

**SERVO Communication Interface SCI**  
**SCI Protocol version 0002**  
**Reference Manual**

**MAQUET**  
GETINGE GROUP

## Notes

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# 1 INTRODUCTION

## 1.1 General information

- The purpose of this Reference Manual is to describe the design of the SERVO Communication Interface (SCI) Protocol version 0002, introduced with SERVO-U/SERVO-n System version 1.1. The manual provides information about commands and responses in using the SERVO Communication Interface (SCI).
- Updated revisions of the Reference Manual will be published when new SCI Protocol versions are released. It is recommended to use the latest version of the Reference Manual, check on [www.maquet.com](http://www.maquet.com) for updates.
- The SERVO Communication Interface (SCI) described herein interfaces an external equipment via an RS-232C serial interface. This specification states the requirements for the communication protocol between the SCI and an external equipment.
- This Reference Manual is intended for programmers only.
- Throughout this Reference Manual, SERVO represents the SERVO-U/SERVO-n Ventilator System.
- The SERVO Communication Interface is an integrated part of the SERVO-U/SERVO-n Ventilator System. In addition to the information given here, always pay attention to the information in the User's Manual.
- The SERVO Communication Interface must not be used as a component in a remote alarm system.
- MAQUET has no responsibility for the safe operation of the equipment if service or repair is done by a non-professional or by persons who are not employed by or authorized by MAQUET. We recommend that service be done as part of a service contract with MAQUET.

## 1.2 Operation

- Due to factors not controlled by MAQUET, the correctness of processed metering values obtained from the SERVO Communication Interface cannot be guaranteed. MAQUET disclaims all responsibility for the correctness of signals processed by external equipment.
- If there should be any deviation between information shown on SERVO and that shown by external equipments, the parameters shown on SERVO shall be considered the primary source for information. It is therefore recommended that the data is verified against actual preset and measured values of SERVO.
- Data obtained from the SERVO Communication Interface, which have been processed in external equipments, must not be used as a substitute for therapeutic or diagnostic decisions. Such decisions can be made only by staff with medical expertise, according to established and accepted practice.

## 1.3 Equipment combinations

- Only components, accessories, supplies and external equipment recommended by MAQUET should be used with the system. Use of any other components, accessories, supplies and external equipment may cause degraded system performance and safety.
- Before starting to use the system with connected external equipment, ensure that the whole combination complies with the international standard IEC 60601-1-1 and the requirements of the local authorities.

## 1.4 Definitions and Acronyms

### 1.4.1 Definitions

Alarm	Alarm data is alarm information generated by the ventilator.
Alarm settings	Alarm settings data represent alarm limit settings.
Breath	Breath data is updated once a breath.
Curve	Curve data changes very often and is typically used to draw real time graphs. It is sampled periodically.
Control Modes	PC, VC, PRVC, NIV-PC, Bi-Vent/APRV.
Parameter	SCI command parameter, i.e. extra information needed to define the semantics of a given SCI command message. For instance, for a read command the parameter designates the data to read.
Preset cycle time	The time equal to 1/CMV freq. (BPM).
Settings	Settings data represent panel settings.
Support Modes	VS, PS, NIV-PS, NAVA, NIV-NAVA.
Technical	Technical information, e.g. module version, configuration etc.

### 1.4.2 Common acronyms

AD	Alarm data
Bi-Vent/APRV	Pressure controlled ventilation mode with the possibility of spontaneous breathing/pressure support on two different pressure levels. APRV: Airway Pressure Release Ventilation.
BPM	Breaths per minute.
BR	Breath data.
Breath cycle T	See SIMV Cycle.
CMV	Continuous Mandatory Ventilation.
CPAP	Continuous Positive Airway Pressure.
CU	Curve data.
Edi	Electrical activity of the diaphragm.
Exp. time	Expiration time.
Insp. time	Inspiration time.
N/A	Not applicable.
NAVA	Neurally Adjusted Ventilatory Assist.
NIV	Non Invasive Ventilation.
NIV-NAVA	Non Invasive – NAVA.
NIV-PC	Non Invasive – Pressure Control.
NIV-PS	Non Invasive – Pressure Support.
PEEP	Positive End Expiratory Pressure.
PC	Pressure Control.
PS	Pressure Support.
PRVC	Pressure Regulated Volume Control.

SCI	Servo Communication Interface.
SD	Settings/Alarm settings data.
SIMV Cycle	The time between the mandatory breaths in an SIMV mode.
SIMV (PC)	SIMV (Pressure Control). Synchronized Intermittent Mandatory Ventilation with Pressure Control (PC) mandatory breaths.
SIMV (PRVC)	SIMV (Pressure Regulated Volume Control). Synchronized Intermittent Mandatory Ventilation with Pressure Regulated Volume Control (PRVC) mandatory breaths.
SIMV Rate	A Ventilation Setting used to set the mandatory breathing rate in SIMV mode.
SIMV (VC)	SIMV (Volume Control). Synchronized Intermittent Mandatory Ventilation with Volume Control (VC) mandatory breaths.
VC	Volume Control.
VS	Volume Support.

## 1.5 Typographical conventions

When reading this specification, note that:

< >	encloses abbreviations, numerical value, etc.
NN16	means hexadecimal value
[ ]	encloses parameters that are not necessary to use
{ }	encloses the set of valid data
...	indicates sequence

## 1.6 Compatibility

To consider when writing a SCI driver:

- The SCI Protocol is designed to be backwards compatible. However, even if the SCI driver is not updated with new functionality, it is still important to make sure that the SCI driver works with the new SERVO System version.
- At SERVO startup, the functionality from SCI Protocol version 0001 (introduced with SERVO System version 1.0) is available.
- New or modified data channels are available after selecting higher SCI Protocol versions with the command SPVE. The protocol version is selectable from SCI Protocol version 0001 to highest for the current SERVO System version, read by the RHVE command. See chapter 2.2.5 Support for different SCI Protocol versions.
- The output from the command RSWV will be updated when a new SERVO System version is released. The output from the command RHVE will be updated when a new SCI Protocol version is released.
- After sending a command to SCI, wait for the response or abort the command with ESC.

## 1.7 Disclaimer

- The device may be pending regulatory approvals to be marketed in your country. Contact your MAQUET representative for more information.
- Caution: Federal (US) law restricts sale of this device to, or on the order of, a physician.

## 2 PROTOCOL SPECIFICATION

### 2.1 Introduction

The SCI interfaces an external equipment via an RS-232C serial interface.

The information transfer between the SCI and the external equipment is performed via a serial communication line. The external equipment acts as the master and transmits commands to the SCI in order to retrieve information.

Curve data, breath data, settings data, alarm settings data, alarm data and technical information may be retrieved from the ventilator through SCI.

### 2.2 Communication Requirements - General

#### 2.2.1 The RS-232 communication settings

The serial interface is according to RS-232C and fulfills the following requirements:

Baud rate: 38 400  
Data length: 8 bits  
Stop bits: 1 bit  
Parity: Even  
Data format: Binary  
Handshake: None

#### 2.2.2 Signal Handshake protocol

The following control characters are used, in order to control the data flow from the SCI:

**<EOT> = 04<sub>16</sub>** End of transmission. General character to be used to define the end of an instruction or end of an ASCII response from the SCI.  
**Note:** An ASCII string shall not be null terminated.

**<ESC> = 1B<sub>16</sub>** Issued by the computer to interrupt the data transfer from the SCI. Upon reception of ESC, SCI aborts transmission and any running command, e.g. RADC, and sends the error message "Command aborted by ESC". Transmission is restarted upon reception of the next valid command.

**<CHK>** Calculated checksum. Checksum is sent either as one byte or two bytes; one byte in binary answer or two bytes in ASCII answer.  
The checksum calculation is defined in chapter 2.5.



### 2.2.3 Error handling

The SCI validates input data in order to detect errors. In case of error the SCI replies with an error message depending on the type of error and the command type, i.e. ASCII or binary.

The following error messages apply to ASCII response:

Error	Error name	Error code (ASCII)	Error message (ASCII)
Not a valid command	ER10	ER10	ER10<CHK><EOT>
Syntax error, e.g. too many, too few parameters, or same parameter twice	ER11	ER11	ER11<CHK><EOT>
Parameter value out of range or parameter not supported by the ventilator	ER12	ER12	ER12<CHK><EOT>
SCI not configured	N/A	N/A	N/A
Ventilator is in Standby mode	N/A	N/A	N/A
Checksum error	ER18	ER18	ER18<CHK><EOT>
Output buffer full	ER19	ER19	ER19<CHK><EOT>
Command aborted by ESC	ER20	ER20	ER20<CHK><EOT>

The ASCII error message consists of the error code followed by the checksum and end of transmission: <error code><CHK><EOT>

The following error messages apply to Binary response:

Error	Error name	Error code (Binary)	Error message (Binary)
Not a valid command	N/A	N/A	N/A
Syntax error, e.g. too many, too few parameters, or same parameter twice	BER11	0B <sub>16</sub>	E00B7F <sub>16</sub> <CHK>
Parameter value out of range or parameter not supported by the ventilator	BER12	0C <sub>16</sub>	E00C7F <sub>16</sub> <CHK>
SCI not configured	BER16	10 <sub>16</sub>	E0107F <sub>16</sub> <CHK>
Ventilator is in Standby mode	BER17	11 <sub>16</sub>	E0117F <sub>16</sub> <CHK>
Checksum error	N/A	N/A	N/A
Output buffer full	BER19	13 <sub>16</sub>	E0137F <sub>16</sub> <CHK>
Command aborted by ESC	BER20	14 <sub>16</sub>	E0147F <sub>16</sub> <CHK>

Note that the binary error code is preceded by the error flag (E0<sub>16</sub>) and followed by the end flag (7F<sub>16</sub>) and the checksum in a binary error response: <error\_flag><error code><end\_flag><CHK>

Note that since all SCI command messages are ASCII messages, the error "Not a valid command" is always returned as an ASCII response message. This is the reason why the error "Not a valid command" is not applicable as a binary response message.

Note that "Checksum error" is always returned as an ASCII response, since it is not possible to determine what command generated the error.

If it is not possible to calculate or retrieve data designated by a command parameter within the SCI, a "Missing value, which is 7EFF<sub>16</sub> for Binary", is transferred.

### 2.2.4 Performance requirements

The SCI needs to receive any character within set timeout, otherwise the previous characters are ignored. See command RTOU, chapter 2.4.16 and command STOU, chapter 2.4.20 for more information.

SCI sends the first character of the response to all commands within 500 ms, unless otherwise stated in the description of each specific command.

### 2.2.5 Support for different SCI Protocol versions

The SCI provides a mechanism for selecting between different protocol versions. The following commands are used:

- Read Highest Protocol Version, RHVE: Requests information about the highest available SCI Protocol version for the current System SW version.
- Read Protocol Version, RPVE: Requests information about the SCI Protocol version currently in use.
- Set Protocol Version, SPVE: Configures SCI to use a specific Protocol version.

The lowest selectable protocol version is SCI Protocol version 0001. This protocol version is selected at the startup, and when the RCTY command is received.

The difference between protocol versions are that:

- Existing channels can be deleted
- New channels can be added
- The configuration, or switch parameters, for existing channels can be changed
- New commands can be added.

### 2.2.6 Design/compatibility considerations for driver developers

Command RCCO, see chapter 2.4.6, shall be used to get the list with actual channels and corresponding configurations.

## 2.3 Channels

A SERVO parameter corresponds to a channel number in the SCI protocol.

When a SERVO parameter shall be read with the command RADC or RADA, the command SDAD is used to add a channel number to the list of activated channels.

The following table defines channels and corresponding SERVO parameters:

Channels 00 – 99:	Reserved for the real time curves.
Channels 100 – 399:	Reserved for the breath data.
Channels 400 – 599:	Reserved for the settings.
Channels 600 – 799:	Reserved for the alarm settings.
Channels 800 – 999:	Reserved for the alarms.

The list with activated SCI channels is cleared at startup, with the commands "Read CI Type" (RCTY) and "Set Protocol Version" (SPVE).

### 2.3.1 Channel 0-99 – Real time curves

Channels used for real time curves. The configuration, i.e. actual scale factors, is received via the command Read Channel Configuration (RCCO). For more information about the configuration see the description of the command RCCO.

