



CENTER *for* **MEDICAL**
INTEROPERABILITY

The Center for Medical Interoperability Specification
Clinical Data Interoperability Based on IHE PCD –
Semantics, Syntax and Encoding:
Annex D: Ventilation and Anesthesia

C4MI-SP-CDI-IHE-PCD-SSE-D-D02-2020-04-08

Draft

Notice

This specification is the result of a cooperative effort undertaken at the direction of the Center for Medical Interoperability™ (C4MI) for the benefit of the healthcare industry and its customers. You may download, copy, distribute, and reference the documents herein only for the purpose of developing products or services in accordance with such documents, and educational use. Except as granted by C4MI in a separate written license agreement, no license is granted to modify the documents herein (except via the Engineering Change process), or to use, copy, modify or distribute the documents for any other purpose.

This document may contain references to other documents not owned or controlled by C4MI. Use and understanding of this document may require access to such other documents. Designing, manufacturing, distributing, using, selling, or servicing products, or providing services, based on this document may require intellectual property licenses from third parties for technology referenced in this document. To the extent this document contains or refers to documents of third parties, you agree to abide by the terms of any licenses associated with such third-party documents, including open source licenses, if any.

DISCLAIMER

This document is furnished on an "AS IS" basis and neither C4MI nor its members provides any representation or warranty, express or implied, regarding the accuracy, completeness, noninfringement, or fitness for a particular purpose of this document, or any document referenced herein. Any use or reliance on the information or opinion in this document is at the risk of the user, and C4MI and its members shall not be liable for any damage or injury incurred by any person arising out of the completeness, accuracy, or utility of any information or opinion contained in the document.

C4MI reserves the right to revise this document for any reason including, but not limited to, changes in laws, regulations, or standards promulgated by various entities, technology advances, or changes in equipment design, manufacturing techniques, or operating procedures described, or referred to, herein.

This document is not to be construed to suggest that any company modify or change any of its products or procedures, nor does this document represent a commitment by C4MI or any of its members to purchase any product whether or not it meets the characteristics described in the document. Unless granted in a separate written agreement from C4MI, nothing contained herein shall be construed to confer any license or right to any intellectual property. This document is not to be construed as an endorsement of any product or company or as the adoption or promulgation of any guidelines, standards, or recommendations.

Table of Contents

1	Introduction and Purpose	5
1.1	The Mechanical Ventilation Semantic Working Group.....	5
1.2	Scope of Observational Identifiers.....	6
2	References.....	7
3	Terms and Definitions	8
3.1	Pulmonary Volume and Capacity	8
3.2	Inspiratory Breath Type Classifications	10
4	Ventilation Observation Identifier Categories.....	11
5	hRTM Ventilator Management Value Set.....	13

Tables

Table 1.	Lung Volume/Capacity Measures.....	8
Table 4.	Ventilator Observations Under Evaluation by IEEE Classification.....	11

Figures

Figure 1.	Pulmonary Volumes	9
-----------	-------------------------	---

Document Status Sheet

Document Control Identifier:	C4MI-SP-CDI-IHE-PCD-SSE-D
Document Title:	Clinical Data Interoperability Based on IHE PCD – Semantics, Syntax and Encoding: Annex D: Ventilation and Anesthesia
Revision History:	D01
Date:	04/02/2020
Status:	Draft
Distribution Restrictions:	Public

Key to Document Status Codes

Work in Progress	An incomplete document designed to guide discussion and generate feedback that may include several alternative requirements for consideration.
Draft	A document considered largely complete but lacking review by Members and vendors. Drafts are susceptible to substantial change during the review process.
Issued	A public document that has undergone Member and Technology Supplier review, cross-vendor interoperability, and is for Certification testing if applicable. Issued Specifications are subject to the Engineering Change Process.
Closed	A static document, reviewed, tested, validated, and closed to further engineering change requests to the specification through C4MI.

1 Introduction and Purpose

The development of medical device semantics and ventilators specifically has been within the domain of the manufacturers and IEEE. The standards developing organizations have operated within the ISO/IEEE community and separate from the clinical informatics community. Laudably, the IEEE has provided 15 years of thoughtful development consolidating and harmonizing terms that form the foundation of ventilator observational identifiers. Historically the ability to capture only rudimentary ventilator data led to minimal demand and limited involvement from healthcare professionals involved in informatics, quality metrics, systems engineering, or T2 translational research.

