



## Health Informatics—Device Interoperability

### Part 10101: Foundational— Nomenclature

### Amendment 1: Additional definitions

IEEE Engineering in Medicine and Biology Society

Developed by the  
IEEE 11073™ Standards Committee

**IEEE Std 11073-10101b™-2023**  
(Amendment to IEEE Std 11073-10101-2019)

**STANDARDS**

**Health informatics—Device Interoperability**

# **Part 10101: Foundational— Nomenclature**

## **Amendment 1: Additional definitions**

Developed by the

**IEEE 11073™ Standards Committee**  
of the  
**IEEE Engineering in Medicine and Biology Society**

Approved 8 November 2023

**IEEE SA Standards Board**

**Abstract:** The scope of this standard is to define a nomenclature for communication of information from point-of-care medical devices. Primary emphasis is placed on acute care medical devices and patient vital signs information. The nomenclature also supports concepts in an object oriented information model that is for medical device communications. This amendment extends IEEE Std 11073-10101-2019 to include additional terms primarily related to infusion pumps, ventilators, dialysis and other key medical devices as well as event and alert identifiers for devices and systems used in acute care.

**Keywords:** alarm, alarm inactivation, alarms, alert communication, anesthesia, device containment model, device model, dialysis, diaphragm, ECG, EDI, electrocardiography, events, fluid chemistry, hemodialysis, hemodynamic monitoring, HFV, high flow therapy, high frequency ventilation, IEEE 11073-10101b™, IHE PCD, information model, infusion pump, ISO 19223, ISO/IEEE 11073-10101, medical device alarms, medical device alerts, medical device communication, medical device types, NAVA, network communication controller, neurally adjusted ventilatory assist, neuromuscular blockade, neuromuscular stimulation, neuromuscular transmission, NMT, nomenclature, observation set identifier, ontology, patient, patient controlled analgesia, PCA, POC, point-of-care, pulse oximetry, pump library, query identifier, regional cerebral oximetry, rSO<sub>2</sub>, semantics, service-oriented device connectivity, signal quality index, SQL, target controlled infusion, TCI, terminology, UCUM, units of measure, ventilation, ventilation mode

---

The Institute of Electrical and Electronics Engineers, Inc.  
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2024 by The Institute of Electrical and Electronics Engineers, Inc.  
All rights reserved. Published 12 January 2024. Printed in the United States of America.

IEEE is a registered trademark in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

Wi-Fi Protected Access is a registered trademark of Wi-Fi Alliance.

PDF: ISBN 979-8-8557-0347-4 STD26643  
Print: ISBN 979-8-8557-0348-1 STDPD26643

*IEEE prohibits discrimination, harassment, and bullying.*

For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

## Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE Standards documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page (<https://standards.ieee.org/ipr/disclaimers.html>), appear in all standards and may be found under the heading “Important Notices and Disclaimers Concerning IEEE Standards Documents.”

### Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE SA) Standards Board. IEEE develops its standards through an accredited consensus development process, which brings together volunteers representing varied viewpoints and interests to achieve the final product. IEEE Standards are documents developed by volunteers with scientific, academic, and industry-based expertise in technical working groups. Volunteers are not necessarily members of IEEE or IEEE SA, and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

IEEE makes no warranties or representations concerning its standards, and expressly disclaims all warranties, express or implied, concerning this standard, including but not limited to the warranties of merchantability, fitness for a particular purpose and non-infringement. In addition, IEEE does not warrant or represent that the use of the material contained in its standards is free from patent infringement. IEEE standards documents are supplied “AS IS” and “WITH ALL FAULTS.”

Use of an IEEE standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity, nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: THE NEED TO PROCURE SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

### Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE is the approved IEEE standard.

## Official statements

A statement, written or oral, that is not processed in accordance with the IEEE SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that the presenter's views should be considered the personal views of that individual rather than the formal position of IEEE, IEEE SA, the Standards Committee, or the Working Group.

## Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE or IEEE SA. However, **IEEE does not provide interpretations, consulting information, or advice pertaining to IEEE Standards documents.**

Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its Societies and Standards Coordinating Committees are not able to provide an instant response to comments, or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in evaluating comments or in revisions to an IEEE standard is welcome to join the relevant IEEE working group. You can indicate interest in a working group using the Interests tab in the Manage Profile & Interests area of the [IEEE SA myProject system](#). An IEEE Account is needed to access the application.

Comments on standards should be submitted using the [Contact Us](#) form.

## Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not constitute compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

## Data privacy

Users of IEEE Standards documents should evaluate the standards for considerations of data privacy and data ownership in the context of assessing and using the standards in compliance with applicable laws and regulations.

## Copyrights

IEEE draft and approved standards are copyrighted by IEEE under US and international copyright laws. They are made available by IEEE and are adopted for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

## Photocopies

Subject to payment of the appropriate licensing fees, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400; <https://www.copyright.com/>. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

## Updating of IEEE Standards documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect.

Every IEEE standard is subjected to review at least every 10 years. When a document is more than 10 years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit [IEEE Xplore](#) or [contact IEEE](#). For more information about the IEEE SA or IEEE's standards development process, visit the IEEE SA Website.

## Errata

Errata, if any, for all IEEE standards can be accessed on the [IEEE SA Website](#). Search for standard number and year of approval to access the web page of the published standard. Errata links are located under the Additional Resources Details section. Errata are also available in [IEEE Xplore](#). Users are encouraged to periodically check for errata.

## Patents

IEEE Standards are developed in compliance with the [IEEE SA Patent Policy](#).

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE SA Website at <https://standards.ieee.org/about/sasb/patcom/patents.html>. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

## IMPORTANT NOTICE

IEEE Standards do not guarantee or ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. IEEE Standards development activities consider research and information presented to the standards development group in developing any safety recommendations. Other information about safety practices, changes in technology or technology implementation, or impact by peripheral systems also may be pertinent to safety considerations during implementation of the standard. Implementers and users of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

## Participants

At the time this standard was completed, the Point-of-Care Devices Working Group had the following membership:

**Stefan Schlichting**, *Working Group Chair*

**Paul Schluter**, *Working Subgroup Chair*

|                  |                            |                     |
|------------------|----------------------------|---------------------|
| Björn Andersen   | Martin Hurrell             | Roland Persson      |
| Piyush Bhageriya | Anders Häggström           | Mikael Petrini      |
| Manfred Bier     | Per Johansson              | Jan-Alrik Philipsen |
| Kimberly Brauer  | Norman Jones               | Dalibor Pokrajac    |
| Malcolm Clarke   | Martin Kasparick           | John Rhoads         |
| Todd Cooper      | Tobias Klotz               | Jeff Rinda          |
| Steven Dain      | Tom Kowalczyk              | Mathieu Roullet     |
| Lisa Diggett     | Mike Krajnak               | Daniel Rubery       |
| Kurt Elliason    | Thomas Kreuger             | Neil Seidl          |
| Al Engelbert     | Konstantinos Makrodimitris | Naveen Sharma       |
| Javier Espina    | Duane Martz                | Michael Tietz       |
| Michael Faughn   | Eldon Metz                 | Peter Verständig    |
| Kenneth Fuchs    | Steve Myers                | John Walsh          |
| John Garguilo    | Teri Neal                  | Rob Wilder          |
| David Gregorczyk | Steven Nichols             | Brian Witkowski     |
| Bill Haralson    | Monroe Pattillo            | Daidi Zhong         |

The following members of the individual Standards Association balloting group voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

|                      |                   |                    |
|----------------------|-------------------|--------------------|
| Björn Andersen       | David Gregorczyk  | Stefan Schlichting |
| Pradeep Balachandran | Charles Gropper   | Paul Schluter      |
| Malcolm Clarke       | Werner Hoelzl     | Harry Solomon      |
| Kurt Elliason        | Piotr Karocki     | Walter Struppler   |
| Javier Espina        | Martin Kasparick  | Lisa Ward          |
| Michael Faughn       | Raymond Krasinski | Yu Yuan            |
| Kenneth Fuchs        | H. Moll           | Oren Yuen          |
| John Garguilo        | Rajesh Murthy     | Janusz Zalewski    |
| Frank Golatowski     | John Rhoads       | Daidi Zhong        |
|                      | Scott Robertson   |                    |

When the IEEE SA Standards Board approved this standard on 8 November 2023, it had the following membership:

**David J. Law**, *Chair*

**Ted Burse**, *Vice Chair*

**Gary Hoffman**, *Past Chair*

**Konstantinos Karachalios**, *Secretary*

|                       |                      |                   |
|-----------------------|----------------------|-------------------|
| Sara R. Biyabani      | Joseph S. Levy       | Paul Nikolich     |
| Doug Edwards          | Howard Li            | Annette D. Reilly |
| Ramy Ahmed Fathy      | Johnny Daozhuang Lin | Robby Robson      |
| Guido R. Hiertz       | Gui Lin              | Lei Wang          |
| Yousef Kimiagar       | Xiaohui Liu          | F. Keith Waters   |
| Joseph L. Koepfinger* | Kevin W. Lu          | Karl Weber        |
| Thomas Koshy          | Daleep C. Mohla      | Philip B. Winston |
| John D. Kulick        | Andrew Myles         | Don Wright        |

\*Member Emeritus

## Introduction

This introduction is not part of IEEE Std 11073-10101b-2023, Health informatics—Device interoperability—Part 10101: Foundational—Nomenclature—Amendment 1: Additional definitions.

ISO/IEEE 11073 standards enable communication between medical devices and external computer systems. They provide automatic and detailed electronic data capture of patient vital signs information and device operational data. The primary goals are to:

- Provide real-time plug-and-play interoperability for patient-connected medical devices
- Facilitate the efficient exchange of vital signs and medical device data, acquired at the point-of-care, in all health care environments

This amendment extends the nomenclature defined in IEEE Std 11073-10101-2019. It reflects the continued innovation in medical device and is based on a highly successful collaboration with the following organizations:

- Integrating the Healthcare Enterprise Devices (IHE DEV) domain, which includes the Patient Care Devices (PCD), Personal Connected Health (PCH) and Device Point-of-Care Interoperability (DPi) Programs
- ISO/TC 121, Anaesthetic and respiratory equipment, Subcommittee 4, Terminology and semantics

In addition, other vendors and standards development and profiling organizations have contributed to and have recognized the value of this work and the benefit it provides to the user and provider communities and to the patients that we ultimately serve.

This nomenclature amendment includes significant extensions to support:

- Haemodynamic monitoring, pulse oximetry and regional cerebral oxygen monitoring
- Respiratory, ventilation and anesthesia: high-frequency ventilation, high-flow therapy, neurally adjusted ventilatory assist (NAVA) and ventilation mode based on ISO 19223
- Infusion pumps, target-controlled infusion (TCI), patient-controlled analgesia (PCA) and other capabilities based on the work of the IHE DEV PCD domain program
- Hemodialysis for chronic and acute care, including fluid chemistry and other fluid related metrics
- Neuromuscular transmission monitoring (NMT) and stimulation modes
- Signal quality index (SQI) and mapping to a unified vendor- and device-independent representation
- Major extension of medical device event and alert nomenclature and grouping with existing terms
- Alarm inactivation and additional attributes related to alert management and communication
- New units of measurement
- New medical device types and monitoring parameters

This amendment also includes:

- Units of measure associated with individual numeric observations and attributes
- Enumerated values with descriptions associated with individual observations and attributes

**NOTES as used in this amendment** (preceding editorial instructions) are not meant to be included in the rollout or part of the editorial instructions. They are used solely to provide informative guidance and background to the reader as to why certain changes were made.

## Acknowledgments

Permissions have been granted as follows:

Hemodialysis Overview reprinted with permission from the Dialysis Interoperability Consortium © 2022.

## Contents

|                                                                                                                                    |     |
|------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. Overview .....                                                                                                                  | 16  |
| 1.1 Scope .....                                                                                                                    | 16  |
| 1.2 Word usage.....                                                                                                                | 16  |
| 2. Normative references.....                                                                                                       | 17  |
| 3. Terms, definitions, acronyms, and abbreviations .....                                                                           | 17  |
| 3.1 Terms and definitions .....                                                                                                    | 17  |
| 3.2 Symbols and abbreviated terms .....                                                                                            | 17  |
| Annex A (normative) Nomenclature semantics.....                                                                                    | 19  |
| A.1 Overview of nomenclature for vital signs—Semantics .....                                                                       | 19  |
| A.3 Data dictionary and codes for object-oriented modeling elements (Partition 1).....                                             | 20  |
| A.3.2 Object-oriented modeling elements: inventory tables .....                                                                    | 20  |
| A.5 Nomenclature, data dictionary, and codes for vital signs, diagnostic and therapeutic devices<br>(Partition 1) .....            | 31  |
| A.6 Terminology and codes for units of measurement (Partition 4).....                                                              | 38  |
| A.6.4 Units of measurement .....                                                                                                   | 38  |
| A.7 Nomenclature, data dictionary, and codes for metrics (measurements and enumerations)<br>(Partition 2).....                     | 40  |
| A.7.1 Nomenclature for ECG measurements.....                                                                                       | 40  |
| A.7.3 Nomenclature, data dictionary, and codes for haemodynamic monitoring measurements .....                                      | 41  |
| A.7.4 Nomenclature and codes for respiratory, ventilator, and anesthesia measurements.....                                         | 43  |
| A.7.5 Nomenclature, data dictionary, and codes for common blood-gas, blood, urine, and<br>other fluid chemistry measurements ..... | 53  |
| A.7.7 Nomenclature, data dictionary, and codes for pumps .....                                                                     | 55  |
| A.7.10 Nomenclature, data dictionary, and codes for stimulation modes.....                                                         | 68  |
| A.7.11 Nomenclature, data dictionary, and codes for miscellaneous measurements .....                                               | 73  |
| A.7.15 Nomenclature and codes for hemodialysis measurements .....                                                                  | 78  |
| A.8 Nomenclature, data dictionary, and codes for body sites and enumerated values (Partition 7) .....                              | 102 |
| A.8.11 Nomenclature and codes for ventilator mode based on ISO 19223 .....                                                         | 102 |
| A.9 Nomenclature, data dictionary, and codes for events and alerts (Partition 3) .....                                             | 114 |
| A.9.1 Introduction.....                                                                                                            | 114 |
| A.9.2 Diagnostic pattern events .....                                                                                              | 115 |
| A.9.3 Device-related and environment-related events and alerts.....                                                                | 124 |
| A.9.4 Alarm Inactivation State (AIS) events .....                                                                                  | 195 |
| A.16 Information attributes to support IHE PCD DEC and PCHA/Continua Services Interface<br>(Partition 1 and Partition 8) .....     | 201 |
| A.17 Nomenclature to support the Service-oriented Device Connectivity (SDC) series of standards<br>(Partition 8).....              | 203 |
| A.17.1 IEEE P11073-10700 Ensemble nomenclature .....                                                                               | 203 |
| A.17.2 IEEE P11073-10700 Context validator nomenclature .....                                                                      | 203 |
| A.17.3 IEEE P11073-10700 Enumerated value set for medical device operational mode .....                                            | 204 |
| Annex C (normative) Terms, discriminators, and numeric codes .....                                                                 | 205 |
| C.3.18 Alarm Inactivation State [AIS] discriminator set .....                                                                      | 205 |
| Annex I (informative) Mapping vendor ventilation modes to ISO 19223 and IEEE 11073.....                                            | 252 |
| I.1 Recommended process.....                                                                                                       | 252 |
| I.2 XSLT for converting ISO 19223 ventilator mode to IEEE 11073 Reference IDs .....                                                | 269 |

|                                                                                  |     |
|----------------------------------------------------------------------------------|-----|
| Annex J (normative) Units of measure and _UOM_GROUPS .....                       | 274 |
| J.1 Specifying individual UOM_MDC and UOM_UCUM units of measure in Annex A ..... | 274 |
| J.2 Specifying _UOM_GROUPS .....                                                 | 275 |
| J.3 Mapping UOM_MDC to UOM_UCUM units of measure .....                           | 276 |
| J.4 List of UOM_MDC to UOM_UCUM units of measure .....                           | 276 |
| Annex K (normative) MDC_ENUMGV enumeration groups and values.....                | 302 |
| K.3 Enum_Groups.....                                                             | 302 |
| K.4 Enum_Values.....                                                             | 303 |
| K.5 Creating Reference ID(s) from Enum_Group and Enum_Value .....                | 303 |
| K.6 Referencing enumerated value sets and/or PEGjs validation expressions .....  | 304 |
| K.7 Referencing enumerated value sets and/or PEGjs validation expressions .....  | 304 |
| Annex L (informative) Bibliography.....                                          | 305 |
| Annex M (informative) Revision history .....                                     | 306 |

