

# ISO 9506-2:2003-07 (E)

## Industrial automation systems - Manufacturing Message Specification - Part 2: Protocol specification

---

<b>Contents</b>		<b>Page</b>
Foreword .....		ix
Introduction .....		x
<b>1</b>	<b>Scope .....</b>	<b>1</b>
1.1	Specifications .....	1
1.2	Procedures .....	1
1.3	Applicability .....	1
1.4	Conformance .....	1
<b>2</b>	<b>Normative references .....</b>	<b>1</b>
<b>3</b>	<b>Definitions .....</b>	<b>2</b>
3.1	Reference Model definitions .....	3
3.2	Service Convention definitions .....	3
3.3	Abstract Syntax Notation definitions .....	3
3.4	Other definitions .....	4
<b>4</b>	<b>Abbreviations .....</b>	<b>7</b>
<b>5</b>	<b>Conventions .....</b>	<b>7</b>
5.1	Service Conventions .....	7
5.2	Base of Numeric Values .....	7
5.3	Notation .....	7
5.4	Supporting Productions .....	7
5.5	Pass-through Parameters .....	8
5.6	Negative Confirmation .....	8
5.7	Modifiers to a Service Request .....	8
5.8	Presentation of Errors .....	9
5.9	Calling and Called MMS-user .....	9
5.10	Sending and Receiving MMS-user and MPPM .....	9
5.11	Requesting and Responding MMS-user .....	9
5.12	Client and Server of a Service .....	9
5.13	ASN.1 Definitions .....	9
5.14	Protocol Subset Notation .....	10
5.15	Determination of the effective protocol .....	10
<b>6</b>	<b>Elements of Protocol Procedure .....</b>	<b>11</b>
6.1	Descriptive Conventions .....	11
6.2	Entering and Leaving the MMS Environment .....	11
6.3	Operating in the MMS Environment .....	11
6.4	Handling of Error Conditions .....	16
6.5	The Reject Service and RejectPDU .....	17
<b>7</b>	<b>MMS PDU .....</b>	<b>17</b>
7.1	The Confirmed-RequestPDU .....	18
7.2	The Unconfirmed-PDU .....	30
7.3	The Confirmed-ResponsePDU .....	31
7.4	The Confirmed-ErrorPDU .....	42
7.5	Common MMS Types .....	45

<b>8</b>	<b>Environment and General Management Protocol .....</b>	<b>48</b>
8.1	Introduction .....	48
8.2	Initiate .....	48
8.3	Conclude .....	49
8.4	Abort .....	49
8.5	Cancel .....	49
8.6	Reject .....	50
<b>9</b>	<b>Conditioned Service Response Protocol .....</b>	<b>51</b>
9.1	Introduction .....	51
9.2	Access Condition .....	51
9.3	DefineAccessControlList .....	51
9.4	GetAccessControlListAttributes .....	52
9.5	ReportAccessControlledObjects .....	53
9.6	DeleteAccessControlList .....	53
9.7	ChangeAccessControl .....	54
<b>10</b>	<b>VMD Support Protocol .....</b>	<b>54</b>
10.1	Introduction .....	54
10.2	Status Response Parameter .....	54
10.3	Status .....	55
10.4	UnsolicitedStatus .....	56
10.5	GetNameList .....	56
10.6	Identify .....	56
10.7	Rename .....	57
10.8	GetCapabilityList .....	57
10.9	VMDStop .....	57
10.10	VMDReset .....	58
<b>11</b>	<b>Domain Management Protocol .....</b>	<b>58</b>
11.1	Introduction .....	58
11.2	InitiateDownloadSequence .....	58
11.3	DownloadSegment .....	59
11.4	TerminateDownloadSequence .....	59
11.5	InitiateUploadSequence .....	60
11.6	UploadSegment .....	60
11.7	TerminateUploadSequence .....	61
11.8	RequestDomainDownload .....	61
11.9	RequestDomainUpload .....	61
11.10	LoadDomainContent .....	62
11.11	StoreDomainContent .....	62
11.12	DeleteDomain .....	63
11.13	GetDomainAttributes .....	63
<b>12</b>	<b>Program Invocation Management Protocol .....</b>	<b>64</b>
12.1	Introduction .....	64
12.2	CreateProgramInvocation .....	64
12.3	DeleteProgramInvocation .....	65
12.4	Start .....	65
12.5	Stop .....	66
12.6	Resume .....	67
12.7	Reset .....	67
12.8	Kill .....	68
12.9	GetProgramInvocationAttributes .....	68
12.10	Select .....	69
12.11	AlterProgramInvocationAttributes .....	69
12.12	ReconfigureProgramInvocation .....	70
<b>13</b>	<b>Unit Control Protocol .....</b>	<b>70</b>
13.1	Introduction .....	70
13.2	Control Element .....	70
13.3	InitiateUnitControlLoad service .....	71