Accordingly, it is not surprising that one finds within current medical literature descriptions of challenges extracting ventilator parameters utilized in the management of pulmonary disease and the associated alterations in lung mechanics. These challenges can apply to research; quality management and effective controls on variation in care. Pragmatically the barrier created to implementation of ventilator management and weaning protocols across multiple manufacturers and models is counterproductive to limiting variation. Further complicating the broad semantic landscape that describes the domain of mechanical ventilation is the proprietary terminology that describes both conventional and novel ventilator modes allowing for the convenient presetting of increasingly complex configurations of ventilator parameters made possible by the digital processors now driving new ventilator technology.

The urgency of alignment of ventilator terminology has increased due the COVID-19 pandemic. This draft of the ventilation and anesthesia annex is being publicly released in order to inform and receive feedback from the larger pulmonology and medical device communities. It is intended for this Annex to be incorporated into the next issued version of the Clinical Data Interoperability Based on IHE PCD –Semantics, Syntax and Encoding specification after following our engineering change process

1.1 The Mechanical Ventilation Semantic Working Group

Newer ventilators and anesthesia machines are capable of delivering increasingly sophisticated observations. The IEEE has responded by expanding ventilator semantic observations two-fold from their original work in 2004. The 11073 – 10101a annex published in 2015 ([IEEE-11073-10101a-2015]) was a major update in the terminology and these observations now constitute approximately 50% of the 900+ terms that define the medical device semantic space in 11073, described within the harmonized Rosetta Terminology Management archive [NIST-hRTM].

To take advantage of this recent work C4MI established a Semantic Working Group to assure a profile would satisfy the needs of the medical community for effective patient management, quality improvement, and clinical research. The working group was comprised of the following professional disciplines: internists, intensivists, pulmonary medicine / critical care, neonatology, anesthesiologists, clinical informaticists, biomedical engineers, and computer scientists. These new observations are highly specified and well defined. The ventilator data now identified creates opportunities for monitoring, measurement, and research previously unavailable.

1.2 Scope of Observational Identifiers

The 956 harmonized rosetta terms were filtered to only include those from table A.7.4.8 in [IEEE-11073-10101a-2015]. These 432 observations represent those identified with ventilator and anesthesia functionality. The list was narrowed through attrition by the following criteria.

Exclusions:

- Observations of respiratory rate not originating from a mechanical ventilator
- POC measures of arterial blood gases
- Anesthetic gas delivery and gas concentration observations
- Anesthesia specific observations

This resulted in a field of 285 ventilator related observations from which 99 were identified as core to ventilator management and weaning.

The semantic working group narrowed the list to 68 making up a profile to support mechanical ventilator management. We would anticipate future additions to this annex as more sophisticated ventilator functions and the need for sequential ventilator adjustment come under evaluation.

These 68 observations are listed below with columns similar to those identified for the presentation of physiologic monitor observations [CMI-SP-CDI-IHE-PCD-SSE]

Early indications are that some devices continue to output legacy observations published in 2004. The goal of this Annex is to identify those ventilator observations that describe a parameter with the least ambiguity and the greatest specificity as they are represented in both [IEEE-11073-10101a-2015] and those additions approved in [IEEE-11073-10101-2019]. Those new and/or more highly specified parameters have been designated as the primary or preferred term while the historic synonym is retained as an alternate to accommodate legacy equipment.

In some cases these updated identifiers have been designated as "True Synonyms" (i.e. both observations have the same CF_CODE10 number). When this occurs the synonyms are represented within the same field, primary in the first position, secondary italicized in the second position. In support of transition to the newer codes in the future some of these synonyms are recommended for deprecation. All of the parameters can be reviewed within the harmonized Rosetta data set at [NIST-hRTM].

