current of the filament (HV/S) [9]	**[C]** ?IE $^{C}_{R}$ **[R]** xxx $^{C}_{R}$	**xxx**: emission current of the filament (1/100 of mbar) *Example [R]: 060* $^{C}_{R}$ *The emission current of the filament is 0.6 mA.*
Requests the CPU software version (HV/S) [9]	**[C]** ?MD $^{C}_{R}$ **[R]** aaaaaa Lxxxx y.yRyy $^{C}_{R}$	**aaaaaa**: detector model **Lxxxx**: detector software code **y.yRyy**: detector software version *Example [R]: ASM310 L0226 1.0R00* $^{C}_{R}$ *Detector model: ASM 310* *Detector software code: L0226* *Detector software version: 1.0R00*
Requests additional information related to the turbomolecular pump (HV/S) [9]	**[C]** ?T1M $^{C}_{R}$ **[R]** yyyyyzz $^{C}_{R}$	**yyyy**: hour counter **zz**: pump temperature (00 if not available) *Example [R]: 256900* $^{C}_{R}$ *The hour counter of the turbomolecular pump is 2569 hours. The pump temperature is not available.*
Requests the current collector voltage (HV/S) [9]	**[C]** ?VO $^{C}_{R}$ **[R]** xxx $^{C}_{R}$	**xxx**: collector voltage (V) *Example [R]: 224* $^{C}_{R}$ *The collector voltage is 224 V.*
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance 4) Last maintenance operation 5) History		6) Information 7) External gauge 8) Turbo and cell maintenance 9) Service

Advanced menu

Description	Command [C] Response [R]	Detail
Requests the status of analog output 1 of the interface board (HV/S) [1]	**[C]** ?AO1 $^{C}_{R}$ **[R]** xCF $^{C}_{R}$	**x** = 1: analysis cell signal mantissa **x** = 2: analysis cell signal exponent **x** = 3: logarithmic value of the analysis cell signal **x** = 4: detector inlet pressure **x** = 5: analysis cell pressure **x** = 8: external gauge pressure **x** = 9: 20-decade exponent **CF**: range start value *Example [C]: ?AO1* $^{C}_{R}$ *Example [R]: 2100-14* $^{C}_{R}$ *Analog output 2 indicates the exponent of the analysis cell signal with a range starting at 1 · 10^{-12}.*
Requests the status of analog output 2 of the interface board (HV/S) [1]	**[C]** ?AO2 $^{C}_{R}$ **[R]** xCF $^{C}_{R}$	
Requests the status of analog output 3 of the interface board (HV/S) [1]	**[C]** ?AO3 $^{C}_{R}$ **[R]** xCF $^{C}_{R}$	
1) Input/Output		2) Service

Description	Command [C] Response [R]	Detail
Requests the status of digital inputs (HV/S) [1]	**[C]** ?IN $^{C}_{R}$ **[R]** xxxxxy $^{C}_{R}$	**xxxx**: 5-digit integer input status **y** = D: 15-pin I/O interface **y** = R: input not available **y** = N: 37-pin I/O interface See chapter “Additional information” *Example [R]: 00004R* $^{C}_{R}$ *Digital input 3 is enabled. The other digital inputs are disabled.*
Requests the status of digital outputs (HV/S) [1]	**[C]** ?OU $^{C}_{R}$ **[R]** xxxxxy $^{C}_{R}$	**xxxx**: 5-digit integer output status **y** = D: 15-pin I/O interface **y** = R: output not available **y** = N: 37-pin I/O interface See chapter “Additional information” *Example [R]: 00008R* $^{C}_{R}$ *Digital output 4 is enabled. The other digital outputs are disabled.*
Requests additional threshold 2 (HV/S) [1]	**[C]** ?S2 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	**CF**: additional threshold *Example [C]: ?S2* $^{C}_{R}$ *Example [R]: 100-10* $^{C}_{R}$ *The 'Additional threshold 2' output is enabled if the additional threshold 2 is lower than 1 · 10^{-8}.*
Requests additional threshold 3 (HV/S) [1]	**[C]** ?S3 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	
Requests additional threshold 4 (HV/S) [1]	**[C]** ?S4 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	
Requests additional threshold 5 (HV/S) [1]	**[C]** ?S5 $^{C}_{R}$ **[R]** CF $^{C}_{R}$	
1) Input/Output		2) Service

11.6.6 List of commands with parameters

The format of commands with parameters is as follows: **=command** $^{C}_{R}$.

Quick list of commands: see chapter “Quick list of commands”.

- HV: hard vacuum method
- S = Sniffer method
- Command [C]: the "-" is not part of the command.

Use

Description	Command [C]	Detail
Start or stop a test with the hard vacuum test method (HV)	**[C]** =CYx $^{C}_{R}$	**x** = E: Start a test with the hard vacuum test method **x** = D: Stop a test with the hard vacuum test method *Example [C]: =CYE* $^{C}_{R}$ *A test with the hard vacuum test method is launched.*

Measurement menu

Description	Command [C]	Detail
Setting the external calibrated leak values for calculating the correction factor (hard vacuum or sniffer test method) (HV/S) [1]	**[C]** =AExCF $^{C}_{R}$	**x** = H: leak value calibrated for calculating the correction coefficient using the hard vacuum test method **x** = S: leak value calibrated for calculating the correction coefficient using the sniffer test method **CF**: calibrated leak value *Example [C]: =AES150-07* $^{C}_{R}$ *Using the sniffer test method, the external calibrated leak value is 1.5 · 10^{-5} for calculating the correction coefficient.*
Setting the hard vacuum correction coefficient (HV) [1]	**[C]** =HVCFx $^{C}_{R}$	**CF**: hard vacuum correction coefficient **x** = E: coefficient enabled (the coefficient configuration is modified) **x** = D: coefficient disabled (the coefficient configuration is not modified) *Example [C]: =HV120-01E* $^{C}_{R}$ *The hard vacuum correction coefficient is enabled and is 12.*
Setting the external coefficient in sniffer (S) [1]	**[C]** =SNCFx $^{C}_{R}$	**CF**: correction coefficient in sniffer **x** = E: coefficient enabled **x** = D: coefficient disabled (the coefficient is not changed) *Example [C]: =SN110-01E* $^{C}_{R}$ *The coefficient with the sniffer test method is enabled and is 11.*
Selection of tracer gas used (HV/S) [2]	**[C]** =GZx $^{C}_{R}$	**x** = 2: hydrogen **x** = 3: helium 3/3-mass **x** = 4: helium 4/helium *Example [C]: =GZ4* $^{C}_{R}$ *The tracer gas selected is helium 4/helium.*
Selection of Master calibrated leak (S) [3][5]	**[C]** =FECx $^{C}_{R}$	**1** = 1: Master 1 calibrated leak **2** = 2: Master 2 calibrated leak **3** = 3: Master 3 calibrated leak **4** = 4: Master 4 calibrated leak **5** = 5: Master 5 calibrated leak *Example [C]: =FEC2* $^{C}_{R}$ *Master 2 calibrated leak is selected.*
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Description	Command [C]	Detail
Setting the calibrated leak used for internal calibration (internal or external calibrated leak) (HV/S) [3]	**[C]** =FEMxyCFzaabbccddd-deeff $^{C}_{R}$	**x** = 2: hydrogen **x** = 3: helium 3/3-mass **x** = 4: helium 4/helium **y** = D: external calibrated leak **y** = E: 'internal' leak position with closed valve **y** = O: 'internal' leak position with open valve **y** = N: no calibrated leak **y** = S: 'ext. sniffer' leak position **y** = C: 'concentration' leak position **y** = M: 'machine' leak position **z**: unit (idem ?UN $^{C}_{R}$) **CF**: internal calibrated leak value **aa**: temperature coefficient (1/10 of %) **bb**: reference temperature (°C) **cc**: loss per year (%) **dddd**: year of calibration **ee**: internal or external calibration leak temperature (°C) **ff**: month of calibration *Example [C]: =FEM4E100-09130200220192201 $^{C}_{R}$* *The calibrated leak used is an internal calibrated helium 4/ helium leak with the valve closed. The leak value is $1 \cdot 10^{-5}$ mbar·l/s: it varies by 3 %/°C, with a reference temperature of 20°C. It loses 2%/year. The ambient temperature is 22°C. It was calibrated in January 2019.*
Setting the Master 1 calibrated leak information (S) [3][5]	**[C]** =FES1xCFy-zaabbccddd-deeffgggggggggg $^{C}_{R}$	**x** = 2: hydrogen **x** = 3: helium 3/3-mass **x** = 4: helium 4/helium **CF**: calibrated leak value **y**: unit (idem ?UN $^{C}_{R}$) **z** = D: external calibrated leak **z** = E: 'internal' leak position with closed valve **z** = O: 'internal' leak position with open valve **z** = N: no calibrated leak **z** = S: 'ext. sniffer' leak position **z** = C: 'concentration' leak position **z** = M: 'machine' leak position **aa**: temperature coefficient (1/10 of %) **bb**: reference temperature (°C) **cc**: loss per year (%) **dddd**: year of calibration **ee**: internal or external calibration leak temperature (°C) **ff**: month of calibration **gggggggggg**: name of the Master calibrated leak (10 characters obligatory) *Example [C]: =FES14100-091E30200220192201Master 1 $^{C}_{R}$* *The calibrated leak used is an internal calibrated helium 4/ helium leak with the valve closed. The leak value is $1 \cdot 10^{-7}$ mbar·l/s: it varies by 3 %/°C, with a reference temperature of 20°C. It loses 2%/year. The ambient temperature is 22°C. It was calibrated in January 2019. It is called Master 1.*
Setting the Master 2 calibrated leak information (S) [3][5]	**[C]** =FES2xCFy-zaabbccddd-deeffgggggggggg $^{C}_{R}$	
Setting the Master 3 calibrated leak information (S) [3][5]	**[C]** =FES3xCFy-zaabbccddd-deeffgggggggggg $^{C}_{R}$	
Setting the Master 4 calibrated leak information (S) [3][5]	**[C]** =FES4xCFy-zaabbccddd-deeffgggggggggg $^{C}_{R}$	
Setting the Master 5 calibrated leak information (S) [3][5]	**[C]** =FES5xCFy-zaabbccddd-deeffgggggggggg $^{C}_{R}$	

1) Correction factor
2) Tracer gas
3) Leak setting calibrated
4) Threshold
5) ASM 306S only

Description	Command [C]	Detail
Setting the code for the PV leak of the Master 1 calibrated leak (S) [3)5)]	**[C]** =FESC1xxxxxxxxxx $^{C}_{R}$	**xxxxxxxxxx**: code for PV leak of the Master calibrated leak *Example [C]: =FESC1145222ZIUM80* $^{C}_{R}$ *The code for the PV leak of the Master 1 calibrated leak is 145222ZIUM80.*
Setting the code for the PV leak of the Master 2 calibrated leak (S) [3)5)]	**[C]** =FESC2xxxxxxxxxx $^{C}_{R}$	
Setting the code for the PV leak of the Master 3 calibrated leak (S) [3)5)]	**[C]** =FESC3xxxxxxxxxx $^{C}_{R}$	
Setting the code for the PV leak of the Master 4 calibrated leak (S) [3)5)]	**[C]** =FESC4xxxxxxxxxx $^{C}_{R}$	
Setting the code for the PV leak of the Master 5 calibrated leak (S) [3)5)]	**[C]** =FESC5xxxxxxxxxx $^{C}_{R}$	
Selection of the type of setting used for Master 1 calibrated leak (S) [3)5)]	**[C]** =FEST1x $^{C}_{R}$	**x** = 0: Setting the Master calibrated leak using the code for the PV leak **x** = 1: Setting the Master calibrated leak without using the code for the PV leak *Example [C]: =FEST11* $^{C}_{R}$ *Setting the Master 1 calibrated leak without using the code for the PV leak.*
Selection of the type of setting used for Master 2 calibrated leak (S) [3)5)]	**[C]** =FEST2x $^{C}_{R}$	
Selection of the type of setting used for Master 3 calibrated leak (S) [3)5)]	**[C]** =FEST3x $^{C}_{R}$	
Selection of the type of setting used for Master 4 calibrated leak (S) [3)5)]	**[C]** =FEST4x $^{C}_{R}$	
Selection of the type of setting used for Master 5 calibrated leak (S) [3)5)]	**[C]** =FEST5x $^{C}_{R}$	
Selection of the internal temperature sensor for the calibration (HV/S) [3)]	**[C]** =TES $^{C}_{R}$	-
Selection of the preset temperature for the calibration (HV/S) [3)]	**[C]** =TEV $^{C}_{R}$	-
Setting the temperature for the calibration with an internal or external calibrated leak (HV/S) [3)]	**[C]** =TEVxx $^{C}_{R}$	**xx**: temperature *Example [C]: =TEV25* $^{C}_{R}$ *The temperature for calibration is 25°C.*
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Description	Command [C]	Detail
Setting the depollution function (HV) [4]	**[C]** =AACFx $^{C}_{R}$	**CF**: depollution threshold **x** = E: depollution function enabled **x** = D: depollution function disabled *Example [C]: =AA500-07E $^{C}_{R}$* *The depollution function is enabled if the depollution threshold of 5 · 10^{-5} is crossed.*
Setting depollution with selection of the Gross Leak test mode (HV/S) [4]	**[C]** =APCFx $^{C}_{R}$	**CF**: depollution threshold **x** = E: depollution enabled **x** = D: depollution disabled *Example [C]: =AP200-06E $^{C}_{R}$* *The Gross Leak test mode is selected if the depollution threshold of 2 · 10^{-4} is crossed.*
Maximum background setting (HV/S) [4]	**[C]** =ARCFx $^{C}_{R}$	**CF**: maximum background **x** = E: maximum background enabled **x** = D: maximum background disabled *Example [C]: =AR100-10E $^{C}_{R}$* *The maximum background is enabled and is 1 · 10^{-8}.*
Selection of the maximum background (HV/S) [4]	**[C]** =ARx $^{C}_{R}$	**x** = E: maximum background enabled **x** = D: maximum background disabled *Example [C]: =ARE $^{C}_{R}$* *The maximum background is enabled.*
Pressure 1 threshold setting (HV) [4]	**[C]** =NP1CF $^{C}_{R}$	**CF**: pressure threshold (mbar) *Example [C]: =NP1100-01 $^{C}_{R}$* *The pressure 1 threshold 1 is 10 mbar.*
Pressure 2 threshold setting (HV) [4]	**[C]** =NP2CF $^{C}_{R}$	
Pressure 3 threshold setting (HV) [4]	**[C]** =NP3CF $^{C}_{R}$	
Setting the current reject threshold using the current test method and with the current measurement unit (HV/S) [4]	**[C]** =S1CF $^{C}_{R}$	**CF**: reject threshold in the current measurement unit *Example [C]: =S1300-04 $^{C}_{R}$* *The reject threshold with the current test method is 3 · 10^{-2}.*
Setting the reject threshold to the current measurement unit (HV/S) [4]	**[C]** =S1CFx $^{C}_{R}$	**CF**: reject threshold in the current unit **x** = H: CF sets the reject threshold with the hard vacuum test method **x** = S: CF sets the reject threshold with the sniffer test method *Example [C]: =S1500-09H $^{C}_{R}$* *The reject threshold with the hard vacuum test method is 5 · 10^{-7} in the current unit.*
Setting the clogged probe threshold (S) [4]	**[C]** =S6CF $^{C}_{R}$	**CF**: clogged probe threshold in the current unit *Example [C]: =S6100-06 $^{C}_{R}$* *The clogged probe threshold is 1 · 10^{-4}.*
Setting the clogged probe threshold of the Smart probe (S) [4]	**[C]** =SSSxxxx $^{C}_{R}$	**xxxx**: clogged probe threshold of the Smart probe (according to sccm or % display) *Example [C]: =SSS0020 $^{C}_{R}$* *The clogged probe threshold is 20.*
1) Correction factor 2) Tracer gas 3) Leak setting calibrated		4) Threshold 5) ASM 306S only

