

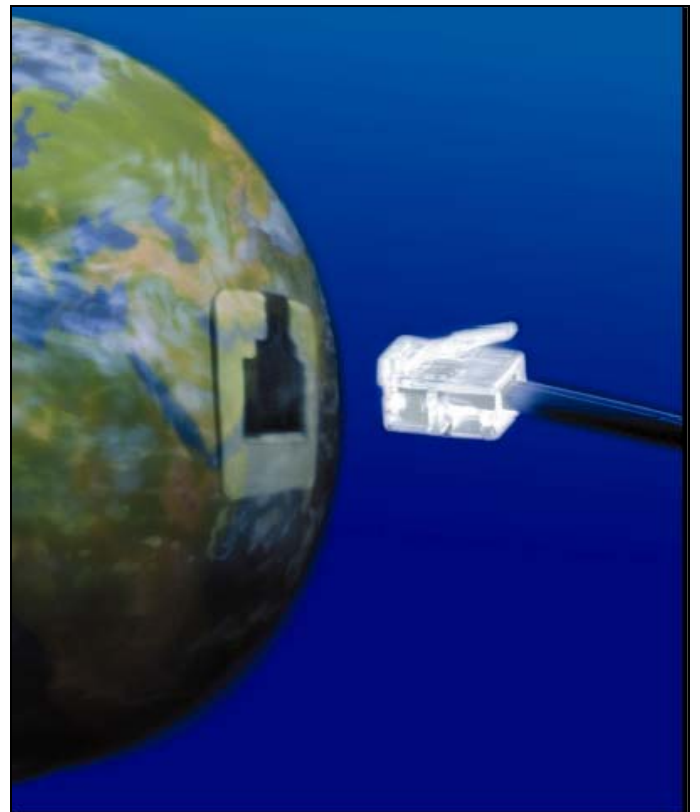
# Open Protocol

Atlas Copco Tools and Assembly Systems

9836 4415 01

Specification release 1.3

Revision 1



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|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Introduction .....</b>                            | <b>9</b>  |
| 1.1      | Revision history .....                               | 9         |
| 1.2      | Specification Revision rules .....                   | 10        |
| 1.3      | Terminology .....                                    | 11        |
| <b>2</b> | <b>Using Open Protocol .....</b>                     | <b>13</b> |
| 2.1      | Communication .....                                  | 13        |
| 2.1.1    | Ethernet protocol .....                              | 13        |
| 2.1.2    | Serial protocol .....                                | 13        |
| 2.2      | Message structure .....                              | 17        |
| 2.2.1    | Header .....   | 18        |
| 2.2.2    | Data Field .....                                     | 19        |
| 2.2.3    | Message End .....                                    | 19        |
| <b>3</b> | <b>Communication examples .....</b>                  | <b>21</b> |
| 3.1      | Establishing contact .....                           | 21        |
| 3.1.1    | Ethernet connection .....                            | 21        |
| 3.1.2    | Serial connection .....                              | 22        |
| 3.1.3    | Serial connection with 3964R .....                   | 23        |
| 3.2      | Starting a subscription .....                        | 23        |
| 3.3      | Sending a request .....                              | 24        |
| <b>4</b> | <b>Message categories .....</b>                      | <b>25</b> |
| 4.1      | Request and request reply messages .....             | 25        |
| 4.2      | Event Messages .....                                 | 25        |
| 4.3      | Programming control .....                            | 26        |
| 4.4      | Message list .....                                   | 26        |
| <b>5</b> | <b>All messages .....</b>                            | <b>31</b> |
| 5.1      | Communication messages .....                         | 31        |
| 5.1.1    | MID 0001 Communication start .....                   | 31        |
| 5.1.2    | MID 0002 Communication start acknowledge .....       | 31        |
| 5.1.3    | MID 0003 Communication stop .....                    | 33        |
| 5.2      | Request reply messages .....                         | 34        |
| 5.2.1    | MID 0004 Command error .....                         | 34        |
| 5.2.2    | MID 0005 Command accepted .....                      | 37        |
| 5.3      | Parameter set messages .....                         | 38        |
| 5.3.1    | MID 0010 Parameter set ID upload request .....       | 38        |
| 5.3.2    | MID 0011 Parameter set ID upload reply .....         | 38        |
| 5.3.3    | MID 0012 Parameter set data upload request .....     | 39        |
| 5.3.4    | MID 0013 Parameter set data upload reply .....       | 40        |
| 5.3.5    | MID 0014 Parameter set selected subscribe .....      | 42        |
| 5.3.6    | MID 0015 Parameter set selected .....                | 42        |
| 5.3.7    | MID 0016 Parameter set selected acknowledge .....    | 42        |
| 5.3.8    | MID 0017 Parameter set selected unsubscribe .....    | 43        |
| 5.3.9    | MID 0018 Select Parameter set .....                  | 43        |
| 5.3.10   | MID 0019 Set Parameter set batch size .....          | 44        |
| 5.3.11   | MID 0020 Reset Parameter set batch counter .....     | 44        |
| 5.3.12   | MID 0021 Lock at batch done subscribe .....          | 45        |
| 5.3.13   | MID 0022 Lock at batch done upload .....             | 45        |
| 5.3.14   | MID 0023 Lock at batch done upload Acknowledge ..... | 46        |
| 5.3.15   | MID 0024 Lock at batch done unsubscribe .....        | 46        |
| 5.3.16   | MID 0025 Parameter user set download request .....   | 47        |
| 5.4      | Job message .....                                    | 47        |
| 5.4.1    | MID 0030 Job ID upload request .....                 | 47        |
| 5.4.2    | MID 0031 Job ID upload reply .....                   | 47        |
| 5.4.3    | MID 0032 Job data upload request .....               | 48        |
| 5.4.4    | MID 0033 Job data upload reply .....                 | 49        |
| 5.4.5    | MID 0034 Job info subscribe .....                    | 53        |

|             |  |            |
|-------------|--|------------|
| 5.4.6       | MID 0035 Job info .....  | 53         |
| 5.4.7       | MID 0036 Job info acknowledge .....                              | 58         |
| 5.4.8       | MID 0037 Job info unsubscribe .....                              | 58         |
| 5.4.9       | MID 0038 Select Job .....  | 58         |
| 5.4.10      | MID 0039 Job restart .....                                       | 59         |
| <b>5.5</b>  | <b>Tool messages .....</b>                                       | <b>60</b>  |
| 5.5.1       | MID 0040 Tool data upload request .....                          | 60         |
| 5.5.2       | MID 0041 Tool data upload reply .....                            | 61         |
| 5.5.3       | MID 0042 Disable tool .....                                      | 63         |
| 5.5.4       | MID 0043 Enable tool .....                                       | 63         |
| 5.5.5       | MID 0044 Disconnect tool request .....                           | 64         |
| 5.5.6       | MID 0045 Set calibration value request .....                     | 64         |
| 5.5.7       | MID 0046 Set primary tool request .....                          | 65         |
| <b>5.6</b>  | <b>VIN Messages .....</b>  | <b>66</b>  |
| 5.6.1       | MID 0050 Vehicle ID Number download request .....                | 66         |
| 5.6.2       | MID 0051 Vehicle ID Number subscribe .....                       | 67         |
| 5.6.3       | MID 0052 Vehicle ID Number .....                                 | 67         |
| 5.6.4       | MID 0053 Vehicle ID Number acknowledge .....                     | 68         |
| 5.6.5       | MID 0054 Vehicle ID Number unsubscribe .....                     | 69         |
| <b>5.7</b>  | <b>Tightening result messages .....</b>                          | <b>69</b>  |
| 5.7.1       | MID 0060 Last tightening result data subscribe .....             | 69         |
| 5.7.2       | MID 0061 Last tightening result data .....                       | 70         |
| 5.7.3       | MID 0062 Last tightening result data acknowledge .....           | 80         |
| 5.7.4       | MID 0063 Last tightening result data unsubscribe .....           | 80         |
| 5.7.5       | MID 0064 Old tightening result upload request .....              | 81         |
| 5.7.6       | MID 0065 Old tightening result upload reply .....                | 81         |
| <b>5.8</b>  | <b>Alarm messages .....</b>                                      | <b>87</b>  |
| 5.8.1       | MID 0070 Alarm subscribe .....                                   | 87         |
| 5.8.2       | MID 0071 Alarm .....   | 88         |
| 5.8.3       | MID 0072 Alarm acknowledge .....                                 | 89         |
| 5.8.4       | MID 0073 Alarm unsubscribe .....                                 | 89         |
| 5.8.5       | MID 0074 Alarm acknowledged on controller .....                  | 89         |
| 5.8.6       | MID 0075 Alarm acknowledged on controller acknowledge .....      | 90         |
| 5.8.7       | MID 0076 Alarm status .....                                      | 90         |
| 5.8.8       | MID 0077 Alarm status acknowledge .....                          | 91         |
| 5.8.9       | MID 0078 Acknowledge alarm remotely on controller .....          | 92         |
| <b>5.9</b>  | <b>Time messages .....</b>                                       | <b>92</b>  |
| 5.9.1       | MID 0080 Read time upload request .....                          | 92         |
| 5.9.2       | MID 0081 Read time upload reply .....                            | 93         |
| 5.9.3       | MID 0082 Set Time .....  | 93         |
| <b>5.10</b> | <b>Multi-spindle status messages .....</b>                       | <b>94</b>  |
| 5.10.1      | MID 0090 Multi-spindle status subscribe .....                    | 94         |
| 5.10.2      | MID 0091 Multi-spindle status .....                              | 94         |
| 5.10.3      | MID 0092 Multi-spindle status acknowledge .....                  | 96         |
| 5.10.4      | MID 0093 Multi-spindle status unsubscribe .....                  | 96         |
| <b>5.11</b> | <b>Multi-spindle result messages .....</b>                       | <b>97</b>  |
| 5.11.1      | MID 0100 Multi-spindle result subscribe .....                    | 97         |
| 5.11.2      | MID 0101 Multi-spindle result .....                              | 98         |
| 5.11.3      | MID 0102 Multi-spindle result acknowledge .....                  | 100        |
| 5.11.4      | MID 0103 Multi spindle result unsubscribe .....                  | 100        |
| <b>5.12</b> | <b>PowerMACS result data .....</b>                               | <b>101</b> |
| 5.12.1      | MID 0105 Last PowerMACS tightening result data subscribe .....   | 101        |
| 5.12.2      | MID 0106 Last PowerMACS tightening result Station data .....     | 102        |
| 5.12.3      | MID 0107 Last PowerMACS tightening result Bolt data .....        | 105        |
| 5.12.4      | MID 0108 Last PowerMACS tightening result data acknowledge ..... | 109        |
| 5.12.5      | MID 0109 Last PowerMACS tightening result data unsubscribe ..... | 109        |
| <b>5.13</b> | <b>User interface messages .....</b>                             | <b>110</b> |
| 5.13.1      | MID 0110 Display user text on compact .....                      | 110        |
| 5.13.2      | MID 0111 Display user text on graph .....                        | 110        |

|             |   |            |
|-------------|---|------------|
| 5.13.3      | MID 0113 Flash green light on tool.....                         | 111        |
| <b>5.14</b> | <b>Job messages, advanced.....</b>                              | <b>112</b> |
| 5.14.1      | MID 0120 Job line control info subscribe.....                   | 112        |
| 5.14.2      | MID 0121 Job line control started.....                          | 112        |
| 5.14.3      | MID 0122 Job line control alert 1.....                          | 113        |
| 5.14.4      | MID 0123 Job line control alert 2.....                          | 113        |
| 5.14.5      | MID 0124 Job line control done.....                             | 114        |
| 5.14.6      | MID 0125 Job line control info acknowledge.....                 | 114        |
| 5.14.7      | MID 0126 Job line control info unsubscribe.....                 | 115        |
| 5.14.8      | MID 0127 Abort Job.....   | 115        |
| 5.14.9      | MID 0128 Job batch increment.....                               | 116        |
| 5.14.10     | MID 0129 Job batch decrement.....                               | 116        |
| 5.14.11     | MID 0130 Job off.....   | 117        |
| 5.14.12     | MID 0131 Set Job line control start.....                        | 117        |
| 5.14.13     | MID 0132 Set Job line alert 1.....                              | 118        |
| 5.14.14     | MID 0133 Set Job line alert 2.....                              | 118        |
| 5.14.15     | MID 0140 Execute dynamic Job request.....                       | 119        |
| <b>5.15</b> | <b>Multiple identifiers messages.....</b>                       | <b>122</b> |
| 5.15.1      | MID 0150 Identifier download request.....                       | 122        |
| 5.15.2      | MID 0151 Multiple identifier and result parts subscribe.....    | 123        |
| 5.15.3      | MID 0152 Multiple identifier and result parts.....              | 123        |
| 5.15.4      | MID 0153 Multiple identifiers and result parts acknowledge..... | 124        |
| 5.15.5      | MID 0154 Multiple identifier and result parts unsubscribe.....  | 125        |
| 5.15.6      | MID 0155 Bypass Identifier.....                                 | 125        |
| 5.15.7      | MID 0156 Reset latest Identifier.....                           | 126        |
| 5.15.8      | MID 0157 Reset all Identifiers.....                             | 126        |
| <b>5.16</b> | <b>I/O Interface.....</b>                                       | <b>127</b> |
| 5.16.1      | MID 0200 Set externally controlled relays.....                  | 127        |
| 5.16.2      | MID 0210 Status externally monitored inputs subscribe.....      | 128        |
| 5.16.3      | MID 0211 Status externally monitored inputs.....                | 128        |
| 5.16.4      | MID 0212 Status externally monitored inputs acknowledge.....    | 129        |
| 5.16.5      | MID 0213 Status externally monitored inputs unsubscribe.....    | 130        |
| 5.16.6      | MID 0214 IO device status request.....                          | 130        |
| 5.16.7      | MID 0215 IO device status reply.....                            | 131        |
| 5.16.8      | MID 0216 Relay function subscribe.....                          | 142        |
| 5.16.9      | MID 0217 Relay function.....                                    | 142        |
| 5.16.10     | MID 0218 Relay function acknowledge.....                        | 143        |
| 5.16.11     | MID 0219 Relay function unsubscribe.....                        | 143        |
| 5.16.12     | MID 0220 Digital input function subscribe.....                  | 144        |
| 5.16.13     | MID 0221 Digital input function.....                            | 144        |
| 5.16.14     | MID 0222 Digital input function acknowledge.....                | 145        |
| 5.16.15     | MID 0223 Digital input function unsubscribe.....                | 146        |
| 5.16.16     | MID 0224 Set digital input function.....                        | 146        |
| 5.16.17     | MID 0225 Reset digital input function.....                      | 147        |
| <b>5.17</b> | <b>PLC user data messages.....</b>                              | <b>148</b> |
| 5.17.1      | MID 0240 User data download.....                                | 149        |
| 5.17.2      | MID 0241 User data subscribe.....                               | 149        |
| 5.17.3      | MID 0242 User data.....   | 150        |
| 5.17.4      | MID 0243 User data acknowledge.....                             | 150        |
| 5.17.5      | MID 0244 User data unsubscribe.....                             | 151        |
| <b>5.18</b> | <b>Selector messages.....</b>                                   | <b>151</b> |
| 5.18.1      | MID 0250 Selector socket info subscribe.....                    | 151        |
| 5.18.2      | MID 0251 Selector socket info.....                              | 152        |
| 5.18.3      | MID 0252 Selector socket info acknowledge.....                  | 153        |
| 5.18.4      | MID 0253 Selector socket info unsubscribe.....                  | 153        |
| 5.18.5      | MID 0254 Selector control green lights.....                     | 153        |
| 5.18.6      | MID 0255 Selector control red lights.....                       | 154        |
| <b>5.19</b> | <b>Tool Location System messages.....</b>                       | <b>155</b> |
| 5.19.1      | MID 0260 Tool tag ID request.....                               | 155        |
| 5.19.2      | MID 0261 Tool tag ID subscribe.....                             | 156        |

|          |  |     |
|----------|--|-----|
| 5.19.3   | MID 0262 Tool tag ID .....                                 | 156 |
| 5.19.4   | MID 0263 Tool tag ID acknowledge .....                     | 157 |
| 5.19.5   | MID 0264 Tool tag ID unsubscribe .....                     | 157 |
| 5.20     | Controller messages .....                                  | 158 |
| 5.20.1   | MID 0270 Controller reboot request .....                   | 158 |
| 5.21     | Statistic messages .....                                   | 159 |
| 5.21.1   | MID 0300 Histogram upload request .....                    | 159 |
| 5.21.2   | MID 0301 Histogram upload reply .....                      | 159 |
| 5.22     | Automatic/Manual mode messages .....                       | 161 |
| 5.22.1   | MID 0400 Automatic/Manual mode subscribe .....             | 162 |
| 5.22.2   | MID 0401 Automatic/Manual mode .....                       | 162 |
| 5.22.3   | MID 0402 Automatic/Manual mode acknowledge .....           | 162 |
| 5.22.4   | MID 0403 Automatic/Manual mode unsubscribe .....           | 163 |
| 5.22.5   | MID 0410 AutoDisable settings request .....                | 163 |
| 5.22.6   | MID 0411 AutoDisable settings reply .....                  | 164 |
| 5.23     | Open Protocol Commands Disabled .....                      | 165 |
| 5.23.1   | MID 0420 Open Protocol commands disabled subscribe .....   | 165 |
| 5.23.2   | MID 0421 Open Protocol commands disabled .....             | 166 |
| 5.23.3   | MID 0422 Open Protocol commands disabled acknowledge ..... | 166 |
| 5.23.4   | MID 0423 Open Protocol commands disabled unsubscribe ..... | 167 |
| 5.24     | MID 8000, MID 8001 .....                                   | 167 |
| 5.25     | Keep alive message .....                                   | 167 |
| 5.25.1   | MID 9999 Keep alive message .....                          | 167 |
| 6        | Appendix .....   | 169 |
| 6.1      | PowerMACS data, names for variable identification .....    | 169 |
| 6.1.1    | Variable names for Bolt values .....                       | 169 |
| 6.1.2    | Variable names for step values .....                       | 171 |
| 6.1.3    | Special values in Station and Bolt data .....              | 177 |
| 6.1.4    | Formatting of error codes .....                            | 178 |
| 6.2      | MID limitations .....                                      | 180 |
|          |  |     |
| Table 1  | Header content .....                                       | 18  |
| Table 2  | Data field content .....                                   | 19  |
| Table 3  | Message end content .....                                  | 19  |
| Table 4  | Available messages .....                                   | 26  |
| Table 5  | MID 0002 Revision 1 .....                                  | 33  |
| Table 6  | MID 0002 Additions for revision 2 .....                    | 33  |
| Table 7  | MID 0002 Additions for revision 3 .....                    | 33  |
| Table 8  | MID 0002 Additions for revision 4 .....                    | 33  |
| Table 9  | Error code description .....                               | 34  |
| Table 10 | MID 0012 additions for Revision 3 .....                    | 39  |
| Table 11 | MID 0013 Revision 1 .....                                  | 40  |
| Table 12 | MID 0013 additions for revision 2 .....                    | 41  |
| Table 13 | MID 0013 Revision 3 .....                                  | 41  |
| Table 14 | MID 0031 Revision 1 .....                                  | 48  |
| Table 15 | MID 0031 Revision 2 .....                                  | 48  |
| Table 16 | MID 0032 Revision 1 .....                                  | 49  |
| Table 17 | MID 0032 Revision 2 .....                                  | 49  |
| Table 18 | MID 0032 Revision 3 .....                                  | 49  |
| Table 19 | MID 0033 Job data Revision 1 .....                         | 50  |
| Table 20 | MID 0033 Job data Revision 2 .....                         | 51  |
| Table 21 | MID 0033 Job data Revision 3 .....                         | 52  |
| Table 22 | MID 0035 Job info Revision 1 .....                         | 55  |
| Table 23 | MID 0035 Job info Revision 2 .....                         | 56  |
| Table 24 | MID 0035 Job info Revision 3 .....                         | 56  |
| Table 25 | MID 0035 Job info Revision 4 .....                         | 57  |
| Table 26 | MID 0038 Job ID, revision 1 .....                          | 59  |
| Table 27 | MID 0038 Job ID, revision 2 .....                          | 59  |