## Tables

|                                                                                                                                                       |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Table A.3.2.2.2—Object-oriented modeling elements—Medical Package—attributes .....                                                                    | 20 |
| Table A.3.2.2.2.1—Enumerated values for [ _MDC_ATTR_PT_BODY_POSN] ( <i>multipage table</i> ) .....                                                    | 20 |
| Table A.3.2.4.1—Object-oriented modeling elements—System Package—object class items .....                                                             | 22 |
| Table A.3.2.4.2—Object-oriented modeling elements—System Package—attributes .....                                                                     | 23 |
| Table A.3.2.4.2.1—Enumerated values for [ _MDC_ATTR_BATT_CONFIG] .....                                                                                | 23 |
| Table A.3.2.4.2.2—Enumerated values for [ _MDC_ATTR_PILLAR_ASSEMBLY] .....                                                                            | 24 |
| Table A.3.2.4.2.3—PEGjs for [ _MDC_ATTR_PILLAR_ASSEMBLY] .....                                                                                        | 24 |
| Table A.3.2.4.2.4—PEGjs for [ _MDC_ATTR_PUMP_PILLAR_DETAILS] .....                                                                                    | 24 |
| Table A.3.2.4.6—Object-oriented modeling elements—System Package—additional object<br>class items.....                                                | 25 |
| Table A.3.2.13.1—Object-oriented modeling elements—MEM-DMC NCC-Wired—attributes .....                                                                 | 26 |
| Table A.3.2.13.1.1—Enumerated values for [ _BOOL] .....                                                                                               | 26 |
| Table A.3.2.13.1.2—Enumerated values for [ _MDC_NCC_WIRED_STATE] .....                                                                                | 27 |
| Table A.3.2.13.2—Object-oriented modeling elements—MEM-DMC NCC-Wireless—attributes<br>( <i>multipage table</i> ) .....                                | 27 |
| Table A.3.2.13.2.1—Enumerated values for [ _MDC_NCC_WIRELESS_STATE] .....                                                                             | 28 |
| Table A.3.2.13.2.2—Enumerated values for [ _MDC_NCC_WIRELESS_AUTH] .....                                                                              | 28 |
| Table A.3.2.13.2.3—Enumerated values for [ _MDC_NCC_WIRELESS_ENCRYPT] .....                                                                           | 29 |
| Table A.3.2.13.2.4—Enumerated values for [ _MDC_NCC_WIRELESS_BAND] .....                                                                              | 29 |
| Table A.3.2.14.2—Object-oriented modeling elements—USI—attributes .....                                                                               | 30 |
| Table A.3.2.15.1—Object-oriented modeling elements—QPD—message query name identifiers .....                                                           | 30 |
| Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices<br>( <i>multipage table</i> ) .....                            | 31 |
| Table A.5.2—Device Type placeholder .....                                                                                                             | 37 |
| Table A.6.4.1—Vital signs units of measurement ( <i>multipage table</i> ) .....                                                                       | 38 |
| Table A.7.1.6.2—Nomenclature and codes for ECG measurements with lead origin ( <i>multipage table</i> ) .....                                         | 40 |
| Table A.7.3.6.1—Nomenclature and codes for haemodynamic monitoring measurements<br>( <i>multipage table</i> ) .....                                   | 41 |
| Table A.7.4.11.3—Ventilator modes nomenclature and codes .....                                                                                        | 43 |
| Table A.7.4.11.3.1—Enumerated values for [ _MDC_VENT_MODE_SEL_ADJUNCTS_ISO_19223] .....                                                               | 44 |
| Table A.7.4.11.3.2—Enumerated values for [ _MDC_VENT_MODE_TRIGGER_TYPE] .....                                                                         | 44 |
| Table A.7.4.11.3.3—Enumerated values for [ _MDC_VENT_OPERATIONAL_STATE] .....                                                                         | 45 |
| Table A.7.4.19.2—Nomenclature and codes for respiratory, ventilator, and anesthesia measurements<br>( <i>multipage table</i> ) .....                  | 47 |
| Table A.7.5.6.1—Nomenclature and codes for common blood-gas, blood, urine, and other fluid chemistry<br>measurements ( <i>multipage table</i> ) ..... | 53 |
| Table A.7.5.6.2—Regional brain oxygen saturation (rSO <sub>2</sub> ) ( <i>multipage table</i> ) .....                                                 | 54 |
| Table A.7.7.20.1—Nomenclature and codes for pump data ( <i>multipage table</i> ) .....                                                                | 56 |
| Table A.7.7.20.1.1—Enumerated values for [ _MDC_PUMP_INFUSING_STATUS] .....                                                                           | 63 |
| Table A.7.7.20.1.2—Enumerated values for [ _PUMP_SOURCE_INFO] .....                                                                                   | 64 |
| Table A.7.7.20.1.3—Enumerated values for [ _MDC_PUMP_CURRENT_DELIVERY_STATUS] .....                                                                   | 64 |
| Table A.7.7.20.1.4—Enumerated values for [ _MDC_PUMP_NOT_DELIVERING_REASON] .....                                                                     | 65 |
| Table A.7.7.20.1.5—Enumerated values for [ _MDC_PUMP_PROGRAM_COMPLETION_MODE] .....                                                                   | 65 |
| Table A.7.7.20.1.6—Enumerated values for [ _MDC_PUMP_PROGRAM_DELIVERY_MODE] .....                                                                     | 65 |
| Table A.7.7.20.1.7—Enumerated values for [ _MDC_PUMP_PROGRAM_STATUS] .....                                                                            | 66 |
| Table A.7.7.20.1.8—Enumerated values for [ _MDC_PUMP_RELAY_STATE] .....                                                                               | 66 |
| Table A.7.7.20.1.9—Enumerated values for [ _MDC_PUMP_TCI_MODE] .....                                                                                  | 66 |
| Table A.7.7.20.1.10—Enumerated values for [ _MDC_PCA_LIMIT_LOCKOUT_STATUS] .....                                                                      | 67 |
| Table A.7.7.20.1.11—Enumerated values for [ _MDC_DOSE_DELAY_INTERVAL_TYPE] .....                                                                      | 67 |
| Table A.7.7.20.1.12—Enumerated values for [ _MDC_INFUS_ORDER_STEP_TYPE] .....                                                                         | 67 |
| Table A.7.7.20.1.13—Enumerated values for [ _MDC_INFUS_ORDER_TYPE] .....                                                                              | 67 |
| Table A.7.10.7.1—Nomenclature and codes for neuromuscular transmission measurements<br>( <i>multipage table</i> ) .....                               | 68 |
| Table A.7.10.7.1.1—Enumerated values for [ _MDC_NMT_MEAS_METHOD] .....                                                                                | 71 |

|                                                                                                                           |     |
|---------------------------------------------------------------------------------------------------------------------------|-----|
| Table A.7.10.7.2—Nomenclature and codes for neuromuscular stimulation ( <i>multipage table</i> ) .....                    | 71  |
| Table A.7.10.7.2.1—Enumerated values for [ _MDC_NMT_STIM_MODE].....                                                       | 72  |
| Table A.7.11.6.1—Nomenclature and codes for miscellaneous measurements .....                                              | 73  |
| Table A.7.11.6.1.1—Enumerated values for [ _MDC_COMM_STATUS] .....                                                        | 73  |
| Table A.7.11.6.2—Nomenclature and codes for temperature .....                                                             | 74  |
| Table A.7.11.6.3—Nomenclature and codes for MEM-DMC device observations and status .....                                  | 75  |
| Table A.7.11.6.3.1—Enumerated values for [ _MDC_CLINICAL_USE_STATE] .....                                                 | 75  |
| Table A.7.11.6.4—Signal Quality Index (SQI) (generic).....                                                                | 76  |
| Table A.7.11.6.4.1—Enumerated values for [ _MDC_SIGNAL_QUALITY_MAPPING] .....                                             | 77  |
| Table A.7.11.6.4.2—PEGjs for [ _MDC_SIGNAL_QUALITY_MAPPING].....                                                          | 77  |
| Table A.7.15.2.1—Nomenclature and codes for hemodialysis measurements ( <i>multipage table</i> ) .....                    | 87  |
| Table A.7.15.2.1.1—Enumerated values for [ _MDC_HDIALY_MACH_MODE_OF_OPERATION] .....                                      | 98  |
| Table A.7.15.2.1.2—Enumerated values for [ _MDC_HDIALY_MACH_TX_MODALITY] .....                                            | 98  |
| Table A.7.15.2.1.3—Enumerated values for [ _MDC_HDIALY_ANTICOAG_MODE] .....                                               | 99  |
| Table A.7.15.2.1.4—Enumerated values for [ _MDC_HDIALY_BLD_PUMP_MODE] .....                                               | 99  |
| Table A.7.15.2.1.5—Enumerated values for [ _MDC_HDIALY_DIALYSATE_FLOW_MODE] .....                                         | 99  |
| Table A.7.15.2.1.6—Enumerated values for [ _MDC_HDIALY_CONC_HCO3_MODE] .....                                              | 99  |
| Table A.7.15.2.1.7—Enumerated values for [ _MDC_HDIALY_DIALYSATE_CONC_NA_MODE] .....                                      | 100 |
| Table A.7.15.2.1.8—Enumerated values for [ _MDC_HDIALY_RF_DILUTION_LOCATION] .....                                        | 100 |
| Table A.7.15.2.1.9—Enumerated values for [ _MDC_HDIALY_RF_FLOW_MODE] .....                                                | 100 |
| Table A.7.15.2.1.10—Enumerated values for [ _MDC_HDIALY_RF_SOURCE] .....                                                  | 100 |
| Table A.7.15.2.1.11—Enumerated values for [ _MDC_HDIALY_THERAPY_COMPLETE_METHOD] .....                                    | 101 |
| Table A.7.15.2.1.12—Enumerated values for [ _MDC_HDIALY_UF_MODE] .....                                                    | 101 |
| Table A.7.15.2.1.13—Enumerated values for [ _MDC_HDIALY_PLASMA_VOL_MARKER] .....                                          | 101 |
| Table A.7.15.2.1.14—Enumerated values for [ _MDC_HDIALY_PLASMA_VOL_PROFILE] .....                                         | 101 |
| Table A.8.11.2.1—PEGjs for [ _MDC_VENT_MODE_ISO_19223] .....                                                              | 103 |
| Table A.8.11.2.2—Principal subexpressions for ISO 19223 ventilation mode .....                                            | 103 |
| Table A.8.11.2.3—ISO to IEEE unified character mapping .....                                                              | 104 |
| Table A.8.11.3.1—Mode prefixes .....                                                                                      | 105 |
| Table A.8.11.4.1—Ventilation patterns.....                                                                                | 106 |
| Table A.8.11.4.2—Inflation types .....                                                                                    | 106 |
| Table A.8.11.4.3—Prefix codes for inflation types .....                                                                   | 106 |
| Table A.8.11.4.4—Trailing codes for inflation types .....                                                                 | 107 |
| Table A.8.11.4.5—Bracketing characters for trailing codes .....                                                           | 107 |
| Table A.8.11.4.6—InflationType separators / and \ .....                                                                   | 107 |
| Table A.8.11.4.7—InflationType combination examples .....                                                                 | 108 |
| Table A.8.11.5.1—Ventilation mode adjuncts .....                                                                          | 108 |
| Table A.8.11.7.1—Consolidated ISO 19223 to IEEE 11073 mapping ( <i>multipage table</i> ) .....                            | 110 |
| Table A.8.11.7.2—Consolidated notes.....                                                                                  | 113 |
| Table A.9.2.5.1—Nomenclature and codes for physiologic and pattern events ( <i>multipage table</i> ) .....                | 116 |
| Table A.9.3.5.1—Nomenclature and codes for device-related and environment-related events ( <i>multipage table</i> ) ..... | 125 |
| Table A.9.4.5.1—Nomenclature and codes for Alarm Inactivation State (AIS) events ( <i>multipage table</i> ) .....         | 196 |
| Table A.16.1.2—IHE PCD Alert Communication Management additional attributes .....                                         | 201 |
| Table A.16.1.2.1—Enumerated values for [ _ALERT_DISSEM_STATUS] .....                                                      | 202 |
| Table A.16.1.2.2—Enumerated values for [ _MDC_ATTR_ALERT_INDICATION] .....                                                | 202 |
| Table A.16.1.2.3—PEGjs for [ _MDC_ATTR_ALERT_INDICATION] .....                                                            | 202 |
| Table A.16.1.3 IHE PCD Alert Communication Management additional observations .....                                       | 203 |
| Table A.17.1.1—IEEE P11073-10700 Ensemble nomenclature .....                                                              | 203 |
| Table A.17.2.1—IEEE P11073-10700 Context validator nomenclature .....                                                     | 204 |
| Table A.17.3.1—IEEE P11073-10700 Enumerated value sets .....                                                              | 204 |
| Table C.3.18.1—Alarm Inactivation State [AIS] discriminator set.....                                                      | 205 |
| Table C.4.1.1—Object-Oriented—Partition 1 ( <i>multipage table</i> ) .....                                                | 206 |
| Table C.4.2.1—Supervisory Control and Data Acquisition (SCADA)—Partition 2 ( <i>multipage table</i> ) .....               | 209 |

|                                                                                                |     |
|------------------------------------------------------------------------------------------------|-----|
| Table C.4.3.1—Events and alerts—Partition 3 ( <i>multipage table</i> ) .....                   | 217 |
| Table C.4.4.1—Dimensions—Partition 4.....                                                      | 241 |
| Table C.4.6.1—Body sites and enumerated values—Partition 7 ( <i>multipage table</i> ) .....    | 242 |
| Table C.4.7.1—Communication Infrastructure—Partition 8 .....                                   | 251 |
| Table I.1—Vendor modes and mapping to ISO 19223 and IEEE 11073 ( <i>multipage table</i> )..... | 253 |
| Table J.1—UOM_GROUPS referenced by terms defined in this amendment .....                       | 275 |
| Table J.2—Units of measure summary with _UOM_GROUPS ( <i>multipage table</i> ).....            | 277 |
| Table M.1—Revision history .....                                                               | 306 |

**Figures**

Figure A.7.15.1.2.1—Typical chronic dialysis machine .....79

Figure A.7.15.1.4.2—Typical acute dialysis machine.....81

Figure A.7.15.1.7.3—Diffusion across dialyzer membrane .....82

# Health informatics—Device Interoperability

## Part 10101: Foundational— Nomenclature

### Amendment 1: Additional definitions

NOTE—The editing instructions contained in this **amendment** define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~striketrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.

*Replace Clause 1 with the following new clause:*

#### 1. Overview

##### 1.1 Scope

This standard defines a nomenclature for communication of information from point-of-care medical devices. Primary emphasis is placed on acute care medical devices and patient vital signs information. The nomenclature also supports concepts in an object-oriented information model that is for medical device communication.

##### 1.2 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).<sup>1,2</sup>

---

<sup>1</sup> The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

## 2. Normative references

*Replace the opening paragraph with the following paragraph:*

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

## 3. Terms, definitions, acronyms, and abbreviations

### 3.1 Terms and definitions

*Replace the boilerplate paragraph (and its footnote) with the following paragraph as shown. Renumber footnotes accordingly.*

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.<sup>3</sup>

*Insert the following terms and definitions in alphabetical order:*

**container:** The reservoir that is holding the fluid to be delivered by an infusion pump, such as an IV bag, cassette, or syringe.

**pump relay:** The operational state of an infusion pump in which one pump takes over fluid delivery by starting its infusion automatically when a corresponding pump has completed its programmed delivery (e.g., its container is empty).

### 3.2 Symbols and abbreviated terms

*Insert the following symbols and abbreviated terms in alphabetical order:*

|             |                                                                                             |
|-------------|---------------------------------------------------------------------------------------------|
| CF_CODE10   | label for the 32-bit “context-free” numeric code                                            |
| CODE10      | label for the lower 16-bit “context-sensitive” code of a 32-bit “context-free” numeric code |
| CommonTerm  | alternative label for “Common term”                                                         |
| Description | alternative label for “Description/Definition”                                              |

<sup>2</sup> The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.