2 References

- [NIST-hRTM] *NIST RTMMS 'Harmonized Rosetta'*.
Available: <https://rtmms.nist.gov/rtmms/index.htm#!hrosetta>
- [IEEE-11073-10101-2019] IEEE Standard for Health informatics--Point-of-care medical device communication - Part 10101: Nomenclature," in IEEE Std 11073-10101-2019 (Revision of ISO/IEEE 11073-10101:2004) , vol., no., pp.1-1061, 9 Oct. 2019
Available: <https://standards.ieee.org/standard/11073-10101-2019.html>
- [IEEE-11073-10101a-2015] IEEE Standard Health informatics--Point-of-care medical device communication --Part 10101: Nomenclature Amendment 1: Additional Definitions," in IEEE Std 11073-10101a-2015 (Amendment to ISO/IEEE 11073-10101:2004) , vol., no., pp.1-116, 9 Dec. 2015
Available: <http://standards.ieee.org/findstds/standard/11073-10101a-2015.html>
- [AJRCCM-184-756-2011] J. Marini, "Dynamic Hyperinflation and Auto-Positive End-Expiratory Pressure," *Am J Respir Crit Care Med*, vol. 184:756-762, Oct. 2011.
Available: <https://www.atsjournals.org/toc/ajrccm/184/7>
- [CMI-SP-CDI-IHE-PCD-SSE] *Center for Medical Interoperability Specification: Clinical Data Interoperability Based on IHE PCD – Semantics, Syntax, and Encoding*, CMI-SP-CDI-IHE-PCD-SSE-D02-2019-05-31.
Available: <https://medicalinteroperability.org/specifications>
- [RC-2014-59-11] RL Chatburn, M El-Khatib and E Mireles-Cabodevila, "A Taxonomy for Mechanical Ventilation: 10 Fundamental Maxims," Data supplement #3, *Respiratory Care* November 2014, 59 (11) 1747-1763
Available: <http://rc.rcjournal.com/content/59/11/1747/tab-supplemental>

