Dräger medical
A Dräger and Siemens Company

MEDIBUS for Dräger Intensive Care Devices

Instructions for Use

Contents

For Your Safety and that of Your Patients

For correct and effective use of the apparatus and to avoid hazards it is essential to read the following recommendations and to act accordingly:

Strictly follow the Instructions for Use

Any use of the apparatus requires full understanding and strict observation of these instructions. The apparatus is only to be used for purposes specified here.

Liability for proper function or damage

The liability for the proper function of the software protocol is irrevocably transferred to the owner or operator if the software protocol is used in a manner not conforming to its intended use.

Dräger cannot be held responsible for damage caused by non-compliance with the recommendations given above. The warranty and liability provisions of the terms of sale and delivery of Dräger are likewise not modified by the recommendations given above.

Dräger Medical AG & Co. KGaA

Intended Use

MEDIBUS is a software protocol intended to be used by two medical devices for exchanging data and control functions via their RS 232 interfaces.

This part of manual describes device dependent supported commands and data sets, port hardware and configurations for Dräger Intensive Care Devices.
For a general description of the protocol please refer to the Instructions for Use "Dräger RS 232 MEDIBUS Protocol Definition" (order-no. 90 28 258).

Any data transmitted via the MEDIBUS interface are intended only for information purposes and should not be used to derive therapeutical decisions.

Data Formats

The underscore character used in the format column in lists of measured data and alarm limits is transmitted as an ASCII "space" character (20H).

A '*' ahead the format indicates that the value may be negative. In that case a '–' character will appear at the first space of the respective format.

Be aware that in a small number of cases the used format for a certain item may be different!

Alarm Phrases

Some alarm phrases contain abreviations as follows:

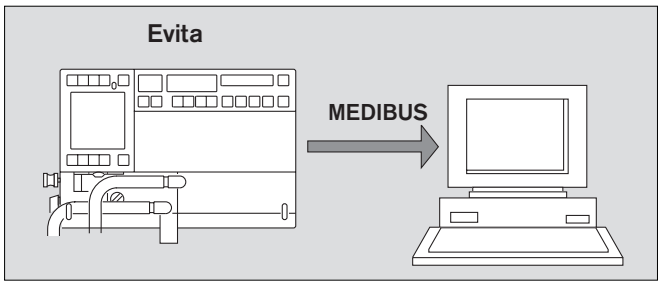
ASCII Short Form	Meaning
$&	LOW
"#	HIGH
'@	ALARM

Alarm Priorities

The alarm source is responsible for the priority.
The priority may be variable even if from the same source. (E.g. the priority may increase the longer an alarm is pending.)

MEDIBUS Specification for Evita

Device Connection



Port Specification

Connector

Type	RS-232-C 9 pin Sub D (female)
Pins	1 Housing 2 RXD 3 TXD 5 GND
Galvanic Isolation	1.5 kV
Location	rear side of Evita on optional extension board "EvitaLink" Label: RS 232

Port Configuration
Channel A

Baudrate	19200 Baud
Databits	8
Startbits	1
Stopbits	1
Parity	even

Port Configuration
Channel B

Baudrate	1200, 2400, 4800, 9600 19200 Baud
Databits	8
Startbits	1
Stopbits	1, 2
Parity	none, odd, even

Device Identification

ID-Number	8210
Name	'Evita'
MEDIBUS-Version	03.00 for Device Version 01.00 and higher

Available Data

MEDIBUS is available only with optional hardware extension "EvitaLink"*.

Current Measured Data, Low and High Alarm Limits, Alarmstatus, Device Settings, Text Messages and Realtime-Data are available since Evita device version 13.03/14.03 and EvitaLink device version 2.01.

Commands

Transmitted Commands

Code	Command-Specification
30H	Do nothing (NOP)
51H	Initialize Communication (ICC)
52H	Request Device Identification

Processed and responded Commands

Code	Command-Specification
24H	Request current DATA
25H	Request current LOW ALARM LIMITS
26H	Request current HIGH ALARM LIMITS
27H	Request current ALARMS
29H	Request current DEVICE SETTINGS
2AH	Request current TEXT MESSAGES
30H	Do nothing (NOP)
4AH	Configure Data Response
51H	Initialize Communication (ICC)
52H	Request Device Identification
53H	Request Realtime Configuration
54H	Configure Realtime Transmission
55H	Stop Communication
6AH	Device Specific

* RS 232 Communication Interface for Evita and Evita 2

Measured Data, Low and High Alarm Limits

Airway related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
07H	Compliance L/bar	L/bar	_XXX	x		
08H	Resistance	mbar/L/s	XXX_	x		
71H	Minimal Airway Pressure	mbar	*_XX_	x		
72H	Occlusion Pressure	mbar	XX.X	x		
73H	Mean Breathing Press.	mbar	*_XX_	x		
74H	Plateau Pressure	mbar	*_XX_	x		
78H	PEEP Breathing Press.	mbar	*_XX_	x		
79H	Intrinsic PEEP Breath. Press.	mbar	XX.X	x		
7DH	Peak Breathing Press.	mbar	*_XX_	x		x
81H	Trapped Volume	mL	_XXX	x		
82H	Tidal Volume L	L	X.XX	x		
B5H	Spontaneous Respiratory Rate	1/min	XXX_	x		
B7H	Spontaneous Minute Volume	L/min	XX.X	x		
B9H	Respiratory Minute Volume	L/min	XX.X	x	x	x
C1H	Airway Temperature	°C	_XX_	x		
D6H	Resp. Rate (Vol./Flow)(Pediat)	1/min	XXX_	x		x

A '*' ahead the format indicates that the value may be negative. In that case a '-' character precedes the numeric value.

O_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
F0H	Insp. O_2	%	XXX_	x		

Realtime Data

Code	Realtime-Data	Unit
00H	Airway Pressure	mbar
01H	Flow (insp./exp.)	L/min
03H	Resp. Volume since insp. Begin	mL
24H	Expiratory Volume	mL

Realtime Sync-Commands

Realtime Sync-Commands will be sent when Realtime Data are enabled.

Command-Code	Argument	Command-Specification
C6H	C0H	Start of Ventilator Inspiratory Cycle

Alarm Messages

Alarm phrases are sent in english only.

Note: Some alarm priorities are configurable by user!

Airway related Alarms

Code	Alarm Description	Priority	Alarm phrase
10H	Airway Pressure > high Limit	27	PAW HIGH
19H	Minute Volume < low Limit	26	MIN VOL LOW
33H	Volume not constant	26/3	VOL INCONST
40H	Tachyapnea Alarm disabled	1	TACHYPN'@OFF
5EH	Volume Alarm disabled	1	VOL ALRM OFF
90H	Respiratory Rate > high Limit	26	RESP RATE HI
98H	Apnoe detected by Evita	27/8	APNEA EVITA
9BH	Minute Volume > high Limit	26	MIN VOL HIGH
A4H	Volume Measurement inoperable (Alarm)	27/8	VOL ERR
ACH	MIN VOL Alarm disabled	1	MV ALRM OFF
ADH	Pressure Measurement inoperable	27	PRESS ERR
B8H	Airway Temperature Measurement inoperable	25	AW-TEMP INOP
B9H	Check Airway Temperature Sensor	25	AW-TEMP SENS
BAH	Airway Temperature > high Limit	25	AW-TEMP HIGH

Miscellaneous Alarms

Code	Alarm Description	Priority	Alarm phrase
78H	Communication Error RS232 Port	1	RS232 COM ERR
7CH	Internal Communication Error	1	INT COM ERR

O_2 related Alarms

Code	Alarm Description	Priority	Alarm phrase
08H	Insp. Oxygen < low Limit (Alarm)	26	% O_2 LOW
37H	% Oxygen > high Limit (Caution)	23	% O_2 HIGH
A1H	Insp O_2 Measurement inoperable (Alarm)	28	% O_2 ERR
BEH	O_2 Measurement inoperable (Advisory)	8	% O_2 ERR
BFH	Insp O_2 > high Limit (Advisory)	7	% O_2 HIGH
C0H	Insp O_2 < low Limit (Advisory)	7	% O_2 LOW