<sup>3</sup> IEEE Standards Dictionary Online is available at: <http://dictionary.ieee.org>. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.

|                    |                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Disc               | alternative label for “Discriminator”                                                                                         |
| EDI                | electrical activity of the diaphragm (used by NAVA)                                                                           |
| Enum_Descriptions  | label for Enumerated Value Descriptions                                                                                       |
| Enum_Values        | label for Enumerated Values                                                                                                   |
| LOINC <sup>®</sup> | Logical Observation Identifiers Names and Codes (Regenstrief Institute)                                                       |
| MEM-DMC            | Medical Equipment Management – Device Management Communication (IHE PCD)                                                      |
| NAVA               | neurally adjusted ventilatory assist (a ventilator monitoring and control mode)                                               |
| NCC                | network communication controller                                                                                              |
| NMT                | neuromuscular transmission                                                                                                    |
| PART               | alternative label for “Partition”, the upper 16-bits of a 32-bit “context-free” numeric code                                  |
| PartCode           | alternative label for “Part::Code”, the concatenation of (upper 16-bits, “::”, lower 16-bits) of a 32-bit “context-free” code |
| PCA                | patient-controlled analgesia                                                                                                  |
| REFID              | alternative label for “Reference ID” or “RefId”                                                                               |
| rSO2               | regional (cerebral) oxygen saturation                                                                                         |
| SQI                | signal quality index                                                                                                          |
| SysName            | alternative label for “Systematic name”                                                                                       |
| TCI                | target controlled infusion                                                                                                    |
| UCUM <sup>®</sup>  | Unified Code for Units of Measure (Regenstrief Institute)                                                                     |
| UOM_MDC            | label for “Unit of Measure – IEEE 11073 Medical Device Communication”                                                         |
| UOM_UCUM           | label for “Unit of Measure – Unified Code for Units of Measure”                                                               |
| _UOM_GROUPS        | unit of measure group consisting of one or more units-of-measure                                                              |

## Annex A

(normative)

### Nomenclature semantics

#### A.1 Overview of nomenclature for vital signs—Semantics

*Insert the following two paragraphs at the end of Clause A.1:*

Two additional columns, UOM\_MDC and UOM\_UCUM, are included in Annex A to specify the units-of-measures that are used with individual numeric observation, measurement and/or settings. This additional resource is specified in Annex J.

Additional tables are included in Annex A to specify the enumerated values associated with individual observations of patient, device and measurement status, and settings. The tables provide a consistent representation of this information as Enum\_Group value sets comprised multiple Enum\_Value, Enum\_Description and numeric identifier tuples defined in Annex A and associated Reference ID defined in Annex C. This additional resource is specified in Annex K.

### A.3 Data dictionary and codes for object-oriented modeling elements (Partition 1)

#### A.3.2 Object-oriented modeling elements: inventory tables

##### A.3.2.2 Medical Package

*Insert the following three rows into Table A.3.2.2.2, as well as the Description/Definition column. Then insert Table A.3.2.2.2.1 immediately afterward:*

**Table A.3.2.2.2—Object-oriented modeling elements—Medical Package—attributes**

| DIM name                | RefId                 | Belongs to object           | Part::Code | Description/Definition                                                                                                     |
|-------------------------|-----------------------|-----------------------------|------------|----------------------------------------------------------------------------------------------------------------------------|
| «Sensor type»           | MDC_ATTR_SENSOR_TYPE  | Numeric and derived objects | 1::3011    | Specifies the sensor type, as identified and reported on behalf of the device.                                             |
| «Breath phase»          | MDC_ATTR_BREATH_PHASE | Numeric and derived objects | 1::3012    | Specifies the “Breath Type Start Delivery” (BTSD) inflation type and other inspiratory and expiratory intra-breath phases. |
| «Patient body position» | MDC_ATTR_PT_BODY_POSN | Numeric and derived objects | 1::2599    | Patient body position at the time of the {blood pressure} measurement. <sup>a</sup> [_MDC_ATTR_PT_BODY_POSN]               |

<sup>a</sup> Words or phrases enclosed in wavy braces { } indicate a source device or parameter likely to be associated with a term, for example, the «patient body position» associated with a {blood pressure} measurement, but not exclusively, allowing re-use of the term with other devices or parameters.

**Table A.3.2.2.2.1—Enumerated values for [\_MDC\_ATTR\_PT\_BODY\_POSN] (multipage table)**

| Enum_Values           | Enum_Descriptions                                                                                                                                                                                                                                                                                                                                                                                 | Part::Code | CF_CODE10 |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| unknown               | The patient position is <b>unknown</b> or cannot be determined based on the information available to the device (sensor, manual entry, or by other means).                                                                                                                                                                                                                                        | 7::18434   | 477186    |
| not-present           | The patient is not available for position monitoring; e.g., the bed is empty.                                                                                                                                                                                                                                                                                                                     | 7::18435   | 477187    |
| Upright               | The patient’s torso is in an <b>upright</b> or nearly vertical orientation, regardless of the position of the lower extremities (e.g., sitting or standing).                                                                                                                                                                                                                                      | 7::18436   | 477188    |
| Sitting               | <b>Sitting</b> (generic term that may include the highFowlersPosition)                                                                                                                                                                                                                                                                                                                            | 7::18437   | 477189    |
| Standing              | <b>Standing</b>                                                                                                                                                                                                                                                                                                                                                                                   | 7::18438   | 477190    |
| Supine                | <b>Supine</b> , lying face upward.                                                                                                                                                                                                                                                                                                                                                                | 7::18439   | 477191    |
| Prone                 | <b>Prone</b> , lying face downward.                                                                                                                                                                                                                                                                                                                                                               | 7::18440   | 477192    |
| lateralDecubitus      | In the <b>lateral decubitus (recumbent) position</b> , the patient lies on one side of their body, typically with the top leg in front of the bottom leg and the hip and knee flexed. Flexing the top hip and knee and placing this leg in front of the body creates a wider, triangular base of support and achieves greater stability.                                                          | 7::18441   | 477193    |
| rightLateralDecubitus | In the <b>right lateral decubitus (recumbent) position</b> , the patient is lying on their right side.                                                                                                                                                                                                                                                                                            | 7::18442   | 477194    |
| leftLateralDecubitus  | In the <b>left lateral decubitus (recumbent) position</b> , the patient is lying on their left side.                                                                                                                                                                                                                                                                                              | 7::18443   | 477195    |
| Trendelenburg         | In the <b>Trendelenburg position</b> , the patient is lying flat on the back (supine position) with the feet higher than the head by 15 to 30 degrees. This is a standard position used in abdominal and gynecological surgery. It allows better access to the pelvic organs as gravity pulls the intestines away from the pelvis. It was named after the German surgeon Friedrich Trendelenburg. | 7::18444   | 477196    |
| reverseTrendelenburg  | In the <b>reverse Trendelenburg position</b> , the patient is lying flat on the back (supine position) with the head and neck elevated with respect to the lower extremities. It is the opposite of the Trendelenburg position, in which the head and the neck are below the lower extremities.                                                                                                   | 7::18445   | 477197    |

**Table A.3.2.2.1—Enumerated values for [MDC\_ATTR\_PT\_BODY\_POSN]** (multipage table)

| Enum_Values             | Enum_Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Part::Code | CF_CODE10 |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| lowFowlersPosition      | In the <b>low Fowler's position</b> , the patient is lying in bed in a supine position with the head of the bed is raised at approximately 15 to 30 degrees. [This is equivalent to 150 to 175 degrees of open seat to back angle in a wheelchair.]                                                                                                                                                                                                                                                                                       | 7::18446   | 477198    |
| semiFowlersPosition     | In the <b>semi-Fowler's position</b> , the patient is lying in bed in a supine position with the head of the bed at approximately 30 to 45 degrees. Patients who are on tube feedings are typically placed in the semi-Fowler's position. Were the patient to lay flat, the tube feeding fluid could possibly run into the lungs. Elevating the head of the bed to 30 degrees decreases the risk of the patient aspirating the tube feeding fluid. [This is equivalent to 135 to 150 degrees of open seat to back angle in a wheelchair.] | 7::18447   | 477199    |
| standardFowlersPosition | In the <b>standard Fowler's position</b> , the patient is sitting in bed with the head of the bed at approximately 45 to 60 degrees. [This corresponds to 120 to 145 degrees of open seat to back angle in a wheelchair.]                                                                                                                                                                                                                                                                                                                 | 7::18448   | 477200    |
| highFowlersPosition     | In the <b>high Fowler's position</b> , the patient is sitting in bed with the head of the bed at approximately 90 degrees. [This corresponds to 90 degrees of open seat to back angle in a wheelchair.]                                                                                                                                                                                                                                                                                                                                   | 7::18449   | 477201    |
| orthopneicPosition      | In the <b>orthopneic or tripod position</b> , the patient is in a sitting position or on the side of the bed with an overbed table in front to lean on and several pillows on the table to rest on.                                                                                                                                                                                                                                                                                                                                       | 7::18450   | 477202    |
| SimsPosition            | In the <b>Sim's (semi-prone) position</b> , the patient assumes a posture halfway between the lateral and the prone positions. The lower arm is positioned behind the client, and the upper arm is flexed at the shoulder and the elbow. The upper leg is more acutely flexed at both the hip and the knee than is the lower one.                                                                                                                                                                                                         | 7::18451   | 477203    |
| lithotomyPosition       | in the <b>lithotomy position</b> , the patient is on their back with hips and knees flexed and thighs apart.                                                                                                                                                                                                                                                                                                                                                                                                                              | 7::18452   | 477204    |
| knee-chestPosition      | The <b>knee-chest position</b> can be in lateral or prone position. In the lateral position, the patient lies on their side, torso lies diagonally across the table, and hips and knees are flexed. In the prone position, the patient kneels on the table and lower shoulders on to the table so chest and face rest on the table.                                                                                                                                                                                                       | 7::18453   | 477205    |
| jackknifePosition       | In the <b>jackknife position</b> (also known as the <b>Kraske position</b> ), the patient's abdomen lies flat on the bed. The bed is scissored so the hip is lifted and the legs and head are low.                                                                                                                                                                                                                                                                                                                                        | 7::18454   | 477206    |
| kidneyPosition          | In the <b>kidney position</b> , the patient assumes a modified lateral position wherein the abdomen is placed over a lift in the operating table that bends the body. The patient is turned on their contralateral side with their back placed on the edge of the table.                                                                                                                                                                                                                                                                  | 7::18455   | 477207    |
| anatomicalPosition      | The <b>anatomical position</b> is the standard position of the human body: erect, upper limbs adducted with palms facing anteriorly and lower limbs straight with soles facing inferiorly.                                                                                                                                                                                                                                                                                                                                                | 7::18456   | 477208    |
| kneelingPosition        | In the <b>kneeling position</b> , one or both knees are on the ground.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 7::18457   | 477209    |
| frogPosition            | The <b>frog position</b> is a lying position of infants in which the lower limbs are flexed, abducted, and resting on the bed on their outer aspects, resembling the legs of a frog. Also termed the <b>Batrachian position</b> .                                                                                                                                                                                                                                                                                                         | 7::18458   | 477210    |
| stooped-overPosition    | In the <b>stooped-over position</b> , the body is not quite erect, presenting a slightly to abnormally stooped posture.                                                                                                                                                                                                                                                                                                                                                                                                                   | 7::18459   | 477211    |
| fetal-likePosition      | In the <b>fetal-like position</b> , the body position is similar to that of a fetus in the womb, with the knees up toward the chest and the head bent forward. [Note: The phrase "fetal position" refers to the observation of the position of the fetus in the uterus.]                                                                                                                                                                                                                                                                  | 7::18460   | 477212    |
| lordoticPosition        | In the <b>lordotic position</b> , the patient is leaning backward.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 7::18461   | 477213    |

#### A.3.2.4 System Package

*Insert the following two rows into Table A.3.2.4.1, as well as the Description/Definition column:*

**Table A.3.2.4.1—Object-oriented modeling elements—System Package—object class items**

| DIM name                      | RefId                | Derived from | Part::Code | Description/Definition                                                  |
|-------------------------------|----------------------|--------------|------------|-------------------------------------------------------------------------|
| «Wired Network Controller»    | MDC_MOC_NCC_WIRED    | Top          | 1::83      | Network Communication Controller, IP-based, wired (typically Ethernet). |
| «Wireless Network Controller» | MDC_MOC_NCC_WIRELESS | Top          | 1::84      | Network Communication Controller, IP-based, wireless.                   |

*Insert the following five rows into Table A.3.2.4.2, as well as the Description/Definition, UOM\_MDC, and UOM\_UCUM columns, and insert Table A.3.2.4.2.1, Table A.3.2.4.2.2, Table A.3.2.4.2.3, and the NOTE (and its footnotes) immediately afterward. Renumber footnotes accordingly:*

**Table A.3.2.4.2—Object-oriented modeling elements—System Package—attributes**

| DIM name                            | RefID                              | Derived from    | Part::Code | Description/Definition                                                                                                                | UOM_MDC         | UOM_UCUM     |
|-------------------------------------|------------------------------------|-----------------|------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|
| «Battery configuration»             | MDC_ATTR_BATT_CONFIG               | Battery         | 1::2473    | Battery configuration<br>[_MDC_ATTR_BATT_CONFIG]                                                                                      |                 |              |
| «Battery Identifier»                | MDC_ATTR_BATT_IDENTIFIER           | Battery         | 1::2474    | Identifier string for a specific battery in a multiple battery device. <i>Example:</i> “A2”                                           |                 |              |
| «Charge-Cycles-Remaining»           | MDC_ATTR_BATT_CHARGE_CYCLES_REMAIN | Battery         | 1::2475    | The number of Charge Discharge cycles remaining. <i>Example:</i> “20”                                                                 | MDC_DIM_DIMLESS | {unitless} 1 |
| «Voltage»                           | MDC_ATTR_BATT_VOLTAGES             | Battery         | 1::2533    | Present battery voltages - a numeric array of the cumulative internal cell voltages, referenced to the battery negative terminal.     | MDC_DIM_VOLT    | V            |
| «Pillar assembly definition»        | MDC_ATTR_PILLAR_ASSEMBLY           | «Infusion Pump» | 1::3013    | Specification of the number, size, and orientation of pillars and their indexing directions<br>[_MDC_ATTR_PILLAR_ASSEMBLY] with PEGjs |                 |              |
| «Position within Pillar (and Rack)» | MDC_ATTR_PUMP_PILLAR_DETAILS       | «Infusion Pump» | 1::3014    | Location of pump in a Pillar (and Rack)<br>[_MDC_ATTR_PUMP_PILLAR_DETAILS] PEGjs                                                      |                 |              |

**Table A.3.2.4.2.1—Enumerated values for [\_MDC\_ATTR\_BATT\_CONFIG]**

| Enum_Values | Enum_Descriptions                                                                      | Part::Code | CF_CODE10 |
|-------------|----------------------------------------------------------------------------------------|------------|-----------|
| 1R          | Single battery, replaceable.                                                           | 7::18462   | 477214    |
| 2R          | Two batteries, independently replaceable (typical dual-battery configuration).         | 7::18463   | 477215    |
| 2SR         | Two series-connected batteries, independently replaceable (e.g., ventilator).          | 7::18464   | 477216    |
| 2PR         | Two parallel-connected batteries, independently replaceable.                           | 7::18465   | 477217    |
| 2S2PR       | Two parallel connected sets of series-connected batteries, independently replaceable.  | 7::18466   | 477218    |
| 2SR1X       | Two series-connected batteries plus external battery (e.g., ventilator or anesthesia). | 7::18467   | 477219    |