|  |     |
|--|-----|
| Table 28 MID 0039 Revision 1 .....   | 60  |
| Table 29 MID 0039 Revision 2 .....   | 60  |
| Table 30 MID 0041 Tool data, revision 1 .....                              | 61  |
| Table 31 MID 0041 Tool data, additions for revision 2 .....                | 62  |
| Table 32 MID 0041 Tool data, additions for revision 3 .....                | 62  |
| Table 33 MID 0041 Tool data, additions for revision 4 .....                | 63  |
| Table 35 MID 0045 Calibration data .....                                   | 65  |
| Table 36 MID 0046 Primary tool .....                                       | 66  |
| Table 37 MID 0052 Identifier data, revision 1 .....                        | 68  |
| Table 38 MID 0052 Identifier data, additions for revision 2 .....          | 68  |
| Table 39 MID 0061 Revision 1 .....   | 71  |
| Table 40 MID 0061 Revision 2 .....   | 73  |
| Table 41 MID 0061 Revision 3 .....   | 78  |
| Table 42 MID 0061 Revision 4 .....   | 78  |
| Table 43 MID 0061 Revision 5 .....   | 78  |
| Table 44 MID 0061 Revision 6 .....   | 78  |
| Table 45 MID 0061 Revision 998 .....                                       | 79  |
| Table 46 MID 0061 Light, revision 999 .....                                | 79  |
| Table 47 MID 0065 Revision 1 .....   | 82  |
| Table 48 MID 0065 Revision 2 .....   | 83  |
| Table 49 MID 0065 Revision 3 .....   | 86  |
| Table 50 MID 0065 Revision 4 .....   | 86  |
| Table 51 MID 0065 Revision 5 .....   | 87  |
| Table 52 MID 0065 Revision 6 .....   | 87  |
| Table 53 MID 0070 Alarm data .....   | 88  |
| Table 54 MID 0076 Alarm status data .....                                  | 91  |
| Table 55 MID 0091 Multi-spindle status data .....                          | 95  |
| Table 56 MID 0100 Revision 2 and 3 .....                                   | 97  |
| Table 57 MID 0101 Multi-spindle result data .....                          | 98  |
| Table 58 MID 0105 Revision 2 and 3 .....                                   | 102 |
| Table 59 MID 0106 Last tightening result Station data .....                | 103 |
| Table 60 MID 0107 Last tightening result Bolt data .....                   | 106 |
| Table 61 MID 0110 Graphic text display .....                               | 111 |
| Table 62 MID 0129 Revision 2 .....   | 117 |
| Table 63 MID 0140 Dynamic Job data revision 1 .....                        | 120 |
| Table 64 MID 0140 Dynamic Job data revision 999 .....                      | 122 |
| Table 65 MID 0152 Multiple identifier and result parts data .....          | 124 |
| Table 66 MID 0200 Relay status .....                                       | 127 |
| Table 67 MID 0211 Digital input status .....                               | 129 |
| Table 68 MID 0215 Revision 1 .....   | 131 |
| Table 69 MID 0215 Revision 2 .....   | 132 |
| Table 70 MID 0215 Relay number .....                                       | 132 |
| Table 71 MID 0215 DigIn number .....                                       | 138 |
| Table 72 MID 0217 Relay no and status .....                                | 143 |
| Table 73 MID 0221 Digital input no and status .....                        | 145 |
| Table 74 Example 1 input .....   | 148 |
| Table 75 Example 1 output .....  | 148 |
| Table 76 MID 0251 Selector socket data .....                               | 152 |
| Table 77 MID 0254 Selector green lights .....                              | 154 |
| Table 78 MID 0254 Selector red lights .....                                | 155 |
| Table 79 MID 0262 TLS ST Tool Tag Identity .....                           | 157 |
| Table 80 MID 0300 Parameter set and histogram type .....                   | 159 |
| Table 81 MID 0301 Histogram data .....                                     | 160 |
| Table 82 Variable names for Bolt values .....                              | 169 |
| Table 83 Measurement values .....  | 170 |
| Table 84 Variable names for step values .....                              | 171 |
| Table 85 Special values type .....   | 177 |
| Table 86 Variable names for special values in Station data, MID 0106 ..... | 177 |
| Table 87 Variable names for special values in Bolt data, MID 0107 .....    | 178 |
| Table 88 MID limitations .....   | 180 |





# 1 Introduction

Open Protocol is an interface for building applications for remote control or data subscription of controllers. It is platform independent and can be implemented on Linux, PLC, printers, and all Windows platforms for example.

The Open Protocol supports both serial and Ethernet connection.

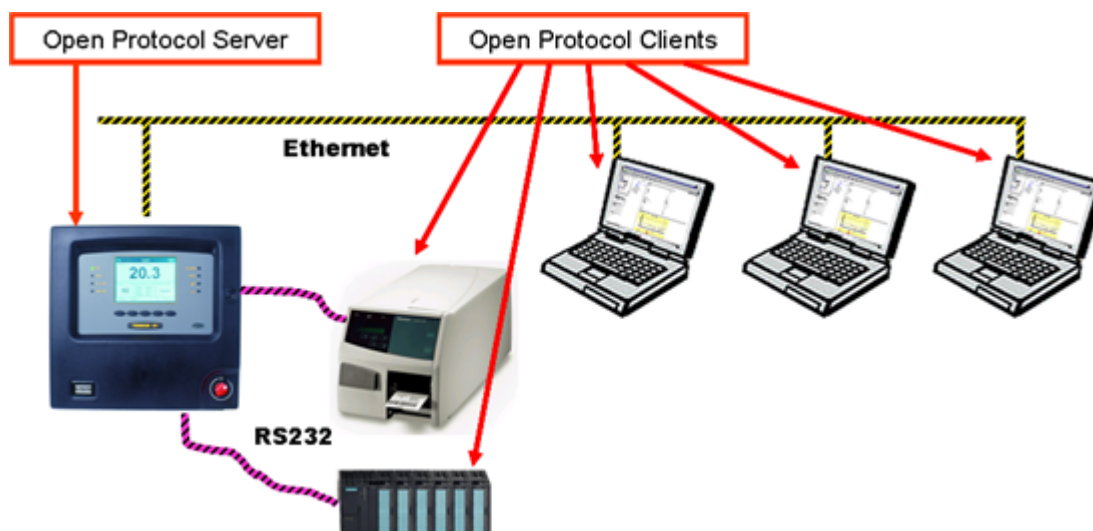


Figure 1 Open Protocol in the network, example

## 1.1 Revision history

The Open Protocol is fully backwards compatible. No changes are made in the existing data. Open Protocol revisions add data that is compatible from the controller SW-version with the corresponding number and later.

The changes since release 1.2 revision 14 are:

- Added revision 1, 2 and 3 for MID 0100.  
Added revision 3 MID 0105.
- Corrected the header contains Table 1 Station is two digits, corresponding to the rest of the document, the Spindel ID starts at byte 15 and spare at 17.
- Added revision 4 for MID 0035. Corrected the revision range in MID 0035 and MID 0034
- Correction of Identifier length in MID 151 to 100
- More thoroughly description of MID 0022 concerning the messages exchanges
- Added Revision 3 documentation for MID 32.

- Corrected the description of MID 411.
- Created a Ford special appendix due to DR 2104. Ford special rev 2 of MID11 and MID 61 now documented 2011-06-09 BJ
- Corrections done to all headers Revision fields from N/A to the real value.
- Added rules for Revision Handling 2011-06-14 /BJ.
- Updated the revision to 1.3.0 due to new MID revisions created. 2011-06-15

## 1.2 Specification Revision rules

Following rules for document revision handling is stated.

Example: 1.2.3.

The 1 is the **Version** of the protocol. No compatibility exists between Versions and that means that major changes has been done in the common communication procedures such as acknowledging, start up etc.

The 2 is the **Release** of the protocol. On release level the protocol must be backward compatible according to the rules of new MID Revisions built on earlier MID Revisions. A new **Release** must hence be backward compatible on the MID Revision and MID level. A new MID or a new MID Revision created, due to new functionality being introduced, increase the figure of the **Release** of the protocol.

The 3 is the **Revision** of the protocol. The Revision is increased due to corrections done in existing MIDs and MIDs revisions. These corrections must NOT have influences on the backward compatibility.

## 1.3 Terminology

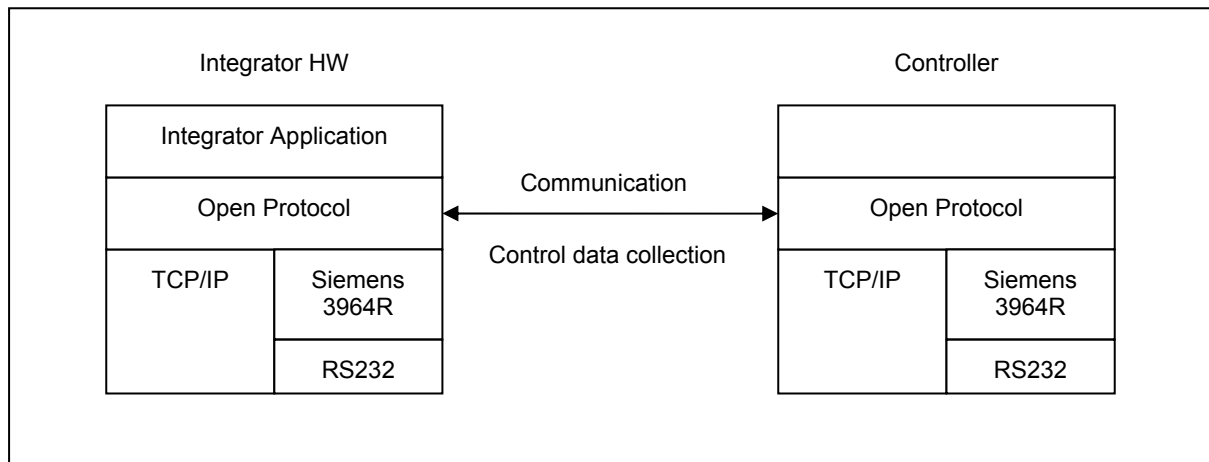
The following terminology is used in this manual.

| Term         | Definition   |
|--------------|--|
| Controller   | Open Protocol supports Power Focus, and PowerMACS controllers. See Table 87 for limitations. PowerMACS classic supports FFCCP. See the PowerMACS user guide for information.   |
| Integrator   | Integrator hardware can for example be a PC, PLC, or printer. Integrator applications use the Open Protocol in the integrator HW.  |
| Message      | A message consists of three parts; header, data field and message end, as described in section Message structure. Depending on type of communication, a package sent or received includes the message and an encapsulation before and after the message, as described in section Communication.  |
| MID          | Message ID of the message represented by four digits, for example 0052. MID 0052 refers to Vehicle ID Number upload. The ID is always included in the message.   |
| MID revision | <p>A MID can have several revisions. If no revision is set, revision 1 is applied. A MID is usually revised to include more data, thus increasing the length of the message. MID revisions are added to ensure backwards compatibility.</p> <p>See for example MID 0052 where revision 2 includes identifier result parts 2, 3 and 4 to the data. If revision 1 is used, this data is not sent. If revision 2 is used and the controller does not support more than one identifier, then only the VIN-number is sent.</p> <p>See Table 87 for limitations.</p> |
| Subscribe    | Subscribe is the term used when the controller sends specific data to the subscriber or subscribers each time it is generated.   |
| Unsubscribe  | Unsubscribe is the term used when a subscription is cancelled by the subscriber. The data will no longer be sent from the controller.  |



## 2 Using Open Protocol

This section describes the communication structure between the integrator HW and the controller.



**Figure 2 Communication structure**

### 2.1 Communication

The Open Protocol can be run using Ethernet or serial communication. The Open Protocol is a full duplex protocol, which means that data can be sent and received at the same time. Every communication partner must be able to operate a send and receive facility simultaneously.

- Power Focus controller can accept up to 5 connections at a time, shared between serial and Ethernet.
- PowerMACS controller can accept two Ethernet connections per station at a time. There is no support for serial connection.

#### 2.1.1 Ethernet protocol

The integrator connects to the controller, and the controller accepts the connection. The controller is the server, and the integrator application is the client. The protocol used is TCP/IP. The default port used for the communication is 4545.

**Note! Ensure that the port is correctly configured in the controller!**

#### 2.1.2 Serial protocol

There are two kinds of serial protocol.

- Serial ASCII protocol
- Serial ASCII protocol with 3964R handshake

**Note! Ensure that the serial port is correctly configured according to the corresponding serial protocol used!**

When running serial communication, the messages are encapsulated according to the protocol used. The messages within the encapsulation are the same regardless of type of communication.

Figure 3 Serial communication protocol, and Figure 5 Controller sending serial communication protocol with 3964R handshake, show the encapsulation requirements that must be fulfilled when using serial communication.

### Serial ASCII protocol

- All messages sent from the integrator to the controller must be stamped with a 4 ASCII character tag before the STX character: BEL (ASCII 0x07 bell) HT (ASCII 0x09 horizontal tab) BEL (ASCII 0x07) HT (ASCII 0x09).
- All messages must be encapsulated between STX (ASCII 0x02 Start of Text) and ETX (ASCII 0x03 End of Text).

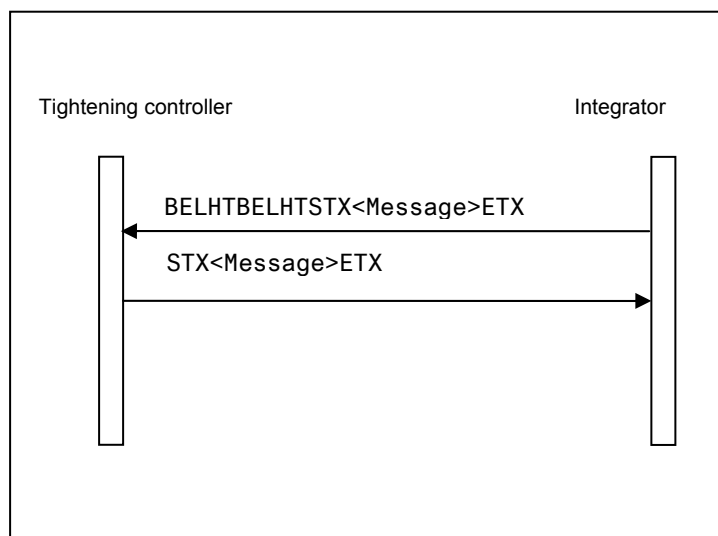


Figure 3 Serial communication protocol

### Serial ASCII protocol with 3964 R handshake

All messages exchanged between the controller and the integrator are transferred within the message frame in accordance with Siemens Procedure 3964R.

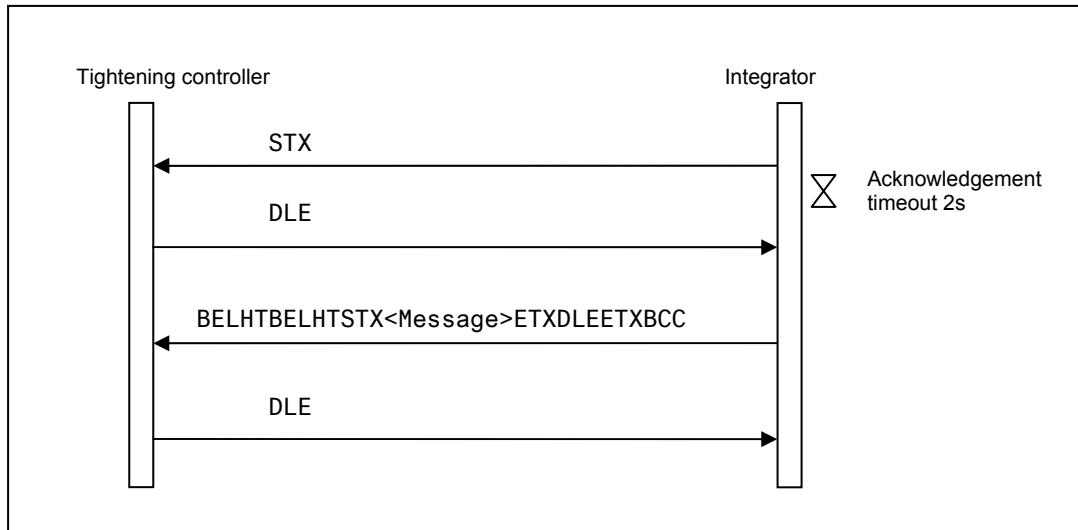
The Procedure 3964R is a transfer protocol between two systems A and B. Every time one of the systems wants to send, the following procedure is initiated.

- request from A to B for data interchange
- data interchange
- end of data interchange

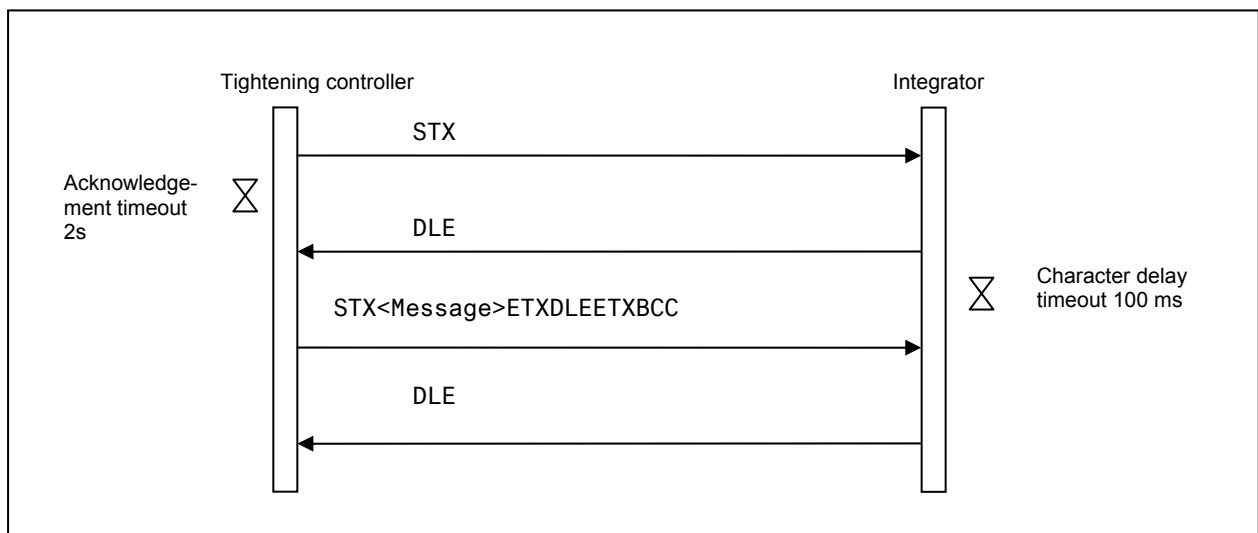
The protocol 3964R allows reliable data as the receiver must first signal to the transmitter that it is ready to receive (communication setup) and then after data interchange must acknowledge correct reception. Data integrity is ensured by an additional block check character (BCC).

The block check control is the XOR sum of all the transmitted data bytes. The generation begins with the first byte of the message and ends after characters DLE (ASCII 0x10 Data Link Escape) and ETX (ASCII 0x03 End of Text).

The description is valid for both cases, when the integrator is the sender and the controller the receiver, and the opposite. See Figure 4 and Figure 5 Controller sending serial communication protocol with 3964R handshake.



**Figure 4 Integrator sending serial communication protocol with 3964R handshake**



**Figure 5 Controller sending serial communication protocol with 3964R handshake**

The following steps are included when the controller is sending to the integrator.

1. The controller sends the control character STX (ASCII 0x02 start of text) and waits for an acknowledgment for 2s (acknowledgment timeout = 2s).
2. The integrator responds with the acknowledge character DLE (ASCII 0x10 data link escape) and the Controller reverts to transmit mode.

If the integrator responds with control character NAK (ASCII 0x15 Negative acknowledgment) or any other control character (apart from DLE) or if the acknowledgment delay time elapses, the connection setup procedure has failed. The connection setup procedure is aborted after a total of 6 unsuccessful attempts.

3. The Controller sends an Open Protocol serial message followed by the characters ETX, DLE, ETX and BCC as end identifier. The controller then waits for an acknowledgement character from the integrator.
4. The integrator monitors the incoming time between two characters. The interval between two characters may not exceed the character delay timeout = 100 ms.
5. The integrator sends the control character DLE and the Open Protocol message has been accepted error free.  
If the integrator responds with control character NAK (ASCII 0x15 Negative acknowledgment) or any other character (apart from DLE) or if the acknowledgment delay time elapses with no answer, then the transmission is aborted and the controller starts a new connection setup with character STX. The procedure is aborted and the controller sends a NAK to the integrator after a total of six unsuccessful attempts.

The following is also applicable:

- If the integrator sends a NAK during transmission, then the controller aborts the transmission and repeats it in the manner described above. In the case of any other character the integrator waits for the character delay time to elapse and then sends a NAK.
- If the integrator receives an STX from the controller in idle state, it answers with DLE. If it receives any other character than STX in idle state it waits for the character delay time to elapse and then sends a NAK.  
After each character, the next character is awaited during the character delay time = 100ms. If the character delay time elapses without new reception a NAK is sent to the controller.
- If the integrator detects the character string DLE ETX BCC, it terminates reception. It then compares the BCC with the internally generated one. If the BCC is correct and no error reception has occurred it sends a DLE to the controller. If the BCC is not correct a NAK is sent to the controller. A retry is then awaited. If it is not possible to receive the message with error free BCC after 6 attempts, the integrator aborts the reception.

### Serial cable loss detection

In order to be able to detect serial cable loss, the controller has a communication timer. This timer is reset every time it sends or receives a message on the serial line. This strategy to detect cable loss implies that the client application sends a keep alive before the timer in the controller expires.



**An inactivity timeout is suggested to integrator i.e. if no message has been exchanged during the last 10s, send a keep alive.**

In a Power Focus controller, the connection is assumed to be lost and the controller closes the connection if no messages have been exchanged for 15 seconds, by default. It is possible to remove the need of sending keep alive to the controller. In this case the controller will not be able to detect the loss of serial connection or serial cable. This possibility can be used to reduce the load on certain serial devices (PLC, printers ...) which have difficulties to handle full duplex traffic.