Ventilator related Alarms

Code	Alarm Description	Priority	Alarm phrase
12H	Check Air Supply	31/2	AIR SUPPLY ?
3AH	Assisted Spontaneous Breathing > 4 sec.	26	ASB > 4 SEC
9AH	Disconnection Ventilator	27	PAW LOW
9FH	Problems with Respirator (Evita)	25	EVITA ERR
B0H	Check Expiration-Valve	27	EXP-VALVE ?
B7H	Too high Respirator Device Temp. (Alarm)	25	COOLING INOP
BBH	Sigh Mode active	2	SIGH ON
BCH	Breathing System vented	10	SYSTEM OPEN
BDH	Check O_2 Supply (Advisory)	31/10	LO O_2 SUPPLY
C2H	Gas Mixer inoperable (Advisory)	8	MIXER INOP
C3H	Time limited Resipratory Volume	7	TIME LIMITED
C4H	Pressure limited Respiratory Volume	2	PRESSURE LTD
C5H	High Respirator Device Temp. (Advisory)	10	COOLING INOP
C6H	Respirator Synchronisation inoperable	26	SYNCHRO INOP
C7H	Fail to Cycle	27	CYCLE FAILED
C8H	Gas Mixer inoperable (Alarm)	29	MIXER INOP

Device Settings

Code	Setting Description	Unit	Format
01H	Insp. Oxygen	%	_XXX_
02H	Max. insp. Flow	L/min	XXX.X
04H	Insp. Tidal Volume	L	X.XXX
07H	I : E I-Part	-	_XX.X
08H	I : E E-Part	-	XXX.X
09H	Frequency IMV (SIMV)	1/min	XXX.X
0AH	Frequency IPPV	1/min	XXX.X
0BH	PEEP (CPAP)	mbar	_XX.X
0CH	Intermittend PEEP	mbar	__XX_
0DH	BIPAP low Pressure	mbar	__XX_
0EH	BIPAP high Pressure	mbar	__XX_
0FH	BIPAP low Time	sec	_XX.X
10H	BIPAP high Time	sec	_XX.X
11H	Apnea Time	sec	__XX_
12H	Assisted spon. Breath.	mbar	__XX_
13H	Max. insp. Airway Pressure	mbar	XXX.X
15H	Trigger Pressure	mbar	_XX.X
16H	Tachyapnea Frequency	1/min	_XXX_
17H	Tachyapnea Duration	sec	_XXX_
29H	Flow Trigger	L/min	__XX_
2EH	ASB Ramp	sec	__XX_

Text Messages

Text Messages are sent in english only.

Code	Text Messsage
01H	Mode IPPV
02H	Mode IPPV/ASSIST
04H	Mode CPPV
05H	Mode CPPV/ASSIST
06H	Mode SIMV
07H	Mode SIMV/ASB
08H	Mode SB
09H	Mode ASB
0AH	Mode CPAP
0BH	Mode CPAP/ASB
0CH	Mode MMV
0DH	Mode MMV/ASB
0EH	Mode BIPAP
0FH	Mode SYNCHRON MASTER
10H	Mode SYNCHRON SLAVE
11H	Mode APNEA VENTILATION
12H	Mode DS
18H	Mode BIPAP-SIMV
19H	Mode BIPAP-SIMV/ASB
1AH	Mode BIPAP-APRV

Device specific Commands

Evita uses the device specific command (code 6AH) to transmit some additional information which is not part of the MEDIBUS standard. The device specific command has the following format:

ESC	Command Code (6AH)	Argument	Checksum	CR

0 1 2 3 5 6 Byte

The 'Argument' is a one byte ASCII character specifying the device specific command:

Argument	Meaning
'2'	Request Key Status
'3'	Request EvitaLink Version
'5'	Request EvitaLink Channel

Device specific Responses

Key Status

This response returns all active keys on a 'Request Key Status' command in the following format:

SOH	Command Echo (6AH)	Argument Echo ('2')	Key Code 1	. . .	Key Code m	Checksum	CR

0 1 2 3 5 2m+1 2m+3 2m+4 2m+5 Byte

The Key Code is a two byte ASCII field holding an identifyer for each currently active key. The meaning of Key Code is given in the following table:

Key Code	Meaning
'32'	Alarm Silence active
'33'	Nebulizer active
'34'	Display stop on
'35'	Oxygen Calibration active
'36'	Oxygen Monitoring off
'37'	Suction active
'38'	Flow Calibration active

EvitaLink Version

This command returns the software version of EvitaLink in the following format:

SOH	Command Echo (6AH)	Argument Echo ('3')	Version	Checksum	CR
0	1	2	3	8	9 10 Byte

The Version is a five byte ASCII field.
Example: Version 2.00 = '02.00'

EvitaLink Channel

This command returns the number of the EvitaLink channel as a one byte ASCII Code:

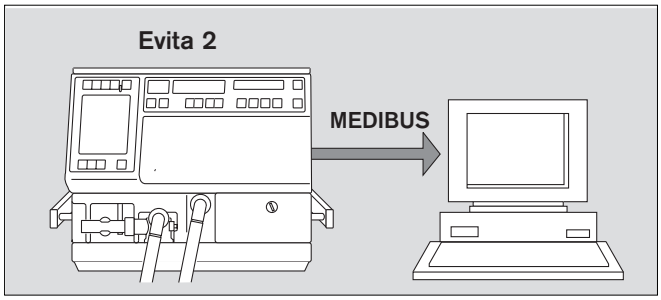
Channel	ASCII Code
A	'0'
B	'1'

The response format is specified as follows:

SOH	Command Echo (6AH)	Argument Echo ('5')	Channel	Checksum	CR
0	1	2	3	4	5 6 Byte

MEDIBUS Specification for Evita 2

Device Connection



Port Specification

Connector

Type	RS-232-C 9 pin Sub D (female)
Pins	1 Housing 2 RXD 3 TXD 5 GND
Galvanic Isolation	1.5 kV
Location	rear side of Evita 2 on optional extension board "EvitaLink" Label: RS 232

Port Configuration
Channel A

Baudrate	19200 Baud
Databits	8
Startbits	1
Stopbits	1
Parity	even

Port Configuration
Channel B

Baudrate	1200, 2400, 4800, 9600 19200 Baud
Databits	8
Startbits	1
Stopbits	1, 2
Parity	none, odd, even

Device Identification

ID-Number	8200
Name	'Evita 2'
MEDIBUS-Version	03.00 for Device Version 01.00 and higher

Available Data

MEDIBUS is available only with optional hardware extension "EvitaLink"*.

Current Measured Data, Low and High Alarm Limits, Alarmstatus, Device Settings, Text Messages and Realtime-Data are available since Evita 2 device version 1.00 and EvitaLink device version 1.00 and EvitaLink device version 2.01.

Commands

Transmitted Commands

Code	Command-Specification
30H	Do nothing (NOP)
51H	Initialize Communication (ICC)
52H	Request Device Identification

Processed and responded Commands

Code	Command-Specification
24H	Request current DATA
25H	Request current LOW ALARM LIMITS
26H	Request current HIGH ALARM LIMITS
27H	Request current ALARMS
29H	Request current DEVICE SETTINGS
2AH	Request current TEXT MESSAGES
30H	Do nothing (NOP)
4AH	Configure Data Response
51H	Initialize Communication (ICC)
52H	Request Device Identification
53H	Request Realtime Configuration
54H	Configure Realtime Transmission
55H	Stop Communication
6AH	Device Specific

* RS 232 Communication Interface for Evita and Evita 2

Measured Data, Low and High Alarm Limits

Airway related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
07H	Compliance L/bar	L/bar	_XXX	x		
08H	Resistance	mbar/L/s	XXX_	x		
71H	Minimal Airway Pressure	mbar	*_XX_	x		
72H	Occlusion Pressure	mbar	XX.X	x		
73H	Mean Breathing Press.	mbar	*_XX_	x		
74H	Plateau Pressure	mbar	*_XX_	x		
78H	PEEP Breathing Press.	mbar	*_XX_	x		
79H	Intrinsic PEEP Breath. Press.	mbar	XX.X	x		
7DH	Peak Breathing Press.	mbar	*_XX_	x		x
81H	Trapped Volume	mL	_XXX	x		
82H	Tidal Volume L	L	X.XX	x		
B5H	Spontaneous Respiratory Rate	1/min	XXX_	x		
B7H	Spontaneous Minute Volume	L/min	XX.X	x		
B9H	Respiratory Minute Volume	L/min	XX.X	x	x	x
C1H	Airway Temperature	°C	_XX_	x		
D6H	Resp. Rate (Vol./Flow)(Pediat)	1/min	XXX_	x		x

A '*' ahead the format indicates that the value may be negative. In that case a '-' character precedes the numeric value.

CO_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits[1)]

Code	Data-Description	Unit	Format	M	LL	HL
09H	CO_2-Production	mL/min	XXX_	x		
89H	Dead Space (Vds)	mL	_XXX	x		
8AH	Relative Dead Space	%	_XX_	x		
DBH	Endtidal CO_2 in %	%	XX.X	x	x	x
E3H	Endtidal CO_2 in kPa	kPa	XX.X	x	x	x
E6H	Endtidal CO_2 in mmHg	mmHg	_XX_	x	x	x

1) Available with CO_2 measurement option.