13.4	UnitControlLoadSegment service .....	71
13.5	UnitControlUpload service .....	72
13.6	StartUnitControl service .....	72
13.7	StopUnitControl service .....	73
13.8	CreateUnitControl service .....	73
13.9	AddToUnitControl service .....	74
13.10	RemoveFromUnitControl service .....	74
13.11	GetUnitControlAttributes service .....	74
13.12	LoadUnitControlFromFile service .....	75
13.13	StoreUnitControlToFile service .....	75
13.14	DeleteUnitControl service .....	76
14	Variable Access Protocol .....	76
14.1	Conventions .....	76
14.2	Protocol For Specifying Types .....	77
14.3	Protocol For Specifying Alternate Access .....	77
14.4	Protocol For Specifying Data Values .....	78
14.5	Protocol for Specifying Access To Variables .....	82
14.6	Read .....	82
14.7	Write .....	83
14.8	InformationReport .....	83
14.9	GetVariableAccessAttributes .....	83
14.10	DefineNamedVariable .....	84
14.11	DeleteVariableAccess .....	84
14.12	DefineNamedVariableList .....	85
14.13	GetNamedVariableListAttributes .....	85
14.14	DeleteNamedVariableList .....	86
14.15	DefineNamedType .....	86
14.16	GetNamedTypeAttributes .....	86
14.17	DeleteNamedType .....	87
15	Data Exchange Protocol .....	87
15.1	Introduction .....	87
15.2	ExchangeData .....	87
15.3	GetDataExchangeAttributes .....	88
16	Semaphore Management Protocol .....	88
16.1	Introduction .....	88
16.2	TakeControl .....	89
16.3	RelinquishControl .....	89
16.4	DefineSemaphore .....	90
16.5	DeleteSemaphore .....	90
16.6	ReportSemaphoreStatus .....	90
16.7	ReportPoolSemaphoreStatus .....	91
16.8	ReportSemaphoreEntryStatus .....	91
16.9	AttachToSemaphore Modifier .....	92
17	Operator Communication Protocol .....	92
17.1	Introduction .....	92
17.2	Input .....	92
17.3	Output .....	93
18	Event Management Protocol .....	93
18.1	Introduction .....	93
18.2	TriggerEvent .....	93
18.3	EventNotification .....	94
18.4	AcknowledgeEventNotification .....	95
18.5	GetAlarmSummary .....	95
18.6	GetAlarmEnrollmentSummary .....	96
18.7	AttachToEventCondition .....	97
19	Event Condition Protocol .....	98

