

ISO 13584-32:2010-12 (E)

Industrial automation systems and integration - Parts library - Part 32: Implementation resources: OntoML: Product ontology markup language

Contents		Page
Foreword		vii
Introduction		ix
1 Scope		1
2 Normative references		2
3 Terms and definitions		2
4 Abbreviated terms		7
5 OntoML implementation levels		7
6 Overview of OntoML ontology representation		8
7 Overview of OntoML libraries representation		57
8 Other structured information elements		66
9 OntoML exchange structure		135
10 Dictionary Change Management Rules		152
Annex A (normative) Information object registration		163
Annex B (normative) Computer interpretable listings		164
Annex C (normative) Standard data requirements for OntoML		166
on ISO/TS 29002-10 shared XML schemas		167
Annex E (normative) Ontology specification of extended values used in OntoML		192
Annex F (normative) Structural transformation of the CIIM model from OntoML XML Schema to EXPRESS		199
Annex G (normative) OntoML exchange levels		233
Annex H (normative) Value format specification		235
Annex I (informative) XML file example		249
Annex J (informative) Information to support implementations		256
Figures Figure 1 -- CIIM ontology concepts description		9
Figure 2 -- UML-like representation of an XML complex type		10
Figure 3 -- UML-like representation of a reference to an XML complex type		10

Figure 4 -- UML-like representation of an external reference to an XML complex type	10
Figure 5 -- UML-like representation of XML attributes and simple type XML elements	11
Figure 6 -- XML representation of XML attributes and simple type XML elements	11
Figure 7 -- UML-like representation of an XML complex type XML element	11
Figure 8 -- XML representation of an XML complex type element	12
Figure 9 -- UML-like representation of XML elements cardinality	12
Figure 10 -- XML representation of XML elements cardinality	12
Figure 11 -- UML-like representation of XML complex type extensions	13
Figure 12 -- XML representation of XML complex type extensions	13
Figure 13 -- Identification of a CIIM ontology concept	14
Figure 14 -- CIIM ontology concept reference	14
Figure 15 -- Reference between CIIM ontology concepts	15
Figure 16 -- UML-like representation of a simple reference between CIIM ontology concepts	16
Figure 17 -- XML representation of a simple reference between CIIM ontology concepts	16
Figure 18 -- UML-like representation of a multi-valued reference between CIIM ontology concepts ..	17
Figure 19 -- XML representation of a multi-valued reference between CIIM ontology concepts	17
Figure 20 -- Ontology structure UML diagram	19
Figure 21 -- Ontology header structure	20
Figure 22 -- Root element of an ontology	22
Figure 23 -- Supplier ontology concept UML diagram	25
Figure 24 -- Simple class ontology concept UML diagram	27
Figure 25 -- Example of a supplier ontology using categorization classes	32
Figure 26 -- Categorization class	33
Figure 27 -- Item class case-of UML diagram	34
Figure 28 -- Class value assignment structure	37
Figure 29 -- Advanced-level ontology class concept UML diagram: functional view class	40
Figure 30 -- Advanced class ontology concept UML diagram: functional model class	41
Figure 31 -- Advanced class ontology concept UML diagram: functional model class view-of	44
Figure 32 -- View control variable structure	46
Figure 33 -- Simple property ontology concept UML diagram	48
Figure 34 -- Advanced property ontology concept UML diagram	51

Figure 35 -- Data type UML diagram	52
Figure 36 -- Simple-level document UML diagram	54
Figure 37 -- Root element of library	57
Figure 38 -- General class extension structure	58
Figure 39 -- Properties classification	60
Figure 40 -- Properties presentation	61
Figure 41 -- Products representation structure	62
Figure 42 -- Functional models structure UML diagram	64
Figure 43 -- Language specification	66
Figure 44 -- Translation resources	67
Figure 45 -- Translation data structure	69
Figure 46 -- Simple-level ontology external resources	70
Figure 47 -- Simple-level ontology external resources: HTTP file structure	71
Figure 48 -- Simple-level ontology external resources: illustration	72
Figure 49 -- Simple-level ontology external resources: message	73
Figure 50 -- Simple-level ontology external resources: external files	73
Figure 51 -- External resources: source document	74
Figure 52 -- External resources: identified document	74
Figure 53 -- External resources: referenced document	75
Figure 54 -- External resources: graphics	76
Figure 55 -- External resources: external graphics	76
Figure 56 -- External resources: referenced graphics	77
Figure 57 -- OntoML datatype system	78
Figure 58 -- Boolean type structure	80
Figure 59 -- String types structure	81
Figure 60 -- Date and time types structure	82
Figure 61 -- Enumeration of string codes type structure	84
Figure 62 -- Numeric types structure	86
Figure 63 -- Numeric currency types structure	88
Figure 64 -- Numeric measure types structure	90
Figure 65 -- Enumeration of integer codes type structure	92