O_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
F0H	Insp. O_2	%	XXX_	x		

Realtime Data

Code	Realtime-Data	Unit
00H	Airway Pressure	mbar
01H	Flow (insp./exp.)	L/min
03H	Resp. Volume since insp. Begin	mL
06H[1)]	Exp. CO_2	mmHg
07H[1)]	Exp. CO_2	kPa
08H[1)]	Exp. CO_2	%
24H[1)]	Expiratory Volume	mL

Realtime Sync-Commands

Realtime Sync-Commands will be sent when Realtime Data are enabled.

Command-Code	Argument	Command-Specification
C6H	C0H	Start of Ventilator Inspiratory Cycle

1) Available since EvitaLink Software 2.00

Alarm Messages

Alarm phrases are sent in english only.

Note: Some alarm priorities are configurable by user!

Airway related Alarms

Code	Alarm Description	Priority	Alarm phrase
10H	Airway Pressure > high Limit	27	PAW HIGH
19H	Minute Volume < low Limit	26	MIN VOL LOW
33H	Volume not constant	26/3	VOL INCONST
40H	Tachyapnea Alarm disabled	1	TACHYPN'@OFF
42H[1)]	Check Flow Sensor	27	FLOW SENSOR?
5EH	Volume Alarm disabled	1	VOL ALRM OFF
90H	Respiratory Rate > high Limit	26	RESP RATE HI
98H	Apnoe detected by Evita	27	APNEA EVITA
9BH	Minute Volume > high Limit	26	MIN VOL HIGH
A4H	Volume Measurement inoperable (Alarm)	27/8	VOL ERR
ACH	MIN VOL Alarm disabled	1	MV ALRM OFF
ADH	Pressure Measurement inoperable	27	PRESS ERR
B8H	Airway Temperature Measurement inoperable	25	AW-TEMP INOP
B9H	Check Airway Temperature Sensor	25	AW-TEMP SENS
BAH	Airway Temperature > high Limit	25	AW-TEMP HIGH
DAH[1)]	PEEP high Pressure Limit	27	PEEP HIGH

CO_2 related Alarms[2)]

Code	Alarm Description	Priority	Alarm phrase
27H	Endtidal CO_2 < low Limit	25	ET CO2 LOW
28H	Endtidal CO_2 > high Limit	25	ET CO2 HIGH
3EH	CO_2 not calibrated	25/7	CO2 NOT CAL
57H	CO_2 Alarm disabled	1	CO2 ALRM OFF
63H	CO_2 Mon. in Low Acc. Mode (warm up)	1	CO2 WARM UP
64H	CO_2 Window occluded	25/7	CLEAN CO2
6AH	CO_2 Device Failure	25/7	CO2 ERR
D9H	CO_2 Sensor disconnected or fault	25/7	CO2 SENS ?

1) Availabe since Evita 2 Software 2.00
2) Available with CO_2 measurement option

Miscellaneous Alarms

Code	Alarm Description	Priority	Alarm phrase
78H	Communication Error RS232 Port	1	RS232 COM ERR
7CH	Internal Communication Error	1	INT COM ERR

O_2 related Alarms

Code	Alarm Description	Priority	Alarm phrase
08H	Insp. Oxygen < low Limit (Alarm)	26	% O_2 LOW
37H	% Oxygen > high Limit (Caution)	23	% O_2 HIGH
A1H	Insp O_2 Measurement inoperable (Alarm)	28	% O_2 ERR
BEH	O_2 Measurement inoperable (Advisory)	8	% O_2 ERR
BFH	Insp O_2 > high Limit (Advisory)	7	% O_2 HIGH
C0H	Insp O_2 < low Limit (Advisory)	7	% O_2 LOW

Ventilator related Alarms

Code	Alarm Description	Priority	Alarm phrase
12H	Check Air Supply	31/2	AIR SUPPLY ?
3AH	Assisted Spontaneous Breathing > 4 sec.	26	ASB > 4 SEC
9AH	Disconnection Ventilator	27	PAW LOW
9FH	Problems with Respirator (Evita)	25	EVITA ERR
B0H	Check Expiration-Valve	27	EXP-VALVE ?
B7H	Too high Respirator Device Temp. (Alarm)	25	COOLING INOP
BBH	Sigh Mode active	2	SIGH ON
BCH	Breathing System vented	10	SYSTEM OPEN
BDH	Check O_2 Supply (Advisory)	31/10	LO O_2 SUPPLY
C2H	Gas Mixer inoperable (Advisory)	8	MIXER INOP
C3H	Time limited Resipratory Volume	7	TIME LIMITED
C4H	Pressure limited Respiratory Volume	2	PRESSURE LTD
C5H	High Respirator Device Temp. (Advisory)	10	COOLING INOP
C6H	Respirator Synchronisation inoperable	26	SYNCHRO INOP
C7H	Fail to Cycle	27	CYCLE FAILED
C8H	Gas Mixer inoperable (Alarm)	29	MIXER INOP

Device Settings

Code	Setting Description	Unit	Format
01H	Insp. Oxygen	%	_XXX_
02H	Max. insp. Flow	L/min	XXX.X
04H	Insp. Tidal Volume	L	X.XXX
07H	I : E I-Part	-	_XX.X
08H	I : E E-Part	-	XXX.X
09H	Frequency IMV (SIMV)	1/min	XXX.X
0AH	Frequency IPPV	1/min	XXX.X
0BH	PEEP (CPAP)	mbar	_XX.X
0CH	Intermittend PEEP	mbar	__XX_
0DH	BIPAP low Pressure	mbar	__XX_
0EH	BIPAP high Pressure	mbar	__XX_
0FH	BIPAP low Time	sec	_XX.X
10H	BIPAP high Time	sec	_XX.X
11H	Apnea Time	sec	__XX_
12H	Assisted spon. Breath.	mbar	__XX_
13H	Max. insp. Airway Pressure	mbar	XXX.X
15H	Trigger Pressure	mbar	_XX.X
16H	Tachyapnea Frequency	1/min	_XXX_
17H	Tachyapnea Duration	sec	_XXX_
29H	Flow Trigger	L/min	__XX_
2EH[1)]	ASB Ramp	sec	__XX_

1) Available since Evita 2 software 2.00

Text Messages

Text Messages are sent in english only.

Code	Text Messsage
01H	Mode IPPV
02H	Mode IPPV/ASSIST
04H	Mode CPPV
05H	Mode CPPV/ASSIST
06H	Mode SIMV
07H	Mode SIMV/ASB
08H	Mode SB
09H	Mode ASB
0AH	Mode CPAP
0BH	Mode CPAP/ASB
0CH	Mode MMV
0DH	Mode MMV/ASB
0EH	Mode BIPAP
0FH	Mode SYNCHRON MASTER
10H	Mode SYNCHRON SLAVE
11H	Mode APNEA VENTILATION
12H	Mode DS
18H	Mode BIPAP-SIMV
19H	Mode BIPAP-SIMV/ASB
1AH	Mode BIPAP-APRV
20H[1)]	Mode Adults
21H[1)]	Mode Neonates
22H[1) 2)]	mmHg
23H[1) 2)]	kPa
24H[1) 2)]	%

1) Availabe since EvitaLink Software 2.01
2) Selected CO_2 unit

Device specific Commands

Evita/Evita 2 uses the device specific command (code 6AH) to transmit some additional information which is not part of the MEDIBUS standard. The device specific command has the following format:

ESC	Command Code (6AH)	Argument	Checksum	CR

0 1 2 3 5 6 Byte

The 'Argument' is a one byte ASCII character specifying the device specific command:

Argument	Meaning
'2'	Request Key Status
'3'	Request EvitaLink Version
'4'	Request Patient Type
'5'	Request EvitaLink Channel

Device specific Responses

Key Status

This response returns all active keys on a 'Request Key Status' command in the following format:

SOH	Command Echo (6AH)	Argument Echo ('2')	Key Code 1	. . .	Key Code m	Checksum	CR

0 1 2 3 5 2m+1 2m+3 2m+4 2m+5 Byte

The Key Code is a two byte ASCII field holding an identifyer for each currently active key. The meaning of Key Code is given in the following table:

Key Code	Meaning
'32'	Alarm Silence active
'33'	Nebulizer active
'34'	Display stop on
'35'	Oxygen Calibration active
'36'	Oxygen Monitoring off
'37'	Suction active
'38'	Flow Calibration active

EvitaLink Version

This response returns the software version of EvitaLink in the following format:

SOH	Command Echo (6AH)	Argument Echo ('3')	Version	Checksum	CR

0 1 2 3 8 9 10 Byte

The Version is a five byte ASCII field.
Example: Version 2.00 = '02.00'

Patient Type

This response returns the type of patient which has been chosen in Evita 2 in the following format:

SOH	Command Echo (6AH)	Argument Echo ('4')	Patient	Checksum	CR

0 1 2 3 m+3 m+4 m+5 Byte

Patient is a ASCII byte field which is given in the table below:

Patient	ASCII Byte field	Field lenght
Adult	'Adult'	5
Paediatric	'Paediatric'	9

EvitaLink Channel

This response returns the number of the EvitaLink channel as a one byte ASCII Code:

Channel	ASCII Code
A	'0'
B	'1'

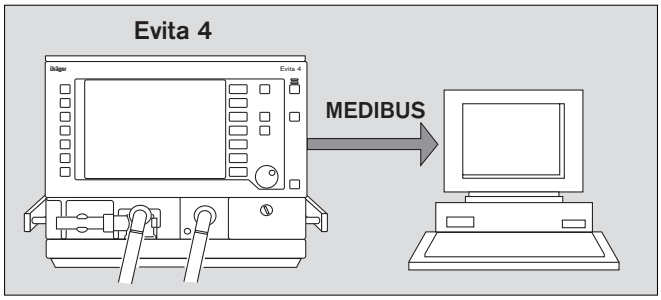
The response format is specified as follows:

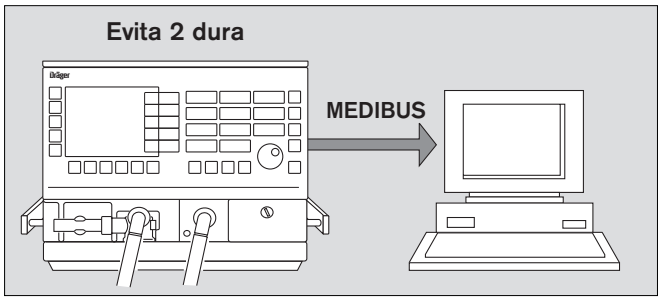
SOH	Command Echo (6AH)	Argument Echo ('5')	Channel	Checksum	CR

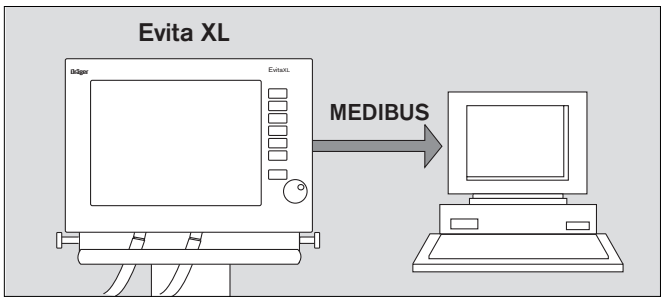
0 1 2 3 4 5 6 Byte

MEDIBUS Specification for Evita 4 / Evita 2 dura / EvitaXL

Device Connection







Port Specification

Connector	
Type	RS-232-C 9 pin Sub D (female)
Pins	1 Housing 2 RXD 3 TXD 5 GND
Galvanic Isolation	1.5 kV
Location	rear side of Evita 4 / Evita 2 dura/ EvitaXL Label COM1 or on optional extension board "Evita 4 Link", Label COM2 or COM3

Port Configuration	
Channel B	
Baudrate	1200, 2400, 4800, 9600 19200 Baud
Databits	8
Startbits	1
Stopbits	1, 2
Parity	none, odd, even

Device Identification for Evita 4

ID-Number	8240
Name	'Evita 4'
MEDIBUS-Version	04.00 for Device Version 01.00 and higher

Device Identification for Evita 2 dura

ID-Number	8230
Name	'Evita 2 dura'
MEDIBUS-Version	04.00 for Device Version 01.00 and higher

Device Identification for EvitaXL

ID-Number	8260
Name	'EvitaXL'
MEDIBUS-Version	04.00 for Device Version 05.00 and higher

Available Data

MEDIBUS is available since Evita 4 / Evita 2 dura device version 01.00 and higher.
MEDIBUS is available since EvitaXL device version 05.00 and higher.

All messages are transfered in english only independent of the language setting.

Commands

Transmitted Commands

Code	Command-Specification
30H	Do nothing (NOP)
51H	Initialize Communication (ICC)
52H	Request Device Identification

Processed and responded Command

Code	Command-Specification
24H	Request current DATA
25H	Request current LOW ALARM LIMITS
26H	Request current HIGH ALARM LIMITS
27H	Request current ALARMS (Codepage 1)
29H	Request current DEVICE SETTINGS
2AH	Request current TEXT MESSAGES
2EH	Request current ALARMS (Codepage 2)
30H	Do nothing (NOP)
4AH	Configure Data Response
51H	Initialize Communication (ICC)
52H	Request Device Identification
53H	Request Realtime Configuration
54H	Configure Realtime Transmission
55H	Stop Communication
6AH	Device Specific

Measured Data, Low and High Alarm Limits

Airway related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
06H[1)]	Compliance	L/bar	XX.X	x		
07H[1)]	Compliance	L/bar	_XXX	x		
0BH[1)]	Resistance	mbar/L/s	XX.X	x		
08H[1)]	Resistance	mbar/L/s	XXX_	x		
71H	Minimum Airway Pressure	mbar	*XXX_	x		
72H	Occlusion Pressure	mbar	XX.X	x		
73H	Mean Airway Pressure	mbar	*XXX_	x		
74H	Plateau Airway Pressure	mbar	*XXX_	x		
78H	PEEP Airway Pressure	mbar	*XXX_	x		
79H	Intrinsic PEEP	mbar	XX.X	x		
7DH	Peak Airway Pressure	mbar	*XXX_	x		x
81H	Trapped Volume	mL	_XXX	x		
82H[3)]	Expiratory Tidal Volume	L	X.XX	x		x[2)]
88H[3)]	Expiratory Tidal Volume	mL	_XXX	x		
B5H	Spont Breathing Frequency	1/min	XXX_	x		
B7H[4)]	Spont Minute Volume	L/min	XX.X	x		
7AH[5)]	Spont Minute Volume	L/min	X.XX	x		
B8H[6)]	Minute Volume	L/min	X.XX	x	x[8)]	x
B9H[7)]	Minute Volume	L/min	XX.X	x	x[8)]	x

1) Values below 100 will be transmitted with one decimal place, otherwise without a decimal place.

2) Device SW version 04.00 and higher:
Limit is not transmitted, if alarm is switched off.

3) Values below 1 L will be transmitted in units of mL, otherwise in units of L.

4) Device SW version 01.XX.: Data is valid if measured value minute volume is valid.
Device SW version 02.00 and higher: Data is valid if measured value minute volume is valid and exceeds or is equal to 1 L/min.

5) Available since Device SW version 02.00. Data is valid if measured value minute volume is valid and is lower than 1 L/min.

6) Available since Device SW version 02.00. Data is valid if measured value minute volume is valid and is lower than 1 L/min. Limits are valid if the value of the limit is lower than 1 L/min.

7) Device SW version 01.XX. Data is valid if measured value minute volume is valid. Limits are always valid.
Device SW version 02.00 and higher: Data is valid if measured value minute volume is valid and exceeds or is equal to 1 L/min. Limits are valid if the value of the limit exceeds or is equal to 1 L/min.

8) Device SW version 04.00 and higher:
Lower limit is not transmitted, if alarm is switched off.

A '*' ahead the format indicates that the value may be negative. In that case a '-' character precedes the numeric value.

Code	Data-Description	Unit	Format	M	LL	HL
C1H	Gas Temperature	°C	_XX_	x		
D6H	Breathing Frequency	1/min	XXX_	x		x
8BH	Inspiratory spont. Support-volume (VT_{ASB})[1]	mL	XXXX	x		
8DH[1][2]	Negative Inspiratory Force	mbar	*XXX	x		
C9H[1]	Rapid Shallow Breathing Index	1/L x min	XXXX	x		

1) Available since Device SW version 04.00

2) Device SW version 04.00 and higher:
The value is not transmitted, if it is displayed on Evita 4 / Evita 2 dura as "< –45 mbar"

A '*' ahead the format indicates that the value may be negative. In that case a '-' character precedes the numeric value.

CO_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
09H	CO_2-Production	mL/min	XXX_	x		
89H	Dead Space	mL	_XXX	x		
8AH	Relative Dead Space	%	_XX_	x		
DBH	Endtidal CO_2	%	XX.X	x	x	x
E3H	Endtidal CO_2	kPa	XX.X	x	x	x
E6H	Endtidal CO_2	mmHg	XXX_	x	x	x

O_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
F0H	Insp. O_2	%	XXX_	x		

SPO_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
E1H	Pulserate	1/min	XXX_	x	x	x
EBH	Saturation	%	XXX_	x	x	x

Realtime Data

Code	Realtime-Data	Unit
00H	Airway Pressure	mbar
01H	Flow (insp./exp.)	L/min
02H	Pleth	%
03H	Resp. Vol. since insp. begin	mL
06H	Exp. CO_2	mmHg
07H	Exp. CO_2	kPa
08H	Exp. CO_2	Vol%
20H	Insp. Flow	L/min
21H	Exp. Flow	L/min
24H	Exp.Volume	mL

Realtime Sync-Commands

Realtime Sync-Commands will be sent when Realtime Data are enabled.