SCI supports curve channels according to the following table:

Ch No	Parameter Name Available in Protocol version:	0001	0002	Configuration (gain, offset, unit, type)
0	Airway Flow	X	X	+2500E-004, +4000E+000, 02, CU
1	Airway Pressure	X	X	+1000E-004, +2000E-001, 04, CU
2	Volume	X	X	+2000E-004, +0000E+000, 01, CU
3	Edi	X	X	+1000E-005, +0000E+000, 19, CU
4	CO <sub>2</sub> concentration (%)	X	X	+1000E-004, +0000E+000, 07, CU
5	CO <sub>2</sub> concentration (mmHg)	X	X	+1000E-004, +0000E+000, 10, CU
6	CO <sub>2</sub> concentration (kPa)	X	X	+1000E-004, +0000E+000, 11, CU
7-99	Not defined			

### 2.3.2 Channel 100-399 – Breath data

Channels used for breath data. The configuration, i.e. actual scale factors, is received via the command Read Channel Configuration (RCCO). For more information about the configuration see the description of the command RCCO. Most breath data will be based on Y-piece data when Y-piece measurement is active.

SCI supports breath channels according to the following table:

Ch No	Parameter Name Available in Protocol version:	100	200	Configuration (gain, offset, unit, type)
100	Measured breath frequency	X	X	+1000E-004, +0000E+000, 06, BR
101	Exp. tidal volume	X	X	+2000E-004, +0000E+000, 01, BR
102	Insp. Tidal volume	X	X	+2000E-004, +0000E+000, 01, BR
103	Insp. Minute volume	X	X	+1000E-005, +0000E+000, 08, BR
104	Exp. minute volume	X	X	+1000E-005, +0000E+000, 08, BR
105	Peak pressure	X	X	+1000E-004, +2000E-001, 04, BR
106	Mean airway pressure	X	X	+1000E-004, +2000E-001, 04, BR
107	Pause pressure	X	X	+1000E-004, +2000E-001, 04, BR
108	End exp. pressure	X	X	+1000E-004, +2000E-001, 04, BR
109	O <sub>2</sub> concentration	X	X	+1000E-004, +0000E+000, 07, BR
110	Barometric pressure	X	X	+1000E-003, +0000E+000, 12, BR
111	Gas supply pressure, Air	X	X	+1000E-003, +0000E+000, 12, BR
112	Gas supply pressure, O <sub>2</sub>	X	X	+1000E-003, +0000E+000, 12, BR
113	CO <sub>2</sub> tidal production	X	X	+1000E-004, +0000E+000, 01, BR
114	End tidal CO <sub>2</sub> concentration (%)	X	X	+1000E-004, +0000E+000, 07, BR
115	End tidal CO <sub>2</sub> concentration (mmHg)	X	X	+1000E-004, +0000E+000, 10, BR
116	End tidal CO <sub>2</sub> concentration (kPa)	X	X	+1000E-004, +0000E+000, 11, BR
117	CO <sub>2</sub> minute production	X	X	+1000E-003, +0000E+000, 03, BR
118	Exp. Resistance	X	X	+1000E-004, +0000E+000, 09, BR
119	Static Compliance	X	X	+1000E-004, +0000E+000, 05, BR
120	End exp. Flow	X	X	+2500E-004, +4000E+000, 02, BR
121	Insp. Resistance	X	X	+1000E-004, +0000E+000, 09, BR
122	I:E Ratio (Note 1)	X	X	+1000E-005, +0000E+000, 20, BR
123	Ti (Insufflation time)	X	X	+1000E-005, +0000E+000, 14, BR
124	C dyn i in Open Lung Tool	X	X	+1000E-004, +0000E+000, 05, BR
125	Dynamic Characteristics	X	X	+1000E-004, +0000E+000, 05, BR
126	Leakage fraction	X	X	+1000E-004, +0000E+000, 07, BR
127	Elastance	X	X	+1000E-004, +0000E+000, 16, BR
128	Ti/Ttot	X	X	+1000E-007, +0000E+000, 20, BR
129	Total PEEP	X	X	+1000E-004, +2000E-001, 04, BR
130	Spontaneous Breath frequency	X	X	+1000E-004, +0000E+000, 06, BR
131	MVe spont	X	X	+1000E-005, +0000E+000, 08, BR

Ch No	Parameter Name Available in Protocol version:	0001	0002	Configuration (gain, offset, unit, type)
132	MVe spont/MVe in Bi-Vent/APRV	X	X	+1000E-007, +0000E+000, 20, BR
133	Time constant	X	X	+1000E-005, +0000E+000, 14, BR
134	Work of Breathing, Ventilator	X	X	+1000E-005, +0000E+000, 18, BR
135	Work of Breathing, Patient	X	X	+1000E-005, +0000E+000, 18, BR
136	CPAP	X	X	+1000E-004, +2000E-001, 04, BR
137	P01	X	X	+1000E-004, +2000E-001, 04, BR
138	Edi peak	X	X	+1000E-005, +0000E+000, 19, BR
139	Edi min	X	X	+1000E-005, +0000E+000, 19, BR
140	Insp. Trigger cause	X	X	-, -, -, BR
141	Cycle off cause	X	X	-, -, -, BR
142	Exp. Trigger cause	X	X	-, -, -, BR
143	Shallow Breathing Index (SBI)	X	X	+1000E-003, +0000E+000, 22, BR
144	Remaining Nebulization time	X	X	+1000E-004, +0000E+000, 23, BR
145	VT <sub>e</sub> /Predicted Body Weight	X	X	+1000E-004, +0000E+000, 25, BR
146-399	Not defined			

Note 1: SCI sends I:E Ratio in the format "value:1". This format is also used by the User Interface as long as "value" ≥ 1. Example: SCI value 2.0 is displayed as 2.0:1.

With a "value" < 1 the I:E Ratio is displayed in the format "1:1/value". Example: SCI value 0.5 is displayed as 1:2.0.

**2.3.2.1 Switch Parameters for channel 100 - 399**

Ch No	Switch Parameters
140	Insp. Trigger cause Value: Trig cause undefined ..... = 0001 <sub>16</sub> Trig by CMV rate..... = 0002 <sub>16</sub> Flow Trig ..... = 0003 <sub>16</sub> Pressure Trig ..... = 0004 <sub>16</sub> Edi Trig..... = 0005 <sub>16</sub> Time to give a mandatory breath ..... = 0006 <sub>16</sub> “Start breath” button pressed ..... = 0007 <sub>16</sub>  Reserved for future use ..... = 0008 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
141	Cycle off cause Value: Cycle off cause undefined ..... = 0001 <sub>16</sub> Cycle off due to Edi drop to 70% of its peak value ..... = 0002 <sub>16</sub> Cycle off due to pressure criteria ..... = 0003 <sub>16</sub> Cycle off due to a too big TV ..... = 0004 <sub>16</sub> Cycle off due to an inspiratory time limitation ..... = 0005 <sub>16</sub> Cycle off due to flow level below set cycle off criteria ..... = 0006 <sub>16</sub>  Reserved for future use ..... = 0007 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
142	Exp. Trigger cause Value: Trig cause undefined ..... = 0001 <sub>16</sub> A cycle off criteria is reached..... = 0002 <sub>16</sub> Pressure limit reached (Safety limit)..... = 0003 <sub>16</sub> Pressure limit reached (UPL) ..... = 0004 <sub>16</sub>  Reserved for future use ..... = 0005 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>

### 2.3.3 Channel 400-599 – Settings

Channels used for settings. The configuration, i.e. actual scale factors, is received via the command Read Channel Configuration (RCCO). For more information about the configuration see the description of the command RCCO.

SCI supports settings channels according to the following table:

Ch No	Parameter Name Available in Protocol version:	0001	0002	Configuration (gain, offset, unit, type)
400	RR (in Control modes)	X	X	+1000E-004, +0000E+000, 06, SD
401	Leakage compensation Status	X	X	-, -, -, SD
402	T pause (%)	X	X	+1000E-004, +0000E+000, 07, SD
403	SIMV rate	X	X	+1000E-004, +0000E+000, 06, SD
404	Tinsp. rise (%)	X	X	+1000E-004, +0000E+000, 07, SD
405	Minute volume	X	X	+1000E-005, +0000E+000, 08, SD
406	PC above PEEP (Pressure Control Level above PEEP)	X	X	+1000E-004, +0000E+000, 04, SD
407	PS above PEEP (Pressure Support Level above PEEP)	X	X	+1000E-004, +0000E+000, 04, SD
408	PEEP	X	X	+1000E-004, +0000E+000, 04, SD
409	Patient range selection	X	X	-, -, -, SD
410	Ventilation Mode	X	X	-, -, -, SD
411	Status of current user request (e.g. Inspiratory Hold). - INSPIRATORY HOLD - EXPIRATORY HOLD - 100 O <sub>2</sub> BOOST - MANUAL BREATH	X	X	-, -, -, SD
412	CPAP	X	X	+1000E-004, +0000E+000, 04, SD
413	Alarm mute/pre-mute Status	X	X	-, -, -, SD
414	O <sub>2</sub> conc.	X	X	+1000E-004, +0000E+000, 07, SD
415	Trigger sensitivity (Pressure trigger sensitivity level )	X	X	-1000E-004, +0000E+000, 04, SD
416	Trigger sensitivity (Flow trigger sensitivity level)	X	X	+1000E-005, +0000E+000, 08, SD
417	Language	X	X	-, -, -, SD
418	Displayed CO <sub>2</sub> Unit	X	X	-, -, -, SD
419	I:E (See Note 1)	X	X	+1000E-005, +0000E+000, 20, SD
420	Tidal volume	X	X	+2000E-004, +0000E+000, 01, SD
421	Backup RR (in Support modes)	X	X	+1000E-004, +0000E+000, 06, SD

Ch No	Parameter Name Available in Protocol version:	1000	2000	Configuration (gain, offset, unit, type)
422	Backup Ti (s) (in Support modes)	X	X	+1000E-005, +0000E+000, 14, SD
423	NIV Program Status	X	X	-, -, -, SD
424	Phigh (High-pressure level in Bi-Vent/APRV)	X	X	+1000E-004, +0000E+000, 04, SD
425	Thigh (High pressure level time in Bi-Vent/APRV)	X	X	+1000E-005, +0000E+000, 14, SD
426	TPEEP (Low pressure level, PEEP, time in Bi-Vent/APRV)	X	X	+1000E-005, +0000E+000, 14, SD
427	PS above Phigh (Pressure Support level above Phigh in Bi-Vent/APRV)	X	X	+1000E-004, +0000E+000, 04, SD
428	PS above PEEP (Pressure Support level above PEEP in Bi-Vent/APRV)	X	X	+1000E-004, +0000E+000, 04, SD
429	Ti (s) (Inspiration Time in Seconds)	X	X	+1000E-005, +0000E+000, 14, SD
430	T pause (s) (Pause Time in Seconds)	X	X	+1000E-005, +0000E+000, 14, SD
431	Tinsp. rise (s) (Insp. Rise time in Seconds)	X	X	+1000E-005, +0000E+000, 14, SD
432	Breath cycle T (in SIMV modes)	X	X	+1000E-005, +0000E+000, 14, SD
433	Backup PC above PEEP (in Support modes)	X	X	+1000E-004, +0000E+000, 04, SD
434	Flow (Inspiration Peak Flow)	X	X	+1000E-006, +0000E+000, 15, SD
435	Suction Support Status	X	X	-, -, -, SD
436	End inspiration (Cycle off Fraction Level)	X	X	+1000E-004, +0000E+000, 07, SD
437	Circuit compliance compensation Status	X	X	-, -, -, SD
438	Max. apnea time (Trigger timeout in Automode)	X	X	+1000E-005, +0000E+000, 14, SD
439	Y-piece measurement Status	X	X	-, -, -, SD
440	Edi trigger	X	X	+1000E-005, +0000E+000, 19, SD
441	NAVA level	X	X	+1000E-005, +0000E+000, 21, SD
442	Gas Type Setting	X	X	-, -, -, SD
443	Backup Tidal volume (in Support modes)	X	X	+2000E-004, +0000E+000, 01, SD



Ch No	Parameter Name Available in Protocol version:	0001	0002	Configuration (gain, offset, unit, type)
444	Backup I:E (in Support modes) (See Note 1)	X	X	+1000E-005, +0000E+000, 20, SD
445	Leakage too high alarm (in non invasive ventilation)	X	X	-, -, -, SD
446	Nebulization mode	X	X	-, -, -, SD
447	Nebulization time	X	X	+1000E-004, +0000E+000, 23, SD
448	NAVA Apnea Alarm	X	X	-, -, -, SD
449	Backup ventilation On/Off (in Support modes)	X	X	-, -, -, SD
450	Backup ventilation status (in Support modes)	X	X	-, -, -, SD
451	Predicted Body Weight	X	X	+1000E-005, +0000E+000, 24, SD
452	Leakage too high alarm (in invasive ventilation)		X	-, -, -, SD
453	Inspiratory tidal volume too high alarm		X	-, -, -, SD
454	Expiratory minute volume high alarm		X	-, -, -, SD
455	Expiratory minute volume low alarm		X	-, -, -, SD
456– 599	Not defined			

Note 1: SCI sends I:E Ratio in the format “value:1”. This format is also used by the User Interface as long as “value” ≥1. Example: SCI value 2.0 is displayed as 2.0:1.