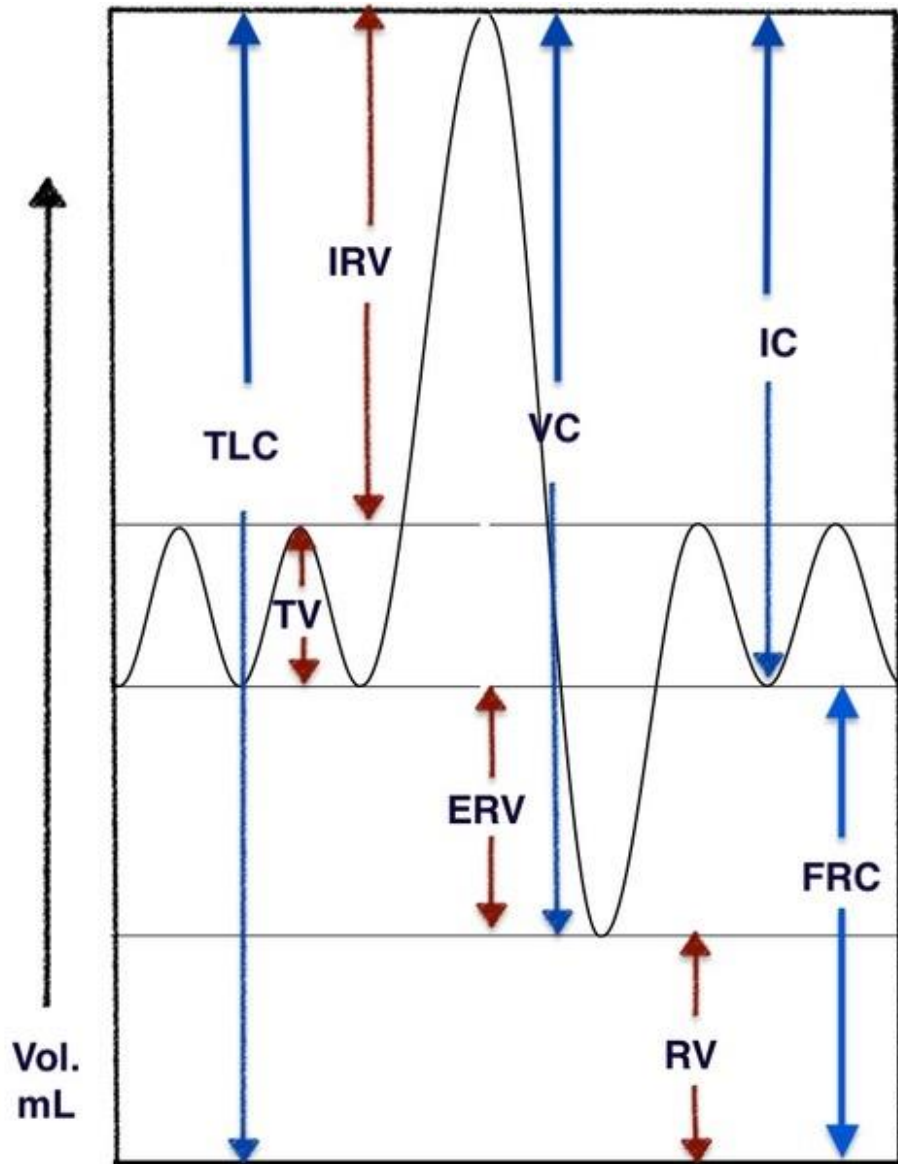
3 Terms and Definitions

For a standardized vocabulary for mechanical ventilation please refer to [RC-2014-59-11].

3.1 Pulmonary Volume and Capacity

Table 1. Lung Volume/Capacity Measures

Lung Volume / Capacity Measure	Definition	Representative Adult Value
Tidal Volume (VT)	The volume of air inspired/expired in a normal breath.	Approx. 500 mL
Inspiratory Reserve Volume (IRV)	The extra volume of air that may be inspired in excess of the VT.	Approx. 3,000 mL
Expiratory Reserve Volume (ERV)	The extra volume of air that may be expired in excess of the tidal volume.	Approx. 1,100 mL
Vital Capacity (VC)	Inspiratory reserve volume plus tidal volume plus expiratory reserve volume. $VC = IRV + VT + ERV$	Approx. 4,600 mL
Residual Volume (RV)	The volume of air remaining in lungs after forceful expiration.	Approx. 1,200 mL
Inspiratory Capacity (IC)	Tidal volume plus Inspiratory reserve volume. $IC = VT + IRV$	Approx. 3,500 mL
Functional Residual Capacity (FRC)	Expiratory reserve volume plus residual volume. $FRC = ERV + RV$	Approx. 2,300 mL
Total Lung Capacity (TLC)	Vital capacity plus residual volume. $TLC = VC + RV$	Approx. 5,800 mL
Minute Ventilation (MV)	Tidal Volume times the respiratory rate. $MV = VT \cdot RR$	$MV = 500 \text{ mL/B} \cdot 12 \text{ B/Min} = 6\text{L/Min}$



Volume (mL/Kg)	Lung Volume	Lung Capacity (sum of volumes)		
43	Inspiratory Reserve Volume (IRV)	Inspiratory Capacity (IC)	Vital Capacity (VC)	Total Lung Capacity (TLC)
7	Tidal Volume (TV or VT)			
15	Expiratory Reserve Volume (ERV)	Functional Reserve Capacity (FRC)		
15	Residual Volume (RV)			

Figure 1. Pulmonary Volumes

3.2 Inspiratory Breath Type Classifications

In order to classify ventilator and patient interaction in response to a patient's breathing effort, a set of five observed breath-types: controlled, synchronized assisted, assisted, supported, and unassisted have been provided with codes to differentiate specific REFID observations by individual or a group of breath types. Numeric observations such as breath rate, minute volume, and tidal volume reported by ventilators may be based on these breath types. In present-day ventilators, breaths are often classified either as spontaneous, assisted, or controlled.

11073 and ISO/TC121/SC4 Working Groups have defined more specific rate and volume observations. Measurements qualified in this manner may be used to characterize the breathing patterns of the ventilated patient and obtain an indication of the degree of patient dependence on the ventilator.

