Protocol descriptions

Ecotec® 4000

Leak detector

Catalog No.
530-201

From software version
HMI: V 1.11

kira59en1-03-(2607)

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Table of Contents

1 Interface Protocol

NOTICE

A write command may cause write access to the internal EEPROM of the device. This also applies to commands that write the same value that is already stored in the EEPROM.

Since the EEPROM has a limited write cycle endurance, unnecessary write commands should be avoided.

The descriptive contents of the protocols is intended for use the INFICON products

- 560-310 IO1000 Modul
- 560-315 BM1000 PROFIBUS
- 560-316 BM1000 PROFINET
- 560-317 BM1000 DeviceNET
- 560-318 BM1000 EtherNet/IP

1.1 Serial Interface Protocols

With the IO1000 module you can communicate with the Ecotec 4000 via the following serial interface protocols:

- LD Protocol
- ASCII Protocol

The serial interface protocol can be selected via DIP switch at the IO module IO1000 or via control unit CU1000. Please refer to appropriate documentation.

2 LD Protocol

2.1 Comparison between ASCII- and LD protocol

ASCII- and LD protocol have nearly the same functional range, but each of them have some advantages and disadvantages:

ASCII protocol:

Advantages:

- human readable
- easy to use with simple terminal program

Disadvantages:

- Fewer commands are supported than with the LD protocol
- No checksum, therefor lower data security
- PC/ PLC software must convert numerical values from ASCII string to binary
- Lower efficiency (for example: 8 data bytes for one float value)

LD protocol:

Advantages:

- Leak detector status always transmitted in each slave telegram
- High data security due to CRC checksum
- Binary transmission of numerical values – no conversion needed in PC/PLC software
- High efficiency (for example: 4 Byte data bytes for one float value)

Disadvantages:

- Not human readable
- Not useable with simple terminal program

2.2 Communication Parameters

Data format

Baudrate 19.200, 8 data bits, 1 stop bit, no parity

2.3 Command format

2.3.1 Telegram structure

Master sends

ENQ	LEN	ADR	CmdH	CmdL	DATA (n bytes)	CRC
0	1	2	3	4	5	5 + n

Slave answers

STX	LEN	StwH	StwL	CmdH	CmdL	DATA (n bytes)	CRC
0	1	2	3	4	5	6	6 + n

Command	Meaning	
ENQ	0x05	Start of master request
STX	0x02	Start of slave response
LEN	Number of telegram bytes	without ENQ(STX)/LEN, however with CRC max. 253, so the total slave telegram length is max. 255
ADR	Slave address	Slave address = 1: non-addressed bus. Address byte is ignored.
Stw H/L	Status word	Info from slave to master see "Status Word [▶ 10]"
Cmd H/L	Command	Bit 15 … 13: Command-specifier Read/Write etc. see "Commands [▶ 12]" Bit 12: free Bit 11 … 0: Command see "Commands [▶ 12]"

Command	Meaning	
DATA	Data belonging to master request (Slave reply to write command is sent without data)	$0 \leq n \leq 248$ If I/O module (7-byte additional header) is used, then limit maximum data length to 241.
CRC	Checksum	Calculate CRC for all bytes (except CRC byte) Polynomial: 0x98, Name: DOWCRC, Maxim/Dallas, $X^8+X^5+X^4+1$ Info: CRC calculation see file "CRC_calculation.c" (C source code)

Cmd H/L: Command: Command-specifier

Bit 15 ... 13	Meaning	High Nibble (Hex)	Comments
000	Read value	0	
001	Write value	2	
010	Read lower limit value	4	Min values also defined for read commands.
011	Read upper limit value	6	Max values also defined for read commands.
100	Read default value	8	Def values also defined for read commands.
101	Read command name in plain text	A	Please refer to chapter “Command name in plain text” below.
110	Read command info	C	Please refer to table “Command info” below
111	not used	E	

Command name in plain text

- 7-Bit ASCII, only printable characters (0x20 and 0x7E)
- Always in English
- Units in square brackets

Command info

1. Byte	Data type see "Telegram structure [▶ 7]"
2. Byte	Number of array elements: 0 = no data, no array 1 = data, no array 2 … 255 = array
3. Byte	Bit 0: 1 = Reading allowed, 0 = Reading not allowed Bit 1: 1 = Writing allowed, 0 = Writing not allowed Bit 2 … 7: always 0 (not used)

Data Types

Value	Meaning	Acronym	Comments
1	Signed 8 bit integer	SINT8	
2	Signed 16 bit integer	SINT16	
3	Signed 32 bit integer	SINT32	
4	Unsigned 8 bit integer	UINT8	
5	Unsigned 16 bit integer	UINT16	
6	Unsigned 32 bit integer	UINT32	
7	Character	CHAR	ISO 8859-1; printable characters
16	Signed 64 bit integer	SINT64	
17	Unsigned 64 bit integer	UINT64	
18	Floating point/real number	FLOAT	IEEE 754
20	no data	NO_DATA	For commands without data, such as Start

All data types are used in Big Endian format (Motorola format), i.e. the byte with the highest-order bits is transferred first.

Arrays

- Read single elements: Array index in first DATA-byte
- Write single elements: Array index in first DATA byte and values in following DATA bytes

- Read all elements: Pseudo array index 255 in first DATA byte
- Write all elements: Pseudo array index 255 in first DATA byte and values in following DATA bytes
- Response from slave (in case data are sent): Array index or pseudo array index in first DATA byte and values in following DATA bytes

All elements of an array have the same Min/Def/Max value.

Array parameters can be found in Chapter "Commands [▶ 65]": The number of array elements is set in brackets behind the data type.

2.4 Status Word

Status word bit no.	Meaning
Bit 0	0 = Runup 1 = Measuring VAC 2 = Measuring SNIF 3 = Standby VAC 4 = Standby SNIF 5 = Calibration VAC 6 = Calibration SNIF 7…14 = not used 15 = Not READY
Bit 1	
Bit 2	
Bit 3	
Bit 4	ZERO
Bit 5	Still warning
Bit 6	Sniffer Key
Bit 7	USER CHANGE
Bit 8	PLC Output Change
Bit 9	Trigger 1, 1 = Trigger 1 exceeded
Bit 10	Trigger 2, 1 = Trigger 2 exceeded
Bit 11	not used
Bit 12	not used
Bit 13	Device warning
Bit 14	Device error
Bit 15	Syntax/Command error

2.5 Meaning of the "nonvolatile" column

See the table in the following chapter.

N/A	not applicable
no	Parameter value is not stored in non-volatile memory
yes	Parameter value is stored non-volatile in the EEPROM of the basic unit
yes (xxx)	Parameter value is stored non-volatile in unit "xxx" (for exampleTMP = TMP controller, RTC = realtime clock etc.)