With a “value” <1, the I:E Ratio is displayed in the format “1:1/value”. Example: SCI value 0.5 is displayed as 1:2.0.

**2.3.3.1 Switch Parameters for channel 400 - 599**

<b>Ch No</b>	<b>Switch Parameters</b>
401	Leakage compensation Status Value: OFF ..... = 0001 <sub>16</sub> ON ..... = 0002 <sub>16</sub>  Reserved for future use ..... = 0003 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
409	Patient range selection Neonate ..... = 0001 <sub>16</sub> Adult ..... = 0002 <sub>16</sub> Pediatric ..... = 0003 <sub>16</sub>  Reserved for future use ..... = 0004 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
410	Ventilation Mode Pressure Control (PC), Automode off ..... = 0001 <sub>16</sub> PC - PS, Automode on, no patient trigg ..... = 0002 <sub>16</sub> PC - PS, Automode on, patient trigg ..... = 0003 <sub>16</sub> Volume Control (VC), Automode off ..... = 0004 <sub>16</sub> VC - VS, Automode on, no patient trigg ..... = 0005 <sub>16</sub> VC - VS, Automode on, patient trigg ..... = 0006 <sub>16</sub> Pressure Reg. Volume Control (PRVC), Automode off ..... = 0007 <sub>16</sub> PRVC - VS, Automode on, no patient trigg ..... = 0008 <sub>16</sub> PRVC - VS, Automode on, patient trigg ..... = 0009 <sub>16</sub> Volume Support (VS) ..... = 000A <sub>16</sub> Pressure Support / CPAP (PS) ..... = 000B <sub>16</sub> SIMV (Vol. Contr.) + Pressure Support ..... = 000C <sub>16</sub> SIMV (Press. Contr.) + Pressure Support ..... = 000D <sub>16</sub> SIMV (Pressure Reg. Volume Control) + Pressure Support ..... = 000E <sub>16</sub> Bi-Vent/APRV ..... = 000F <sub>16</sub> Pressure Control in NIV ..... = 0010 <sub>16</sub> Pressure Support / CPAP in NIV ..... = 0011 <sub>16</sub> Nasal CPAP ..... = 0012 <sub>16</sub> NAVA ..... = 0013 <sub>16</sub> NIV NAVA ..... = 0014 <sub>16</sub>  Reserved for future use ..... = 0015 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>

411	<p>Status of current user request, issued by means of a panel button: Insp./Exp Pause Hold, Oxygen Breaths/Start Breaths.</p> <p>The status is synchronized with the ventilation cycle.</p> <p>Combined channel. Output value is the sum of all active functions.</p> <p>Example: 5 = Oxygen breaths and Insp. Pause hold.</p> <p>Value:</p> <p>Normal state, no active function ..... = 0000<sub>16</sub></p> <p>INSPIRATORY HOLD ..... = 0001<sub>16</sub></p> <p>EXPIRATORY HOLD ..... = 0002<sub>16</sub></p> <p>100 O<sub>2</sub> BOOST ..... = 0004<sub>16</sub></p> <p>MANUAL BREATH ..... = 0008<sub>16</sub></p> <p>Reserved for future use ..... = 0009<sub>16</sub>~7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>																						
413	<p>Alarm mute/pre-mute Status</p> <p>Value:</p> <p>Normal state ..... = 0001<sub>16</sub></p> <p>Alarm muted/pre-muted ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>~7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>																						
417	<p>Language switch</p> <p>Value:</p> <table border="0"> <tr> <td>English ..... = 0001<sub>16</sub></td> <td>Greek ..... = 000C<sub>16</sub></td> </tr> <tr> <td>Swedish ..... = 0002<sub>16</sub></td> <td>Chinese ..... = 000D<sub>16</sub></td> </tr> <tr> <td>German ..... = 0003<sub>16</sub></td> <td>Russian ..... = 000E<sub>16</sub></td> </tr> <tr> <td>French ..... = 0004<sub>16</sub></td> <td>Polish ..... = 000F<sub>16</sub></td> </tr> <tr> <td>Italian ..... = 0005<sub>16</sub></td> <td>Hungarian ..... = 0010<sub>16</sub></td> </tr> <tr> <td>Spanish ..... = 0006<sub>16</sub></td> <td>Czech ..... = 0011<sub>16</sub></td> </tr> <tr> <td>Japanese ..... = 0007<sub>16</sub></td> <td>Finnish ..... = 0012<sub>16</sub></td> </tr> <tr> <td>Dutch ..... = 0008<sub>16</sub></td> <td>Norwegian ..... = 0013<sub>16</sub></td> </tr> <tr> <td>Portuguese ..... = 0009<sub>16</sub></td> <td>Slovak ..... = 0014<sub>16</sub></td> </tr> <tr> <td>Danish ..... = 000A<sub>16</sub></td> <td>Reserved for future use . = 0015<sub>16</sub>~7EFE<sub>16</sub></td> </tr> <tr> <td>Turkish ..... = 000B<sub>16</sub></td> <td>Undefined ..... = 7EFF<sub>16</sub></td> </tr> </table>	English ..... = 0001 <sub>16</sub>	Greek ..... = 000C <sub>16</sub>	Swedish ..... = 0002 <sub>16</sub>	Chinese ..... = 000D <sub>16</sub>	German ..... = 0003 <sub>16</sub>	Russian ..... = 000E <sub>16</sub>	French ..... = 0004 <sub>16</sub>	Polish ..... = 000F <sub>16</sub>	Italian ..... = 0005 <sub>16</sub>	Hungarian ..... = 0010 <sub>16</sub>	Spanish ..... = 0006 <sub>16</sub>	Czech ..... = 0011 <sub>16</sub>	Japanese ..... = 0007 <sub>16</sub>	Finnish ..... = 0012 <sub>16</sub>	Dutch ..... = 0008 <sub>16</sub>	Norwegian ..... = 0013 <sub>16</sub>	Portuguese ..... = 0009 <sub>16</sub>	Slovak ..... = 0014 <sub>16</sub>	Danish ..... = 000A <sub>16</sub>	Reserved for future use . = 0015 <sub>16</sub> ~7EFE <sub>16</sub>	Turkish ..... = 000B <sub>16</sub>	Undefined ..... = 7EFF <sub>16</sub>
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Turkish ..... = 000B <sub>16</sub>	Undefined ..... = 7EFF <sub>16</sub>																						

418	<p>Displayed CO<sub>2</sub> Unit</p> <p>Value:</p> <p>% ..... = 0001<sub>16</sub></p> <p>kPa ..... = 0002<sub>16</sub></p> <p>mmHg ..... = 0003<sub>16</sub></p> <p>Reserved for future use ..... = 0004<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
423	<p>NIV Program Status</p> <p>Value:</p> <p>Undefined Status ..... = 0000<sub>16</sub></p> <p>Waiting position ..... = 0001<sub>16</sub></p> <p>Ventilation ..... = 0002<sub>16</sub></p> <p>Disconnected ..... = 0003<sub>16</sub></p> <p>Reserved for future use ..... = 0004<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
435	<p>Suction Support Status</p> <p>Value:</p> <p>Undefined Status ..... = 0000<sub>16</sub></p> <p>Normal ventilation ..... = 0001<sub>16</sub></p> <p>Waiting for disconnect ..... = 0002<sub>16</sub></p> <p>Disconnected ..... = 0003<sub>16</sub></p> <p>Post oxygenation ..... = 0004<sub>16</sub></p> <p>Reserved for future use ..... = 0005<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
437	<p>Circuit compliance compensation Status</p> <p>Value:</p> <p>OFF ..... = 0001<sub>16</sub></p> <p>ON ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
439	<p>Y-piece Measurement Status</p> <p>Value:</p> <p>Inactive ..... = 0001<sub>16</sub></p> <p>Active ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>

442	<p>Gas Type Setting</p> <p>Value:</p> <p>Undefined Gas Type ..... = 0000<sub>16</sub></p> <p>Heliox ..... = 0001<sub>16</sub></p> <p>Air ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
445	<p>Leakage too high alarm (in non invasive ventilation)</p> <p>Value:</p> <p>Alarm OFF ..... = 0001<sub>16</sub></p> <p>Alarm ON ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
446	<p>Nebulization mode</p> <p>Value:</p> <p>OFF ..... = 0001<sub>16</sub></p> <p>Intermittent ..... = 0002<sub>16</sub></p> <p>Continuous ..... = 0003<sub>16</sub></p> <p>Reserved for future use ..... = 0004<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
448	<p>NAVA Apnea alarm</p> <p>Value:</p> <p>Alarm OFF ..... = 0001<sub>16</sub></p> <p>Alarm ON ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>
449	<p>Backup ventilation</p> <p>Value:</p> <p>Backup ventilation disabled ..... = 0001<sub>16</sub></p> <p>Backup ventilation enabled ..... = 0002<sub>16</sub></p> <p>Reserved for future use ..... = 0003<sub>16</sub>-7EFE<sub>16</sub></p> <p>Undefined ..... = 7EFF<sub>16</sub></p>

450	Backup ventilation status  Value: Support breath ..... = 0001 <sub>16</sub> Control breath ..... = 0002 <sub>16</sub>  Reserved for future use ..... = 0003 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
452	Leakage too high alarm (in invasive ventilation)  Value: Alarm OFF ..... = 0001 <sub>16</sub> Alarm ON ..... = 0002 <sub>16</sub>  Reserved for future use ..... = 0003 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
453	Inspiratory tidal volume too high alarm  Value: Alarm OFF ..... = 0001 <sub>16</sub> Alarm ON ..... = 0002 <sub>16</sub>  Reserved for future use ..... = 0003 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
454	Expiratory minute volume high alarm  Value: Alarm OFF ..... = 0001 <sub>16</sub> Alarm ON ..... = 0002 <sub>16</sub>  Reserved for future use ..... = 0003 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>
455	Expiratory minute volume low alarm  Value: Alarm OFF ..... = 0001 <sub>16</sub> Alarm ON ..... = 0002 <sub>16</sub>  Reserved for future use ..... = 0003 <sub>16</sub> -7EFE <sub>16</sub> Undefined ..... = 7EFF <sub>16</sub>

### 2.3.4 Channel 600-799 – Alarm settings

Channels used for alarm settings. The actual configuration is received via the command Read Channel Configuration (RCCO). For more information about the configuration see the description of the command RCCO.