Although legacy 'spontaneous' terms may be used when detailed { P, S, A, Z, C } information is not available, the newer '_BTSD' breath and inflation types should be used whenever possible. Additional breath rate examples and { P, S, A, Z, C } encodings are provided in [IEEE-11073-10101a-2015] Annex D, Table A7.4.6. See Figure E-1 in [IEEE-11073-10101-2019] for bi-level pressure waveform with patient <P/> and <S/> breaths. Refer to Table E-1 in [IEEE-11073-10101-2019] for inspiratory breath and inflation types and rates.

4 Ventilation Observation Identifier Categories

Table 2. Ventilator Observations Under Evaluation by IEEE Classification

IEEE Category	Observations Included
1. Respiratory Rates - Method Specific	2
2. Vent Resp & Inflation Rates	6
3. Phase and Time Intervals	6
4. Airway Measured Flow	
5. Ventilator Measured Flow and Settings	1
6. Tidal Volume (Airway & Vent)	9
7. Minute Volume (Airway & Vent = vol/min)	3
8. Minute Volume (Adap Support Ref Value)	
9. Other Volumes	1
10. Airway & Other Pressures	4
11. Vent and Airway Pressures	6
12. Pressure Limits	
13. Pressure Risetimes	2
14. Plateau Pressure	3
15. Resistance & Compliance	5
16. PEEP	5
17. Apnea	2
18. Patient Vent Synchronization	4
19. Metabolics	
20. Work of Breathing	
21. Insp Pressure Time Product	

IEEE Category	Observations Included
22. Tube Compensation	
23. Miscellaneous	1
24. Ventilator Mode	2
25. Gas Flow	
26. Gas Conc. and Partial Press	7
27. High Frequency Ventilation	
Total	69