**Table A.3.2.4.2.2—Enumerated values for [MDC\_ATTR\_PILLAR\_ASSEMBLY]**

| Enum_Values                   | Enum_Descriptions                                             | Part::Code | CF_CODE10 |
|-------------------------------|---------------------------------------------------------------|------------|-----------|
| pillar-orientation-vertical   | Pillar consists of pumps/racks that are stacked vertically.   | 7::18468   | 477220    |
| pillar-orientation-horizontal | Pillar consists of pumps/racks that are stacked horizontally. | 7::18469   | 477221    |
| pillar-direction-up           | Pillar indexing increments in the “up” direction.             | 7::18470   | 477222    |
| pillar-direction-down         | Pillar indexing increments in the “down” direction.           | 7::18471   | 477223    |
| pillar-direction-right        | Pillar indexing increments from left to right.                | 7::18472   | 477224    |
| pillar-direction-left         | Pillar indexing increments from right to left.                | 7::18473   | 477225    |
| slot-rack-direction-up        | Pump slot/rack indexing increments in the “up” direction.     | 7::18474   | 477226    |
| slot-rack-direction-down      | Pump slot/rack indexing increments in the “down” direction.   | 7::18475   | 477227    |
| slot-rack-direction-right     | Pump slot/rack indexing increments from left to right.        | 7::18476   | 477228    |
| slot-rack-direction-left      | Pump slot/rack indexing increments from right to left.        | 7::18477   | 477229    |

**Table A.3.2.4.2.3—PEGjs for [MDC\_ATTR\_PILLAR\_ASSEMBLY]**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>pegjs = ( (' PillarAssembly '))<br/> PillarAssembly = ( NumberOfPillars ' , ' NumberOfRacksInPillars ' , ' NumberOfSlotsInPillars ' , ' PillarOrientation ' , ' PillarDirection ' , ' SlotRackDirection ' )<br/> NumberOfPillars = ( [0-9]+ / 'NA' )<br/> NumberOfRacksInPillars = ( ( (' [0-9]+ ' , ' [0-9]+ ' ) ) / 'NA' )<br/> NumberOfSlotsInPillars = ( ( (' [0-9]+ ' , ' [0-9]+ ' ) ) / 'NA' )<br/> PillarOrientation = ( 'pillar-orientation-vertical' / 'pillar-orientation-horizontal' / 'NA' )<br/> PillarDirection = ( 'pillar-direction-up' / 'pillar-direction-down' / 'pillar-direction-right' / 'pillar-direction-left' )<br/> SlotRackDirection = ( 'slot-rack-direction-up' / 'slot-rack-direction-down' / 'slot-rack-direction-right' / 'slot-rack-direction-left' )<br/> <i>Example value:</i> (2, (3,2), (12,8), pillar-orientation-vertical, pillar-direction-right, slot-rack-direction-up)</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table A.3.2.4.2.4—PEGjs for [MDC\_ATTR\_PUMP\_PILLAR\_DETAILS]**

|                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>pegjs = ( (' PillarDetails '))<br/> PillarDetails = ( PillarIndex ' , ' RackIndex ' , ' RackSlotIndex ' , ' PillarSlotIndex ' )<br/> PillarIndex = ( [0-9]+ / 'NA' )<br/> RackIndex = ( [0-9]+ / 'NA' )<br/> RackSlotIndex = ( [0-9]+ / 'NA' )<br/> PillarSlotIndex = ( [0-9]+ / 'NA' )<br/> <i>Example value:</i> (2, 2, 3, NA)</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

NOTE—A detailed explanation with examples and diagrams of MDC\_ATTR\_PILLAR\_ASSEMBLY and MDC\_ATTR\_PUMP\_PILLAR\_DETAILS is provided by the IHE PCD DEC Technical Framework [B7].<sup>4, 5, 6</sup>

<sup>4</sup> The PEGjs Parsing Expression Grammar parser, validator, documentation, and source code are available at <http://pegjs.org/online/>.

<sup>5</sup> The numbers in brackets correspond to those of the bibliography in Annex L.

<sup>6</sup> Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

*Insert the following table after Table A.3.2.4.5:*

**Table A.3.2.4.6—Object-oriented modeling elements—System Package—additional object class items**

| DIM name            | RefID          | Belongs to object                           | Part::Code | Description/Definition                                                                                                     |
|---------------------|----------------|---------------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------|
| «Battery (generic)» | MDC_OBJ_BATT   | MDC_MOC_BATT or other VMD or derived object | 1::1024    | Individual battery (generic, single or multiple independently replaceable batteries, each consisting of one or more cells) |
| «Battery 1»         | MDC_OBJ_BATT_1 |                                             | 1::1025    | Individual battery 1                                                                                                       |
| «Battery 2»         | MDC_OBJ_BATT_2 |                                             | 1::1026    | Individual battery 2                                                                                                       |
| «Battery 3»         | MDC_OBJ_BATT_3 |                                             | 1::1027    | Individual battery 3                                                                                                       |
| «Battery 4»         | MDC_OBJ_BATT_4 |                                             | 1::1028    | Individual battery 4                                                                                                       |
| «Battery 5»         | MDC_OBJ_BATT_5 |                                             | 1::1029    | Individual battery 5                                                                                                       |
| «Battery 6»         | MDC_OBJ_BATT_6 |                                             | 1::1030    | Individual battery 6                                                                                                       |
| «Battery 7»         | MDC_OBJ_BATT_7 |                                             | 1::1031    | Individual battery 7                                                                                                       |
| «Battery 8»         | MDC_OBJ_BATT_8 |                                             | 1::1032    | Individual battery 8                                                                                                       |
| «Battery 9»         | MDC_OBJ_BATT_9 |                                             | 1::1033    | Individual battery 9                                                                                                       |
| «External battery»  | MDC_OBJ_BATT_X |                                             | 1::1034    | Individual battery (external)                                                                                              |

*Insert the following subclause as A.3.2.13 after A.3.2.12. Renumber the existing subclause A.3.2.13 to A.3.2.14 and the existing subclause A.3.2.14 to A.3.2.16 (see the new subclause A.3.2.15 below). Renumber all tables in these subclauses accordingly:*

### A.3.2.13 Object-oriented modeling elements MEM-DMC object class items

The following attributes are deployed under MDC\_MOC\_NCC\_WIRED and MDC\_MOC\_NCC\_WIRELESS wired and wireless IP-based Network Communication Controllers to support the IHE PCD Medical Equipment Management Device Management Control (MEM-DMC) supplements and profiles.

**Table A.3.2.13.1—Object-oriented modeling elements—MEM-DMC NCC-Wired—attributes**

| RefID                                     | Common term                          | Description/Definition                                                                                                                                                                                  | Part::Code |
|-------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| MDC_NCC_WIRED_STATE                       | Wired NCC State                      | Wired NCC State of the device [_MDC_NCC_WIRED_STATE]                                                                                                                                                    | 1::3840    |
| MDC_NCC_WIRED_DHCP_ENABLED                | Wired DHCP Enabled                   | True if wired NCC IP address assigned via DHCP, False if using a static IP [_BOOL]                                                                                                                      | 1::3841    |
| MDC_NCC_WIRED_DEVICE_IPV4_ADDR            | Wired device IPv4 Address            | Wired device IPv4 Address. Example: "192.168.0.121"                                                                                                                                                     | 1::3842    |
| MDC_NCC_WIRED_GATEWAY_IPV4_ADDR           | Wired gateway IPv4 Address           | Wired gateway IPv4 Address. Example: "192.168.0.1" (optional if active)                                                                                                                                 | 1::3843    |
| MDC_NCC_WIRED_DEVICE_IPV4_SUBNET_MASK     | Wired IPv4 Subnet Mask               | Wired IPv4 Subnet Mask. Example: "255.255.255.0" (optional if active)                                                                                                                                   | 1::3844    |
| MDC_NCC_WIRED_DEVICE_IPV6_ADDR_LINK_LOCAL | Wired device IPv6 Link Local Address | Wired IPv6 Link Local Address, a non-routable (L2 or L3 only) IP address that is self-generated by the device, typically derived from its MAC (EUI-64) identifier. Example: "FE80::C001:37FF:FE6C:1234" | 1::3845    |
| MDC_NCC_WIRED_DEVICE_IPV6_ADDR            | Wired device IPv6 Address            | Wired device IPv6 Address. Example: "2001:DB8:0:12:C001:37FF:FE6C:1234"                                                                                                                                 | 1::3846    |
| MDC_NCC_WIRED_GATEWAY_IPV6_ADDR           | Wired gateway IPv6 Address           | Wired gateway IPv6 Address. Example: "FE80::C001:37FF:FE6C:1239" (optional if active, may be a link local or global address)                                                                            | 1::3847    |
| MDC_NCC_WIRED_MAC                         | Wired MAC                            | MAC address of the Wired network adapter                                                                                                                                                                | 1::3848    |

**Table A.3.2.13.1.1—Enumerated values for [\_BOOL]**

| Enum_Values                                                                                                                                                                                                                                                               | Enum_Descriptions                                      | Part::Code | CF_CODE10 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------|-----------|
| true 1                                                                                                                                                                                                                                                                    | The "true" or "active" state for a Boolean variable    | 7::18432   | 477184    |
| false 0                                                                                                                                                                                                                                                                   | The "false" or "inactive" state for a Boolean variable | 7::18433   | 477185    |
| NOTE—Multiple synonym tokens may be listed, separated by a space ' ' (ASCII 0x20). The first-listed token is the preferred token and is used for constructing an equivalent Reference ID, e.g., 'MDC_ENUMGV_BOOL_true', that may be used in messages (see Table C.4.6.1). |                                                        |            |           |

**Table A.3.2.13.1.2—Enumerated values for [\_MDC\_NCC\_WIRED\_STATE]**

| Enum_Values   | Enum_Descriptions                                                            | Part::Code | CF_CODE10 |
|---------------|------------------------------------------------------------------------------|------------|-----------|
| Configured    | Device is configured for a wired (Ethernet) connection but it is not active. | 7::18478   | 477230    |
| NotConfigured | Device is not configured for a wired (Ethernet) connection.                  | 7::18479   | 477231    |
| Active        | Device's wired (Ethernet) connection is active.                              | 7::18480   | 477232    |

**Table A.3.2.13.2—Object-oriented modeling elements—MEM-DMC NCC-Wireless—attributes (multipage table)**

| RefId                                        | Common term                             | Description/Definition                                                                                                                                                                                      | Part::Code |
|----------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| MDC_NCC_WIRELESS_STATE                       | Wireless NCC State                      | Wireless NCC State of the device.<br>[_MDC_NCC_WIRELESS_STATE]                                                                                                                                              | 1::3872    |
| MDC_NCC_WIRELESS_DHCP_ENABLED                | Wireless DHCP Enabled                   | True if IP address assigned via DHCP, False if using a static IP.<br>[_BOOL]                                                                                                                                | 1::3873    |
| MDC_NCC_WIRELESS_DEVICE_IPV4_ADDR            | Wireless device IPv4 Address            | Wireless device IPv4 Address. Example: "192.168.0.121".                                                                                                                                                     | 1::3874    |
| MDC_NCC_WIRELESS_GATEWAY_IPV4_ADDR           | Wireless gateway IPv4 Address           | Wireless gateway IPv4 Address. Example: "192.168.0.1"<br>(optional if active).                                                                                                                              | 1::3875    |
| MDC_NCC_WIRELESS_DEVICE_IPV4_SUBNET_MASK     | Wireless IPv4 Subnet Mask               | Wireless IPv4 Subnet Mask. Example: "255.255.255.0"<br>(optional if active).                                                                                                                                | 1::3876    |
| MDC_NCC_WIRELESS_DEVICE_IPV6_ADDR_LINK_LOCAL | Wireless device IPv6 Link Local Address | Wireless IPv6 Link Local Address, a non-routable (L2 or L3 only) IP address that is self-generated by the device, typically derived from its MAC (EUI-64) identifier. Example: "FE80::C001:37FF:FE6C:1234". | 1::3877    |
| MDC_NCC_WIRELESS_DEVICE_IPV6_ADDR            | Wireless device IPv6 Address            | Wireless device IPv6 Address. Example: "2001:DB8:0:12:C001:37FF:FE6C:1234".                                                                                                                                 | 1::3878    |
| MDC_NCC_WIRELESS_GATEWAY_IPV6_ADDR           | Wireless gateway IPv6 Address           | Wireless gateway IPv6 Address. Example: "FE80::C001:37FF:FE6C:1239" (optional if active, may be a link local or global address).                                                                            | 1::3879    |
| MDC_NCC_WIRELESS_MAC                         | Wireless MAC                            | MAC address of the Wireless network adapter.                                                                                                                                                                | 1::3880    |
| MDC_NCC_WIRELESS_SSID                        | SSID                                    | The wireless network name (SSID) of the active wireless network.                                                                                                                                            | 1::3881    |
| MDC_NCC_WIRELESS_AUTH                        | Authentication Method                   | Authentication Method of the active wireless network.<br>[_MDC_NCC_WIRELESS_AUTH]                                                                                                                           | 1::3882    |
| MDC_NCC_WIRELESS_ENCRYPT                     | WPA Encryption Method                   | Encryption Method of the active wireless network.<br>[_MDC_NCC_WIRELESS_ENCRYPT]                                                                                                                            | 1::3883    |

**Table A.3.2.13.2—Object-oriented modeling elements—MEM-DMC NCC-Wireless—attributes** (*multipage table*)

| RefId                              | Common term       | Description/Definition                                                 | Part::Code |
|------------------------------------|-------------------|------------------------------------------------------------------------|------------|
| MDC_NCC_WIRELESS_BAND              | Band              | Radio band of the active wireless network.<br>[_MDC_NCC_WIRELESS_BAND] | 1::3884    |
| MDC_NCC_WIRELESS_NOISE             | Noise Level       | NoiseLevel of the active wireless network.                             | 1::3885    |
| MDC_NCC_WIRELESS_CHANNEL_BANDWIDTH | Channel Bandwidth | Channel Bandwidth of the active wireless network.                      | 1::3886    |
| MDC_NCC_WIRELESS_CHANNEL           | Wireless Channel  | Wireless Channel of the active wireless network.                       | 1::3887    |
| MDC_NCC_WIRELESS_STRENGTH          | Wireless Strength | Wireless Strength of the active wireless network.                      | 1::3888    |
| MDC_NCC_WIRELESS_STRENGTH_PERCENT  | Wireless Strength | Wireless Strength Percent of the active wireless network.              | 1::3889    |
| MDC_NCC_WIRELESS_ACCESS_POINT_MAC  | Access Point MAC  | MAC Address of Access point the device is connected to.                | 1::3890    |
| MDC_NCC_WIRELESS_TXRATE            | Tx Rate           | Transmit Rate of the active wireless network.                          | 1::3891    |
| MDC_NCC_WIRELESS_TXPOWER           | Tx Power          | Transmit Power of the active wireless network.                         | 1::3892    |

**Table A.3.2.13.2.1—Enumerated values for [\_MDC\_NCC\_WIRELESS\_STATE]**

| Enum_Values   | Enum_Descriptions                                                             | Part::Code | CF_CODE10 |
|---------------|-------------------------------------------------------------------------------|------------|-----------|
| Configured    | Device is configured for a wireless network connection, but it is not active. | 7::18481   | 477233    |
| NotConfigured | Device is not configured for a wireless network connection.                   | 7::18482   | 477234    |
| Active        | Device's wireless network connection is active.                               | 7::18483   | 477235    |

**Table A.3.2.13.2.2—Enumerated values for [\_MDC\_NCC\_WIRELESS\_AUTH]**

| Enum_Values                                                                                                                                 | Enum_Descriptions                                                                                  | Part::Code | CF_CODE10 |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------|-----------|
| OPEN                                                                                                                                        | No security                                                                                        | 7::18484   | 477236    |
| WEP                                                                                                                                         | Wired Equivalent Privacy                                                                           | 7::18485   | 477237    |
| WPA-PSK                                                                                                                                     | Wi-Fi Protected Access® (WPA™) – Pre-shared key exchange                                           | 7::18486   | 477238    |
| WPA-ENT                                                                                                                                     | Wi-Fi Protected Access (WPA) – Enterprise authentication                                           | 7::18487   | 477239    |
| WPA2-PSK                                                                                                                                    | Wi-Fi Protected Access II (WPA2™) – Pre-shared key exchange                                        | 7::18488   | 477240    |
| WPA2-ENT                                                                                                                                    | Wi-Fi Protected Access II (WPA2) – Enterprise authentication                                       | 7::18489   | 477241    |
| WPA3-PSK                                                                                                                                    | Wi-Fi Protected Access 3 (WPA3™) – Personal mode, Simultaneous Authentication of Equals (WPA3-SAE) | 7::18490   | 477242    |
| WPA3-ENT                                                                                                                                    | Wi-Fi Protected Access 3 (WPA3) – Enterprise authentication                                        | 7::18491   | 477243    |
| NOTE—Wi-Fi Protected Access® is a registered trademark of the Wi-Fi Alliance®. WPA™, WPA2™, and WPA3™ are trademarks of the Wi-Fi Alliance. |                                                                                                    |            |           |