SCI supports alarm settings channels according to the following table:

Ch No	Parameter Name Available in Protocol version:	0001	0002	Configuration (gain, offset, unit, type)
600	Upper pressure limit	X	X	+1000E-003, +0000E+000, 04, SD
601	O <sub>2</sub> concentration Upper alarm limit	X	X	+1000E-004, +0000E+000, 07, SD
602	O <sub>2</sub> concentration Lower alarm limit	X	X	+1000E-004, +0000E+000, 07, SD
603	Respiratory rate Upper alarm limit	X	X	+1000E-004, +0000E+000, 06, SD
604	Respiratory rate Lower alarm limit	X	X	+1000E-004, +0000E+000, 06, SD
605	Apnea time	X	X	+1000E-004, +0000E+000, 14, SD
606	PEEP High limit	X	X	+1000E-004, +0000E+000, 04, SD
607	PEEP Low limit	X	X	+1000E-004, +0000E+000, 04, SD
608	CPAP Upper alarm limit	X	X	+1000E-004, +0000E+000, 04, SD
609	CPAP Lower alarm limit	X	X	+1000E-004, +0000E+000, 04, SD
610	Exp. minute vol. Upper alarm limit	X	X	+1000E-005, +0000E+000, 08, SD
611	Exp. minute vol. Lower alarm limit	X	X	+1000E-005, +0000E+000, 08, SD
612	EtCO <sub>2</sub> concentration Upper alarm limit (%)	X	X	+1000E-004, +0000E+000, 07, SD
613	EtCO <sub>2</sub> concentration Lower alarm limit (%)	X	X	+1000E-004, +0000E+000, 07, SD
614	EtCO <sub>2</sub> concentration Upper alarm limit (mmHg)	X	X	+1000E-004, +0000E+000, 10, SD
615	EtCO <sub>2</sub> concentration Lower alarm limit (mmHg)	X	X	+1000E-004, +0000E+000, 10, SD
616	EtCO <sub>2</sub> concentration Upper alarm limit (kPa)	X	X	+1000E-004, +0000E+000, 11, SD
617	EtCO <sub>2</sub> concentration Lower alarm limit (kPa)	X	X	+1000E-004, +0000E+000, 11, SD
618	Apnea audio delay	X	X	+1000E-004, +0000E+000, 14, SD
619	VTi Upper alarm limit	X	X	+2000E-004, +0000E+000, 01, SD
620–799	Not defined			

### 2.3.5 Channel 800-999 – Alarms

Channels used for alarms. The configuration is received via the command Read Channel Configuration (RCCO). For more information about the configuration see the description of the command RCCO.

SCI supports alarm channels according to the following table:

Ch No	Parameter Name Available in Protocol version:	100	000	Configuration (gain, offset, unit, type)
800	O <sub>2</sub> concentration high	X	X	-, -, -, AD
801	O <sub>2</sub> concentration low	X	X	-, -, -, AD
802	EtCO <sub>2</sub> concentration high	X	X	-, -, -, AD
803	EtCO <sub>2</sub> concentration low	X	X	-, -, -, AD
804	Airway pressure high (Upper pressure limit exceeded)	X	X	-, -, -, AD
805	Apnea	X	X	-, -, -, AD
806	Gas supply alarm One or more of following alarms: Gas supply pressures low Air supply pressure low Air supply pressure high O <sub>2</sub> supply pressure low O <sub>2</sub> supply pressure high	X	X	-, -, -, AD
807	Battery alarm One or more of following alarms: Missing battery Limited battery capacity Battery voltage low No battery capacity	X	X	-, -, -, AD
808	The nebulizer cannot be run on one battery	X	X	-, -, -, AD
809	Battery operation	X	X	-, -, -, AD
810	No consistent patient effort	X	X	-, -, -, AD
811	Airway pressure continuously high	X	X	-, -, -, AD
812	Overrange alarm One or more of following alarms: Inspiratory tidal volume too high Pressure delivery is restricted	X	X	-, -, -, AD
813	O <sub>2</sub> cell/sensor failure	X	X	-, -, -, AD
814	Time in waiting position > 2 min	X	X	-, -, -, AD
815	No patient effort	X	X	-, -, -, AD
816	Leakage too high	X	X	-, -, -, AD
817	Patient circuit disconnected	X	X	-, -, -, AD
818	Volume delivery is restricted	X	X	-, -, -, AD
819	Respiratory rate high	X	X	-, -, -, AD



Ch No	Parameter Name Available in Protocol version:	0001	0002	Configuration (gain, offset, unit, type)
820	Respiratory rate low	X	X	-, -, -, AD
821	PEEP high	X	X	-, -, -, AD
822	PEEP low	X	X	-, -, -, AD
823	CPAP high	X	X	-, -, -, AD
824	CPAP low	X	X	-, -, -, AD
825	Inconsistent Edi signal	X	X	-, -, -, AD
826	Low Edi signal	X	X	-, -, -, AD
827	No Edi signal detected	X	X	-, -, -, AD
828	Patient disconnected > 1 min	X	X	-, -, -, AD
829	Expiratory minute volume high	X	X	-, -, -, AD
830	Expiratory minute volume low	X	X	-, -, -, AD
831	Expiratory cassette disconnected	X	X	-, -, -, AD
832	Expiratory cassette replaced	X	X	-, -, -, AD
833	Edi signal invalid	X	X	-, -, -, AD
834	Edi signal interference from ECG	X	X	-, -, -, AD
835–993	Not defined			
994	Internal communication failure alarm. (Reserved for internal use)	X	X	-, -, -, AD
995	Any low priority alarm active (Note 1)	X	X	-, -, -, AD
996	Any medium priority alarm active (Note 1)	X	X	-, -, -, AD
997	Any high priority alarm active (Note 1)	X	X	-, -, -, AD
998	Any technical alarm active (Note 1)	X	X	-, -, -, AD
999	Any alarm active (Note 1)	X	X	-, -, -, AD

Note 1: Priority is not defined in the output for this alarm.

## 2.4 Commands

### Equipment administration commands:

Command	Description	Valid in Standby	Possible errors
Empty command	The empty command can be used for connection check.	Yes	ER19
Escape	The escape command clears the input command buffer, and aborts any running RADC or RADAUC command. Sends the error message "Command aborted by ESC".	Yes	ER19, BER19, ER20, BER20
Read Channel Configuration, RCCO	Reads the channel configuration.	Yes	ER11, ER12, ER18, ER19
Read CI Type, RCTY	Reads the type of device, and the internal communication status. It also clears the list with activated channels and sets the sample time and the input character time out to default. It also set the SCI Protocol version to 0001 (default at startup).	Yes	ER11, ER18, ER19
Read Highest Protocol Version, RHVE	Reads the highest available SCI Protocol version for the current System SW version.	Yes	ER11, ER18, ER19
Read Protocol Version, RPVE	Reads the SCI Protocol version currently in use.	Yes	ER11, ER18, ER19
Read Software Version, RSWV	Reads the device name and the System SW version.	Yes	ER11, ER18, ER19
Read Serial Number, RSEN	Reads the serial number of the ventilator.	Yes	ER11, ER18, ER19
Read Time, RTIM	Reads the internal clock.	Yes	ER11, ER18, ER19
Read input character timeout, RTOU	Reads the input character timeout.	Yes	ER11, ER18, ER19
Set Protocol Version, SPVE	Configures SCI to use a specific Protocol version.	Yes	ER11, ER12, ER18, ER19
Set input character timeout, STOU	Defines the input character timeout.	Yes	ER11, ER12, ER18, ER19

**Data acquisition commands:**

Command	Description	Valid in Standby	Possible errors
Set Data Acquisition Definition, SDAD	Defines the table of channels to be read by the commands Read Acquired Data or Read Acquired Data Continuously.	Yes	ER11, ER12, ER18, ER19
Read Data Acquisition Definition, RDAD	Reads the data acquisition channel table defined by the command Set Data Acquisition Definition.	Yes	ER11, ER18, ER19
Read Acquired Data, RADA	Reads the data (curve-, breath-, settings-, alarm settings- or alarm data) according to the channel table.	No	BER11, BER16, BER17, ER18, BER19, BER20
Read Acquired Data Continuously, RADC	Reads combined data stream (curve-, breath-, settings-, alarm settings- and alarm data) continuously.	No	BER11, BER16, BER17, ER18, BER19, BER20
Read Sampling Time, RSTI	Reads the sampling time for real time curves (in milliseconds).	Yes	ER11, ER18, ER19
Set Sampling Time, SSMP	Sets the sampling time for real time curves (in milliseconds).	Yes	ER11, ER12, ER18, ER19
Read Alarm Output, RALO	Reads the summary alarm status.	Yes	ER11, ER18, ER19

**Patient administration commands:**

Command	Description	Valid in Standby	Possible errors
Read Patient Info, RPAI	Reads the patient information from the active patient field.	Yes	ER11, ER18, ER19

**2.4.1 Empty command**

The empty command can be used for connection check.

<b>Input syntax:</b>	<EOT>
<b>Output syntax:</b>	*<CHK><EOT>

**2.4.2 Escape**

The escape command clears the input command buffer, and abort any running RADC or RADAUC command. If a RADC or RADAUC command is running, the data stream is terminated and a binary error message BER20 is sent. Otherwise escape results in an ER20 message in ASCII format.

<b>Input syntax:</b>	<ESC>
<b>Output syntax (ASCII):</b>	ER20<CHK><EOT>
<b>Output syntax (Binary):</b>	E0147F <sub>16</sub> <CHK>

### 2.4.3 Read Acquired Data RADA

This command reads the data, i.e. curve-, breath-, settings-, alarm settings- or alarm data, according to the channel table defined by the command Set Data Acquisition Definition. Each type of RADA command is described in detail in the subsections below.

For error handling see chapter 2.2.3.

#### 2.4.3.1 Curve Data

It is possible to have 1 or more curves at the same time. Up to 6 curves are allowed.

<b>Input syntax:</b>	RADA<curve_parameters><CHK><EOT>
<b>Normal Output syntax:</b>	<pre> &lt;phase_flag&gt;&lt;phase&gt;&lt;value_flag&gt;&lt;value<sub>(0,0)</sub>&gt; [&lt;value_flag&gt;&lt;value<sub>(1,0)</sub>&gt;[&lt;value_flag&gt;&lt;value<sub>(2,0)</sub>&gt; [&lt;value_flag&gt;&lt;value<sub>(3,0)</sub>&gt;[&lt;value_flag&gt;&lt;value<sub>(4,0)</sub>&gt;[&lt;value_flag&gt; &lt;value<sub>(5,0)</sub>&gt;]]]]] [&lt;phase_flag&gt;&lt;phase&gt;](&lt;diff_value<sub>(0,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(0,1)</sub>&gt;) [(&lt;diff_value<sub>(1,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(1,1)</sub>&gt;) [(&lt;diff_value<sub>(2,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(2,1)</sub>&gt;) [(&lt;diff_value<sub>(3,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(3,1)</sub>&gt;) [(&lt;diff_value<sub>(4,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(4,1)</sub>&gt;) [(&lt;diff_value<sub>(5,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(5,1)</sub>&gt;)]]]]]... &lt;end_flag&gt;&lt;CHK&gt; </pre>
<b>Output syntax in case of error:</b>	<error_flag><error><end_flag><CHK>
<b>Output syntax in case of buffer full error:</b>	...data<end_flag><CHK><error_flag>13 <sub>16</sub> <end_flag><CHK>
<b>Output syntax in case of Standby:</b>	...data<end_flag><CHK><error_flag>11 <sub>16</sub> <end_flag><CHK>
<b>Output syntax in case of ESC:</b>	...data<end_flag><CHK><error_flag>14 <sub>16</sub> <end_flag><CHK>
<b>Parameters:</b>	<pre> &lt;curve_parameters&gt; = UC&lt;n&gt;[&lt;trigger_point&gt;][&lt;end_trigger_point&gt;] n = 0001 - 1500 (number of samples)  &lt;trigger_point&gt; = {     0 (free run) – default,     1 (start insp),     2 (end insp),     3 (start exp),     4 (end exp)}  &lt;end_trigger_point&gt; = { 0 (free run),     1 (start insp),     2 (end insp),     3 (start exp),     4 (end exp)}  &lt;phase_flag&gt; = 81<sub>16</sub> &lt;phase&gt; = {     10<sub>16</sub> (insp phase),     20<sub>16</sub> (pause phase),     30<sub>16</sub> (exp phase)} </pre>

	$\langle \text{value\_flag} \rangle = 80_{16}$ $\langle \text{value}_{(x)} \rangle = 0000_{16} - 7\text{EFF}_{16}$ (MSB first) $\langle \text{diff\_value}_{(x)} \rangle = 82_{16} - 7\text{E}_{16}$ ( $82_{16} = -126_{10}$ ; $7\text{E}_{16} = 126_{10}$ )  $\langle \text{error\_flag} \rangle = \text{E}0_{16}$ $\langle \text{error} \rangle = \text{XX}_{16}$ (error code) $\langle \text{end\_flag} \rangle = 7\text{F}_{16}$  During Nasal CPAP: $\langle \text{trigger\_point} \rangle$ ignored and treated as 0 (free run) $\langle \text{phase} \rangle$ will always be $30_{16}$ (exp phase)
--	--

If no  $\langle \text{trigger\_point} \rangle$  selected, the default value 0 (free run) is applied.