2.6 Commands

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
0	0	NOP No operation	R	N/A	NO_DATA	"No operation", replies without data	no
1	1	Start	W	N/A	NO_DATA	Switch to "measure"	no
2	2	Stop	W	N/A	NO_DATA	Switch to "standby"	no
4	4	Start calibration	R/W	N/A	UINT8	Start calibration 0 = Calibration inactive (read only) 1 = Gas 1 2 = Gas 2 3 = Gas 3 4 = Gas 4 5 = IGS adjust	yes
5	5	Clear error	W	N/A	NO_DATA	Clear Error or Warning	no
6	6	Zero	R/W	no	UINT8	0 = Zero "Off" 1 = Zero "On" respectively update zero value	yes
9	9	Emission nominal status	R/W	no	UINT8	Emission nominal status 0 = off 1 = on	read only
10	A	TMP nominal status	R/W	no	UINT8	TMP nominal status 0 = off 1 = on	read only
11	B	Calibration acknowledge	W	N/A	UINT8	Calibration acknowledge 0 = cancel 1 = continue 2 = Switch Proof to Cal	no
14	E	Backing pump nominal status	R/W	no	UINT8	Backing pump nominal status 0 = off 1 = on	read only
15	F	Purge	W	N/A	NO_DATA	Switch to "purge"	no
118	76	Flow [sccm]	R	no	FLOAT	Flow [sccm]	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
128	80	Leak rate [interface unit]	R	no	FLOAT[4]	Leak rate [interface unit] [0] = Gas 1 [1] = Gas 2 [2] = Gas 3 [3] = Gas 4	read only
129	81	Leak rate [mbar*l/s]	R	no	FLOAT[4]	Leak rate [mbar*l/s] [0] = Gas 1 [1] = Gas 2 [2] = Gas 3 [3] = Gas 4	read only
130	82	Internal pressure 1 [interface unit]	R	no	FLOAT	Internal pressure 1 [interface unit]	read only
131	83	Internal pressure 1 [mbar]	R	no	FLOAT	Internal pressure 1 [mbar]	read only
132	84	Internal pressure 2 [interface unit]	R	no	FLOAT	Internal pressure 2 [interface unit]	read only
133	85	Internal pressure 2 [mbar]	R	no	FLOAT	Internal pressure 2 [mbar]	read only
137	89	TMP runup time [s]	R	no	UINT16	TMP runup time [s]	read only
138	8A	TMP current rotation speed [Hz]	R	no	UINT16	TMP current rotation speed	read only
139	8B	TMP power [W]	R	no	FLOAT	TMP power in Watt as reported by TMP controller	read only
140	8C	TMP operation hours [h]	R	yes (TMP)	UINT32	TMP operation hours	read only
141	8D	Frequency converter operation hours [h]	R	yes (TMP)	UINT32	Frequency converter operation hours [h]	read only
142	8E	Leak detector operation hours	R	yes	UINT32	Leak detector operation hours	read only
143	8F	TMP temperature bottom [deg. C]	R	no	FLOAT	TMP temperature bottom [deg. C] Pfeiffer Vacuum TMPs only	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
144	90	TMP temperature electronic [deg. C]	R	no	FLOAT	TMP temperature electronic [deg. C]	read only
145	91	TMP temperature bearing [deg. C]	R	no	FLOAT	TMP temperature bearing [deg. C]	read only
146	92	TMP temperature motor [deg. C]	R	no	FLOAT	TMP temperature motor [deg. C]	read only
147	93	Time since power on [min]	R	no	UINT32	Time since power on [min]	read only
148	94	Filament A operation hours [h]	R	yes (Transpector)	UINT32	Filament A operation hours [h]	read only
149	95	Filament B operation hours [h]	R	yes (Transpector)	UINT32	Filament B operation hours [h]	read only
150	96	TMP voltage [V]	R	no	FLOAT	TMP voltage as reported by TMP controller	read only
151	97	TMP current [A]	R	no	FLOAT	TMP current as reported by TMP controller	read only
157	9D	Switch on counter	R	yes	UINT16	Counts the switch on cycles	read only
158	9E	Runup time [s]	R	no	UINT16	Runup time [s]	read only
159	9F	Time in measure [s]	R	no	UINT16	Time in measure [s]	read only
165	A5	Electronic temperature [deg. C]	R	no	FLOAT	Temperature of electronic board in °C	read only
166	A6	Ambient Pressure P2 [mbar]	R	no	FLOAT	Ambient Pressure P2 [mbar] measured during startup	read only
200	C8	24 V supply [V]	R	no	FLOAT	24 V supply [V]	read only
209	D1	24V supply TMP [V]	R	no	FLOAT	24V supply TMP [V]	read only
212	D4	24V supply sniffer [V]	R	no	FLOAT	24V supply sniffer [V]	read only
213	D5	24 V supply IO [V]	R	no	FLOAT	24V IO-Modul supply voltage [V]	read only
216	D8	24V supply HCOM [V]	R	no	FLOAT	24V supply HCOM [V]	read only
219	DB	24V supply IO M12 [V]	R	no	FLOAT	24V supply IO M12	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
220	DC	Analog input IO module [V]	R/W	no	FLOAT	Analog input voltage IO module in [V] write for internal use only	read only
221	DD	Analog outputs IO [V]	R/W	no	FLOAT[2]	Analog output voltage for IO module in [V] Index 0: Channel 1 Index 1: Channel 2 It is possible to write an arbitrary voltage value, if the "Analog output configuration" (command 222) of the accordant channel is set to 3	no
222	DE	Analog output configuration IO module	R/W	yes	UINT8[2]	Function of analog output Index 0: Channel 1 Index 1: Channel 2 Functions see table "Analog output configuration"	yes
225	E1	Analog output upper value [mbar*l/s for 10V]	R/W	yes	FLOAT[2]	Upper limit for the analog out at IO module Index 0: Channel 1; Index 1: Channel 2 The value sets the leak rate in mbarl/s for an output voltage of 10V. With “crooked” values, the numerical value in volts can be made to match a desired leak rate unit.	yes
229	E5	Flow control	R/W	yes	UINT8	Flow control 0 = NORMAL 1 - MEDIUM 2 = HIGH	yes
230	E6	Enable/Disable flow modes	R/W	yes	UINT8	Enables 1-X different Flows by setting the corresponding bits 0x01 = NORMAL 0x02 = MEDIUM 0x04 = HIGH Currently allowed: 0x01-0x07	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
231	E7	Gas number for analog output IO module	R/W	yes	FLOAT[2]	Gas number for analog output IO module Index 0: Channel 1; Index 1: Channel 2 0: auto - the leak rate which has the highest value with reference to the corresponding trigger level is output as the analog signal. 1 … 4: Gas 1 … Gas 4 - the corresponding gas 1 … 4 on the display as the analog signal.	yes
233	E9	24V internal supply [V]	R	no	FLOAT	24V internal supply [V]	read only
234	EA	24V supply Transpector [V]	R	no	FLOAT	24V supply Transpector [V]	read only
239	EF	3V3 internal supply [V]	R	no	FLOAT	Internal 3.3V supply voltage	read only
241	F1	Voltage supply fans [V]	R	no	FLOAT	Voltage supply for internal fans [V]	read only
242	F2	5V internal supply [V]	R	no	FLOAT	Internal 5 V supply	read only
245	F5	Sniffer identification voltage [V]	R	no	FLOAT	Sniffer identification voltage (Sniffer length)	read only
246	F6	Sniffer information voltage [V]	R	no	FLOAT	Sniffer information voltage	read only
250	FA	Fan current [A]	R	no	FLOAT	Total fan supply current for internal fans	read only
252	FC	5V supply LED [V]	R	no	FLOAT	5V supply LED [V]	read only
253	FD	24V supply backing pump [V]	R	no	FLOAT	24V supply voltage backing pump	read only
259	103	Text of calibration state	R	N/A	CHAR[*]	Text of a calibration state / result To read send after the index the UINT8 state number (see table "State calibration") Without state number you will get the current calibration state Use only with index=255!	no
260	104	Calibration status	R	no	UINT8	Status of calibration See table "State calibration"	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
261	105	PLC input state IO module	R/W	no	UINT16	Get PLC input state and DIP switch state IO module Bit 0 … 9 = PLCin 1 … 10 Bit 10 … 15 = DIP 1 … 6 (S1.1, S1.2, S1.3, S1.4, S2.1, S2.2) write for internal use only	yes
262	106	PLC output state IO module	R	no	UINT8	Get PLC output state IO module Bit 0 … 7 = PLCOut 1 … 8	read only
263	107	PLC output configuration IO module	R/W	yes	SINT8[8]	Index 0…7 = PLC_OUT1 … PLC_OUT_8 See table "PLC output conf."	yes
264	108	Emission current status	R	no	UINT8	Emission status: BIT 0: Emission interlock active No/Yes BIT 1: Emission regulator, request pending No/Yes BIT 2: Emission regulator, degas mode Off/On BIT 3: Emission regulator, constant power mode Off/On BIT 4: Emission regulator, regulated current mode Off/On	read only
266	10A	TMP current status	R	no	UINT8	TMP current status 0 = OFF 1 = ON 2 = RUNNING_UP 3 = RUNNING_DOWN 4 = FAIL 5 = RESET	read only
275	113	Calibration log	R	yes	CHAR[*]	Text of a calibration in calibration log. To read send after the array index 255 the UINT8 history list index (0…19). Without index or index 0 you will get the last (newest) entry. Index 19 is the eldest on. Entry format: see enumerations table	no
280	118	Used entries in calibration log	R	yes	UINT8	Used entries in calibration log	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
281	119	Used entries in error log	R	yes	UINT8	Used entries in error log	no
282	11A	Used entries in TMP error log	R	yes (TMP)	UINT8	Used entries in TMP error log	no
287	11F	Error log	R	yes	CHAR[*]	Text of an error/warning in error log. To read send after the array index 255 the UINT8 history list index (0…19). Without index or index 0 you will get the last (newest) entry. Index 19 is the eldest one. Entry format: see enumerations table	no
288	120	TMP error log	R	yes (TMP)	CHAR[*]	Text of an error/warning in TMP error log. To read send after the array index 255 the UINT8 history list index (0…9). Without index or index 0 you will get the last (newest) entry. Index 9 is the eldest one. Entry format: see enumerations table	no
289	121	Value of current error	R	no	FLOAT	Value associated with the current error or warning	read only
290	122	Number of current error or warning	R	no	UINT16	Error number of the current error or warning	read only
291	123	List of signal values of active errors	R	N/A	FLOAT[10]	Lists the signal values of the errors/warnings since the last "clear error"	read only
292	124	TMP error log extended	R	yes (TMP)	CHAR[*]	Extended text of an error/warning in TMP error log. Shimadzu-TMP only. To read send after the array index 255 the UINT8 history list index (0…19). Without index or index 0 you will get the last (newest) entry. Index 19 is the eldest one. Entry format: see enumerations table	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
294	126	Text of error number	R	N/A	CHAR[*]	text of an error/warning number To read send after the index the UINT16 error number Without error number you will get the current error/ warning Use only with index = 255!	no
295	127	Text of warning bits	R	N/A	CHAR[*]	Explanation text for a specific warning bit: To read, send after the index the UINT8 bit position Use only with index=255!	no
296	128	List of active errors or warnings	R	no	UINT16[10]	Lists the error/warning numbers since the last "clear error"	read only
297	129	Present warnings	R	no	UINT32	Each bit represents a warning. See table "Present warnings"	read only
298	12A	Sniffer button	R/W	no	UINT8	Read state sniffer button 0 = PROOF 1 = CAL	read only
300	12C	Device identification	R	N/A	UINT8[3]	Device identification Index 0, Manufacturer ID: 1 – INFICON Index 1, Device ID: 7 - ST4xxx Index 2, Sub ID: 1 - E4000, 2 - P4000, 3 - XL4000	read only
301	12D	Device name	R	N/A	CHAR[*]	Get device name as ASCII string "E4000", "P4000", "XL4000", "XX4000"	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
302	12E	Sniffer probe type	R	N/A	UINT8	'READ: Combination of device Information and length: 0 = SL4000 BC 3m 1 = SL4000 3m 2 = Device without SL4000 and with customized length 10 = SL4000 BC 5m 11 = SL4000 5m 20 = SL4000 BC 10m 21 = SL4000 10m 30 = SL4000 BC 15m 31 = SL4000 15m 255 = no Sniffer / unknown type or length	read only
309	135	SW-version web server	R/W	N/A	UINT8[3]	Software version of web server based operating unit Index 0: Main version Index 1: Sub version Index 2: Debug version write for internal use only	read only
310	136	SW-version MV21	R	N/A	UINT8[3]	Software version MV21 Index 0: Main version Index 1: Sub version Index 2: Debug version	read only
312	138	SW-version sniffer probe	R/W	N/A	UINT8[3]	Software version probe Index 0: Main version Index 1: Sub version Index 2: always 0	read only
313	139	SW-version I/O module	R/W	N/A	UINT8[3]	Software version IO module Index 0: Main version Index 1: Sub version Index 2: Debug version write for internal use only	read only
315	13B	SW-version TMP controller	R	N/A	CHAR[6]	SW version TMP controller (character string from TMP controller)	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
316	13C	HW-version TMP controller	R	N/A	CHAR[6]	HW version TMP controller (character string from TMP controller)	read only
317	13D	TMP controller name	R	N/A	CHAR[6]	TMP controller name (character string from TMP controller)	read only
318	13E	SW version boot loader	R	N/A	UINT8[3]	Software version of boot loader MV21	read only
319	13F	SW version boot loader I/O module	R/W	N/A	UINT8[3]	Software version of boot loader IO module write for internal use only	read only
320	140	CRC-code MV21	R	N/A	UINT32	CRC-code MV21 abcdwxyz (hex) abcd: calculated value wxyz: nominal value	read only
321	141	DIP switch MV21	R	no	UINT8	DIP switch setting of the MV21	read only
322	142	Field bus status word	R	no	UINT16	Status word for Bus module refer to Bus module documentation	read only
323	143	SW version bus module	R	N/A	UINT8[3]	SW version bus module	read only
324	144	Bus module field bus type	R	no	UINT16	Bus module field bus type. Refer to AnybusCC specification for enumeration.	read only
325	145	Serial number plug-in unit bus module	R	N/A	UINT8[4]	Serial number plug-in unit bus module	read only
326	146	Field bus address current value	R	no	UINT8	Fieldbus address current value Refer to AnybusCC specification for enumeration.	read only
327	147	Field bus baud rate	R	no	UINT8	Baud rate at field bus Refer to AnybusCC specification for enumeration.	read only
328	148	Exception code bus module	R	no	UINT8	Exception code bus module	read only
329	149	Error counters bus module	R	no	UINT16[4]	Error counters bus module Index: 0: Discarded commands 1: Discarded Responses 2: Serial Reception errors 3: Fragmentation errors	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
330	14A	Bus module state	R	no	UINT8	State of bus module 0 = SETUP 1 = NW_INIT 2 = WAIT_PROCESS 3 = IDLE 4 = PROCESS_ACTIVE 5 = ERROR 6 = UNKNOWN 7 = EXCEPTION	read only
331	14B	Field bus address nominal value	R/W	yes	UINT8	Fiedbus address nominal value Refer to AnybusCC specification for enumeration.	yes
332	14C	Bootloader version sniffer probe	R/W	N/A	UINT8[3]	Software version of boot loader SL4000	read only
336	150	Field bus station name	R	yes (BM)	CHAR[*]	BM1000 Station name (PROFINET IO only)	read only
337	151	Field bus IP address	R	yes (BM)	UINT8[4]	BM1000 IP address (IP based field busses only)	read only
338	152	Field bus IP subnet mask	R	yes (BM)	UINT8[4]	BM1000 IP subnet mask (IP based field busses only)	read only
339	153	Field bus gateway IP address	R	yes (BM)	UINT8[4]	BM1000 gateway IP address (IP based field busses only)	read only
340	154	Field bus DHCP enable	R	yes (BM)	UINT8	BM1000 DHCP (IP based field busses only) 0=disabled; 1=enabled	read only
345	159	SW version backing pump controller	R	N/A	CHAR[6]	SW version backing pump controller	read only
351	15F	Ethernet IP address	R/W	N/A	UINT8[4]	IP address of Ethernet port. Write for internal use only. IP address cannot be set via this command.	read only
352	160	Ethernet IP sub net mask	R/W	N/A	UINT8[4]	IP sub net mask of Ethernet port. Write for internal use only. IP sub net mask cannot be set via this command.	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
353	161	Ethernet MAC address	R/W	N/A	UINT8[6]	MAC address of Ethernet port. Write for internal use only. MAC address cannot be set via this command.	read only
354	162	Mass storage serial number	R/W	N/A	CHAR[30]	Serial number of solid state drive. Write for internal use only.	read only
361	169	Warnings shown as errors	R/W	yes	UINT16[8]	List of warning numbers (value between 0 and 999) which will be displayed as error. Value 0 means "no entry"	yes
372	174	Device identification sniffer	R/W	no	UNIT8[2]	DeviceID und ManufacturerID SL4000 Index 0 : DeviceID Index 1 : ManufacturerID	read only
373	175	Device name sniffer	R/W	no	CHAR[16]	Device name SL4000 Length of a name is 16 characters.	read only
378	17A	Sniffer movement	R/W	no	UINT8[3]	Sniffer movement Index 0: 1 = movement detected 0 = no movement Index 1: 0 Index 2: 0	read only
382	17E	Over- and underrange status	R	no	UINT8	Underrange / Overrange status Bit 0 - underrange gas 1 Bit 1 - underrange gas 2 Bit 2 - underrange gas 3 Bit 3 - underrange gas 4 Bit 4 - overrange gas 1 Bit 5 - overrange gas 2 Bit 6 - overrange gas 3 Bit 7 - overrange gas 4	read only
384	180	Setpoint [interface unit]	R/W	yes	FLOAT[7]	Setpoint [interface unit] Index: gas slot 0…6	yes
385	181	Setpoint [mbar*l/s]	R/W	yes	FLOAT[7]	Setpoint [mbar*l/s] Index: gas slot 0…6	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
387	183	Setpoint status	R	no	UINT8	Setpoint / Search status 0 = Leck rate < level 1 = Leak rate > level Bit 0 - setpoint gas 1 Bit 1 - setpoint gas 2 Bit 2 - setpoint gas 3 Bit 3 - setpoint gas 4 Bit 4 - search gas 1 Bit 5 - search gas 2 Bit 6 - search gas 3 Bit 7 - search gas 4	no
394	18A	Leak rate auto cal. leak [mbar*l/s]	R/W	yes (Leak)	FLOAT[8]	Leak rate auto cal. leak [mbar*l/s] Index: cal leak index 0…7	read only
401	191	Operation mode	R	no	UINT8	0 = Flow NORMAL 1 = Flow MEDIUM 2 = Flow HIGH 3 = STANDBY 4 = PURGE	read only
402	192	Leak rate filter	R/W	yes	UINT8	Leak rate filter 0 = fixed 1 = I-Filter	yes
404	194	Serial number sniffer probe	R/W	N/A	CHAR[11]	Serial number of SL4000 Write for internal use only	read only
405	195	Serial number TMP controller	R	N/A	CHAR[11]	Serial number TMP controller (Shimadzu-TMP only)	read only
406	196	Serial number leak detector	R	yes	CHAR[11]	Serial number of the complete leak detector	read only
408	198	Serial number IO module	R/W	N/A	CHAR[11]	Serial number of the IO module	no
410	19A	Zero key enable	R/W	yes	UINT8	Zero key (only for sniffer and operation unit) 0 = disabled 1 = enabled not valid for interface commands	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
411	19B	Zero time [0.1s]	R/W	yes	UINT16	Update interval for offset value if leak rate signal is negative. Resolution 0.1 s (50 = 5.0 s)	yes
413	19D	Sniffer LED alarm configuration	R/W	yes	UINT8	Configures the behavior of the white sniffer probe LEDs in case of trigger alarm: 0=disabled 1=on (blink)	yes
414	19E	Sniffer white LED brightness	R/W	yes	UINT8	Configures the brightness of the white sniffer probe LEDs in case of normal measurement: 0=off ... 6=max Brightness	yes
415	19F	Flow Sniffer key enable	R/W	yes	UINT8	0 = flow key disabled 1 = flow key enabled	yes
419	1A3	Calibration request enable	R/W	yes	UINT8	0 = Calibration request disabled 1 = Calibration request enabled	yes
420	1A4	Volume	R/W	yes	UINT8	Volume (Min.: 0; Default: 2; Max.: 15)	yes
423	1A7	Speaker beep	W	N/A	UINT8[2]	Performs a speaker beep. Index 0: Typ Index 1: Volume (1..15) Typ: 1=2000Hz, 2=first 2000Hz, then 1000Hz	no
430	1AE	Pressure interface unit	R/W	yes	UINT8	Pressure unit via interface mbar = 0 Pa = 1 atm = 2 Torr = 3	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
432	1B0	Leak rate interface unit	R/W	yes	UINT8	Leak rate interface unit 0 = mbar*l/s 1 = Pa*m^3/s 2 = atm*cm^3/s 3 = Torr*l/s 4 = ppm 5 = g/a 6 = oz/yr 7 = sft^3/yr	yes
438	1B6	PLC input configuration IO module	R/W	yes	SINT8[10]	Configuration of PLC input port of the IO module Index 0...9 = PLC_IN1...PLC_IN10 See table "PLC input conf."	yes
449	1C1	Valve state	R	no	UINT16	Valve state see table "Valve numbers" collumn "Bit assignment" Bit set means valve is open	read only
450	1C2	Date+Time [YMDhms]	R/W	yes (RTC)	UINT8[6]	Date and time use only with array-index 255 (all bytes) year (1..99), month, day, hour (0..23), min, sec	read only
452	1C4	Min low Flow [sccm]	R/W	yes	FLOAT	Minimum Flow [sccm] while low flow is active. If flow falls below this value, warning 540 (Flow too low) is generated.	yes
453	1C5	Max low Flow [sccm]	R/W	yes	FLOAT	Maximum Flow [sccm] while low flow is active. If flow rises above this value, warning 542 (Sniffer broken) is generated.	yes
455	1C7	Min optimum flow [sccm]	R/W	yes	FLOAT	minimum flow while optimum flow is active [sccm]	yes
456	1C8	Max optimum flow [sccm]	R/W	yes	FLOAT	maximum flow while optimum flow is active [sccm]	yes
480	1E0	Auto standby interval [min]	R/W	yes	UINT8	Auto standby interval 0 = OFF (Min.: 0; Default: 10(min); Max.: 60(min)) (Key:Value(min): 0:0, 1:5, 2:6, 3:7, 4:8, 5:9, 6:10, 7:15, 8:20, 9:25, 10:30, 11:35, 12:40, 13:45, 14:50, 15:60)	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
501	1F5	TMP rotation speed [Hz]	R	yes	UINT16	TMP rotation speed 1000Hz	read only
530	212	Filament selection	R/W	yes (Transpector)	UINT8	Filament selection 1 - Filament A 2 - Filament B	yes
544	1C7	FlowValue High min limit [sccm]	R/W	yes	FLOAT	minimum flow while high flow is active [sccm]	yes
545	1C8	FlowValue High max limit [sccm]	R/W	yes	FLOAT	maximum flow while high flow is active [sccm]	yes
574	23E	Popup message number	R	no	UINT8[2]	[0] = Number of pop message. "0" means no message [1] = PopUp Message hold time [s] "0" means no hold time	no
575	23F	Text of popup message number	R	N/A	CHAR[*]	Text of popup message To read send after the index the UINT8 popup message number Without error number you will get the text of the actual popup message Use only with index=255!	no
576	240	Clear popup message	W	N/A	NO_DATA	Clear popup message. Sets number of popup message to "0"	no
577	241	Invoke message	W	no	UINT8[6]	Invokes a popup or warning/error message. Index 0 and 1: Message number (UINT16) 0…99: Popup message 997: Dummy Warning 998: Dummy Error Index 2…5: Additional Value (Float-Value)	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
589	24D	TMP type	R/W	yes	UINT8	TMP type 0 = unknown 1 = Pfeiffer Vacuum 2 = Shimadzu	read only
600	258	Audio alarm type	R/W	yes	UINT8	Audio alarm type 0 = Alarm off 1 = Trigger alarm 2 = Setpoint 3 = Pinpoint 4 = Leak rate prop	yes
601	259	Audio alarm sub type	R/W	yes	UINT8	Audio alarm sub type 0 = Tone 1 1 = Tone 2 2 = Tone 3	yes
602	25A	Audio alarm delay [s]	R/W	yes	UINT16	Audio alarm delay [s]	yes
604	25C	Audio beep	R/W	yes	UINT8	Audio beep 0 = disabled 1 = enabled	yes
606	25E	Sniffer settings	R/W	yes	UINT8[2]	Settings for SL4000 byte [0] = speaker volume (0 .. 15, 2 = default) byte [1] = vibration (0 = off, 1 = on)	read only
625	271	Backing pump rotation speed [1/min]	R/W	N/A	UINT16	Rotation frequency setting of the backing pump Write access only possible if "Manual control for service" is active	read only
751	2EF	Active gas slots (volatile)	R/W	no	UINT8	Active gas slots (volatile) Bit 0 - Gas 1, Bit 1 - Gas 2, …. max 4 of 7	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
752	2F0	Active Gas slots	R/W	yes	UINT8	Active gas slots Bit 0 - Gas 1, Bit 1 - Gas 2, ….. max 4 of 7	read only
753	2F1	Gas measured numbers	R	yes	UINT8[4]	Gas measured numbers List index of enabled gases (0 up to 6, 255 if disabled)	read only
757	2F5	Gas modulation	R/W	no	UINT8	Gas modulation 0 = off 1 = on	yes