Figure 66 -- Bag type structure	94
Figure 67 -- Set type structure	95
Figure 68 -- List type structure	96
Figure 69 -- Array type structure	97
Figure 70 -- Set with a subset constraint type structure	98
Figure 71 -- Instance value domain structure	99
Figure 72 -- Levels value domain structure	100
Figure 73 -- Named type structure	101
Figure 74 -- Advanced-level data types structure	102
Figure 75 -- General measure property unit structure	105
Figure 76 -- Basic unit structures	105
Figure 77 -- Named unit general structure	106
Figure 78 -- Dimensional exponent structure	107
Figure 79 -- International standardized unit structure	107
Figure 80 -- Non international standardized unit structure	108
Figure 81 -- Conversion based unit structure	109
Figure 82 -- Context dependent unit structure	110
Figure 83 -- Derived unit structure	110
Figure 84 -- General constraints structure	111
Figure 85 -- Constraint reference structure	112
Figure 86 -- Class constraint structure	113
Figure 87 -- Configuration control constraint structure	113
Figure 88 -- Property constraint structure	115
Figure 89 -- Context restriction constraint structure	115
Figure 90 -- Integrity constraint structure	116
Figure 91 -- Domain constraints	117
Figure 92 -- Subclass constraint representation	118
Figure 93 -- String pattern constraint representation	119
Figure 94 -- Cardinality constraint representation	120
Figure 95 -- String size constraint representation	121
Figure 96 -- Range constraint representation	122

Figure 97 -- Enumeration constraint representation	123
Figure 98 -- A posteriori relationship general structure representation	126
Figure 99 -- A posteriori case-of relationship representation	128
Figure 100 -- A posteriori semantic relationships structure	130
Figure 101 -- Library integrated information model identification structure	131
Figure 102 -- View exchange protocol identification structure	132
Figure 103 -- Organization structure	133
Figure 104 -- Mathematical string structure	133
Figure 105 -- Geometric context structure	134
Figure 106 -- Geometric unit context structure	134
Figure 107 -- Classifying a dictionary change	158
Figure E.1 -- Planning model of the ontology of extended values	193
Figure F.1 -- A UML information model example	200
Figure F.2 -- An UML-like representation of the information model	201
Figure F.3 -- An XML Schema example	201
Figure F.4 -- Mapping representation in OntoML	203
Figure F.5 -- XML source Path	203
Figure F.6 -- Global Vs local XML elements	204
Figure F.7 -- Local EXPRESS target path structure	207
Figure F.8 -- Complete EXPRESS target path structure	209
Figure I.1 -- General model example: ontology definition	249
Figure I.2 -- General model example: product specification	250
Tables Table 1 -- OntoML modules cross-references	143
Table 2 -- Conformance options of OntoML	144
Table 3 -- Revision and version	155
Table E.1 -- OntoML extendedvalues: class identifiers	198
Table E.2 -- OntoML extendedvalues: property identifiers	198
Table F.1 -- XML and corresponding ISO 10303-21 instances	202
Table F.2 -- SELF meaning in its use context	205
Table F.3 -- OntoML identifiers mapping	213
Table F.4 -- OntoML list of class identifiers mapping	215

Table F.5 -- OntoML ontology identifier mapping	216
Table F.6 -- OntoML label and translated label mapping	216
Table F.7 -- OntoML text and translated text mapping	218
Table F.8 -- OntoML synonymous and translated synonymous mapping	219
Table F.9 -- OntoML keywords and translated keywords mapping	220
Table F.10 -- OntoML HTTP protocol mapping	222
Table F.11 -- OntoML translated and not translated files mapping	222
Table F.12 -- OntoML external resource mapping	223
Table F.13 -- OntoML a posteriori case-of relationship mapping	226
Table F.14 -- OntoML a posteriori view-of relationship mapping	226
Table F.15 -- OntoML global language mapping	228
Table F.16 -- OntoML complex types / CIIM entity datatypes correspondence	228
Table H.1 -- ISO/IEC 14977 EBNF syntactic metalanguage	236
Table H.2 -- Transposing European style digits into Arabic digits	243
Table H.3 -- Number value examples	244
Table H.4 -- Characters from other rows of the Basic Multilingual Plane of ISO/IEC 10646-1	245