In Power Focus, to remove the need of sending keep alive messages using serial connection, uncheck C331 Serial cable loss detection.



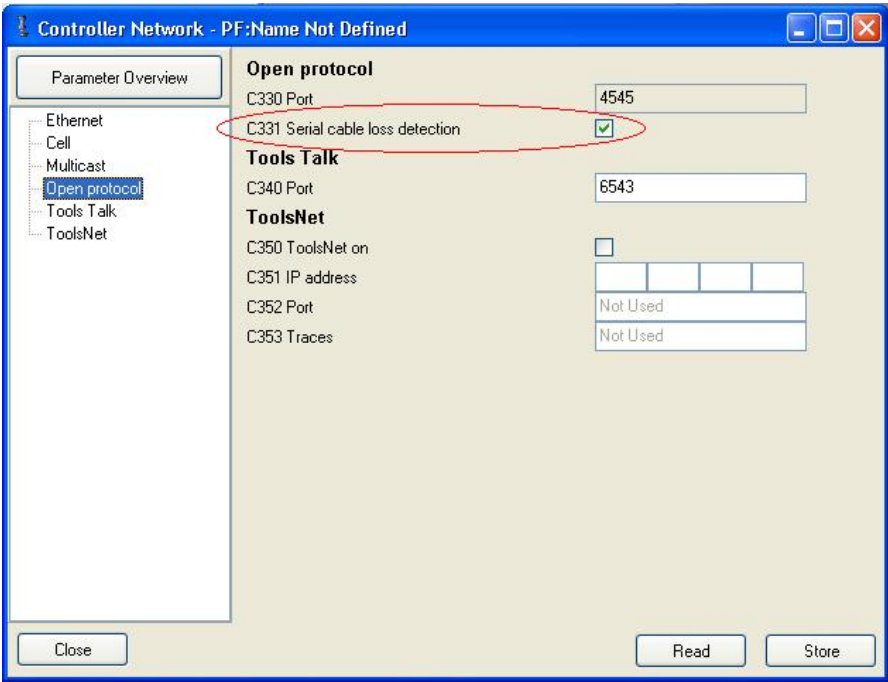



Figure 6 Power Focus Open Protocol settings

 In some cases after communication lost, the controller may answer to MID 0001 Communication start with MID 0004 Command error Client already connected.

This case must be handled by the client application and should not be considered as a failure.

## 2.2 Message structure

All information sent over the communication links is ASCII format.

A message consists of three parts; header, data field and message end. The sections below describe each part in detail.

### Example

This following example shows MID 0071 Alarm.

- Figure 7 shows the number of the byte above the message.
- Figure 8 shows the same message without the numbers but with the spaces shown.

The spaces must be included according to each message structure.

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54  |
| 0 | 0 | 5 | 3 | 0 | 0 | 7 | 1 |   |    |    |    |    |    |    |    |    |    |    |    | 0  | 1  | E  | 4  | 0  | 4  | 0  | 2  | 1  | 0  | 3  | 1  | 0  | 4  | 2  | 0  | 0  | 8  | -  | 0  | 9  | -  | 2  | 5  | :  | 1  | 0  | :  | 1  | 4  | :  | 1  | 6  | NUL |

Figure 7 Message example with byte number

|          |                                      |
|----------|--------------------------------------|
| 00530071 | 01E404021031042008-09-25:10:14:16NUL |
|----------|--------------------------------------|

Figure 8 Message example without byte number

## 2.2.1 Header

The header contains 20 bytes according to Table 1.

Table 1 Header content

| Message part | Byte  | Parameter   | Value  |
|--------------|-------|-------------|--|
| Header       | 1-4   | Length      | The length is the length of the header plus the data field excluding the NUL termination.<br>The header always includes information about the length of the message. The length is represented by four ASCII digits ('0'...'9') specifying a range of 0000 to 9999.  |
|              | 5-8   | MID         | The MID is four bytes long and is specified by four ASCII digits ('0'...'9'). The MID describes how to interpret the message.  |
|              | 9-11  | Revision    | The revision of the MID is specified by three ASCII digits ('0'...'9').<br>The MID revision is unique per MID and is used in case several versions are available for the same MID. Using the revision number the integrator can subscribe or ask for different versions of the same MID. By default the MID revision number is three spaces (revision 1 of the MID). So, if the integrator is interested in the initial revision (revision 1) of the MID, it can send three spaces as MID revision or 001. |
|              | 12    | No ack flag | ONLY FOR SUBSCRIPTION MIDs.<br>The No Ack Flag is used when setting a subscription. If the No Ack flag is not set in a subscription it means that the subscriber will acknowledge each "push" message sent by the controller (reliable mode).<br>If set, the controller will only push out the information required without waiting for a receive acknowledgement from the subscriber (unreliable mode).   |
|              | 13-14 | Station ID  | The station the message is addressed to in the case of controller with multi-station configuration. The station ID is 2 byte long and is specified by two ASCII digits ('0'...'9'). One space is considered as station 1 (default value). Only available if not marked with N/A.   |
|              | 15-16 | Spindle ID  | The spindle the message is addressed to in the case several spindles are connected to the same controller. The spindle ID is 2 bytes long and is specified by two ASCII digits ('0'...'9'). Two spaces are considered as spindle 1 (default value). Only available if not marked with N/A. OBS! Is allways 0 for FORD OBS!   |
|              | 17-20 | Spare       | Reserved space in the header for future use.   |



**The Length and MID are padded on the left with zeroes (ASCII 0x30).**

## 2.2.2 Data Field

The Data Field is ASCII data representing the data. The data contains a list of parameters depending on the MID. Each parameter is represented with an ID and the parameter value. Note that the ID always is 2 bytes. The data field can be empty or contain a maximum of 9979 bytes.

**Table 2 Data field content**

| Message part | Byte  | Parameter          | Value   |
|--------------|-------|--------------------|---|
| Data field   | 21-22 | 01                 | Parameter ID (00...99), length two bytes. The parameter ID is padded on the left with the ASCII characters '0'.   |
|              | 23 -  | Parameter 01 value | Parameter value is defined by parameter selection (fixed number of bytes).<br>ASCII digits ('0'...'9') or ASCII characters between 0x20 and 0x7F Hex.<br>If the Parameter value is specified only by ASCII digits, then the parameter value is padded on the left with the ASCII characters '0'.<br>If the Parameter value is specified by ASCII characters, then the parameter value is padded on the right with space <SPC> (ASCII character 0x20 Hex). |
|              | n-    | 02                 | Parameter 02  |
|              | n+2-  | Parameter 02 value | Parameter 02 value...   |
|              |       | 03                 | Parameter 03  |
|              |       | Parameter 02 value | Parameter 03 value...   |



**All the parameters of the data field must be sent.**

**The data field of each message is subject to future modifications handled by adding MID revisions. A new revision can include new parameters or increased length of the data field.**

## 2.2.3 Message End

The message end is empty.

**Table 3 Message end content**

| Message part | Byte | Parameter   | Value  |
|--------------|------|-------------|--|
| Message end  | 0    | Message end | All the messages are NUL terminated. The NUL termination is not included in the message length. In this manual this is illustrated with NUL, ASCII 0x00. |



### 3 Communication examples

This section gives a few examples on communication sessions.

#### 3.1 Establishing contact

This section describes how to set up a communication.

##### 3.1.1 Ethernet connection

Prerequisite: The controller has an IP address and listens to port 4545.

- 1. The controller listens to port 4545.
- 2. The integrator connects to the controller.
- 3. The controller accepts the connection.
- 4. The integrator sends **MID 0001 Communication start**.
- 5. The controller answers **MID 0002 Communication start acknowledge** with Cell ID 0001, Channel ID 04 and Controller name Airbag.

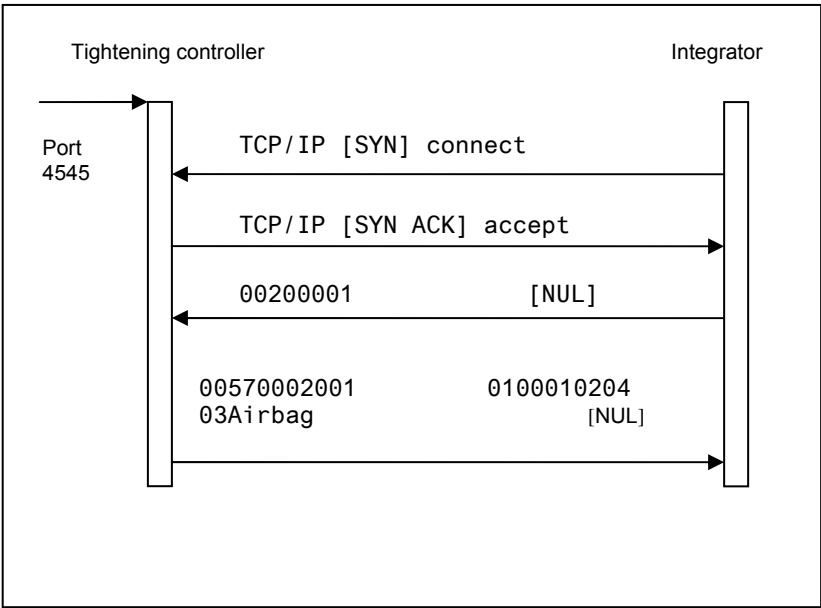


Figure 9 Ethernet connection example

### 3.1.2 Serial connection

Prerequisite: The controller and the integrator are connected through a serial cable.

1. The integrator sends  
**MID 0001 Communication start.**
2. The controller answers  
**MID 0002 Communication start**  
acknowledge with Cell ID 0001,  
Channel ID 04 and Controller  
name Airbag.

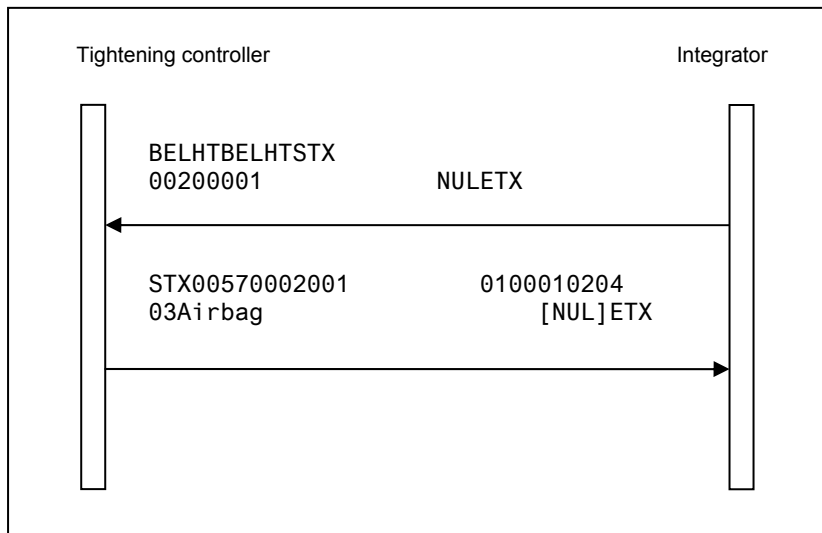


Figure 10 Serial connection example

### 3.1.3 Serial connection with 3964R

1. The integrator sends request for connection with the controller.
2. The controller accepts the request to send.
3. The integrator sends **MID 0001 Communication start**.
4. The controller accepts the communication.
5. The controller sends request to send on Siemens protocol.
6. The integrator accepts the communication.
7. The controller answers **MID 0002 Communication start** acknowledge with Cell ID 0001, Channel ID 04 and Controller name Airbag.
8. The integrator accepts the message.

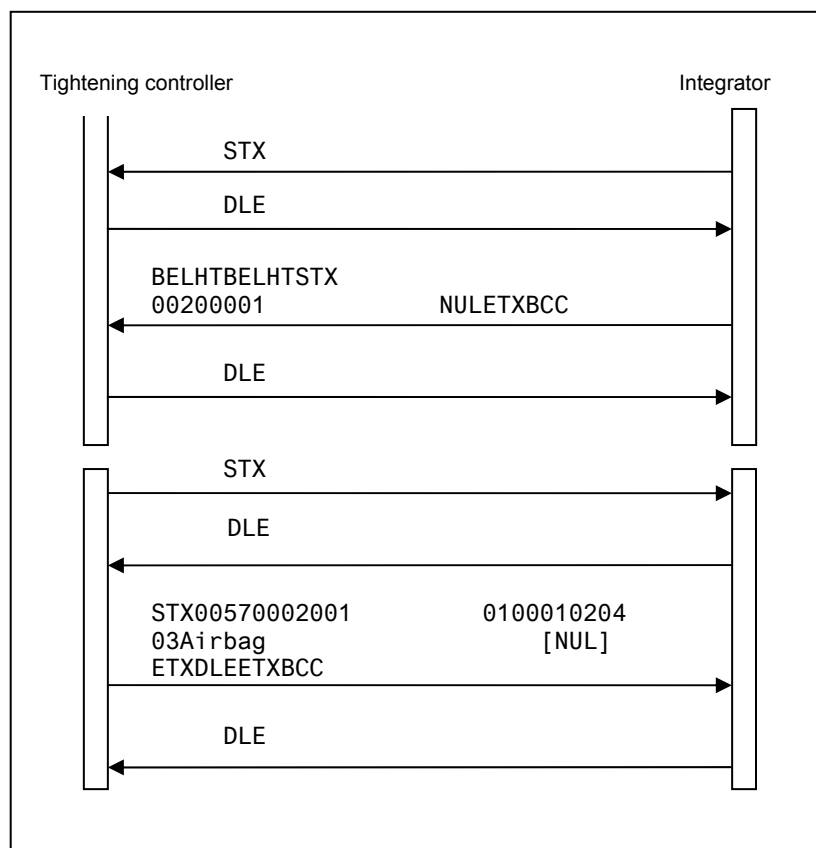


Figure 11 Serial connection with 3964R, example

## 3.2 Starting a subscription

The example shows the sequence for **MID 0060 Last tightening data subscribe** and **MID 0061 Last tightening data upload**.

Prerequisite: A communication session is already established. The example shows only the data sent, not the protocol frames.

1. The integrator sends **MID 0060 Last tightening result data subscribe**. The subscription is for revision number 6.

2. The controller sends **MID 0005 Command accepted**.

3. A tightening is performed.  
(See arrow in figure.)

4. The controller sends **MID 0061 Last tightening result data upload** and then waits for acknowledgement.

The example shows only parameters 01, 02 and 03 of the total 55 parameters for revision 6. See Table 38 MID 0061 Revision 1.

5. The integrator sends **MID 0062 Last tightening result data acknowledge**.

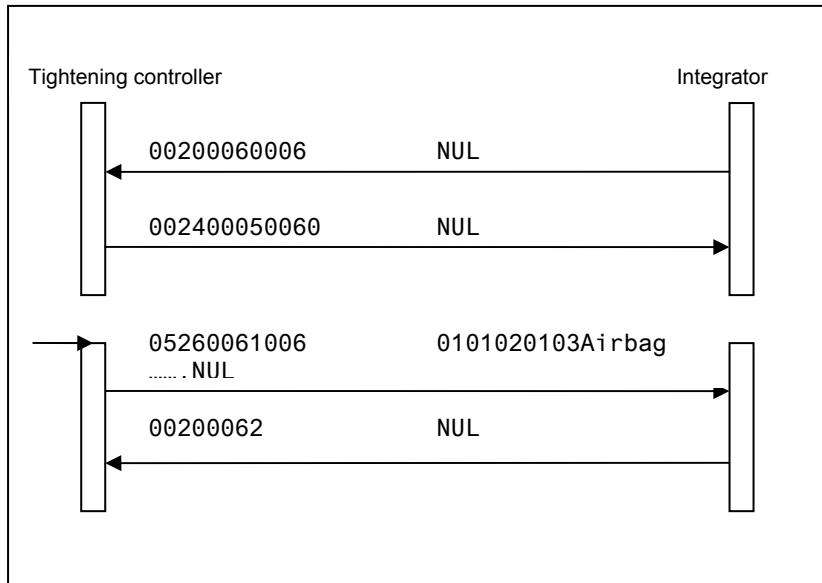


Figure 12 Starting a subscription

### 3.3 Sending a request

This example shows a request for collecting parameter set data.

1. The integrator sends **MID 0012 Parameter set data upload request**. The request is sent for parameter set number 001.

2. The controller sends **MID 0013 Parameter set data upload reply**. For a description of the parameters, see Table 11 MID 0013 Revision 1

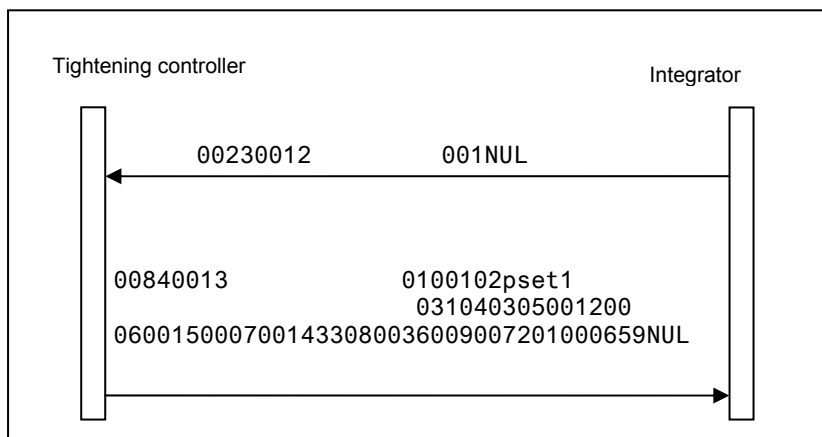


Figure 13 Sending a request



## 4 Message categories

Most, but not all, messages can be sorted into two main categories. **MID 0001 Communication start** or **MID 0003 Communication stop**, do not belong to any of these categories.

The categories are:

- Request messages
- Event messages

### 4.1 Request and request reply messages

The integrator sends a request to the controller and the controller responds to the request with a positive or negative reply. If no answer to the request is received before the response timeout, the integrator should re-send the request up to three times. After three times, the connection is considered lost and a new connection must be established.

Some of the request messages are available as Open Protocol commands disable. These commands are rejected if the digital input **Open Protocol commands disable** digital input is active. The commands are marked in Table 4 Available messages. See also section Open Protocol Commands Disabled for more information.

Example of request and request reply messages:

- The integrator sends **MID 0018 Select Parameter set**
- The controller answers **MID 0005 Command accepted** or **MID 0004 Command error**

### 4.2 Event Messages

The event messages can be divided into three categories:

- Event subscribe – unsubscribe messages
- Event messages
- Event acknowledge messages

#### Event subscribe – unsubscribe messages

The subscription is made with the subscribe - unsubscribe message. The subscription can be cancelled at any time by the integrator by sending an unsubscribe message.

#### Events messages

The controller can spontaneously send messages to the integrator after an event such as a tightening or an alarm. This service is only enabled after a subscription event message.

## Event message acknowledge

The integrator should acknowledge the event messages by sending the corresponding acknowledge MID. If no acknowledge is received before the response timeout the controller will re-send the message up to three times. After three attempts the controller will consider the connection as lost.

## 4.3 Programming control

Some command MIDs require an exclusive access to the controller called “programming control”. Programming control can be compared to a regular lock needed to perform programming tasks.

The concerned MIDs require that programming control is available (i.e. the lock shall be unlocked) in order to execute, take programming control during the time of execution of the command (i.e. they lock the lock), and then automatically release programming control (i.e. automatically unlock the lock).

If programming control is not available when sending such a MID (i.e. the lock is already locked), the controller answers with **MID 0004 Command error, Programming control not granted**.

When a command MID requires programming control, this is indicated as a warning in the MID specification.

## 4.4 Message list

The section lists all available messages in Table 4. See Table 87 MID limitations for a list of which MID is implemented in each controller.