780	30C	Calibration Validity Duration (h)	R/W	yes	UINT16	0: disabled >0 : Validity Duration for Calibration requests in hours	yes
800	320	Pressure display unit	R/W	yes	UINT8	Pressure unit display mbar = 0 Pa = 1 atm = 2 Torr = 3	yes
810	32A	Internal pressure 1 [display unit]	R	no	FLOAT	Internal pressure 1 [display unit]	no
811	32B	Internal pressure 2 [display unit]	R	no	FLOAT	Internal pressure 2 [display unit]	no
812	32C	Internal pressure 3 [display unit]	R	no	FLOAT	Internal pressure 3 [display unit]	no
813	32D	Internal pressure 4 [display unit]	R	no	FLOAT	Internal pressure 4 [display unit]	no
827	33B	Relative deviation low flow [%]	R/W	yes	UINT8	Relative deviation low flow [%]	yes
828	33C	Relative deviation medium flow [%]	R/W	yes	UINT8	Relative deviation medium flow [%]	yes
829	33D	Relative deviation high flow [%]	R/W	yes	UINT8	Relative deviation high flow [%]	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
833	341	Relative deviation modulation [%]	R/W	yes	UINT8	Relative deviation modulation [%]	yes
860	35C	Leak rate [display unit]	R	no	FLOAT[4]	Leak rate [display unit] [0] = Gas 1 [1] = Gas 2 [2] = Gas 3 [3] = Gas 4	no
865	361	Group measure [display unit]	R	no	UINT8[24]	Measurement data in display unit	no
880	370	Leak rate limit [mbar*l/s]	R	no	FLOAT[12]	Leak rate limit [mbar*l/s] [0]...[3] = lower limit Gas 1...4 [4]...[7] = raised lower limit Gas 1...4 [8]...[11] = upper limit Gas 1...4	yes
882	372	Leak rate limit [interface unit]	R	no	FLOAT[12]	Leak rate limit [interface unit] [0]...[3] = lower limit Gas 1...4 [4]...[7] = raised lower limit Gas 1...4 [8]...[11] = upper limit Gas 1...4	no
884	374	Leak rate limit [display unit]	R	no	FLOAT[12]	Leak rate limit [display unit] [0]...[3] = lower limit Gas 1...4 [4]...[7] = raised lower limit Gas 1...4 [8]...[11] = upper limit Gas 1...4	no
890	37A	Peak hold leak rate [mbar*l/s]	R	no	FLOAT[4]	Peak hold leak rate [mbar*l/s] [0] = Gas 1 [1] = Gas 2 [2] = Gas 3 [3] = Gas 4	yes
892	37C	Peak hold leak rate [interface unit]	R	no	FLOAT[4]	Max leak rate [interface unit] [0] = Gas 1 [1] = Gas 2 [2] = Gas 3 [3] = Gas 4	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
894	37E	Peak hold leak rate [display unit]	R	no	FLOAT[4]	Max leak rate [display unit] [0] = Gas 1 [1] = Gas 2 [2] = Gas 3 [3] = Gas 4	no
900	384	Peak hold enable	R/W	yes	UINT8	Peak hold enable	yes
901	385	Peak hold time [s]	R/W	yes	UINT8	Peak hold time [s] 2s ... 60s the peak won't be reset, if the time is 255	no
1161	489	Parameter reset	W	N/A	UINT8	Parameter reset: 0: Load factory settings 3: Clear error history 4: Clear calibration history 6: Restart bus module 8: HMI Soft reset 9: HMI Power reset 10: TMP replaced 12: Clear test history 13: Load HMI factory settings 15: Load Gas settings 17: Clear K1 history 18: Clear IGS history 19: Clear FilB history 20: Load iGuide settings	no
1200	4B0	MGM operation hours [h]	R	yes (MGM)	UINT32	MGM operation hours [h]	read only
1202	4B2	MGM switch on counter	R	yes (MGM)	UINT16	MGM Counts the switch on cycles	read only
1203	4B3	SW version boot loader MGM	R	yes (MGM)	UINT8[3]	SW version boot loader MGM	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1204	4B4	SW version MGM	R	yes (MGM)	UINT8[3]	Software version MGM Index 0: Main version Index 1: Sub version Index 2: Debug version	read only
1206	4B6	Serial number MGM	R	yes (MGM)	CHAR[11]	Serial number MGM	read only
1208	4B8	MGM temperature [deg. C]	R	no	FLOAT	MGM temperature [deg. C]	read only
1210	4BA	Device identification MGM	R	N/A	UNIT8[2]	DeviceID und ManufacturerID MGM Length of a DeviceID is 2 UINT8.	read only
1211	4BB	Device name MGM	R	yes (Leak)	CHAR[16]	Device name MGM Length of a name is 16 characters.	read only
1259	4EB	Offset pressure p3 [mbar]	R/W	yes	FLOAT	Offset pressure p3 [mbar]	yes
1260	4EC	Min pressure p3 [mbar]	R/W	yes	FLOAT	Minimum pressure 3 [mbar]. If pressure falls below this value, warning 567 is generated.	yes
1261	4ED	Max pressure p3 [mbar]	R/W	yes	FLOAT	Maximum pressure 3 [mbar]. If pressure rises above this value, warning 568 is generated.	yes
1262	4EE	Min pressure p3 [interface unit]	R/W	N/A	FLOAT	Minimum pressure 3 [mbar]. If pressure falls below this value, warning 567 is generated.	yes
1263	4EF	Max pressure p3 [interface unit]	R/W	N/A	FLOAT	Maximum pressure 3 [mbar]. If pressure rises above this value, warning 568 is generated.	yes
1264	4F0	Min pressure p3 [display unit]	R/W	N/A	FLOAT	Minimum pressure 3 [mbar]. If pressure falls below this value, warning 567 is generated.	no
1265	4F1	Max pressure p3 [display unit]	R/W	N/A	FLOAT	Maximum pressure 3 [mbar]. If pressure rises above this value, warning 568 is generated.	no
1284	504	Control word	R/W	no	UINT16	Control word (used for Bus module)	yes
1285	505	Stop service buffer	R/W	no	UINT8	Stop service buffer 0=recording active 1=recording stopped	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1350	546	Valve cycle counter	R	yes	UINT32[3]	Valve cycle counter see table "Valve numbers" column "Valve No." for array index	read only
1351	547	Valve cycle counter SL4000	R/W		UINT32	Valve cycle counter SL4000	read only
1353	549	Valve cycle counter SL4000 limit [cycles]	R/W		UINT32	Valve cycle counter limit (default : 100 Mio. = 100.000.000 for Buerkert 2007507 / Inficon 200011978)	read only
1356	54C	Operation hours filter [h] / SL4000	R/W		UINT32	Operation hours filter [h] / SL4000	read only
1359	54F	Maintenance interval sniffer filter [h]	R/W		UINT32	Maintenance interval sniffer filter [h]	no
1360	550	Maintenance interval sniffer valve [cycles]	R		UINT32	Maintenance interval sniffer valve [cycles]	no
1361	551	Maintenance backing pump [h]	R/W	yes	UINT32	Maintenance backing pump [h] 0 … 12000 h (default: 8000 h) (TS620 only)	read only
1362	552	Maintenance TMP [d]	R/W	yes	UINT32	Maintenance TMP [d] 0 … 1460 d (default: 1460 d) WRITE access creates a maintenance history entry with text "Lubricant"	read only
1367	557	Maintenance air filter [h]	R/W	yes	UINT32	Maintenance air filter [h] 0 … 4000h (default: 2500 h)	read only
1369	559	Maintenance sniffer tip filter [h]	R/W	yes	UINT32	Maintenance sniffer tip filter [h] 0 … 4000h (default: 1000 h)	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1370	55A	Expiry date auto cal. leak [YMD]	R	yes (Leak)	UINT8[3]	Expiry date of all auto cal. leaks year (1..99), month, day To read send after the array index 255 the UINT8 list index (0…7).	no
1420	58C	Backing pump current rotation speed [1/min]	R	no	UINT16	Backing pump current rotation speed [1/min]	read only
1421	58D	Backing pump temp. Controller [deg. C]	R	no	FLOAT	Backing pump temperature Controller in degree celsius	read only
1425	591	Backing pump current [mA]	R	no	UINT16	Backing pump current [mA]	read only
1430	596	Backing pump error code	R	no	UINT16	Backing pump error code	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1564	61C	Value changed reason	R	no	UINT32	Cause of setting the value changed flag (see status word bit 11). Bit 0: Gas (751, 752, 384, 385, 2132, 2133, 2134, 2135, 2136, ...) Bit 1: Flow control (401, 229, 230) Bit 4: Leak rate unit IF (432) Bit 5: Pressure unit (430, 800) Bit 6: TMP rotation speed (501) Bit 7: Filament (530) Bit 8: Data + Time (450) Bit 9: Automatic Control (1165) Bit 12: Display Limit (884) Bit 13: Popup message (574) Bit 14: Parameter Reset (1161 with value 13) Bit 23: SL ValveCounterReset(1351) Bit 24: CL State (1724) Bit 25: SL Settings (606, 414) Bit 26: Zero Mode (410) Bit 27: iGuide Configuration(2221-2230, 2236-2242) Bit 28: Volume (420) Bit 29: Peak hold time(901) A write command to the corresponding command in brackets causes the corresponding bit to be set here.	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1565	61D	Value changed flag	R/W	no	UINT8	Value changed flag Read: Same value as Statusword Bit 11 Bit will be set if one or more value changed reason flags (see commando 1564) are set. Write: Write 0 to clear the value changed flag. This will also clear all value changed reason flags (see commando 1564).	yes
1716	6B4	Leak expired	R		UINT8[8]	Leak expired status	read only
1717	6B5	Leak installed	R		UINT8[8]	Leak installed status	read only
1718	6B6	Expiry leak warning days	R/W		UINT16	A warning is issued days before the leak expires	read only
1720	6B8	Serial number auto cal. leak	R	N/A	CHAR[11]	Serial number auto cal. leak To read send after the array index 255 the UINT8 list index (0…7). Length of a serial number is 11 characters.	no
1721	6B9	Serial number auto cal. leak gas reservoirs	R	N/A	CHAR[11]	Serial number auto cal. leak gas reservoirs To read send after the array index 255 the UINT8 list index (0…7). Length of a serial number is 11 characters.	no
1722	6BA	SW version auto cal. leak	R	N/A	UNIT8[3]	SW Version auto cal. leak To read send after the array index 255 the UINT8 SW-Version list index (0…7). Length of a SW-Version is 3 UINT8.	no
1723	6BB	SW version boot loader auto cal. leak	R	N/A	UNIT8[3]	SW version boot loader auto cal. leak To read send after the array index 255 the UINT8 list index (0…7). Length of a SW-Version is 3 UINT8.	no
1724	6BC	State auto cal. leak	R	no	UINT8[2]	State auto cal. leak Index 0: task state Index 1: light barrier (no.)	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1725	6BD	Leak rate unit auto cal. leak	R	yes (Leak)	UINT8[8]	Leak rate unit auto cal. leak Index: cal leak index 0…14 0 = unknown 1 = mbar*l/s 2= Pa*m^3/s 3 = Torr*l/s 4 = sccm 5 = sccs 6 = g/a 7 = oz/yr 8 = lb/yr 9 = ppm 10 = mol/s 11 = atm*cc/s 12 = not used 13 = not used 14 = sft^3/yr	read only
1726	6BE	Gas name auto cal. leak	R	yes (Leak)	CHAR[8]	Gas name auto cal. leak To read send after the array index 255 the UINT8 cal. leak index (0…7). Length of a name is 8 characters.	no
1727	6BF	Temperature compensated leak rate auto cal. leak [mbar*l/s]	R	yes (Leak)	FLOAT[8]	Temperature compensated leak rate auto cal. leak [mbar*l/s] Index: cal leak index 0…7	read only
1728	6C0	Bottling date auto cal. leak [YMD]	R	yes (Leak)	UNIT8[3]	Date of bottling [YMD] cal. leak year (1..99), month, day To read send after the array index 255 the UINT8 list index (0…7).	no
1730	6C2	Leak rate auto cal. leak [cal. leak unit]	R	yes (Leak)	FLOAT[8]	Leak rate cal. leak in selected unit (Command 1725) Index: cal leak index 0…7	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1731	6C3	Temp. compensated leak rate auto cal. Leak [cal. Leak unit]	R	yes (Leak)	FLOAT[8]	Temperature compensated leak rate auto cal. leak in interface unit (Command 1725) Index: cal leak index 0…7	read only
1732	6C4	Device name auto cal. leak	R	yes (Leak)	CHAR[16]	Device name auto cal. leak To read send after the array index 255 the UINT8 list index (0…7). Length of a name is 16 characters.	no
1733	6C5	Device identification auto cal. leak	R	N/A	UNIT8[2]	DeviceID and ManufacturerID auto cal. leak To read send after the array index 255 the UINT8 list index (0…7). Length of a DeviceID is 2 UINT8.	no
1734	6C6	Calibration behavior interface	R/W	no	UINT8	Define the calibration behavior of the device: 0: E4000 default behavior (CAL needs to be acknowledged 3 times) 1: Calibration behavior is the same as the E3000	no
1740	6CC	Calibration result	R	no	FLOAT[4]	Calibration result see enumeration	read only
1755	6DB	Unlock key	W	N/A	CHAR[12]	Key for unlocking additional features 12 digits, always whole array	no
1795	703	Progress bar [%]	R	no	UINT8	Progress bar in percent during run up phases	read only
1800	708	Active protocol IO	R	no	UINT8	Active interface protocol for I/O module. Defined by DIP switch at I/O module or command 2593. Values: See enumerations table	read only
1815	717	Reset source	R	no	UINT8	Shows the last reason of reset	read only
1913	779	Start TMP pre-conditioning	R/W	yes	UINT8	1 = Start TMP pre-conditioning at next restart of leak detector (Shimadzu-TMP only)	read only
1985	7C1	Transpector Monitor FW version	R	N/A	CHAR[20]	Transpector Monitor Firmware version	read only
1986	7C2	Transpector SW revision	R	N/A	UINT32	Transpector SW revision	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
1987	7C3	Transpector API revision	R	N/A	UINT32	Transpector API revision	read only
1988	7C4	Transpector name	R	yes (Transpector)	CHAR[20]	Transpector name	no
1989	7C5	Transpector description	R	yes (Transpector)	CHAR[20]	Transpector description	no
1992	7C8	Period of power off [d]	R	yes	UINT16	Period of power off [d]	read only
2000	7D0	Transpector serial number box	R	N/A	CHAR[11]	Transpector serial number box	read only
2001	7D1	Transpector serial number sensor	R	N/A	CHAR[11]	Transpector serial number sensor	read only
2002	7D2	Transpector temperature [deg. C]	R	yes (Transpector)	FLOAT[3]	Transpector temperature [deg. C] Index 0: minimum Index 1: current Index 2: maximum	read only
2003	7D3	Transpector operation hours [h]	R	yes (Transpector)	UINT32	Transpector operation hours [h]	read only
2009	7D9	Transpector switch on counter	R	yes (Transpector)	UINT32	Transpector boot count	read only
2010	7DA	Transpector Configuration	R	N/A	UINT8[7]	Transpector Configuration Index 0: Mass filter type Index 1: Mass range Index 2: Detector type Index 3: Ion source type Index 4: Brand Index 5: Family Index 6: Genus	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2011	7DB	Transpector Release	R	N/A	CHAR[20]	Transpector Release	read only
2012	7DC	Transpector Control SW version	R	N/A	CHAR[20]	Transpector Control FW version	read only
2013	7DD	Transpector power supply SW version	R	N/A	CHAR[20]	Transpector power supply SW version	read only
2017	7E1	Transpector Focus voltage [V]	R	N/A	FLOAT[4]	Transpector Focus voltage [V] (min, set, max, current)	no
2018	7E2	Transpector Emission current [A]	R	N/A	FLOAT[4]	Transpector Emission current [A] (min, set, max, current)	no
2020	7E4	Transpector Electron energy [V]	R	N/A	FLOAT[4]	Transpector Electron energy [V] (min, set, max, current)	no
2021	7E5	Transpector Ion energy [eV]	R	N/A	FLOAT[4]	Transpector Ion energy [V] (min, set, max, current)	no
2022	7E6	Transpector Multiplier voltage [V]	R	N/A	FLOAT[4]	Transpector Multiplier voltage [V] (min, set, max, current)	no
2027	7EB	Transpector Filament voltage [V]	R	no	FLOAT	Transpector Filament voltage [V]	no
2028	7EC	Transpector Filament current [A]	R	no	FLOAT	Transpector Filament current [A]	no
2029	7ED	Transpector Filament power [W]	R	no	FLOAT	Transpector Filament power [W]	no
2035	7F3	Transpector Error counter	R	yes (Transpector)	UINT16[6]	Transpector Error counter Index 0: Start filament A Index 1: Start filament B Index 2: Start both filaments Index 3: Sensitivity Index 4: Over pressure Index 5: Measure	no
2060	80C	Emission on counter A	R	yes	UINT32	Emission on counter filament A	read only
2061	80D	Emission on counter B	R	yes	UINT32	Emission on counter filament B	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2062	80E	Emission turn on time [s]	R	no	UINT16	Emission turn on time [s]	read only
2067	813	Transpector Filament information	R	no	UINT8[4]	Transpector Filament information 1-Filament A, 2-Filament B Index 0: EEPROM Index 1: MPH Index 2: last calibration Index 3: preferred	no
2068	814	Filament auto	R/W	yes	UINT8	Filament change automatic	yes
2069	815	Transpector Emission information	R	yes	UINT16[7]	Transpector Emission information Index 0: switch Index 1: try (0-4) Index 2: level (0:low, 1:high) Index 3: timeout count [0.1sec] Index 4: error Index 5: status Index 6: time [0.1s}	no
2070	816	Factor Filament B	R/W	yes	FLOAT	Factor Filament B	no
2072	818	Completed BurnIn cycles	R	yes	UINT8	Completed BurnIn cycles	read only
2073	819	Factors R152a	R/W	yes	FLOAT[2]	0: Factor R152a Filament A 1: Factor R152a Filament B	no
2074	81A	Factors R134a	R/W	yes	FLOAT[2]	0: Factor R134a Filament A 1: Factor R134a Filament B	no
2075	81B	Factors R1234ze	R/W	yes	FLOAT[2]	0: Factor R1234ze Filament A 1: Factor R1234ze Filament B	no
2076	81C	Factors R290	R/W	yes	FLOAT[2]	0: Factor R290 Filament A 1: Factor R290 Filament B	no
2077	81D	Factors R600a	R/W	yes	FLOAT[2]	0: Factor R600a Filament A 1: Factor R600a Filament B	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2078	81E	Flow zero parameter	R/W	yes	FLOAT[3]	[0] Flow zero parameter NORMAL Flow (Precision mode) [1] Flow zero parameter MEDIUM Flow (Optimum mode) [2] Flow zero parameter HIGH Flow (High speed mode)	no
2079	81F	Flow slope parameter	R/W	yes	FLOAT[3]	[0] Flow slope parameter NORMAL Flow (Precision mode) [1] Flow slope parameter MEDIUM Flow (Optimum mode) [2] Flow slope parameter HIGH Flow (High speed mode)	no
2080	820	Factor IGS K1	R/W	yes	FLOAT	Factors IGS K1	yes
2081	821	Factor IGS M18	R/W	yes	FLOAT	Factor IGS M18	yes
2082	822	Factor IGS M55	R/W	yes	FLOAT	Factor IGS M55	yes
2083	823	Factor IGS M57	R/W	yes	FLOAT	Factor IGS M57	yes
2085	825	Factor internal calibration	R	yes	FLOAT[8]	Factor internal calibration Index 0: mass 7 He Index 1: mass 69 R134a Index 2: mass 83 R134a Index 3: mass 69 R1234yf Index 4: mass64 R1234yf Index 5: mass 114 R1234yf Index 6: mass 51 R152a Index 7: mass 65 R152a	read only
2086	826	Mass position internal calibration	R	yes	FLOAT[8]	Mass position internal calibration Index 0: mass 7 He Index 1: mass 69 R134a Index 2: mass 83 R134a Index 3: mass 69 R1234yf Index 4: mass64 R1234yf Index 5: mass 114 R1234yf Index 6: mass 51 R152a Index 7: mass 65 R152a	read only
2090	82A	Used entries in IGS K1 log	R	yes	UINT8	Used entries in IGS K1 log	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2091	82B	IGS K1 log	R	yes	CHAR[*]	IGS K1 log To read send after the array index 255 the UINT8 service list index (0…19). Without index, you will get the last (newest) entry.	no
2092	82C	Used entries in IGS log	R	yes	UINT8	Used entries in IGS log	no
2093	82D	IGS log	R	yes	CHAR[*]	IGS log To read send after the array index 255 the UINT8 service list index (0…19). Without index, you will get the last (newest) entry.	no
2094	82E	Used entries in Factor Filament B log	R	yes	UINT8	Used entries in Factor Filament B log	no
2095	82F	Factor Filament B log	R	yes	CHAR[*]	Factor Filament B log To read send after the array index 255 the UINT8 service list index (0…19). Without index, you will get the last (newest) entry.	no
2120	848	GAS-Lib entry	R	N/A	CHAR[*]	GAS-Library entry To read send after the array index 255 the UINT8 GAS-Lib index (0…max). Without index, you will get the R134a entry. See enumerations	no
2121	849	Used entries in GAS-Lib	R	N/A	UINT8	Used entries in GAS-Library	no
2122	84A	Copy GAS-Lib to Gas	W	N/A	UINT8[2]	Copy GAS-Lib to Gas setup Index 0: Gas-Lib number Index 1: Gas setup number	no
2127	84F	Calibration factors Modulation	R/W	yes	FLOAT[7]	Calibration factors modulation Index: gas slot 0…6	read only
2128	850	Gas number	R	yes	UINT8[7]	Gas number Index: gas slot 0…6	no
2129	851	Gas mass [AMU]	R	yes	UINT8[7]	Gas mass [AMU] Index: gas slot 0…6	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2130	852	Gas name	R	yes	CHAR[*]	Gas name To read send after the array index 255 the UINT8 name list index (0…6). Length of a name is 8 characters.	no
2131	853	Gas enabled	R	yes	UINT8[7]	Gas enabled 0 = disabled, 1 = enabled Index: gas slot 0…6 to change see commands 751 and 752	read only
2132	854	Gas mass item	R/W	yes	UINT8[7]	Gas mass item (0…4) Index: gas slot 0…6	read only
2133	855	Setpoints [display unit]	R/W	yes	FLOAT[7]	Setpoints [display unit] Index: gas slot 0…6	no
2134	856	Search levels [%]	R/W	yes	UINT8[7]	Search levels [% of setpoint] 5 … 100 Index: gas slot 0…6	no
2135	857	Leak rate units	R/W	yes	UINT8[7]	Leak rate units (Index: gas slot 0…6) 0 = mbar*l/s 1 = Pa*m^3/s 2 = atm*cm^3/s 3 = Torr*l/s 4 = ppm 5 = g/a 6 = oz/yr 7 = sft^3/yr	no
2136	858	Raise lower leak rate display limits	R/W	yes	UINT8[7]	Raise lower leak rate display limits 1, 2, 5, 10, 20, 50, 100 Index: gas slot 0…6	no
2138	85A	Leak rate ext. manual cal. leak [Cal. leak unit]	R/W	yes	FLOAT[7]	Leak rate ext. manual cal. leak [Cal. leak unit] Index: gas slot 0…6 Cal. leak unit see command 2139	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2139	85B	Leak rate unit ext. manual cal. leak	R/W	yes	UINT8[7]	Leak rate unit ext. manual cal. leak Index: gas slot 0…6	no
2140	85C	Calibration mode	R/W	yes	UINT8[7]	Calibration mode of cal. leak 0 = Deactivated 1 = Same gas only 2 = If possible Index: gas slot 0…6	no
2141	85D	Calibration data	R	yes	CHAR[*]	Calibration data To read send after the array index 255 the UINT8 gas slot (0…6). (2025/02/14 10:46:04 Same gas)	no
2142	85E	Calibration factors	R/W	yes	FLOAT[7]	Calibration factors Index: gas slot 0…6	no
2143	85F	Calibration positions [cAMU]	R	no	UINT16[7]	Calibration positions [cAMU] Index: gas slot 0…6	no
2149	865	Gas auto cal. leak light barrier setting	R/W	yes	UINT8[7]	Setting to trigger proof, measure or calibrate for gas[1..7] when auto cal. leak light barrier is interrupted 0 = PROOF 1 = MEASURE 2 = CALIBRATE Index: gas slot 0…6	no
2205	8A7	iGuide Global leak rate [mbar*l/s]	R	no	FLOAT[2]	iGuide Global leak rate (gas A/B)	no
2206	8A8	iGuide Single leak rate [mbar*l/s]	R	no	FLOAT[2]	iGuide Single leak rate (gas A/B) (last measured values)	no
2207	8A7	iGuide Global leak rate [interface unit]	R	no	FLOAT[2]	iGuide Global leak rate (gas A/B)	read only
2208	8A8	iGuide Single leak rate [interface unit]	R	no	FLOAT[2]	iGuide Single leak rate (gas A/B) (last measured values)	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2209	8A1	iGuide Program number (volatile)	R/W	no	UINT8	iGuide program number volatile, only RAM 0…9, 10-off	yes
2210	8A2	iGuide Program number	R/W	yes	UINT8	iGuide program number 0…9, 10-off	yes
2212	8A4	iGuide Cycle counter	R/W	yes	UINT32	iGuide Cycle counter	yes
2213	8A5	iGuide Cycle state	R	no	UINT8[5]	iGuide Cycle state Index 0: state Index 1: point Index 2: fail single point Index 3: fail sum Gas A Index 4: fail sum Gas B	read only
2214	8A6	iGuide Times [s]	R	no	FLOAT[2]	iGuide Times Index 0: Waiting time Index 1: Measuring time	read only
2215	8A7	iGuide Global leak rate [display unit]	R	no	FLOAT[2]	iGuide Global leak rate (gas A/B)	no
2216	8A8	iGuide Single leak rate [display unit]	R	no	FLOAT[2]	iGuide Single leak rate (gas A/B) (last measured values)	no
2219	8AB	iGuide Used entries in Log	R	no	UINT8	iGuide used entries in Log	yes
2220	8AC	iGuide Log	R	no	CHAR[*]	iGuide Log To read send after the array index 255 the UINT8 index (0…98). Without index, you will get the last (newest) entry.	no
2221	8AD	iGuide Program name 0	R/W	yes	CHAR[8]	iGuide Program name 0	yes
2222	8AE	iGuide Program name 1	R/W	yes	CHAR[8]	iGuide Program name 1	yes
2223	8AF	iGuide Program name 2	R/W	yes	CHAR[8]	iGuide Program name 2	yes
2224	8B0	iGuide Program name 3	R/W	yes	CHAR[8]	iGuide Program name 3	yes
2225	8B1	iGuide Program name 4	R/W	yes	CHAR[8]	iGuide Program name 4	yes