Command-Code	Argument	Command-Specification
C6H	C0H	Start of Ventilator Inspiratory Cycle

Alarm Messages

Alarm phrases are sent in english only.

Note: Some alarm priorities are configurable by user!

Airway related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
10H	Airway Pressure > high	30	PAW HIGH
19H	Minute Volume < low Limit	29	MIN VOL LOW
33H	Volume not constant	22	VOL INCONST
3AH	Assisted Spontaneous Breathing > 1.5 sec	7	ASB > 1,5 SEC
3AH	Assisted Spontaneous Breathing > 4 sec	28	ASB > 4 SEC
42H	Check Flow Sensor	30	FLOW SENSOR?
90H	Respiratory Rate > high Limit	29	RESP RATE HI
98H	Apnoe detected by Evita	29	APNEA EVITA
9AH	Disconnection Ventilator	30	PAW LOW
9BH	Minute Volume > high Limit	29	MIN VOL HIGH
A4H	Volume Measurement inoperable	31	VOL ERR
ACH	MIN VOL Alarm disabled	5	MV ALRM OFF
ADH	Pressure Measurement inoperable	29	PRESS ERR
B8H	Airway Temperature Measurement inop	27	AW-TEMP INOP
BAH	Airway Temperature > high Limit	27	AW-TEMP HI
C4H	Pressure limited Respiratory Volume	4	PRESSURE LTD
DAH	PEEP > high Limit	30	PEEP HIGH
E8H	Tidal Volume > high Limit	8/29	TIDVOL HI
EAH	Neo. Volume Measurement inoperable	1/25/31	N-VOL ERR

Codepage 2

Code	Alarm Description	Priority	Alarm phrase
6AH	Tube obstruction	30	TUBE OBSTRUC
66H	Apnoe Alarm off	5	APN ALRM OFF
67H	Minute Volume Alarm low off	4	MV LOW OFF
68H	Tidal Volume Alarm high off	5	VT HIGH OFF
6BH	External Flow	1	EXTERN FLOW
90H	Neonatal Flow Sensor not at Y-piece	29/1	NEO FLOW ?
93H	Apnea Ventilation	23	APNEAE VENT
97H	Check Slave Frequency Setting	2	SLAVE FREQ ?

Code	Alarm Description	Priority	Alarm phrase
9AH	Inspiratory Time in CPAP/PPS Mode > 1,5 sec	7	PPS-TI > 1,5S
9BH	Inspiratory Time in ASB > T_{insp} Setting (neonatal mode only)	7	ASB > TINSP
9CH	Hose System Leaks	1	LEAKAGE
9DH	Safety mode if neonatal flowsensor not available during volume controlled ventilation (neonatal mode only)	30	BACKUP VENT

CO_2 related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
27H	Endtidal CO_2 < low Limit	28	ET CO2 LOW
28H	Endtidal CO_2 > high Limit	28	ET CO2 HIGH
3EH	CO_2 Zero-Calibration requested	28	CO2 ZERO CAL
57H	CO_2 Alarm disabled	4	CO2 ALRM OFF
64H	Clean CO_2 Sensor (Window occluded)	28	CLEAN CO2
6AH	CO_2 Device Failure	28	CO2 ERR
D9H	CO_2 Sensor disconnected or fault	28	CO2 SENSOR ?

O_2 related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
08H	Insp. Oxygen < low Limit	28	% O2 LOW
37H	% Oxygen > high Limit	28	% O2 HIGH
A1H	Insp. O_2 Measurement inoperable	28	% O2 ERR
E9H	O_2 Monitoring disabled	4	O2 ALRM OFF

Sp0$_2$ related alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
01H	No SpO_2 Pulse	28	NO SPO2 PULS
02H	SpO_2 Pulse < low Limit	6/28	SPO2 PULS LO
07H	Oxygen Saturation < low Limit	6/28	SPO2 LOW
1EH	SpO_2 Pulse > high Limit	6/28	SPO2 PULS HI
22H	Oxygen Saturation > high Limit	6/28	SPO2 HIGH
35H	SpO_2 Sensor disconnected or fault	28	SPO2SEN DISC
5BH	Oximeter Alarm disable	4	SPO2 ALRM OF
68H	Oximeter Device Failure	28	SPO2 ERR

Ventilator related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
12H	Check Air Supply	10/31	AIR SUPPLY ?
13H	O_2 Supply Press low	31	LO O2 SUPPLY
4BH	Battery low or malfunction	6/31	BATTERY ERR
9FH	Problems with Respirator (Evita)	31	EVITA ERR
B0H	Check Expiration-Valve	30	EXP-VALVE ?
BDH	Check O_2 Supply (Advisory)	10	LO O2 SUPPLY
C6H	Respirator Synchronisation inoperable	27	SYNCHRO INOP
C7H	Fail to Cycle	29	CYCLE FAILED
C8H	Gas Mixer inoperable (Alarm)	31	MIXER INOP
CAH	Problems with Fan	2/26	FAN ERR
E6H	Air Supply Pressure > high Limit	3/16	AIR PRESS HI
E7H	High O_2 Supply Presssure	3/16	HI O2 SUPPLY

Codepage 2

Code	Alarm Description	Priority	Alarm phrase
5AH	Power Supply by Battery	10	BATTERY ON
5CH	Batterie less than 2 min left	24	BATT. < 2MIN
91H	Loss of Data	30	LOSS OF DATA
94H	Check Device	21/22	CHECK EVITA
95H	Evita Standby	31	EVITA STDBY

Code	Alarm Description	Priority	Alarm phrase
3BH	Ambient Pressure?	21	AMB PRESS ?
3CH	Error multi functional board	1/21	ERR MULTIPCB
69H	Remote Pad Error	1	REM.PAD-ERR
96H	PEEP Valve inoperable	30	PEEP V ERR
98H	Nebulizer active	3	NEBULIZER ON
99H	Inspiration hold aborted	9	INSPHOLD END
9EH	Expiration hold aborted	9	EXSPHOLD END
9FH	Nebulizing aborted	17	NEBULIZ OFF

Device Settings

Code	Setting Description	Unit	Format
01H	Insp. O_2	%	_XXX_
02H	Max. insp Flow	L/min	XXX.X
04H	Insp. Tidal Volume	L	X.XXX
05H	Ti	sec	XX.XX
07H	I : E Insp	-	XXX.X
08H	I : E Exp	-	XXX.X
09H	Frequency	1/min	XXX.X
0BH	PEEP	mbar	_XX.X
0CH	Interm. PEEP	mbar	__XX_
0DH	APRV Low Pressure	mbar	__XX_
0EH	APRV High Pressure	mbar	__XX_
0FH	APRV Low Time	sec	_XX.X
10H	APRV High Time	sec	_XX.X
11H	Apnea Time	sec	__XX_
12H	ASB	mbar	_XX.X
13H	Max./Insp. Pressure	mbar	XXX.X
16H	Tachyapnea Frequency	1/min	_XXX_
29H	Flow Trigger	L/min	_XX.X
2EH	ASB Ramp	sec	_X.XX
3CH	Flow Assist	mbar*s/L/10	XXXXX
3DH	Volume Assist	mbar/L/10	XXXXX
4EH	$T_{Deconnect}$ [1)]	sec	__XX_

1) Available since Device SW version 04.00.

Text Messages

Text Messages are sent in english only.