**Table A.3.2.13.2.3—Enumerated values for [\_MDC\_NCC\_WIRELESS\_ENCRYPT]**

| Enum_Values | Enum_Descriptions                                                               | Part::Code | CF_CODE10 |
|-------------|---------------------------------------------------------------------------------|------------|-----------|
| CCMP        | Counter Cipher Mode Protocol (CCMP, also known as AES CCMP) encryption protocol | 7::18492   | 477244    |
| TKIP        | Temporal Key Integrity Protocol (TKIP, now deprecated by WPA2 and later)        | 7::18493   | 477245    |
| AES_CCM_128 | AES_CCM_128 encryption method                                                   | 7::18494   | 477246    |
| AES_GCM_256 | AES_GCM_256 encryption method                                                   | 7::18495   | 477247    |

**Table A.3.2.13.2.4—Enumerated values for [\_MDC\_NCC\_WIRELESS\_BAND]**

| Enum_Values | Enum_Descriptions                                                                   | Part::Code | CF_CODE10 |
|-------------|-------------------------------------------------------------------------------------|------------|-----------|
| 2.4GHz      | Device is using the 2.4GHz band for its wireless network connection                 | 7::18496   | 477248    |
| 5GHz        | Device is using the 5GHz band for its wireless network connection                   | 7::18497   | 477249    |
| 2.4-5GHz    | Device is using the 2.4 and 5GHz bands for its wireless network connection          | 7::18498   | 477250    |
| 6GHz        | Device is using the 6GHz band for its wireless network connection                   | 7::18696   | 477448    |
| 2.4-5-6GHz  | Device is using the 2.4GHz, 5GHz and 6GHz bands for its wireless network connection | 7::18697   | 477449    |

*Insert the following five rows into the renumbered Table A.3.2.14.2:*

**Table A.3.2.14.2—Object-oriented modeling elements—USI—attributes**

| Description                                                                                                                                                             | RefId                              | Belongs to object | Part::Code |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------|------------|
| Continuous and episodic observations                                                                                                                                    | MDC_OBS_CTS                        |                   | 1::3587    |
| Non-continuous observations (of any type)                                                                                                                               | MDC_OBS_NONCTS                     |                   | 1::3588    |
| Settings, ambient measurements and additional detailed patient demographic and other information common to a sequence of observation sets that follow                   | MDC_OBS_INITIAL                    |                   | 1::3589    |
| Summary and statistical measurements, observations and clinician observations and notes reported at the end of a sequence of maneuvers, procedures and diagnostic tests | MDC_OBS_SUMMARY                    |                   | 1::3590    |
| Medical Equipment Management observation set                                                                                                                            | MDC_OBS_MEM                        |                   | 1::3599    |
| The patient to device association observation set used when transmitting association and disassociation reports                                                         | MDC_OBS_ASSOCIATION_PATIENT_DEVICE |                   | 1::3600    |
| The device to device association observation set used when transmitting association and disassociation reports                                                          | MDC_OBS_ASSOCIATION_DEVICE_DEVICE  |                   | 1::3601    |

*Insert the following subclause as A.3.2.15 after the renumbered A.3.2.14 and before the newly renumbered A.3.2.16:*

### **A.3.2.15 HL7 V2 QPD-1 Message Query Name identifiers**

This subclause includes nomenclature to support the HL7 V2 QPD-1 Query Parameter Definition Message Query Name identifiers where both the query request and response conform to a previously defined message profile and content model.

**Table A.3.2.15.1—Object-oriented modeling elements—QPD—message query name identifiers**

| Description/Definition                 | RefId                   | Common term                            | Part::Code |
|----------------------------------------|-------------------------|----------------------------------------|------------|
| Hemodialysis Prescription Query        | MDC_QRY_HDIALY_RX_QUERY | Hemodialysis Prescription Query        | 1::3648    |
| Peritoneal Dialysis Prescription Query | MDC_QRY_PDIALY_RX_QUERY | Peritoneal Dialysis Prescription Query | 1::3649    |

*Change the titles for Clause A.5 and Table A.5.1 as follows. Insert the following term rows into Table A.5.1, and rearrange the columns for the entire table as shown:*

**A.5 Nomenclature, data dictionary, and codes for vital signs, diagnostic and therapeutic devices (Partition 1)**

**Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices (multipage table)**

| Systematic name                                                            | RefId                         | Common term                                          | Description/Definition                                                                                                                                     | Part::Code |
|----------------------------------------------------------------------------|-------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| System   Location Services (of people or things)   Infrastructure   <type> | MDC_DEV_LS                    | Location services                                    | Location services.                                                                                                                                         | 1::5332    |
| System   Breathing   Ventilator   <type>                                   | MDC_DEV_SYS_BREATHING_PT_VENT | Breathing system, ventilator                         | Breathing system, ventilator.                                                                                                                              | 1::5336    |
| System   Breathing   Anesthesia   <type>                                   | MDC_DEV_SYS_BREATHING_ANESTH  | Breathing system, anesthesia                         | Breathing system, anesthesia.                                                                                                                              | 1::5340    |
| System   Clinical Decision Support   Ventilator   <type>                   | MDC_DEV_CDS_VENT              | Clinical decision support, ventilator                | Clinical decision support, ventilator.                                                                                                                     | 1::5344    |
| Analyzer and Generator   Neuromuscular Blockade   Nerve   <type>           | MDC_DEV_NMT                   | NMT Neuromuscular Muscular Transmission (NMT)        | Instrument that measures the degree of neuromuscular blockade by stimulating a peripheral nerve and measuring the response.                                | 1::5348    |
| Analyzer   Neuromuscular Blockade   Train-of-four   <type>                 | MDC_DEV_NMT_TOF               | NMT Train of Four (TOF) observations                 | NMT Train of Four (TOF) observations.                                                                                                                      | 1::5352    |
| Analyzer   Neuromuscular Blockade   Double-burst   <type>                  | MDC_DEV_NMT_DBS               | NMT Double Burst Stimulus (DBS) observations         | NMT Double Burst Stimulus (DBS) observations.                                                                                                              | 1::5356    |
| Analyzer   Neuromuscular Blockade   Single-Twitch   <type>                 | MDC_DEV_NMT_STW               | NMT Single Twitch Stimulus (STW) observations        | NMT Single Twitch Stimulus (STW) observations.                                                                                                             | 1::5360    |
| Analyzer   Neuromuscular Blockade   Post-Tetanic Count   <type>            | MDC_DEV_NMT_PTC               | NMT Post-Tetanic Count (PTC) observations            | NMT Post-Tetanic Count (PTC) observations.                                                                                                                 | 1::5364    |
| Analyzer   Neuromuscular Blockade   Tetanic   <type>                       | MDC_DEV_NMT_TET               | NMT Tetanic (TET) stimulation observations           | NMT Tetanic (TET) stimulation observations.                                                                                                                | 1::5368    |
| Analyzer   Neuromuscular Blockade   Monitoring, General   <type>           | MDC_DEV_NMT_MON               | NMT monitoring general information                   | NMT monitoring general information.                                                                                                                        | 1::5372    |
| Generator   Neuromuscular Blockade   Stimulator   <type>                   | MDC_DEV_NMT_STIM              | NMT Stimulator                                       | NMT Stimulator.                                                                                                                                            | 1::5376    |
| Analyzer   Concentration [Sat O <sub>2</sub> ]   Brain, Regional   <type>  | MDC_DEV_ANALY_SAT_O2_REGIONAL | Regional Brain Oxygen Saturation (rSO <sub>2</sub> ) | Instrument that continuously and non-invasively monitors oxygen saturation in cerebral or other deep tissue sites using near-infrared spectroscopy (NIRS). | 1::5380    |

**Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices** (*multipage table*)

| Systematic name                                                                                                 | RefId                                         | Common term                   | Description/Definition                                                                                                                                                                                 | Part::Code |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Calculator   Hemodynamic Response   Surgical stimuli and analgesic medication under general anesthesia   <type> | MDC_DEV_CALC_SURGICAL_PLETH_INDEX             | Surgical Pleth Index          | Surgical Pleth Index, indicating the hemodynamic response to surgical stimuli and analgesic medication under general anesthesia.                                                                       | 1::5384    |
| Sensor, Drop   Infusion     <type>                                                                              | MDC_DEV_DROP_SENSOR                           | Infusion drop or drip sensor  | Infusion drop or drip sensor, a flow rate sensor typically used with infusion pumps to verify accurate flow rate above or below the programmed settings, free-flow and IV bag/bottle empty conditions. | 1::5388    |
| Pump, Rack   Infusion     MDS                                                                                   | MDC_DEV_PUMP_INFUS_RACK_MDS                   | Pump Rack MDS                 | The rack device that houses, or is intended to house, zero-or-more pump devices.                                                                                                                       | 1::4565    |
| Pump   Infusion   Large Volume   MDS                                                                            | MDC_DEV_PUMP_INFUS_LVP_MDS                    | LVP Pump MDS                  | LVP infusion pump MDS device identifier.                                                                                                                                                               | 1::4513    |
| Pump   Infusion   Syringe   MDS                                                                                 | MDC_DEV_PUMP_INFUS_SYRINGE_MDS                | Syringe Pump MDS              | Syringe infusion pump MDS device identifier.                                                                                                                                                           | 1::4517    |
| Pump   Infusion   Patient Controlled Analgesia   MDS                                                            | MDC_DEV_PUMP_INFUS_PCA_MDS                    | PCA Pump MDS                  | PCA infusion pump MDS device identifier.                                                                                                                                                               | 1::4521    |
| Pump   Infusion   Patient Controlled Analgesia, Syringe   MDS                                                   | MDC_DEV_PUMP_INFUS_PCA_SYRINGE_MDS            | PCA Syringe infusion pump MDS | PCA device using a syringe pump mechanism.                                                                                                                                                             | 1::4525    |
| Pump   Infusion   Large Volume   VMD                                                                            | MDC_DEV_PUMP_INFUS_LVP_VMD                    | LVP Infusion Pump             | Infusion pump VMD type for LVPs.                                                                                                                                                                       | 1::4514    |
| Pump   Infusion   Syringe   VMD                                                                                 | MDC_DEV_PUMP_INFUS_SYRINGE_VMD                | Syringe Infusion Pump         | Infusion pump VMD type for syringe devices.                                                                                                                                                            | 1::4518    |
| Pump   Infusion   Patient Controlled Analgesia   VMD                                                            | MDC_DEV_PUMP_INFUS_PCA_VMD                    | PCA Infusion Pump             | Infusion pump VMD type for PCAs.                                                                                                                                                                       | 1::4522    |
| Pump   Infusion   Patient Controlled Analgesia, Syringe   VMD                                                   | MDC_DEV_PUMP_INFUS_PCA_SYRINGE_VMD            | PCA Infusion Pump             | Infusion pump VMD type for PCAs with a syringe delivery mechanism.                                                                                                                                     | 1::4526    |
| Pump   Infusion   Delivery Information   Channel, Info                                                          | MDC_DEV_PUMP_DELIVERY_INFO                    | Pump Delivery Info            | Contains parameters that describe the overall operation of the infusion device, as well as characterize the distal administration of fluid to the patient.                                             | 1::4531    |
| Pump   Infusion   Primary Infusate Information   Channel                                                        | MDC_DEV_PUMP_INFUSATE_SOURCE_PRIMARY_C<br>HAN | Primary Infusate Source       | Contains parameters that describe the administration settings and status for the primary infusate. [Note: If there is only one source, the source is the primary source.]                              | 1::4535    |

**Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices** (*multipage table*)

| Systematic name                                                              | RefId                                       | Common term               | Description/Definition                                                                                                                         | Part::Code |
|------------------------------------------------------------------------------|---------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Pump   Infusion   Secondary Infusate Information   Channel                   | MDC_DEV_PUMP_INFUSATE_SOURCE_SECONDARY_CHAN | Secondary Infusate Source | Contains parameters that describe the administration settings and status for the secondary infusate.                                           | 1::4539    |
| Pump   Infusion   Piggyback Infusate Information   Channel                   | MDC_DEV_PUMP_INFUSATE_SOURCE_PIGGYBACK_CHAN | Piggyback Infusate Source | Information related to the piggyback infusate source, when present.                                                                            | 1::4563    |
| Pump   Infusion   Syringe-based Infusate Information   Channel, Info         | MDC_DEV_PUMP_SYRINGE_INFO                   | Syringe Info              | Information related to a syringe-based infusate delivery.                                                                                      | 1::4555    |
| Pump   Infusion   Clinician-initiated bolus dose Information   Channel, Info | MDC_DEV_PUMP_CLINICIAN_DOSE_INFO            | Clinician Dose Info       | Contains parameters that describe the administration settings and status for a clinician-initiated bolus dose.                                 | 1::4543    |
| Pump   Infusion   Loading dose Information   Channel, Info                   | MDC_DEV_PUMP_LOADING_DOSE_INFO              | Loading Dose Info         | Contains parameters that describe the administration settings and status for a dose administered at initiation of an infusate delivery.        | 1::4547    |
| Pump   Infusion   Patient Controlled Analgesia (PCA) Therapy   Channel, Info | MDC_DEV_PUMP_PCA_INFO                       | PCA Info                  | Contains parameters that describe the administration settings and status for Patient Controlled Analgesia (PCA) therapy.                       | 1::4559    |
| Pump   Infusion   Intermittent therapy Information   Channel, Info           | MDC_DEV_PUMP_INTERMITTENT_DOSE_INFO         | Intermittent Dose Info    | Contains parameters that describe the administration settings and status for an intermittent therapy (multi-dosing).                           | 1::4551    |
| Pump   Infusion   Pump Priming Information   Channel, Info                   | MDC_DEV_PUMP_PRIMING_INFO                   | Priming Info              | Contains parameters that describe administration settings and status for priming of the infusion line.                                         | 1::4571    |
| System   Dialysis     MDS                                                    | MDC_DEV_HDIALY_MACHINE_MDS                  | Hemodialysis machine      | A device or system used to treat renal failure delivered by removing toxins from the blood through an artificial kidney, called a dialyzer.    | 1::5393    |
| Device   Dialysis     VMD                                                    | MDC_DEV_HDIALY_VMD                          | Hemodialysis subsystem    | A device or subsystem used to treat renal failure delivered by removing toxins from the blood through an artificial kidney, called a dialyzer. | 1::5398    |

**Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices** (*multipage table*)

| Systematic name                                                    | RefId                                | Common term                     | Description/Definition                                                                                                                                                                                             | Part::Code |
|--------------------------------------------------------------------|--------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Subsystem   Dialysis   Machine Configuration   Channel             | MDC_DEV_HDIALY_MACH_CONFIG_CHAN      | Hemodialysis configuration      | The principal dialysis machine operational modes, treatment modality, settings and other information about the dialysis machine.                                                                                   | 1::5403    |
| Subsystem   Dialysis, Hemodialysis   Pump, Anticoagulant   Channel | MDC_DEV_HDIALY_ANTICOAG_PUMP_CHAN    | Hemodialysis anticoagulant pump | The operational mode, status, profiles and settings related to the delivery of anticoagulants into the patient's blood.                                                                                            | 1::5407    |
| Subsystem   Dialysis, Hemodialysis   Blood Pump   Channel          | MDC_DEV_HDIALY_BLOOD_PUMP_CHAN       | Hemodialysis patient blood pump | The observations and settings related to the pressure, flow rate, temperature and conductivity of the patient's blood.                                                                                             | 1::5411    |
| Subsystem   Dialysis, Hemodialysis   Fluid Pump   Channel          | MDC_DEV_HDIALY_FLUID_CHAN            | Dialysate                       | The observations and settings related to fluid chemistry and pressures, flow rates, temperature and conductivity of the dialysate solution.                                                                        | 1::5415    |
| Subsystem   Dialysis, Hemodialysis   Filter   Channel              | MDC_DEV_HDIALY_FILTER_CHAN           | Hemodialysis filter             | The identity and observations related to the hemodialysis filter, the replaceable semi-permeable membrane filter that removes toxins from the blood and transport of other solutes by diffusion and/or convection. | 1::5419    |
| Subsystem   Dialysis, Hemodialysis   Convective Pump   Channel     | MDC_DEV_HDIALY_CONVECTIVE_CHAN       | Hemodialysis convective channel | The observations and settings related to convective clearance of solutes out of the blood compartment along with movement of water and/or ultrafiltration.                                                         | 1::5423    |
| Subsystem   Dialysis, Hemodialysis   Safety   Channel              | MDC_DEV_HDIALY_SAFETY_SYSTEMS_CHAN   | Hemodialysis safety system      | Dialysis system safety events, not covered by other subsystems.                                                                                                                                                    | 1::5427    |
| Subsystem   Dialysis, Hemodialysis   Therapy Outcomes   Channel    | MDC_DEV_HDIALY_THERAPY_OUTCOMES_CHAN | Hemodialysis therapy outcomes   | Dialysis system patient treatment events, not covered by other subsystems.                                                                                                                                         | 1::5431    |
| Subsystem   Dialysis, Hemodialysis   Ultrafiltration   Channel     | MDC_DEV_HDIALY_UF_CHAN               | Hemodialysis ultrafiltration    | The observations, settings and events related to the removal of fluid from the patient (aka ultrafiltration).                                                                                                      | 1::5435    |
| Device   Multiparameter, Multimethod   Blood Chemistry   <type>    | MDC_DEV_BLOOD_CHEM                   | Blood Chemistry Monitor         | Blood chemistry monitor that may include multiple analytes and multiple acquisition, analysis and data capture methods (e.g., optical, ultrasound) and may include manually entered measurements.                  | 1::5436    |

**Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices** (*multipage table*)

| Systematic name                                                                                                                           | RefId                                  | Common term                                                                                     | Description/Definition                                                                                                                                                                                                                      | Part::Code |
|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Device   Multiparameter, Multimethod   Blood Chemistry   MDS                                                                              | MDC_DEV_BLOOD_CHEM_MDS                 | Blood Chemistry Monitor MDS                                                                     | Blood chemistry monitor, standalone device or instrument.                                                                                                                                                                                   | 1::5437    |
| Device or Subsystem   Multiparameter, Multimethod   Blood Chemistry   VMD                                                                 | MDC_DEV_BLOOD_CHEM_VMD                 | Blood Chemistry Monitor VMD                                                                     | Blood chemistry monitor, analyzer or module.                                                                                                                                                                                                | 1::5438    |
| Subsystem   Multiparameter, Multimethod   Blood Chemistry   Channel                                                                       | MDC_DEV_BLOOD_CHEM_CHAN                | Blood Chemistry Monitor Channel                                                                 | Blood chemistry monitor, parameter or analyte channel.                                                                                                                                                                                      | 1::5439    |
| Analyzer + Regulator   Electrical Activity, Diaphragm + Pressure, Lung   Neurally Adjusted Ventilatory Assist (NAVA)   Ventilator, <type> | MDC_DEV_ANALY_NAVA_ELEC_POTL_DIAPHRAGM | Neurally Adjusted Ventilatory Assist using the electrical activity of the diaphragm (NAVA EDI). | Instrument that derives diaphragm electrical activity to support neurally adjusted ventilatory assist.                                                                                                                                      | 1::5440    |
| Regulator, High Frequency Ventilator   Multi-Parameter   Lung   <type>                                                                    | MDC_DEV_SYS_PT_VENT_HFV                | High Frequency Ventilation                                                                      | Instrument for data acquisition, analysis and therapy for the lung system at rates greater than 60 breaths/minute using high-frequency jet ventilation or high-frequency oscillation, possibly in conjunction with traditional ventilation. | 1::5444    |
| Calculator   Multi-Parameter   Metabolics   <type>                                                                                        | MDC_DEV_CALC_METABOLICS                | Metabolics                                                                                      | Instrument for analysis, measurement (or estimate) of expended energy using indirect calorimetry based on O2 consumption and CO2 production by the patient, measured over a period of time.                                                 | 1::5448    |
| Calculator   Multi-Parameter   Work of Breathing   <type>                                                                                 | MDC_DEV_CALC_WORK_OF_BREATHING         | Work of Breathing                                                                               | Instrument for analysis, measurement (or estimate) of work expended by the patient and/or ventilator over one or more inspiratory and expiratory cycles.                                                                                    | 1::5452    |
| Regulator, High Flow Oxygen Therapy (O2, Air or HeO2)   Multi-Parameter   Lung   <type>                                                   | MDC_DEV_SYS_PT_VENT_HIFLOW             | High Flow (O2) Therapy                                                                          | Instrument for data acquisition, analysis and therapy for the lung system using a high flow nasal cannula.                                                                                                                                  | 1::5456    |
| Analyzer   Patient Breaths and Ventilator Inflations   Patient and Ventilator Interactions   <type>                                       | MDC_DEV_ANALY_BREATH_PATTERN           | Breath pattern analyzer                                                                         | Instrument or subsystem for the analysis of patient breaths and ventilator inflations and interactions between patient and ventilator.                                                                                                      | 1::5460    |

**Table A.5.1—Nomenclature and codes for vital signs, diagnostic and therapeutic devices** (*multipage table*)

| Systematic name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RefId                   | Common term                                | Description/Definition                                                                                                                                                                                          | Part::Code |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Monitor   Environmental and Ambient Conditions   Temperature, humidity, barometric pressure, ambient gases and vibration   <type>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | MDC_DEV_ENVIRON_AMBIENT | Enironmental and ambient condition monitor | Instrument or subsystem or collection of sensors used for the measurement and analysis of environmental and ambient conditions such as temperature, humidity, barometric pressure, ambient gases and vibration. | 1::5464    |
| <p>NOTE 1—This table includes specific [MVC] discriminator group expansions { _MDS, _VMD and _CHAN } as a convenience to developers, based on device containment models that have been subject to consensus review.</p> <p>NOTE 2—An _INFO channel suffix has been defined for infusion pump term groups that convey the overall operation, administration settings, and status information regarding pump operation, in contrast to near real-time observations and settings typically reported by a traditional IEEE 11073 CHAN and METRICs. Each _INFO channel term occupies an [MVC] slot at dOffset = 3 (CHAN) using the discriminator 1(0).</p> |                         |                                            |                                                                                                                                                                                                                 |            |

***Insert the following text, Table A.5.2, and NOTE after Table A.5.1:***

When transforming containment tree models between various protocols and encodings, the need may arise for a “placeholder” device object identifier. For example, when converting HL7 V2 OBX-4 dot notation to an XML containment tree, the HL7 V2 OBX-4 representation allows MDC\_ATTR attributes and other device observations to be listed at the METRIC level immediately following the top-level MDC\_DEV\_xxxx\_MDS identifier, using an OBX-4 notation of “1.0.0.#”. In this case, MDC\_DEV\_PH\_VMD and MDC\_DEV\_PH\_CHAN would be used as placeholders for the two .0. entries in an XML representation, where all levels in the containment hierarchy must be present. The placeholders can be removed when transforming the XML representation back to HL7 V2 OBX-4 dot notation. The first four MDC\_DEV\_PH\* terms follow the discriminator offset convention already defined by the [MVC] discriminator, but for this set of eight terms, the simpler 1(0) discriminator is used. The new placeholder terms immediately precede the existing MDC\_DEV object identifiers starting at 1::4096.

**Table A.5.2—Device Type placeholder**

| RefId                  | Common term             | Description/Definition                                   | Disc | Part::Code |
|------------------------|-------------------------|----------------------------------------------------------|------|------------|
| MDC_DEV_PH             | Device type placeholder | Device type placeholder, level not otherwise specified   | 1(0) | 1::4088    |
| MDC_DEV_PH_MDS         | MDS placeholder         | Device type placeholder for Medical Device System (MDS)  | 1(0) | 1::4089    |
| MDC_DEV_PH_VMD         | VMD placeholder         | Device type placeholder for Virtual Medical Device (VMD) | 1(0) | 1::4090    |
| MDC_DEV_PH_CHAN        | Channel placeholder     | Device type placeholder for Channel (CHAN)               | 1(0) | 1::4091    |
| MDC_DEV_PH_METRIC      | Metric placeholder      | Device type placeholder for Metric (METRIC)              | 1(0) | 1::4092    |
| MDC_DEV_PH_FACET       | Facet placeholder       | Device type placeholder for Facet (FACET)                | 1(0) | 1::4093    |
| MDC_DEV_PH_SUBFACET    | Subfacet placeholder    | Device type placeholder for Subfacet (SUBFACET)          | 1(0) | 1::4094    |
| MDC_DEV_PH_SUBSUBFACET | Subsubfacet placeholder | Device type placeholder for Subsubfacet (SUBSUBFACET)    | 1(0) | 1::4095    |

NOTE—The existing MDC\_DEV\_MDS (1::4097), MDC\_DEV\_VMD (1::4098), and MDC\_DEV\_CHAN (1::4099) identifiers should be used as “anonymous” device nodes that have not been assigned a specific device object identifier.

## A.6 Terminology and codes for units of measurement (Partition 4)

### A.6.4 Units of measurement

*Insert the following rows into Table A.6.4.1:*

**Table A.6.4.1—Vital signs units of measurement (multipage table)**

| Dimension<br>(not normative)                      | Dimensionality<br>(not normative) | Unit of measurement<br>(not normative)                                                 | Symbol<br>(not normative) | UOM_UCUM<br>(not normative)  | Refid                                           | Part::Code |
|---------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------|---------------------------|------------------------------|-------------------------------------------------|------------|
| Sound pressure [Bel] level                        | [Bel]                             | decibel (20 uPa)                                                                       | dB(SPL) dB                | dB[SPL]                      | MDC_DIM_DECIBEL_SPL                             | 4::7904    |
| Rate of information, bits                         | T-1                               | «magnitude» bit per second                                                             | bit/s b/s                 | bit/s                        | MDC_DIM_X_BIT_PER_SEC                           | 4::12064   |
| Rate of information, byte (8 bits)                | T-1                               | «magnitude» byte per second                                                            | Byte/s                    | By/s                         | MDC_DIM_X_BYTE_PER_SEC                          | 4::12096   |
| Rate of signalling, symbol rate                   | T-1                               | «magnitude» baud (symbols per second)                                                  | Bd                        | Bd                           | MDC_DIM_X_BAUD                                  | 4::12128   |
| Work or energy per hour                           | L2MT-2T-1                         | «magnitude» joule(s) per hour                                                          | J/h                       | J/h                          | MDC_DIM_X_JOULES_PER_HR                         | 4::12160   |
| Electrical conductivity                           | M-1L-3I2T3                        | «magnitude» Siemens per cm                                                             | S/cm                      | S/cm                         | MDC_DIM_X_SIEMENS_PER_CM                        | 4::12192   |
| Neuro Ventilatory Efficiency unit                 | L1M-1T3I                          | «magnitude» liters per microvolt                                                       | L/uV                      | L/uV                         | MDC_DIM_X_L_PER_UV                              | 4::12224   |
|                                                   | L1M-1T3I                          | milliliters per microvolt                                                              | mL/uV                     | mL/uV                        | MDC_DIM_MILLI_L_PER_UV                          | 4::12242   |
| Oxygen saturation-minutes                         | T                                 | sat % minutes                                                                          | sat-min                   | {sat}%.min %.min             | MDC_DIM_O2_SAT_PERCENT_MIN                      | 4::12256   |
| L <sup>-1</sup> MT <sup>-2</sup> (pressure)       | LMT-2L-2                          | 100 «magnitude» Pascal                                                                 | 100.Pa                    | 100.Pa                       | MDC_DIM_100_X_PASCAL                            | 4::12288   |
|                                                   | LMT-2L-2                          | 100 kilo Pascal                                                                        | 100.kPa                   | 100.kPa                      | MDC_DIM_100_KILO_PASCAL                         | 4::12291   |
| Nutritional caloric dose quantity per body weight | L2MT-2M-1                         | «magnitude» calories nutritional per kg                                                | nutr cal per kg           | [Cal]/kg                     | MDC_DIM_X_NUTR_CAL_PER_KG                       | 4::12320   |
|                                                   | L2MT-2M-1                         | milli nutritional calories per kg                                                      | milli nutr kcal per kg    | m[Cal]/kg                    | MDC_DIM_MILLI_NUTR_CAL_PER_KG                   | 4::12338   |
| Vial (container)                                  | 1                                 | Vial (container)                                                                       | Vial                      | {Vial} {Vials}               | MDC_DIM_VIAL                                    | 4::12352   |
| Enzyme catalytic activity                         | NT-1                              | «magnitude» enzyme catalytic activity (1 micromole/minute)                             | U, EU (non-US)            | U                            | MDC_DIM_X_ENZYME_CATALYTIC_ACTIVITY_UNIT        | 4::12384   |
| Enzyme catalytic activity per body weight         | NT-1M-1                           | «magnitude» enzyme catalytic activity per kg                                           | U/kg, EU/kg (non-US)      | U/kg                         | MDC_DIM_X_ENZYME_CATALYTIC_ACTIVITY_UNIT_PER_KG | 4::12416   |
| Number of sequences                               | 1                                 | number of sequences, e.g., number of low energy antitachycardia pacing (ATP) sequences | sequences, seq            | {sequences} {sequence} {seq} | MDC_DIM_SEQUENCE                                | 4::12448   |
| Number of shocks                                  | 1                                 | number of high energy defibrillation cardiac shocks.                                   | shocks                    | {shocks} {shock}             | MDC_DIM_SHOCK                                   | 4::12480   |

**Table A.6.4.1—Vital signs units of measurement** (*multipage table*)

| Dimension<br>(not normative)                   | Dimensionality<br>(not normative) | Unit of measurement<br>(not normative)                                                  | Symbol<br>(not normative) | UOM_UCUM<br>(not normative)                                         | RefId                                      | Part::Code |
|------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------|--------------------------------------------|------------|
| Number of switches between modes               | 1                                 | number of switches between modes, e.g., tracking and non-tracking cardiac pacing modes. | mode switches             | {switches} {switch}                                                 | MDC_DIM_SWITCH                             | 4::12512   |
| Relative percent                               | 1                                 | relative percent                                                                        | relative percent          | %{relative} {relative}.% %                                          | MDC_DIM_RELATIVE_PERCENT                   | 4::12544   |
| Gram-force                                     | LMT-2                             | «magnitude» gram-force                                                                  | gf                        | gf                                                                  | MDC_DIM_X_G_FORCE                          | 4::12576   |
| Work or energy per minute                      | L2MT-2T-1                         | «magnitude» joule(s) per minute                                                         | J/min                     | J/min                                                               | MDC_DIM_X_JOULES_PER_MIN                   | 4::12608   |
| Rapid Shallow Breathing Index per kg (RSBI/kg) | T-1L-3M-1                         | breaths per minute per «magnitude» liter per kg                                         | breaths/min/L/kg          | {breaths}/min/L/kg<br>{breath}/min/L/kg<br>1/min/L/kg /min/L/kg     | MDC_DIM_BREATHS_PER_MIN_PER_X_L_PER_KG     | 4::12640   |
|                                                | T-1L-3M-1                         | breaths per minute per milliliter per kg                                                | breaths/min/mL/kg         | {breaths}/min/mL/kg<br>{breath}/min/mL/kg<br>1/min/mL/kg /min/mL/kg | MDC_DIM_BREATHS_PER_MIN_PER_MILLI_L_PER_KG | 4::12658   |

NOTE—Several units of measure in this table are listed with specific decade scale factors (e.g., MILLI and \_KILO) in addition to the base \_X\_ unity-scaled unit of measure to match the original clinical or technical request for a unit of measure.