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2226	8B2	iGuide Program name 5	R/W	yes	CHAR[8]	iGuide Program name 5	yes
2227	8B3	iGuide Program name 6	R/W	yes	CHAR[8]	iGuide Program name 6	yes
2228	8B4	iGuide Program name 7	R/W	yes	CHAR[8]	iGuide Program name 7	yes
2229	8B5	iGuide Program name 8	R/W	yes	CHAR[8]	iGuide Program name 8	yes
2230	8B6	iGuide Program name 9	R/W	yes	CHAR[8]	iGuide Program name 9	yes
2236	8BC	iGuide Program points	R/W	yes	UINT8[10]	iGuide Program points	yes
2237	8BD	iGuide Program Gas A no.	R/W	yes	UINT8[10]	iGuide Program Gas A no.	yes
2238	8BE	iGuide Program Gas B no.	R/W	yes	UINT8[10]	iGuide Program Gas B no.	yes
2239	8BF	iGuide Program waiting time [s]	R/W	yes	FLOAT[10]	iGuide Program waiting time [s]	yes
2240	8C0	iGuide Prog measuring time [s]	R/W	yes	FLOAT[10]	iGuide Program measuring time [s]	yes
2241	8C1	iGuide Program setpoint A [display unit]	R/W	yes	FLOAT[10]	iGuide Program setpoint A [display unit]	no
2242	8C2	iGuide Program setpoint B [display unit]	R/W	yes	FLOAT[10]	iGuide Program setpoint B [display unit]	no
2246	8C6	Text of iGuide state	R	N/A	CHAR[*]	Text of an iGuide state / result To read send after the index the UINT8 state number (see table "State calibration") Without state number you will get the current iGuide state Use only with index=255!	no
2247	8C7	iGuide Confirm	W	N/A	NO_DATA	iGuide Confirm measured value	no
2248	8C8	iGuide Back	W	N/A	NO_DATA	iGuide Back (discard last value)	no
2249	8C9	iGuide Abort	W	N/A	NO_DATA	iGuide Abort (restart cycle)	no
2250	8CA	Sensitivity check	R/W	yes	UINT8	Argon sensitivity check: 0: Deactivates sensitivity check 1: Activates sensitivity check	no
2260	8D4	Leak rate gas1 [interface unit]	R	no	FLOAT	Leak rate gas1 [interface unit]	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2261	8D5	Leak rate gas2 [interface unit]	R	no	FLOAT	Leak rate gas2 [interface unit]	read only
2262	8D6	Leak rate gas3 [interface unit]	R	no	FLOAT	Leak rate gas3 [interface unit]	read only
2263	8D7	Leak rate gas4 [interface unit]	R	no	FLOAT	Leak rate gas4 [interface unit]	read only
2270	8DE	Leak rate ext. manual cal. leak [mbar*l/s]	R/W	yes	FLOAT[7]	Leak rate ext. manual cal. leak [mbar*l/s] Index: gas slot 0…6	no
2272	8E0	Leak rate ext. manual cal. leak [interface unit]	R/W	yes	FLOAT[7]	Leak rate ext. manual cal. leak [interface unit] Index: gas slot 0…6	no
2301	8FD	User gas 1 masses [AMU]	R/W	yes	UINT8[5]	User gas 1 masses	no
2302	8FE	User gas 2 masses [AMU]	R/W	yes	UINT8[5]	User gas 2 masses	no
2303	8FF	User gas 3 masses [AMU]	R/W	yes	UINT8[5]	User gas 3 masses	no
2304	900	User gas 4 masses [AMU]	R/W	yes	UINT8[5]	User gas 4 masses	no
2306	902	User gas 1 frag. factors	R/W	yes	FLOAT[5]	User gas 1 fragmentation factors	no
2307	903	User gas 2 frag. factors	R/W	yes	FLOAT[5]	User gas 2 fragmentation factors	no
2308	904	User gas 3 frag. factors	R/W	yes	FLOAT[5]	User gas 3 fragmentation factors	no
2309	905	User gas 4 frag. factors	R/W	yes	FLOAT[5]	User gas 4 fragmentation factors	no
2311	907	User gas normalization factor	R/W	yes	FLOAT[4]	User gas normalization factor	no
2312	908	User gas molecular mass [AMU]	R/W	yes	FLOAT[4]	User gas molecular mass	no
2313	909	User gas viscosity factor	R/W	yes	FLOAT[4]	Viscosity factor user gas to He/H_2	no
2320	910	Name Gas 1	R	no	CHAR[8]	Gas Setup: Name Gas 1	read only
2321	911	Name Gas 2	R	no	CHAR[8]	Gas Setup: Name Gas 2	read only
2322	912	Name Gas 3	R	no	CHAR[8]	Gas Setup: Name Gas 3	read only
2323	913	Name Gas 4	R	no	CHAR[8]	Gas Setup: Name Gas 4	read only
2324	914	Name Gas 5	R	no	CHAR[8]	Gas Setup: Name Gas 5	read only
2325	915	Name Gas 6	R	no	CHAR[8]	Gas Setup: Name Gas 6	read only
2326	916	Name Gas 7	R	no	CHAR[8]	Gas Setup: Name Gas 7	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2480	9B0	Internal pressure 3 [interface unit]	R	no	FLOAT	Internal pressure 3 [interface unit]	read only
2481	9B1	Internal pressure 3 [mbar]	R	no	FLOAT	Internal pressure 3 [mbar]	read only
2482	9B2	Internal pressure 4 [interface unit]	R	no	FLOAT	Internal pressure 4 [interface unit] (Transpector total pressure)	read only
2483	9B3	Internal pressure 4 [mbar]	R	no	FLOAT	Internal pressure 4 [mbar] (Transpector total pressure)	read only
2591	A1F	Local control	R/W	yes	UINT8	Local control (hardware button) 0 = START, STOP, ZERO and Calibration is locked 1 = START, STOP, ZERO and calibration is allowed 2 = START, STOP, ZERO and calibration is allowed, if a user is logged in	read only
2593	A21	Interface protocol IO	R/W	yes	UINT8	Selected interface protocol for I/O module. Only valid if DIP switch at I/O module is set to “000” 0 = LD 1= ASCII	read only
2642	A52	Used entries in maintenance log	R	yes	UINT8	Used entries in maintenance log	no
2643	A53	Maintenance log	R	yes	CHAR[*]	Text of a maintenance in maintenance log. To read send after the array index 255 the UINT8 maintenance list index (0…19). Without index, you will get the last (newest) entry. Example: ‘”00 2016/06/10 OpTm: 229 Bpump Lubricant ExhaustF AirF SnifferF RefLeak TMP”	no