Test menu

Description	Command [C]	Detail
Massive mode status selection (HV) [1)]	**[C]** =MASxy $^{C}_{R}$	**x** = E: Massive mode authorized **x** = D: Massive mode not authorized **y** = E: Massive mode in progress **y** = E: Massive mode not triggered *Example [C]: =MASED $^{C}_{R}$* *Massive mode is authorized but not triggered.*
Setting the zero function (HV/S) [2)]	**[C]** =AUZxy $^{C}_{R}$	**x** = E: zero function activation **x** = E: zero function deactivation **x** = R: reference zero acquisition **y** = 1: exit the zero function with a single press (once) **y** = 2: exit the zero function by pressing and holding for at least 3 seconds *Example [C]: =AUZE2 $^{C}_{R}$* *Zero function is enabled and the user must press and hold the* ZERO *button for at least 3 seconds to exit zero.*
Launch or stop zero function (HV/S) [2)]	**[C]** =AZx $^{C}_{R}$	**x** = E: launch zero function **x** = E: stop zero function *Example [C]: =AZE $^{C}_{R}$* *Zero function is launched.*
Setting the advanced zero function (HV/S) [2)]	**[C]** =ZBxyzzzzCF $^{C}_{R}$	**x** = A: zero function launched automatically **x** = O: manually launched zero function (operator controlled) **y** = T: trigger on counter **y** = S: trigger on threshold crossed **zzzz**: counter (mmss) **CF**: threshold *Example [C]: =ZBAT0230100-08 $^{C}_{R}$* *Zero function is triggered automatically with the counter set to 2 minutes 30 seconds. The threshold is $1 \cdot 10^{-6}$ but is not taken into account.*
Setting the zero function (HV/S) [2)]	**[C]** =ZBxy $^{C}_{R}$	**x** = A: zero function launched automatically **x** = O: manually launched zero function (operator controlled) **y** = T: trigger on counter **y** = S: trigger on threshold crossed *Example [C]: =ZBA $^{C}_{R}$* *Zero function is triggered automatically.*
Setting the dynamic calibration function (HV) [14)]	**[C]** =CDx $^{C}_{R}$	**x** = E: coefficient enabled **x** = D: coefficient disabled **x** = C: launch the dynamic calibration coefficient **x** = S: stop the dynamic calibration coefficient *Example [C]: =CDE $^{C}_{R}$* *The dynamic calibration is enabled.*
Setting the dynamic calibration function target value (HV) [14)]	**[C]** =CVCF $^{C}_{R}$	**CF**: target value *Example [C]: =CV150-09 $^{C}_{R}$* *The target value is $1.5 \cdot 10^{-7}$.*

1) Massive mode	9) Type of probe
2) Zero activation	10) Purge valve
3) Inlet vent	11) Bypass
4) Cycle end	12) Crossover pressure
5) Memo function	13) Calibration check
6) Method	14) Dynamic calibration
7) Mode	15) Calibration
8) Regeneration	

Description	Command [C]	Detail
Setting the 'Autocal requested' warning (HV/S) [13)]	**[C]** =ACAabbbbbccccc $^{C}_{R}$	**a** = E: warning enabled **a** = D: warning disabled **bbbbb** number of cycles set for automatic warning (00000–09999) **ccccc** number of hours set for automatic warning (00000–09999) *Example [C]: =ACAE0150002000* $^{C}_{R}$ *The 'Autocal Requested' warning is enabled: it is set to appear every 1500 cycles or every 2000 hours.*
Inlet vent selection at the end of the cycle (HV) [3)]	**[C]** =IVx $^{C}_{R}$	**x** = E: inlet vent selection at the end of the cycle **x** = D: no inlet vent at the end of the cycle *Example [C]: =IVE* $^{C}_{R}$ *Inlet vent at the end of the cycle is enabled.*
Setting the inlet vent function (HV) [3)]	**[C]** =IVPxyzmmss $^{C}_{R}$	**x** = M: manual opening of the inlet vent valve by the operator **x** = A: automatic opening of the inlet vent valve **y** = 0: opening delay of 0 seconds **y** = 1: opening delay of 1 second **y** = 2: opening delay of 2 seconds **z** = E: counter for open position **z** = D: no counter for open position **mm**: counter value for open position (min) **ss**: counter value for open position (sec) *Example [C]: =IVPA1E0030* $^{C}_{R}$ *The inlet vent valve opens automatically, with an opening delay of 1 second. The valve remains open for 30 seconds.*
Selection of the inlet vent valve status in standby mode (HV) [3)]	**[C]** =VTx $^{C}_{R}$	**x** = A: valve always open in standby mode **x** = D: valve always closed in standby mode *Example [C]: VTA* $^{C}_{R}$ *The inlet vent valve is always open in standby mode.*
Setting the automatic cycle end function (HV/S) [4)]	**[C]** =CAabccccdddd $^{C}_{R}$	**a** = E: automatic stop at the cycle end **a** = D: manual stop at the cycle end **b** = E: roughing time used **b** = D: roughing time not used **cccc**: roughing time (mmss) **dddd**: measurement time (mmss) *Example [C]: =CAEE01000015* $^{C}_{R}$ *The cycle ends automatically, with 1 minute of roughing time used and a measurement time of 15 seconds.*

1) Massive mode
2) Zero activation
3) Inlet vent
4) Cycle end
5) Memo function
6) Method
7) Mode
8) Regeneration
9) Type of probe
10) Purge valve
11) Bypass
12) Crossover pressure
13) Calibration check
14) Dynamic calibration
15) Calibration

Description	Command [C]	Detail
Setting the Memo function (HV/S) [5]	**[C]** =MExbmmss $^{C}_{R}$	**x** = M: Memo function enabled **x** = A: Memo function disabled **b** = E: Memo function stopped when the counter finishes **b** = D: Memo function not stopped when the counter finishes **mmss**: memorization time (mmss) *Example [C]: =MEME0130 $^{C}_{R}$* *The Memo function is enabled, on the counter. The leak rate is memorized for 1 minute 30 seconds.*
Memo function selection (HV) [5]	**[C]** =MEx $^{C}_{R}$	**x** = E: Memo function enabled **x** = E: Memo function disabled *Example [C]: =MEE $^{C}_{R}$* *The Memo function is enabled.*
Start or stop a test with the sniffer test method (HV/S) [6]	**[C]** =SFx $^{C}_{R}$	**x** = E: Start a test with the sniffer test method **x** = D: Stop a test with the sniffer test method *Example [C]: =SFE $^{C}_{R}$* *A test with the sniffer test method is launched.*
Selection of the test method used (HV/S) [6]	**[C]** =TSTx $^{C}_{R}$	**x** = 0: hard vacuum test method **x** = 2: sniffer test method *Example [C]: =TST0 $^{C}_{R}$* *The hard vacuum test method is selected.*
Selection of test mode (HV) [7]	**[C]** =CYTx $^{C}_{R}$	**x** = 2: test in Gross Leak mode **x** = 3: test in Normal mode **x** = 4: test in High Sensitivity mode *Example [C]: =CYT2 $^{C}_{R}$* *The Gross Leak test is selected.*
Selection of the calibration type (HV/S) [15]	**[C]** =ACx $^{C}_{R}$	**x** = E: automatic internal calibration on start-up **x** = D: internal calibration disabled, manual calibration **x** = S: operator internal calibration **x** = V: calibration check on start-up *Example [C]: =ACE $^{C}_{R}$* *Automatic internal calibration on start-up is enabled.*
Selection of the calibrated leak used for calibration. (HV/S) [15]	**[C]** =FEPx $^{C}_{R}$	**x** = D: external calibrated leak (hard vacuum test method only) **x** = E: internal calibrated leak with valve closed (hard vacuum test method only) **x** = O: internal calibrated leak with valve open (hard vacuum test method only) **x** = M: machine calibration (sniffer test method only) **x** = S: external sniffer calibration (sniffer test method only) **x** = C: calibration on concentration (sniffer test method only) *Example [C]: =FEPE $^{C}_{R}$* *Internal calibrated leak with the valve open is selected.*
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end 5) Memo function 6) Method 7) Mode 8) Regeneration		9) Type of probe 10) Purge valve 11) Bypass 12) Crossover pressure 13) Calibration check 14) Dynamic calibration 15) Calibration

Description	Command [C]	Detail
Setting the pressure threshold in Gross Leak mode in the current unit (HV) [12]	**[C]** =P1UCF $^{C}_{R}$	**CF**: pressure threshold *Example [C]: =P1U150-02 $^{C}_{R}$* *The threshold for switching to Gross Leak mode is 1.5 mbar (if the current unit is mbar l/s).*
Setting the pressure threshold in Normal mode in the current unit (HV) [12]	**[C]** =P2UCF $^{C}_{R}$	
Setting the pressure threshold in High Sensitivity mode in the current unit (HV) [12]	**[C]** =P3UCF $^{C}_{R}$	
Selection of the probe type (S) [9]	**[C]** =SPRx $^{C}_{R}$	**x** = 1: standard probe **x** = 2: Smart probe *Example [C]: =SPR1 $^{C}_{R}$* *The standard probe is selected.*
Selection of the purge valve status (HV) [10]	**[C]** =VPUx $^{C}_{R}$	**x** = E: purge valve set to 'open' **x** = A: purge valve set to 'automatic' **x** = D: purge valve set to 'closed' *Example [C]: =VPUD $^{C}_{R}$* *The purge valve set to 'closed'.*
Setting the Bypass function (HV) [11]	**[C]** =PADxyz $^{C}_{R}$	**x** = E: Bypass enabled **x** = D: Bypass disabled **y** = 1: Bypass mode: rapid pumping **y** = 2: Bypass mode: partial flow **z** = 1: internal pumping not delayed **z** = 2: internal pumping delayed *Example [C]: =PADE21 $^{C}_{R}$* *The Bypass function is set to partial flow without delayed internal pumping.*
1) Massive mode 2) Zero activation 3) Inlet vent 4) Cycle end 5) Memo function 6) Method 7) Mode 8) Regeneration		9) Type of probe 10) Purge valve 11) Bypass 12) Crossover pressure 13) Calibration check 14) Dynamic calibration 15) Calibration

Configuration menu

Description	Command [C]	Detail
Setting the date (HV/S) [1]	**[C]** =DAmmddyy $^{C}_{R}$	**mm**: month **dd**: day **yy**: year *Example [C]: =DA113021 $^{C}_{R}$* *The date is November 30, 2021.*
Setting the time (HV/S) [1]	**[C]** =TIhhmmss $^{C}_{R}$	**hh**: hour **mm**: minutes **ss**: seconds *Example [C]: =TI142233 $^{C}_{R}$* *The time set is 14:22:33.*
1) Date - Time - Language - Unit 2) Minimum value displayed		3) Sound volume

Description	Command [C]	Detail
Select the language from the control panel (HV/S) [1]	**[C]** =SPx $^{C}_{R}$	**x** = 0: English **x** = 1: Spanish **x** = 2: Germany **x** = 3: French **x** = 4: Japanese **x** = 5: Italy **x** = 6: Chinese **x** = 7: Korean **x** = 8: Russian **x** = 9: Portuguese *Example [C]: =SP3* $^{C}_{R}$ *French is selected.*
Selection of the unit of measurement (HV/S) [1]	**[C]** =UNx $^{C}_{R}$	**x** = 1: mbar·l/s **x** = 2: Pa·m^3/s **x** = 3: Torr·l/s **x** = 4: atm·cm^3/s **x** = 5: ppm **x** = 6: sccm **x** = 7: sccs **x** = 8: mTorr·l/s **x** = 9: gr/yr **x** = A: oz/yr **x** = B: lb/yr *Example [C]: =UN1* $^{C}_{R}$ *The current measurement unit is mbar·l/s.*
Setting the display lower limit displayed for the leak rate (current test method) (HV/S) [2]	**[C]** =LDLCF $^{C}_{R}$	**CF**: lower display limit in current unit *Example [C]: =LDL100-11* $^{C}_{R}$ *The leak rate displayed cannot be less than 1 · 10^{-9} mbar·l/s (if the current unit is mbar·l/s).*
Setting the display lower limit displayed for the leak rate (hard vacuum test method) (HV) [2]	**[C]** =LDLHCF $^{C}_{R}$	**CF**: lower display limit in current unit *Example [C]: =LDLH100-14* $^{C}_{R}$ *The leak rate displayed cannot be less than 1 · 10^{-12} mbar·l/s (if the current unit is mbar·l/s).*
Setting the display lower limit displayed for the leak rate (sniffer test method) (S) [2]	**[C]** =LDLSCF $^{C}_{R}$	**CF**: lower display limit in current unit *Example [C]: =LDLH100-09* $^{C}_{R}$ *The leak rate displayed cannot be less than 1 · 10^{-7} mbar·l/s (if the current unit is mbar·l/s).*
Setting the status of the external speaker and headphones (HV/S) [3]	**[C]** =HPx $^{C}_{R}$	**x** = E: active speaker and inactive external headphones **x** = D: inactive speaker and active external headphones *Example [C]: =HPE* $^{C}_{R}$ *The speaker is active and the external headphones are inactive.*
1) Date - Time - Language - Unit 2) Minimum value displayed		3) Sound volume

Description	Command [C]	Detail
Setting the sound level (HV/S) [3]	**[C]** =SOxy $^{C}_{R}$	**x**: sound volume **y** = E: sound enabled **y** = D: sound disabled *Example [C]: =SO5E $^{C}_{R}$* *The sound is enabled and the volume is 5.*
Setting the voice synthesis level (HV/S) [3]	**[C]** =SYxy $^{C}_{R}$	**x**: voice synthesis volume **y** = E: voice synthesis enabled **y** = D: voice synthesis disabled (the volume does not change) *Example [C]: =SY4E $^{C}_{R}$* *Voice synthesis is enabled and the volume is 4.*
1) Date - Time - Language - Unit 2) Minimum value displayed		3) Sound volume

Maintenance menu

Description	Command [C]	Detail
Setting the password (HV/S) [1]	**[C]** =PWxxxxy $^{C}_{R}$	**xxxx**: 4-digit password between 1 and 9 **y**= E: password enabled **y**= D: password disabled *Example [C]: =PW1998E $^{C}_{R}$* *The password is 1998 and it is enabled.*
Select the external gauge (HV) [2]	**[C]** =GAUExxx $^{C}_{R}$	**xxx**: name of the gauge • AP-: Pirani gauge 0-10 V • P-C: Piezo-capacitive gauge *Example [C]: =GAUEAP- $^{C}_{R}$* *The external gauge used by the detector is a Pirani 0-10 V gauge.*
Select the internal gauge (HV) [2]	**[C]** =GAUIxxx $^{C}_{R}$	**xxx**: name of the gauge • AP-: Pirani gauge 0-10 V • P-C: Piezo-capacitive gauge *Example [C]: =GAUIAP- $^{C}_{R}$* *The internal gauge used by the detector is a Pirani 0-10 V gauge.*
Setting the full range of the internal gauge (HV) [2]	**[C]** =GAUSxxxxx $^{C}_{R}$	**xxxxx**: full range of the Piezo-capacitive gauge (mbar) *Example [C]: =GAUS50000 $^{C}_{R}$* *The full range of the gauge is 50,000 mbar (information shown on gauge label).*
Setting the full range of the external gauge (HV) [4]	**[C]** =GAUMSxxxxx $^{C}_{R}$	**xxxxx**: full range of the Piezo-capacitive external gauge *Example [C]: =GAUMS50000 $^{C}_{R}$* *The full range of the external gauge is 50,000 mbar (information shown on gauge label).*
Reset of the selected filament hour counter (HV/S) [3]	**[C]** =CHx $^{C}_{R}$	**x** = 1: reset of the filament 1 counter **x** = 2: reset of the filament 2 counter *Example [C]: =CH1 $^{C}_{R}$* *The filament 1 hour counter is reset.*
Setting the initial value of the cycle counter (HV/S) [3]	**[C]** =MCCICF $^{C}_{R}$	**CF**: initial value of the cycle counter *Example [C]: =MCCI300+01 $^{C}_{R}$* *The initial value of the cycle counter is 3000 cycles.*
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance		4) External gauge 5) Turbo and cell maintenance

Description	Command [C]	Detail
Reset of the initial value of the cycle counter (HV/S) 3)	**[C]** =MCCZ $^{C}_{R}$	-
Selection of filament (1 or 2) (HV/S) 5)	**[C]** =SWx $^{C}_{R}$	**x** = 1: filament 1 enabled **x** = 2: filament 2 enabled *Example [C]: =SW1 $^{C}_{R}$* *Filament 1 is enabled.*
1) Access/Password 2) Pirani internal calibration 3) Counter before next maintenance		4) External gauge 5) Turbo and cell maintenance

Advanced menu

Description	Command [C]	Detail
Assign analog output 1 (HV/S) 1)	**[C]** =AO1y $^{C}_{R}$	**y** = 1: analysis cell signal mantissa **y** = 3: logarithmic value of the analysis cell signal **y** = 4: detector inlet pressure **y** = 8: external gauge pressure *Example [C]: =AO11 $^{C}_{R}$* *Analog output 1 is assigned to the mantissa of the analysis cell signal.*
Assign analog output 2 (HV/S) 1)	**[C]** =AO2y $^{C}_{R}$	
Assigning analog output 1 and setting the range start value (HV/S) 1)	**[C]** =AO1yCF $^{C}_{R}$	**CF**: range start value (10^{-14}–10^{3}) **y** = 2: analysis cell signal exponent **y** = 3: logarithmic value of the analysis cell signal *Example [C]: =AO12100-05 $^{C}_{R}$* *Analog output 1 is assigned to the exponent of the analysis cell signal. The range start value is $1 \cdot 10^{-3}$.*
Assigning analog output 2 and setting the range start value (HV/S) 1)	**[C]** =AO2yCF $^{C}_{R}$	
Setting the initial value of the backing pump counter (HV/S) 2)	**[C]** =MC0Iyyyyy $^{C}_{R}$	**yyyyy**: initial value of the counter (time) *Example [C]: =MC0I03000 $^{C}_{R}$* *The initial value of the counter is 3000 cycles.*
Setting the initial value of the turbomolecular pump counter (HV/S) 2)	**[C]** =MC1Iyyyyy $^{C}_{R}$	
Reset of the backing pump hour counter (HV/S) 2)	**[C]** =MC0Z $^{C}_{R}$	-
Reset of the turbomolecular pump hour counter (HV/S) 2)	**[C]** =MC1Z $^{C}_{R}$	-
Select the status of the background suppression function (HV/S) 2)	**[C]** =RBFx $^{C}_{R}$	**x** = E: background suppression function enabled **x** = D: background suppression function disabled *Example [C]: =RBFE $^{C}_{R}$* *The background suppression function is enabled.*
1) Input/Output		2) Service

11.6.7 Additional information

Detector status string character encoding (?ST $^{C}_{R}$)

16 bits (binary code) represent the state of the detector. These 16 bits are transmitted in the form of a 5-digit integer (0 to 65535 in decimal).