**Table 4 Available messages**

| ID   | Description                       | Sent by    | Request message | Request reply message | Event subscription | Events | Event Acknowledge | Open Protocol command |
|------|-----------------------------------|------------|-----------------|-----------------------|--------------------|--------|-------------------|-----------------------|
| 0001 | Communication start               | Integrator | X               |                       |                    |        |                   |                       |
| 0002 | Communication start acknowledge   | Controller |                 | X                     |                    |        |                   |                       |
| 0003 | Communication stop                | Integrator | X               |                       |                    |        |                   |                       |
| 0004 | Command error                     | Controller | X               |                       |                    |        |                   |                       |
| 0005 | Command accepted                  | Controller | X               |                       |                    |        |                   |                       |
| 0010 | Parameter set ID upload request   | Integrator | X               |                       |                    |        |                   |                       |
| 0011 | Parameter set ID upload reply     | Controller |                 | X                     |                    |        |                   |                       |
| 0012 | Parameter set data upload request | Integrator | X               |                       |                    |        |                   |                       |
| 0013 | Parameter set data upload reply   | Controller |                 | X                     |                    |        |                   |                       |

| ID   | Description                             | Sent by    | Request message | Request reply message | Event subscription | Events | Event Acknowledge | Open Protocol command |
|------|---|------------|-----------------|-----------------------|--------------------|--------|-------------------|-----------------------|
| 0014 | Parameter set selected subscribe        | Integrator |                 |                       | X                  |        |                   |                       |
| 0015 | Parameter set selected                  | Controller |                 |                       |                    | X      |                   |                       |
| 0016 | Parameter set selected acknowledge      | Integrator |                 |                       |                    |        | X                 |                       |
| 0017 | Parameter set selected unsubscribe      | Integrator |                 |                       | X                  |        |                   |                       |
| 0018 | Select Parameter set                    | Integrator | X               |                       |                    |        |                   | X                     |
| 0019 | Set Parameter set batch size            | Integrator | X               |                       |                    |        |                   | X                     |
| 0020 | Reset Parameter set batch counter       | Integrator | X               |                       |                    |        |                   | X                     |
| 0021 | Lock at batch done subscribe            | Integrator |                 |                       | X                  |        |                   |                       |
| 0022 | Lock at batch done upload               | Controller |                 |                       |                    | X      |                   |                       |
| 0023 | Lock at batch done upload acknowledge   | Integrator |                 |                       |                    |        | X                 |                       |
| 0024 | Lock at batch done unsubscribe          | Integrator |                 |                       | X                  |        |                   |                       |
| 0025 | Reserved for Ford                       | Integrator | X               |                       |                    |        |                   |                       |
| 0030 | Job ID upload request                   | Integrator | X               |                       |                    |        |                   |                       |
| 0031 | Job ID upload reply                     | Controller |                 | X                     |                    |        |                   |                       |
| 0032 | Job data upload request                 | Integrator | X               |                       |                    |        |                   |                       |
| 0033 | Job data upload reply                   | Controller |                 | X                     |                    |        |                   |                       |
| 0034 | Job info subscribe                      | Integrator |                 |                       | X                  |        |                   |                       |
| 0035 | Job info                                | Controller |                 |                       |                    | X      |                   |                       |
| 0036 | Job info acknowledge                    | Integrator |                 |                       |                    |        | X                 |                       |
| 0037 | Job info unsubscribe                    | Integrator |                 |                       | X                  |        |                   |                       |
| 0038 | Select Job                              | Integrator | X               |                       |                    |        |                   | X                     |
| 0039 | Job restart                             | Integrator | X               |                       |                    |        |                   | X                     |
| 0040 | Tool data upload request                | Integrator | X               |                       |                    |        |                   |                       |
| 0041 | Tool data upload reply                  | Controller |                 | X                     |                    |        |                   |                       |
| 0042 | Disable tool                            | Integrator | X               |                       |                    |        |                   | X                     |
| 0043 | Enable tool                             | Integrator | X               |                       |                    |        |                   | X                     |
| 0044 | Disconnect tool request                 | Integrator | X               |                       |                    |        |                   | X                     |
| 0045 | Set calibration value request           | Integrator | X               |                       |                    |        |                   | X                     |
| 0046 | Set primary tool request                | Integrator | X               |                       |                    |        |                   | X                     |
| 0050 | Vehicle ID number download request      | Integrator | X               |                       |                    |        |                   | X                     |
| 0051 | Vehicle ID number subscribe             | Integrator |                 |                       | X                  |        |                   |                       |
| 0052 | Vehicle ID number                       | Controller |                 |                       |                    | X      |                   |                       |
| 0053 | Vehicle ID number acknowledge           | Integrator |                 |                       |                    |        | X                 |                       |
| 0054 | Vehicle ID number unsubscribe           | Integrator |                 |                       | X                  |        |                   |                       |
| 0060 | Last tightening result data subscribe   | Integrator |                 |                       | X                  |        |                   |                       |
| 0061 | Last tightening result data             | Controller |                 |                       |                    | X      |                   |                       |
| 0062 | Last tightening result data acknowledge | Integrator |                 |                       |                    |        | X                 |                       |
| 0063 | Last tightening result data unsubscribe | Integrator |                 |                       | X                  |        |                   |                       |
| 0064 | Old tightening result upload request    | Integrator | X               |                       |                    |        |                   |                       |

| ID   | Description                                       | Sent by    | Request message | Request reply message | Event subscription | Events | Event Acknowledge | Open Protocol command |
|------|---|------------|-----------------|-----------------------|--------------------|--------|-------------------|-----------------------|
| 0065 | Old tightening result upload reply                | Controller |                 | X                     |                    |        |                   |                       |
| 0070 | Alarm subscribe                                   | Integrator |                 |                       | X                  |        |                   |                       |
| 0071 | Alarm   | Controller |                 |                       |                    | X      |                   |                       |
| 0072 | Alarm acknowledge                                 | Integrator |                 |                       |                    |        | X                 |                       |
| 0073 | Alarm unsubscribe                                 | Integrator |                 |                       | X                  |        |                   |                       |
| 0074 | Alarm acknowledged on controller                  | Controller |                 |                       |                    | X      |                   |                       |
| 0075 | Alarm acknowledged on controller acknowledge      | Integrator |                 |                       |                    |        | X                 |                       |
| 0076 | Alarm status                                      | Controller |                 |                       |                    | X      |                   |                       |
| 0077 | Alarm status acknowledge                          | Integrator |                 |                       |                    |        | X                 |                       |
| 0078 | Acknowledge alarm remotely on controller          | Integrator | X               |                       |                    |        |                   | X                     |
| 0080 | Read time upload request                          | Integrator | X               |                       |                    |        |                   |                       |
| 0081 | Read time upload reply                            | Controller |                 | X                     |                    |        |                   |                       |
| 0082 | Set time  | Integrator | X               |                       |                    |        |                   | X                     |
| 0090 | Multi-spindle status subscribe                    | Integrator |                 |                       | X                  |        |                   |                       |
| 0091 | Multi-spindle status                              | Controller |                 |                       |                    | X      |                   |                       |
| 0092 | Multi-spindle status acknowledge                  | Integrator |                 |                       |                    |        | X                 |                       |
| 0093 | Multi-spindle status unsubscribe                  | Integrator |                 |                       | X                  |        |                   |                       |
| 0100 | Multi-spindle result subscribe                    | Integrator |                 |                       | X                  |        |                   |                       |
| 0101 | Multi-spindle result                              | Controller |                 |                       |                    | X      |                   |                       |
| 0102 | Multi-spindle result acknowledge                  | Integrator |                 |                       |                    |        | X                 |                       |
| 0103 | Multi-spindle result unsubscribe                  | Integrator |                 |                       | X                  |        |                   |                       |
| 0105 | Last PowerMACS tightening result data subscribe   | Integrator |                 |                       | X                  |        |                   |                       |
| 0106 | Last PowerMACS tightening result Station data     | Controller |                 |                       |                    | X      |                   |                       |
| 0107 | Last PowerMACS tightening result Bolt data        | Controller |                 |                       |                    | X      |                   |                       |
| 0108 | Last PowerMACS tightening result data acknowledge | Integrator |                 |                       |                    |        | X                 |                       |
| 0109 | Last PowerMACS tightening result data unsubscribe | Integrator |                 |                       | X                  |        |                   |                       |
| 0110 | Display user text on compact                      | Integrator | X               |                       |                    |        |                   | X                     |
| 0111 | Display user text on graph                        | Integrator | X               |                       |                    |        |                   | X                     |
| 0113 | Flash green light on tool                         | Integrator | X               |                       |                    |        |                   | X                     |
| 0120 | Job line control info subscribe                   | Integrator |                 |                       | X                  |        |                   |                       |
| 0121 | Job line control started                          | Controller |                 |                       |                    | X      |                   |                       |
| 0122 | Job line control alert 1                          | Controller |                 |                       |                    | X      |                   |                       |
| 0123 | Job line control alert 2                          | Controller |                 |                       |                    | X      |                   |                       |
| 0124 | Job line control done                             | Controller |                 |                       |                    | X      |                   |                       |
| 0125 | Job line control info acknowledge                 | Integrator |                 |                       |                    |        | X                 |                       |
| 0126 | Job line control info unsubscribe                 | Integrator |                 |                       | X                  |        |                   |                       |
| 0127 | Abort Job   | Integrator | X               |                       |                    |        |                   | X                     |
| 0128 | Job batch increment                               | Integrator | X               |                       |                    |        |                   | X                     |
| 0129 | Job batch decrement                               | Integrator | X               |                       |                    |        |                   | X                     |

| ID   | Description                                  | Sent by    | Request message | Request reply message | Event subscription | Events | Event Acknowledge | Open Protocol command |
|------|--|------------|-----------------|-----------------------|--------------------|--------|-------------------|-----------------------|
| 0130 | Job off                                      | Integrator | X               |                       |                    |        |                   | X                     |
| 0131 | Set Job line control start                   | Integrator |                 |                       |                    |        |                   | X                     |
| 0132 | Set Job line control alert 1                 | Integrator |                 |                       |                    |        |                   | X                     |
| 0133 | Set Job line control alert 2                 | Integrator |                 |                       |                    |        |                   | X                     |
| 0140 | Execute dynamic Job request                  | Integrator | X               |                       |                    |        |                   | X                     |
| 0150 | Identifier download request                  | Integrator | X               |                       |                    |        |                   | X                     |
| 0151 | Multiple identifiers work order subscribe    | Integrator |                 |                       | X                  |        |                   |                       |
| 0152 | Multiple identifiers work order              | Controller |                 |                       |                    | X      |                   |                       |
| 0153 | Multiple identifiers work order acknowledge  | Integrator |                 |                       |                    |        | X                 |                       |
| 0154 | Multiple Identifiers work order unsubscribe  | Integrator |                 |                       | X                  |        |                   |                       |
| 0155 | Bypass identifier                            | Integrator | X               |                       |                    |        |                   | X                     |
| 0156 | Reset latest identifier                      | Integrator | X               |                       |                    |        |                   | X                     |
| 0157 | Reset all identifiers                        | Integrator | X               |                       |                    |        |                   | X                     |
| 0200 | Set external controlled relays               | Integrator | X               |                       |                    |        |                   | X                     |
| 0210 | Status external monitored inputs subscribe   | Integrator |                 |                       | X                  |        |                   |                       |
| 0211 | Status external monitored inputs             | Controller |                 |                       |                    | X      |                   |                       |
| 0212 | Status external monitored inputs acknowledge | Integrator |                 |                       |                    |        | X                 |                       |
| 0213 | Status external monitored inputs unsubscribe | Integrator |                 |                       | X                  |        |                   |                       |
| 0214 | IO device status request                     | Integrator | X               |                       |                    |        |                   |                       |
| 0215 | IO device status reply                       | Controller |                 | X                     |                    |        |                   |                       |
| 0216 | Relay function subscribe                     | Integrator |                 |                       | X                  |        |                   |                       |
| 0217 | Relay function                               | Controller |                 |                       |                    | X      |                   |                       |
| 0218 | Relay function acknowledge                   | Integrator |                 |                       |                    |        | X                 |                       |
| 0219 | Relay function unsubscribe                   | Integrator |                 |                       | X                  |        |                   |                       |
| 0220 | Digital input function subscribe             | Integrator |                 |                       | X                  |        |                   |                       |
| 0221 | Digital input function                       | Controller |                 |                       |                    | X      |                   |                       |
| 0222 | Digital input function acknowledge           | Integrator |                 |                       |                    |        | X                 |                       |
| 0223 | Digin function unsubscribe                   | Integrator |                 |                       | X                  |        |                   |                       |
| 0224 | Set digital input function                   | Integrator | X               |                       |                    |        |                   | X                     |
| 0225 | Reset digital input function                 | Integrator | X               |                       |                    |        |                   | X                     |
| 0240 | User data download                           | Integrator |                 |                       |                    |        |                   |                       |
| 0241 | User data subscribe                          | Integrator |                 |                       | X                  |        |                   |                       |
| 0242 | User data                                    | Controller |                 |                       |                    | X      |                   |                       |
| 0243 | User data acknowledge                        | Integrator |                 |                       |                    |        | X                 |                       |
| 0244 | User data unsubscribe                        | Integrator |                 |                       | X                  |        |                   |                       |
| 0250 | Selector socket info subscribe               | Integrator |                 |                       | X                  |        |                   |                       |
| 0251 | Selector socket info                         | Controller |                 |                       |                    | X      |                   |                       |
| 0252 | Selector socket info acknowledge             | Integrator |                 |                       |                    |        | X                 |                       |
| 0253 | Selector socket info unsubscribe             | Integrator |                 |                       | X                  |        |                   |                       |

| ID   | Description                                 | Sent by    | Request message | Request reply message | Event subscription | Events | Event Acknowledge | Open Protocol command |
|------|---|------------|-----------------|-----------------------|--------------------|--------|-------------------|-----------------------|
| 0254 | Selector control green lights               | Integrator |                 |                       |                    |        |                   | X                     |
| 0255 | Selector control red lights                 | Integrator |                 |                       |                    |        |                   | X                     |
| 0260 | Tool Tag ID request                         | Integrator | X               |                       |                    |        |                   |                       |
| 0261 | Tool Tag ID subscribe                       | Integrator |                 |                       | X                  |        |                   |                       |
| 0262 | Tool Tag ID                                 | Controller |                 | X                     |                    | X      |                   |                       |
| 0263 | Tool Tag ID acknowledge                     | Integrator |                 |                       |                    |        | X                 |                       |
| 0264 | Tool Tag ID unsubscribe                     | Integrator |                 |                       | X                  |        |                   |                       |
| 0270 | Controller reboot request                   | Integrator | X               |                       |                    |        |                   | X                     |
| 0300 | Histogram upload request                    | Integrator | X               |                       |                    |        |                   |                       |
| 0301 | Histogram upload reply                      | Controller |                 | X                     |                    |        |                   |                       |
| 0400 | Automatic/Manual mode subscribe             | Integrator |                 |                       | X                  |        |                   |                       |
| 0401 | Automatic/Manual mode                       | Controller |                 |                       |                    | X      |                   |                       |
| 0402 | Automatic/Manual mode acknowledge           | Integrator |                 |                       |                    |        | X                 |                       |
| 0403 | Automatic/Manual mode unsubscribe           | Integrator |                 |                       | X                  |        |                   |                       |
| 0410 | AutoDisable settings request                | Integrator | X               |                       |                    |        |                   |                       |
| 0411 | AutoDisable settings reply                  | Controller |                 | X                     |                    |        |                   |                       |
| 0420 | Open protocol commands disabled subscribe   | Integrator |                 |                       | X                  |        |                   |                       |
| 0421 | Open protocol commands disabled             | Controller |                 |                       |                    | X      |                   |                       |
| 0422 | Open protocol commands disabled acknowledge | Integrator |                 |                       |                    |        | X                 |                       |
| 0423 | Open protocol commands disabled unsubscribe | Integrator |                 |                       | X                  |        |                   |                       |
| 8000 | Audi emergency status subscribe             | Integrator |                 |                       | X                  |        |                   |                       |
| 8001 | Audi emergency status                       | Controller |                 |                       |                    | X      |                   |                       |
| 8002 | Audi emergency status acknowledge           | Integrator |                 |                       |                    |        | X                 |                       |
| 8003 | Audi emergency status unsubscribe           | Integrator |                 |                       | X                  |        |                   |                       |
| 9999 | Keep alive open protocol communication      | Integrator | X               | X                     |                    |        |                   |                       |

## 5 All messages

The following section describes all the messages in the Open Protocol.

### 5.1 Communication messages

#### 5.1.1 MID 0001 Communication start

This message enables the communication. The controller does not respond to any other command before this.

- Message sent by: Integrator
- Answers: **MID 0002 Communication start acknowledge** or  
**MID 0004 Command error, Client already connected.**

Example: Communication start with call for **MID 0002 Communication start acknowledge** revision 3.

|             |     |
|-------------|-----|
| 00200001003 | NUL |
|-------------|-----|

| Message part | Parameter            | Byte  | Value          |
|--------------|----------------------|-------|----------------|
| Header       | Length               | 1-4   | 0020           |
|              | MID                  | 5-8   | 0001           |
|              | Revision of MID 0002 | 9-11  | Range: 000-004 |
|              | No Ack flag          | 12    | N/A            |
|              | Station ID           | 13-14 | N/A            |
|              | Spindle ID           | 15-16 | N/A            |
|              | Spare                | 17-20 | N/A            |
| Data field   | N/A                  | 0     | N/A            |
| Message end  |                      | 21    | NUL            |

#### 5.1.2 MID 0002 Communication start acknowledge

When accepting the communication start the controller sends as reply, a Communication start acknowledge. This message contains some basic information about the controller, such as cell ID, channel ID, and name.

- Message sent by: Controller
- Answer: None

Example, revision 1: The connected controller belongs to cell 1, the channel ID is 1 and the name is Airbag1

|          |                     |     |
|----------|---------------------|-----|
| 00570002 | 010001020103Airbag1 | NUL |
|----------|---------------------|-----|

| Message part | Parameter              | Byte   | Value  |
|--------------|------------------------|--|--|
| Header       | Length                 | 1-4  | Rev 1: 0057<br>Rev 2: 0062<br>Rev 3: 0125<br>Rev 4: 0163 |
|              | MID                    | 5-8  | 0002   |
|              | Revision               | 9-11   | Range: 000-004   |
|              | No Ack flag            | 12   | N/A  |
|              | Station ID             | 13-14  | N/A  |
|              | Spindle ID             | 15-16  | N/A  |
|              | Spare                  | 17-20  | N/A  |
| Data field   | Controller information | 21-length  | See Table 5,<br>Table 6 and<br>Table 7 and<br>Table 7    |
| Message end  |                        | Rev 1: 58<br>Rev 2: 63<br>Rev 3: 126<br>Rev 3: 153 | NUL  |



**Table 5 MID 0002 Revision 1**

| Parameter       | Byte  | Value  |
|-----------------|-------|--|
| Cell ID         | 21-22 | 01   |
|                 | 23-26 | The cell ID is four bytes long specified by four ASCII digits. Range: 0000-9999. |
| Channel ID      | 27-28 | 02   |
|                 | 29-30 | The channel ID is two bytes long specified by two ASCII digits. Range: 00-20.    |
| Controller Name | 31-32 | 03   |
|                 | 33-57 | The controller name is 25 bytes long and specified by 25 ASCII characters.       |

**Table 6 MID 0002 Additions for revision 2**

| Parameter     | Byte  | Value  |
|---------------|-------|--|
| Supplier code | 58-59 | 04   |
|               | 60-62 | ACT (supplier code for Atlas Copco Tools) specified by three ASCII characters. |

**Table 7 MID 0002 Additions for revision 3**

| Parameter                   | Byte    | Value   |
|-----------------------------|---------|---|
| Open Protocol version       | 63-64   | 05  |
|                             | 65-83   | Open Protocol version. 19 ASCII characters. This version mirror the IMPLEMENTED version of the Open Protocol and is hence not the same as the version of the specification. This is caused by, for instance, the possibility of implementation done of only a subset of the protocol. |
| Controller software version | 84-85   | 06  |
|                             | 86-104  | The controller software version. 19 ASCII characters.   |
| Tool software version       | 105-106 | 07  |
|                             | 107-125 | The tool software version. 19 ASCII characters.   |

**Table 8 MID 0002 Additions for revision 4**

| Parameter                | Byte    | Value  |
|--------------------------|---------|--|
| RBU Type                 | 126-127 | 08   |
|                          | 128-151 | The RBU Type. 24 ASCII characters.                 |
| Controller Serial Number | 152-153 | 09   |
|                          | 154-163 | The Controller Serial Number. 10 ASCII characters. |

### 5.1.3 MID 0003 Communication stop

This message disables the communication. The controller will stop to respond to any commands except for **MID 0001 Communication start** after receiving this command.

- Message sent by: Controller:
- Answer: **MID 0005 Command accepted**

| Message part | Parameter | Byte | Value |
|--------------|-----------|------|-------|
| Header       | Length    | 1-4  | 0020  |

|             |             |       |       |
|-------------|-------------|-------|-------|
|             | MID         | 5-8   | 0003  |
|             | Revision    | 9-11  | 00-01 |
|             | No Ack flag | 12    | N/A   |
|             | Station ID  | 13-14 | N/A   |
|             | Spindle ID  | 15-16 | N/A   |
|             | Spare       | 17-20 | N/A   |
| Data field  | N/A         |       | N/A   |
| Message end |             | 21    | NUL   |

## 5.2 Request reply messages

### 5.2.1 MID 0004 Command error

This message is used by the controller when a request for any reason has not been performed. The data field contains the message ID of the message request that failed as well as an error code.