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2660	A64	Maintenance warning active	R/W	yes	UINT8	Maintenance warning active (0: disabled,1: enabled) Bit 0 = Backing pump Bit 1 = TMP Bit 2 = Exhaust filter Bit 3 = Air filter Bit 4 = Sniffer tip filter Bit 5 = Expiry date reference leak Bit 6 = not used Bit 7 = not used	yes
2677	A75	Flow factor optimum flow	R	yes	FLOAT	Flow Factor Optimum Flow	read only
2678	A76	Flow factor high flow	R	yes	FLOAT	Flow Factor High Flow	read only
2679	A77	Auto Cal. Leak index	R/W	no	UINT8[12]	Index parameter which contains the information which cal. Leak device should be handled next for some special commands.	no
2684	A7C	Total number of connected auto cal. leaks	R	N/A	UINT8	Auto cal. leak number	read only
2685	A7D	Auto cal. Leak address	R	N/A	UINT8[8]	Auto cal. Leak address Index: cal leak index 0…7	read only
2686	A7E	Auto cal. Leak key	R	N/A	ULINT[8]	Cal. Leak key Index: cal leak index 0…7	read only
2687	A7F	Auto cal. Leak temperature [deg. C]	R	N/A	FLOAT[8]	Cal. Leak temperature [deg. C] Index: cal leak index 0…7	read only
2688	A80	Auto cal. Leak switch on counter	R	yes (CL)	UINT16[8]	Cal. Leak switch on counter Index: cal leak index 0…7	read only
2689	A81	Auto cal. Leak operation hours [h]	R	yes (CL)	UINT32[8]	Cal. Leak operation hours [h] Index: cal leak index 0…7	read only
2694	A86	Auto cal. Leak present warnings	R	yes (CL)	UINT32[8]	Auto cal. Leak present warnings Index: cal leak index 0…7	read only

Command dec	Command hex	Name	Read / Write	Non volatile	Data type	Meaning	Fieldbus support
2695	A87	Leak rate decay per year of auto cal. leak [%]	R	yes (CL)	UINT8[8]	Gas leak rate decay per year [%]	read only
2696	A88	Date+Time of auto cal. Leak	R	yes (CL)	UINT8[8]	0: ArrayIndex 1: Year 2: Month 3: Day 4: Hour 5: Min 6: Seconds 7: n/a	no
2697	A8F	MGM reference ambient pressure [mbar]	R/W	yes	FLOAT	MGM reference ambient pressure [mbar]	read only
2698	A8A	Ambient pressure preset [mbar]	R/W	no	FLOAT	Ambient pressure preset [mbar]	read only
2699	A8B	Ambient pressure preset enable	R/W	no	UINT8	Ambient pressure preset enable (0=auto, 1=use preset)	read only

2.7 Enumerations

Analog output configuration (command 222)

Value	Meaning
0	off; 0 V fixed
1	Leak rate linear (see command 225)
2	Leak rate logarithmic (see command 225) 5 decades; 0…10 V; 2 V / decade
3	Voltage can be set by command 221
4	Leak rate linear setpoint corresponds to 1 V; 0.1 … 10 V
5	Leak rate logarithmic Trigger value within the 2nd decade (of 4 ½ decades; 2V/decade; 1…10 V) Trigger is within 3.0 … 5 V; decade change suitable in interface unit (see command 432)
6	1.0 / 2.0 / 3.0 or 4.0 V, depending on the gas selected on the other channel (see command 231) 10.2 V if no gas is displayed on the other channel

State calibration (command 259, 260)

Value	Meaning	Calibration result (command 1740)			
		[0]	[1]	[2]	[3]
0	Inactive	0.0	0.0	0.0	0.0
1	Preparing measure	time [%]	0.0	0.0	0.0
10	CL: Preparing leak	time [%]	0.0	0.0	0.0
11	CL: Baseline	wait	0.0	0.0	0.0
12	CL: Peakfind	wait	0.0	0.0	0.0
13	CL: Measure leak	time [%]	0.0	0.0	0.0
14	CL: Remove sniffer	wait	0.0	0.0	0.0

Value	Meaning	Calibration result (command 1740)			
		[0]	[1]	[2]	[3]
15	CL: Measure air	time [%]	0.0	0.0	0.0
16	CL: Wrong Input of Sniffer Line	0.0	0.0	0.0	0.0
17	CL: Check Different Flow Values	time [%]	0	0	0
20	CL: Calibration OK	factor old	factor new	mass pos old	mass pos new
21	CL: Unknown gas	0.0	0.0	0.0	0.0
22	CL: Gas not measured	0.0	0.0	0.0	0.0
23	CL: Peak not found	status	0.0	0.0	0.0
24	CL: Signal too small	leak	gas measured mass	0.0	0.0
25	CL: Signal difference too small	leak / background	gas measured mass	0.0	0.0
26	CL: Calfac too low	factor old	factor new	0.0	0.0
27	CL: Calfac too high	factor old	factor new	0.0	0.0
28	CL: Calfac lower than last (< 50%)	factor old	factor new	0.0	0.0
29	CL: Calfac higher than last (> 200%)	factor old	factor new	0.0	0.0
30	PR: Preparing leak	time [%]	0.0	0.0	0.0
31	PR: Baseline	wait	0.0	0.0	0.0
32	PR: Peakfind	wait	0.0	0.0	0.0
33	PR: Measure leak	time [%]	0.0	0.0	0.0
34	PR: Remove sniffer	wait	0.0	0.0	0.0
35	PR: Measure air	time [%]	0.0	0.0	0.0
36	PR: Wrong Input of Sniffer Line	0.0	0.0	0.0	0.0
37	PR: Check Different Flow Values	time [%]	0	0	0
40	PR: Proof OK	factor old	factor new	0.0	0.0
41	PR: Unknown gas	0.0	0.0	0.0	0.0
42	PR: Gas not measured	0.0	0.0	0.0	0.0
43	PR: No Peak found	status	0.0	0.0	0.0
44	PR: Signal too small	leak	gas measured mass	0.0	0.0

Value	Meaning	Calibration result (command 1740)			
		[0]	[1]	[2]	[3]
45	PR: Signal difference too small	leak / background	gas measured mass	0.0	0.0
46	PR: Calfac too low	factor old	factor new	0.0	0.0
47	PR: Calfac too high	factor old	factor new	0.0	0.0
48	PR: Calfac lower than last (< 80%)	factor old	factor new	0.0	0.0
49	PR: Calfac higher than last (> 120%)	factor old	factor new	0.0	0.0
51	EXT: Wait "Signal stable"	ImessFilter[mass]	stable [%]	0.0	0.0
52	EXT: Baseline	wait	0.0	0.0	0.0
53	EXT: Peakfind	wait	0.0	0.0	0.0
54	EXT: Measure leak	time [%]	0.0	0.0	0.0
55	EXT: Wait "Background stable"	ImessFilter[mass]	stable [%]	0.0	0.0
56	EXT: Check Different Flow Values	time [%]	0	0	0
60	EXT: Calibration OK	factor old	factor new	mass pos old	mass pos new
61	EXT: Peak not found	status	0.0	0.0	0.0
62	EXT: Signal too small	ImessFilter[mass]	0.0	0.0	0.0
63	EXT: Calfactor out of range	factor old	factor new	0.0	0.0
64	EXT: Signal difference too small	leak / background	0.0	0.0	0.0
70	MS: Measure gas	measured leakrate	leakrate CL	Gas measured number	max deviation[%]
71	MS: Unknown gas	0.0	0.0	0.0	0.0
72	MS: Gas not measured	0.0	0.0	0.0	0.0
80	MOD: synchronisation CL	time [%]	0.0	0.0	0.0
81	MOD: Measure CL	time [%]	0.0	0.0	0.0
82	MOD: synchronisation external leak	time [%]	0.0	0.0	0.0
83	MOD: Measure external leak	time [%]	0.0	0.0	0.0
90	IGS: Wait "Background stable"	ImessFilter[IGSSUM]	stable [%]	0.0	0.0
91	IGS: Performing baseline	wait	0.0	0.0	0.0

Value	Meaning	Calibration result (command 1740)			
		[0]	[1]	[2]	[3]
92	IGS: Preparing adjust	time [%]	0.0	0.0	0.0
93	IGS: Wait "Isopentane stable"	stable [%]	factor M55 new	detection 0-no gas 1-no pentane 2-cyclo pentane 3-isopentane	factor M57 new
94	IGS: Wait "Cyclopentane stable"	stable [%]	factor M55 new	detection 0-no gas 1-no pentane 2-cyclo pentane 3-isopentane	factor M57 new
95	IGS: Show result "Factor ok"	factor M55 old	factor M55 new	factor M57 old	factor M57 new
96	IGS: Show Error "Factor out of range"	factor M55 old	factor M55 new	factor M57 old	factor M57 new
100	CL: Show Error "Flow to low"	flow value	0.0	flow mode	0.0
101	CL: Show Error "Flow to high"	flow value	0.0	flow mode	0.0
102	EXT: Show Error "Flow to low"	flow value	0.0	flow mode	0.0
103	EXT: Show Error "Flow to high"	flow value	0.0	flow mode	0.0
104	CL: Show Error "Current too low medium Flow"	ImessFilter[normal]	ImessFilter[medium]	ImessFilter[air]	current ratio to normal flow
105	EXT: Show Error "Current too low medium Flow"	ImessFilter[normal]	ImessFilter[medium]	ImessFilter[air]	current ratio to normal flow
106	CL: Show Error "Current too high medium Flow"	ImessFilter[normal]	ImessFilter[medium]	ImessFilter[air]	current ratio to normal flow
107	EXT: Show Error "Current too high medium Flow"	ImessFilter[normal]	ImessFilter[medium]	ImessFilter[air]	current ratio to normal flow
108	CL: Show Error "Current too low high Flow"	ImessFilter[normal]	ImessFilter[high]	ImessFilter[air]	current ratio to normal flow
109	EXT: Show Error "Current too low high Flow"	ImessFilter[normal]	ImessFilter[high]	ImessFilter[air]	current ratio to normal flow
110	CL: Show Error "Current too high high Flow"	ImessFilter[normal]	ImessFilter[high]	ImessFilter[air]	current ratio to normal flow
111	EXT: Show Error "Current too high high Flow"	ImessFilter[normal]	ImessFilter[high]	ImessFilter[air]	current ratio to normal flow

Cal history (command 275)

Answer: ListNo, year/month/day, hour:min:sec, Gasname, Filament, Massposition, Calibration factor, Argon current, Leak, Mode, Gas, Flow

Example: '"01 2023-04-03 09:47:53 R1234ze Fil:A Pos:069.05 Fac:1.03E+0 Ar:2.34E-10 Leak:1.49E+1 mbar*l/s Mode:1 Gas:1346 Flow:1234sccm"

Comment: Mode: 0-manual, 1-CLmono, 2-Clmulti; Gas: Number from GasSetup

Error history (command 287)

Answer: ListNo 'ERR' or 'WRN' ErrNo ErrValue(float), year/month/day hour:min:sec 'SwOnCnt:' SwitchOnCnt 'OnTm:' MinSinceStart

Example: '"00 ERR502 2.022E-3 2015/08/25 08:51:32 SwOnCnt: 030 OnTm: 004 Pressure sensor 2 not connected"

TMP error history (command 288)

Answer: ListNo, code

Example: "00 Wrn117"

Present warnings (command 297)

Value Index / Bit	Meaning	Bit No.
0x00000001	Warning normal flow	0
0x00000002	Warning high or optimum flow	1
0x00000004	Warning pressure p3 / foreline	2
0x00000008	Warning Calibration Request gaslist gas 1	3
0x00000010	Warning Calibration Request gaslist gas 2	4
0x00000020	Warning Calibration Request gaslist gas 3	5
0x00000040	Warning TMP	6
0x00000080	Warning Anybus	7
0x00000100	Warning maintenance	8
0x00000200	Warning I/O disconnected	9
0x00000400	not used	10

Value Index / Bit	Meaning	Bit No.
0x00000800	not used	11
0x00001000	Warning supply voltage out of range	12
0x00002000	Warning fan current out of range	13
0x00004000	Warning calibration leak has present warning	14
0x00008000	Warning MGM has present warning	15
0x00010000	Warning Calibration Request gaslist gas 4	16
0x00020000	Warning Calibration Request gaslist gas 5	17
0x00040000	Warning Calibration Request gaslist gas 6	18
0x00080000	Warning Calibration Request gaslist gas 7	19
0x00100000	Warning electronic temperature	20
0x00200000	not used	21
0x00400000	not used	22
0x00800000	Warning operating unit not connected	23
0x01000000	not used	24
0x02000000	not used	25
0x04000000	not used	26
0x08000000	Warning Backing Pump	27
0x10000000	Warning real time clock	28
0x20000000	not used	29
0x40000000	not used	30
0x80000000	not used	31

Gas Setup entry (command 2123)

1	2	3	4	5	6	7
"78901234567890123456789012345678901234567890123456789012345678901234567890123456789"						
"_1 _92 R1234ze_ 1 2 _69 0.72 1.10E+08 _69.05 _1.00 1"						

PLC output configuration IO module (command 263)

For a detailed description of the individual functions, see the Ecotec 4000 User Manual, Chapter 10.2.4 (Configuring digital outputs).