This coding is used in various commands.

Byte No.	Description	Value	
		0	1
0	Activation of filament 1 or 2	Filament 1	Filament 2
1	Filament status	Switched off (OFF)	Switched on (ON)
2	Detector status	Out of cycle	In cycle
3 - 4	If the detector is in cycle • 00: Atmosphere/Roughing • 01: Gross Leak • 10: Normal • 11: High Sensitivity	-	-
5	Sniffer test method status	Hard vacuum test	Sniffer test
6	Calibration status	Not OK	OK
7	Lock the control panel	Locked	Unlocked
8	Fault	Presence of faults	No faults
9	Inlet vent valve status	No inlet vent	Inlet vent
10	Availability of a cycle launch	Not available	Available
11	Turbomolecular pump synchronism	No synchronism	Synchronism
12	Not used	-	1
13	Not used	-	1
14	Probe clogged	Clogged	Not clogged
15	Not used	-	1

Data string character encoding (?TR $^{C}_{R}$)

The digits of the data string give the most critical information about the status of the detector in the following coded format:

Example:

991-12 (1) 65179 (2) 340+00 (3)

1 Helium signal corrected in compressed format (CF): $9.91 \cdot 10^{-10}$ mbar·l/s
2 Detector status code (see "Description of bytes" below)
3 Inlet pressure in compressed format (CF) in mbar: $3.40 \cdot 10^{-2}$ mbar

Description of bytes

Byte No.	Description	Value	
		0	1
0	Activation of filament 1 or 2	Filament 1	Filament 2
1	Filament status	Switched off (OFF)	Switched on (ON)
2	Detector status	Out of cycle	In cycle
3 - 4	If the detector is in cycle • 00: Atmosphere/Roughing • 01: Gross Leak • 10: Normal • 11: High Sensitivity	-	-
5	Sniffer test method status	Hard vacuum test	Sniffer test
6	Calibration status	Not OK	OK
7	Lock the control panel	Locked	Unlocked
8	Fault	Presence of faults	No faults
9	Inlet vent valve status	No inlet vent	Inlet vent
10	Availability of a cycle launch	Not available	Available
11	Turbomolecular pump synchronism	No synchronism	Synchronism
12	Not used	-	-
13	Not used	-	-

Byte No.	Description	Value	
		0	1
14	Probe clogged	Clogged	Not clogged
15	= 0	-	-

For example:

Byte No.	Decimal value	Binary decoded string	Description
0	1	1	Filament 1 active
1	2	1	Filament on (ON)
2	4	1	Detector in cycle
3	8	1	High Sensitivity test mode
4	16	1	
5	32	0	Sniffer test method disabled
6	64	1	Calibration
7	128	0	Control panel locked
8	256	0	No faults
9	512	0	Inlet vent valve ON
10	1024	0	Cycle launch not available
11	2048	1	Turbomolecular pump at synchronism
12	4096	1	Not used
13	8192	1	Not used
14	16384	1	Probe not clogged
15	32768	1	Not used
Total	64351	1111101000011111	-

Digital input values (?IN $^{C}_{R}$)

Input	With a 15-pin I/O interface	With a 37-pin I/O interface
1	14-Ground	11-Ground
2	Not used	30-Ground
3	Not used	12-Ground
4	Not used	31-Ground
5	Not used	13-Ground
6	Not used	32-Ground
7 ... 16	Not used	Not used

Digital output values (?OU $^{C}_{R}$)

Output	With a 15-pin I/O interface	With a 37-pin I/O interface
1	6-Ground: test mode reached (except ASI 30/35) 6-Ground: detector ready (ASI 30/35 only)	9-28
2	7-Ground: threshold crossed	8-27
3	Not used	7-26
4	Not used	6-25
5	Not used	5-24
6	Not used	4-23
7	Not used	3-22
8	Not used	2-21
9	Not used	1-20
10 ... 16	Not used	Not used

11.7 List of messages

For all messages, note their contents in order to identify the origin of the message and take the corresponding corrective measures if necessary.

Warnings

RS-232 command	RS-232 code	Message
?WA	w060	Check probe type
?WA	w097	Temperature too high
?WA	w098	Temperature too low
?WA	w140	Calibrated leak maintenance
?WA	w145	Maintenance required
?WA	w150	Backing pump maintenance
?WA	w160	Turbo pump maintenance
?WA	w180	New Fil. #2 Required
?WA	w181	New Fil. #1 Required
?WA	w182	Emission too low on fil2
?WA	w183	Emission too low on fil1
?WA	w203	External calib. leak
?WA	w205	Autocal aborted
?WA	w211	Manual calibration
?WA	w220	Filament Request Off
?WA	w230	Calibration required
?WA	w235	Calibration required
?WA	w240	Calibration required
?WA	w241	Calibration required
?WA	w242	Internal Pirani uncalibrated
?WA	w244	Cell tuning uncalibrated
?WA	w245	Temperature too high
?WA	w249	Check Lithium battery
?WA	w250	Adjust date and time
?WA	w255	Out Start Conditions

Alarms

RS-232 command	RS-232 code	Message
?ER	e050	Cell zero stability
?ER	e056	Background trouble
?ER	e057	Lack of sensitivity
?ER	e058	Sensitivity too high
?ER	e059	Calibrated test mode lost
?ER	e065	Background too high
?ER	e070	Peak adjust error
?ER	e075	Peak search error
?ER	e080	Calibrated leak year error
?ER	e085	Temperature too high
?ER	e089	Emission lost
?ER	e093	Dynamic calib. fail
?ER	e095	Cell.Zero OFF limits
?ER	e096	Calibration failure
?ER	e097	Temperature too high
?ER	e098	Temperature too low
?ER	e099	24 V DC troubles

RS-232 command	RS-232 code	Message
?ER	e160	Sniffer probe clogged
?ER	e161	Probe flow overload
?ER	e180	Emission failure
?ER	e185	Triode safety
?ER	e188	Turbo pump speed
?ER	e192	Fil current too high
?ER	e194	Fil2-Collector Short
?ER	e195	Fil1-Collector Short
?ER	e205	Backing pump failure
?ER	e206	Backing pump temperature too high
?ER	e210	Backing pump failure
?ER	e220	No collector voltage
?ER	e224	-15V cell failure
?ER	e230	Filaments bad
?ER	e231	No emission on fil 1 and 2
?ER	e235	Cell pressure > 1e-04 mbar
?ER	e238	No cell communication
?ER	e239	No turbo pump communication
?ER	e241	Turbo pump speed
?ER	e243	EEPROM error
?ER	e244	Turbo pump #2 failure
?ER	e245	Turbo pump failure
?ER	e247	Check turbo pump connector
?ER	e248	Check turbo pump connector
?ER	e251	+15V cell failure
?ER	e252	24 V cell failure
?ER	e253	Timekeeper RAM failure
?ER	e255	*AN ERROR OCCURRED*

11.8 Data export mode

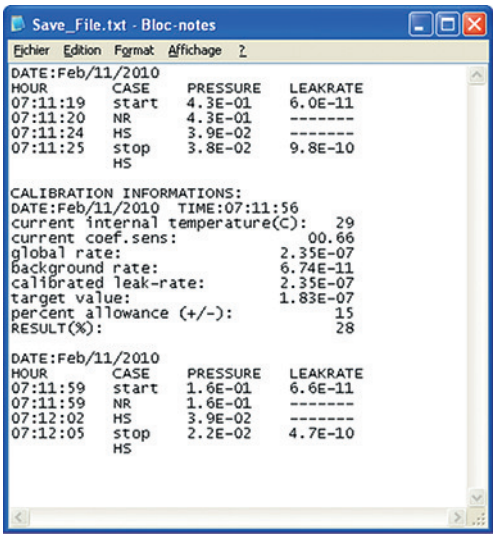
Tickets
3 test ticket models are pre-defined for export.

Test tickets	Export
Calibration with an internal or external calibrated leak	Automatic export following an internal calibration with an internal or external calibrated leak
Calibration check with an internal calibrated leak	Automatic export following a calibration check with an internal calibrated leak
Test	Automatic export at the end of the test

Procedure

Communication settings	Value
Port	COM1
Baud rate	9600
Data bit	8
Stop bit	1
Parity	No
Flow control	No

Example: “Save_File.txt” generated file



11.9 HLT5xx protocol

The HLT5xx protocol is not available for all leak detectors.

Refer to the detector user manual to find out whether this protocol is available for your detector.

Only the protocol commands for the HLT5xx leak detector, listed in this chapter, are included in the detector's HLT5xx protocol.

All other commands are not listed in this chapter and have no effect.

Abbreviations and symbols

Symbol	Description
ASCII	American Standard Code for Information Interchange
Send	Transfer from RS-232 to the detector
Receive	Transfer from the detector to RS-232

Protocol

The HLT5xx protocol uses the ASCII format, i.e. all data bytes are displayable characters with an ASCII code ≥ 32 (all decimal numbers) except for the carriage return character ($^{C}{}_{R}$, 13) EOT (end of telegram).

Without exception, the transferred commands are supported by a frame, as shown below.

General protocol

A	A	A	B	B	N_1	N_2	N_3	D_1	D_2	.....	C_1	C_2	C_3	C_R
1			2		3			4		5		6		7

Item	Data	Description
1	Address	'001' by default
2	Action	00 = command on request 10 = command with parameter
3	Setting number (PV#)	Relevant parameter number (n_1 n_2 n_3) For example: 303
4	Data length	Data length (d_1 d_2) For example: 06 for 6 characters

Item	Data	Description
5	Data	Data in ASCII format The data format and size depends on the following points: ● Transfer of values -> Host commands and description of the parameter ● Data request -> Device commands and description of the parameter ● Error message -> Device commands
6	Checksum	Sum of all ASCII characters up to modulus checksum 256 (decimal) (c_1 c_2 c_3) Example: sum = 786 -> 786 modulus 256 = 18 -> checksum = 018
7	C_R	Carriage return (ASCII character 13)

With the Host - Device behavior, a data exchange always takes place according to the following pattern:

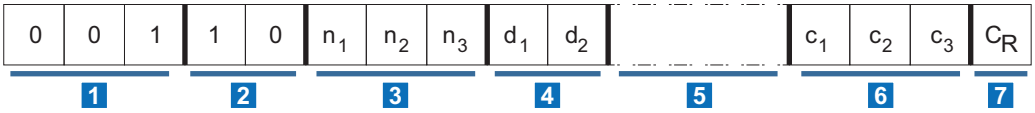
- Host sends (either setting request or data request)
- Device responds (confirmation or sending data/error messages)

Commands

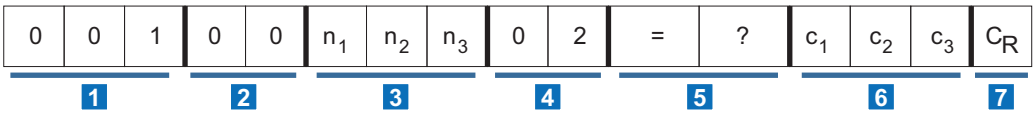
Host commands

The device controlling the communication (host, e.g. PC) can send the following commands.

Adjustment request



Data request



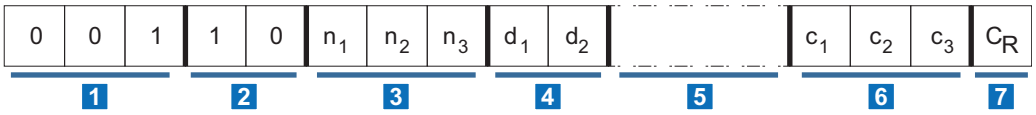
Device commands

The device (e.g. ASM xxx leak detector) cannot start communication on its own but only responds when provided with a valid unique address.

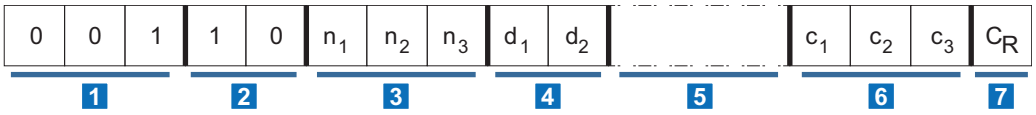
Instruments addressed by group address (address 949) or global address (address 000) do not respond.

The following commands are possible:

- response to a data request



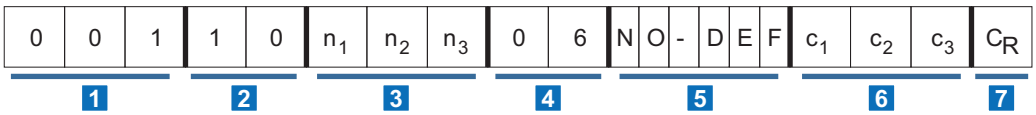
- confirmation of adjustment request



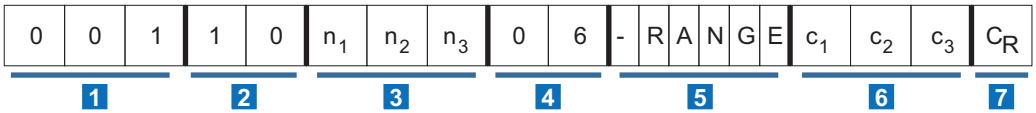
A confirmation of the adjustment request received initially only means that the command sent by the Host has been understood. If the instrument's operating status permits an adjustment, this is also carried out. It is advisable to then request the parameter as a check.

Error message

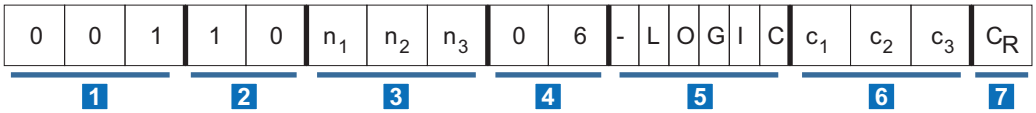
- The parameter number does not exist.



- The transferred data is out of the permitted range.