- Message sent by: Controller:
- Answer: None

Example: The request **MID 0018 Select parameter set** failed, the parameter set number was not present in the controller.

|          |           |
|----------|-----------|
| 00260004 | 001802NUL |
|----------|-----------|

| Message part | Parameter          | Byte  | Value                               |
|--------------|--------------------|-------|-------------------------------------|
| Header       | Length             | 1-4   | 0026                                |
|              | MID                | 5-8   | 0004                                |
|              | Revision           | 9-11  | Range: 000-001                      |
|              | No Ack flag        | 12    | N/A                                 |
|              | Station ID         | 13-14 | N/A                                 |
|              | Spindle ID         | 15-16 | N/A                                 |
|              | Spare              | 17-20 | N/A                                 |
| Data field   | MID and error code | 21-26 | see Table 9 Error code description. |
| Message end  |                    | 27    | NUL                                 |

**Table 9 Error code description**

| ID | Description                            |
|----|--|
| 00 | No Error                               |
| 01 | Invalid data                           |
| 02 | Parameter set ID not present           |
| 03 | Parameter set can not be set.          |
| 04 | Parameter set not running              |
| 06 | VIN upload subscription already exists |

| ID | Description  |
|----|--|
| 07 | VIN upload subscription does not exists                      |
| 08 | VIN input source not granted                                 |
| 09 | Last tightening result subscription already exists           |
| 10 | Last tightening result subscription does not exist           |
| 11 | Alarm subscription already exists                            |
| 12 | Alarm subscription does not exist                            |
| 13 | Parameter set selection subscription already exists          |
| 14 | Parameter set selection subscription does not exist          |
| 15 | Tightening ID requested not found                            |
| 16 | Connection rejected protocol busy                            |
| 17 | Job ID not present   |
| 18 | Job info subscription already exists                         |
| 19 | Job info subscription does not exist                         |
| 20 | Job can not be set   |
| 21 | Job not running  |
| 22 | Not possible to execute dynamic Job request                  |
| 23 | Job batch decrement failed                                   |
| 24 | Not possible to create Pset                                  |
| 25 | Programming control not granted                              |
| 30 | Controller is not a sync Master/station controller           |
| 31 | Multi-spindle status subscription already exists             |
| 32 | Multi-spindle status subscription does not exist             |
| 33 | Multi-spindle result subscription already exists             |
| 34 | Multi-spindle result subscription does not exist             |
| 40 | Job line control info subscription already exists            |
| 41 | Job line control info subscription does not exist            |
| 42 | Identifier input source not granted                          |
| 43 | Multiple identifiers work order subscription already exists  |
| 44 | Multiple identifiers work order subscription does not exist  |
| 50 | Status external monitored inputs subscription already exists |
| 51 | Status external monitored inputs subscription does not exist |
| 52 | IO device not connected                                      |
| 53 | Faulty IO device ID  |
| 54 | Tool Tag ID unknown  |
| 55 | Tool Tag ID subscription already exists                      |
| 56 | Tool Tag ID subscription does not exist                      |
| 58 | No alarm present   |
| 59 | Tool currently in use  |
| 60 | No histogram available                                       |
| 70 | Calibration failed   |
| 79 | Command failed   |
| 80 | Audi emergency status subscription exists                    |
| 81 | Audi emergency status subscription does not exist            |

| ID | Description   |
|----|---|
| 82 | Automatic/Manual mode subscribe already exist               |
| 83 | Automatic/Manual mode subscribe does not exist              |
| 84 | The relay function subscription already exists              |
| 85 | The relay function subscription does not exist              |
| 86 | The selector socket info subscription already exist         |
| 87 | The selector socket info subscription does not exist        |
| 88 | The digin info subscription already exist                   |
| 89 | The digin info subscription does not exist                  |
| 90 | Lock at bach done subscription already exist                |
| 91 | Lock at bach done subscription does not exist               |
| 92 | Open protocol commands disabled                             |
| 93 | Open protocol commands disabled subscription already exists |
| 94 | Open protocol commands disabled subscription does not exist |
| 95 | Reject request, PowerMACS is in manual mode                 |
| 96 | Client already connected                                    |
| 97 | MID revision unsupported                                    |
| 98 | Controller internal request timeout                         |
| 99 | Unknown MID   |

## 5.2.2 MID 0005 Command accepted

This message is used by the controller to confirm that the latest request sent by the integrator was accepted. The data field contains the MID of the request accepted.

- Message sent by: Controller.
- Answer: None.

Example: The request **MID 0018 Select parameter set** is accepted.

|          |         |
|----------|---------|
| 00240005 | 0018NUL |
|----------|---------|

| Message part | Parameter    | Byte  | Value             |
|--------------|--------------|-------|-------------------|
| Header       | Length       | 1-4   | 0024              |
|              | MID          | 5-8   | 0005              |
|              | Revision     | 9-11  | Range: 000-001    |
|              | No Ack flag  | 12    | N/A               |
|              | Station ID   | 13-14 | N/A               |
|              | Spindle ID   | 15-16 | N/A               |
|              | Spare        | 17-20 | N/A               |
| Data field   | MID accepted | 21-24 | Four ASCII digits |
| Message end  |              | 25    | NUL               |

## 5.3 Parameter set messages

### 5.3.1 MID 0010 Parameter set ID upload request

A request to get the valid parameter set IDs from the controller.

- Message sent by: Integrator
- Answer: **MID 0011 Parameter set ID upload reply**

| Message part | Parameter          | Byte  | Value          |
|--------------|--------------------|-------|----------------|
| Header       | Length             | 1-4   | 0020           |
|              | MID                | 5-8   | 0010           |
|              | Revision, MID 0011 | 9-11  | Range: 000-001 |
|              | No Ack flag        | 12    | N/A            |
|              | Station ID         | 13-14 | N/A            |
|              | Spindle ID         | 15-16 | N/A            |
|              | Spare              | 17-20 | N/A            |
| Data field   | N/A                |       | N/A            |
| Message end  |                    | 21    | NUL            |

### 5.3.2 MID 0011 Parameter set ID upload reply

The transmission of all the valid parameter set IDs of the controller. The data field contains the number of valid parameter sets currently present in the controller, and the ID of each parameter set present.

- Message sent by: Controller
- Answer: None

Example: parameter set 1 and 2 are present in the controller.

|          |              |
|----------|--------------|
| 00290011 | 002001002NUL |
|----------|--------------|

| Message part | Parameter   | Byte  | Value   |
|--------------|-------------|-------|---|
| Header       | Length      | 1-4   | Length depends on the number of parameter sets.<br>23 + number of parameter sets x3 |
|              | MID         | 5-8   | 0011  |
|              | Revision    | 9-11  | Range: 000-001  |
|              | No Ack flag | 12    | N/A   |
|              | Station ID  | 13-14 | N/A   |
|              | Spindle ID  | 15-16 | N/A   |
|              | Spare       | 17-20 | N/A   |

| Message part       | Parameter                                      | Byte      | Value                                     |
|--------------------|--|-----------|---|
| Data field, part 1 | The number of parameter sets in the controller | 21-23     | Three ASCII digits. Range: 000-999        |
| Data field, part 2 | The ID of each parameter set present           | 24 -      | Three ASCII digits for each parameter set |
| Message end        |  | Length +1 | NUL                                       |

### 5.3.3 MID 0012 Parameter set data upload request

Request to upload parameter set data from the controller.

- Message sent by: Integrator
- Answer: **MID 0013 Parameter set data upload reply, or  
MID 0004 Command error, Parameter set not present**

Example: Request to upload parameter set data for parameter set 1.

|          |        |
|----------|--------|
| 00230012 | 001NUL |
|----------|--------|

| Message part | Parameter          | Byte  | Value                              |
|--------------|--------------------|-------|------------------------------------|
| Header       | Length             | 1-4   | 0023                               |
|              | MID                | 5-8   | 0012                               |
|              | Revision, MID 0013 | 9-11  | Range: 000-002                     |
|              | No Ack flag        | 12    | N/A                                |
|              | Station ID         | 13-14 | N/A                                |
|              | Spindle ID         | 15-16 | N/A                                |
|              | Spare              | 17-20 | N/A                                |
| Data field   | Parameter set ID   | 21-23 | Three ASCII digits. Range: 000-999 |
| Message end  |                    | 24    | NUL                                |

**Table 10 MID 0012 additions for Revision 3**

| Message part | Parameter          | Byte  | Value  |
|--------------|--------------------|-------|--|
| Header       | Length             | 1-4   | 0031   |
|              | MID                | 5-8   | 0012   |
|              | Revision, MID 0013 | 9-11  | Range: 003                                   |
|              | No Ack flag        | 12    | N/A  |
|              | Station ID         | 13-14 | N/A  |
|              | Spindle ID         | 15-16 | N/A  |
|              | Spare              | 17-20 | N/A  |
| Data field   | Parameter set ID   | 21-23 | Three ASCII digits. Range: 000-999           |
| Data field   | Pset file version  | 24-31 | 00000000 (special usage see Toyota appendix) |
| Message end  |                    | 24    | NUL  |

### 5.3.4 MID 0013 Parameter set data upload reply

Upload of parameter set data reply. The following tables show the revisions available:

- Table 11 MID 0013 Revision 1
- Table 12 MID 0013 additions for revision 2
- Table 13 MID 0013 Revision 3

- Message sent by: Controller

- Answer: None

Example: Upload parameter set data for parameter set 1 called Airbag 1.

|  |                |                 |
|--|----------------|-----------------|
| 01040013                                 | 0100102Airbag1 | 031040305001200 |
| 0600150007001400080036009007201000480NUL |                |                 |

| Message part | Parameter          | Byte   | Value                            |
|--------------|--------------------|--------|----------------------------------|
| Header       | Length             | 1-4    | 0104                             |
|              | MID                | 5-8    | 0013                             |
|              | Revision           | 9-11   | Range: 000-003                   |
|              | No Ack flag        | 12     | N/A                              |
|              | Station ID         | 13-14  | N/A                              |
|              | Spindle ID         | 15-16  | N/A                              |
|              | Spare              | 17-20  | N/A                              |
| Data field   | Parameter set data | 21-104 | See Table 11 MID 0013 Revision 1 |
| Message end  |                    | 105    | NUL                              |

**Table 11 MID 0013 Revision 1**

| Parameter           | Byte  | Value   |
|---------------------|-------|---|
| Parameter set ID    | 21-22 | 01  |
|                     | 23-25 | Three ASCII digits, range 000-999   |
| Parameter set name  | 26-27 | 02  |
|                     | 28-52 | 25 ASCII characters. Right padded with space if name is less than 25 characters.  |
| Rotation direction  | 53-54 | 03  |
|                     | 55    | 1=CW, 2=CCW   |
| Batch size          | 56-57 | 04  |
|                     | 58-59 | 2 ASCII digits, range 00-99   |
| Torque min          | 60-61 | 05  |
|                     | 62-67 | The torque min limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits. |
| Torque max          | 68-69 | 06  |
|                     | 70-75 | The torque max limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits. |
| Torque final target | 76-77 | 07  |



| Parameter          | Byte    | Value  |
|--------------------|---------|--|
|                    | 78-83   | The torque final target is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits. |
| Angle min          | 84-85   | 08   |
|                    | 86-90   | The angle min value is five bytes long and is specified by five ASCII digits. Range: 00000-99999.  |
| Angle max          | 91-92   | 09   |
|                    | 93-97   | The angle max value is five bytes long and is specified by five ASCII digits. Range: 00000-99999.  |
| Final Angle Target | 98-99   | 10   |
|                    | 100-104 | The target angle is specified in degrees. 5 ASCII digits. Range: 00000-99999.  |

**Table 12 MID 0013 additions for revision 2**

| Parameter         | Byte    | Value   |
|-------------------|---------|---|
| First Target      | 105-106 | 11  |
|                   | 107-112 | The torque first target is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.  |
| Start final angle | 113-114 | 12  |
|                   | 115-120 | The start final angle is the torque to reach the snug level. The start final angle is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits. |

**Table 13 MID 0013 Revision 3**

| Message part | Parameter          | Byte        | Value               |
|--------------|--------------------|-------------|---------------------|
| Header       | Length             | 1-4         | Variable length     |
|              | MID                | 5-8         | 0013                |
|              | Revision           | 9-11        | 003                 |
|              | No Ack flag        | 12          | N/A                 |
|              | Station ID         | 13-14       | N/A                 |
|              | Spindle ID         | 15-16       | N/A                 |
|              | Spare              | 17-20       | N/A                 |
| Data field   | Pset file version  | 21-28       | N/A                 |
| Data field   | Parameter set data | 29-variable | See Toyota appendix |
| Message end  |                    | Variable    | NUL                 |

### 5.3.5 MID 0014 Parameter set selected subscribe

A subscription for the parameter set selection. Each time a new parameter set is selected the **MID 0015 Parameter set selected** is sent to the integrator. Note that the immediate response is **MID 0005 Command accepted** and **MID 0015 Parameter set selected** with the current parameter set number selected.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** and **MID 0015 Parameter set selected**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0014                          |
|              | Revision    | 9-11  | Range: 000-001                |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         | 0     | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.3.6 MID 0015 Parameter set selected

A new parameter set is selected in the controller. The message includes the ID of the parameter set selected as well as the date and time of the last change in the parameter set settings. This message is also sent as an immediate response to **MID 0014 Parameter set selected subscribe**.

- Message sent by: Controller
- Answer: **MID 0016 New parameter set selected acknowledge**

| Message part | Parameter                                    | Byte  | Value                                    |
|--------------|--|-------|--|
| Header       | Length                                       | 1-4   | 0042                                     |
|              | MID  | 5-8   | 0015                                     |
|              | Revision                                     | 9-11  | Range: 000-001                           |
|              | No Ack flag                                  | 12    | 0=Ack needed, 1=No ack needed            |
|              | Station ID                                   | 13-14 | N/A                                      |
|              | Spindle ID                                   | 15-16 | N/A                                      |
|              | Spare  | 17-20 | N/A                                      |
| Data field   | Parameter set ID                             | 21-23 | Three ASCII digits, range 000-999        |
| Data field   | Date of last change in parameter set setting | 24-42 | 19 ASCII characters. YYYY-MM-DD:HH:MM:SS |
| Message end  |  | 43    | NUL                                      |

### 5.3.7 MID 0016 Parameter set selected acknowledge

Acknowledgement for a new parameter set selected.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0016           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         | 0     | N/A            |
| Message end  |             | 21    | NUL            |

### 5.3.8 MID 0017 Parameter set selected unsubscribe

Reset the subscription for the parameter set selection.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Parameter set subscription does not exist**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0017           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         | 0     | N/A            |
| Message end  |             | 21    | NUL            |

### 5.3.9 MID 0018 Select Parameter set

Select a parameter set.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Parameter set can not be set**
- **Note!**  
For an PF3000/4000 with Open protocol version 1.2.1 or later, configured with selector accessory configured with “confirm” or “confirm with ack” the answer will be Command accepted if it is possible for the operator to select the Pset via choosing the correct socket on the selector.  
The Pset will then be automatically selected when the operator chooses the correct socket from the selector.  
Subscription of the currently selected Pset via MID 0014 will show when the operator has selected the correct Pset.

| Message part | Parameter        | Byte  | Value                             |
|--------------|------------------|-------|-----------------------------------|
| Header       | Length           | 1-4   | 0023                              |
|              | MID              | 5-8   | 0018                              |
|              | Revision         | 9-11  | Range: 000-001                    |
|              | No Ack flag      | 12    | N/A                               |
|              | Station ID       | 13-14 | N/A                               |
|              | Spindle ID       | 15-16 | N/A                               |
|              | Spare            | 17-20 | N/A                               |
| Data field   | Parameter set ID | 21-23 | Three ASCII digits, range 000-999 |
| Message end  |                  | 24    | NUL                               |

### 5.3.10 MID 0019 Set Parameter set batch size

This message gives the possibility to set the batch size of a parameter set at run time.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Invalid data**

| Message part       | Parameter        | Byte  | Value                             |
|--------------------|------------------|-------|-----------------------------------|
| Header             | Length           | 1-4   | 0025                              |
|                    | MID              | 5-8   | 0019                              |
|                    | Revision         | 9-11  | Range: 000-001                    |
|                    | No Ack flag      | 12    | N/A                               |
|                    | Station ID       | 13-14 | N/A                               |
|                    | Spindle ID       | 15-16 | N/A                               |
|                    | Spare            | 17-20 | N/A                               |
| Data field, part 1 | Parameter set ID | 21-23 | Three ASCII digits, range 000-999 |
| Data field, part 2 | Batch size       | 24-25 | Two ASCII digits, range 00-99     |
| Message end        |                  | 26    | NUL                               |

### 5.3.11 MID 0020 Reset Parameter set batch counter

This message gives the possibility to reset the batch counter of the running parameter set, at run time.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Invalid data, or Parameter set not running**

| Message part | Parameter        | Byte  | Value                             |
|--------------|------------------|-------|-----------------------------------|
| Header       | Length           | 1-4   | 0023                              |
|              | MID              | 5-8   | 0020                              |
|              | Revision         | 9-11  | Range: 000-001                    |
|              | No Ack flag      | 12    | N/A                               |
|              | Station ID       | 13-14 | N/A                               |
|              | Spindle ID       | 15-16 | N/A                               |
|              | Spare            | 17-20 | N/A                               |
| Data field   | Parameter set ID | 21-23 | Three ASCII digits, range 000-999 |
| Message end  |                  | 24    | NUL                               |

### 5.3.12 MID 0021 Lock at batch done subscribe

A subscription for the Lock at batch done relay status.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or **MID 0004 Command error**
- Message: **MID 0022** relay status immediately after **MID 0005** Command accepted

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 00210          |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Message end  |             | 21    | NUL            |

### 5.3.13 MID 0022 Lock at batch done upload

This message gives the relay status for Lock at batch done.

- Message sent by: Controller
- Answer: **MID 0023 Lock at batch done upload Ack**

| Message part | Parameter    | Byte  | Value                      |
|--------------|--------------|-------|----------------------------|
| Header       | Length       | 1-4   | 0021                       |
|              | MID          | 5-8   | 0022                       |
|              | Revision     | 9-11  | Range: 000-001             |
|              | No Ack flag  | 12    | N/A                        |
|              | Station ID   | 13-14 | N/A                        |
|              | Spindle ID   | 15-16 | N/A                        |
|              | Spare        | 17-20 | N/A                        |
| Data field   | Relay status | 21    | One ASCII digit, range 0-1 |
| Message end  |              | 22    | NUL                        |

### 5.3.14 MID 0023 Lock at batch done upload Acknowledge

This message is an acknowledge to MID 0022.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0023           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Message end  |             | 21    | NUL            |

### 5.3.15 MID 0024 Lock at batch done unsubscribe

Reset the subscription for Lock at batch done.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or **MID 0004 Command error**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0024           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Message end  |             | 21    | NUL            |

### 5.3.16 MID 0025 Parameter user set download request

This message is reserved for Toyota, see Toyota Appendix.

## 5.4 Job message

### 5.4.1 MID 0030 Job ID upload request

This is a request for a transmission of all the valid Job IDs of the controller. The result of this command is a transmission of all the valid Job IDs.

- Message sent by: Integrator.
- Answer: **MID 0031 Job ID upload reply**

| Message part | Parameter          | Byte  | Value          |
|--------------|--------------------|-------|----------------|
| Header       | Length             | 1-4   | 0020           |
|              | MID                | 5-8   | 0030           |
|              | Revision, MID 0031 | 9-11  | Range: 000-002 |
|              | No Ack flag        | 12    | N/A            |
|              | Station ID         | 13-14 | N/A            |
|              | Spindle ID         | 15-16 | N/A            |
|              | Spare              | 17-20 | N/A            |
| Data field   | N/A                | 0     | N/A            |
| Message end  |                    | 21    | NUL            |

### 5.4.2 MID 0031 Job ID upload reply

The transmission of all the valid Job IDs of the controller. The data field contains the number of valid Jobs currently present in the controller, and the ID of each Job.

- Message sent by: Controller
- Answer: None

Example revision 1: Job 1 and 2 are present in the controller.

|             |           |
|-------------|-----------|
| 00260031001 | 020102NUL |
|-------------|-----------|

Example revision 2: Job 1 and 2 are present in the controller.

|             |              |
|-------------|--------------|
| 00290031002 | 002001002NUL |
|-------------|--------------|

| Message part | Parameter                             | Byte      | Value  |
|--------------|---------------------------------------|-----------|--|
| Header       | Length                                | 1-4       | Revision 1: 2 + no of Jobs x 2<br>Revision 2: 4 + no of Jobs x 4 |
|              | MID                                   | 5-8       | 0031   |
|              | Revision                              | 9-11      | Range: 000-002   |
|              | No Ack flag                           | 12        | N/A  |
|              | Station ID                            | 13-14     | N/A  |
|              | Spindle ID                            | 15-16     | N/A  |
|              | Spare                                 | 17-20     | N/A  |
| Data field   | Number of Jobs and the ID of each Job | 21-length | See Table 14 or Table 15   |
| Message end  |                                       | Length +1 | NUL  |

**Table 14 MID 0031 Revision 1**

| Parameter                                    | Byte      | Value  |
|--|-----------|--|
| Number of Jobs                               | 21-22     | Two ASCII digits, range 00-99.               |
| Job ID of each Job present in the controller | 23-length | Two ASCII digits for each Job. Range: 00-99. |

**Table 15 MID 0031 Revision 2**

| Parameter                                    | Byte      | Value   |
|--|-----------|---|
| Number of Jobs                               | 21-24     | Four ASCII digits, range 0000-9999.               |
| Job ID of each Job present in the controller | 25-length | Four ASCII digits for each Job. Range: 0000-9999. |

### 5.4.3 MID 0032 Job data upload request

Request to upload the data for a specific Job from the controller.