Use negative values for inverted functions.

Value	Meaning
0	OFF/OPEN
1	OPEN
2	SETPOINT1 (active if the setpoint of at least one of the gases selected with command 751/752 is exceeded)
3	SETPOINT2 (active if the search level of at least one of the gases selected with command 751/752 is exceeded)
4	READY
5	WARNING
6	ERROR
7	CAL_ACTIVE
8	CAL_REQUEST
9	RUN_UP
10	ZERO_ACTIVE
11	EMISSION_ON
12	MEASURE
13	STANDBY
14	IGUIDE_WAIT
15	ERROR_WARNING
16	CAL_STABLE
17	CATHODE

PLC input configuration IO module (command 438)

For a detailed description of the individual functions, see the Ecotec 4000 User Manual, Chapter 10.2.3 (Configuring digital inputs).

Use negative values for inverted functions

Value	Meaning
0	NO_FUNCTION
1	ZERO
2	ZERO_UP
3	CLEAR
4	CAL
5	CAL_ABBORT
6	Activate GAS_1
7	Activate GAS_2
8	Activate GAS_3
9	Activate GAS_4
10	Activate GAS_5
11	Activate GAS_6
12	Activate GAS_7
13	HIGH_FLOW
14	MID_FLOW
15	STANDBY
16	PURGE

Calibration leak states (command 1724)

Value	Meaning
0	Ecotec 4000 is starting
30	Communication to calibration leak is online
31	Calibration leak is logging out
32	New calibration leak is being read
33	New calibration leak found
35	All calibration leaks online and ready to use

iGuide Cycle state (command 2213)

Value	Meaning	Display
0	Idle	-
1	Move to point	Waiting time
2	Wait on point	Waiting time
3	Confirm point	-
4	Check point	Measuring time
5	Show sum	Result / Log

iGuide available States in relation to configurated Points

Value	Meaning
0	States 1, 2, 3, 4
1…98	States 1, 2, 3, 4, 5
99	States 1, 2, 3, 4, 5

2.8 Example of External Calibration (LD Protocol)

1. START
2. Move sniffer tip in front of the calibration leak.
3. Start calibration: Write LD command 4 = 1
4. Read LD command 260 continuously.
5. Wait until LD command 260 (calibration status) = 51.
6. Read LD command 1740 [255] (read all) continuously.
7. Wait until signal is stable (LD1740 [0] = stable signal).
8. Confirm signal stable: Write LD command 11 = 1
9. Read LD command 260 continuously.
10. Wait until LD command 260 (calibration status) = 55.
11. Remove sniffer tip from calibration leak; move to background air.
12. Read LD command 1740 [255] (read all) continuously.
13. Wait until signal is stable (LD1740 [0] = stable signal).
14. Confirm stable signal: Write LD command 11 = 1
15. Read LD command 260 continuously.
16. Wait until LD command 260 (calibration status) returns:
    - ⇨ 60 → Calibration OK → continue to step 17.
    - ⇨ 61/62/63/64 → Calibration ERROR → Calibration canceled! Start external calibration again.
17. Optional: Read LD command 1740 [255] (read all) once to retrieve calibration factors:
    - ⇨ LD1740 [0] = Calibration factor (old)
    - ⇨ LD1740 [1] = Calibration factor (new)
    - ⇨ LD1740 [2] = Mass position (old)
    - ⇨ LD1740 [3] = Mass position (new)
18. Confirm calibration factor: Write LD command 11 = 1
19. Read LD command 260 continuously.

20 Wait until LD command 260 (calibration status) = 0.

⇨ Done, external calibration completed.

2.9 Error Messages

Telegram error handling

- Slave discards all characters until it receives a STX as telegram start identifier.
- Slave does not generate an error message, if address is not correct.
- Slave reports CRC errors with error message 1 (CRC failure)
- Slave reports length errors with error message 2 (Illegal telegram length) or 11 (Data length is not correct for the command)

To prevent the response from colliding with the next request, the slaves do not respond in case of a timeout.

Error numbers (if status word Bit 15 is set 1)

Error No.	Meaning
1	CRC-failure
2	Illegal telegram length
10	command doesn't exist
11	Data length is not correct for the command
12	Read not allowed
13	Write not allowed
14	Array-Index out of range or missing
20	Control actually not allowed with this interface
21	Password not OK
22	Command actually not allowed (e.g. calibration during Run-Up)
30	Data not in range
31	No data available

In case of error: STX, LEN, Stw, Cmd and one Data-Byte (with error number) sent

3 ASCII Protocol

Limited functional range of the ASCII protocol

Please do not use the ASCII protocol for new developments, as it has a limited functional range and will most likely not be supported in the future.

3.1 Communication Parameters

Data format

19200 baud, 8 data bits, no parity, 1 stop bit

3.2 Command Format

In ASCII protocol any command starts with « * » (ASCII code 42dec/2Ahex) and is finished with the end sign CR (ASCII code 13dex/ 0Dhex). There is no differentiation between upper and lower case. A blank is required between the command and the parameter, no other blanks are allowed.

There is a short and an extended form of the command. Either the short or the extended command must be used, no other abbreviations are allowed (The short form is here written in capitals but the SW don't difference upper and lower cases). Command Words have to be separated by a colon. A command can be composed of up to three words. Parameters have to be separated by a comma.

Each command is answered with the requested data, „ok" or „EXX" (in case of an error). A list of all error messages, can be found in chapter "Error Messages [▶ 79]". The transmission can be cancelled and the receive-buffer will be cleared with ESC (ASCII code 27dec/1Bhex), ^C (ASCII code 3dec/03hex) or ^X (ASCII code 24dec/18hex).

Some commands can be used as queries, some can be used to set menu parameter and some can be used for both. A query is marked by a „?" (ASCII code 63dec/3Fhex) after the command; for setting data the command has to be followed by the new value to be set.

Parameter can be Boolean or numerical:

<b>	Boolean	0 / 1 or OFF / ON
<No>	Numeric representation format: integer, real (15.6) or exponential (4.5^{-7})	

	Format: [space] [sign] [ddd] [.] [e[sign]ddd] (d:digit)

Error due to incorrect format

If a comma is used during numerical data entry, the conversion of the number is cancelled at this point and only the integer part of the number will be used.

▶ Always use a point as the decimal marker.

Timing recommendations for the PC/PLC - Program:

- Sample rate > 100 ms
- Timeout between request to and answer from the leak detector: 1500 ms

After sending a command the answer must be waited for before sending a new command. Otherwise the receive buffer may be overwritten.

3.3 Commands

Limited functional range of the ASCII protocol

Please do not use the ASCII protocol for new developments, as it has a limited functional range and will most likely not be supported in the future.

Command	Meaning	Relates to LD cmd. no.	Read / Write
*CAL:ESC	Escape	11 (0)	W
*CAL:FACtor:NEW	Factor current calibration	1740	R
*CAL:FACtor:OLD	Factor last calibration	1740	R
*CAL:QUIT	Acknowledge (confirm)	11 (1)	W
*CAL:READ	Current [A] (for stability observation)	1740	R
*CAL:SELect	Gas selection (1…4; only enabled gases)	4	W
*CLS	Clear error	5	W
*CLS:VALUEChanged	Clear the value changed flag	1565	W
*CONFig:AUDio	Audio alarm type (OFF, TRIG, SET, PIN, PROP)	600	R/W
*CONFig:AUDIOType	Audio alarm sub type (1, 2, 3)	601	R/W
*CONFig:BAUD	Baudrate ASCII Mode (fix 19200)	-	R
*CONFig:BEEP	Beep-sound (on, off)	604	R/W
*CONFIG:BRIGHTness	Sniffer light brightness (1, 2, … 6)	414	R/W
*CONFig:CALREQ	Calibration request (on, off)	419	R/W
*CONFIG:CONTrol	Control via sniffer keys enabled / disabled. (ON/OFF)	2591	R/W
*CONFig:DELay	Alarm delay (0.0, 0.1, 0.2, … 9.9)	602	R/W
*CONFig:FILament	Filament (A, B)	530	R/W
*CONFig:FILAMENTAuto	Filament auto (on, off)	2068	R/W
*CONFig:FILTer	Filter type (FIXed, I-filter)	402	R/W
*CONFig:IOMODULEPROTOcol	Interface protocol IO (LD,ASCII)	2593	R/W

Command	Meaning	Relates to LD cmd. no.	Read / Write
*CONFIG:Maintenance:SNIFFERfilter	Time until next service for sniffer tip filter [h]	1369	R
*CONFig:MODE	Gas configuration (example: off, on,off,off,0ff,0ff,0ff)	751	R/W
*CONFig:MODERam	Gas configuration (example: off, on,off,off,off,off,off) volatile, RAM only	752	R/W
*CONFig:PEAKhold	Peak hold (on, off)	900	R/W
*CONFig:PEAKTime	Peak hold time (2, 3, 4, ... 20)	901	R/W
*CONFig:PLCINlink:n	Configuration of the PLC inputs (1...10) NOT_USED ZERO ZERO_UP CLEAR CAL CAL_ABORT GAS1 GAS2 GAS3 GAS4 GAS5 GAS6 GAS7 HIGH_FLOW MID_FLOW SLEEP STBY PURGE and inv.... (all functions also inverted)	438	R/W
*CONFig:PLCOUTlink:n	Configuration of the PLC outputs (1...7) OPEN TRIGGER_1 TRIGGER_2 READY	263	R/W

Command	Meaning	Relates to LD cmd. no.	Read / Write
	WARNING ERROR CAL_ACTIVE CAL_REQUEST RUN_UP ZERO_ACTIVE EMISSION_ON MEASURE STANDBY IGUIDE_WAIT ERR/WARN CAL_STAB FILAMENT_B and inv.... (all functions also inverted)		
*CONFig:PROGram	iGuide: Program number (DISABLED, 0, 1, 2, ... 9)	2210	R/W
*CONFig:PROGRAMRAM	iGuide: Program number (DISABLED, 0, 1, 2, ... 9) volatile, RAM only	2209	R/W
*CONFig:RS232	RS232 mode (Ascii, Ld)	26	R/W
*CONFig:SENSitivity	Sensitivity check (on, off)	2250	R/W
*CONFig:SNIFFer	Audio sniffer (0,1,..,15)	595	R/W
*CONFig:UNIT	Pressure unit (MBAR, PA, ATM, TORR)	430	R/W
*CONFig:VOLume	Volume (0, 1, ... 15)	420	R/W
*CONFig:ZERO	Zero (on, off)	410	R/W
*FACtor:CALint:M4	Calibration factor internal M4	2085	R
*FACtor:CALint[:M69]	Calibration factor internal M69	2085	R
*FACtor:FILament	Factor Filament B	2070	R/W
*FACtor:K1	IGS Factor K1	2080	R/W
*FACtor:M18	IGS Factor Mass 18 (not stored in EEPROM)	2080	R/W
*FACtor:M55	IGS Factor Mass 55	2080	R/W