19.1	Introduction .....	98
19.2	DefineEventCondition .....	98
19.3	DeleteEventCondition .....	98
19.4	GetEventConditionAttributes .....	99
19.5	ReportEventConditionStatus .....	100
19.6	AlterEventConditionMonitoring .....	100
20	Event Action Protocol .....	101
20.1	Introduction .....	101
20.2	DefineEventAction .....	101
20.3	DeleteEventAction .....	102
20.4	GetEventActionAttributes .....	102
20.5	ReportEventActionStatus .....	103
21	Event Enrollment Protocol .....	103
21.1	Introduction .....	103
21.2	DefineEventEnrollment .....	104
21.3	DeleteEventEnrollment .....	104
21.4	GetEventEnrollmentAttributes .....	105
21.5	ReportEventEnrollmentStatus .....	107
21.6	AlterEventEnrollment .....	107
21.7	Supporting Productions .....	108
22	Event Condition List Protocol .....	108
22.1	Introduction .....	108
22.2	DefineEventConditionList protocol .....	108
22.3	DeleteEventConditionList protocol .....	109
22.4	AddEventConditionListReference protocol .....	109
22.5	RemoveEventConditionListReference protocol .....	110
22.6	GetEventConditionListAttributes protocol .....	110
22.7	ReportEventConditionListStatus protocol .....	111
22.8	AlterEventConditionListMonitoring protocol .....	111
23	Journal Management Protocol .....	112
23.1	Introduction .....	112
23.2	ReadJournal .....	112
23.3	WriteJournal .....	112
23.4	InitializeJournal .....	113
23.5	ReportJournalStatus .....	113
23.6	CreateJournal .....	114
23.7	DeleteJournal .....	114
23.8	Supporting Productions .....	114
24	Mapping to Underlying Communication Services .....	115
24.1	Mapping of PDUs .....	115
24.2	M-ASSOCIATE Data .....	115
24.3	Termination of Application Association .....	116
24.4	Directly-Mapped Abort Service .....	116
24.5	Construction of MMS PDUs .....	116
24.6	Delivery of Service Primitives to an MMS-user .....	116
24.7	Right to Send Data .....	117
24.8	Reliable Underlying Service .....	117
24.9	Flow Control .....	117
24.10	Use of Presentation Contexts .....	117
24.11	Abstract Syntax Definition .....	117
25	Configuration and Initialization Statement .....	117
25.1	Introduction .....	117
25.2	CIS Part One: Initialization of the VMD .....	118
25.3	CIS Part Two: Service and Parameter CBBs .....	130
	Annex A (normative) Relation of M-Services to ACSE and Presentation Services .....	144

A.1	Mapping of M-services .....	144
A.2	M-DATA service .....	145
A.3	M-U-ABORT service .....	145
A.4	M-P-ABORT service .....	145
A.5	Use of Presentation Contexts .....	145
A.6	Transfer Syntax Definition .....	146
A.7	Application Context Name .....	146
<b>Annex B (normative) Abstract format for Configuration and Initialization .....</b>		<b>148</b>
B.1	SCI Part One: Initialization of the VMD .....	148
B.2	Services and parameter CBBs .....	156
<b>Annex C (normative) File Access Protocol .....</b>		<b>159</b>
C.1	Introduction .....	159
C.2	ObtainFile .....	159
<b>Annex D (informative) File Management Protocol .....</b>		<b>161</b>
D.1	Overview .....	161
D.2	FileOpen .....	161
D.3	FileRead .....	161
D.4	FileClose .....	162
D.5	FileRename .....	162
D.6	FileDelete .....	162
D.7	FileDirectory .....	163
D.8	FileAttributes .....	163
<b>Annex E (informative) Scattered Access .....</b>		<b>164</b>
E.1	Introduction .....	164
E.2	DefineScatteredAccess .....	164
E.3	GetScatteredAccessAttributes .....	164
<b>Annex F (informative) REAL Data Type .....</b>		<b>166</b>
F.1	Introduction .....	166
F.2	REAL Data .....	166
F.3	End of Module .....	166
Index	.....	167
<b>Figures Figure 1 - Confirmed Service Request as seen by the Service Requester .....</b>		<b>12</b>
<b>Figure 2 - Confirmed Service Request as seen by the Service Responder .....</b>		<b>14</b>
<b>Figure 3 - Unconfirmed Service as seen by the Service Requester .....</b>		<b>15</b>
<b>Figure 4 - Unconfirmed Service as seen by the Service Responder .....</b>		<b>16</b>
<b>Tables Table 1 - CIS Implementation Information .....</b>		<b>119</b>
<b>Table 2 - Capability Description .....</b>		<b>120</b>
<b>Table 3 - Predefined Access Control object .....</b>		<b>121</b>
<b>Table 4 - Predefined Domain object .....</b>		<b>122</b>
<b>Table 5 - Predefined Program Invocation object .....</b>		<b>123</b>