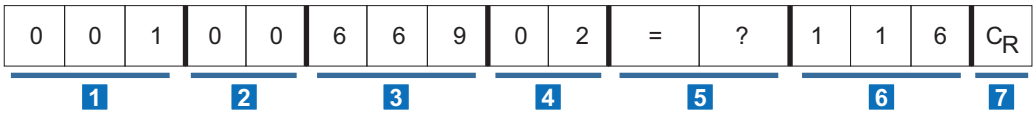
- digital error (example: writing a read-only parameter, command structure, control mode on RS-232, command not possible here)



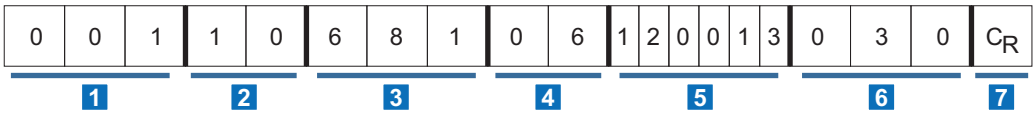
Examples of commands

- Leak rate reading in progress

  Host -> Appliance



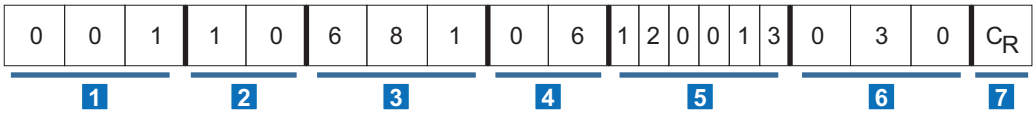
  Appliance -> Host



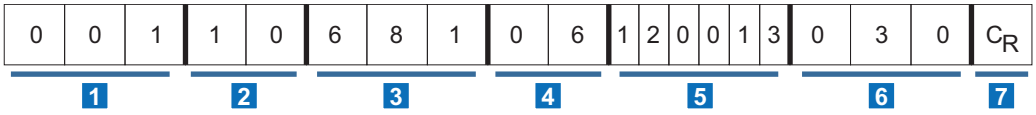
  Leak rate: 2.796E-7

- Setting the reject threshold at 1.2E-7 mbar l/s

  Host -> Appliance

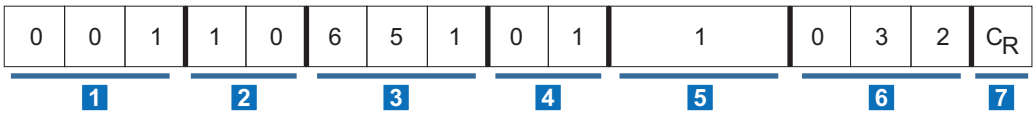


  Appliance -> Host

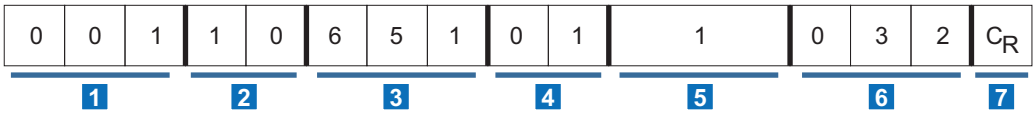


- Activation of background

  Host -> Appliance



  Appliance -> Host



Available commands

Description of parameters

These can be formatted differently depending on the data content represented by a parameter.

Format	Description	Size of characters	For example
0 - boolean_old	True/false as 6 zeros (0) (ASCII 48) or 1 (ASCII 49)	06	• 000000 -> false • 111111 -> true
1 - u_integer	6-digit unsigned integer	06	• 000042 123456 001200

Format	Description	Size of characters	For example
2 - u_real	Fixed-point number with 4 digits before and 2 digits after the point, normalized to 0.01	06	• 001570 -> 15.70 • 000020 -> 0.2
4 - string	Any string with ASCII characters ≥ 32 (decimal)	06	• hallo! TC_600 hgnrfx
6 - boolean_new	True/false as 1 zero (0) (ASCII 48) or 1 (ASCII 49)	01	• 0 -> false • 1 -> true
7 - u_short_int	3-digit unsigned integer	03	• 123 042 007
10 - u_expo_new	Positive exponential number from 1.000E-20 to 9.999E79. The first 4 digits are the mantissa, with a place before the point ≠ 0; the last 2 are the exponent with an offset of -20.	06	• 123456 -> 1.234E36 • 100000 -> 1.0000E-20 • 243011 -> 2.430E-9
11 - string16	Any string with ASCII characters ≥ 32 (decimal)	16	• abcdefghijklmnopQr-StUvWxYzAbCdEf

RS-232 serial link commands

PV #	Name	Description	Command with parameter (10)	Command on request (00)	Data format	Min	Max	Description of parameters Parameter options
016	Pre-sMaxRng	Gauge pressure over range	x	x	7 - u_short_int	000	008	000 = 0.1 mbar 001 = 1 mbar 002 = 10 mbar 003 = 100 mbar 004 = 1000 mbar 005 = 2000 mbar 006 = 5000 mbar 007 = 10000 mbar 008 = 50000 mbar
023	Mo-tor_TMP	Turbomolecular pump motor ON/OFF	-	x	0 - boolean_old	000000	111111	000000 = OFF 111111 = ON
303	Error_code	Current error number	-	x	4 - string	-	-	00000 = no error ErrABC = ABC error WrnABC = ABC warning
309	Act_rotspd	Current rotational speed of the turbomolecular pump (Hz)	-	x	1 - u_integer	000000	002000	-
310	TMP_I-mot	Turbomolecular pump current (A)	-	x	2 - u_real	000000	001500	0 - 15.00
312	Fw_version	MC68 software version	-	x	4 - string	-	-	Vx.xx For example: V3.60
314	Op_hours	Hours of use (detector powered on)	-	x	1 - u_integer	000000	999999	-
340	Pv_mbar	External gauge pressure (mbar)	-	x	10 - u_expo_new	100016	500024	First 4 digits = mantissa Last 2 digits = exponent - 20 For example: 100016 = 1.00E-04

PV #	Name	Description	Command with parameter (10)	Command on request (00)	Data format	Min	Max	Description of parameters Parameter options
349	Device-Name	Detector model	-	x	4 - string	-	-	ASM xxx
600	OpMod-eST	Test method (writable only as detector waiting, testing and in the event of an error)	x	x	7 - u_short_int	000	001	Writing and reading 000 = hard vacuum 001 = sniffer
630	Ex-tPresSns	Choice of gauge	x	x	6 - boo-lean_new	0	1	0 = internal gauge active 1 = external gauge active
631	Ua_M2	Stored anode potential mass 2 (V)	x	x	7 - u_short_int	000	330	Writing and reading
632	Ua_M3	Stored anode potential mass 3 (V)	x	x	7 - u_short_int	000	330	Writing and reading
633	Ua_M4	Stored anode potential mass 4 (V)	x	x	7 - u_short_int	000	330	Writing and reading
642	Mass	Mass of the gas to be detected in amu (writable only as detector waiting, testing and in the event of an error)	x	x	7 - u_short_int	002	004	Writing and reading 002 = 2-mass (hydrogen) 003 = 3-mass (Helium 3/3-mass) 004 = 4-mass (Helium 4/Helium)
643	Phys_units	Unit	x	x	7 - u_short_int	000	060	Writing and reading Leak rate unit (automatically selected pressure unit) 000 = mbar·l/s (mbar) 010 = Pa.m^3/s (Pa) 020 = Atm·cc/s (mbar) 030 = Torr·l/s (Torr) 040 = sccm (mbar) 050 = sccs (mbar) 060 = ppm (mbar) [1)] 1) only in sniffer test mode
645	Filament	Filament used	x	x	7 - u_short_int	000	002	Writing and reading 000 = emission OFF 001 = filament 1, emission ON 002 = filament 2, emission ON
651	Zero	Background suppression during test	x	x	6 - boo-lean_new	0	1	Writing and reading 0 = disabled 1 = enabled
653	MeaStdby	Test (Launch/ Stop)	x	x	6 - boo-lean_new	0	1	Writing and reading 0 = standby 1 = test

PV #	Name	Description	Command with parameter (10)	Command on request (00)	Data format	Min	Max	Description of parameters Parameter options
654	CalRequest	Calibration required	x	x	7 - u_short_int	000	002	Writing 000 = stop calibration 001 = launch calibration Reading 000 = no calibration in progress 002 = calibration in progress
655	Filtertype	Type of filter for calculating the leak rate (writable only as detector ready to test, on start-up and in the event of an error)	x	x	7 - u_short_int	000	002	000 = without 001 = static 002 = dynamic
659	Sniff_Flow	Flow with sniffer test method (sccm)	-	x	7 - u_short_int	000	255	• with standard probe: always 59 sccm (1 mbar l/s) • with Smart probe: range 0–255 sccm
660	Trigger_GL	Threshold for switching to Gross Leak mode (mbar)	x	x	2 - u_real	000010	002500	0.1 – 25 mbar
661	Trigg_N	Threshold for switching to Normal mode (mbar)	x	x	2 - u_real	000010	000500	0.1 – 5 mbar
663	Lock_N_vent	Test mode and inlet vent	x	x	7 - u_short_int	000	031	Bit 0 = Gross Leak mode permitted Bit 1 = Normal mode permitted Bit 3 = Manual inlet vent Bit 4 = Automatic inlet vent with delay
666	Curr_State	Detector status	-	x	7 - u_short_int	001	011	001: start-up 002: standby 003: roughing 004: refresh 012: test in high sensitivity mode
667	GetCalStat	Calibration status	-	x	7 - u_short_int	000	012	000 = inactive 001 = pending 'Calibrated leak connected' 004 = masses adjustment 008 = pending 'Calibrated leak closed' or 'Stable background' 009 = background in Normal mode 012 = pending 'Calibration result'

PV #	Name	Description	Command with parameter (10)	Command on request (00)	Data format	Min	Max	Description of parameters Parameter options
668	AckCal-Step	Validation of calibration stop	x	-	6 - boo-lean_new	0	1	0 = autocalibration aborted 1= validation of auto-calibration step
669	Leakrate	Leak rate in selected unit	-	x	10 - u_ex-po_new	1000 02	9999 99	Leak rate value
670	lr_mbarls	Leak rate in mbar l/s	-	x	10 - u_ex-po_new	1000 02	9999 32	-
671	CLext_vac	calibrated leak rate (hard vacuum test) in units below	x	x	10 - u_ex-po_new	-	-	Writing and reading 1E-100 ...*1E-7*...1E+0 (for mbar·l/s)
		mbar·l/s Pa·m³/s Atm·cc/s Torr·l/s sccm sccs ppm				1000 10 1000 09 9870 09 7500 09 5920 11 9870 09 1000 16	1000 20 1000 19 9870 19 7500 19 5920 21 9870 19 1000 26	
673	CLext_snif	External calibrated leak rate (sniffer test) in units below	x	x	10 - u_ex-po_new	-	-	Writing and reading 1E-6 ...*1E5-5*...1E+0 (for mbar·l/s)
		mbar·l/s Pa·m³/s Atm·cc/s Torr·l/s sccm sccs ppm				1000 14 1000 13 9870 13 7500 13 5920 15 9870 13 1000 20	1000 20 1000 19 9870 19 7500 19 5920 21 9870 19 1000 26	
676	CL_int	Internal calibrated leak rate (mbar.l/s)	x	x	10 - u_ex-po_new	1000 11	1000 15	Writing and reading 1E-9 ...*1E-6*...1E-5 (for mbar·l/s)
679	Pressure	Roughing pressure in unit selected	-	x	10 - u_ex-po_new	1000 13	1000 25	-
680	Press_p2	Inlet manifold pressure	-	x	10 - u_ex-po_new	1000 13	1000 25	-

PV #	Name	Description	Command with parameter (10)	Command on request (00)	Data format	Min	Max	Description of parameters Parameter options
681	Trigger_1	Reject threshold 1 in the units below	x	x	10 - u_expo_new	-	-	Writing and reading (- 2 ...*1E-9*...1E+3 (for mbar·l/s)
		mbar·l/s Pa·m³/s Atm·cc/s Torr·l/s sccm sccs ppm				100008 100007 987007 750007 592009 987007 100014	100023 100022 987022 750022 592024 987022 100029	
690	Pressext	External gauge pressure in unit selected	-	x	10 - u_expo_new	100013	100025	-
694	GetCalFHi	Calibration factor in Normal mode	-	x	10 - u_expo_new	100019	100022	-
698	SetTLLoc	Selection of calibrated leak	x	x	7 - u_short_int	000	002	0 = internal automatically (only with He 4 tracer gas) + calibration by the operator 1 = internal manually 2 = external + calibration by the operator
699	StartCal	Launch calibration	x	-	6 - boolean_new	1	1	1 = launch calibration
738	Gaugetype	External gauge model (distinguished by resistance identification)	-	x	4 - string	6*0X20	6*0X7f	nogauge = no gauge xxxTPR = TPR or PCR gauge xxxPKR = PKR gauge linear = linear gauge

Conversion table

DEC	HEX	Binary	ASCII	-	DEC	HEX	Binary	ASCII
C	0	0000 0000	NUL		128	80	1000 000	
1	1	0000 0001	SOH		129	81	1000 0001	
2	2	0000 0010	STX		130	82	1000 0010	
3	3	0000 0011	ETX		131	83	1000 0011	
4	4	0000 0100	EOT		132	84	1000 0100	
5	5	0000 0101	ENQ		133	85	1000 0101	
6	6	0000 0110	ACK		134	86	1000 0110	
7	7	0000 0111	BEL		135	87	1000 0111	
8	8	0000 1000	BS		136	88	1000 1000	136
9	9	0000 1001	HT		137	89	1000 1001	
10	A	0000 1010	LF		138	8A	1000 1010	
11	B	0000 1011	VT		139	8B	1000 1011	
12	C	0000 1100	FF		140	8C	1000 1100	
13	D	0000 1101	CR		141	8D	1000 1101	

DEC	HEX	Binary	ASCII	-	DEC	HEX	Binary	ASCII
14	E	0000 1110	SO		142	8E	1000 1110	
15	F	0000 1111	SI		143	8F	1000 1111	
16	10	0001 0000	DLE		144	90	1001 0000	
17	11	0001 0001	DC1		145	91	1001 0001	
18	12	0001 0010	DC2		146	92	1001 0010	
19	13	0001 0011	DC3		147	93	1001 0011	
20	14	0001 0100	DC4		148	94	1001 0100	
21	15	0001 0101	NAK		149	95	1001 0101	
22	16	0001 0110	SYSN		150	96	1001 0110	
23	17	0001 0111	ETB		151	97	1001 0111	
24	18	0001 1000	CAN		152	98	1001 1000	
25	19	0001 1001	EM		153	99	1001 1001	
26	1A	0001 1010	SUB		154	9A	1001 1010	
27	1B	0001 1011	ESC		155	9B	1001 1011	155
28	1C	0001 1100	FS		156	9C	1001 1100	156
29	1D	0001 1101	GS		157	9D	1001 1101	157
30	1E	0001 1110	RS		158	9E	1001 1110	158
31	1F	0001 1111	US		159	9F	1001 1111	
32	20	0010 0000	SP		160	A0	1010 0000	
33	21	0010 0001	!		161	A1	1010 0001	
34	22	0010 0010	"		162	A2	1010 0010	
35	23	0010 0011	#		163	A3	1010 0011	
36	24	0010 0100	$		164	A4	1010 0100	
37	25	0010 0101	%		165	A5	1010 0101	
38	26	0010 0110	&		166	A6	1010 0110	
39	27	0010 0111	'		167	A7	1010 0111	
40	28	0010 1000	(		168	A8	1010 1000	
41	29	0010 1001	)		169	A9	1010 1001	
42	2A	0010 1010	*		170	AA	1010 1010	
43	2B	0010 1011	+		171	AB	1010 1011	
44	2C	0010 1100	,		172	AC	1010 1100	
45	2D	0010 1101	-		173	AD	1010 1101	
46	2E	0010 1110	.		174	AE	1010 1110	
47	2F	0010 1111	/		175	AF	1010 1111	
48	30	0011 0000	0		176	B0	1011 0000	
49	31	0011 0001	1		177	B1	1011 0001	
50	32	0011 0010	2		178	B2	1011 0010	
51	33	0011 0011	3		179	B3	1011 0011	
52	34	0011 0100	4		180	B4	1011 0100	
53	35	0011 0101	5		181	B5	1011 0101	
54	36	0011 0110	6		182	B6	1011 0110	
55	37	0011 0111	7		183	B7	1011 0111	
56	38	0011 1000	8		184	B8	1011 1000	-
57	39	0011 1001	9		185	B9	1011 1001	-
58	3A	0011 1010	:		186	BA	1011 1010	-
59	3B	0011 1011	;		187	BB	1011 1011	-
60	3C	0011 1100	<		188	BC	1011 1100	-
61	3D	0011 1101	=		189	BD	1011 1101	-
62	3E	0011 1110	>		190	BE	1011 1110	-
63	3F	0011 1111	?		191	BF	1011 1111	-