If no  $\langle \text{end\_trigger\_point} \rangle$  selected,  $\langle n \rangle$  samples are transmitted.

If  $\langle \text{end\_trigger\_point} \rangle$  selected,  $\langle \text{trigger\_point} \rangle$  must also be selected. In this case the command transmits samples until the trigger condition  $\langle \text{end\_trigger\_point} \rangle$  is true or a maximum of  $\langle n \rangle$  samples are transmitted.

Values are sent as differences  $\langle \text{diff\_value} \rangle$  when possible in order to save bandwidth, where  $\langle \text{diff\_value} \rangle$  is the difference between the current and the preceding value, i.e.  $\langle \text{diff\_value} \rangle = \langle \text{value}_{(t)} \rangle - \langle \text{value}_{(t-1)} \rangle$ .

Absolute values  $\langle \text{value} \rangle$  are sent the first time and when the difference is too large. An absolute value is preceded by a value flag  $\langle \text{value\_flag} \rangle$ . The most significant byte (MSB) of an absolute value is sent first.

The breath phase  $\langle \text{phase} \rangle$  is sent the first time and then only upon breath phase changes. It is preceded by a phase flag  $\langle \text{phase\_flag} \rangle$ .

Note that RADAUC in combination with the start trigger can result in delay of answer.

ESC command shall be used if RADAUC command shall be aborted before start trigger point is reached.

All other commands, except ESC, are ignored during execution of this command.

When in standby mode this command returns the binary error BER17.

If no curve channels are defined this command returns the binary error BER16.

If the ventilator is set in standby mode before the  $\langle \text{trigger\_point} \rangle$  is reached, this command returns the binary error code  $11_{16}$ .

#### 2.4.3.2 Breath Data

<b>Input syntax:</b>	RADA $\langle \text{breath\_parameters} \rangle \langle \text{CHK} \rangle \langle \text{EOT} \rangle$
<b>Output syntax:</b>	$\langle \text{value}_{(0)} \rangle \dots \langle \text{value}_{(n)} \rangle \langle \text{end\_flag} \rangle \langle \text{CHK} \rangle$ $n = 0 - 49$
<b>Parameters:</b>	$\langle \text{breath\_parameters} \rangle = \text{B}$ $\langle \text{value}_{(n)} \rangle = 0000_{16} - 7\text{EFF}_{16}$ (MSB first) $\langle \text{end\_flag} \rangle = 7\text{F}_{16}$

When in standby mode this command returns binary error BER17.

If no breath channels are defined this command returns binary error BER16.

**2.4.3.3 Settings Data**

<b>Input syntax:</b>	RADA<setting_parameters><CHK><EOT>
<b>Output syntax:</b>	<value <sub>(0)</sub> >...<value <sub>(n)</sub> ><end_flag><CHK> n = 0 – 99
<b>Parameters:</b>	<setting_parameters> = S <value <sub>(n)</sub> > = 0000 <sub>16</sub> - 7EFF <sub>16</sub> (MSB first) <end_flag> = 7F <sub>16</sub>

When in standby mode this command returns binary error BER17.

If no settings channels are defined this command returns binary error BER16.

**2.4.3.4 Alarm Settings Data**

<b>Input syntax:</b>	RADA<alarm_setting_parameters><CHK><EOT>
<b>Output syntax:</b>	<value <sub>(0)</sub> >...<value <sub>(n)</sub> ><end_flag><CHK> n = 0 – 49
<b>Parameters:</b>	<alarm_setting_parameters> = L <value <sub>(n)</sub> > = 0000 <sub>16</sub> - 7EFF <sub>16</sub> (MSB first) <end_flag> = 7F <sub>16</sub>

When in standby mode this command returns binary error BER17.

If no settings channels are defined this command returns binary error BER16.

**2.4.3.5 Alarm Data**

<b>Input syntax:</b>	RADA<alarm_parameters><CHK><EOT>
<b>Output syntax:</b>	<prio <sub>(0)</sub> ><value <sub>(0)</sub> >...<prio <sub>(n)</sub> ><value <sub>(n)</sub> > <end_flag><CHK> n = 0 – 99
<b>Parameters:</b>	<alarm_parameters> = A <prio <sub>(n)</sub> > = { 00 <sub>16</sub> (Undefined prio) 01 <sub>16</sub> (Low prio) 02 <sub>16</sub> (Medium prio) 03 <sub>16</sub> (High prio) } <value <sub>(n)</sub> > = { 00 <sub>16</sub> (No Alarm) 01 <sub>16</sub> (Alarm active) 02 <sub>16</sub> (Alarm active but silenced) } <prio><value> = 7EFF <sub>16</sub> (Alarm not applicable)

When in standby mode this command returns binary error BER17.

If no alarm channels are defined this command returns binary error BER16.

Alarm prio can change dynamically. Defined only when the alarm is active.

#### 2.4.4 Read Acquired Data Continuously RADC

This command reads the data continuously, i.e. curve-, breath-, settings-, alarm settings- and alarm data according to the channel table defined by the command Set Data Acquisition Definition.

It is possible to read 1 or more curves at the same time. Up to 6 curves are allowed.

New breath data are transmitted when the breath is finished, i.e. when a new breath is started.

In Nasal CPAP, new breath data is transmitted every two seconds.

Breath/Setting/Alarm setting/Alarm data package is transmitted when some of the data, according to the channel table set-up, is updated.

The curve data is transferred continuously. However, if an alarm occur, a setting changes or new breath data are available, the curve data transfer will be temporarily interrupted. If curve data is not interrupted, a forced interrupt occurs every minute to send out checksum.

If buffer overflow occur, ESC is received or "Standby" mode set, the transmission will stop.

For error handling see chapter 2.2.3.

<b>Input syntax:</b>	RADC<CHK><EOT>
<b>Normal Output syntax:</b>	[<settings_data><CHK>] [<alarm_settings_data><CHK>] [<alarm_data><CHK>] [<breath_data><CHK>] [<curve_data><CHK>]
<b>Output syntax in case of error:</b>	<error_flag><error><end_flag><CHK>
<b>Output syntax in case of buffer full error:</b>	...data<end_flag><CHK><error_flag>13 <sub>16</sub> <end_flag><CHK>
<b>Output syntax in case of Standby:</b>	...data<end_flag><CHK><error_flag>11 <sub>16</sub> <end_flag><CHK>
<b>Output syntax in case of ESC:</b>	...data<end_flag><CHK><error_flag>14 <sub>16</sub> <end_flag><CHK>
<b>Parameters:</b>	<p>&lt;curve_data&gt; =  [&lt;phase_flag&gt;&lt;phase&gt;]&lt;value_flag&gt;&lt;value<sub>(0,0)</sub>&gt;  [&lt;value_flag&gt;&lt;value<sub>(1,0)</sub>&gt;[&lt;value_flag&gt;&lt;value<sub>(2,0)</sub>&gt;  [&lt;value_flag&gt;&lt;value<sub>(3,0)</sub>&gt;[&lt;value_flag&gt;&lt;value<sub>(4,0)</sub>&gt;  [&lt;value_flag&gt;&lt;value<sub>(5,0)</sub>&gt;]]]]]  [&lt;phase_flag&gt;&lt;phase&gt;](&lt;diff_value<sub>(0,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(0,1)</sub>&gt;)  [(&lt;diff_value<sub>(1,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(1,1)</sub>&gt;)  [(&lt;diff_value<sub>(2,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(2,1)</sub>&gt;)  [(&lt;diff_value<sub>(3,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(3,1)</sub>&gt;)  [(&lt;diff_value<sub>(4,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(4,1)</sub>&gt;)  [(&lt;diff_value<sub>(5,1)</sub>&gt; &lt;value_flag&gt;&lt;value<sub>(5,1)</sub>&gt;)]])...  &lt;end_flag&gt;</p> <p>&lt;error_flag&gt; = E0<sub>16</sub>  &lt;error&gt; = XX<sub>16</sub>(error code)</p> <p>&lt;phase_flag&gt; = 81<sub>16</sub>  &lt;phase&gt; = { 10<sub>16</sub> (insp phase),  20<sub>16</sub> (pause phase),  30<sub>16</sub> (exp phase)}</p> <p>During Nasal CPAP &lt;phase&gt; will always be 30<sub>16</sub> (exp phase)</p>

	<pre> &lt;value_flag&gt;    = 80<sub>16</sub> &lt;value<sub>(0,0)</sub>&gt;...&lt;value<sub>(5,n)</sub>&gt; = 0000<sub>16</sub> - 7EFF<sub>16</sub> (MSB first) &lt;diff_value<sub>(0,1)</sub>&gt;...&lt;diff_value<sub>(5,n)</sub>&gt; = 82<sub>16</sub> - 7E<sub>16</sub> (82<sub>16</sub> = -126<sub>10</sub> ; 7E<sub>16</sub> = 126<sub>10</sub>) &lt;end_flag&gt; = 7F<sub>16</sub> n = 0 – ∞  &lt;alarm_data&gt; = A&lt;prio<sub>(0)</sub>&gt;&lt;value<sub>(0)</sub>&gt;...&lt;prio<sub>(n)</sub>&gt;&lt;value<sub>(n)</sub>&gt;&lt;end_flag&gt; &lt;prio<sub>(n)</sub>&gt; = {    00<sub>16</sub> (Undefined prio)                  01<sub>16</sub> (Low prio)                  02<sub>16</sub> (Medium prio)                  03<sub>16</sub> (High prio) } &lt;value<sub>(n)</sub>&gt; = {    00<sub>16</sub> (No Alarm)                  01<sub>16</sub> (Alarm active)                  02<sub>16</sub> (Alarm active but silenced)} n = 0 – 99 &lt;prio&gt;&lt;value&gt; = 7EFF<sub>16</sub> (Alarm not applicable)  &lt;breath_data&gt; = B&lt;value<sub>(0)</sub>&gt;...&lt;value<sub>(n)</sub>&gt;&lt;end_flag&gt; &lt;value<sub>(0)</sub>&gt;...&lt;value<sub>(n)</sub>&gt; = 0000<sub>16</sub> - 7EFF<sub>16</sub> (MSB first) n = 0 – 49  &lt;settings_data&gt; = S&lt;value<sub>(0)</sub>&gt;...&lt;value<sub>(n)</sub>&gt;&lt;end_flag&gt; &lt;value<sub>(0)</sub>&gt;...&lt;value<sub>(n)</sub>&gt; = 0000<sub>16</sub> - 7EFF<sub>16</sub> (MSB first) n = 0 – 99  &lt;alarm_settings_data&gt; = L&lt;value<sub>(0)</sub>&gt;...&lt;value<sub>(n)</sub>&gt;&lt;end_flag&gt; &lt;value<sub>(0)</sub>&gt;...&lt;value<sub>(n)</sub>&gt; = 0000<sub>16</sub> - 7EFF<sub>16</sub> (MSB first) n = 0 – 49 </pre>
--	---

The SCI transmits channel data according to the channel table set-up via Set Data Acquisition Definition command.

The <end\_flag> is transmitted when curve data transfer is interrupted. The curve data transfer continues, after an interrupt, from where it was interrupted. When curve data transfer continues, absolute values must be sent first.

The breath phase <phase> is sent the first time and then only upon breath phase changes. It is preceded by a phase flag <phase\_flag>.

All other commands, except ESC, are ignored during execution of this command.

If output buffer is full this command returns the binary error BER19.

When in standby mode this command returns the binary error BER17.

If no curve channels are defined this command returns the binary error BER16.

Alarm prio can change dynamically. Defined only when the alarm is active.



### 2.4.5 Read Alarm Output RALO

This command reads the summary alarm status.

The output of this command covers all alarms. Not depending on configuration made with command SDADA.

<b>Input syntax:</b>	RALO<CHK><EOT>
<b>Output syntax:</b>	<value><CHK><EOT>
<b>Parameters:</b>	<value> = { 0 (No Alarm), 1 (Alarm active), 2 (Alarm active but silenced)}

### 2.4.6 Read Channel Configuration RCCO

This command reads the channel configuration, e.g. gain, offset, either for a specific channel or for all available channels.