## A.7 Nomenclature, data dictionary, and codes for metrics (measurements and enumerations) (Partition 2)

### A.7.1 Nomenclature for ECG measurements

*Insert the following term row into the end of Table A.7.1.6.2, as well as the UOM\_MDC and UOM\_UCUM columns. Rearrange the columns for the entire table as shown:*

**Table A.7.1.6.2—Nomenclature and codes for ECG measurements with lead origin (multipage table)**

| Systematic name                                                        | RefId                    | Common term            | Acronym                | Description/Definition                                                                                                                                                                                                                                                                                      | Part::Code | UOM_MDC                                  | UOM_UCUM |
|------------------------------------------------------------------------|--------------------------|------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------|----------|
| ElectricalPotential   ECG <lead>, ST, baseline or median   Heart   CVS | MDC_ECG_AMPL_ST_BASELINE | ST baseline, ST median | ST baseline, ST median | Amplitude of the baseline or median ST segment at xx ms after the end of QRS complex of ECG in specified <lead>. The time point xx is defined globally by item with code MDC_ECG_TIME_ST_Jxx (2::16304). [May also be used to represent a baseline or median ST waveform segment for the specified <lead>.] | 2::35328   | MDC_DIM_MICRO_VOLT<br>MDC_DIM_MILLI_VOLT | uV<br>mV |

### A.7.3 Nomenclature, data dictionary, and codes for haemodynamic monitoring measurements

*Insert the following term rows into the end of Table A.7.3.6.1, as well as the UOM\_MDC and UOM\_UCUM columns. Rearrange the columns for the entire table as shown:*

**Table A.7.3.6.1—Nomenclature and codes for haemodynamic monitoring measurements (multipage table)**

| Systematic name                                                                                                                                                                       | RefId                      | Common term                 | Acronym | Description/Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Part::Code | UOM_MDC                    | UOM_UCUM     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|--------------|
| Index   PerMinute, Measured Continuously   Volume   Blood, LeftVentricle, CVS                                                                                                         | MDC_OUTPUT_CARD_INDEX_CTS  | Continuous Cardiac Index    | CCI     | Quantity of blood pumped by the left ventricle into the aorta per minute and divided by the body surface area (CO/BSA), measured on a continuous basis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2::18708   | MDC_DIM_L_PER_MIN_PER_M_SQ | L/min/m2     |
| Index   Surgical Pleth Index   Hemodynamic response to surgical stimuli and analgesic medication under general anesthesia   CVS, CNS                                                  | MDC_SURGICAL_PLETH_INDEX   | Surgical Pleth Index (SPI)  | SPI     | The Surgical Pleth Index, or SPI, is a dimensionless, normalized score (0–100) that may be used to monitor the patient's hemodynamic responses to surgical stimuli and analgesic medications during general anesthesia. SPI reflects the patient's responses, which result from increased sympathetic activity as a reaction to painful (nociceptive) stimuli. SPI values range from 0 to 100, with higher scores indicating higher stress level. The Surgical Pleth Index is computed as $SPI = 100 - (0.7 \cdot PPGAnorm + 0.3 \cdot HBInorm)$ , where PPGAnorm is the normalized plethysmographic pulse wave amplitude and HBInorm the normalized heart beat interval, the latter two quantities normalized by applying a histogram transformation on the raw time series data. A detailed description of the method can be found in: M. Huiku, et.al. Assessment of surgical stress during general anaesthesia British Journal of Anaesthesia 98 (4): 447–55 (2007) <a href="https://www.ncbi.nlm.nih.gov/pubmed/17329347">https://www.ncbi.nlm.nih.gov/pubmed/17329347</a> | 2::18712   | MDC_DIM_DIMLESS            | {unitless} 1 |
| Pressure, Difference   (Maximum Systolic Pressure, Minimum Systolic Pressure) following a single positive pressure breath (inflation)   Arterial Pressure Waveform   CVS, Respiratory | MDC_PRESS_BLD_SYS_VAR_DIFF | Systolic Pressure Variation | SPV     | The average value of one or more (maximum systolic pressure minus the minimum systolic pressure) difference values from an arterial pressure waveform following a single positive pressure breath. [An increase in the SPV is known to occur clinically during hypovolemia.] SPV is calculated using the following formula: $SPV = (SP_{max} - SP_{min})$ where: $SP_{max}$ = $SP_{max}(\text{systolic})$ of the maximum arterial pulse(s) $SP_{min}$ = $SP_{min}(\text{systolic})$ of the minimum arterial pulse(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2::18716   | MDC_DIM_MMHG               | mm[Hg]       |

**Table A.7.3.6.1—Nomenclature and codes for haemodynamic monitoring measurements** (*multipage table*)

| Systematic name                                                                                                                                                                                                                                                                                                              | RefId                              | Common term                            | Acronym | Description/Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Part::Code | UOM_MDC         | UOM_UCUM |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|----------|
| Ratio, relative   (Averaged SPV values, Average of All Systolic Pressures)   Arterial Pressure Waveform   CVS, Respiratory                                                                                                                                                                                                   | MDC_PRESS_BLD_SYS_VAR_RATIO        | Systolic Pressure Variation (relative) | SPV(%)  | The average value of one or more (maximum systolic pressure minus the minimum systolic pressure) difference values from an arterial pressure waveform following a single positive pressure breath, normalized by the average value of all systolic pressures during the measurement time period. SPV(%) is calculated using the following formula: $SPV(\%) = (SP_{max} - SP_{min}) / SP_{mean} \times 100$ where: $SP_{max}$ = $SP_{max}(\text{systolic})$ of the maximum arterial pulse(s) $SP_{min}$ = $SP_{min}(\text{systolic})$ of the minimum arterial pulse(s) $SP_{mean}$ = average over all systolic pressures during time period                                                                                                        | 2::18720   | MDC_DIM_PERCENT | %        |
| Average   Three user selected SPV values   Arterial Press Waveform   CVS, Respiratory                                                                                                                                                                                                                                        | MDC_PRESS_BLD_SYS_VAR_DIFF_MA_NUAL | Systolic Pressure Variation (manual)   | mSPV    | The average value of up to three user selected (maximum systolic pressure minus the minimum systolic pressure) difference values from an arterial pressure waveform.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2::18724   | MDC_DIM_MMHG    | mm[Hg]   |
| Ratio, relative   Average Difference (Maximum Pulse Pressure, Minimum Pulse Pressure), Mean Pulse Pressure   Arterial Pressure Waveform   CVS, Respiratory                                                                                                                                                                   | MDC_PRESS_BLD_PULS_VAR_RATIO       | Pulse Pressure Variation (relative)    | PPV(%)  | The average value of multiple (maximum pulse pressure minus the minimum pulse pressure) differences divided by the mean pulse pressure from an arterial pressure waveform over a respiratory cycle or other period of time. [A PPV(%) >10% suggests that the patient's stroke volume is sensitive to fluctuations in preload caused by the respiratory cycle.] PPV(%) is calculated using the following formula: $PPV(\%) = (PP_{max} - PP_{min}) / PP_{mean} \times 100$ where: $PP_{max}$ = $PP_{max}(\text{systolic}) - PP_{max}(\text{diastolic})$ of maximum arterial pulse $PP_{min}$ = $PP_{min}(\text{systolic}) - PP_{min}(\text{diastolic})$ of minimum arterial pulse $PP_{mean}$ = average over all pulse pressures during time period | 2::18728   | MDC_DIM_PERCENT | %        |
| Ratio, relative   Stroke Volume (estimate), Average Difference (Maximum Pulse Pressure, Minimum Pulse Pressure), Mean Pulse Pressure, based on the relationship between stroke volume and arterial pulse pressure that considers vessel compliance and peripheral resistance   Arterial Pressure Waveform   CVS, Respiratory | MDC_VOL_BLD_STROKE_VAR_RATIO       | Stroke Volume Variation (relative)     | SVV(%)  | An estimate of the variation in stroke volume across at least one respiratory cycle or other period of time, based on the relationship between stroke volume and arterial pulse pressure that considers vessel compliance and peripheral resistance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2::18732   | MDC_DIM_PERCENT | %        |

#### A.7.4 Nomenclature and codes for respiratory, ventilator, and anesthesia measurements

*Insert the following paragraph and Table A.7.4.11.3 with subsidiary tables after Table A.7.4.11.2:*

ISO 19223:2019 [B16] defines a well-structured and computable human-readable text string representation of the ventilation mode. This subclause defines the control and state variables that convey the ISO 19223 ventilator mode using the IEEE 11073 Reference IDs and numeric codes and adjuncts defined in A.8.11 of this standard. Additional control and state variables to report the ventilator trigger type and operational state as well as the vendor display text for the selected mode.

**Table A.7.4.11.3—Ventilator modes nomenclature and codes**

| Systematic name                                                     | RefId                                | Common term                  | Acronym | Description/Definition                                                                                                                                                                                                                                                                                                                                               | Part::Code | UOM_MDC | UOM_UCUM |
|---------------------------------------------------------------------|--------------------------------------|------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|----------|
| Mode    VentilationMode, ISO 19223   Ventilator                     | MDC_VENT_MODE_ISO_19223              | Ventilation mode, ISO        |         | Selected mode of ventilator (using ISO 19223 syntax and nomenclature) [_MDC_VENT_MODE_ISO_19223] PEGjs                                                                                                                                                                                                                                                               | 2::53344   |         |          |
| Mode    VentilationMode Selectable Adjuncts, ISO 19223   Ventilator | MDC_VENT_MODE_SEL_ADJUNCTS_ISO_19223 | Selectable adjuncts, ISO     |         | Selectable adjuncts for ventilation mode (ISO 19223). Note: Selectable Adjuncts that are “inherent to the mode” should be included in MDC_VENT_MODE_ISO_19223. All Selectable Adjuncts, including those “inherent to the mode” and run-time selectable Boolean flags, shall be conveyed by MDC_VENT_MODE_ADJUNCTS_ISO_19223. [_MDC_VENT_MODE_SEL_ADJUNCTS_ISO_19223] | 2::53345   |         |          |
| Mode    VentilationMode, vendor display text   Ventilator           | MDC_VENT_MODE_DISPLAY_TEXT           | Vendor vent mode name        |         | Selected mode of ventilator using the vendor display text.                                                                                                                                                                                                                                                                                                           | 2::53329   |         |          |
| Mode    VentilationMode, trigger type   Ventilator                  | MDC_VENT_MODE_TRIGGER_TYPE           | Trigger type or source       |         | The measured parameters used to indicate that the patient has reached the threshold value required to trigger an inflation. Note: Multiple parameters and values may be used by the trigger function, and if the parameters are listed as a ordered sequence, the predominant parameter shall be listed first. [_MDC_VENT_MODE_TRIGGER_TYPE]                         | 2::53347   |         |          |
| State    Ventilator, operational state   Ventilator, Anesthesia     | MDC_VENT_OPERATIONAL_STATE           | Ventilator operational state |         | The operational state of the ventilator or anesthesia delivery system. [_MDC_VENT_OPERATIONAL_STATE]                                                                                                                                                                                                                                                                 | 2::53346   |         |          |

**Table A.7.4.11.3.1—Enumerated values for [\_MDC\_VENT\_MODE\_SEL\_ADJUNCTS\_ISO\_19223]**

| Enum_Values | Enum_Descriptions                                                                                     | Part::Code | CF_CODE10 |
|-------------|-------------------------------------------------------------------------------------------------------|------------|-----------|
| TC          | Tube compensation for the additional resistive load imposed by an airway device (selectable)          | 7::18499   | 477251    |
| CC          | Breathing system compliance compensation (selectable)                                                 | 7::18500   | 477252    |
| LC          | Breathing system leakage compensation (selectable)                                                    | 7::18501   | 477253    |
| NIV         | Non-invasive ventilation (selectable)                                                                 | 7::18502   | 477254    |
| SIGH        | Ventilator 'sigh' inflations enabled (selectable adjunct/option)                                      | 7::18503   | 477255    |
| TRGC        | Trigger compensation (e.g., automatically adjust flow trigger to compensate for leaks)                | 7::18504   | 477256    |
| noFGFC      | The additional delivered flow (or tidal volume) due to fresh gas flow is not compensated (anesthesia) | 7::18505   | 477257    |

**Table A.7.4.11.3.2—Enumerated values for [\_MDC\_VENT\_MODE\_TRIGGER\_TYPE]**

| Enum_Values            | Enum_Descriptions                                                                                     | Part::Code | CF_CODE10 |
|------------------------|-------------------------------------------------------------------------------------------------------|------------|-----------|
| Flow                   | Flow { MDC_VENT_FLOW_TRIG_SENS_SETTING }                                                              | 7::18506   | 477258    |
| Pressure               | Pressure { MDC_VENT_PRESS_TRIG_SENS_SETTING }                                                         | 7::18507   | 477259    |
| Electromyogram         | Electromyogram (EMG), diaphragmatic electrical activity (EDI) { MDC_VENT_NAVA_ED1_TRIG_SENS_SETTING } | 7::18508   | 477260    |
| Neural                 | Neural, not otherwise specified                                                                       | 7::18509   | 477261    |
| ComplexComputed        | Complex computed trigger function based on multiple parameters                                        | 7::18510   | 477262    |
| ChestWallMotion        | Chest wall motion                                                                                     | 7::18511   | 477263    |
| TransthoracicImpedance | Transthoracic impedance                                                                               | 7::18512   | 477264    |

**Table A.7.4.11.3.3—Enumerated values for [MDC\_VENT\_OPERATIONAL\_STATE]**

| Enum_Values          | Enum_Descriptions                                                                                                                                                                                                                                                                              | Part::Code | CF_CODE10 |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| Unspecified          | Not otherwise specified (NOS).                                                                                                                                                                                                                                                                 | 7::18513   | 477265    |
| Off                  | Off (reported by external device interface).                                                                                                                                                                                                                                                   | 7::18514   | 477266    |
| PowerOnSelfTest      | Power-on self-test.                                                                                                                                                                                                                                                                            | 7::18515   | 477267    |
| PreUseCheck          | Pre-use system checkout (may include breathing system check).                                                                                                                                                                                                                                  | 7::18516   | 477268    |
| BreathingSystemCheck | Ventilator breathing system check, extending within and outside the body of the ventilator or anesthesia system.                                                                                                                                                                               | 7::18517   | 477269    |
| Calibration          | Calibration.                                                                                                                                                                                                                                                                                   | 7::18518   | 477270    |
| Standby              | Standby.                                                                                                                                                                                                                                                                                       | 7::18519   | 477271    |
| PatientSetup         | Enter patient information, alarm limits, ventilation mode and other settings.                                                                                                                                                                                                                  | 7::18520   | 477272    |
| StartVentilation     | Start ventilation.                                                                                                                                                                                                                                                                             | 7::18521   | 477273    |
| OperationalMode      | Normal operational state using the intended ventilation mode as configured by the operator's settings and selections.                                                                                                                                                                          | 7::18522   | 477274    |
| ApneaVentilation     | Selected apnea ventilation mode, a safety provision by which the ventilator automatically switches to a predetermined ventilation mode that generates controlled breaths whenever a hypoventilation alarm condition occurs or when a breath is not detected during a specified period of time. | 7::18523   | 477275    |
| BackupVentilation    | Backup mode of ventilator where the normal function is for the ventilator to automatically deliver an inflation of a predetermined inflation-type when a breath is not detected during a set period.                                                                                           | 7::18524   | 477276    |
| FailSafeVentilation  | Selected fail-safe mode of ventilator, a safety provision by which the ventilator automatically switches to a predetermined alternative ventilation-mode intended to maintain patient safety in the event of a component, sensor or function becoming inoperable.                              | 7::18525   | 477277    |
| Service              | Service state, where the device or system is diagnosed, repaired and/or maintained by trained personnel.                                                                                                                                                                                       | 7::18526   | 477278    |
| ServiceSysAdmin      | Service system administrator state, allowing qualified biomedical or service personnel to make unrestricted, potentially adverse, system-wide changes to a device or system in a role-based security model.                                                                                    | 7::18527   | 477279    |
| SoftwareUpdate       | Software update state.                                                                                                                                                                                                                                                                         | 7::18528   | 477280    |
| Failed               | Failed state, the device or system is non-operational.                                                                                                                                                                                                                                         | 7::18529   | 477281    |
| Shutdown             | Standby/Shutdown, the device or system is shutting down.                                                                                                                                                                                                                                       | 7::18530   | 477282    |
| MonitoringOnly       | Monitoring only; active ventilation is not occurring.                                                                                                                                                                                                                                          | 7::18531   | 477283    |

*Insert the following text as the last paragraph in A.7.4.19.2:*

Table A.7.4.19.2 includes specific ventilator technologies. One of these, Neurally Adjusted Ventilatory Assist (NAVA), uses the electrical activity obtained from the diaphragm to monitor and to synchronize and drive inflations delivered by the ventilator. An excellent tutorial regarding NAVA and the techniques used for obtaining and processing the electrical activity of the diaphragm (EDI) is provided by Sinderby and Beck [B11].