- Message sent by: Integrator
- Answer: **MID 0033 Job data upload** or  
**MID 0004 Command error, Job ID not present**

Example: Upload Job data for Job 1

|          |       |
|----------|-------|
| 00220032 | 01NUL |
|----------|-------|



| Message part | Parameter          | Byte      | Value                    |
|--------------|--------------------|-----------|--------------------------|
| Header       | Length             | 1-4       | 0022                     |
|              | MID                | 5-8       | 0032                     |
|              | Revision, MID 0033 | 9-11      | Range: 000-003           |
|              | No Ack flag        | 12        | N/A                      |
|              | Station ID         | 13-14     | N/A                      |
|              | Spindle ID         | 15-16     | N/A                      |
|              | Spare              | 17-20     | N/A                      |
| Data field   | The ID of the Job  | 21-length | See Table 16 or Table 17 |
| Message end  |                    | Length+1  | NUL                      |

**Table 16 MID 0032 Revision 1**

| Parameter | Byte  | Value  |
|-----------|-------|--|
| Job ID    | 21-22 | Two ASCII digits for the Job Id. Range: 00-99. |

**Table 17 MID 0032 Revision 2**

| Parameter | Byte  | Value  |
|-----------|-------|--|
| Job ID    | 21-24 | Four ASCII digits for the JobId. Range: 0000-9999. |

**Table 18 MID 0032 Revision 3**

| Parameter | Byte  | Value  |
|-----------|-------|--|
| Job ID    | 21-24 | Four ASCII digits for the JobId. Range: 0000-9999. |

## 5.4.4 MID 0033 Job data upload reply

This message is sent as a reply to the **MID 0032 Job data request**.

- Message sent by: Controller
- Answer: None

| Message part | Parameter   | Byte      | Value  |
|--------------|-------------|-----------|--|
| Header       | Length      | 1-4       | 20+71 + no of parameter sets in the Job x 12 bytes.                          |
|              | MID         | 5-8       | 0033   |
|              | Revision    | 9-11      | Range: 000-003   |
|              | No Ack flag | 12        | N/A  |
|              | Station ID  | 13-14     | N/A  |
|              | Spindle ID  | 15-16     | N/A  |
|              | Spare       | 17-20     | N/A  |
| Data field   | Job data    | 21-length | 71 + no of parameter sets in the Job x 12 bytes.<br>See Table 19 or Table 20 |
| Message end  |             | Length +1 | NUL  |

**Table 19 MID 0033 Job data Revision 1**

| Parameter                           | Byte          | Value  |
|-------------------------------------|---------------|--|
| Job ID                              | 21-22         | 01   |
|                                     | 23-24         | The Job ID is specified by two ASCII characters.<br>Range: 00-99   |
| Job name                            | 25-26         | 02   |
|                                     | 27-51         | 25 ASCII characters.   |
| Forced order                        | 52-53         | 03   |
|                                     | 54            | One ASCII character:<br>0=free order, 1=forced order, 2=free and forced  |
| Max time for first tightening       | 55-56         | 04   |
|                                     | 57-60         | Four ASCII digits, range 0000-9999,<br>0000=not used   |
| Max time to complete Job            | 61-62         | 05   |
|                                     | 63-67         | Five ASCII digits, range 00000-99999,<br>00000=not used  |
| Job batch mode/<br>batch count type | 68-69         | 06   |
|                                     | 70            | The Job batch mode is the way to count the tightening in a Job;<br>only the OK or both OK and NOK. One ASCII character.<br>0=only the OK tightenings are counted<br>1=both the OK and NOK tightenings are counted  |
| Lock at Job done                    | 71-72         | 07   |
|                                     | 73            | One ASCII character: 0=No, 1=Yes   |
| Use line control                    | 74-75         | 08   |
|                                     | 76            | One ASCII character: 0=No, 1=Yes   |
| Repeat Job                          | 77-78         | 09   |
|                                     | 79            | One ASCII character: 0=No, 1=Yes   |
| Tool loosening                      | 80-81         | 10   |
|                                     | 82-84         | Tool loosening. One ASCII character.<br>0=Enable, 1=Disable, 2=Enable only on NOK tightening   |
| Reserved                            | 85-86         | 11   |
|                                     | 87            | Reserved for Job repair. One ASCII character.<br>0=E, 1=G  |
| Number of parameter sets            | 88-89         | 12   |
|                                     | 90-91         | The number of parameter sets in the Job list, defined by two<br>ASCII characters, range 00-99.   |
| Job list                            | 92-93         | 13   |
|                                     | 93-<br>N x 12 | A list of parameter sets (N=value from parameter "Number of<br>parameter sets", max 99).<br>Each parameter set is defined by a number of parameters<br>separated by ":" and terminated by ";" (12 bytes) according to:<br>[Channel-ID]:[Type-ID]:[AutoValue]:[BatchSize];<br>Channel-ID = two ASCII characters, range 00-99<br>Type ID = parameter set ID or Multistage ID, three ASCII<br>characters, range 000-999<br>Auto Value = One ASCII character, 1 or 0, 1=for Auto Next<br>Change,<br>BatchSize = Two ASCII characters, range 00-99<br>Example: 15:011:0:22; |

**Table 20 MID 0033 Job data Revision 2**

| Parameter                           | Byte  | Value   |
|-------------------------------------|-------|---|
| Job ID                              | 21-22 | 01  |
|                                     | 23-26 | The Job ID is specified by two ASCII characters.<br>Range: 0000-9999  |
| Job name                            | 27-28 | 02  |
|                                     | 29-53 | 25 ASCII characters.  |
| Forced order                        | 54-55 | 03  |
|                                     | 56    | One ASCII character:<br>0=free order, 1=forced order, 2=free and forced   |
| Max time for first tightening       | 57-58 | 04  |
|                                     | 59-62 | Four ASCII digits, range 0000-9999,<br>0000=not used  |
| Max time to complete Job            | 63-64 | 05  |
|                                     | 65-69 | Five ASCII digits, range 00000-99999,<br>00000=not used   |
| Job batch mode/<br>batch count type | 70-71 | 06  |
|                                     | 72    | The Job batch mode is the way to count the tightening in a Job;<br>only the OK or both OK and NOK. One ASCII character.<br>0=only the OK tightenings are counted<br>1=both the OK and NOK tightenings are counted |
| Lock at Job done                    | 73-74 | 07  |
|                                     | 75    | One ASCII character: 0=No, 1=Yes  |
| Use line control                    | 76-77 | 08  |
|                                     | 78    | One ASCII character: 0=No, 1=Yes  |
| Repeat Job                          | 79-80 | 09  |
|                                     | 81    | One ASCII character: 0=No, 1=Yes  |
| Tool loosening                      | 82-83 | 10  |
|                                     | 84-86 | Tool loosening. One ASCII character.<br>0=Enable, 1=Disable, 2=Enable only on NOK tightening  |
| Reserved                            | 87-88 | 11  |
|                                     | 89    | Reserved for Job repair. One ASCII character.<br>0=E, 1=G   |
| Number of parameter sets            | 90-91 | 12  |
|                                     | 92-93 | The number of parameter sets in the Job list, defined by two<br>ASCII characters, range 00-99.  |
| Job list                            | 94-95 | 13  |

| Parameter | Byte          | Value  |
|-----------|---------------|--|
|           | 96-<br>N x 12 | A list of parameter sets (N=value from parameter "Number of parameter sets", max 99).<br>Each parameter set is defined by a number of parameters separated by ":" and terminated by ";" (12 bytes) according to:<br>[Channel-ID]:[Type-ID]:[AutoValue]:[BatchSize];<br>Channel-ID = two ASCII characters, range 00-99<br>Type ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999<br>Auto Value = One ASCII character, 1 or 0, 1=for Auto Next Change,<br>BatchSize = Two ASCII characters, range 00-99<br>Example: 15:011:0:22; |

**Table 21 MID 0033 Job data Revision 3**

| Parameter | Byte          | Value   |
|-----------|---------------|---|
| Job list  | 94-95         | 13  |
|           | 96-<br>N x 44 | A list of parameter sets (N=value from parameter "Number of parameter sets", max 99).<br>Each parameter set is defined by a number of parameters separated by ":" and terminated by ";" (41 bytes) according to:<br>[Channel-ID]:[Type-ID]:[AutoValue]:[BatchSize]:[Socket]:[Job step name]:[Job step type];<br>Channel-ID = two ASCII characters, range 00-99<br>Type ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999<br>Auto Value = One ASCII character, 1 or 0, 1=for Auto Next Change,<br>BatchSize = Two ASCII characters, range 00-99<br>Socket = Two ASCII characters, range 00-99 (socket used)<br>Job step name = 25 ASCII characters<br>Job step type = Two ASCII characters, range 00-99<br>Batch step = 1<br>Reserved = 2-6<br>Example: 15:011:0:22:02:Front axel :01; |

### 5.4.5 MID 0034 Job info subscribe

A subscription for the Job info. **MID 0035 Job info** is sent to the integrator when a new Job is selected and after each tightening performed during the Job.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Job info subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0034                          |
|              | Revision    | 9-11  | Range: 000-004                |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         | 0     | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.4.6 MID 0035 Job info

The Job info subscriber will receive a Job info message after a Job has been selected and after each tightening performed in the Job. The Job info consists of the ID of the currently running Job, the Job status, the Job batch mode, the Job batch size and the Job batch counter.

- Message sent by: Controller
- Answer: **MID 0036 Job info Acknowledge**

Example: Job info for Job 1

|          |  |
|----------|--|
| 00630035 | 0101020030040008050003062001-12-01:20:12:45NUL |
|----------|--|

## All messages

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| Message part | Parameter   | Byte  | Value  |
|--------------|-------------|-------|--|
| Header       | Length      | 1-4   | 0063   |
|              | MID         | 5-8   | 0035   |
|              | Revision    | 9-11  | Range: 000-004   |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed                                  |
|              | Station ID  | 13-14 | N/A  |
|              | Spindle ID  | 15-16 | N/A  |
|              | Spare       | 17-20 | N/A  |
| Data field   | Job info    | 21-63 | See<br>Table 22 MID 0035 Job <b>info</b> or<br>Table <b>23</b> |
| Message end  |             | 64    | NUL  |

**Table 22 MID 0035 Job info Revision 1**

| Parameter         | Byte  | Value  |
|-------------------|-------|--|
| Job ID            | 21-22 | 01   |
|                   | 23-24 | The Job ID is specified by two ASCII characters, range 00-99   |
| Job status        | 25-26 | 02   |
|                   | 27    | The Job batch status is specified by one ASCII character.<br>0=Job not completed, 1=Job OK, 2=Job NOK.   |
| Job batch mode    | 28-29 | 03   |
|                   | 30    | The Job batch mode is the way to count the tightening in a Job only the OK or both OK and NOK. One ASCII character<br>0= only the OK tightenings are counted<br>1= both the OK and NOK tightenings are counted                     |
| Job batch size    | 31-32 | 04   |
|                   | 33-36 | This parameter gives the total number of tightening in the Job. The Job batch size is four bytes long. Four ASCII characters, range 0000-9999.   |
| Job batch counter | 37-38 | 05   |
|                   | 39-42 | This parameter gives the current value of the Job batch counter. The Job is completed when the Job batch counter is equal to the Job batch size. The Job batch counter is four bytes long. Four ASCII characters, range 0000-9999. |
| Time stamp        | 43-44 | 06   |
|                   | 45-63 | Time stamp for the Job info. The time stamp is 19 bytes long and is specified by 19 ASCII characters<br>YYYY-MM-DD:HH:MM:SS.   |

**Table 23 MID 0035 Job info Revision 2**

| Parameter         | Byte  | Value  |
|-------------------|-------|--|
| Job ID            | 21-22 | 01   |
|                   | 23-26 | The Job ID is specified by four ASCII characters, range 0000-9999  |
| Job status        | 27-28 | 02   |
|                   | 29    | The Job batch status is specified by one ASCII character.<br>0=Job not completed, 1=Job OK, 2=Job NOK.   |
| Job batch mode    | 30-31 | 03   |
|                   | 32    | The Job batch mode is the way to count the tightening in a Job only the OK or both OK and NOK. One ASCII character<br>0= only the OK tightenings are counted<br>1= both the OK and NOK tightenings are counted                     |
| Job batch size    | 33-34 | 04   |
|                   | 35-37 | This parameter gives the total number of tightening in the Job. The Job batch size is four bytes long. Four ASCII characters, range 0000-9999.   |
| Job batch counter | 39-40 | 05   |
|                   | 41-44 | This parameter gives the current value of the Job batch counter. The Job is completed when the Job batch counter is equal to the Job batch size. The Job batch counter is four bytes long. Four ASCII characters, range 0000-9999. |
| Time stamp        | 45-46 | 06   |
|                   | 47-65 | Time stamp for the Job info. The time stamp is 19 bytes long and is specified by 19 ASCII characters<br>YYYY-MM-DD:HH:MM:SS.   |

**Table 24 MID 0035 Job info Revision 3**

| Parameter                 | Byte  | Value   |
|---------------------------|-------|---|
| Job current step          | 66-67 | 07  |
|                           | 68-70 | The number of the step currently executed in the job. 3 bytes long, 3 ASCII characters range 000-999. For PF4000,PF3000 is zero reported. |
| Job total number of steps | 71-72 | 08  |
|                           | 73-75 | The total number of steps in the job. 3 bytes long, 3 ASCII characters range 000-999. For PF4000,PF3000 is zero reported.                 |
| Job step type             | 76-77 | 09  |
|                           | 78-79 | Job step type = Two ASCII characters, range 00-99<br>Batch step = 1<br>Reserved = 2-6<br>For PF4000,PF3000 is zero reported.              |



**Table 25 MID 0035 Job info Revision 4**

| Parameter                 | Byte   | Value  |
|---------------------------|--------|--|
| Job ID                    | 21-22  | 01   |
|                           | 23-26  | The Job ID is specified by four ASCII characters, range 0000-9999  |
| Job status                | 27-28  | 02   |
|                           | 29     | The Job batch status is specified by one ASCII character.<br>0=Job not completed, 1=Job OK, 2=Job NOK, 3=Job ABORTED   |
| Job batch mode            | 301-31 | 03   |
|                           | 32     | The Job batch mode is the way to count the tightening in a Job only the OK or both OK and NOK. One ASCII character<br>0= only the OK tightenings are counted<br>1= both the OK and NOK tightenings are counted   |
| Job batch size            | 33-34  | 04   |
|                           | 35-38  | This parameter gives the total number of tightening in the Job. The Job batch size is four bytes long. Four ASCII characters, range 0000-9999.   |
| Job batch counter         | 39-40  | 05   |
|                           | 41-44  | This parameter gives the current value of the Job batch counter. The Job is completed when the Job batch counter is equal to the Job batch size. The Job batch counter is four bytes long. Four ASCII characters, range 0000-9999.   |
| Time stamp                | 45-46  | 06   |
|                           | 47-65  | Time stamp for the Job info. The time stamp is 19 bytes long and is specified by 19 ASCII characters<br>YYYY-MM-DD:HH:MM:SS.   |
| Job current step          | 66-67  | 07   |
|                           | 68-70  | N/A  |
| Job total number of steps | 71-72  | 08   |
|                           | 73-75  | N/A  |
| Job step type             | 76-77  | 09   |
|                           | 78-79  | N/A  |
| Job tightening status     | 80-81  | 10   |
|                           | 82-83  | The Job tightening status is specified by two ASCII character.<br>0=JobTight OFF, 1=JobTight OK, 2=JobTight NOK, 3=JobTight ABORTED, 4= JobTight INCREMENTED,<br>5=JobTight DECREMENTED, 6=JobTight BYPASSED,<br>7=JobTight RESET BATCH, 8=JobTight LOOSENING,<br>9=JobTight FREE BATCH, 10=JobTight JOB ABORTED |

### 5.4.7 MID 0036 Job info acknowledge

Acknowledgement of a Job info message.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0036           |
|              | Revision    | 9-11  | Range: 000-004 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         | 0     | N/A            |
| Message end  |             | 21    | NUL            |

### 5.4.8 MID 0037 Job info unsubscribe

Reset the subscription for a Job info message.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Job info subscription does not exist**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0037           |
|              | Revision    | 9-11  | Range: 000-004 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  |             | 21    | NUL            |

### 5.4.9 MID 0038 Select Job

Message to select Job. If the requested ID is not present in the controller, then the command will not be performed.

- Message sent by: Integrator

- Answer: **MID 0005 Command accepted or  
MID 0004 Command error, Job can not be set, or Invalid data**

| Message part | Parameter   | Byte                   | Value                                |
|--------------|-------------|------------------------|--------------------------------------|
| Header       | Length      | 1-4                    | Revision 1: 0022<br>Revision 2: 0024 |
|              | MID         | 5-8                    | 0038                                 |
|              | Revision    | 9-11                   | Range: 000-002                       |
|              | No Ack flag | 12                     | N/A                                  |
|              | Station ID  | 13-14                  | N/A                                  |
|              | Spindle ID  | 15-16                  | N/A                                  |
|              | Spare       | 17-20                  | N/A                                  |
| Data field   | Job ID      | 21-length              | See Table 26 and Table 27            |
| Message end  |             | Rev 1: 23<br>Rev 2: 25 | NUL                                  |

**Table 26 MID 0038 Job ID, revision 1**

| Parameter | Byte  | Value   |
|-----------|-------|---|
| Job ID    | 21-22 | The Job ID is specified by two ASCII characters. Range: 00-99 |

**Table 27 MID 0038 Job ID, revision 2**

| Parameter | Byte  | Value   |
|-----------|-------|---|
| Job ID    | 21-24 | The Job ID is specified by four ASCII characters.<br>Range: 0000-9999 |

## 5.4.10 MID 0039 Job restart

Job restart message.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted or  
MID 0004 Command error, Job not running, or Invalid data**

Example: Restart Job 1

|          |       |
|----------|-------|
| 00220039 | 01NUL |
|----------|-------|

| Message part | Parameter   | Byte      | Value                    |
|--------------|-------------|-----------|--------------------------|
| Header       | Length      | 1-4       | 0022                     |
|              | MID         | 5-8       | 0039                     |
|              | Revision    | 9-11      | Range: 000-002           |
|              | No Ack flag | 12        | N/A                      |
|              | Station ID  | 13-14     | N/A                      |
|              | Spindle ID  | 15-16     | N/A                      |
|              | Spare       | 17-20     | N/A                      |
| Data field   | Job ID      | 21-Length | See Table 28 or Table 29 |
| Message end  |             | Length+1  | NUL                      |

**Table 28 MID 0039 Revision 1**

| Parameter | Byte  | Value  |
|-----------|-------|--|
| Job ID    | 21-22 | Two ASCII digits for the Job Id. Range: 00-99. |

**Table 29 MID 0039 Revision 2**

| Parameter | Byte  | Value  |
|-----------|-------|--|
| Job ID    | 21-24 | Four ASCII digits for the JobId. Range: 0000-9999. |

## 5.5 Tool messages

### 5.5.1 MID 0040 Tool data upload request

A request for some of the data stored in the tool. The result of this command is the transmission of the tool data.

- Message sent by: Integrator
- Answer: **MID 0041 Tool data upload reply**

| Message part | Parameter          | Byte  | Value          |
|--------------|--------------------|-------|----------------|
| Header       | Length             | 1-4   | 0020           |
|              | MID                | 5-8   | 0040           |
|              | Revision, MID 0041 | 9-11  | Range: 000-004 |
|              | No Ack flag        | 12    | N/A            |
|              | Station ID         | 13-14 | N/A            |
|              | Spindle ID         | 15-16 | N/A            |
|              | Spare              | 17-20 | N/A            |
| Data field   | N/A                |       | N/A            |
| Message end  |                    | 21    | NUL            |

## 5.5.2 MID 0041 Tool data upload reply

Upload of tool data from the controller.