<b>Input syntax:</b>	RCCO[<ch>]<CHK><EOT>																																																																
<b>Output syntax:</b>	<sampling_time>; <ch <sub>0</sub> >,<gain>,<offset>,<unit>,<type>; [<ch <sub>1</sub> >,<gain>,<offset>,<unit>,<type>; <ch <sub>n</sub> >,<gain>,<offset>,<unit>,<type>;] <CHK><EOT>																																																																
<b>Parameters:</b>	<div>&lt;ch&gt; = 0 – 999 , channel number</div> <div>&lt;sampling_time&gt; = 010 - 220 (ms)(even numbers only)</div> <div>&lt;ch<sub>0</sub>&gt;...&lt; ch<sub>n</sub> &gt; = 0 - 999 , channel</div> <div>&lt;gain&gt; = &lt;X&gt;E&lt;Y&gt; Interpretation: Gain = X * 10<sup>Y</sup> &lt;X&gt; = -9999 to +9999, 5 ASCII characters &lt;Y&gt; = -127 to +127, 4 ASCII characters</div> <div>&lt;offset&gt; = &lt;X&gt;E&lt;Y&gt; Interpretation: Offset = X * 10<sup>Y</sup> &lt;X&gt; = -9999 to +9999, 5 ASCII characters &lt;Y&gt; = -127 to +127, 4 ASCII characters</div> <div>&lt;unit&gt; = 01 to 99, 2 ASCII characters</div> <table><thead><tr><th>&lt;unit&gt;</th><th>Unit</th><th>&lt;unit&gt;</th><th>Unit</th><th>&lt;unit&gt;</th><th>Unit</th></tr></thead><tbody><tr><td>01....</td><td>ml</td><td>10 ....</td><td>mmHg</td><td>19 ....</td><td>µV</td></tr><tr><td>02....</td><td>ml/s</td><td>11 ....</td><td>kPa</td><td>20 ....</td><td>no unit</td></tr><tr><td>03....</td><td>ml/min</td><td>12 ....</td><td>mbar</td><td>21 ....</td><td>cmH<sub>2</sub>O/µV</td></tr><tr><td>04....</td><td>cmH<sub>2</sub>O</td><td>13 ....</td><td>mV</td><td>22 ....</td><td>breaths/min/l</td></tr><tr><td>05....</td><td>ml/cmH<sub>2</sub>O</td><td>14 ....</td><td>s</td><td>23 ....</td><td>min</td></tr><tr><td>06....</td><td>breaths/min</td><td>15 ....</td><td>l/s</td><td>24 ....</td><td>kg</td></tr><tr><td>07....</td><td>%</td><td>16 ....</td><td>cmH<sub>2</sub>O/l</td><td>25 ....</td><td>ml/kg</td></tr><tr><td>08....</td><td>l/min</td><td>17 ....</td><td>l</td><td></td><td></td></tr><tr><td>09....</td><td>cmH<sub>2</sub>O/l/s</td><td>18 ....</td><td>Joule/l</td><td></td><td></td></tr></tbody></table>					<unit>	Unit	<unit>	Unit	<unit>	Unit	01....	ml	10 ....	mmHg	19 ....	µV	02....	ml/s	11 ....	kPa	20 ....	no unit	03....	ml/min	12 ....	mbar	21 ....	cmH <sub>2</sub> O/µV	04....	cmH <sub>2</sub> O	13 ....	mV	22 ....	breaths/min/l	05....	ml/cmH <sub>2</sub> O	14 ....	s	23 ....	min	06....	breaths/min	15 ....	l/s	24 ....	kg	07....	%	16 ....	cmH <sub>2</sub> O/l	25 ....	ml/kg	08....	l/min	17 ....	l			09....	cmH <sub>2</sub> O/l/s	18 ....	Joule/l		
<unit>	Unit	<unit>	Unit	<unit>	Unit																																																												
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02....	ml/s	11 ....	kPa	20 ....	no unit																																																												
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08....	l/min	17 ....	l																																																														
09....	cmH <sub>2</sub> O/l/s	18 ....	Joule/l																																																														

	$\langle \text{type} \rangle = \{$ <ul style="list-style-type: none"> <li>CU (Curve Data),</li> <li>BR (Breath Data),</li> <li>SD (Settings and Alarm settings Data),</li> <li>AD (Alarm Data)}</li> </ul>
--	--

If channel is omitted in the received command, information concerning all available channels are transferred.

The ASCII character '-' represents information not applicable.

Any CU, BR, SD parameter which has defined value of gain has the following magnitude:

Magnitude =  $\{\text{Value}_n * \text{Gain} - \text{Offset}\}$

#### 2.4.7 Read CI Type RCTY

This command reads the type of device, and the internal communication status.

This command also clears the list with activated channels and sets the sample time and the input character time out to default.

This command also set the SCI Protocol version to 0001 (default at startup).

<b>Input syntax:</b>	RCTY<CHK><EOT>
<b>Output syntax:</b>	<device_name><status><CHK><EOT>
<b>Parameters:</b>	<device_name> = SERVO-U or SERVO-n <device_name> = ASCII character string (without a terminating null character) containing device name <status> = { <ul style="list-style-type: none"> <li>1 (there is an error in the internal communication)</li> <li>0 (OK) }</li> </ul>
<b>Output example:</b>	SERVO-U0<CHK><EOT>

#### 2.4.8 Read Data Acquisition Definition RDAD

This command reads the data acquisition channel table defined by the command Set Data Acquisition Definition.

<b>Input syntax:</b>	RDAD<CHK><EOT>
<b>Output syntax:</b>	C[<n <sub>C0</sub> >...<n <sub>C5</sub> >] B[<n <sub>B0</sub> >...<n <sub>B49</sub> >] S[<n <sub>S0</sub> >...<n <sub>S99</sub> >] L[<n <sub>L0</sub> >...<n <sub>L49</sub> >] A[<n <sub>A0</sub> >...<n <sub>A99</sub> >] <CHK><EOT>
<b>Parameters:</b>	<n <sub>C0</sub> >...<n <sub>C5</sub> > = 000 – 099, curve channel number <n <sub>B0</sub> >...<n <sub>B49</sub> > = 100 – 399, breath channel number <n <sub>S0</sub> >...<n <sub>S99</sub> > = 400 – 599, settings channel number <n <sub>L0</sub> >...<n <sub>L49</sub> > = 600 – 799, alarm settings channel number <n <sub>A0</sub> >...<n <sub>A99</sub> > = 800 – 999, alarm channel number

### 2.4.9 Read Highest Protocol Version RHVE

This command reads the highest available SCI Protocol version for the current System SW version.

<b>Input syntax:</b>	RHVE<CHK><EOT>
<b>Output syntax:</b>	<highest_version><CHK><EOT>
<b>Parameters:</b>	<highest_version> = 0002 (SCI Protocol version 0002 introduced with SERVO-U/ SERVO-n System version 1.1) <highest_version> = Highest available SCI Protocol version.

### 2.4.10 Read Patient Info RPAI

This command reads the patient information from the active patient field.

<b>Input syntax:</b>	RPAI<CHK><EOT>
<b>Output syntax:</b>	<id><admittance_time><CHK><EOT>
<b>Parameters:</b>	<id> = Patient id, ASCII characters <admittance_time> = <year><month><day><hour><minute> <year> = 0000 – 9999 <month> = 01 – 12 <day> = 01 – 31 <hour> = 00 – 23 <minute> = 00 – 59

The SCI responds to the command by transmitting the active patient id.

A string (without a terminating null character) of 32 ASCII '-' characters is transmitted if no active patient exists.

Patient id is represented by a UTF-8 character set, but will be encoded through ASCII characters in the reply message's <id> field. This implies that some characters are considered as 'special' characters and will be coded through an escape sequence. (See example 1 below.)

If a patient id contains an escape character: '\ ' then the message's <id> field is populated with an additional escape character: '\\'. (See example 2 below.)

The maximum number of characters for a patient id is 20 characters. Note! The size of <id> field may be greater since it is dependent on escape sequence(s) and current UTF-8 code page.

Escape sequence example 1:

- Character 'Ö' (Latin capital letter O with dieresis) is encoded as 0xC396 in UTF-8, which yields an <id> field with the following escape sequence: '\xC3\x96'. The escape sequence is equivalent to the following byte stream of hex values: 5C, 78, 43, 33, 5C, 78, 39, 36.

Escape sequence example 2:

- A patient id containing character '\ ' yields an <id> field with the following character sequence: '\\ '.

### 2.4.11 Read Protocol Version RPVE

This command reads the SCI Protocol version currently in use.

<b>Input syntax:</b>	RPVE<CHK><EOT>
<b>Output syntax:</b>	<current_version><CHK><EOT>
<b>Parameters:</b>	<current_version> = 0001 – xxxx <current_version> = SCI protocol version currently used. Set to 0001 (first release) as default.

The protocol version is selected with the command SPVE.

The protocol version is set to 0001 at startup and when the command RCTY is received.

**2.4.12 Read Serial Number RSEN**

This command reads the serial number of the ventilator.

<b>Input syntax:</b>	RSEN<CHK><EOT>
<b>Output syntax:</b>	<serial_number><CHK><EOT>
<b>Parameters:</b>	<serial_number> = ASCII character string (without a terminating null character) containing serial number.
<b>Output syntax in case of missing serial number:</b>	0<CHK><EOT>

**2.4.13 Read Sampling Time RSTI**

This command reads the sampling time for real time curves (in milliseconds). See further the command Set Sampling Time.

<b>Input syntax:</b>	RSTI<CHK><EOT>
<b>Output syntax:</b>	<value><CHK><EOT>
<b>Parameters:</b>	<value> = 010 - 220 (ms)

**2.4.14 Read Software Version RSWV**

This command reads the device name and the System SW version.

<b>Input syntax:</b>	RSWV<CHK><EOT>
<b>Output syntax:</b>	<device_name>,<version><CHK><EOT>
<b>Parameters:</b>	<device_name> = SERVO-U or SERVO-n <device_name> = ASCII character string (without a terminating null character) containing device name. <version> = ASCII character string (without a terminating null character) containing System SW version. See example below.
<b>Output example:</b>	SERVO-U,0.535.29598<CHK><EOT>

**2.4.15 Read Time RTIM**

This command reads the internal clock.

<b>Input syntax:</b>	RTIM<CHK><EOT>
<b>Output syntax:</b>	<year><month><day><hour><minute><sec><CHK><EOT>
<b>Parameters:</b>	<year> = 0000 – 9999 <month> = 01 – 12 <day> = 01 – 31 <hour> = 00 – 23 <minute> = 00 – 59 <sec> = 00 – 59

#### 2.4.16 Read input character Timeout RTOU

This command reads the input character timeout. See further the command Set input character Timeout.

<b>Input syntax:</b>	RTOU<CHK><EOT>
<b>Output syntax:</b>	<value><CHK><EOT>
<b>Parameters:</b>	<value> = 001 – 250 (steps of 0.1 seconds).

When receiving a command, SCI needs to receive any character within the character timeout. Otherwise the previous characters are ignored.

#### 2.4.17 Set Data Acquisition Definition SDAD

This command defines the table of channels to be read by the commands Read Acquired Data or Read Acquired Data Continuously. The channels may contain curve, breath, settings, alarm settings and alarm data.

<b>Input syntax:</b>	SDADC[<n <sub>C0</sub> >...<n <sub>C5</sub> >]<CHK><EOT> or SDADB[<n <sub>B0</sub> >...<n <sub>B49</sub> >]<CHK><EOT> or SDADS[<n <sub>S0</sub> >...<n <sub>S99</sub> >]<CHK><EOT> or SDADL[<n <sub>L0</sub> >...<n <sub>L49</sub> >]<CHK><EOT> or SDADA[<n <sub>A0</sub> >...<n <sub>A99</sub> >]<CHK><EOT>
<b>Output syntax:</b>	*<CHK><EOT>
<b>Parameters:</b>	[<n <sub>C0</sub> >...<n <sub>C5</sub> >] = 000 - 099 , curve channel number [<n <sub>B0</sub> >...<n <sub>B49</sub> >] = 100 - 399 , breath channel number [<n <sub>S0</sub> >...<n <sub>S99</sub> >] = 400 - 599 , settings channel number [<n <sub>L0</sub> >...<n <sub>L49</sub> >] = 600 - 799 , alarm settings channel number [<n <sub>A0</sub> >...<n <sub>A99</sub> >] = 800 - 999 , alarm channel number

The SCI sets up a Data acquisition table in memory of channels to be read by the RADA or RADC commands.