DEC	HEX	Binary	ASCII	-	DEC	HEX	Binary	ASCII
64	40	0100 0000	@		192	C0	1100 0000	-
65	41	0100 0001	A		193	C1	1100 0001	-
66	42	0100 0010	B		194	C2	1100 0010	-
67	43	0100 0011	C		195	C3	1100 0011	-
68	44	0100 0100	D		196	C4	1100 0100	-
69	45	0100 0101	E		197	C5	1100 0101	-
70	46	0100 0110	F		198	C6	1100 0110	-
71	47	0100 0111	G		199	C7	1100 0111	-
72	48	0100 1000	H		200	C8	1100 1000	-
73	49	0100 1001	I		201	C9	1100 1001	-
74	4A	0100 1010	J		202	CA	1100 1010	-
75	4B	0100 1011	K		203	CB	1100 1011	-
76	4C	0100 1100	L		204	CC	1100 1100	-
77	4D	0100 1101	M		205	CD	1100 1101	-
78	4E	0100 1110	N		206	CE	1100 1110	-
79	4F	0100 1111	O		207	CF	1100 1111	-
80	50	0101 0000	P		208	D0	1101 0000	-
81	51	0101 0001	Q		209	D1	1101 0001	-
82	52	0101 0010	R		210	D2	1101 0010	-
83	53	0101 0011	S		211	D3	1101 0011	-
84	54	0101 0100	T		212	D4	1101 0100	-
85	55	0101 0101	U		213	D5	1101 0101	-
86	56	0101 0110	V		214	D6	1101 0110	-
87	57	0101 0111	W		215	D7	1101 0111	-
88	58	0101 1000	X		216	D8	1101 1000	-
89	59	0101 1001	Y		217	D9	1101 1001	-
90	5A	0101 1010	Z		218	DA	1101 1010	-
91	5B	0101 1011	[		219	DB	1101 1011	-
92	5C	0101 1100	\		220	DC	1101 1100	-
93	5D	0101 1101	]		221	DD	1101 1101	-
94	5E	0101 1110	^		222	DE	1101 1110	-
95	5F	0101 1111	_		223	DF	1101 1111	-
96	60	0110 0000	`		224	E0	1110 0000	-
97	61	0110 0001	a		225	E1	1110 0001	-
98	62	0110 0010	b		226	E2	1110 0010	-
99	63	0110 0011	C		227	E3	1110 0011	-
100	64	0110 0100	D		228	E4	1110 0100	-
101	65	0110 0101	E		229	E5	1110 0101	-
102	66	0110 0110	f		230	E6	1110 0110	-
103	67	0110 0111	g		231	E7	1110 0111	-
104	68	0110 1000	H		232	E8	1110 1000	-
105	69	0110 1001	I		233	E9	1110 1001	-
106	6A	0110 1010	J		234	EA	1110 1010	-
107	6B	0110 1011	k		235	EB	1110 1011	-
108	6C	0110 1100	L		236	EC	1110 1100	-
109	6D	0110 1101	m		237	ED 1	1110 1101	-
110	6E	0110 1110	n		238	EE	1110 1110	-
111	6F	0110 1111	o		239	EF	1110 1111	-
112	70	0111 0000	p		240	F0	1111 0000	-
113	71	0111 0001	q		241	F1	1111 0001	-

DEC	HEX	Binary	ASCII	-	DEC	HEX	Binary	ASCII
114	72	0111 0010	R.		242	F2	1111 0010	-
115	73	0111 0011	s		243	F3	1111 0011	-
116	74	0111 0100	t		244	F4	1111 0100	-
117	75	0111 0101	u		245	F5	1111 0101	-
118	76	0111 0110	V.		246	F6	1111 0110	-
119	77	0111 0111	w		247	F7	1111 0111	-
120	78	0111 1000	x		248	F8	1111 1000	-
121	79	0111 1001	y		249	F9	1111 1001	-
122	7A	0111 1010	z		250	FA	1111 1010	-
123	7B	0111 1011	{		251	FB	1111 1011	-
124	7C	0111 1100	|		252	FC	1111 1100	-
125	7D	0111 1101	}		253	FD	1111 1101	-
126	7E	0111 1110	~		254	FE	1111 1110	-
127	7F	0111 1111	DEL		255	FF	1111 1111	(Error)

11.10 HLT2xx protocol

The HLT2xx protocol is not available for all leak detectors.

Refer to the detector user manual to find out whether this protocol is available for your detector.

Only the protocol commands for the HLT2xx leak detector, listed in this chapter, are included in the detector's HLT2xx protocol.

All other commands are not listed in this chapter and have no effect.

Abbreviations and symbols

Symbol	Description
HOST	Computer or terminal
ASCII	American Standard Code for Information Interchange
ENQ	ASCII 05_h
Send	Data transfer from the HOST to the detector
Receive	Data transfer from the detector to the HOST

Protocol

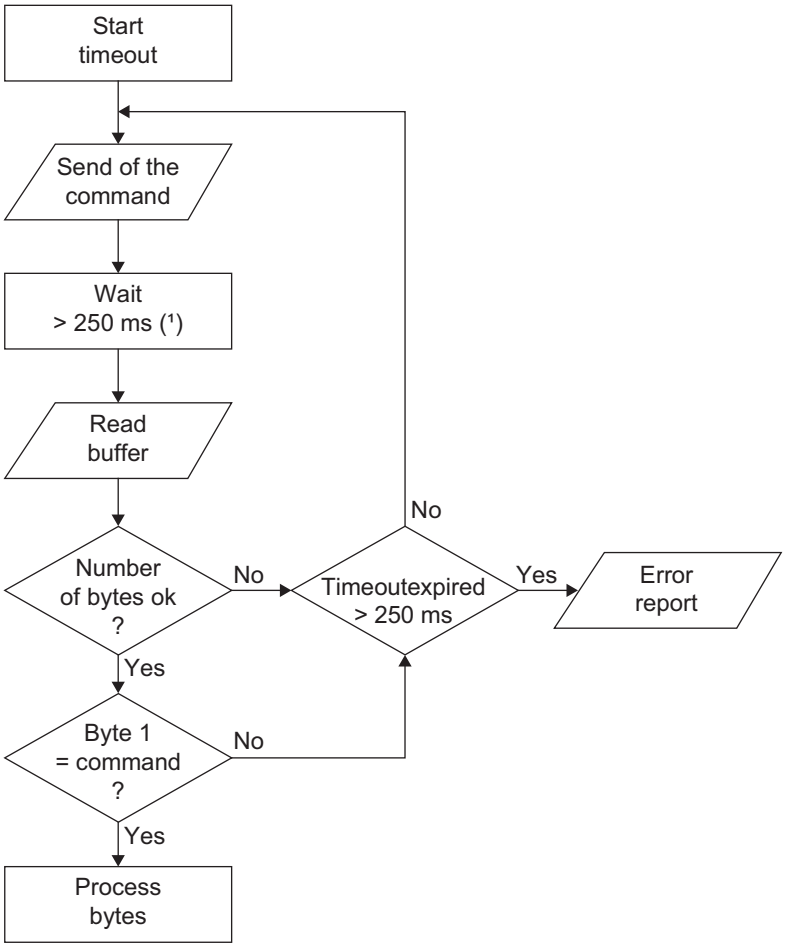
Communication

HOST **Detector**

ENQ + command code + parameters →

← Command code + parameters

Flow diagram (suggested)



***) Current measurement values (command 2: leak rate) can be measured every 50 ms.**

Error management

All received command strings are checked by the detector.

- if OK, the command code is echoed back.
- if not OK, the detector sends a negative validation <FF_h>.

Data types

Data	Data format
FLOAT	4 bytes according to IEEE 754 (± $10^{\pm 38}$)
LONGINT	4 bytes, integer signed, LSB … MSB
INTEGER	2 bytes, integer signed, L-Byte, H-Byte (-32768 … 32767)
BYTE	1 byte, integer signed (-128 … +127)
UBYTE	1 byte, integer not signed (0 … 255)
BOOL	1 byte, 0 = FALSE, otherwise TRUE

Commands

Codes

Hex	Dec	Name	Description	Data format	Comments
0x02	2	LeakRate	Provides the current leak rate	Byte 0...3	Leak rate in mbar l/s (FLOAT)
				Byte 4 and Byte 5	1: threshold reached (BOOL) 0: other (BOOL)
				Byte 6	1: Zero function enabled (BOOL) 0: other (BOOL)

Hex	Dec	Name	Description	Data format	Comments
0x00	0	StopMeasure	Returns the product to 'Ready to start' status	-	Stops the measurement
0x13	19	StartMeasure	Launches the measurement	-	Launches the measurement
0x0A	10	CurrentState	Provides the status information	Byte 0	Detector status (BYTE) 1: preparation of vacuum circuit 2: ready to test (standby) 3: pumping to measure (roughing) 5: stop (default) or other internal status 6: calibration 10: measurement in Gross Leak mode 11: measurement in Normal mode 12: measurement in High Sensitivity mode
				Byte 1	Always 0
0x03	3	SetMeasure- Filter	Defines the parameters of the measurement filter	Byte 0	Type of filter (BYTE) 0: no filter (signal not processed) 1...4: filter available (signal processed)
0x66	102	SetMeasMode	Defines the test mode	Byte 0	Test mode (BYTE) 0: sniffer 1: hard vacuum
0x68	104	SetMassType	Defines the mass to be measured	Byte 0	Mass (BYTE) 0 H_2 1: Helium 3/3-mass 2: Helium4/Helium
0x81	129	SetZeroMode	Defines the zero mode	Byte 0	0…255: not generated (BYTE)
0x98	152	SetTestLeak- Location	Defines the location of the calibrated leak	Byte 0	Location of the calibrated leak (BOOL) 1: internal Other: external
0x71	113	SetValveValues	Sets the pressure thresholds and locks	Byte 0…6	0…255: not generated (BYTE)
0x9D	157	SetTestLeak- Value	Defines the calibrated leak values	Byte 0…3	0…255: not generated (FLOAT)
0x05	5	Zero	Removes the current background	-	-
0x06	6	ZeroReset	Disables background suppression	-	-
0x9C	156	GetCalCF	Provides the calibration factors	Byte 0…3 Byte 4...7 Byte 8...11	Current factors for the current filament (FLOAT)

Examples

Bytes are represented in hexadecimal format.

Conversion between the different formats: see chapter “HLT5xx protocol”

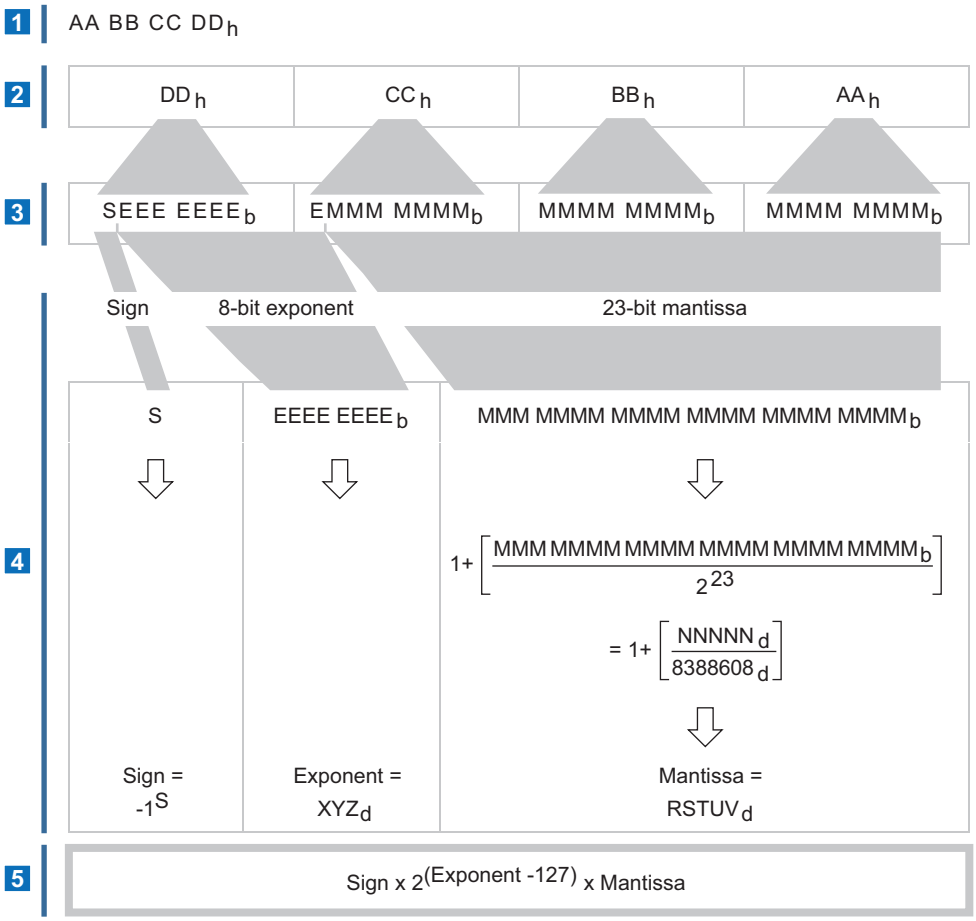
StartMeasure (0x13)

	HOST	Detector
1	05 13	→
2	←	13

Input error

	HOST	Detector
1	05 4C C8	→
2	←	FF

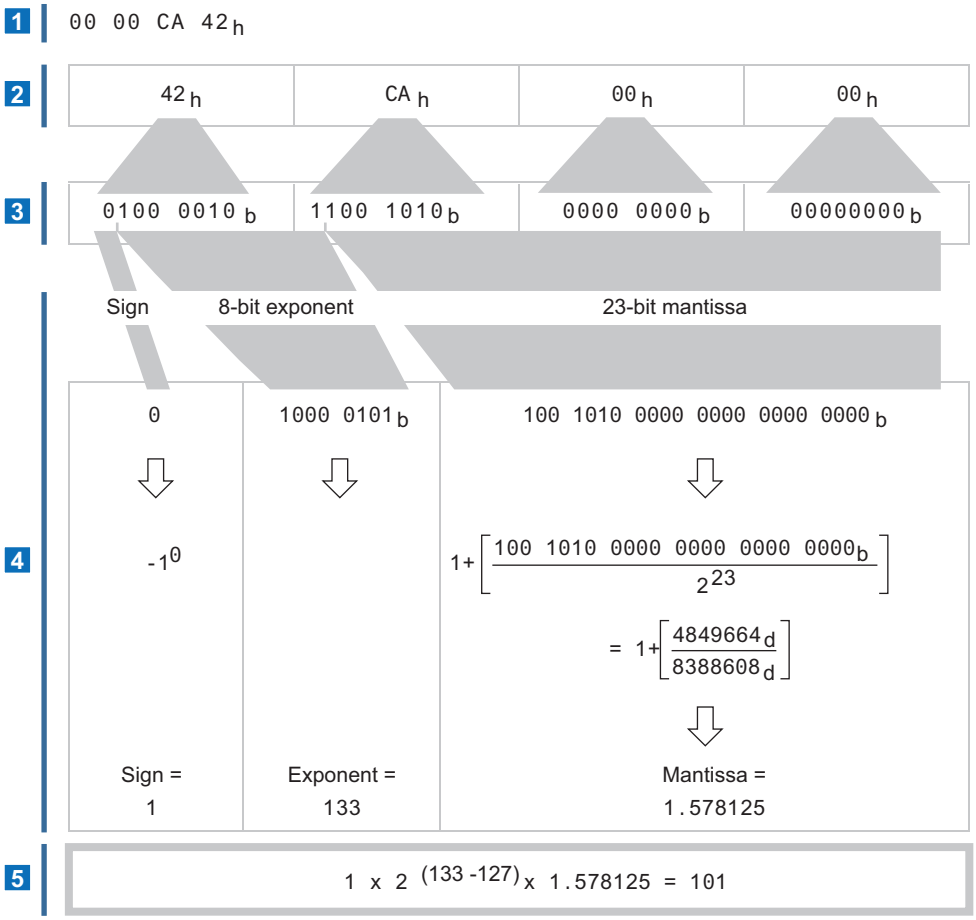
Floating-point number conversion according to IEEE 754



1 XX_h: hexadecimal number (base = 16)
2 XX_d: decimal number (base = 10)
3 XX_b: binary number (base = 2)

1 Number received
2 Inversion of the HEX word string
3 Byte separation
4 Calculation
5 Converted number

Examples

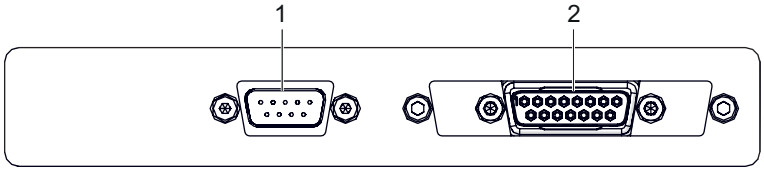
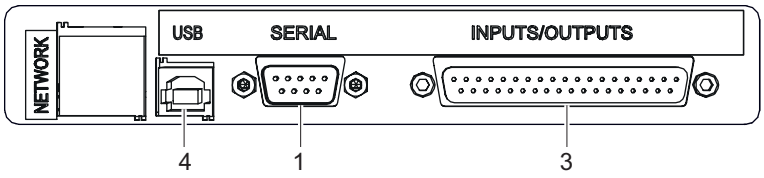
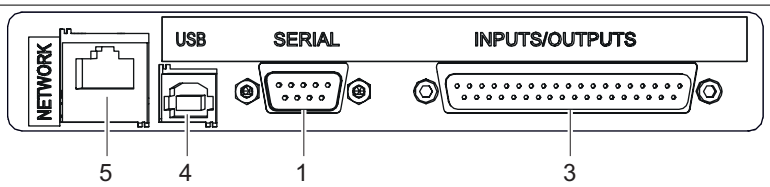
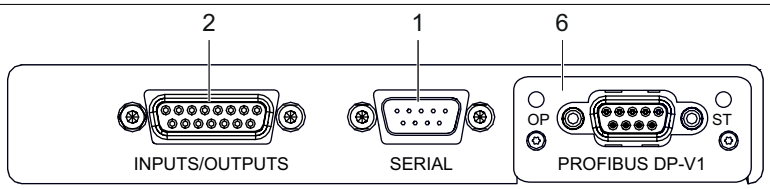
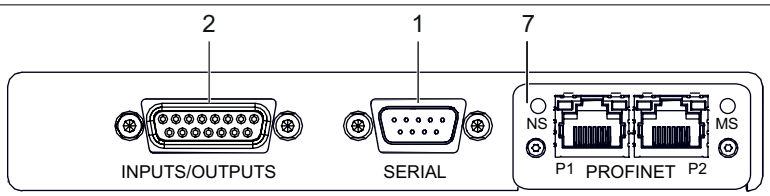