5 hRTM Ventilator Management Value Set

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_CODE10	C4MI Status
Spontaneous respiration rate (preferred)	MEASURE of patient-driven spontaneous resp rate	Respiratory Rates - Method Specific	MDC_RESP_BTSD_PS_RATE Precision Alternates	151674	Preferred Term
Respiration rate	MEASURE of resp rate by direct airflow (Nonspecific)	Respiratory Rates - Method Specific	MDC_AWAY_RESP_RATE	151570	Secondary Term
Set inflation rate	SETTING of ventilator rate	Vent Resp & Inflation Rates	MDC_VENT_RESP_RATE_SETTING	16928802	Preferred Term
Average ventilation rate setting	SETTING of average ventilator-driven inflation rate	Vent Resp & Inflation Rates	MDC_VENT_RESP_RATE_AVG_SETTING MDC_VENT_RESP_RATE_MEAN_SETTING True Synonyms	16928805	Preferred Term
Patient-initiated breath rate	MEASURE of patient-initiated resp rate as unassisted, assisted or supported ventilator inflations	Vent Resp & Inflation Rates	MDC_VENT_RESP_BTSD_PSAZ_RATE	152554	Preferred Term
Ventilation rate	MEASURE of ventilation rate by flow volume (pediatric)	Vent Resp & Inflation Rates	MDC_VENT_FLOW_RESP_RATE	151626	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Ventilation rate	MEASURE of ventilation rate by pressure change	Vent Resp & Inflation Rates	MDC_VENT_PRESS_RESP_RATE	151618	Preferred Term
Ventilation sigh number	MEASURE of the number of ventilator sighs / min	Vent Resp & Inflation Rates	MDC_VENT_SIGH_RATE	151634	Preferred Term
Expiratory time	MEASURE of expiratory phase in seconds	Phase and Time Intervals	MDC_TIME_PD_EXP	152612	Preferred Term
Inspiratory time	MEASURE of inspiratory phase in seconds	Phase and Time Intervals	MDC_TIME_PD_INSP	152608	Preferred Term
Inspiratory time setting	SETTING of duration inspiratory time in seconds	Phase and Time Intervals	MDC_VENT_TIME_PD_INSP_SETTING	16929632	Preferred Term
Ratio inspiration expiration time	MEASURE of the ratio of inspiratory/expiration time	Phase and Time Intervals	MDC_RATIO_IE	151832	Preferred Term
IE ratio setting	SETTING of the ratio of inspiratory/expiration time	Phase and Time Intervals	MDC_RATIO_IE_SETTING	16929048	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Expiratory hold maneuver	MEASURE of the zero flow extension of expiratory phase	Phase and Time Intervals	MDC_VENT_TIME_PD_EXP_HOLD	152636	Preferred Term
Ventilation inspiratory flow	MEASURE of airway inspiratory flow during ventilation	Ventilator Measured Flow and Settings	MDC_VENT_FLOW_INSP	151948	Preferred Term
Tidal volume per body mass	MEASURE of expired tidal volume normalized by IBW	Tidal Volume (Airway & Vent)	MDC_VOL_AWAY_TIDAL_PER_IBW	153208	Preferred Term
Normalized Tidal volume setting	SETTING of tidal volume normalized by IBW	Tidal Volume (Airway & Vent)	MDC_VOL_AWAY_TIDAL_PER_IBW_SETTI NG	16930604	Preferred Term
Expired Tidal Volume	MEASURE of expired tidal volume for all designated breath types	Tidal Volume (Airway & Vent)	MDC_VOL_AWAY_TIDAL_EXP_BTSD_PSAZ C Precision Alternates	152672	Preferred Term
Expired Tidal Volume	MEASURE of expired tidal volume without designated breath type (Nonspecific Legacy term)	Tidal Volume (Airway & Vent)	MDC_VOL_AWAY_TIDAL_EXP	152664	Secondary Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_CODE10	C4MI Status
Expired Tidal Volume per body mass (for all breath types)	MEASURE of expired tidal volume for all designated breath types, normalized by IBW	Tidal Volume (Airway & Vent)	MDC_VOL_AWAY_TIDAL_EXP_BTSD_PSAZ C_PER_IBW MDC_VOL_AWAY_TIDAL_EXP_PER_IBW True Synonyms	152668	Preferred Term
Expired Tidal Volume for unassisted or supported (aka spontaneous) breaths	MEASURE of expired tidal volume for spontaneous breaths	Tidal Volume (Airway & Vent)	MDC_VOL_AWAY_TIDAL_EXP_BTSD_PS	152676	Preferred Term
Ventilation tidal volume	MEASURE as a numeric observation of tidal volume in older ventilators without distinguishing inspiration or expiration. Preferred are those providing greater specification when available	Tidal Volume (Airway & Vent)	MDC_VENT_VOL_TIDAL	151980	Secondary Term
Tidal volume setting	SETTING of tidal volume	Tidal Volume (Airway & Vent)	MDC_VENT_VOL_TIDAL_SETTING	16929196	Preferred Term
Inspired tidal volume setting	SETTING of inspiratory tidal volume	Tidal Volume (Airway & Vent)	MDC_VENT_VOL_TIDAL_INSP_SETTING	16930436	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Expired minute volume (total for all breath types)	MEASURE of expired minute volume for all designated breath types	Minute Volume (Airway & Vent = vol/min)	MDC_VOL_MINUTE_AWAY_EXP_BTSD_PS AZC Precision Alternates	152692	Preferred Term
Expired Minute volume	MEASURE of expired minute volume without designated breath type (Nonspecific Legacy term)	Minute Volume (Airway & Vent = vol/min)	MDC_VOL_MINUTE_AWAY_EXP	151884	Secondary Term
Minute volume	MEASURE of minute volume, specificity variably applied by vendors (Nonspecific Legacy term)	Minute Volume (Airway & Vent = vol/min)	MDC_VOL_MINUTE_AWAY	151880	Secondary Term
Vital capacity	MEASURE of vital capacity	Other Volumes	MDC_CAPAC_VITAL	151680	Preferred Term
Maximum airway pressure	MEASURE of peak airway pressure	Airway & Other Pressures	MDC_PRESS_AWAY_MAX	151793	Preferred Term
CPAP pressure	MEASURE of continuous positive airway pressure (CPAP) in spontaneous respiration	Airway & Other Pressures	MDC_PRESS_AWAY_CTS_POS	151796	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Inspiratory airway pressure	MEASURE of airway pressure during inspiration	Airway & Other Pressures	MDC_PRESS_AWAY_INSP	151816	Preferred Term
Maximum inspiratory airway pressure (peak inspiratory pressure)	MEASURE of maximum airway pressure during inspiration. (PIP)	Airway & Other Pressures	MDC_PRESS_AWAY_INSP_MAX	151817	Preferred Term