- Message sent by: Controller
- Answer: None

Example: Tool data

|                               |           |          |
|-------------------------------|-----------|----------|
| 00810041                      | 01C341212 | 02548796 |
| 032001-05-07:13:24:5404670919 | NUL       |          |

| Message part | Parameter   | Byte                    | Value   |
|--------------|-------------|-------------------------|---|
| Header       | Length      | 1-4                     | Revision 1: 0081<br>Revision 2: 0156<br>Revision 2 Ford: 0146<br>Revision 3: 0180<br>Revision 4: 0184 |
|              | MID         | 5-8                     | 0041  |
|              | Revision    | 9-11                    | Range: 000-004  |
|              | No Ack flag | 12                      | N/A   |
|              | Station ID  | 13-14                   | N/A   |
|              | Spindle ID  | 15-16                   | N/A   |
|              | Spare       | 17-20                   | N/A   |
| Data field   | Tool data   | 21-length               | See Table 30 and<br>Table 31, Table 32, Table 33, Table 33 and Table<br>34(Ford)                      |
| Message end  | N/A         | Rev 1: 82<br>Rev 2: 157 | NUL   |

**Table 30 MID 0041 Tool data, revision 1**

| Parameter                 | Byte  | Value               |
|---------------------------|-------|---------------------|
| Tool serial number        | 21-22 | 01                  |
|                           | 23-36 | 14 ASCII characters |
| Tool number of tightening | 37-38 | 02                  |

| Parameter   | Byte  | Value                                    |
|---|-------|--|
|   | 39-48 | 10 ASCII digits. Max 4294967295          |
| Last calibration date                                   | 49-50 | 03                                       |
|   | 51-69 | 19 ASCII characters. YYYY-MM-DD:HH:MM:SS |
| Controller serial number =<br>Ford. RBU Serial = Normal | 70-71 | 04                                       |
|   | 72-81 | 10 ASCII characters                      |

**Table 31 MID 0041 Tool data, additions for revision 2**

| Parameter                   | Byte    | Value  |
|-----------------------------|---------|--|
| Calibration value           | 82-83   | 05   |
|                             | 84-89   | The tool calibration value is multiplied by 100 and sent as an integer (2 decimals truncated). Six ASCII digits.   |
| Last service date           | 90-91   | 06   |
|                             | 92-110  | YYYY-MM-DD:HH:MM:SS  |
| Tightenings since service   | 111-112 | 07   |
|                             | 113-122 | The number of tightenings since last service is specified by 10 ASCII digits. Max 4294967295.  |
| Tool type                   | 123-124 | 08   |
|                             | 125-126 | The tool type is specified by 2 ASCII digits:<br>00=No Tool, 01=S-tool, 02=DS-tool, 03=Ref. transducer, 04=ST-tool, 05=EP-tool, 06=ETX-tool, 07=SL-tool, 08=DL-tool, 09=IRC Offline, 10=STB-tool, 11=QST-tool, 12=STT-tool, 13=STwrench, 14 = ES-tool  |
| Motor size                  | 127-128 | 09   |
|                             | 129-130 | The motor size is specified by 2 ASCII digits, range 00-99.<br>00 = no motor, 01-99 = motor size xx in Atlas Copco nomenclature, or motor size = 10xx in Atlas Copco nomenclature (certain numbers correspond to 2 different motor sizes, for example 62 for both motor size 62 and motor size 1062) |
| Open end data               | 131-132 | 10   |
|                             | 133-135 | The open end data is specified by 3 ASCII digits.<br>The first digit represents the "use open end": 1=true, 0=false.<br>The second digit indicates the tightening direction: 0=CW, 1=CCW.<br>The third digit indicates motor rotation: 0=normal, 1=inverted.   |
| Controller software version | 136-137 | 11   |
|                             | 138-156 | The software version is specified by 19 ASCII characters.  |

**Table 32 MID 0041 Tool data, additions for revision 3**

| Parameter       | Byte    | Value   |
|-----------------|---------|---|
| Tool max torque | 157-158 | 12  |
|                 | 159-164 | The tool max torque value is multiplied by 100 and sent as an integer (2 decimals truncated). Six ASCII digits. |
| Gear ratio      | 165-166 | 13  |
|                 | 167-172 | The gear ratio value is multiplied by 100 and sent as an integer (2 decimals truncated). Six ASCII digits.      |
| Tool full speed | 173-174 | 14  |

|  |         |   |
|--|---------|---|
|  | 175-180 | The tool full speed value is multiplied by 100 and sent as an integer (2 decimals truncated). Six ASCII digits. |
|--|---------|---|

**Table 33 MID 0041 Tool data, additions for revision 4**

| Parameter    | Byte    | Value   |
|--------------|---------|---|
| Primary tool | 181-182 | 15  |
|              | 183-184 | Primary tool. The primary tool is two byte-long and specified by two ASCII digits.<br>01=Cable (invalid for IRC-controller), 02=IRC-B, 03=IRC-W |

### 5.5.3 MID 0042 Disable tool

Disable tool.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0042           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  |             | 21    | NUL            |

### 5.5.4 MID 0043 Enable tool

Enable tool.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0043           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  |             | 21    | NUL            |

### 5.5.5 MID 0044 Disconnect tool request

This command is sent by the integrator in order to request the possibility to disconnect the tool from the controller. The command is rejected if the tool is currently used.

When the command is accepted the operator can disconnect the tool and replace it (hot swap).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Tool currently in use**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0044           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  |             | 21    | NUL            |

### 5.5.6 MID 0045 Set calibration value request

This message is sent by the integrator in order to set the calibration value of the tool.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Calibration failed**

Example: Request for setting a calibration value of 35,5 Nm.

|          |                |
|----------|----------------|
| 00310045 | 01102003550NUL |
|----------|----------------|



| Message part | Parameter        | Byte  | Value          |
|--------------|------------------|-------|----------------|
| Header       | Length           | 1-4   | 0031           |
|              | MID              | 5-8   | 0045           |
|              | Revision         | 9-11  | Range: 000-001 |
|              | No Ack flag      | 12    | N/A            |
|              | Station ID       | 13-14 | N/A            |
|              | Spindle ID       | 15-16 | N/A            |
|              | Spare            | 17-20 | N/A            |
| Data field   | Calibration data | 21-31 | See Table 34   |
| Message end  |                  | 32    | NUL            |

**Table 34 MID 0045 Calibration data**

| Parameter              | Byte  | Value   |
|------------------------|-------|---|
| Calibration value Unit | 21-22 | 01  |
|                        | 23    | The unit in which the calibration value is sent. The calibration value unit is one byte long and specified by one ASCII digit.<br>1=Nm, 2=Lbf.ft, 3=Lbf.In, 4=Kpm       |
| Calibration value      | 24-25 | 02  |
|                        | 26-31 | The calibration value is multiplied by 100 and sent as an integer (2 decimals truncated). The calibration value is six bytes long and is specified by six ASCII digits. |

### 5.5.7 MID 0046 Set primary tool request

This message is sent by the integrator in order to set tool data.

Warning 1: this MID requires **programming control** (see 4.3 Programming control).

Warning 2: the new configuration will not be active until the next controller reboot!

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Programming control not granted**  
**or Invalid data** (value not supported by controller)

Example: Request for setting primary tool to Cable.

|          |         |
|----------|---------|
| 00240046 | 0101NUL |
|----------|---------|

| Message part | Parameter    | Byte  | Value          |
|--------------|--------------|-------|----------------|
| Header       | Length       | 1-4   | 0024           |
|              | MID          | 5-8   | 0046           |
|              | Revision     | 9-11  | Range: 000-001 |
|              | No Ack flag  | 12    | N/A            |
|              | Station ID   | 13-14 | N/A            |
|              | Spindle ID   | 15-16 | N/A            |
|              | Spare        | 17-20 | N/A            |
| Data field   | Primary tool | 21-24 | See Table 35   |
| Message end  |              | 25    | NUL            |

**Table 35 MID 0046 Primary tool**

| Parameter    | Byte  | Value   |
|--------------|-------|---|
| Primary tool | 21-22 | 01  |
|              | 23-24 | Primary tool. The primary tool is two byte-long and specified by two ASCII digits.<br>01=Cable (invalid for IRC-controller), 02=IRC-B, 03=IRC-W |

## 5.6 VIN Messages

### 5.6.1 MID 0050 Vehicle ID Number download request



**This message is replaced by MID 0150. MID 0050 is still supported.**

Used by the integrator to send a VIN number to the controller.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted or**  
**MID 0004 Command error, VIN input source not granted**

| Message part | Parameter   | Byte       | Value                                 |
|--------------|-------------|------------|---------------------------------------|
| Header       | Length      | 1-4        | 0045                                  |
|              | MID         | 5-8        | 0050                                  |
|              | Revision    | 9-11       | Range: 000-001                        |
|              | No Ack flag | 12         | N/A                                   |
|              | Station ID  | 13-14      | N/A                                   |
|              | Spindle ID  | 15-16      | N/A                                   |
|              | Spare       | 17-20      | N/A                                   |
| Data field   | VIN number  | 21-Length  | Dynamic with max 25 ASCII characters. |
| Message end  |             | Length + 1 | NUL                                   |

## 5.6.2 MID 0051 Vehicle ID Number subscribe

This message is used by the integrator to set a subscription for the current identifiers of the tightening result.

The tightening result can be stamped with up to four identifiers:

- VIN number
- Identifier result part 2
- Identifier result part 3
- Identifier result part 4

The identifiers are received by the controller from several input sources, for example serial, Ethernet, or field bus.

In revision 1 of the **MID 0052 Vehicle ID Number**, only the VIN number is transmitted. In revision 2, all four possible identifiers are transmitted.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, VIN subscription already exists**

| Message part | Parameter         | Byte  | Value                         |
|--------------|-------------------|-------|-------------------------------|
| Header       | Length            | 1-4   | 0020                          |
|              | MID               | 5-8   | 0051                          |
|              | Revision MID 0052 | 9-11  | Range: 000-002                |
|              | No Ack flag       | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID        | 13-14 | N/A                           |
|              | Spindle ID        | 15-16 | N/A                           |
|              | Spare             | 17-20 | N/A                           |
| Data field   | N/A               |       | N/A                           |
| Message end  | N/A               | 21    | NUL                           |

## 5.6.3 MID 0052 Vehicle ID Number

Transmission of the current identifiers of the tightening by the controller to the subscriber.

The tightening result can be stamped with up to four identifiers:

- VIN number (identifier result part 1)
- Identifier result part 2
- Identifier result part 3
- Identifier result part 4

The identifiers are received by the controller from several input sources, for example serial, Ethernet, or field bus.

- Message sent by: Controller
- Answer: **MID 0053 Vehicle ID Number acknowledge**

| Message part | Parameter       | Byte                    | Value                                |
|--------------|-----------------|-------------------------|--------------------------------------|
| Header       | Length          | 1-4                     | Revision 1: 0047<br>Revision 2: 0128 |
|              | MID             | 5-8                     | 0051                                 |
|              | Revision        | 9-11                    | Range: 000-002                       |
|              | No Ack flag     | 12                      | 0=Ack needed, 1=No ack needed        |
|              | Station ID      | 13-14                   | N/A                                  |
|              | Spindle ID      | 15-16                   | N/A                                  |
|              | Spare           | 17-20                   | N/A                                  |
| Data field   | Identifier data | 21-length               | See Table 36 and Table 37            |
| Message end  | N/A             | Rev 1: 48<br>Rev 2: 129 | NUL                                  |

**Table 36 MID 0052 Identifier data, revision 1**

| Parameter  | Byte  | Value  |
|------------|-------|--|
| VIN number | 21-22 | 01   |
|            | 23-47 | The VIN number is 25 bytes long and is specified by 25 ASCII characters. |

**Table 37 MID 0052 Identifier data, additions for revision 2**

| Parameter                | Byte   | Value  |
|--------------------------|--------|--|
| Identifier result part 2 | 48-49  | 02   |
|                          | 50-74  | The identifier result part 2 is 25 bytes long and is specified by 25 ASCII characters. |
| Identifier result part 3 | 75-76  | 03   |
|                          | 77-91  | The identifier result part 3 is 25 bytes long and is specified by 25 ASCII characters. |
| Identifier result part 4 | 92-93  | 04   |
|                          | 94-128 | The identifier result part 4 is 25 bytes long and is specified by 25 ASCII characters. |

## 5.6.4 MID 0053 Vehicle ID Number acknowledge

Vehicle ID Number acknowledge.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0053           |
|              | Revision    | 9-11  | Range: 000-002 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  | N/A         | 21    | NUL            |

### 5.6.5 MID 0054 Vehicle ID Number unsubscribe

Reset the subscription for the current tightening identifiers.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, VIN subscription does not exist**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0054           |
|              | Revision    | 9-11  | Range: 000-002 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  | N/A         | 21    | NUL            |

## 5.7 Tightening result messages

### 5.7.1 MID 0060 Last tightening result data subscribe

Set the subscription for the result tightenings. The result of this command will be the transmission of the tightening result after the tightening is performed (push function). The MID revision in the header is used to subscribe to different revisions of **MID 0061 Last tightening result data upload reply**.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Last tightening subscription already exists** or  
**MID revision not supported**

| Message part | Parameter            | Byte  | Value                                  |
|--------------|----------------------|-------|--|
| Header       | Length               | 1-4   | 0020                                   |
|              | MID                  | 5-8   | 0060                                   |
|              | Revision of MID 0061 | 9-11  | Range: 001-006, 998-999. See MID 0061. |
|              | No Ack flag          | 12    | 0=Ack needed, 1=No ack needed          |
|              | Station ID           | 13-14 | N/A                                    |
|              | Spindle ID           | 15-16 | N/A                                    |
|              | Spare                | 17-20 | N/A                                    |
| Data field   | N/A                  |       | N/A                                    |
| Message end  | N/A                  | 21    | NUL                                    |

## 5.7.2 MID 0061 Last tightening result data

Upload the last tightening result. The following tables show the revisions available:

- Table 38 MID 0061 Revision 1
- Table 39 MID 0061 Revision 2
- Table 40 MID 0061 Revision 3. Addition of parameters 47, 48 and 49
- Table 41 MID 0061 Revision 4. Addition of parameters 50, 51, and 52
- Table 42 MID 0061 Revision 5. Addition of parameter 53
- Table 43 MID 0061 Revision 6. Addition of parameters 54 and 55
- Table 44 MID 0061 Revision 998. Addition of multistage information in parameters 56, 57, and 58.
- Table 45, MID 0061 revision 999.

- Message sent by: Controller
- Answer: **MID 0062 Last tightening result data acknowledge**

Example: **MID 0061 Last tightening result data upload reply**, revision 1

```
023100610010      010001020103airbag7
04KP0L3456JKL0897      05000600307000008000009010011112000840
130014001400120015000739160000017099991800000
19000000202001-06-02:09:54:09212001-05-29:12:34:3322123345675      NUL
```

| Message part | Parameter       | Byte   | Value   |
|--------------|-----------------|--|---|
| Header       | Length          | 1-4  | Revision 001: 0231<br>Revision 002: 0385<br>Revision 003: 0419<br>Revision 004: 0500<br>Revision 005: 0506<br>Revision 006: 0526<br>Revision 998: variable length<br>Revision 999: 0121 |
|              | MID             | 5-8  | 0061  |
|              | Revision        | 9-11   | Range: 001-006, 998-999.  |
|              | No Ack flag     | 12   | 0=Ack needed, 1=No ack needed   |
|              | Station ID      | 13-14  | N/A   |
|              | Spindle ID      | 15-16  | N/A   |
|              | Spare           | 17-20  | N/A   |
| Data field   | Tightening data | 21-length  | See Table 38, Table 39, Table 40, Table 41, Table 42, Table 43, Table 44, Table 45  |
| Message end  |                 | Rev 1: 232<br>Rev 2: 386<br>Rev 3: 420<br>Rev 4: 501<br>Rev 5: 507<br>Rev 6: 527<br>Rev 998:<br>length +1<br>Rev 999:<br>122 | NUL   |

Table 38 MID 0061 Revision 1

| Parameter              | Byte  | Value   |
|------------------------|-------|---|
| Cell ID                | 21-22 | 01  |
|                        | 23-26 | The cell ID is four bytes long and specified by four ASCII digits. Range: 0000-9999.          |
| Channel ID             | 27-28 | 02  |
|                        | 29-30 | The channel ID is two bytes long and specified by two ASCII digits. Range: 00-99.             |
| Torque controller Name | 31-32 | 03  |
|                        | 33-57 | The controller name is 25 bytes long and is specified by 25 ASCII characters.                 |
| VIN Number             | 58-59 | 04  |
|                        | 60-84 | The VIN number is 25 bytes long and is specified by 25 ASCII characters.                      |
| Job ID                 | 85-86 | 05  |
|                        | 87-88 | The Job ID is two bytes long and specified by two ASCII digits. Range: 00-99                  |
| Parameter set ID       | 89-90 | 06  |
|                        | 91-93 | The parameter set ID is three bytes long and specified by three ASCII digits. Range: 000-999. |
| Batch size             | 94-95 | 07  |

| Parameter           | Byte    | Value   |
|---------------------|---------|---|
|                     | 96-99   | This parameter gives the total number of tightening in the batch. The batch size is four bytes long and specified by four ASCII digits. Range: 0000-9999. |
| Batch counter       | 100-101 | 08  |
|                     | 102-105 | The batch counter information is four bytes long specifying and specified by four ASCII digits. Range: 0000-9999.   |
| Tightening Status   | 106-107 | 09  |
|                     | 108     | The tightening status is one byte long and specified by one ASCII digit. 0=tightening NOK, 1=tightening OK.   |
| Torque status       | 109-110 | 10  |
|                     | 111     | 0=Low, 1=OK, 2=High   |
| Angle status        | 112-113 | 11  |
|                     | 114     | 0=Low, 1=OK, 2=High   |
| Torque Min limit    | 115-116 | 12  |
|                     | 117-122 | The torque min limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.       |
| Torque Max limit    | 123-124 | 13  |
|                     | 125-130 | The torque max limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.       |
| Torque final target | 131-132 | 14  |
|                     | 133-138 | The torque final target is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.    |
| Torque              | 139-140 | 15  |
|                     | 141-146 | The torque value is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.           |
| Angle Min           | 147-148 | 16  |
|                     | 149-153 | The angle min value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.           |
| Angle Max           | 154-155 | 17  |
|                     | 156-160 | The angle max value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.           |
| Final Angle Target  | 161-162 | 18  |
|                     | 163-167 | The target angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.        |
| Angle               | 168-169 | 19  |
|                     | 170-174 | The turning angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.       |
| Time stamp          | 175-176 | 20  |
|                     | 177-195 | Time stamp for each tightening. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).  |



| Parameter  | Byte    | Value  |
|--|---------|--|
| Date/time of last change in parameter set settings | 196-197 | 21   |
|  | 198-216 | Time stamp for the last change in the current parameter set settings. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS). |
| Batch status                                       | 217-218 | 22   |
|  | 219     | The batch status is specified by one ASCII character. 0=batch NOK (batch not completed), 1=batch OK, 2=batch not used.                                   |
| Tightening ID                                      | 220-221 | 23   |
|  | 222-231 | The tightening ID is a unique ID for each tightening result. It is incremented after each tightening. 10 ASCII digits. Max 4294967295                    |

**Table 39 MID 0061 Revision 2**

| Parameter              | Byte  | Value   |
|------------------------|-------|---|
| Cell ID                | 21-22 | 01  |
|                        | 23-26 | The cell ID is four bytes long and specified by four ASCII digits. Range: 0000-9999.          |
| Channel ID             | 27-28 | 02  |
|                        | 29-30 | The channel ID is two bytes long and specified by two ASCII digits. Range: 00-99.             |
| Torque controller Name | 31-32 | 03  |
|                        | 33-57 | The controller name is 25 bytes long and is specified by 25 ASCII characters.                 |
| VIN Number             | 58-59 | 04  |
|                        | 60-84 | The VIN number is 25 bytes long and is specified by 25 ASCII characters.                      |
| Job ID                 | 85-86 | 05  |
|                        | 87-90 | The Job ID is four bytes long and specified by four ASCII digits. Range: 0000-9999            |
| Parameter set number   | 91-92 | 06  |
|                        | 93-95 | The parameter set ID is three bytes long and specified by three ASCII digits. Range: 000-999. |
| Strategy               | 96-97 | 07  |

| Parameter            | Byte    | Value  |
|----------------------|---------|--|
|                      | 98-99   | The strategy currently run by the controller. It is two bytes long and specified by two ASCII digits. Range: 00-99.<br>The corresponding strategies are :<br>01=Torque control, 02=Torque control / angle monitoring,<br>03=Torque control / angle control AND,<br>04=Angle control / torque monitoring, 05=DS control,<br>06=DS control torque monitoring, 07=Reverse angle,<br>08=Reverse torque, 09=Click wrench,<br>10=Rotate spindle forward, 11=Torque control angle control OR,<br>12=Rotate spindle reverse, 13=Home position forward,<br>14=EP Monitoring, 15=Yield, 16=EP Fixed, 17=EP Control,<br>18=EP Angle shutoff, 19=Yield / torque control OR,<br>20=Snug gradient, 21=Residual torque / Time<br>22=Residual torque / Angle, 23=Breakaway peak<br>24=Loose and tightening, 25=Home position reverse,<br>26=PVT comp with Snug<br>99=No strategy |
| Strategy options     | 100-101 | 08   |
|                      | 102-106 | Five bytes long bit field.<br>Bit 0 Torque<br>Bit 1 Angle<br>Bit 2 Batch<br>Bit 3 PVT Monitoring<br>Bit 4 PVT Compensate<br>Bit 5 Selftap<br>Bit 6 Rundown<br>Bit 7 CM<br>Bit 8 DS control<br>Bit 9 Click Wrench<br>Bit 10 RBW Monitoring  |
| Batch size           | 107-108 | 09   |
|                      | 109-112 | This parameter gives the total number of tightening in the batch. The batch size is four bytes long and specified by four ASCII digits. Range: 0000-9999.  |
| Batch counter        | 113-114 | 10   |
|                      | 115-118 | The batch counter information is four bytes long specifying and specified by four ASCII digits. Range: 0000-9999.  |
| Tightening Status    | 119-120 | 11   |
|                      | 121     | The tightening status is one byte long and is specified by one ASCII digit. 0=tightening NOK, 1=tightening OK. <b>OBS ! For Ford the status is built on certain "Tightening error status" bits and "Result type", see fields below. See Ford appendix for detailed description. OBS !.</b>   |
| Batch status         | 122-123 | 12   |
|                      | 124     | The batch status is specified by one ASCII character.<br>0=batch NOK (batch not completed), 1=batch OK, 2=batch not used.  |
| Torque status        | 125-126 | 13   |
|                      | 127     | 0=Low, 1=OK, 2=High  |
| Angle status         | 128-129 | 14   |
|                      | 130     | 0=Low, 1=OK, 2=High  |
| Rundown angle status | 131-132 | 15   |