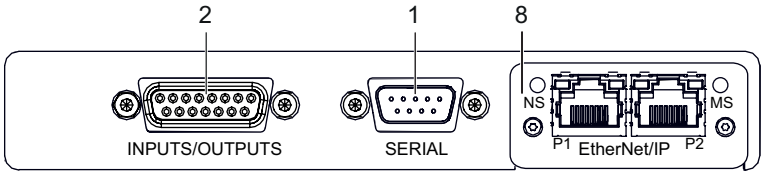
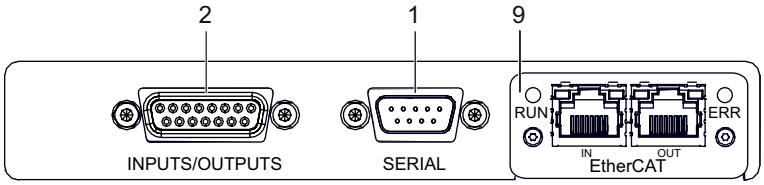
1 Number received
2 Inversion of the HEX word string
3 Byte separation
4 Calculation
5 Converted number

12 Installation

12.1 Compatibility table

Communication interface		ASI 35	ASM 306S	ASM 310 (V1/V2/V3 model)	ASM 340 (V1 model)	ASM 340 (V2 model)	ASM 390	ASM 392
①	RS-232 - 15-pin I/O	-	✔	✔	✔	✔	✔	✔
②	RS-232 - 37-pin I/O - USB	✔	✔	-	✔	✔	✔	✔
③	RS-232 - 37-pin I/O - USB - Ethernet	✔	✔	-	✔	✔	✔	✔
④	RS-232 - 15-pin I/O - Profibus	✔	✔	-	-	✔	-	-
⑤	RS-232 - 15-pin I/O - Profinet	✔	✔	-	-	✔	-	-
⑥	RS-232 - 15-pin I/O - USB - EtherNet/IP	✔	-	-	-	✔	-	-
⑦	RS-232 - 15-pin I/O - USB - EtherCAT	✔	-	-	-	✔	-	-

Communication interface		**1 - RS-232 serial link** **2 - 15-pin I/O** **3 - 37-pin I/O** **4 - USB** **5 - Ethernet**	**6 - Profibus** **7 - Profinet** **8 - EtherNet/IP** **9 - EtherCAT**
①	RS-232 - 15-pin I/O		
②	RS-232 - 37-pin I/O - USB		
③	RS-232 - 37-pin I/O - USB - Ethernet		
④	RS-232 - 15-pin I/O - Profibus		
⑤	RS-232 - 15-pin I/O - Profinet		

Communication interface		1 - RS-232 serial link 2 - 15-pin I/O 3 - 37-pin I/O 4 - USB 5 - Ethernet	6 - Profibus 7 - Profinet 8 - EtherNet/IP 9 - EtherCAT
⑥	RS-232 - 15-pin I/O - USB - EtherNet/IP		
⑦	RS-232 - 15-pin I/O - USB - EtherCAT		

12.2 Receipt of the product

Condition of the delivery

- Check that the product has not been damaged during transport.
- If the product is damaged, take the necessary measures with the carrier **and** notify the manufacturer.

► Keeping the product in its original packaging so it stays as clean as it was when dispatched by us. Only unpack the product once it has arrived at the location where it will be used.

Keep the packaging (recyclable materials) in case the product needs to be transported or stored.

12.3 ASI 35

To install the 'Communication interface board' accessory, the communication interface already installed in the electronic box of the leak detector must be removed in order to replace it with the accessory instead.

12.3.1 Removing the interface in place - ASI 35

⚠ WARNING

Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.

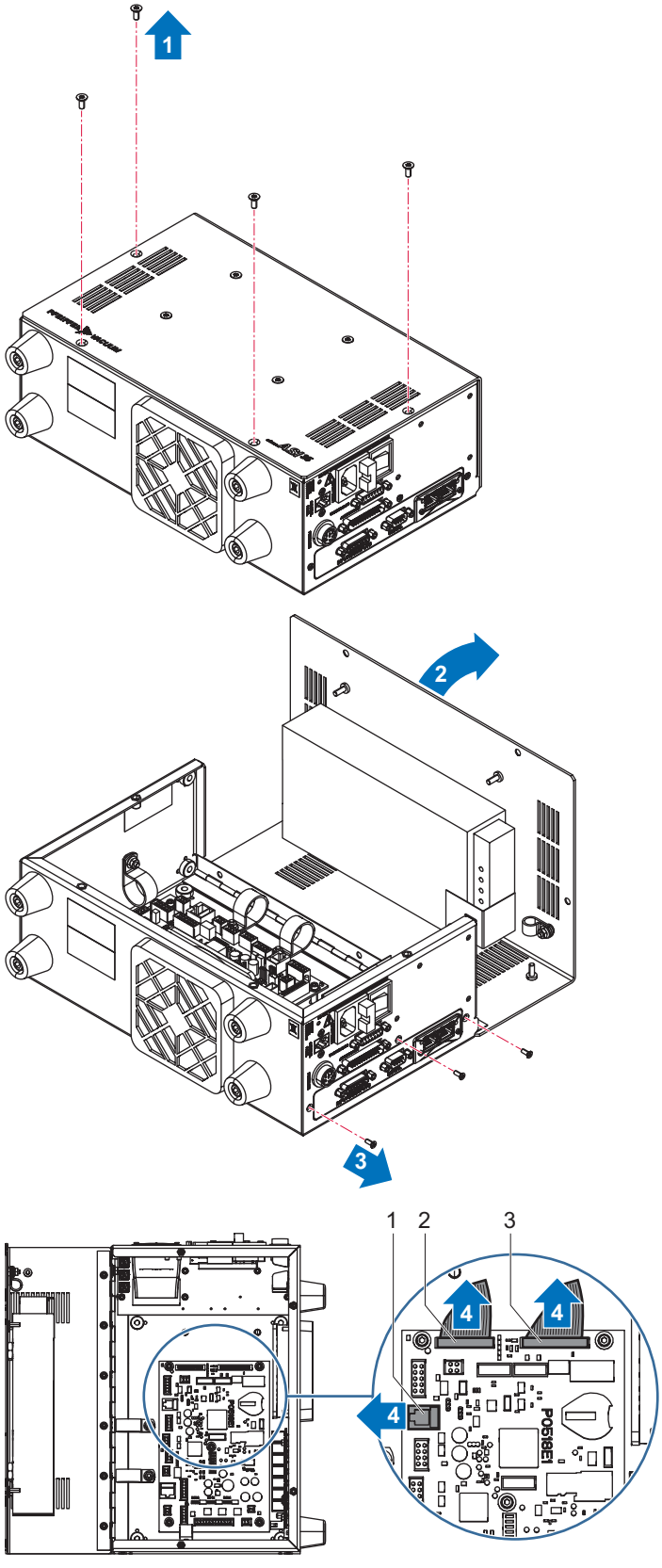
⚠ WARNING

Risk of crushing during product handling

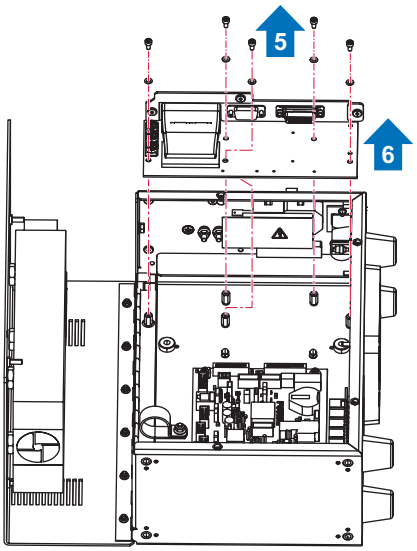
Considering the weight of the leak detector in which the accessory is to be installed, there is a risk of crushing when handling the leak detector. Under no circumstances shall the manufacturer be liable if the following instructions are not followed:

► Only qualified staff trained in handling heavy objects are authorized to handle the product.
► The lifting devices **must** be used on the leak detector and follow the procedures (see chapter "Handling" of the leak detector operating instructions).

► Switch off the leak detector (see chapter "Shutting down the detector" in the leak detector operating instructions).



1 24 VDC power connector
2 J2 connector
3 J1 connector



12.3.2 Installation of the new interface - ASI 35

The communication interface user manual is available in the leak detector user manual (USB drive) or on the website (www.pfeiffer-vacuum.com).

Composition of the 37-pin I/O set and 37-pin I/O - Ethernet

- 1 bracing plate fitted with the 37-pin I/O board or 37-pin I/O - Ethernet depending on the set part number
- 1 label with module address (37-pin I/O - Ethernet only)
- 1 set of screws and washers for fastening the plate on the detector
- 1 37-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the 15-pin I/O set

- 1 bracing plate fitted with 15-pin I/O
- 1 set of screws and washers for fastening the plate on the detector
- 1 15-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the Profibus, Profinet, EtherCAT or EtherNet/IP set

- 1 bracing plate fitted with the Profibus, Profinet, EtherCAT or EtherNet/IP board, depending on the set part number
- 1 set of screws and washers for fastening the plate on the detector

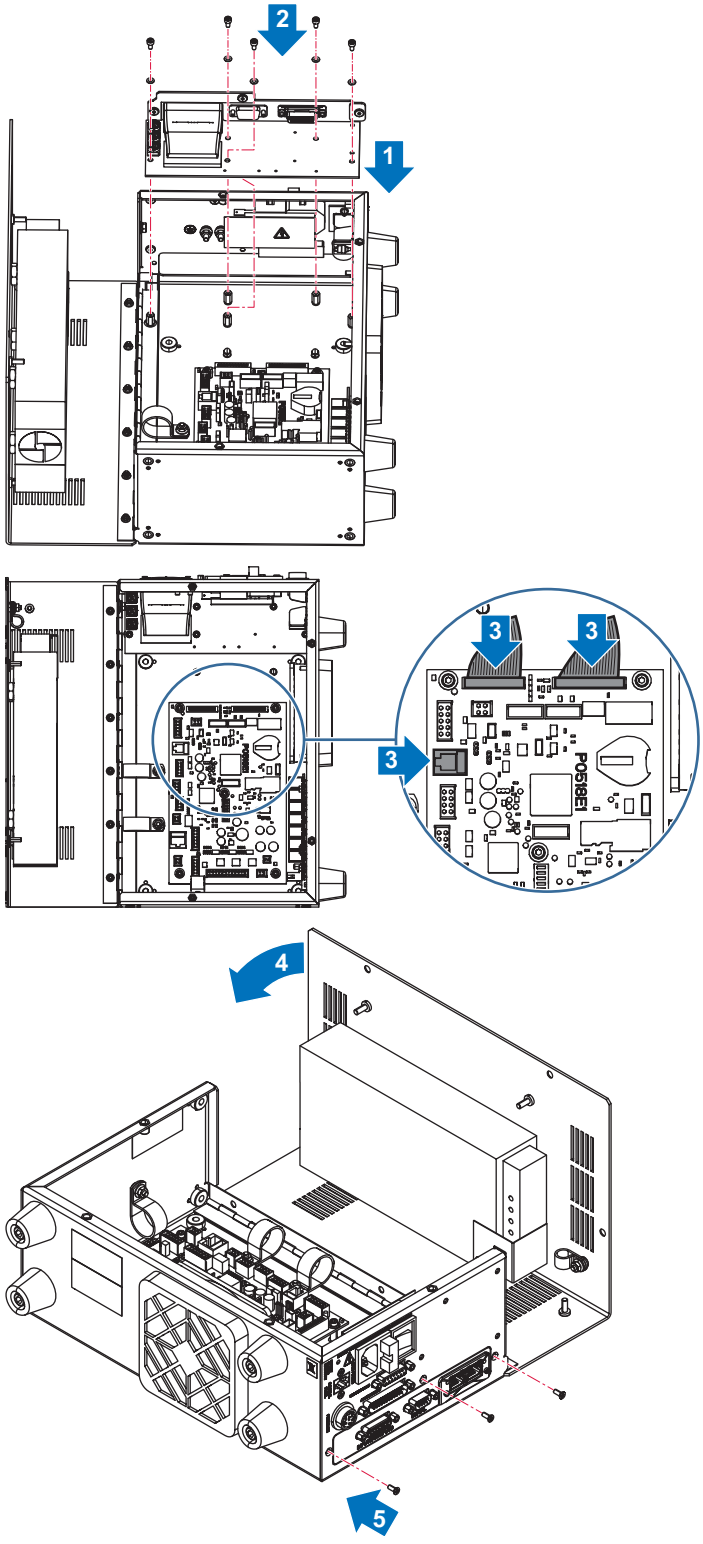
⚠ WARNING

Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.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1
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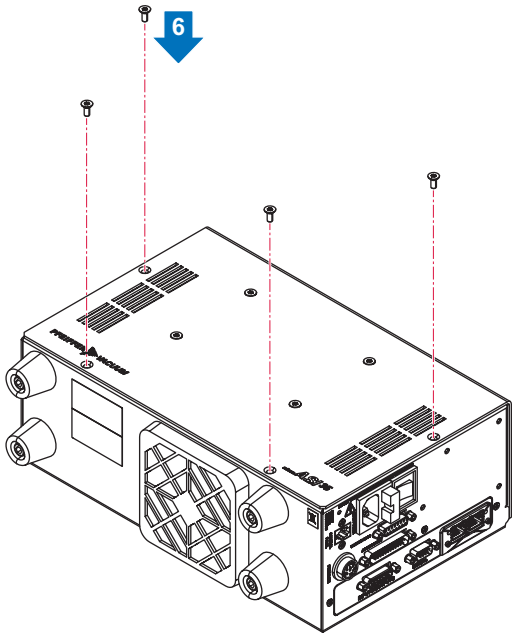


1. Perform the following operations, depending on the model of the new communication interface installed (see below).
2. Configure the leak detector according to the model of the new communication interface.

37-pin I/O and 37-pin I/O - Ethernet

1. Stick the label provided in the package on the detector frame if the I/O board is equipped with an Ethernet module.
2. Configure the USB port (see chapter “USB”).
3. Configure the Ethernet module if the I/O board is equipped with the module (see chapter “Ethernet”).

Profibus

► Load the GSD file into the PLC (see chapter “GSD file”).

Profinet

► Load the GSDML file into the PLC (see chapter “GSDML file”).

EtherCAT

► Load the ESI file into the PLC (see chapter “ESI file”).

EtherNet/IP

► Load the EDS file into the PLC (see chapter “EDS file”).

12.4 ASM 340

To install the “Communication interface board” accessory, it is necessary to remove the communication interface already installed in the leak detector in order to replace it with the accessory instead.

12.4.1 Removal of the interface in place - ASM 340

⚠ WARNING

Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.