Command	Meaning	Relates to LD cmd. no.	Read / Write
*FACtor:M57	IGS Factor Mass 57	2080	R/W
*FACtor:POSint:M4	Mass position internal calibration M4 [amu]	2086	R
*FACtor:POSint[:M69]	Mass position internal calibration M69 [amu]	2086	R
*FACtor:Pressure	Foreline pressure offset (mbar)	1259	R/W
*FACtor:R152A	Factor R152a	2073	R/W
*FACtor:R1234YF	Factor R1234yf	2074	R/W
*FACtor:R1234ZE	Factor R1234ze	2075	R/W
*FACtor:R290	Factor R290	2076	R/W
*FACtor:R600A	Factor R600a	2077	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):CALFAC	Calibration factor	2142	R
*GAS:1(:2,:3,:4,:5,:6,:7):CALintern	Internal calibration (DISABLED, SAME_GAS, ENABLED)	2140	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):CONFig	Configuration selected mass position 1,2,..5	2132	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):ETAfac	Viscosity	-	R
*GAS:1(:2,:3,:4,:5,:6,:7):FACTOR	Fragmentation factor to the mass positions (5) example: 0.72,0.46,0.12,0.0,0.0)	2120	R
*GAS:1(:2,:3,:4,:5,:6,:7):LASTcal	Last calibration (Date, Time, Mode)	-	R
*GAS:1(:2,:3,:4,:5,:6,:7):LIMIT	Lower display limit (factor: 1, 2, 5, 10, 20, 50, 100)	2136	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):LRlimit	Lower display limit (leak rate)	2136	R
*GAS:1(:2,:3,:4,:5,:6,:7):MASS	Mass position [amu] +/- deviation [amu]	2143	R
*GAS:1(:2,:3,:4,:5,:6,:7):MASSES	Possible mass positions	2120	R
*GAS:1(:2,:3,:4,:5, :6, :7):MODE	Mode enable: on, 1, ENAble disable: off, 0, DISable	2131	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):MOLmass	Molecule mass (example : 102.0)	2120	R
*GAS:1(:2,:3,:4,:5,:6,:7):NAME	Gas name (Attention: if it exists in RomLib, it will be loaded)	2130	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):NORMfac	Normalization factor (example: 1.1E8)	2120	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*GAS:1(:2,:3,:4,:5,:6,:7):SEARch	Search level [%] (5, 6, ... 100)	2134	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):TLRate	Leakrate external leak (4.1 [TLUnit] (proper setting of molecule mass required	2138	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):TLUnit	Unit external leak (g/a, oz/yr, ppm, mbar*l/s, Pa*m3/s, atm*cc/s, Torr*l/s, sft3/yr)	2139	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):TRIGger	Trigger level (2.5 [Unit]) (proper setting of molecule mass required)	2133	R/W
*GAS:1(:2,:3,:4,:5,:6,:7):UNIT	Trigger unit (g/a, oz/yr, ppm, mbar*l/s, Pa*m3/s, atm*cc/s, Torr*l/s, sft3/yr)	2135	R/W
*HOUR:BASic	Operating hours [h] (without probe)	142	R
*HOUR:DATE	Date (DD,MM,YYYY)	450	R/W
*HOUR:DEVice	Operating hours of device	142	R
*HOUR:EMIon	Emission turn on time [s]	2062	R
*HOUR:MAINTenance:AIRfilter	Maintenance Airfilter [h] 0 ... 4000 h (default: 2500 h)	1992	R
*HOUR:OFF	Period of power off [d]	1992	R
*HOUR:POWer	Time since power on [min]	147	R
*HOUR:RUNup	Run up time [s]	158	R
*HOUR:SERVice:AIRfilter	Time until next service for air filter [h]	1367	R
*HOUR:SERVice:FOREpump	Time until next service for diaphragm pump [h]	1361	R
*HOUR:SERVice:TURBOpump	Time until next service for turbo pump [d]	1362	R
*HOUR:TC	Operating hours TMP controler [h]	141	R
*HOUR:TIME	Time (HH,MM,SS)	450	R/W
*HOUR:TL:DATE	Cal. leak date of bottling [dd:MM:yyyy] (1)	1728	R
*HOUR:TL:EXPiry	Cal. leak Expiration date [dd:MM:yyyy] (1)	1370	R
*HOUR:TSP:FILA	Operating hours Transpector filament A [h]	148	R
*HOUR:TSP:FILB	Operating hours Transpector filament B [h]	149	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*HOUR:TSP:POWer	Operating hours Transpector power on [h]	2003	R
*HOUR:TURBO	Operating hours Turbo pump [h]	140	R
*IDN:CRC	Check sum of firmware MV21	320	R
*IDN:DEVice	Device name	301	R
*IDN:DIP	MV21 DipSwitch setting	321	R
*IDN:SERial	Serial number Ecotec 4000	406	R
*IDN:SNSerial	Sniffer Serial number	404	R
*IDN:SNType	Sniffer Type (length/type)	302	R
*IDN:SNVersion	Sniffer Software version	312	R
*IDN:TCName	TC controller name	317	R
*IDN:TCVersion	Software version TC1x0	315	R
*IDN:TLSerial	Cal. leak (1) serial number	1720	R
*IDN:TLSerial2	Cal. leak (1) serial number reservoir	1721	R
*IDN:TLVersion	Cal. leak (1) software version	1722	R
*IDN:TSPControl	Transpector Control version	2012	R
*IDN:TSPIP	Transpector IP address	2014	R
*IDN:TSPMeasure	Transpector Power supply version	2013	R
*IDN:TSPSNBox	Transpector Serial number box	2000	R
*IDN:TSPSNSensor	Transpector Serial number sensor	2001	R
*IDN:TURBO	Software version TMP controller	315	R
*IDN:VERsion	Software version Ecotec 4000	310	R
*MEASure:Argon:Current	Current Argon [A]	2032	R
*MEASure:Argon:Position	Mass position Argon [amu]	2047	R
*MEASure:BASEline	Baseline offset [A]	2045	R
*MEASure:BPUMP:FREQency	Backing pump rotation freq. [Hz]	1420	R
*MEASure:BPUMP:CURRent	Backing pump current [mA]	1425	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*MEASure:Filament:Current	Heater current [A]	2028	R
*MEASure:Filament:Voltage	Heater voltage [V]	2027	R
*MEASure:Filament:Power	Heater power [W]	2029	R
*MEASure:FLOW	Flow [sccm]	118	R
*MEASure:GLOBal	iGuide global leak rate [display unit] (Gas A/B => 2 values)	2215	R
*MEASure:P1	p1 pressure (MGM21) in interface unit	130	R
*MEASure:P1:ATM	p1 pressure (MGM21) in atm	-	R
*MEASure:P1:DISPlay	p1 pressure (MGM21) in display unit	810	R
*MEASure:FOREline	p3 pressure (foreline)	812, 2480, 2481	R
*MEASure:P1:MBAR	p1 pressure (MGM21) in mbar	131	R
*MEASure:P1:PA	p1 pressure (MGM21) in Pa	-	R
*MEASure:P1:TORR	p1 pressure (MGM21) in Torr	-	R
*MEASure:P2	p2 pressure (MGM21) in interface unit	131	R
*MEASure:P2:ATM	p2 pressure (MGM21) in atm	-	R
*MEASure:P2:DISPlay	p2 pressure (MGM21) in display unit	811	R
*MEASure:P2:MBAR	p2 pressure (MGM21) in mbar	133	R
*MEASure:P2:PA	p2 pressure (MGM21) in Pa	-	R
*MEASure:P2:TORR	p2 pressure (MGM21) in Torr	-	R
*MEASure:P4	p4 pressure (total, MPH)	813, 2482, 2483	R
*MEASure:POInt no	iGuide leak rate for measuring point no (1, 2, ...) (Gas A/B => 2 values)	(2220)	R
*MEASure:POInt:LOG no	iGuide logfile item for measuring point (1, 2, ...)	2220	R
*MEASure:POInt:TIMEstamp no	with date and time (Gas A/B => 2 values)	(2220)	R
*MEASure:Pressure:FOREline (:unit)	Foreline pressure	2480	R
*MEASure:Pressure:P1 (:unit)	Pressure p1	130	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*MEASure:Pressure:P2 (:unit)	Pressure p2	132	R
*MEASure:Pressure:TOTal (:unit)	Total pressure (Transpector)	2482	R
*MEASure:REC0	Output voltage recorder channel 1	221	R
*MEASure:REC1	Output voltage recorder channel 2	221	R
*MEASure:SINGle	iGuide single leak rate [display unit] (Gas A/B => 2 values)	2216	R
*MEASure:SNIFFERID	SL4000 sniffer identification voltage [V]	245	R
*MEASure:TEMPeratur:Electronic	Temperature Electronic MV21 [°C]	165	R
*MEASure:TEMPeratur:Leak	Temperature Cal. leak [°C]	2687	R
*MEASure:TEMPeratur:MC50	Temperature Electronic MV21 [°C]	165	R
*MEASure:TEMPeratur:TCBearing	Temperature TC bearing [°C]	145	R
*MEASure:TEMPeratur:TCElectronic	Temperature TC electronic [°C]	144	R
*MEASure:TEMPeratur:TCMotor	Temperature TC motor [°C]	146	R
*MEASure:TEMPeratur:TCPump	Temperature TC pump [°C]	143	R
*MEASure:TEMPeratur:TSP	Temperature Transpector [°C]	2002	R
*MEASure:TEMPeratur:TSPMAX	Temperature Transpector [°C] maximum	2002	R
*MEASure:TEMPeratur:TSPMIN	Temperature Transpector [°C] minimum	2002	R
*MEASure:TURBO:Current	TMP current [A]	151	R
*MEASure:TURBO:Frequency	TMP frequency [Hz]	138	R
*MEASure:TURBO:Power	TMP power [W]	139	R
*MEASure:TURBO:Voltage	TMP voltage [V]	150	R
*MEASure:U24TMP	Voltage 24V Turbo pump [V]	209	R
*MEASure:U24TSP	Voltage 24V Transpector [V]	234	R
*PROGram(:1,:2,..:10):ENABle	iGuide: Enable (on/off) program	-	R/W
*PROGram(:1,:2,..:10):GASa	Gas name A (read only, determined by Gas number)	-	R
*PROGram(:1,:2,..:10):GASB	Gas name B (read only, determined by Gas num B)	-	R
*PROGram(:1,:2,..:10):MEAStime	Measuring time [s] (1.0, 1.1, ... 25.0)	2240	R/W

Command	Meaning	Relates to LD cmd. no.	Read / Write
*PROGram(:1,:2,..:10):NAME	Program name (max 8 characters)	2221 ...	R/W
*PROGram(:1,:2,..:10):NRa	Gas number A (0,1,2,3,4,5,6)	2237	R/W
*PROGram(:1,:2,..:10):NRB	Gas number B (0,1,2,3,4,5,6)	2238	R/W
*PROGram(:1,:2,..:10):POInts	Number of points (0, 1, ... 99)	2236	R/W
*PROGram(:1,:2,..:10):TRIGger (or TRIGA)	Global trigger gas A [selected unit] (unit read only, determined by Gas number)	2241	R/W
*PROGram(:1,:2,..:10):TRIGgerB (or TRIGB)	Global trigger gas B [selected unit] (unit read only, determined by Gas number B)	2242	R/W
*PROGram(:1,:2,..:10):WAITtime	Wait time [s] (0.1, 0.2, ... 25.0)	2239	R/W
*PROGram:ABORT	Restart testing cycle	2249	W
*PROGram:BACK	Point back	2248	W
*PROGram:CONFirm	Confirm point	2247	W
*PROGram:CYCLE	Cycle counter (for resetting counter to 0)	2212	R/W
*PURGE	Start purge	15	W
*READ[:1, :2, :3, :4, :5, :6, :7][:unit]	Leak rate gas (without number => first selected gas; without unit => interface unit is used), returns disabled if gas is not active	128 129 860	R
*STANDby	StandBy mode V1,V2,V3 closed, backing pump 500 1/min	2	W
*START	Start measurement mode, run-up	1	W
*STATus	Device state ACCL (acceleration) STBY (standby) MEAS (measuring) CAL (calibration) ERROR IGUIDE	Status word	R
*STATus:ACTFILament	Active filamant	2067	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*STATus:CAL	Calibration State Value See enumerations table (State calibration)	260	R
*STATus:CALFILament	Calibration filamant	2067	R
*STATus:CALHist	Calibration history starting from 1 to 20 Date, Time, Gas name, Filament, Mass position, Calibration factor, Calibration leak, Leak rate unit, Mode, Gas numbers, Flow	275	R
*STATus:EMISsion	Emission status: OFF, ON	264	R
*STATus:ERRor	current number of error / warning („NO ERROR/WARNING“ or 3-digit failure number)	290	R
*STATus:ERRorCount	Transpector error counter No emission filament A No emission filament B No emission both filaments Sensitivity too low Over pressure Emission fail	2035	R
*STATus:ERRorHist	Error history starting from 1 to 20 Error number, Info, Date, Time, Switch on counter, Time since power on, Error text	287	R
*STATus:ERRorWARning	List of active errors or warnings (10)	296	R
*STATus:FILBHist	Factor Filament B history starting from 0 to 19 Date, Time, Factor, Cause	2095	R
*STATus:GASsetup	Gas setup (from 0 to 6) RomLib index, Gas name, Enabled, Mass index, Fragmentation factor, Normalization factor, Mass position, Calibration factor, Calibration mode	2123	R
*STATus:IGSHist	IGS calibration history starting from 1 to 20 Date, Time, Filament, Factor K1, Faktor M55, Factor M57	2093	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*STATus:Input	State PLC input Byte 0 Pin 1 Byte 1 Pin 2 ... Byte 9 Pin 10	261	R
*STATus:K1Hist	Factor K1 history starting from 1 to 20 Date, Time, Filament, Factor K1, cause	2091	R
*STATus:LEAK:Gas	Cal. leak gas name	1726	R
*STATus:LEAK:LREff	Cal. leak effective leak rate	1727	R
*STATus:LEAK:LRNom	Cal. leak nominal leak rate	1730	R
*STATus:LEAK:Unit	Cal. leak unit	1725	R
*STATus:MAINTenanceHist	Maintenance history, entry 1 ... 20	2643	R
*STATus:OUTput	State PLC output Byte 0 Pin 1 Byte 1 Pin 2 ... Byte 7 Pin 8	262	R
*STATus:PROGram	iGuide: Current measuring point + State cycle	2213	R
*STATus:PROGram:CYCle	State iGuide cycle MOVE – „Move to point x“ WAIT – „Please wait“ CHECK – „Leak check point x“ END – Display result of cycle CONFIRM – „Confirm point x“	2213	R
*STATus:PROGram:GLOBal	iGuide: Trigger level of global leak rate exceeded (Gas A/B => 2 flags)	2213	R
*STATus:PROGram:POInt	iGuide: Current measuring point (not measured yet, 0-end)	2213	R
*STATus:PROGram:SINGle	iGuide: Trigger level of at least one measuring point exceeded	2213	R
*STATus:SEARch	Search level of gas x exceeded (Number 1...4, OFF/ ON)	387	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*STATus:SERviceHist	Service history starting from 1 to 20 Date, Operating hours, Type of maintenance	2643	R
*STATus:SWITCHONCnt	Switch on counter device	157	R
*STATus:SWITCHONCnt:FILA	Switch on counter filament A	2060	R
*STATus:SWITCHONCnt:FILB	Switch on counter filament B	2061	R
*STATus:SWITCHONCnt:MPH	Switch on counter MPH	2009	R
*STATus:TMPHist	TMP error history, entry 1 ... 10	288	R
*STATus:TRIGger	Trigger level of gas x exceeded (Number 1...4, OFF/ ON)	387	R
*STATus:TURBO	Device state TMP: OFF, ON	266	R
*STATus:VALve	Status of internal valves: V1, V2, V3 OFF,ON	449	R
*STATus:WARNing	State warning flags Byte 0 - Pressure p1 / flow Byte 1 - Pressure p2 / flow XL Byte 2 - Pressure p3 / foreline Byte 6 - TMP Byte 7 - Anybus Byte 8 - Maintenance Byte 9 - I/O disconnected Byte 12 - Some supply voltage out of range Byte 13 - Fan current out of range Byte 14 - CL Byte 15 - MGM Byte 20 - Electronic temperature Byte 22 - Calibration request Byte 23 - Control unit disconnect Byte 27 - Backing pump Byte 28 - RTC	297	R
*STATus:ZERO	Zero state (ON, OFF)	Status word	R

Command	Meaning	Relates to LD cmd. no.	Read / Write
*ZERO	Zero (update)	6	W
*ZERO:OFF	Zero Off	6	W
*ZERO:ON	Zero On	6	W

3.4 Examples

3.4.1 Examples of Commands

Command	answer	
*stat? (CR)	MEAS (CR)	mode
*status? (CR)	MEAS (CR)	mode
*read? (CR)	2.876E-7 (CR)	leak rate according to programmed unit
*read:pa*m3/s? (CR)	2.876E-6 (CR)	leak rate in a different unit
*start (CR)	OK (CR)	start measurement
*conf:trig1? (CR)	1.0E-9 (CR)	retrieve trigger 1
*conf:trig1 2.0E-9 (CR)	OK (CR)	set trigger 1

3.4.2 Example of External Calibration (ASCII Protocol)

1. Move sniffer tip in front of the calibration leak
2. Wait until leak rate signal is stable.
3. Select calibration gas: *Cal:select <n> (n = 1..4)
4. Wait until *Stat? returns "CAL".
5. Wait until *Status:cal? returns "51".
6. Wait until *Cal:read? returns a stable ion current signal.
7. Confirm stable signal: *Cal:quit
8. Wait until *Status:cal? returns "55".
9. Move sniffer tip away from the calibration leak into background air.
10. Wait until *Cal:read? returns a stable ion current signal.
11. Confirm stable signal: *Cal:quit
12. Wait until *Status:cal? returns:
    - ⇨ "60" → Calibration successful (results displayed).
    - ⇨ "61" → Calibration failed
    - ⇨ "62" → Calibration failed
    - ⇨ "63" → Calibration failed
    - ⇨ "64" → Calibration failed
13. [Optional] Read calibration factors:
    - ⇨ *Cal:fac:old? (previous factor)
    - ⇨ *Cal:fac:new? (new factor)
14. Confirm and apply calibration factor: *Cal:quit
15. Done.

3.5 Error Messages

Message	Meaning
OK	command completed
E01	wrong command start (no „*“)
E02	illegal blank
E03	command word 1 illegal
E04	command word 2 illegal
E05	command word 3 illegal
E06	control by RS232 not enabled
E07	argument faulty
E08	no data available
E09	error buffer overflow
E10	command invalid
E11	query not allowed
E12	only query allowed
E13	not yet implemented

4 Fieldbus Communication

4.1 Preface

In order to use fieldbus communication with a device from the Ecotec 4000, you need an INFICON Bus-Module BM1000.

Fieldbus systems normally support device-specific configuration files e.g. GSD files for the PROFIBUS field bus system.

You will find the appropriate configuration files on the USB memory stick which is supplied with your BM1000 or on the INFICON website.

4.2 Setup

✓ The leak detector is turned off.

1. Connect the INFICON bus module to the LD-1 or LD-2 port on the device using a data cable.
2. Switch on the leak detector.
3. > Setup > Accessories > Device selection
4. Select the “Device @LD-1” or “Device @LD-2” field depending on which LD-1 or LD-2 interface the data cable is connected to on the leak detector, and set it to “Bus Module.”

Attention:

Address and profile do not come into effect until a restart of the leak detector (power off/power on)!

4.3 Write Process Data (PLC --> Leak Detector)

This data word (2 Bytes) is sent periodically from the field bus master (e.g. programmable logic controller) to the leak detector.

PROFIBUS and PROFINET IO receive high byte first, DeviceNet and EtherNet/IP receive low byte first.