Inspiratory Pmax	MEASURE of maximum airway pressure during inspiration	Vent and Airway Pressures	MDC_VENT_PRESS_AWAY_MAX	151973	Preferred Term
Inspiratory Pmin	MEASURE of minimum airway pressure during inspiration	Vent and Airway Pressures	MDC_VENT_PRESS_AWAY_MIN	151974	Preferred Term
Inspiratory mean airway pressure	MEASURE of mean airway pressure during inspiration	Vent and Airway Pressures	MDC_VENT_PRESS_AWAY_MEAN	151975	Preferred Term
Inspiratory airway pressure setting	SETTING inspiratory airway pressure	Vent and Airway Pressures	MDC_VENT_PRESS_AWAY_SETTING	16929188	Preferred Term
Pressure for support inflations	MEASURE of inspiratory airway pressure in supported breaths	Vent and Airway Pressures	MDC_VENT_PRESS_AWAY_SUPP	152732	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Inspiratory support pressure	SETTING of inspiratory support pressure	Vent and Airway Pressures	MDC_VENT_PRESS_AWAY_SUPP_SETTIN G	16929948	Preferred Term
Rise time setting	SETTING of time for pressure to reach preset fraction of a set inspiratory pressure in controlled ventilation	Pressure Risetimes	MDC_VENT_PRESS_AWAY_RISETIME_CT LD_SETTING	16929984	Preferred Term
Rise time percent	MEASURE of risetime as a percentage of the duration of the inspiratory phase	Pressure Risetimes	MDC_VENT_PRESS_AWAY_RISETIME_CT LD_PERCENT	153260	Preferred Term
Plateau pressure	MEASURE of plateau pressure during an inspiratory hold procedure under pressure control	Plateau Pressure	MDC_PRESS_RESP_PLAT MDC_PRESS_RESP_PLAT_STATIC True Synonyms	151784	Preferred Term
Dynamic Plateau Pressure	MEASURE of plateau pressure without use of an inspiratory hold procedure	Plateau Pressure	MDC_PRESS_RESP_PLAT_DYNAMIC	152776	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_CODE10	C4MI Status
Negative Inspiratory Force (NIF)	MEASURE of negative inspiratory force (NIF) during an occluded inspiratory effort.	Plateau Pressure	MDC_VENT_PRESS_OCCL_NIF	152784	Preferred Term
Airway Resistance	MEASURE of airway resistance in older ventilators without distinguishing inspiratory or expiratory phases. Preferred are those terms providing greater specification below.	Resistance & Compliance	MDC_RES_AWAY	151840	Secondary Term
Expiratory Airway Resistance	MEASURE of airway resistance during expiration	Resistance & Compliance	MDC_RES_AWAY_EXP	151844	Preferred Term
Inspiratory Airway Resistance	MEASURE of airway resistance during inspiration	Resistance & Compliance	MDC_RES_AWAY_INSP	151848	Preferred Term
Thoracic compliance	MEASURE of change in tidal vol per change in transthoracic pressure - dynamic	Resistance & Compliance	MDC_COMPL_LUNG_DYN	151692	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Lung compliance, static	MEASURE of change in tidal vol per change in transthoracic pressure at end expiration - as a static maneuver	Resistance & Compliance	MDC_COMPL_LUNG_STATIC	151696	Preferred Term
Intrinsic PEEP (aka AutoPEEP)	MEASURE of intrinsic PEEP (PEEPi)	PEEP	MDC_PRESS_AWAY_END_EXP_POS_INTRINSIC	151808	Preferred Term
Dynamic intrinsic PEEP	MEASURE of intrinsic PEEP (PEEPi) - dynamic	PEEP	MDC_PRESS_AWAY_END_EXP_POS_INTRINSIC_DYNAMIC	152796	Preferred Term
Dynamic extrinsic PEEP	MEASURE of extrinsic PEEP, min. pressure at end expiration - dynamic	PEEP	MDC_PRESS_AWAY_END_EXP_POS_EXTRINSIC_DYNAMIC	152792	Preferred Term
Dynamic total PEEP	MEASURE of total PEEP (PEEPe+i) - dynamic	PEEP	MDC_PRESS_AWAY_END_EXP_POS_TOTAL_DYNAMIC	152800	Preferred Term
Set PEEP	SETTING of positive end expiratory pressure applied to airway by the ventilator	PEEP	MDC_VENT_PRESS_AWAY_END_EXP_POS_SETTING	16929192	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_CODE10	C4MI Status
Apnea Duration	MEASURE of duration of absent airflow, apnea	Apnea	MDC_TIME_PD_APNEA	151856	Preferred Term
Apnea alarm duration setting	SETTING apnea duration to alarm trigger	Apnea	MDC_TIME_PD_APNEA_SETTING	16929072	Preferred Term
Ventilator pressure trigger sensitivity	MEASURE pressure value required to trigger ventilator inflation - pressure trigger sensitivity	Patient Vent Synchronization	MDC_VENT_PRESS_TRIG_SENS	152428	Preferred Term
Ventilator pressure trigger sensitivity setting	SETTING pressure value required to trigger ventilator inflation - pressure trigger sensitivity setting	Patient Vent Synchronization	MDC_VENT_PRESS_TRIG_SENS_SETTING	16929644	Preferred Term
Ventilator flow trigger sensitivity	MEASURE flow value required to trigger ventilator inflation - flow trigger sensitivity	Patient Vent Synchronization	MDC_VENT_FLOW_TRIG_SENS	152804	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_CODE10	C4MI Status
Ventilator flow trigger sensitivity setting	SETTING flow value required to trigger ventilator inflation - flow trigger sensitivity setting	Patient Vent Synchronization	MDC_VENT_FLOW_TRIG_SENS_SETTING	16930020	Preferred Term
Rapid Shallow Breathing Index	MEASURE of Rapid Shallow Breathing Index (RSBI) (RR/VT/Min)	Miscellaneous	MDC_RESP_RAPID_SHALLOW_BREATHING_INDEX	152860	Preferred Term
Ventilation mode	SETTING of ventilator mode	Ventilator Mode	MDC_VENT_MODE	184352	Preferred Term
Backup ventilation mode	SETTING of backup ventilator mode	Ventilator Mode	MDC_VENT_MODE_BACKUP	184400	Preferred Term
End tidal carbon dioxide concentration (or partial pressure) in airway gas	MEASURE of partial pressure of CO2 in end expiratory airway gas.	Gas Conc. and Partial Press	MDC_CONC_AWAY_CO2_ET	151708	Preferred Term
Expired carbon dioxide concentration (or partial pressure) in airway gas	MEASURE of partial pressure of CO2 in expiratory airway gas.	Gas Conc. and Partial Press	MDC_CONC_AWAY_CO2_EXP	151712	Preferred Term