Code	Text Messsage
01H	Mode IPPV
02H	Mode IPPV/ASSIST
06H	Mode SIMV
07H	Mode SIMV/ASB
0EH	Mode BIPAP
2DH	Mode BIPAP/ASB
2EH	Mode SIMV/AutoFlow
2FH	Mode SIMV/ASB/AutoFlow
30H	Mode IPPV/AutoFlow
31H	Mode IPPV/ASSIST/AutoFlow
1AH	Mode APRV
0CH	Mode MMV
0DH	Mode MMV/ASB
32H	Mode MMV/AutoFlow
33H	Mode MMV/ASB/AutoFlow
0AH	Mode CPAP
0BH	Mode CPAP/ASB
11H	Mode APNEA VENTILATION
35H	Mode CPAP/PPS
0FH	Mode SYNCHRON MASTER
10H	Mode SYNCHRON SLAVE
47H[2)]	Mode BIPAP/ASSIST
20H	Mode Adults
3AH	Mode Pediatrics
21H	Mode Neonates
48H[2)]	IV-Invasive Ventilation
49H[2)]	NIV-Non-Invasive Ventilation
1EH[3)]	Ventilator STANDBY
22H[1)]	mmHg
23H[1)]	kPa
24H[1)]	%

1) Selected CO_2 unit

2) Available since Device SW version 04.00

3) Available since Device SW version 04.10

Device specific Commands

Evita 4 uses the device specific command (code 6AH) to transmit some additional information which is not part of the MEDIBUS standard. The device specific command has the following format:

ESC	Command Code (6AH)	Argument	Checksum	CR

0 1 2 3 5 6 Byte

The 'Argument' is a one byte ASCII character specifying the device specific command:

Argument	Meaning
'2'	Request Key Status
'3'	Request SW Version
'4'	Request Patient Type
'5'	Request Evita Link Channel

Device specific Responses

Key Status

This response returns all active keys on a 'Request Key Status' command in the following format:

SOH	Command Echo (6AH)	Argument Echo ('2')	Code 1	. . .	Code m	Checksum	CR

0 1 2 3 5 2m+1 2m+3 2m+4 2m+5 Byte

The Code is a two byte ASCII field holding an identifyer for each currently active key. The meaning of the Code is given in the following table:

Key Code	Meaning
'32'	Alarm Silence active
'33'	Nebulizer active
'35'	Oxygen Calibration active
'37'	Suction active
'38'	Flow Calibration active
'39'	CO_2 Calibration, Zero or Check active
'40'	Monitoring Flow active
'41'	Monitoring FiO_2 active
'42'	Monitoring SpO_2 active
'43'	Monitoring CO_2 active
'44'	Monitoring Paed. Flow active

EvitaLink Version

This response returns the software version of EvitaLink in the following format:

SOH	Command Echo (6AH)	Argument Echo ('3')	Version	Checksum	CR

0 1 2 3 8 9 10 Byte

The Version is a five byte ASCII field.
Example: Version 2.00 = '02.00'

Patient Type

This response returns the type of patient which has been chosen in Evita 4 in the following format:

SOH	Command Echo (6AH)	Argument Echo ('4')	Patient	Checksum	CR

0 1 2 3 m+3 m+4 m+5 Byte

Patient is a ASCII byte field which is given in the table below:

Patient	ASCII Byte field	Field lenght
Adult	'Adult'	5
Paediatric	'Paediatric'	10
Neonates	'Neonates'	8

EvitaLink Channel

This response returns the number of the EvitaLink channel as a one byte ASCII Code:

Channel	ASCII Code
Com1	'0'
Com2	'1'
Com3	'2'

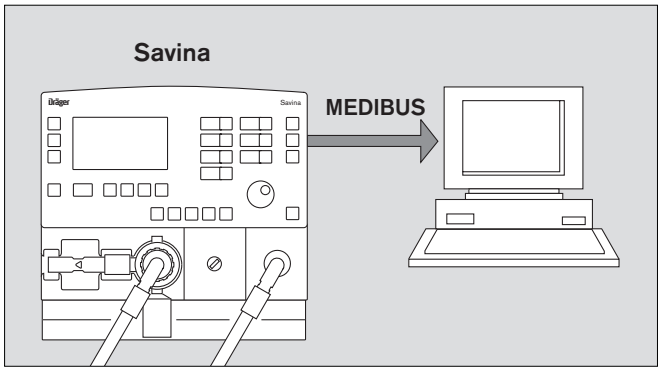
The response format is specified as follows:

SOH	Command Echo (6AH)	Argument Echo ('5')	Channel	Checksum	CR

0 1 2 3 4 5 6 Byte

MEDIBUS Specification for Savina

Device Connection



Port Specification

Connector

Type	RS-232-C 9 pin Sub D (female)
Pins	2 RXD 3 TXD 5 GND
Galvanic Isolation	1.5 kV
Location	rear side of Savina Label RS 232

Port Configuration

Baudrate	1200, 2400, 4800, 9600 19200 Baud
Databits	8
Startbits	1
Stopbits	1, 2
Parity	no, odd, even

Device Identification for Savina

ID-Number	8250
Name	'Savina'
MEDIBUS-Version	04.00 for Device Version 01.00 and higher

Available Data

MEDIBUS is available since Savina device version 01.00 and higher.

All messages are transfered in english only independent of the language setting.

Commands

Transmitted Commands

Code	Command-Specification
30H	Do nothing (NOP)
49H	Time changed
51H	Initialize Communication (ICC)
52H	Request Device Identification

Processed and responded Command

Code	Command-Specification
24H	Request current DATA
25H	Request current LOW ALARM LIMITS
26H	Request current HIGH ALARM LIMITS
27H	Request current ALARMS (Codepage 1)
28H	Request Current Date And Time
29H	Request current DEVICE SETTINGS
2AH	Request current TEXT MESSAGES
2EH	Request current ALARMS (Codepage 2)
30H	Do nothing (NOP)
4AH	Configure Data Response
51H	Initialize Communication (ICC)
52H	Request Device Identification
53H	Request Realtime Configuration
54H	Configure Realtime Transmission
55H	Stop Communication
6AH	Device Specific

Measured Data, Low and High Alarm Limits

Airway related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
07H[1)]	Compliance	L/bar	_XXX	x		
08H[1)]	Resistance	mbar/L/s	XXX_	x		
69H	Plateau (Tplat)	s	XX.X	x		
6FH	Inspiratory Time	s	XX.X	x		
73H	Mean Breathing Pressure	mbar	*_XX_	x		
74H	Plateau Pressure	mbar	*_XX_	x		
76H	Flow Peak	mL/s	XXXX	x		
78H	PEEP Breathing Pressure	mbar	*_XX_	x		
7AH[2)]	Spontaneous Minute Volume	L/min	X.XX	x		
B7H[3)]	Spontaneous Minute Volume	L/min	XX.X	x		
7DH	Peak Breathing Pressure	mbar	*XXX_	x		x
88H	Tidal Volume in mL	mL	XXXX	x		x[4)]
B5H	Spontaneous Respiratory Rate	1/min	XXX_	x		
B8H[1)]	Respiratory Minute Volume	L/min	X.XX	x		
B9H[2)]	Respiratory Minute Volume	L/min	XX.X	x	x[4)]	x
C1H	Airway Temperatur	°C	_XX_	x		
C6H[5)]	Battery Capacity	%	_XXX	x		
D6H	Respiratory Rate	1/min	XXX_	x		x
E7H	I:E I-Part	–	XX.X	x		
E8H	I:E E-Part	–	XX.X	x		

1) Available since Device SW version 02.00.

2) Measured Data is valid if measured value minute volume is valid and is lower than 1 L/min.

3) Measured Data is valid if measured value minute volume is valid and exceeds or is equal to 1 L/min.

4) Device SW version 02.00 and higher: Limit is not transmitted, if alarm is switched off.

5) Available since Device SW version 02.10.

O_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
F0H	Insp. O_2	%	XXX_	x	x[2)]	x[2)]
C7H[1)]	Insp. O_2 Accuracy	%	_XXX	x		

Realtime Data

Code	Realtime-Data	Unit
00H	Airway Pressure	mbar
01H	Flow	L/min
03H	Resp. Vol. since insp. begin	mL

Realtime Sync-Commands

Realtime Sync-Commands will be sent when Realtime Data are enabled.

Command-Code	Argument	Command-Specification
C6H	C0H	Start of Ventilator Inspiratory Cycle

1) Available since Device SW version 03.00. Value is transmitted in LPO-Mode (Option) only.

2) Available since Device SW version 03.00. Limits are transmitted in LPO-Mode (Option) only.

Alarm Messages

Alarm phrases are sent in english only.

Note: Some alarm priorities are configurable by user!

Airway related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
10H	Airway Pressure > high	30	PAW HIGH
19H	Minute Volume < low Limit	29	MIN VOL LOW
33H	Tidal Volume < VTinsp setting	8/22	TIDVOL LO
3AH	Assisted Spontaneous Breathing > 4 sec	5/28	ASB > 4 SEC
42H	Check Flow Sensor	30	FLOW SENSOR?
90H	Respiratory Rate > high Limit	29	RESP RATE HI
98H	Apnoe detected by Savina	29	APNEA SAVINA
9AH	Disconnection Ventilator	30	PAW LOW
9BH	Minute Volume > high Limit	29	MIN VOL HIGH
A4H	Volume Measurement inoperable	30	VOL ERR
ACH	MIN VOL Alarm disabled	5	MV ALARM OFF
ADH	Pressure Measurement inoperable	30	PRESS ERR
B8H	Airway Temperature Measurement inop	27	AW-TEMP INOP
BAH	Airway Temperature > high Limit	7/27	AW-TEMP HI
DAH	PEEP > high Limit	30	PEEP HIGH
E8H	Tidal Volume > high Limit	8/29	TIDVOL HI

Codepage 2

Code	Alarm Description	Priority	Alarm phrase
66H[1)]	Apnoe Alarm off	5	APN ALRM OFF
67H[1)]	Minute Volume Alarm low off	4	MV LOW OFF
68H[1)]	Tidal Volume Alarm high off	5	VT HIGH OFF

1) Available since Device SW version 02.00.