The max number of curve channels that can be set is 6.

The max number of breath and alarm settings channels is 50 for each category.

The max number of settings and alarm channels that can be set is 100 for each category.

The definition will be valid until next time the command SDAD is received.

If no channel parameters are given, the corresponding data acquisition table is cleared.

The Data acquisition table will also be cleared if the command RCTY or SPVE is received.

The new channel table is activated within 500 ms after the variable has been set.

#### 2.4.18 Set Protocol Version SPVE

This command configures SCI to use a specific Protocol version.

<b>Input syntax:</b>	SPVE<version><CHK><EOT>
<b>Output syntax:</b>	*<CHK><EOT>
<b>Parameters:</b>	<version> = 0001 – xxxx <version> = Selected SCI protocol version. Selectable from first version (0001) to highest (read by the RHVE command).

The requested version shall be expressed with 4 digits, otherwise this command will return ER11.

When the Set Protocol Version command is issued, the data acquisition table (set up with the Set Data Acquisition Definition command) is cleared.

If the requested protocol version is not available, this command returns ER12 and the ventilator continues using the same protocol version and data acquisition definition as before the request.

If the selected protocol version is lower than the highest available then the ventilator behaves as the selected protocol version (use the same channel configuration, switch parameters etc.)

Note! New switch parameter values (e.g. a new ventilation mode) will be sent as “Undefined” if active when a lower protocol version is selected.

#### 2.4.19 Set Sampling Time SSMP

This command sets the sampling time for real time curves (in milliseconds).

<b>Input syntax:</b>	SSMP<value><CHK><EOT>
<b>Output syntax:</b>	*<CHK><EOT>
<b>Parameters:</b>	<value> = 010 – 220 (ms)

The sampling time is valid for all sampled real time curves until next time the command Set Sampling Time is received.

The default sampling time is 20 ms.

The sampling time is set to default at startup and when the command RCTY is received.

Odd requested sampling time is decremented by 1 ms.

The new sampling time is activated within 500 ms.

#### 2.4.20 Set input character timeout STOU

This command defines the input character timeout.

<b>Input syntax:</b>	STOU<value><CHK><EOT>
<b>Output syntax:</b>	*<CHK><EOT>
<b>Parameters:</b>	<value> = 001-250 (steps of 0.1 seconds)

If this command has not been received, the default timeout of 10 seconds is applied.

The new timeout is activated within 500 ms after command received.

The input character timeout is set to default at startup and when the command RCTY is received.

When receiving a command, SCI needs to receive any character within the character timeout. Otherwise the previous characters are ignored.

## 2.5 Checksum calculation

### 2.5.1 General

A checksum byte is included in transmission messages. The checksum is based on the exclusive OR operation (XOR).

### 2.5.2 Formula

The checksum is calculated according to the following formula:

Data:

Chk: Checksum byte

Number\_Of\_Bytes: Number of bytes in the message

^ : Bitwise XOR (exclusive OR)

Formula:

Chk = 0;

for ( i = 0; i < Number\_Of\_Bytes; i++ )

{

Chk = Chk ^ Message\_Byte[i];

}

### 2.5.3 Checksum transmission

If Message format is ASCII, the checksum byte is transmitted as two ASCII characters, representing the hexadecimal equivalent.

If Message format is Binary, the checksum byte is transmitted as one byte.

### 2.5.4 Example

The command "Read CI Type", RCTY is transmitted:

RCTY1C<EOT>

Checksum byte = 1C<sub>16</sub>

1C = ASCII equivalent

### 3 APPENDIX A – DISPLAY RANGE

The following tables are a summary of the displayed names, units, values and texts on the SERVO User Interface.

#### 3.1 Waveforms

SCI channel	Description	Display name	Display range	Display unit
0	Airway Flow (SCI unit: ml/s)	FLOW	-400 – 400 -7.0 – 7.0	l/min l/s
1	Airway Pressure (SCI unit: cmH <sub>2</sub> O)	PRESSURE	-40 – 150	cmH <sub>2</sub> O mbar
2	Volume	VOLUME	0 – 9000	ml
3	Edi	Edi	0 – 200	μV
4	CO <sub>2</sub> concentration (%)	CO <sub>2</sub> conc.	0 – 25	%
5	CO <sub>2</sub> concentration (mmHg)	CO <sub>2</sub> conc.	0 – 200	mmHg
6	CO <sub>2</sub> concentration (kPa)	CO <sub>2</sub> conc.	0 – 25	kPa

#### 3.2 Breath data

SCI channel	Description	Display name	Display range	Display unit
100	Measured breath frequency	RR	0 – 200	b/min
101	Exp. tidal volume	VT <sub>e</sub>	0 – 4000 (0.0 – 20.0 21 – 4000)	ml
102	Insp. Tidal volume	VT <sub>i</sub>	0 – 4000 (0.0 – 20.0 21 – 4000)	ml
103	Insp. Minute volume	MV <sub>i</sub>	0.00 – 60.0 (0.00 – 0.50 0.6 – 60.0)	l/min
104	Exp. minute volume	MV <sub>e</sub>	0.00 – 60.0 (0.00 – 0.50 0.6 – 60.0)	l/min
105	Peak pressure (SCI unit: cmH <sub>2</sub> O)	P <sub>peak</sub>	-40 – 150	cmH <sub>2</sub> O mbar
106	Mean airway pressure (SCI unit: cmH <sub>2</sub> O)	P <sub>mean</sub>	-40 – 150	cmH <sub>2</sub> O mbar
107	Pause pressure (SCI unit: cmH <sub>2</sub> O)	P <sub>plat</sub>	-40 – 150	cmH <sub>2</sub> O mbar
108	End exp. Pressure (SCI unit: cmH <sub>2</sub> O)	PEEP	-40 – 150 (-40 – -10 -9.9 – 9.9, 10 – 150)	cmH <sub>2</sub> O mbar
109	O <sub>2</sub> concentration	O <sub>2</sub> conc.	0 – 100	%



SCI channel	Description	Display name	Display range	Display unit
110	Barometric pressure (SCI unit: mbar)	Not displayed on the User Interface	650 – 1070 650 – 1070 488 – 803	mbar hPa mmHg
111	Gas supply pressure, Air (SCI unit: mbar)	Not displayed on the User Interface	0 – 15 0 – 220 0 – 15	bar PSI kPa*100
112	Gas supply pressure, O <sub>2</sub> (SCI unit: mbar)	Not displayed on the User Interface	0 – 15 0 – 220 0 – 15	bar PSI kPa*100
113	CO <sub>2</sub> tidal production	VTco <sub>2</sub>	0.0 – 100.0	ml
114	End tidal CO <sub>2</sub> concentration (%)	etCO <sub>2</sub>	0.0 – 20.0	%
115	End tidal CO <sub>2</sub> concentration (mmHg)	etCO <sub>2</sub>	0 – 100	mmHg
116	End tidal CO <sub>2</sub> concentration (kPa)	etCO <sub>2</sub>	0.0 – 14.0	kPa
117	CO <sub>2</sub> minute production	Vco <sub>2</sub>	0 – 1000	ml/min
118	Exp. Resistance (SCI unit: cmH <sub>2</sub> O/l/s)	Re	0 – 4000	cmH <sub>2</sub> O/l/s mbar/l/s
119	Static Compliance (SCI unit: ml/cmH <sub>2</sub> O)	Cstatic	0.0 – 500.0	ml/cmH <sub>2</sub> O ml/mbar
120	End exp. Flow (SCI unit: l/s)	Flowee	0 – 20 0.0 – 0.35	l/min l/s
121	Insp. Resistance (SCI unit: cmH <sub>2</sub> O/l/s)	Ri	0 – 4000	cmH <sub>2</sub> O/l/s mbar/l/s
122	I:E Ratio (SCI sends I:E Ratio in the format "value:1")	I:E	1:20.0 – 300.0:1	N/A
123	Ti (Insufflation time)	Ti	0.10 – 15.00	s
124	C dyn i in Open Lung Tool (SCI unit: ml/cmH <sub>2</sub> O)	Cdyn	0.0 – 500.0	ml/cmH <sub>2</sub> O ml/mbar
125	Dynamic Characteristics (SCI unit: ml/cmH <sub>2</sub> O)	Cdyn	0.0 – 500.0	ml/cmH <sub>2</sub> O ml/mbar
126	Leakage fraction	Leakage	0 – 100	%
127	Elastance (SCI unit: cmH <sub>2</sub> O/l)	E	0 – 1000	cmH <sub>2</sub> O/l
128	Ti/Ttot	Ti/Ttot	0.00 – 1.00	N/A
129	Total PEEP (SCI unit: cmH <sub>2</sub> O)	PEEPtot	-40 – 150 (-40 – -10 -9.9 – 9.9, 10 – 150)	cmH <sub>2</sub> O mbar
130	Spontaneous Breath frequency	RRsp	0 – 200	b/min
131	MVe spont	MVe sp	0.00 – 60.0 (0.00 – 0.50 0.6 – 60.0)	l/min
132	MVe spont/MVe in Bi-Vent/APRV	MVe sp/MVe	0.0 – 100.0	N/A
133	Time constant	Tc	0.00 – 30.00	s
134	Work of Breathing, Ventilator	WOBvent	0.00 – 20.00	Joule/l

SCI channel	Description	Display name	Display range	Display unit
135	Work of Breathing, Patient	WOBpat	0.00 – 20.00	Joule/l
136	CPAP (SCI unit: cmH <sub>2</sub> O)	CPAP	-40 – 150 (-40 – -10 -9.9 – 9.9, 10 – 150)	cmH <sub>2</sub> O mbar
137	P01 (SCI unit: cmH <sub>2</sub> O)	P 0.1	0.0 – 100.0	cmH <sub>2</sub> O mbar
138	Edi peak	Edipeak	0.0 – 200.0	μV
139	Edi min	Edimin	0.0 – 200.0	μV
140	Insp. Trigger cause	-	-	-
141	Cycle off cause	-	-	-
142	Exp. Trigger cause	-	-	-
143	Shallow Breathing Index (SBI)	SBI	0 – 9999	breaths/min/l
144	Remaining Nebulization time	Not displayed on the User Interface	0 – 30	min
145	VTe/Predicted Body Weight	VT/PBW	0.0 – 20.0	ml/kg

### 3.3 Parameter settings

SCI channel	Description	Display name	Display range	Display unit
400	RR (in Control modes)	RR	4 – 150	b/min
401	Leakage compensation Status	-	-	-
402	T pause (%)	T pause (%)	0 – 30	%
403	SIMV rate	SIMV rate	1 – 60	b/min
404	Tinsp. rise (%)	Tinsp. rise (%)	0 – 20	%
405	Minute volume	Minute volume	0.1 – 60.0	l/min
406	PC above PEEP (Pressure Control Level above PEEP) (SCI unit: cmH <sub>2</sub> O)	PC above PEEP	0 – 120	cmH <sub>2</sub> O mbar
407	PS above PEEP (Pressure Support Level above PEEP) (SCI unit: cmH <sub>2</sub> O)	PS above PEEP	0 – 120	cmH <sub>2</sub> O mbar
408	PEEP (SCI unit: cmH <sub>2</sub> O)	PEEP	1.0 – 50 (1.0 – 9.5, 10 – 50)	cmH <sub>2</sub> O mbar
409	Patient range selection	-	-	-
410	Ventilation Mode	-	-	-