IEEE/C4MI Common Term	C4MI Description/ Disambiguation	Category	REFID	CF_ CODE10	C4MI Status
Concentration airway carbon dioxide expiratory (gas delivery system)	MEASURE of the partial pressure of CO2 in the gas delivery system carrying expiratory gas.	Gas Conc. and Partial Press	MDC_CONC_GASDLV_CO2_EXP	153024	Preferred Term
End tidal oxygen concentration (or partial pressure) in airway gas	MEASURE of partial pressure of O2 in end expiratory airway gas.	Gas Conc. and Partial Press	MDC_CONC_AWAY_O2_ET	152440	Preferred Term
Expired oxygen concentration (or partial pressure) in airway gas	MEASURE of partial pressure of O2 in expiratory airway gas.	Gas Conc. and Partial Press	MDC_CONC_AWAY_O2_EXP	153132	Preferred Term
Inspiratory oxygen concentration (or partial pressure) in airway gas	MEASURE of partial pressure of O2 in inspiratory airway gas at the airway adaptor	Gas Conc. and Partial Press	MDC_CONC_AWAY_O2_INSP	152196	Preferred Term
FiO2 setting of gas delivery	SETTING of O2 concentration delivered at the gas delivery system (FiO2)	Gas Conc. and Partial Press	MDC_CONC_GASDLV_O2_INSP_SETTING	16930360	Preferred Term