Byte	Bit	Name	Meaning	Similar to LD cmd.
1 high	0	not used		
	1	ZERO	Transition 0 -> 1: 0x02 = ZERO on	6
			Transition 1 -> 0: 0x00 = ZERO off	
	2	Clear	Transition 0 -> 1: 0x04 = Clear	5
	3	Start/Stop	Transition 0 -> 1: 0x08= Start	1
			Transition 1 -> 0: 0x00= Sleep	2
	4-6	CAL	Transition 0: 0x00 = Cancel external CAL	4, 11
			Transition 1: 0x10 = Start external CAL active gas 1	
			Transition 2: 0x20 = Start external CAL active gas 2	
			Transition 3: 0x30 = Start external CAL active gas 3	
			Transition 4: 0x40 = Start external CAL active gas 4	
			Transition 5: 0x50 = Start internal CAL (Ecocheck)	
			Transition 6: 0x60 = Acknowledge CAL	
			Transition 7: 0x70 = Acknowledge CAL 2	
	7	Not used		
If iGuide is activated				
2 low	0	iGuide Confirm	Transition 0 -> 1: 0x01 = Confirm measured value	2247
	1	iGuide Back	Transition 1 -> 0: 0x02 = Discard last value	2248
	2	iGuide Abort	Transition 1 -> 0: 0x04 = Restart cycle	2249
	4-6	not used		
	7	Zero update	Transition 0 -> 1: 0x80 = ZERO update	6
If iGuide is deactivated				

Byte	Bit	Name	Meaning	Similar to LD cmd.
2 low	0-6	Select active gases	Transition 0: 0x01 = activate gas 1	751, 752
			Transition 1: 0x02 = activate gas 2	
			Transition 2: 0x04 = activate gas 3	
			Transition 3: 0x08 = activate gas 4	
			Transition 4: 0x10 = activate gas 5	
			Transition 5: 0x20 = activate gas 6	
			Transition 6: 0x40 = activate gas 7	
			Min 1 active gas, Max 4 active gases	
	7	ZERO update	Transition 0 -> 1: 0x80 = ZERO update	6

4.4 Process Data Mapping for Cyclic Data Transfer

4.4.1 Read Process Data (Leak Detector --> PLC)

These 29 data bytes are sent periodically from the leak detector to the field bus master (e.g. a programmable logic controller): Attention: PROFIBUS and PROFINET IO send high byte first, DeviceNet and EtherNet/IP send low byte first.

Title	Byte	Bit	Name	Meaning	Similar to IO1000 Output	Similar to RS232 ASCII cmd.	Similar to RS232 LD cmd.
status word	1 (high byte)	0	Not used	always 1			
		1	Zero active	0 : off 1 ≙ 0x02 : on	ZERO active	*STATUS:ZERO?	
		2	Error	0 : no error 1 ≙ 0x04 : error	Error		Status word
		3	Warning	0 : no warning 1 ≙ 0x08 : warning	Warning		Status word
		4 5	State internal calibration	0 : inactive 1 ≙ 0x10 : active 2...3 ≙ 0x20/0x30 : not used	CAL active	*STATUS:CAL?	260
		6 7	State external calibration	0 : inactive 1 ≙ 0x40 : active 2 ≙ 0x80 : waiting for air signal stable 3 ≙ 0xC0 : waiting for stable leak or acceptance of calibration result	CAL active	*STATUS:CAL?	260

Title	Byte	Bit	Name	Meaning	Similar to IO1000 Output	Similar to RS232 ASCII cmd.	Similar to RS232 LD cmd.
status word (continued)	2 (low byte)	0	Calibration request	0 : CAL request function disabled 1 ≙ 0x01 : CAL request function enabled but no CAL requested 2 ≙ 0x02 : CAL request function enabled and CAL requested 3 ≙ 0x03 : not used	CAL request	*CONFIG:CALREQ?	419
		1					
		2	Emission	0 = Emission off 1 = 0x04: Emission on	Emission on	*STATUS:EMIS?	9
		3	Filament	0 = Filament A 1 = Filament B	Cathode	*STATUS:CATHODE?	530
		4		not used			
		5	State	0: Standby 1 = 0x20 = Runup 2 = 0x40 = Measure 3 = 0x60 = Calibration 4 = 0x80 = Error 5 = 0xA0 = Emission off 6 = 0xC0 = Measure iGuide 7 = 0xE0 = Burn In	Run up, CAL active, Error, Ready,	*STATUS?	Status word
		6					
		7					
leak rate Gas 1	3 … 6		Leak rate	Actual leak rate gas 1 in interface unit (IEEE 754 float value)	Analog output (LR_LIN, LR_LOG…)	*READ:1?	2260
flow	7 … 10		Flow (ml/min)	Flow in mbar/l (IEEE 754 float value)			118
error_code	11 … 12		Actual error number	Error/warning code (16 bit unsigned integer)		*STATUS:ERROR?	290

Title	Byte	Bit	Name	Meaning	Similar to IO1000 Output	Similar to RS232 ASCII cmd.	Similar to RS232 LD cmd.
trigger_status	13	0	Status of Trigger 1	0 = Leak rate lower than trigger level 1 = Leak rate higher than trigger level	Trigger 1	*STATUS:TRIGger?	387
		1	Status of Trigger 2		Trigger 2		
		2	Status of Trigger 3		Trigger 3		
		3	Status of Trigger 4		Trigger 4		
		4	Status of Search 1	0: leak rate lower then search trigger level 1: leak rate higher then search trigger level	Search 1		
		5	Status of Search 2		Search 2		
		6	Status of Search 3		Search 3		
		7	Status of Search 4		Search 4		
calibration_status	14		Calibration_status	For possible values please refer to command 260 see table 3.4, "Commands".	CAL active	*STATUS:CAL?	260
leak_detector ID	15		Leak_detector ID	always 7 for Ecotec 4000		*IDN:DEVice?	303
leak rate Gas 2	16 … 19		Device specific float 1	Actual leak rate gas 2 in interface unit (IEEE 754 float value)		*READ:2?	2261
leak rate Gas 3	20 … 23		Device specific float 2	Actual leak rate gas 3 in interface unit (IEEE 754 float value)		*READ:3?	2262
leak rate Gas 4	24 … 27		Device specific float 3	Actual leak rate gas 4 in interface unit (IEEE 754 float value)		*READ:4?	2263

Title	Byte	Bit	Name	Meaning	Similar to IO1000 Output	Similar to RS232 ASCII cmd.	Similar to RS232 LD cmd.
device specific word	28 … 29		Device specific word	**If iGuide active:** Byte 28: iGuide current point Byte 29: iGuide Cycle state 0 = Idle 1 = Move to point 2 = Wait on point 3 = Confirm point 4 = Check point 5 = Show sum Result / Log **If iGuide inactive:** Byte 28: Return currently active gases: (Bit = 0 => inactive, Bit = 1 => active) Bit 0: Gas 1 Bit 1: Gas 2 Bit 2: Gas 3 Bit 3: Gas 4 Bit 4: Gas 5 Bit 5: Gas 6 Bit 6: Gas 7 Byte 29: not used			iGuide active: 2213 iGuide inactive: 751, 752, 2131

4.5 Acyclic Data Transfer

If you want to use acyclic data transfer with PROFIBUS, you must use a PROFIBUS master which supports DPV1 data transfers. A PROFIBUS master which supports DPV0 only, can only use cyclic data transfer.

4.5.1 Addressing Rules for Acyclic Access

Mapping from LD command number to field bus:

Fieldbus	Rule	Example for LD_command_number 229 (Flow control)
PROFIBUS	LD_command_number = slot · 255 + index + 1 slot = (LD_command_number - 1) / 255 index = (LD_command_number - 1) MOD 255	Slot = 0 index = 228
PROFINET IO	Application Process Instance (API) = 0 Slot = 0 Subslot = 1 Index = LD_command_number	API = 0 Slot = 0 Subslot = 1 Index = 229dez = E4hex
DeviceNet	Object number A2h (ADI object) Instance_number = LD_command_number Attribute 5 (Value)	Instance_number = 229
EthernetIP	Object number A2h (ADI object) Instance_number = LD_command_number Attribute 5 (Value)	Instance_number = 229

Fieldbus supports all commands from LD protocol, except the commands which are marked accordingly in LD command list, see "Commands".

4.5.2 CIP Object "ADI object" (A2h)

The following text only applies to DeviceNet and Ethernet/IP:

Instance Attributes:

#	Name	Access	Type	Description
1	Name	Get	SHORT_STRING	Parameter name (Including length)
2	ABCC Data type	Get	USINT	Data type of instance value
3	No. of elements	Get	USINT	Number of elements of the specified data type
4	Descriptor	Get	USINT	Bit field describing the access rights for this instance Bit:Meaning: 0 Set = Get Access 1 Set = Set Access
5	Value [a)]	Get/Set	Determined by attribute #2	Instance value
6	Max value [a)]	Get		The maximum permitted parameter value
7	Min value [a)]	Get		The minimum permitted parameter value
8	Default value [a)]	Get		The default parameter value

a) Converted to/from CIP standard by the module

ABCC Data type:

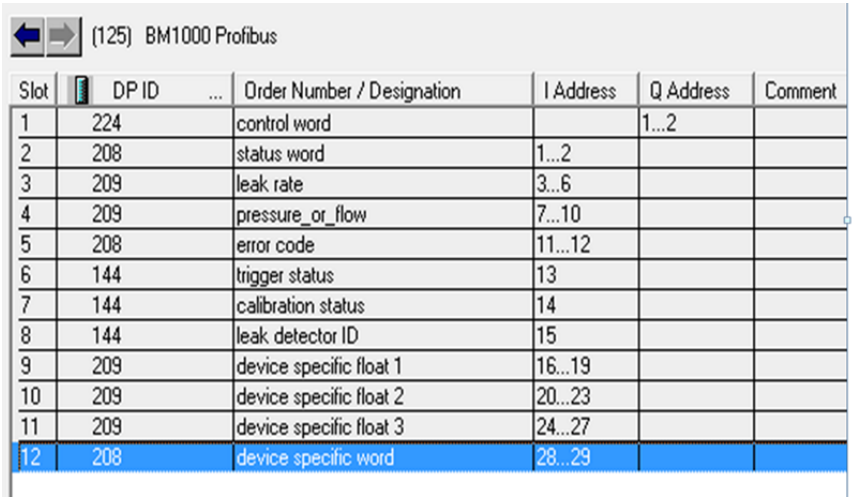
#	Type	Bits	Description	Range
1	SINT8	8	Signed 8 bit integer	-128… +127
2	SINT16	16	Signed 16 bit integer	-32768… +32767
3	SINT32	32	Signed 32 bit integer	-2^{31}… $+(2^{31}-1)$
4	UINT8	8	Unsigned 8 bit integer	0… +255
5	UINT16	16	Unsigned 16 bit integer	0… +65535
6	UINT32	32	Unsigned 32 bit integer	0… $+(2^{32}-1)$
7	CHAR	8	Character (ISO 8859-1)	0… +255
16	SINT64	64	Signed 64 bit integer	-2^{63}… $+(2^{63}-1)$
17	UINT64	64	Unsigned 64 bit integer	0… $+(2^{64}-1)$
18	FLOAT	32	Floating point (IEC 60559)	±1.17549435E-38… ±3.40282347E+38

4.6 Hardware Configuration for Profibus

4.6.1 Hardware configuration

Attention:

You must select INFICON profile and must use IFCN0E8D.GSD file for this configuration


(125) BM1000 Profibus

Slot	DP ID ...	Order Number / Designation	I Address	Q Address	Comment
1	224	control word		1...2	
2	208	status word	1...2		
3	209	leak rate	3...6		
4	209	pressure_or_flow	7...10		
5	208	error code	11...12		
6	144	trigger status	13		
7	144	calibration status	14		
8	144	leak detector ID	15		
9	209	device specific float 1	16...19		
10	209	device specific float 2	20...23		
11	209	device specific float 3	24...27		
12	208	device specific word	28...29		

4.6.2 Assignment of the PROFIBUS Address

The PROFIBUS address can be assigned via Ecotec 4000 or via the hardware configuration tool of the PLC.

To assign the PROFIBUS address via Ecotec 4000 select

1. > Setup > Accessories > Bus module
2. Enter the desired address in the "Bus module address" field.
3. Confirm with .

Note: The value set is first carried over when restarting the leak detector. To do this, switch the power supply off and back on.

To assign the PROFIBUS address via hardware configuration tool of the PLC

- refer to the documentation of your PLC.
- refer to the document: "How to configure an Anybus PROFIBUS slave module with Siemens Step 7". You will find this document on the USB memory stick which is supplied with your device.

4.6.3 Diagnosis

The current state of the BM1000 is visible in the info menu:

▶ > Accessories > Bus module

4.7 Hardware Configuration for PROFINET

4.7.1 Hardware Configuration

Attention:

You must select INFICON profile and must use the GSDML-V2.3-Inficon-BM1000_PROFINET-20131206.XML file. In addition you must put the INFICON Bitmap File GSDML-0282-03E8-INFICON-BM1000.BMP in the same folder as the xml file.

(1) BM1000

Slot	Module	Order number	I address	Q address	Diagnostic address:	Comment
0	BM1000	560-316			2041*	
X1	Interface				2040*	
P1	Port 1				2039*	
P2	Port 2				2038*	
1	Ausgang 1 word			1...2		
2	Eingang 1 word		1...2			
3	Eingang 2 word		3...6			
4	Eingang 2 word		7...10			
5	Eingang 1 word		11...12			
6	Eingang 1 byte		13			
7	Eingang 1 byte		14			
8	Eingang 1 byte		15			
9	Eingang 2 word		16...19			
10	Eingang 2 word		20...23			
11	Eingang 2 word		24...27			
12	Eingang 1 word		28...29			
13						
14						

4.7.2 Assignment of the PROFINET address

The PROFINET address can only be assigned via the hardware configuration tool of the PLC. To assign the PROFINET IP address via hardware configuration tool of the PLC, please refer to the documentation of the PLC.

5 Trouble Shooting

5.1 Serial communication via RS232 (common)

Error	Possible Reason	Solution
No characters are received via the interface/ the leak detector does not answer	Wrong cable	Please use a 1:1 cable, (NO null-modem cable, also called cross-over cable!)
	Problems with flow control	Deactivate flow control in PC/PLC or use cable according to the wiring diagram in Section 2
	Wrong COM-Port used at PC	Select correct COM-Port
No characters are received via the interface/ the leak detector does not answer	Wrong interface parameters (Baud rate, Data bits, Parity, Stop bits)	Check if interface parameters (Baud rate, number of data bits, parity bit and number of stop bits in the leak detector and PC/PLC match)
	Wrong protocol selected in the leak detector	Select correct protocol in the leak detector
	PC uses an USB-RS232 converter	In general the IO1000 will also work with an USBRS232- converter. However, these often cause multiple difficult to track problems (driver, flow control.) Please test your PC program on a “real” RS232 interface first preferably. Especially with USB-RS232-converters it is often helpful to use a cable according to the wiring diagram in chapter 4 of the IO1000 documentation.
	Serial interface of PC is (still) occupied with a different program	Check if other programs uses the serial interface. It is also possible that an already closed program has not released the interface again yet. In this case a restart of the PC will help.
The leak detector replies with “unreadable“ characters	Wrong interface parameters (Baud rate, Data bits, Parity, Stop bits)	Check if interface parameters (Baud rate, number of data bits, parity bit and number of stop bits in the IO1000 and PC/PLC match)
	Wrong protocol selected in the leak detector	Select correct protocol in the leak detector

5.2 ASCII Protocol specific

Error	Possible Reason	Solution
IO1000 does not reply/ leak detector replies after several command with "E10"	"Carriage Return" at the end of the command is missing	Finish all commands with "Carriage Return" (ASCII 0dhex/13dez)
leak detector replies with error message to the first command only, following commands are interpreted correctly	Receiving buffer of the leak detector was not empty before sending the first command (e.g. by plugging in the RS232 cable during operation)	In the ASCII protocol the leak detector has not time out function which will empty the receiving buffer automatically. Therefore, the buffer should be emptied before the first command by sending of ESC, ^C or ^X

5.3 LD Protocol specific

Error	Possible Reason	Solution
IO1000 does not reply	Wrong Address	Always use Address 1 in LD protocol.
	Other protocol errors	Try to use NOP command (05hex 04hex 01hex 00hex 00hex 77hex) first, to check if connection works in general. The answer should be 02hex 05hex XXhex XXhex 00hex 00hex XXhex
IO1000 replys with CRC error (error code 1)	Wrong CRC calculation	Check you CRC code calculation. See example C source file "CRC_calculation.c" provided by INFICON. Check your code with unit test function in this source code file.

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