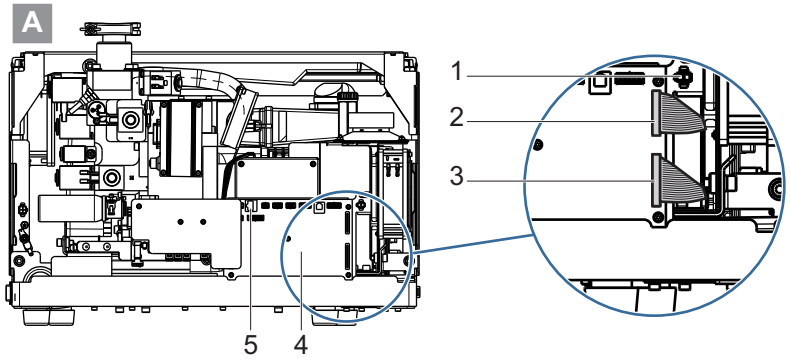
⚠ WARNING

Risk of crushing during product handling

Considering the weight of the leak detector in which the accessory is to be installed, there is a risk of crushing when handling the leak detector. Under no circumstances shall the manufacturer be liable if the following instructions are not followed:

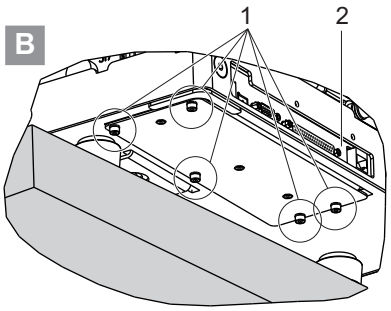
- ► Only qualified staff trained in handling heavy objects are authorized to handle the product.
- ► The lifting devices **must** be used on the leak detector and follow the procedures (see chapter "Handling" of the leak detector operating instructions).

A



1 24 VDC supply connector
2 J2 connector
3 J1 connector
4 Supervisor board
5 J9 connector

B



1 Fixing screws
2 Support plate

1. Switch off the leak detector (see chapter “Shutdown the detector” in the detector operating instructions).
2. Remove the front cover of the detector (see leak detector maintenance manual).
3. Disconnect connectors J1, J2 and J9 from the supervisor board (see **[A]**).
   – There are no J2 connectors for the 15-pin I/O board
4. Disconnect the 24 VDC supply (see **[A]**).
5. Move the detector over the edge of the work surface.
6. Remove the 5 fixing screws from the support plate located below the leak detector (see **[B]**).

12.4.2 Installation of the new interface - ASM 340

The communication interface user manual is available in the leak detector user manual (USB drive) or on the website (www.pfeiffer-vacuum.com).

Composition of the 37-pin I/O set and 37-pin I/O - Ethernet

- 1 bracing plate fitted with the 37-pin I/O board or 37-pin I/O - Ethernet depending on the set part number
- 1 label with module address (37-pin I/O - Ethernet only)

- 1 set of screws and washers for fastening the plate on the detector
- 1 37-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the 15-pin I/O set

- 1 bracing plate fitted with 15-pin I/O
- 1 set of screws and washers for fastening the plate on the detector
- 1 15-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the Profibus, Profinet, EtherCAT or EtherNet/IP set

- 1 bracing plate fitted with the Profibus, Profinet, EtherCAT or EtherNet/IP board, depending on the set part number
- 1 set of screws and washers for fastening the plate on the detector

⚠ WARNING

Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.

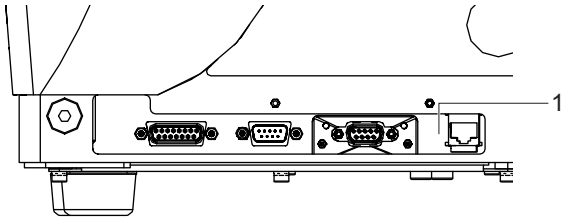
⚠ WARNING

Risk of tipping when removing/installing the bracing plate

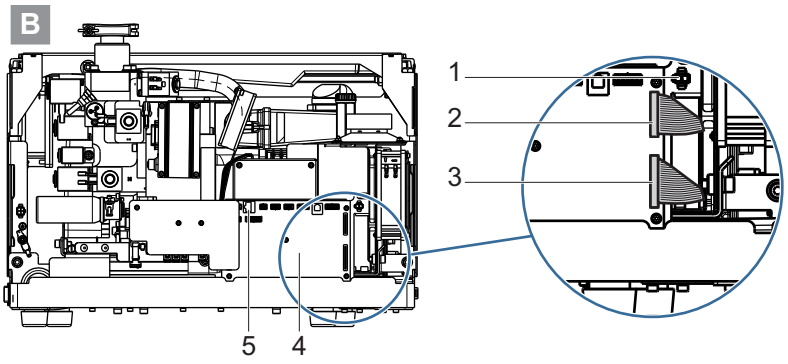
To remove/install the bracing plate, it is necessary to access the underside of the detector without tilting it.

► 2 people are required to remove/install the bracing plate:
  - 1 person to move the detector on the edge of the work surface and hold it in this position (the feet of the detector always remain in contact with the work surface)
  - 1 person to remove/install the bracing plate.

A



1 Bracing plate (example: Profibus communication interface)



1 24 VDC power connector
2 J2 connector
3 J1 connector
4 Supervisor board
5 J9 connector

1. Remove the communication interface (see chapter “Removing the communication interface”).
2. Install the new fitted bracing plate instead (see **[A]**).
3. Place the gauges under the supervisor board of the new communication interface (see **[B]**).
4. Refit the 5 fastening screws and washers.
5. Connect the J1, J2 and J9 connectors to the supervisor board (see **[B]**).
   – There are no J2 and J9 connectors for the 15-pin I/O board.
6. Connect the 24 VDC power supply (see **[B]**).
7. Perform the following operations, depending on the model of the new communication interface installed (see below).
8. Configure the leak detector according to the model of the new communication interface.

37-pin I/O and 37-pin I/O - Ethernet

1. Stick the label provided in the package on the detector frame if the I/O board is equipped with an Ethernet module.
2. Configure the USB port (see chapter “USB”).
3. Configure the Ethernet module if the I/O board is equipped with the module (see chapter “Ethernet”).

Profibus

► Load the GSD file into the PLC (see chapter “GSD file”).

Profinet

► Load the GSDML file into the PLC (see chapter “GSDML file”).

EtherCAT

► Load the ESI file into the PLC (see chapter “ESI file”).

EtherNet/IP

► Load the EDS file into the PLC (see chapter “EDS file”).

12.5 ASM 390-392

To install the “Communication interface board” accessory, it is necessary to remove the communication interface already installed in the leak detector in order to replace it with the accessory instead.

12.5.1 Removal of the interface in place- ASM 390/392

⚠ WARNING

Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.

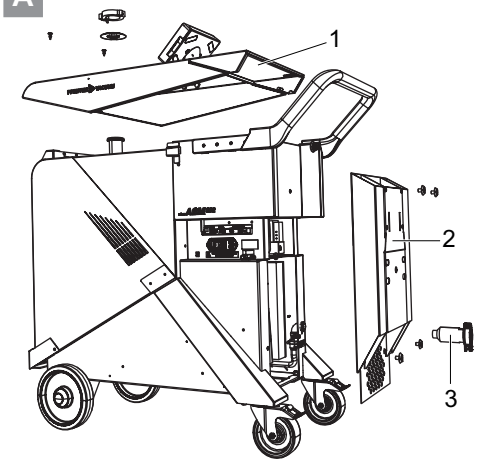
⚠ WARNING

Risk of crushing during product handling

Considering the weight of the leak detector in which the accessory is to be installed, there is a risk of crushing when handling the leak detector. Under no circumstances shall the manufacturer be liable if the following instructions are not followed:

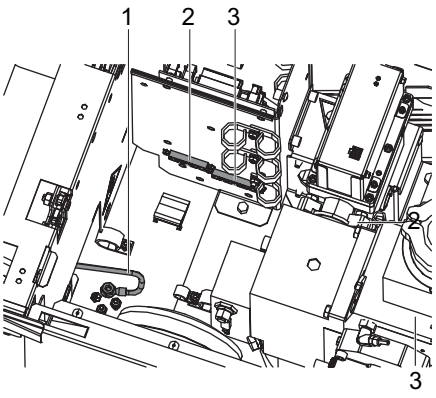
- ► Only qualified staff trained in handling heavy objects are authorized to handle the product.
- ► The lifting devices **must** be used on the leak detector and follow the procedures (see chapter "Handling" of the leak detector operating instructions).

A

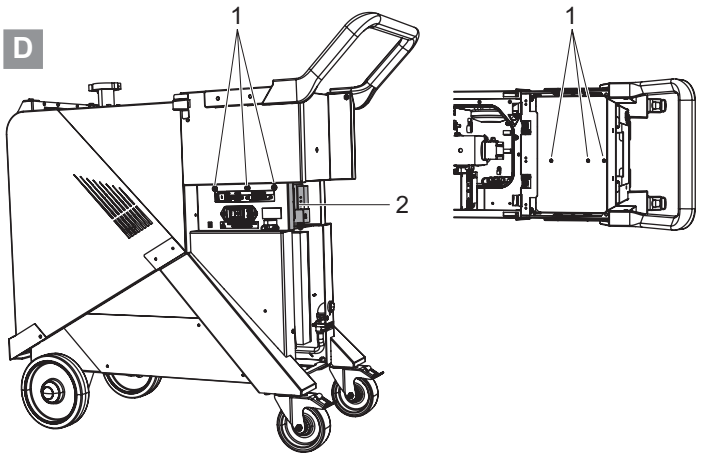


1 Work surface
2 Rear panel
3 Exhaust

B



1 J2 connector
2 J1 connector
3 Ground connection



1 Fixing screws 2 Support plate

1. Switch off the leak detector (see chapter “Shutdown the detector” in the detector operating instructions).
2. Remove the work surface and the pump exhaust if installed (see **[A]**).
3. Remove the rear panel from the detector (see **[A]**).
4. Empty the storage box and remove the groundsheet.
5. Disconnect connectors J1 and J2 from the supervisor board (see **[B]**).
   – There are no J2 connectors for the 15-pin I/O board
6. Remove the ground wire connecting the support plate to the detector frame (see **[B]**).
7. Remove the 6 support plate fixing screws (see **[C]**).
   – 3 on the detector side,
   – 3 on the bottom of the storage box.
8. Pull the support plate horizontally to remove it (see **[C]**).

12.5.2 Installation of the new interface - ASM 390/392

The communication interface user manual is available in the leak detector user manual (USB drive) or on the website (www.pfeiffer-vacuum.com).

Composition of a 37-pin I/O interface board

Composition of the 37-pin I/O set and 37-pin I/O - Ethernet

- 1 bracing plate fitted with the 37-pin I/O board or 37-pin I/O - Ethernet depending on the set part number
- 1 label with module address (37-pin I/O - Ethernet only)
- 1 set of screws and washers for fastening the plate on the detector
- 1 37-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the 15-pin I/O set

- 1 bracing plate fitted with 15-pin I/O
- 1 set of screws and washers for fastening the plate on the detector
- 1 15-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

⚠ WARNING

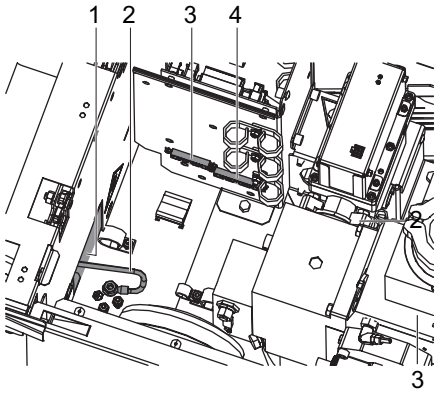
Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

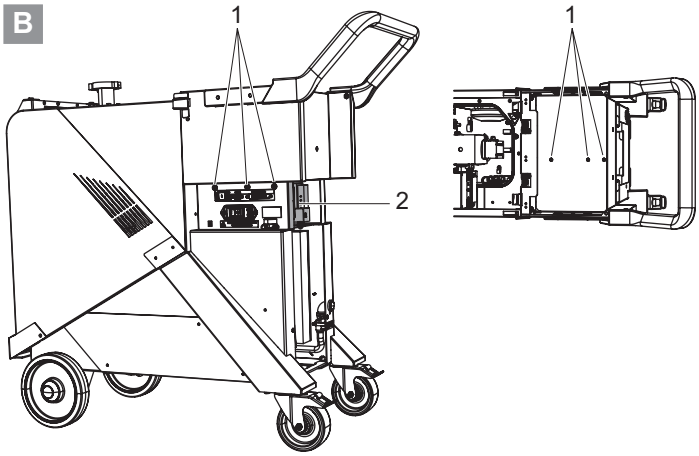
► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.

A



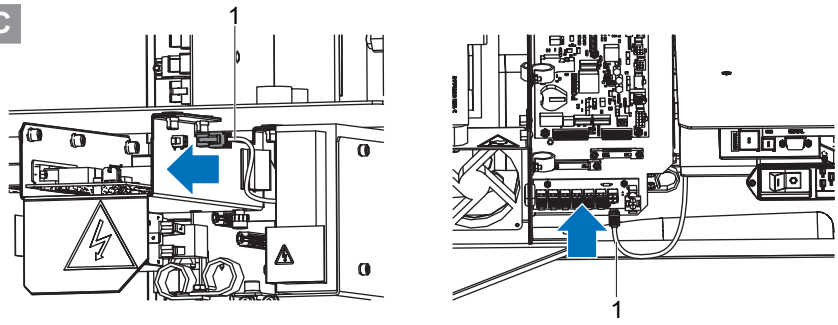
1 Passage for ground wire and gauges
2 Ground wire
3 J2 connector
4 J1 connector

B



1 Fastening screw
2 Bracing plate

C



1 Power cable

1. Remove the communication interface (see chapter “Removing the communication interface”).
2. Install the new bracing plate fitted with the I/O board instead.
   – The bracing plate is introduced horizontally, the gauges and the ground wire first: the gauges and the ground wire must come out (see **[A]** and **[B]**).
3. Replace the 6 fixing screws of the bracing plate (see **[B]**):
   – 3 on the side of the detector,
   – 3 on the bottom of the storage compartment.
4. Connect the J1 and J2 connectors of the I/O board on the supervisor board (**[A]**).
   – There are no J2 connectors for the 15-pin I/O board.
5. Fasten the ground wire connecting the bracing plate to the detector frame (see **[A]**).
6. Connect the power cable (see **[C]**).

7. Return the countertop, back panel and mat to the storage compartment.
8. Perform the following operations, depending on the model of the new communication interface installed (see below).
9. Configure the leak detector according to the model of the new communication interface.

37-pin I/O and 37-pin I/O - Ethernet

1. Stick the label provided in the package on the detector frame if the I/O board is equipped with an Ethernet module.
2. Configure the USB port (see chapter “USB”).
3. Configure the Ethernet module if the I/O board is equipped with the module (see chapter “Ethernet”).

12.6 ASM 306S

To install the “Communication interface board” accessory, it is necessary to remove the communication interface already installed in the leak detector in order to replace it with the accessory instead.

12.6.1 Removal of the communication in place - ASM 306S

⚠ WARNING

Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

- ► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.
- ► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.

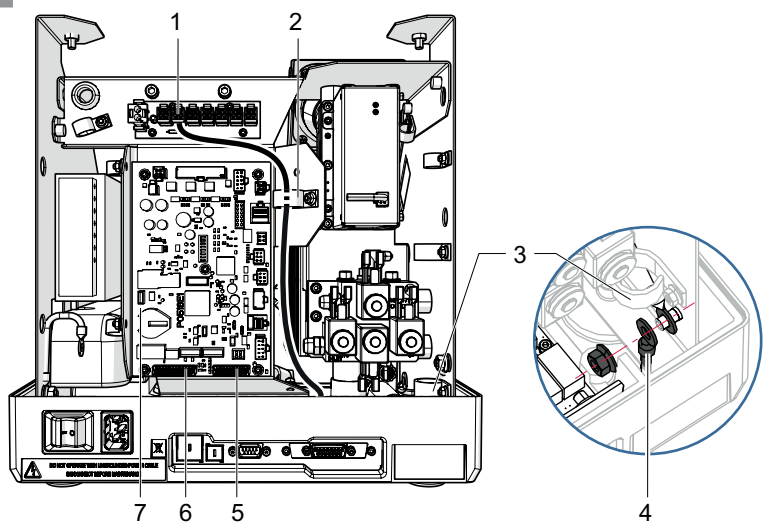
⚠ WARNING

Risk of crushing during product handling

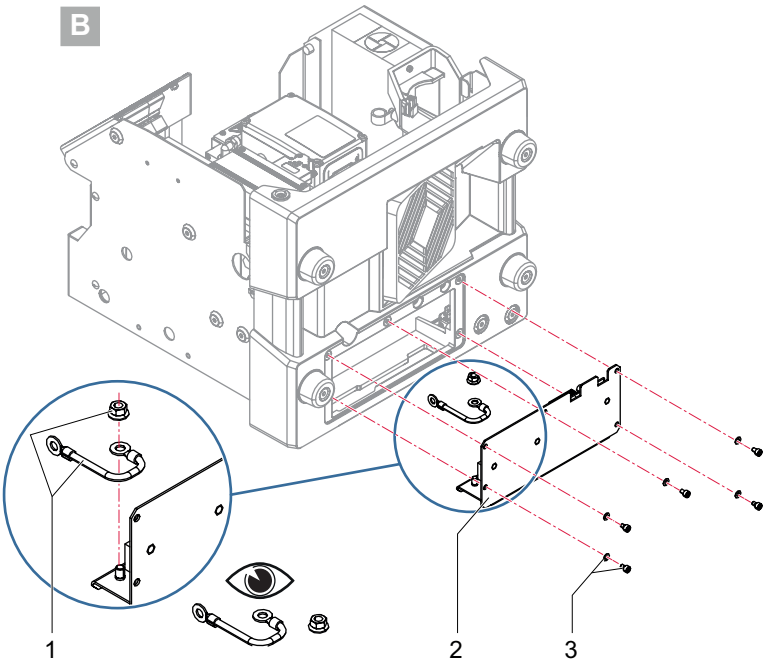
Considering the weight of the leak detector in which the accessory is to be installed, there is a risk of crushing when handling the leak detector. Under no circumstances shall the manufacturer be liable if the following instructions are not followed:

- ► Only qualified staff trained in handling heavy objects are authorized to handle the product.
- ► The lifting devices **must** be used on the leak detector and follow the procedures (see chapter "Handling" of the leak detector operating instructions).