O_2 related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
08H	Insp. Oxygen < low Limit	28	% O2 LOW
37H	Insp. Oxygen > high Limit	28	% O2 HIGH
A1H	Insp. O_2 Measurement inoperable	28	% O2 ERR
E9H	O_2 Monitoring disabled	4/22	O2 ALARM OFF

Ventilator related Alarms

Codepage 1

Code	Alarm Description	Priority	Alarm phrase
13H	O_2 Supply Press low	6/30	LO O2 SUPPLY
4BH	Battery low or malfunction	6/31	BATTERY ERR
9FH	Problems with Respirator (Savina)	31	SAVINA ERR
B0H	Check Expiration-Valve	30	EXP-VALVE ?
C7H	Fail to Cycle	29	CYCLE FAILED
C9H	Check Cooling	21	COOLING ?
CAH	Problems with Fan	27	FAN ERR
E7H	High O_2 Supply Presssure	3/16	HI O2 SUPPLY

Codepage 2

Code	Alarm Description	Priority	Alarm phrase
5AH	Power Supply by Internal Battery	6/24	INT BATT ON
5BH	No Nebulizer[1)]	15	NO NEBUL.
5CH	Battery low	6/21/31	BATTERY LOW
6CH	Check Microfilter	2/20/30	MICROFILTER?
6DH	Power Supply by External DC	2	EXTERN DC ON
6EH	Ambient Pressure high	6	AMB PRESS HI
6FH	Ambient Pressure low	6	AMB PRESS LO
93H	Apnea Ventilation	23	APNEAE VENT
94H	Check Savina	21	CHECK SAVINA
95H	Savina Standby	31	SAVINA STDBY
96H	Problems with PEEP control	29	PEEP ERR
98H	Nebulizer active	3	NEBULIZER ON
99H	Inspiration hold aborted	9	INSPHOLD END
9CH	Leakage	1	LEAKAGE

1) Available since Device SW version 02.10.

Device Settings

Code	Setting Description	Unit	Format
01H	Insp. O_2	%	_XXX_
04H	Insp. Tidal Volume	L	X.XXX
05H	Ti	s	XX.XX
07H	I : E Insp	-	XXX.X
08H	I : E Exp	-	XXX.X
09H	Frequency	1/min	XXX.X
0BH	PEEP	mbar	_XX.X
0CH	Interm. PEEP	mbar	_XX.X
11H	Apnea Time	sec	__XX_
12H	ASB	mbar	_XX.X
13H	Max. insp. Airway Pressure (Pmax)	mbar	XXX.X
29H	Flow Trigger	L/min	_XX.X
42H	Backup Frequency	1/min	XXX.X
44H	Backup Tidal Volume	L	X.XXX
45H	Insp. Pressure (Pinsp)	mbar	XXX.X
4EH	$T_{Deconnect}$ [1)]	sec	__XX_
4FH	Flow Acceleration	mbar/s	__XXX

1) Available since Device SW version 02.00.

Text Messages

Text Messages are sent in english only.

Code	Text Messsage
01H	Mode IPPV
02H	Mode IPPV/ASSIST
06H	Mode SIMV
07H	Mode SIMV/ASB
0AH	Mode CPAP
0BH	Mode CPAP/ASB
0EH	Mode BIPAP
11H	Mode APNEA VENTILATION
1EH[2)]	Ventilator STANDBY
2DH	Mode BIPAP/ASB
2EH	Mode SIMV/AutoFlow
2FH	Mode SIMV/ASB/AutoFlow
30H	Mode IPPV/AutoFlow
31H	Mode IPPV/ASSIST/AutoFlow
48H[1)]	IV – Invasive Ventilation
49H[1)]	NIV – Non-Invasive Ventilation
55H[3)]	LPO – Low Pressure Oxygenation

1) Available since Device SW version 02.00.

2) Available since Device SW version 02.10.

3) Available since Device SW version 03.00.

Device specific Commands

Savina uses the device specific command (code 6AH) to transmit some additional information which is not part of the MEDIBUS standard. The device specific command has the following format:

ESC	Command Code (6AH)	Argument	Checksum	CR

0 1 2 3 5 6 Byte

The 'Argument' is a one byte ASCII character specifying the device specific command:

Argument	Meaning
'2'	Request Key Status
'3'	Request Savina Link Version

Device specific Responses

Key Status

This response returns all active keys on a 'Request Key Status' command in the following format:

SOH	Command Echo (6AH)	Argument Echo ('2')	Code 1	. . .	Code m	Checksum	CR

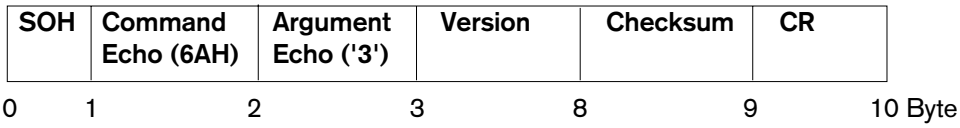
0 1 2 3 5 2m+1 2m+3 2m+4 2m+5 Byte

The Code is a two byte ASCII field holding an identifyer for each currently active key. The meaning of the Code is given in the following table:

Key Code	Meaning
'32'	Alarm Silence active
'33'	Nebulizer active
'35'	Oxygen Calibration active
'37'	Suction active
'40'	Monitoring Flow active
'41'	Monitoring $Fi0_2$ active

Savina Link Version

This response returns the software version of Savina in the following format:



The Version is a five byte ASCII field.
Example: Version 1.00 = '01.00'

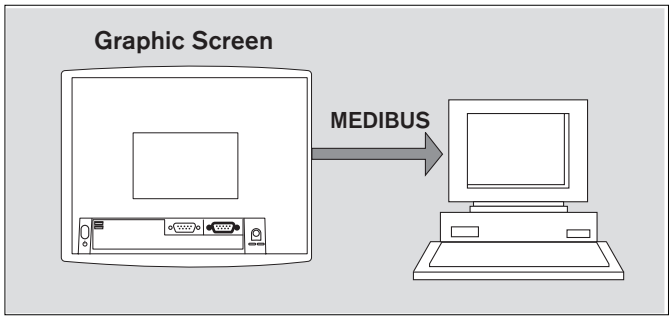
MEDIBUS Specification for Graphic Screen

The Graphic Screen utilizing the software VentView 2.n or higher provides an additional Medibus output for transferring Medibus data - which are sent by the connected ventilator to the Graphic Screen - to an external medical or non-medical device (e. g. additional computers for data management systems) via the COM3 port of the Graphic Screen.

The connected system (ventilator, Graphic Screen and additional computer) must meet the requirements about medical electrical equipment in accordance to ICE/EN 60601-1-1 and ICE/EN 60601-1-2.

In order to protect patients and users from electrical hazards it is imperative that all systems consisting of electrical medical devices and other electrical devices such as but not limited to PCs, Printers, etc. be mounted exclusively by trained personnel.

Device Connection



Port Specification

Connector	
Type	RS-232-C
	9 pin Sub D (male)
Pins	2 RXD
	3 TXD
	5 GND
Galvanic Isolation	1.5 kV
Location	rear side of Graphic Screen
	Label COM3
Port Configuration	
Baudrate	19200 Baud
Databits	8
Startbits	1
Stopbits	1
Parity	none

Device Identification for Graphic Screen

ID-Number	7012
Name	'VentViewVrt'
MEDIBUS-Version	04.00 for Device Version 2.n

Available Data

MEDIBUS is available since Graphic Screen device version 2.0 and higher.
All messages are transfered in the language which has been set in the VentView software.

For detailed information on the data transmitted by the connected ventilator refer to the applicable Medibus Instructions for Use.

Commands

Transmitted Commands

Code	Command-Specification
30H	Do nothing (NOP)
49H	Time changed
51H	Initialize Communication (ICC)
52H	Request Device Identification

Processed and responded Commands

Code	Command-Specification
24H	Request current DATA
27H	Request current ALARMS (Codepage 1)
28H	Request Current Date And Time
29H	Request current DEVICE SETTINGS
2AH	Request current TEXT MESSAGES
2EH	Request current ALARMS (Codepage 2)
30H	Do nothing (NOP)
4AH	Configure Data Response
51H	Initialize Communication (ICC)
52H	Request Device Identification
55H	Stop Communication

Measured Data, Low and High Alarm Limits

Depending on the ventilator connected to the Graphic Screen all measured data transmitted by the ventilator are made available in the Medibus output of the Graphic Screen.