*Insert the following subclause titles and terms into Table A.7.4.19.2 according to the instructions provided below:*

| <i>Table A.7.4.19.2 Subclause Titles</i>                                            | <i>Instruction</i>    |
|-------------------------------------------------------------------------------------|-----------------------|
| <i>Phase and Time Intervals</i>                                                     | <i>Append</i>         |
| <i>Minute volume (airway and ventilator, units = volume/minute)</i>                 | <i>Append</i>         |
| <i>Airway and other pressures</i>                                                   | <i>Context</i>        |
| <i>Transpulmonary and Esophageal Pressures</i>                                      | <i>New Section</i>    |
| <i>Ventilator and airway pressures</i>                                              | <i>Append</i>         |
| <i>Resistance and compliance Retitle to “Resistance, Compliance, and Elastance”</i> | <i>Retitle-Append</i> |
| <i>Patient-ventilator synchronization</i>                                           | <i>Context</i>        |
| <i>NAVA and EDI</i>                                                                 | <i>New Section</i>    |
| <i>High-Frequency Ventilation</i>                                                   | <i>Append</i>         |
| <i>Miscellaneous Retitle to “Miscellaneous (not grouped)”</i>                       | <i>Retitle-Append</i> |
| <i>High-Flow Therapy</i>                                                            | <i>New Section</i>    |
| <i>Agents and Gases</i>                                                             | <i>Append</i>         |
| <i>Fresh Gas Concentration (%)</i>                                                  | <i>New Section</i>    |
| <i>Liquid Anesthetic Agent Flow</i>                                                 | <i>New Section</i>    |

*Append – append new term rows to existing table section*

*Retitle-Append – retitle existing table section and append new term rows*

*New Section – insert new table section after section listed immediately above*

*Context – provides context for placement*

**Table A.7.4.19.2—Nomenclature and codes for respiratory, ventilator, and anesthesia measurements** (*multipage table*)

| Systematic name                                                                                                                 | RefId                                                       | Common term                                    | Acronym           | Description/Definition                                                                                                                                          | Part::Code | UOM_MDC                                                                                            | UOM_UCUM                                |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>Phase and Time Intervals</b>                                                                                                 |                                                             |                                                |                   |                                                                                                                                                                 |            |                                                                                                    |                                         |
| Duration, ratio   Inspiratory flow time, total respiratory period (inspiratory time + expiratory time)   Inflation   Ventilator | MDC_RATIO_TIME_PD_INSP_FLOW_RT<br>O_TIME_PD_INSP_EXP        |                                                |                   | Duration of the inspiratory flow time, expressed as a ratio relative to the total respiratory cycle time (inspiratory time + expiratory time).                  | 2::52224   | MDC_DIM_DIMLESS                                                                                    | {unitless} 1                            |
| Duration   Inspiratory time + Expiratory time   Spontaneous breath (initiated and terminated by patient)   Ventilator (Patient) | MDC_TIME_PD_SPONT_INSP_EXP                                  | Spontaneous breath cycle time                  |                   | Measured cycle time of spontaneous breath, the duration of the inspiratory and expiratory phases of spontaneous breath initiated and terminated by the patient. | 2::52228   | MDC_DIM_SEC                                                                                        | s                                       |
| Duration   Inspiratory time + Expiratory time   Assured Inflation   Ventilator                                                  | MDC_VENT_TIME_PD_ASSURED_INFLA<br>TION_INSP_EXP             | Assured-inflation cycle time                   |                   | Measured cycle time, the duration of the inspiratory and expiratory phases of the assured inflation. Note that this can be less than or equal to 1/(set-rate).  | 2::52232   | MDC_DIM_SEC                                                                                        | s                                       |
| Duration, Maximum   Inspiratory time + Expiratory time   Assured Inflation   Ventilator, Setting                                | MDC_VENT_TIME_PD_ASSURED_INFLA<br>TION_INSP_EXP_MAX_SETTING | Maximum assured-inflation cycle time (setting) |                   | Set maximum duration of assured-inflation cycle.                                                                                                                | 258::52233 | MDC_DIM_SEC                                                                                        | s                                       |
| Duration, Ratio   Duration (Inspiratory Phase), Duration (Expiratory Phase)   Inflation, Backup   Ventilator, Setting           | MDC_RATIO_IE_BACKUP_SETTING                                 |                                                |                   | Ratio of durations of inspiratory and expiratory phases when a backup inflations are delivered (setting).                                                       | 258::52236 | MDC_DIM_DIMLESS                                                                                    | {unitless} 1                            |
| <b>Minute Volume (airway and ventilator)</b>                                                                                    |                                                             |                                                |                   |                                                                                                                                                                 |            |                                                                                                    |                                         |
| Flow   OneMinute, Expired   { Unassisted, Delivered as Supported, Assisted or Synchronized Assisted   Breaths   Ventilator      | MDC_VOL_MINUTE_AWAY_EXP_BTSD_<br>PSAZ                       |                                                |                   | Volume of expired gas per minute for unassisted or delivered as supported, assisted or synchronized assisted breaths.                                           | 2::52240   | MDC_DIM_L_PER_MIN                                                                                  | L/min l/min                             |
| <b>Ventilator and airway pressures</b>                                                                                          |                                                             |                                                |                   |                                                                                                                                                                 |            |                                                                                                    |                                         |
| Pressure   Inspiratory Phase   Gas   Ventilator, Airway                                                                         | MDC_VENT_PRESS_AWAY_INSP                                    | Inspiratory airway pressure                    | P <sub>insp</sub> | Airway pressure, measured during the inspiratory phase.                                                                                                         | 2::22392   | MDC_DIM_HECTO_PASCAL<br>MDC_DIM_KILO_PASCAL<br>MDC_DIM_MMHG<br>MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | hPa<br>kPa<br>mm[Hg]<br>cm[H2O]<br>mbar |
| Pressure   Expiratory Phase   Gas   Ventilator, Airway                                                                          | MDC_VENT_PRESS_AWAY_EXP                                     | Expiratory airway pressure                     | P <sub>exp</sub>  | Airway pressure, measured during the expiratory phase.                                                                                                          | 2::22396   | MDC_DIM_HECTO_PASCAL<br>MDC_DIM_KILO_PASCAL<br>MDC_DIM_MMHG<br>MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | hPa<br>kPa<br>mm[Hg]<br>cm[H2O]<br>mbar |
| Pressure, Difference   End-inspiratory pressure, End-expiratory pressure   ZeroFlow   Ventilator                                | MDC_VENT_PRESS_AWAY_DIFF_INSP_<br>END_EXP_END_AT_ZERO_FLOW  |                                                |                   | Measured difference between end-inspiratory pressure and end-expiratory pressure during zero flow conditions.                                                   | 2::52244   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR                                                                | cm[H2O]<br>mbar                         |

**Table A.7.4.19.2—Nomenclature and codes for respiratory, ventilator, and anesthesia measurements** (*multipage table*)

| Systematic name                                                                                                                                              | RefId                                                  | Common term                                                                       | Acronym | Description/Definition                                                                                                                                                                                                                                                                                                               | Part::Code | UOM_MDC                             | UOM_UCUM               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------|------------------------|
| <b>Ventilator and airway pressures</b>                                                                                                                       |                                                        |                                                                                   |         |                                                                                                                                                                                                                                                                                                                                      |            |                                     |                        |
| Pressure, Difference   Inspiratory airway pressure, relative to P <sub>high</sub>   Pressure support inflations, in Bi-Vent/APRV modes   Ventilator          | MDC_VENT_PRESS_AWAY_DELTA_SUP_P_HIGH                   | Delta pressure for support inflations relative to P <sub>high</sub> (observation) |         | The inspiratory airway pressure relative to PEEP or BAP for pressure support inflations, relative to P <sub>high</sub> in Bi-Vent/APRV modes (if different than P <sub>low</sub> ). (observation)                                                                                                                                    | 2::52248   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar        |
| Pressure, Difference   Inspiratory airway pressure, relative to P <sub>high</sub>   Pressure support inflations, in Bi-Vent/APRV modes   Ventilator, Setting | MDC_VENT_PRESS_AWAY_DELTA_SUP_P_HIGH_SETTING           | Delta pressure for support inflations relative to P <sub>high</sub> (setting)     |         | The inspiratory airway pressure relative to PEEP or BAP for pressure support inflations, relative to P <sub>high</sub> in Bi-Vent/APRV modes (if different than P <sub>low</sub> ). (setting)                                                                                                                                        | 258::52248 | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar        |
| <b>Resistance, Compliance, and Elastance</b>                                                                                                                 |                                                        |                                                                                   |         |                                                                                                                                                                                                                                                                                                                                      |            |                                     |                        |
| Elastance   Static, measured at end-expiration   Alveoli, Pleura   Lung Mechanics                                                                            | MDC_ELASTANCE_LUNG_STATIC                              | Lung elastance, static                                                            |         | Change of airway pressure per unit change of lung volume, measured statically at expiration end. The static elastance is calculated as $E_{stat} = (P_{plat} - PEEP) / \Delta V$ , where P <sub>plat</sub> is the Plateau pressure, PEEP (BAP) is the Positive End Expiratory Pressure, and $\Delta V$ is the change of lung volume. | 2::52252   | MDC_DIM_CM_H2O_PER_L                | cm[H2O]/L<br>cm[H2O]/l |
| Elastance   Dynamic, Least Squares (or other curve fitting algorithm)   Alveoli   LungStructure                                                              | MDC_ELASTANCE_LUNG_DYNAMIC                             | Dynamic elastance                                                                 |         | Change of airway pressure per unit change of lung volume, dynamically calculated using a least squares or other curve fitting algorithm where airway resistance and lung elastance are related by the "equation of motion" $\Delta P_i = R_{dyn} V_i + V E_{dyn} + PEEP_{tot}$ .                                                     | 2::52256   | MDC_DIM_CM_H2O_PER_L                | cm[H2O]/L<br>cm[H2O]/l |
| <b>Transpulmonary and Esophageal Pressures</b>                                                                                                               |                                                        |                                                                                   |         |                                                                                                                                                                                                                                                                                                                                      |            |                                     |                        |
| Pressure, Difference   End-inspiratory pressure, End-inspiratory esophageal pressure   Transpulmonary   Ventilator (Patient)                                 | MDC_PRESS_TRANSPULM_INSP_END                           |                                                                                   |         | The difference between measured end-inspiratory pressure and end-inspiratory esophageal pressure                                                                                                                                                                                                                                     | 2::52260   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar        |
| Pressure, Difference   End-expiratory pressure (measured PEEP), End-expiratory esophageal pressure   Transpulmonary   Ventilator (Patient)                   | MDC_PRESS_TRANSPULM_EXP_END                            |                                                                                   |         | The difference between measured PEEP and end-expiratory esophageal pressure                                                                                                                                                                                                                                                          | 2::52264   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar        |
| Pressure, Difference   Transpulmonary end-inspiratory pressure, Transpulmonary end-expiratory pressure   ZeroFlow   Ventilator (Patient)                     | MDC_PRESS_TRANSPULM_DIFF_INSP_END_EXP_END_AT_ZERO_FLOW |                                                                                   |         | The difference between the transpulmonary end-inspiratory pressure and the transpulmonary end-expiratory pressure at zero flow conditions.                                                                                                                                                                                           | 2::52268   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar        |

**Table A.7.4.19.2—Nomenclature and codes for respiratory, ventilator, and anesthesia measurements** (*multipage table*)

| Systematic name                                                                                                                                                           | RefId                                                         | Common term                      | Acronym | Description/Definition                                                                                                                                                                                                                                                                                                                                                                                    | Part::Code | UOM_MDC                             | UOM_UCUM        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------|-----------------|
| <b>Transpulmonary and Esophageal Pressures</b>                                                                                                                            |                                                               |                                  |         |                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                     |                 |
| Pressure, Difference   Esophageal (maximum during inspiration), Esophageal (end-expiration)   Esophageal, Pleura   Ventilator (Patient)                                   | MDC_PRESS_ESOPH_DIFF_INSP_EXP_END                             |                                  |         | The largest pressure deviation for Pes during inspiration compared with Pes at the end of expiration                                                                                                                                                                                                                                                                                                      | 2::52272   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar |
| <b>High-Frequency Ventilation</b>                                                                                                                                         |                                                               |                                  |         |                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                     |                 |
| Pressure, Difference, Peak-to-Peak   Inspiratory Outlet Port   High Frequency Ventilation   Ventilator                                                                    | MDC_PRESS_ILPORT_DIFF_MAX_MIN_H F                             |                                  |         | The peak-to-peak pressure amplitude at the inspiratory outlet during high frequency ventilation.                                                                                                                                                                                                                                                                                                          | 2::52276   | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar |
| Pressure, Difference, Peak-to-Peak   Inspiratory Outlet Port   High Frequency Ventilation   Ventilator, Setting                                                           | MDC_PRESS_ILPORT_DIFF_MAX_MIN_H F_SETTING                     |                                  |         | Set peak-to-peak pressure amplitude at the inspiratory outlet during high frequency ventilation.                                                                                                                                                                                                                                                                                                          | 258::52276 | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar |
| Pressure, Difference, Peak-to-Peak   Inspiratory Outlet Port   High Frequency Ventilation   Ventilator, Setting, Backup                                                   | MDC_PRESS_ILPORT_DIFF_MAX_MIN_H F_BACKUP_SETTING              |                                  |         | Set backup peak-to-peak pressure amplitude at the inspiratory outlet during high frequency ventilation.                                                                                                                                                                                                                                                                                                   | 258::52280 | MDC_DIM_CM_H2O<br>MDC_DIM_MILLI_BAR | cm[H2O]<br>mbar |
| Diffusion Coefficient, CO2   Calculated as Frequency * (Tidal Volume in HFV)2   High Frequency Ventilation (HFV)   Ventilator                                             | MDC_COEF_CO2_DIFFUSION_COEF_HF                                | CO2 Diffusion Coefficient in HFV | DCO2    | CO2 diffusion coefficient (DCO2) in HFV, calculated as $f * V_{THF}^2$ , where f is frequency and VTHF is the tidal volume in HFV.                                                                                                                                                                                                                                                                        | 2::52284   | MDC_DIM_MILLI_L_SQ_PER_SEC          | mL2/s ml2/s     |
| <b>Miscellaneous (not grouped)</b>                                                                                                                                        |                                                               |                                  |         |                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                     |                 |
| Coefficient, Stress Index   Pressure-time curve during constant flow   Volume Control Ventilation   Ventilator (Patient)                                                  | MDC_VENT_SHAPE_PRESS_TIME_STRESS_INDEX                        |                                  |         | Coefficient derived from the shape of pressure-time curve during constant flow in volume control ventilation used to assess risk of lung-overdistention. The stress index is the coefficient b of a power equation $Pressure = a \times Time^b + c$ , where the coefficient b (stress index) describes the shape of the curve based on curve-fitting the equation during passive constant-flow inflation. | 2::52288   | MDC_DIM_DIMLESS                     | {unitless} 1    |
| Flow   Threshold, inflection point in a linearly decreasing flow pattern, expressed as a percentage of peak inspiratory flow   terminates inspiratory phase   Ventilation | MDC_VENT_MODE_FLOW DECREASING_LINEAR_END_INSP_PERCENT_SETTING |                                  |         | Flow inflection point in a linearly decreasing flow pattern to end the inspiratory phase, expressed as a percentage of peak inspiratory flow.                                                                                                                                                                                                                                                             | 258::52310 | MDC_DIM_PERCENT                     | %               |
| <b>NAVA and EDI</b>                                                                                                                                                       |                                                               |                                  |         |                                                                                                                                                                                                                                                                                                                                                                                                           |            |                                     |                 |
| Electrical Activity, EMG EDI   Neural Effort, inspiration and exhalation   Muscle, Diaphragm   Muscular System                                                            | MDC_EMG_MUSC_DIAPH_EDI                                        |                                  |         | Waveform of Electrical activity of the diaphragm, indicating the level of neural effort during inspiration and exhalation.                                                                                                                                                                                                                                                                                | 2::52292   | MDC_DIM_MICRO_VOLT                  | uV              |