A



1 24 VDC J6 supply connector
2 Grommet
3 Grommet
4 Ground connection
5 J2 connector
6 J1 connector
7 Supervisor board



The ground connection and the nut are not supplied with the kit. They must be removed from the support plate of the old kit to be put back on the support plate of the new kit.

1 Ground connection with nut
2 Support plate
3 Fixing screw with washers

1. Switch off the leak detector (see chapter “Shutdown the detector” in the detector operating instructions).
2. Remove the front cover of the detector (see leak detector maintenance manual).
3. On the supervisor board, disconnect the wiring harness(es) from the communication interface (connectors J1 and J2 depending on the configuration and connector J9) (see **[A]**).
4. Disconnect connectors J1, J2 and J9 from the supervisor board (see **[A]**).
   – There are no J2 and J9 connectors for the 15-pin I/O board
5. Disconnect the 24 VDC power supply (J6) (see **[A]**).
6. Remove the ground wire connecting the support plate to the detector frame (see **[A]**).
7. Tilt the detector onto its rear face on the work surface (the side with the connectors facing the user).
8. Remove the ground connection from the support plate (see **[B]**).
9. Remove the 5 support plate fixing screws and the washers (see **[B]**).

12.6.2 Installation of the new interface - ASM 306S

The communication interface user manual is available in the leak detector user manual (USB drive) or on the website (www.pfeiffer-vacuum.com).

Composition of the 37-pin I/O set and 37-pin I/O - Ethernet

- 1 bracing plate fitted with the 37-pin I/O board or 37-pin I/O - Ethernet depending on the set part number
- 1 label with module address (37-pin I/O - Ethernet only)
- 1 set of screws and washers for fastening the plate on the detector
- 1 37-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the 15-pin I/O set

- 1 bracing plate fitted with 15-pin I/O
- 1 set of screws and washers for fastening the plate on the detector
- 1 15-pin male D-Sub connector for preparing the connecting cable (must be purchased by the customer)

Composition of the Profibus and Profinet set

- 1 bracing plate fitted with the Profibus or Profinet board, depending on the set part number
- 1 set of screws and washers for fastening the plate on the detector

⚠ WARNING

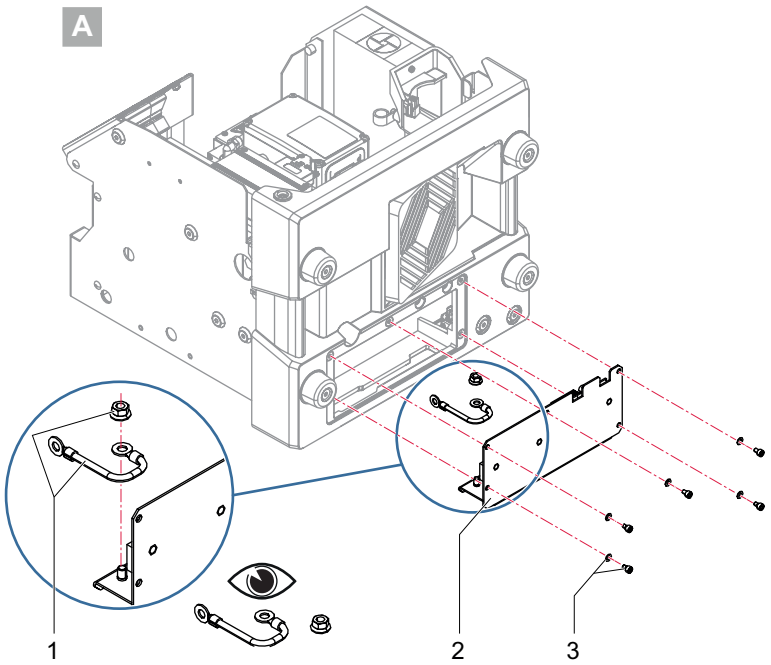
Electric shock hazard

Voltage and current can cause electric shock.

Only skilled, authorized people may carry out maintenance work.

► Insulate and lock the power supply circuit by positioning the circuit breaker on **O**.

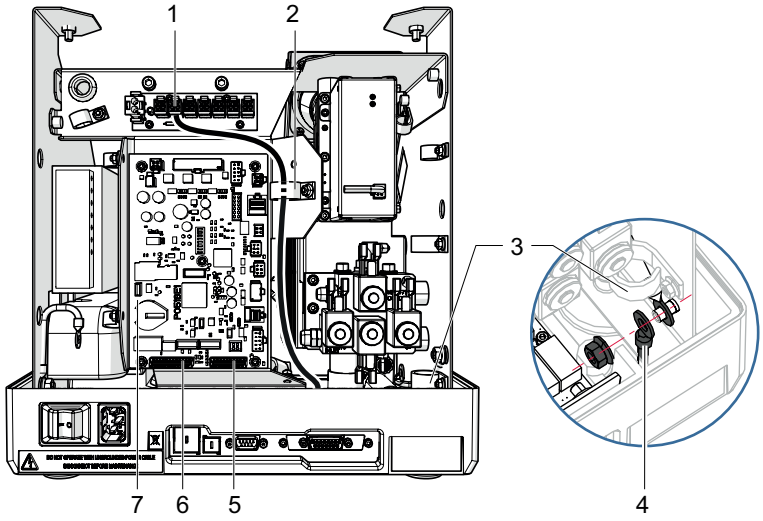
► Disconnect the power supply cable from all power sources before working on the product and/or removing the covers.



The ground wire and nut are not supplied with the kit. They must be removed from the bracing plate of the old kit to be put back on the bracing plate of the new kit.

1 Ground wire with nut
2 Bracing plate
3 Fastening screw with washers

B



1 24 VDC J6 power connector
2 Grommet
3 Grommet
4 Ground wire
5 J2 connector
6 J1 connector
7 Supervisor board

1. Remove the communication interface (see chapter “Removing the communication interface”).
2. Put the ground wire on the new bracing plate (see **[A]**).
3. Install the new fitted bracing plate instead (see **[A]**).
4. Place the gauges under the supervisor board of the new communication interface.
5. Refit the 5 fastening screws and washers (see **[A]**).
6. Position the detector on its feet on the work surface.
7. Connect the J1, J2 and J9 connectors to the supervisor board (see **[B]**).
   – There are no J2 and J9 connectors for the 15-pin I/O board.
8. Connect the 24 VDC power supply (see **[B]**).
9. Replace the ground wire connecting the bracing plate to the detector frame (see **[B]**).
10. Perform the following operations, depending on the model of the new communication interface installed (see below).
11. Configure the leak detector according to the model of the new communication interface.

37-pin I/O and 37-pin I/O - Ethernet

1. Stick the label provided in the package on the detector frame if the I/O board is equipped with an Ethernet module.
2. Configure the USB port (see chapter “USB”).
3. Configure the Ethernet module if the I/O board is equipped with the module (see chapter “Ethernet”).

Profibus

► Load the GSD file into the PLC (see chapter “GSD file”).

Profinet

► Load the GSDML file into the PLC (see chapter “GSDML file”).

13 Additional equipment

13.1 ASM 142 type I/O cable

Available for the ASM 340, ASM 390/392 and ASM 306S leak detectors only (see chapter "Spare parts").

This accessory is used to communicate with the customer's automated system to replace an ASM 142 detector (25-pin D-Sub) with an ASM 340 (37-pin D-Sub) detector. The D-sub connectors of the two products are configured identically.

1. From the “Settings” screen, press **[Advanced] [Input/Output] [I/O Connector] [Other configurations] [ASM142]** (see chapter “Other configurations”).
2. Connect the adapter cable between the detector 37-pin D-Sub I/O connector and the automation system 25-pin D-Sub I/O connector.

13.2 ASM 182 type I/O cable

Available for the ASM 340 and ASM 390/392 leak detectors only (see chapter "Spare parts").

This accessory is used to communicate with the customer automated system to replace an ASM 182 detector (25-pin D-Sub) with an ASM 340 (37-pin D-Sub) detector. The D-sub connectors of the two products are configured identically.

1. From the “Settings” screen, press **[Advanced] [Input/Output] [I/O Connector] [Other configurations] [ASM182]** (see chapter “Other configurations”) .
2. Connect the adapter cable between the detector 37-pin D-Sub I/O connector and the automation system 25-pin D-Sub I/O connector.

13.3 Type HLT I/O module

Available for the ASM 340 and ASM 390/392 leak detectors only (see chapter "Spare parts").

This accessory is used to communicate with the customer's automated system to replace an HLT5xx detector with an ASM 340 detector: see the operating instructions for the HLT I/O compatibility module (see chapter "Applicable documents”).

13.4 Type ASI 20 MD I/O module

Available for the ASI 35 leak detector only (see chapter "Spare parts").

This accessory is used to communicate with the customer's automated system to replace a 2xxx or 3xxx detector with an ASI 20 detector: see the operating instructions for the type ASI 20 MD I/O module (see chapter "Applicable documents”).

13.5 Type 2xxx or 3xxx I/O module

Available for the ASI 35 leak detector only (see chapter "Spare parts").

This accessory is used to communicate with the customer's automated system to replace a 2xxx or 3xxx detector with an ASI 35 detector: see the operating instructions for the type 2xxx/3xxx I/O module (see chapter "Applicable documents”).

14 Malfunctions

In case of difficulties when using these communication interfaces, please refer to the “Malfunctions” chapter of the leak detector maintenance instructions.

15 Decommissioning

15.1 Disposal

Environmental protection

The product and its components **must be disposed of in accordance with the applicable regulations relating to environmental protection and human health**, with a view to reducing natural resource wastage and preventing pollution.

Our products contain various materials which must be recycled (see chapter "Disposal" in the leak detector maintenance instructions).

15.2 Electrical and Electronic Equipment (EEE)

Electrical and Electronic Equipment (EEE) contain polluting material (electronic boards, batteries, screens, capacitors, mercury, etc.)

Depollution and subsequent recycling of this equipment are necessary to preserve our natural resources and particularly strategic raw materials.

The manufacturer shall only be required to take back EEE marked adixen or Pfeiffer Vacuum sold by Pfeiffer Vacuum:

- EEE subject to applicable regulations for recycling end-of-life products;
- Complete, non modified EEE using original Pfeiffer Vacuum spare parts and including all of their assemblies and sub-assemblies, excluding batteries.

Product on sale on French soil

In the absence of any specific contract and pursuant to current applicable legislation (and Articles R543-172 et seq. of the Environment Code in particular), all EEEs sold by Pfeiffer Vacuum on French soil are covered by the organization and financing of removal and treatment of waste from EEEs provided by Pfeiffer Vacuum.

In order to fulfill its obligations, Pfeiffer Vacuum finances the collection and recycling of waste from EEE by subscribing to **ecosystem**. This voluntary arrangement enables owners of EEEs on French soil to benefit from easy, free solutions to ensure that EEEs subject to the regulations are recycled.

To find out more about the collection solutions, contact **ecosystem** who will inform you of the best collection solution for your needs: www.ecosystem.eco

For further details, consult the General Conditions of Sale available in French on the Pfeiffer Vacuum website.

Product on sale outside of France

In the absence of any specific contract and pursuant to Directive 2012/19/EU on the treatment of waste from EEE, for all EEE sold by Pfeiffer Vacuum outside of France (European Union and third countries), the owner shall be exclusively responsible for organizing and financing the collection and treatment of waste from EEE sold by Pfeiffer Vacuum.

The owner is exclusively responsible, in particular, for its collection (gathering, sorting and storage of waste for its transportation to the treatment site), recycling, recovery and/or disposal, unless otherwise required by legal provisions applicable in the country where the owner is located, which must be reported to Pfeiffer Vacuum by the owner.

16 Spare parts

16.1 ASM 340

Désignation	Part Number
37-pin male D-Sub connector (without cover)	118733
37-pin D-Sub connector cover	118732
15-pin male D-Sub connector (without cover)	114425
15-pin D-Sub connector cover	114424
ASM 142 type I/O cable	A333758
ASM 182 type I/O cable	A335068
Type HLT I/O module	122742
Accessory - Communication interface kit - 15-pin I/O - RS-232	121349S
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB	121350S
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	121352S
Accessory - Communication interface kit - 15-pin I/O - RS-232 - Profinet	127448S
Accessory - Communication interface kit - 15-pin I/O - RS-232 - Profibus	127447S
Accessory - Communication interface kit - 15-pin I/O - RS-232 - EtherCAT - Consult us	129995S
Accessory - Communication interface kit - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	129994S
External adapter for Wi-Fi communication interface - RS-232 serial link	125902
RS-232 serial link cable	103616

16.2 ASM 390/392

Désignation	Part number
37-pin male D-Sub connector (without cover)	118733
37-pin D-Sub connector cover	118732
15-pin male D-Sub connector (without cover)	114425
15-pin D-Sub connector cover	114424
ASM 142 type I/O cable	A333758
ASM 182 type I/O cable	A335068
Type HLT I/O module	122742
Accessory - Communication interface kit - 15-pin I/O - RS-232	126253S
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB	126254S
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	126255S
External adapter for Wi-Fi communication interface - RS-232 serial link	125902
RS-232 serial link cable	103616

16.3 ASM 306S

Désignation	Part Number
37-pin male D-Sub connector (without cover)	118733
37-pin D-Sub connector cover	118732
15-pin male D-Sub connector (without cover)	114425
15-pin D-Sub connector cover	114424
ASM 142 type I/O cable	A333758
Accessory - Communication interface kit - 15-pin I/O - RS-232	127254S
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB	127258S

Désignation	Part Number
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	127256S
Accessory - Communication interface kit - 15-pin I/O - RS-232 - Profinet	127255S
Accessory - Communication interface kit - 15-pin I/O - RS-232 - Profibus	127257S
External adapter for Wi-Fi communication interface - RS-232 serial link	125902
RS-232 serial link cable	103616
ASM 182 type I/O cable	A335068

16.4 ASI 35

Désignation	Part Number
37-pin male D-Sub connector (without cover)	118733
37-pin D-Sub connector cover	118732
15-pin male D-Sub connector (without cover)	114425
15-pin D-Sub connector cover	114424
Electronic box equipped - 37-pin I/O - RS-232 - USB [1)]	123057S
Electronic box equipped - 37-pin I/O - RS-232 - USB - Ethernet [1)]	123058S
Electronic box equipped - 15-pin I/O - RS-232 - Profibus [1)]	126915S
Electronic box equipped - 15-pin I/O - RS-232 - Profinet [1)]	126914S
Electronic box equipped - 15-pin I/O - RS-232 - EtherCAT - Consult us [1)]	129996S
Electronic box equipped - 15-pin I/O - RS-232 - EtherNet/IP - Consult us [1)]	129997S
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB	130196
Accessory - Communication interface kit - 37-pin I/O - RS-232 - USB - Ethernet	130195
Accessory - Communication interface kit - 15-pin I/O - RS-232 - Profibus	130193
Accessory - Communication interface kit - 15-pin I/O - RS-232 - Profinet	130192
Accessory - Communication interface kit - 15-pin I/O - RS-232 - EtherCAT - Consult us	130190
Accessory - Communication interface kit - 15-pin I/O - RS-232 - EtherNet/IP - Consult us	130191
Type ASI 20 MD I/O module	123352
Type 2xxx I/O module	123353
Type 3xxx I/O module	123354
External adapter for Wi-Fi communication interface - RS-232 serial link	125902
RS-232 serial link cable	103616
1) Contact us to check the compatibility of your leak detector with this accessory	

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