SCI channel	Description	Display name	Display range	Display unit
411	Status of current user request (e.g. Inspiratory Hold). - INSPIRATORY HOLD - EXPIRATORY HOLD - 100 O <sub>2</sub> BOOST - MANUAL BREATH	-	-	-
412	CPAP (SCI unit: cmH <sub>2</sub> O)	CPAP	2.0 – 20 (2.0 – 10.0, 11 – 20)	cmH <sub>2</sub> O mbar
413	Alarm mute/pre-mute Status	-	-	-
414	O <sub>2</sub> conc.	O <sub>2</sub> conc.	21 – 100	%
415	Trigger sensitivity (Pressure trigger sensitivity level )	Trigger (cmH <sub>2</sub> O)	(-20) – (-1)	cmH <sub>2</sub> O
416	Trigger sensitivity (Flow trigger sensitivity level)	Trigger (l/min)	0.00 – 2.0 (0.00 – 0.50, 0.6 – 2.0)	l/min
417	Language	-	-	-
418	Displayed CO <sub>2</sub> Unit	-	-	-
419	I:E Ratio (SCI sends I:E Ratio in the format "value:1")	I:E	1:10.0 – 4.0:1	N/A
420	Tidal volume	Tidal volume	2.0 – 4000 (2.0 – 9.9 10 – 4000)	ml
421	Backup RR (in Support modes)	Backup RR	4 – 150	b/min
422	Backup Ti (s) (in Support modes)	Backup Ti	0.10 – 5.00	s
423	NIV Program Status	-	-	-
424	Phigh (High-pressure level in Bi-Vent/APRV) (SCI unit: cmH <sub>2</sub> O)	Phigh	2.0 – 50 (2.0 – 9.5, 10 – 50)	cmH <sub>2</sub> O mbar
425	Thigh (High pressure level time in Bi-Vent/APRV)	Thigh	0.20 – 30.0 (0.20 – 0.95, 1.0 – 30.0)	s
426	TPEEP (Low pressure level, PEEP, time in Bi-Vent/APRV)	TPEEP	0.10 – 10.0 (0.10 – 0.95, 1.0 – 10.0)	s
427	PS above Phigh (Pressure Support level above Phigh in Bi-Vent/APRV) (SCI unit: cmH <sub>2</sub> O)	PS above Phigh	0 – 120	cmH <sub>2</sub> O mbar

SCI channel	Description	Display name	Display range	Display unit
428	PS above PEEP (Pressure Support level above PEEP in Bi-Vent/APRV) (SCI unit: cmH <sub>2</sub> O)	PS above PEEP	0 – 120	cmH <sub>2</sub> O mbar
429	Ti (s) (Inspiration Time in Seconds)	Ti	0.10 – 5.00	s
430	T pause (s) (Pause Time in Seconds)	T pause (s)	0.00 – 1.50	s
431	Tinsp. rise (s) (Insp. Rise time in Seconds)	Tinsp. rise (s)	0.00 – 0.40	s
432	Breath cycle T (in SIMV modes)	Breath cycle T	0.5 – 15.0	s
433	Backup PC above PEEP (in Support modes) (SCI unit: cmH <sub>2</sub> O)	Backup PC above PEEP	5 – 120	cmH <sub>2</sub> O mbar
434	Flow (Inspiration Peak Flow) (SCI unit: l/s)	Flow	0 – 200 0 – 3.3	l/min l/s
435	Suction Support Status	-	-	-
436	End inspiration (Cycle off Fraction Level)	End inspiration	1 – 70	%
437	Circuit compliance compensation Status	-	-	-
438	Max. apnea time (Trigger timeout in Automode)	Max. apnea time	3 – 15	s
439	Y-piece measurement Status	-	-	-
440	Edi trigger	Edi trigger	0.1 – 2.0	μV
441	NAVA level	NAVA level	0.1 – 15.0	cmH <sub>2</sub> O/μV
442	Gas Type Setting	-	-	-
443	Backup tidal volume (in Support modes)	Backup tidal volume	2.0 – 4000 (2.0 – 9.9 10 – 4000)	ml
444	Backup I:E (in Support modes) (SCI sends I:E Ratio in the format “value:1”)	Backup I:E	1:10.0 – 4.0:1	N/A
445	Leakage too high alarm (in non invasive ventilation)	-	-	-
446	Nebulization mode	-	-	-
447	Nebulization time	Time	5 – 30	min
448	NAVA Apnea Alarm	-	-	-
449	Backup ventilation On/Off (in Support modes)	-	-	-

SCI channel	Description	Display name	Display range	Display unit
450	Backup ventilation status (in Support modes)	-	-	-
451	Predicted Body Weight	Predicted Body Weight	Adult/Ped: 2 – 100 Neo: 200 – 10000	kg g
452	Leakage too high alarm (in invasive ventilation)	-	-	-
453	Inspiratory tidal volume too high alarm	-	-	-
454	Expiratory minute volume high alarm	-	-	-
455	Expiratory minute volume low alarm	-	-	-

### 3.4 Alarm limit settings

SCI channel	Description	Display name	Display range	Display unit
600	Upper pressure limit (SCI unit: cmH <sub>2</sub> O)	Ppeak	16 – 120	cmH <sub>2</sub> O mbar
601	O <sub>2</sub> concentration Upper alarm limit	Not displayed on the User Interface	26 – 105	%
602	O <sub>2</sub> concentration Lower alarm limit	Not displayed on the User Interface	18 – 95	%
603	Respiratory rate Upper alarm limit	RR	1 – 160	b/min
604	Respiratory rate Lower alarm limit	RR	1 – 160	b/min
605	Apnea time	Apnea time	2 – 45	sec
606	PEEP High limit (SCI unit: cmH <sub>2</sub> O)	PEEP	0 – 55	cmH <sub>2</sub> O mbar
607	PEEP Low limit (SCI unit: cmH <sub>2</sub> O)	PEEP	0 – 47	cmH <sub>2</sub> O mbar
608	CPAP Upper alarm limit (SCI unit: cmH <sub>2</sub> O)	CPAP	0 – 25	cmH <sub>2</sub> O mbar
609	CPAP Lower alarm limit (SCI unit: cmH <sub>2</sub> O)	CPAP	0 – 25	cmH <sub>2</sub> O mbar
610	Exp. minute vol. Upper alarm limit	MVe	0.01 – 60.0 (0.01 – 0.45, 0.5 – 60.0)	l/min
611	Exp. minute vol. Lower alarm limit	MVe	0.01 – 40.0 (0.01 – 0.45, 0.5 – 40.0)	l/min
612	EtCO <sub>2</sub> concentration Upper alarm limit (%)	etCO <sub>2</sub>	0.5 – 20.0	%
613	EtCO <sub>2</sub> concentration Lower alarm limit (%)	etCO <sub>2</sub>	0.0 – 20.0	%
614	EtCO <sub>2</sub> concentration Upper alarm limit (mmHg)	etCO <sub>2</sub>	4 – 100	mmHg

SCI channel	Description	Display name	Display range	Display unit
615	EtCO <sub>2</sub> concentration Lower alarm limit (mmHg)	etCO <sub>2</sub>	0 – 100	mmHg
616	EtCO <sub>2</sub> concentration Upper alarm limit (kPa)	etCO <sub>2</sub>	0.5 – 14.0	kPa
617	EtCO <sub>2</sub> concentration Lower alarm limit (kPa)	etCO <sub>2</sub>	0.0 – 14.0	kPa
618	Apnea audio delay	Apnea audio delay	0 – 30	sec
619	VTi Upper alarm limit	VTi	2 – 70	ml

### 3.5 Alarm texts

SCI channel	Description	Display alarm text	Displayed alarm priority
800	O <sub>2</sub> concentration high	O <sub>2</sub> concentration high	Medium
801	O <sub>2</sub> concentration low	O <sub>2</sub> concentration low	High
802	EtCO <sub>2</sub> high	EtCO <sub>2</sub> high	Medium
803	EtCO <sub>2</sub> low	EtCO <sub>2</sub> low	Medium
804	Airway pressure high (Upper pressure limit exceeded)	Airway pressure high	High
805	Apnea	Apnea	High
806	Gas supply alarm	One or more of following alarms: Gas supply pressures low Air supply pressure low Air supply pressure high O <sub>2</sub> supply pressure low O <sub>2</sub> supply pressure high	High Medium Medium Medium Medium
807	Battery alarm	One or more of following alarms: Battery missing Limited battery capacity Battery voltage low No battery capacity	Medium Medium High High
808	The nebulizer cannot be run on one battery	The nebulizer cannot be run on one battery	Medium
809	Battery operation	Battery operation	Low
810	No consistent patient effort	No consistent patient effort	Medium
811	Airway pressure continuously high	Airway pressure continuously high	High
812	Overrange alarm	One or more of following alarms: Inspiratory tidal volume too high Pressure delivery restricted	High Medium
813	O <sub>2</sub> cell/sensor failure	O <sub>2</sub> cell/sensor failure	Medium

814	Time in waiting position > 2 min	Time in waiting position > 2 min	High
815	No patient effort	No patient effort	Medium
816	Leakage too high	Leakage too high	Medium High
817	Patient circuit disconnected	Patient circuit disconnected	High
818	Volume delivery restricted	Volume delivery restricted	Low
819	Respiratory rate high	Respiratory rate high	Medium
820	Respiratory rate low	Respiratory rate low	Medium
821	PEEP high	PEEP high	Medium
822	PEEP low	PEEP low	Medium
823	CPAP high	CPAP high	Medium
824	CPAP low	CPAP low	Medium
825	Inconsistent Edi signal	Inconsistent Edi signal	Low
826	Low Edi signal	Low Edi signal	Low
827	No Edi signal detected	No Edi signal detected	Low
828	Patient disconnected > 1 min	Patient disconnected > 1 min	High
829	Expiratory minute volume high	Expiratory minute volume high	Medium
830	Expiratory minute volume low	Expiratory minute volume low	High
831	Expiratory cassette disconnected	Expiratory cassette disconnected	Medium
832	Expiratory cassette replaced	Expiratory cassette replaced	Low
833	Edi signal invalid	Edi signal invalid	Medium
834	Edi signal interference from ECG	Edi signal interference from ECG	Medium

## 4 REVISION HISTORY

### 4.1 Protocol version 0001 – Reference Manual revision 00

Draft version – For internal use only.

### 4.2 Protocol version 0001 – Reference Manual revision 01

In the table below, the following keywords are used in 'Comment' column:

- Added. New functionality added in Reference Manual revision 01.
- Changed. Changed functionality in Reference Manual revision 01.
- Corrected. Corrections made due to printing errors or lack of information in the previous version of the Reference Manual.

Page	Section	Comment
–	Throughout the whole manual	Device name SERVO-X/SERVO-Y corrected, replaced by SERVO-U/SERVO-n.
–	Throughout the whole manual	Mode name Bi-Vent changed to Bi-Vent/APRV.
23	2.3.5 Channel 800-999 – Alarms	Channel 807: 'Missing battery' alarm added.
33	2.4.6 Read Channel Configuration RCCO	Unit 16 corrected.
40–47	3 Appendix A – Display Range	Appendix A was not included in the previous version of the Reference Manual.

### 4.3 Protocol version 0002 – Reference Manual revision 02

In the table below, the following keywords are used in 'Comment' column:

- Added. New functionality added in Reference Manual revision 02.
- Changed. Changed functionality in Reference Manual revision 02.
- Corrected. Corrections made due to printing errors or lack of information in the previous version of the Reference Manual.

Added	Changed	Corrected	Page	Section	Comment
	X		5	General information	Text changed due to Protocol version 0002/ System version 1.1.
		X	6	1.4.1 Definitions	Bi-Vent/APRV included in definition of Control Modes.
	X			2.3 Channels	Information about availability in protocol version 0002 introduced in the channel tables.
		X	17	2.3.3 Channel 400-599 – Settings	Channel 445: Parameter name corrected.
X			17	2.3.3 Channel 400-599 – Settings	Channels 452 – 455 introduced.
		X	21	2.3.3.1 Switch Parameters for channels 400-599	Channel 445: Parameter name corrected.
X			22	2.3.3.1 Switch Parameters for channels 400-599	Switch Parameters for channels 452 – 455 introduced.
		X	24	2.3.5 Channel 800-999 – Alarms	Channel 805: Parameter name corrected.



Added	Changed	Corrected	Page	Section	Comment
	X		31	2.4.4 Read Acquired Data Continuously RADC	Information about breath data transmission in Nasal CPAP introduced.
	X		35	2.4.9 Read Highest Protocol Version RHVE	Highest Protocol version 0002.
		X	36	2.4.14 Read Software Version RSWV	Output example corrected.
		X	44	3.3 Parameter settings	Channel 445: Parameter name corrected.
X			45	3.3 Parameter settings	Channels 452 – 455 introduced.
		X	46	3.5 Alarm texts	Channel 805: Description and Display alarm text corrected.

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