Alarm limits are not transmitted by the Graphic Screen.

Realtime Data

No Realtime-data are transmitted by the Graphic Screen.

Alarm Messages

Depending on the ventilator connected to the Graphic Screen all alarm messages transmitted by the ventilator are made available in the Medibus output of the Graphic Screen.

Device Settings

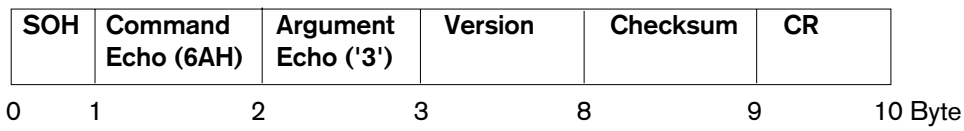
Depending on the ventilator connected to the Graphic Screen all device settings transmitted by the ventilator are made available in the Medibus output of the Graphic Screen.

Text Messages

Depending on the ventilator connected to the Graphic Screen all text messages transmitted by the ventilator are made available in the Medibus output of the Graphic Screen.

Graphic Screen Version

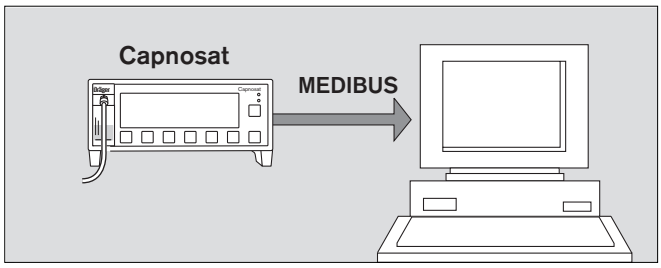
This response returns the software version of VentView in the following format:



The Version is a five byte ASCII field.
Example: Version 2.1 = '02.10'

MEDIBUS Specification for Capnosat

Device Connection



Port Specification

Connector		
	Type	RS-232-C 25 pin Sub D (female)
	Pins	1 Housing 2 TXD 3 RXD 7 GND
	Galvanic Isolation	none: Only devices fulfilling IEC 601 are allowed to be connected to Capnosat.
	Location	rear side of Capnosat Label: RS-232-C
Port Configuration		
	Baudrate	9600 Baud
	Databits	8
	Startbits	1
	Stopbits	1
	Parity	even

Device Identification

ID-Number	8300
Name	'Capnosat'
MEDIBUS-Version	03.00 for Device Version 01.00 and higher

Available Data

Current Measured Data, Low and High Alarm Limits, Alarmstatus and Realtime Data are available since Capnosat device version 1.00.

Commands

Transmitted Commands

Code	Command-Specification
30H	Do nothing (NOP)
51H	Initialize Communication (ICC)
52H	Request Device Identification

Processed and responded Commands

Code	Command-Specification
24H	Request current DATA
25H	Request current LOW ALARM LIMITS
26H	Request current HIGH ALARM LIMITS
27H	Request current ALARMS
30H	Do nothing (NOP)
4AH	Configure Data Response
51H	Initialize Communication (ICC)
52H	Request Device Identification
53H	Request Realtime Configuration
54H	Configure Realtime Transmission
55H	Stop Communication

Measured Data, Low and High Alarm Limits

CO_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
D5H	Respiratory Rate (CO2)	1/min	XX__	x		
DAH	Insp. CO2 in %	%	XX.X	x		x
DBH	Endtidal CO2 in %	%	XX.X	x	x	x
E3H	Endtidal CO2 in kPa	kPa	XX.X	x	x	x
E5H	Insp. CO2 mmHg	mmHg	XX__	x		x
E6H	Endtidal CO2 in mmHg	mmHg	XX__	x	x	x
FFH	Insp. CO2 kPa	kPa	XX.X	x		x

SpO_2 related Measured Data (M), Low (LL) and High (HL) Alarm Limits

Code	Data-Description	Unit	Format	M	LL	HL
E1H	Pulse Rate (OXIMETER)	1/min	XXX_	x	x	x
EBH	Oxygen Saturation	%	XXX_	x	x	x

Realtime-Data

Code	Realtime-Data	Unit
02H	Oxygen Saturation Pulse (Pleth.)	% Full Scale
06H	CO_2	mmHg
07H	CO_2	kPa
08H	CO_2	%

Alarm Messages

CO_2 related Alarms:

	Priority: 31	Apnea - No CO2 fluct. for 30 Seconds	
Code:	D: APNOE CO2	GB: APNEA CO2	F: APNEE CO2
0DH	I: APNEA - CO2	NL: APNOE CO2	E: APNEA CO2

	Priority: 18	Endtidal CO2 < low Limit	
Code:	D: ET CO2 $&	GB: ET CO2 LOW	F: ET CO2 $&
27H	I: ET CO2 $&	NL: ET CO2 $&	E: CO2 FE $&

	Priority: 18	Endtidal CO2 > high Limit	
Code:	D: ET CO2 "#	GB: ET CO2 HIGH	F: ET CO2 "#
28H	I: ET CO2 "#	NL: ET CO2 "#	E: CO2 FE "#

	Priority: 2	Inspiratory CO2 > high Limit	
Code:	D: INSP CO2 "#	GB: INSP CO2 HI	F: CO2 INSP "#
3CH	I: CO2 INSP "#	NL: INSP CO2 "#	E: CO2 INSP "#

	Priority: 7	CO2 Patient Sensor Line blocked	
Code:	D: CO2 LEITUNG?	GB: CO2 LINE BLK	F: TUYAU CO2 ?
3DH	I: LINEA CO2 ?	NL: CO2 LEIDING?	E: TOMA CO2 ?

	Priority: 8	Apnea CO2 Alarm disabled	
Code:	D: APN.CO2'@AUS	GB: APN.CO2'@OFF	F: ARR'@APN CO2
56H	I: APN.CO2'@OFF	NL: APN.CO2'@UIT	E: APNCO2'@DESC

	Priority: 1	CO2 Alarm disabled	
Code:	D: CO2 '@ AUS	GB: CO2 ALRM OFF	F: ARRET '@ CO2
57H	I: '@ CO2 OFF	NL: CO2 '@ UIT	E: '@ CO2 DESC

	Priority: 1	CO2 Mon. in Low Acc. Mode (warm up)	
Code:	D: CO2 AUFHEIZ	GB: CO2 WARM UP	F: PRECHF CO2
63H	I: CO2 RISCALD.	NL: CO2 OPWARM	E: CALEN CO2

	Priority: 1	CO2 Device Failure	
Code:	D: CO2 INOP	GB: CO2 ERR	F: CO2 INOP
6AH	I: CO2 INOP	NL: CO2 INOP	E: CO2 INOP

SpO_2 related Alarms

	Priority: 31	SpO2 Pulse < low Limit	
Code:	D: PULS SPO2 $&	GB: SPO2 PULS LO	F: POULS SAT $&
02H	I: POLSO SPO2$&	NL: POLS SPO2 $&	E: PULSO SPO2$&

	Priority: 31	Oxygen Saturation < low Limit	
Code:	D: SPO2 $&	GB: SPO2 LOW	F: SPO2 $&
07H	I: SPO2 $&	NL: SPO2 $&	E: SPO2 $&

	Priority: 21	SpO2 Pulse > high Limit	
Code:	D: PULS SPO2 "#	GB: SPO2 PULS HI	F: POULS SAT "#
1EH	I: POLSO SPO2"#	NL: POLS SPO2 "#	E: PULSO SPO2"#

	Priority: 21	Oxygen Saturation > high Limit	
Code:	D: SPO2 "#	GB: SPO2 HIGH	F: SPO2 "#
22H	I: SPO2 "#	NL: SPO2 "#	E: SPO2 "#

	Priority: 10	SpO2 Sensor disconnected or fault	
Code:	D: SPO2 SENSOR?	GB: SPO2SEN DISC	F: CAPT SPO2 ?
35H	I: SENSOR SPO2?	NL: SPO2 SENSOR?	E: SENSOR SPO2?

	Priority: 1	Oximeter Alarm disabled	
Code:	D: SPO2 '@ AUS	GB: SPO2 ALRM OF	F: ARRET '@ SAT
5BH	I: '@ SPO2 OFF	NL: SPO2 '@ UIT	E: '@ SPO2 DESC

	Priority: 1	Oximeter Device Failure	
Code:	D: SPO2 INOP	GB: SPO2 ERR	F: SPO2 INOP
68H	I: SPO2 INOP	NL: SPO2 INOP	E: SPO2 INOP

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