<b>Table 6 - Predefined Unit Control object .....</b>	<b>123</b>
<b>Table 7 - Unnamed Variable objects .....</b>	<b>124</b>
<b>Table 8 - Predefined Named Variable object .....</b>	<b>124</b>
<b>Table 9 - Predefined Named Variable List object .....</b>	<b>125</b>
<b>Table 10 - Predefined Named Type object .....</b>	<b>125</b>
<b>Table 11 - Predefined Data Exchange object .....</b>	<b>126</b>
<b>Table 12 - Predefined Semaphore object .....</b>	<b>126</b>
<b>Table 13 - Predefined Operator Station object .....</b>	<b>127</b>
<b>Table 14 - Predefined Event Condition object .....</b>	<b>127</b>
<b>Table 15 - Predefined Event Action object .....</b>	<b>128</b>
<b>Table 16 - Predefined Event Enrollment object .....</b>	<b>128</b>
<b>Table 17 - Predefined Event Condition List object .....</b>	<b>129</b>
<b>Table 18 - Predefined Journal object .....</b>	<b>129</b>
<b>Table 19 - Predefined Journal Entry object .....</b>	<b>130</b>
<b>Table 20 - Environment &amp; General Management services .....</b>	<b>131</b>
<b>Table 21 - Environment &amp; General Management parameters .....</b>	<b>131</b>
<b>Table 22 - Access Control services .....</b>	<b>132</b>
<b>Table 23 - Access Control parameter .....</b>	<b>132</b>
<b>Table 24 - VMD Support services .....</b>	<b>132</b>
<b>Table 25 - VMD Support parameters .....</b>	<b>133</b>
<b>Table 26 - Domain Management services .....</b>	<b>133</b>
<b>Table 27 - Domain Management parameters .....</b>	<b>134</b>
<b>Table 28 - Program Invocation Management services .....</b>	<b>134</b>
<b>Table 29 - Program Invocation Management parameters .....</b>	<b>135</b>
<b>Table 30 - Unit Control services .....</b>	<b>135</b>
<b>Table 31 - Variable Access services .....</b>	<b>136</b>
<b>Table 32 - Variable Access parameters .....</b>	<b>137</b>
<b>Table 33 - Data parameters .....</b>	<b>137</b>
<b>Table 34 - Data Exchange services .....</b>	<b>137</b>
<b>Table 35 - Semaphore Management services .....</b>	<b>138</b>
<b>Table 36 - Semaphore Management parameter .....</b>	<b>138</b>

<b>Table 37 - Operator Communication services .....</b>	<b>138</b>
<b>Table 38 - Operator Communication parameter .....</b>	<b>139</b>
<b>Table 39 - Event Management services .....</b>	<b>139</b>
<b>Table 40 - Event Condition services .....</b>	<b>139</b>
<b>Table 41 - Event Condition parameters .....</b>	<b>140</b>
<b>Table 42 - Event Action services .....</b>	<b>140</b>
<b>Table 43 - Event Enrollment services .....</b>	<b>140</b>
<b>Table 44 - Event Condition List services .....</b>	<b>141</b>
<b>Table 45 - Event Condition List parameter .....</b>	<b>141</b>
<b>Table 46 - Journal Management services .....</b>	<b>141</b>
<b>Table 47 - Errors parameters .....</b>	<b>142</b>
<b>Table 48 - File Access service .....</b>	<b>142</b>
<b>Table 49 - File Management services .....</b>	<b>142</b>
<b>Table 50 - File Management parameter .....</b>	<b>142</b>
<b>Table 51 - Scattered Access services .....</b>	<b>143</b>
<b>Table 52 - Scattered Access parameter .....</b>	<b>143</b>