| Parameter                        | Byte    | Value   |
|----------------------------------|---------|---|
|                                  | 133     | 0=Low, 1=OK, 2=High   |
| Current Monitoring Status        | 134-135 | 16  |
|                                  | 136     | 0=Low, 1=OK, 2=High   |
| Selftap status                   | 137-138 | 17  |
|                                  | 139     | 0=Low, 1=OK, 2=High   |
| Prevail Torque monitoring status | 140-141 | 18  |
|                                  | 142     | 0=Low, 1=OK, 2=High   |
| Prevail Torque compensate status | 143-144 | 19  |
|                                  | 145     | 0=Low, 1=OK, 2=High   |
| Tightening error status          | 146-147 | 20  |
|                                  | 148-157 | <p>Ten bytes long bit field.</p> <p>Tightening error bits show what went wrong with the tightening.</p> <p>Bit 1      Rundown angle max shut off</p> <p>Bit 2      Rundown angle min shut off</p> <p>Bit 3      Torque max shut off</p> <p>Bit 4      Angle max shut off</p> <p>Bit 5      Selftap torque max shut off</p> <p>Bit 6      Selftap torque min shut off</p> <p>Bit 7      Prevail torque max shut off</p> <p>Bit 8      Prevail torque min shut off</p> <p>Bit 9      Prevail torque compensate overflow</p> <p>Bit 10     Current monitoring max shut off</p> <p>Bit 11     Post view torque min torque shut off</p> <p>Bit 12     Post view torque max torque shut off</p> <p>Bit 13     Post view torque Angle too small</p> <p>Bit 14     Trigger lost</p> <p>Bit 15     Torque less than target</p> <p>Bit 16     Tool hot</p> <p>Bit 17     Multistage abort</p> <p>Bit 18     Rehit</p> <p>Bit 19     DS measure failed</p> <p>Bit 20     Current limit reached</p> <p>Bit 21     EndTime out shutoff</p> <p>Bit 22     Remove fastener limit exceeded</p> <p>Bit 23     Disable drive</p> <p>Bit 24     Transducer lost</p> <p>Bit 25     Transducer shorted</p> <p>Bit 26     Transducer corrupt</p> <p>Bit 27     Sync timeout</p> <p>Bit 28     Dynamic current monitoring min</p> <p>Bit 29     Dynamic current monitoring max</p> <p>Bit 30     Angle max monitor</p> <p>Bit 31     Yield nut off</p> <p>Bit 32     Yield too few samples</p> |
| Torque Min limit                 | 158-159 | 21  |
|                                  | 160-165 | The torque min limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.   |
| Torque Max limit                 | 166-167 | 22  |
|                                  | 168-173 | The torque max limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.   |
| Torque final target              | 174-175 | 23  |

| Parameter                | Byte    | Value  |
|--------------------------|---------|--|
|                          | 176-181 | The torque final target is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.         |
| Torque                   | 182-183 | 24   |
|                          | 184-189 | The torque value is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.                |
| Angle Min                | 190-191 | 25   |
|                          | 192-196 | The angle min value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.                |
| Angle Max                | 197-198 | 26   |
|                          | 199-203 | The angle max value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.                |
| Final Angle Target       | 204-205 | 27   |
|                          | 206-210 | The target angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.             |
| Angle                    | 211-212 | 28   |
|                          | 213-217 | The turning angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.            |
| Rundown angle Min        | 218-219 | 29   |
|                          | 220-224 | The tightening angle min value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.     |
| Rundown angle Max        | 225-226 | 30   |
|                          | 227-231 | The tightening angle max value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.     |
| Rundown angle            | 232-233 | 31   |
|                          | 234-238 | The tightening angle value reached in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999. |
| Current Monitoring Min   | 239-240 | 32   |
|                          | 241-243 | The current monitoring min limit in percent is three bytes long and is specified by three ASCII digits. Range: 000-999.  |
| Current Monitoring Max   | 244-245 | 33   |
|                          | 246-248 | The current monitoring max limit in percent is three bytes long and is specified by three ASCII digits. Range: 000-999.  |
| Current Monitoring Value | 249-250 | 34   |
|                          | 251-253 | The current monitoring value in percent is three bytes long and is specified by three ASCII digits. Range: 000-999.  |
| Selftap min              | 254-255 | 35   |
|                          | 256-261 | The selftap min limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.              |
| Selftap max              | 262-263 | 36   |

| Parameter  | Byte    | Value  |
|--|---------|--|
|  | 264-269 | The selftap max limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.  |
| Selftap torque                                     | 270-271 | 37   |
|  | 272-277 | The selftap torque is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.   |
| Prevail torque monitoring min                      | 278-279 | 38   |
|  | 280-285 | The PVTmin limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.   |
| Prevail torque monitoring max                      | 286-287 | 39   |
|  | 288-293 | The PVT max limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.  |
| Prevail torque                                     | 294-295 | 40   |
|  | 296-301 | The prevail torque value is multiplied by 100 and sent as an integer (2 decimals truncated). The prevail torque is six bytes long and is specified by six ASCII digits.  |
| Tightening ID                                      | 302-303 | 41   |
|  | 304-313 | The tightening ID is a unique ID. It is incremented after each tightening. It is ten bytes long and specified by ten ASCII digits. Max 4294967295.   |
| Job sequence number                                | 314-315 | 42   |
|  | 316-320 | The Job sequence number is unique for each Job. All tightenings performed in the same Job are stamped with the same Job sequence number. It is specified by five ASCII digits. Range: 00000-65535.   |
| Sync tightening ID                                 | 321-322 | 43   |
|  | 323-327 | The sync tightening ID is a unique ID for each sync tightening result.<br>Each individual result of each spindle is stamped with this ID. The tightening ID is incremented after each sync tightening. It is specified by five ASCII digits. Range: 00000-65535. |
| Tool serial number                                 | 328-329 | 44   |
|  | 330-343 | The Tool serial number is specified by 14 ASCII characters.  |
| Time stamp   | 344-345 | 45   |
|  | 346-364 | Time stamp for the tightening. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).  |
| Date/time of last change in parameter set settings | 365-366 | 46   |
|  | 367-385 | Time stamp for the last change in the current parameter set settings. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).   |

**Table 40 MID 0061 Revision 3**

| Parameter          | Byte    | Value   |
|--------------------|---------|---|
| Parameter set Name | 386-387 | 47  |
|                    | 388-412 | The parameter set name is 25 bytes long and is specified by 25 ASCII characters.  |
| Torque values Unit | 413-414 | 48  |
|                    | 415     | The unit in which the torque values are sent. The torque values unit is one byte long and is specified by one ASCII digit.<br>1=Nm, 2=Lbf.ft, 3=Lbf.In, 4=Kpm<br>5=Kgf.cm, 6=ozf.in, 7=%  |
| Result type        | 416-417 | 49  |
|                    | 418-419 | The result type is two bytes long and specified by two ASCII digits.<br>1=Tightening, 2=Loosening, 3=Batch Increment<br>4=Batch decrement, 5=Bypass parameter set result<br>6=Abort Job result, 7=Sync tightening,<br>8=Reference setup |

**Table 41 MID 0061 Revision 4**

| Parameter                | Byte    | Value  |
|--------------------------|---------|--|
| Identifier result part 2 | 420-421 | 50   |
|                          | 422-446 | The identifier result part 2 is 25 bytes long and is specified by 25 ASCII characters. |
| Identifier result part 3 | 447-448 | 51   |
|                          | 449-473 | The identifier result part 3 is 25 bytes long and is specified by 25 ASCII characters. |
| Identifier result part 4 | 474-475 | 52   |
|                          | 476-500 | The identifier result part 4 is 25 bytes long and is specified by 25 ASCII characters. |

**Note :** The identifier result parts will only be set if the multiple identifier option has been activated in the controller.

**Table 42 MID 0061 Revision 5**

| Parameter                      | Byte    | Value   |
|--------------------------------|---------|---|
| Customer tightening error code | 501-502 | 53  |
|                                | 503-506 | The customer tightening error code is 4 byte long and is specified by 4 ASCII characters. |

**Table 43 MID 0061 Revision 6**

| Parameter                       | Byte    | Value   |
|---------------------------------|---------|---|
| Prevail Torque compensate value | 507-508 | 54  |
|                                 | 509-514 | The PVT compensate torque value. It is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits. |
| Tightening error status 2       | 515-516 | 55  |
|                                 | 517-526 | Bit field, Tightening error bits 2 shows what went wrong with the tightening.   |

|  |  |   |
|--|--|---|
|  |  | Bit 1 Drive deactivated<br>Bit 2 Tool stall<br>Bit 3 Drive hot<br>Bit 4 Gradient monitoring high<br>Bit 5 Gradient monitoring low<br>Bit 6 Reaction bar failed<br>Bit 7-32 Reserved |
|--|--|---|

**Table 44 MID 0061 Revision 998**

| Parameter                      | Byte   | Value  |
|--------------------------------|--|--|
| Number of stages in multistage | 527-528  | 56   |
|                                | 529-530  | The total number of stages to be run for this tightening. It is two bytes long and specified by two ASCII digits.  |
| Number of stage results        | 531-532  | 57   |
|                                | 533-534  | Number of run stages. It is two bytes long and specified by two ASCII digits.<br>For each completed stage the final torque and the final angle are reported.   |
| Stage result                   | 535-536  | 58   |
|                                | 537-<br>+11 x<br>number<br>of stage<br>results | Byte 1-6: The stage torque value. The torque is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.<br>Byte 7-11: The turning angle stage value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999. |

**Table 45 MID 0061 Light, revision 999**

| Parameter         | Byte  | Value   |
|-------------------|-------|---|
| VIN Number        | 21-45 | The VIN number is 25 bytes long and is specified by 25 ASCII characters taken.  |
| Job ID            | 46-47 | This is the Job ID. It is two bytes long and specified by two ASCII digits. Range: 00-99.   |
| Parameter set ID  | 48-50 | The parameter set ID is three bytes long and specified by three ASCII digits. Range: 000-999.   |
| Batch size        | 51-54 | This parameter gives the total number of tightening in the batch. It is four bytes long and specified by four ASCII digits. Range: 0000-9999.       |
| Batch counter     | 55-58 | The batch counter is four bytes long and specified by four ASCII digits. Range: 0000-9999.  |
| Batch status      | 59    | The batch status is specified by one ASCII character.<br>0=batch NOK (batch not completed), 1=batch OK,<br>2=batch not used.                        |
| Tightening status | 60    | The tightening status is one byte long and specified by one ASCII digit. 0=tightening NOK, 1=tightening OK.   |
| Torque status     | 61    | 0=Low, 1=OK, 2=High   |
| Angle status      | 62    | 0=Low, 1=OK, 2=High   |
| Torque            | 63-68 | The torque value is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.     |
| Angle             | 69-73 | The turning angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999. |

| Parameter  | Byte    | Value  |
|--|---------|--|
| Time stamp   | 74-92   | Time stamp for the tightening. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).  |
| Date/time of last change in parameter set settings | 93-111  | Time stamp for the last change in the current parameter set settings. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS). |
| Tightening ID                                      | 112-121 | The tightening ID is a unique ID for each tightening result. It is incremented after each tightening. 10 ASCII digits. Max 4294967295                    |

**Note :** The MID 0061 light revision 999 is intended to be used by integrators with limited receiving capability (small receive buffer). In order to limit the size of the MID 0061 as much as possible the parameter IDs usually sent in the message have been removed.

### 5.7.3 MID 0062 Last tightening result data acknowledge

Acknowledgement of last tightening result data.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value                   |
|--------------|-------------|-------|-------------------------|
| Header       | Length      | 1-4   | 0020                    |
|              | MID         | 5-8   | 0062                    |
|              | Revision    | 9-11  | Range: 001-006, 998-999 |
|              | No Ack flag | 12    | N/A                     |
|              | Station ID  | 13-14 | N/A                     |
|              | Spindle ID  | 15-16 | N/A                     |
|              | Spare       | 17-20 | N/A                     |
| Data field   | N/A         |       | N/A                     |
| Message end  | N/A         | 21    | NUL                     |

### 5.7.4 MID 0063 Last tightening result data unsubscribe

Reset the last tightening result subscription.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted or**  
**MID 0004 Command error, Last tightening result subscription does not exist**



| Message part | Parameter   | Byte  | Value                   |
|--------------|-------------|-------|-------------------------|
| Header       | Length      | 1-4   | 0020                    |
|              | MID         | 5-8   | 0063                    |
|              | Revision    | 9-11  | Range: 001-006, 998-999 |
|              | No Ack flag | 12    | N/A                     |
|              | Station ID  | 13-14 | N/A                     |
|              | Spindle ID  | 15-16 | N/A                     |
|              | Spare       | 17-20 | N/A                     |
| Data field   | N/A         |       | N/A                     |
| Message end  | N/A         | 21    | NUL                     |

### 5.7.5 MID 0064 Old tightening result upload request

This message is a request to upload a particular tightening result from the controller. The requested result is specified by its unique ID (tightening ID). This message is useful after a failure of the network in order to retrieve the missing result during the communication interruption. The integrator can see the missing results by always comparing the last tightening IDs of the two last received tightenings packets (parameter 23 in the result message).

Requesting tightening ID zero is the same as requesting the latest tightening performed.

- Message sent by: Integrator
- Answer: **MID 0065 Old tightening result upload reply** or  
**MID 0004 Command error, Tightening ID requested not found**, or  
**MID revision not supported**

| Message part | Parameter          | Byte  | Value                           |
|--------------|--------------------|-------|---------------------------------|
| Header       | Length             | 1-4   | 0030                            |
|              | MID                | 5-8   | 0064                            |
|              | Revision, MID 0065 | 9-11  | Range: 000-006                  |
|              | No Ack flag        | 12    | N/A                             |
|              | Station ID         | 13-14 | N/A                             |
|              | Spindle ID         | 15-16 | N/A                             |
|              | Spare              | 17-20 | N/A                             |
| Data field   | Tightening ID      | 21-30 | 10 ASCII digits. Max 4294967295 |
| Message end  | N/A                | 31    | NUL                             |

### 5.7.6 MID 0065 Old tightening result upload reply

Old tightening upload. The following tables show the revisions available:

- Table 46 MID 0065 Revision 1
- Table 47 MID 0065 Revision 2
- Table 48 MID 0065 Revision 3. Addition of parameters 29 and 30
- Table 49 MID 0065 Revision 4. Addition of parameters 31, 32 and 33.
- Table 50 MID 0065 Revision 5. Addition of parameter 34

▪ Table 51 MID 0065 Revision 6. Addition of parameters 35 and 36

- Message sent by: Controller
- Answer: None

Example: **MID 0065 Old tightening result upload reply**, revision 1

```
01180065001      01456789   02AIRBAG
0300104002050060070080014670900046
102001-04-22:14:54:34142112
```

| Message part | Parameter       | Byte   | Value  |
|--------------|-----------------|--|--|
| Header       | Length          | 1-4  | Revision 001: 0118<br>Revision 002: 0226<br>Revision 003: 0233<br>Revision 004: 0314<br>Revision 005: 0320<br>Revision 006: 0340 |
|              | MID             | 5-8  | 0065   |
|              | Revision        | 9-11   | Range: 000-006   |
|              | No Ack flag     | 12   | N/A  |
|              | Station ID      | 13-14  | N/A  |
|              | Spindle ID      | 15-16  | N/A  |
|              | Spare           | 17-20  | N/A  |
| Data field   | Tightening data | 21-length  | See Table 46, Table 47, Table 48, Table 50 MID 0065 Revision 5<br>Table 50 and Table 51  |
| Message end  | Tightening data | Rev 1: 119<br>Rev 2: 227<br>Rev 3: 234<br>Rev 4: 315<br>Rev 5: 321<br>Rev 6: 341 | NUL  |

**Table 46 MID 0065 Revision 1**

| Parameter        | Byte  | Value   |
|------------------|-------|---|
| Tightening ID    | 21-22 | 01  |
|                  | 23-32 | The tightening ID is a unique ID for each tightening result. It is incremented after each tightening. 10 ASCII digits. Max 4294967295 |
| VIN Number       | 33-34 | 02  |
|                  | 35-59 | The VIN number is 25 bytes long and is specified by 25 ASCII characters.  |
| Parameter set ID | 60-61 | 03  |
|                  | 62-64 | The parameter set ID is three bytes long and specified by three ASCII digits. Range: 000-999.   |
| Batch counter    | 65-66 | 04  |

| Parameter         | Byte    | Value   |
|-------------------|---------|---|
|                   | 67-70   | The batch counter information is four bytes long and specified by four ASCII digits. Range: 0000-9999.  |
| Tightening Status | 71-72   | 05  |
|                   | 73      | The tightening status is one byte long and specified by one ASCII digit. 0=tightening NOK, 1=tightening OK.   |
| Torque status     | 74-75   | 06  |
|                   | 76      | 0=Low, 1=OK, 2=High   |
| Angle status      | 77-78   | 07  |
|                   | 79      | 0=Low, 1=OK, 2=High   |
| Torque            | 80-81   | 08  |
|                   | 82-87   | The torque value is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.     |
| Angle             | 88-89   | 09  |
|                   | 90-94   | The turning angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999. |
| Time stamp        | 95-96   | 10  |
|                   | 97-115  | Time stamp for the tightening. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).                                   |
| Batch status      | 116-117 | 11  |
|                   | 118     | The batch status is specified by one ASCII character. 0=batch NOK (batch not completed), 1=batch OK, 2=batch not used.                              |

Table 47 MID 0065 Revision 2

| Parameter        | Byte  | Value   |
|------------------|-------|---|
| Tightening ID    | 21-22 | 01  |
|                  | 23-32 | The tightening ID is a unique ID for each tightening result. It is incremented after each tightening. 10 ASCII digits. Max 4294967295 |
| VIN Number       | 33-34 | 02  |
|                  | 35-59 | The VIN number is 25 bytes long and is specified by 25 ASCII characters.  |
| Job ID           | 60-61 | 03  |
|                  | 62-65 | The Job ID is four bytes long and specified by four ASCII digits. Range: 00-99  |
| Parameter set ID | 66-67 | 04  |
|                  | 68-70 | The parameter set ID (Pset ID) is three bytes long and specified by three ASCII digits. Range: 000-999.                               |
| Strategy         | 71-72 | 05  |

| Parameter                 | Byte    | Value  |
|---------------------------|---------|--|
|                           | 73-74   | The strategy currently run by the controller. It is two bytes long and specified by two ASCII digits. Range: 00-99.<br>The corresponding strategies are :<br>01=Torque control, 02=Torque control / angle monitoring,<br>03=Torque control / angle control AND,<br>04=Angle control / torque monitoring, 05=DS control,<br>06=DS control torque monitoring, 07=Reverse angle,<br>08=Reverse torque, 09=Click wrench,<br>10=Rotate spindle forward, 11=Torque control angle control OR,<br>12=Rotate spindle reverse, 13=Home position forward,<br>14=EP Monitoring, 15=Yield, 16=EP Fixed, 17=EP Control,<br>18=EP Angle shutoff, 19=Yield / torque control OR,<br>20=Snug gradient, 21=Residual torque / Time<br>22=Residual torque / Angle, 23=Breakaway peak<br>24=Loose and tightening, 25=Home position reverse,<br>26=PVT comp with Snug<br>99=No strategy |
| Strategy options          | 75-76   | 06   |
|                           | 77-81   | Five bytes long bit field.<br>Bit 0 Torque<br>Bit 1 Angle<br>Bit 2 Batch<br>Bit 3 PVT Monitoring<br>Bit 4 PVT Compensate<br>Bit 5 Selftap<br>Bit 6 Rundown<br>Bit 7 CM<br>Bit 8 DS control<br>Bit 9 Click Wrench<br>Bit 10 RBW Monitoring  |
| Batch size                | 82-83   | 07   |
|                           | 84-87   | This parameter gives the total number of tightening in the batch.<br>The batch size is four bytes long and specified by four ASCII digits. Range: 0000-9999.   |
| Batch counter             | 88-89   | 08   |
|                           | 90-93   | The batch counter information is four bytes long specifying and specified by four ASCII digits. Range: 0000-9999.  |
| Tightening Status         | 94-95   | 09   |
|                           | 96      | The tightening status is one byte long and is specified by one ASCII digit. 0=tightening NOK, 1=tightening OK.   |
| Batch status              | 97-98   | 10   |
|                           | 99      | The batch status is specified by one ASCII character.<br>0=batch NOK (batch not completed), 1=batch OK, 2=batch not used.  |
| Torque status             | 100-101 | 11   |
|                           | 102     | 0=Low, 1=OK, 2=High  |
| Angle status              | 103-104 | 12   |
|                           | 105     | 0=Low, 1=OK, 2=High  |
| Rundown angle status      | 106-107 | 13   |
|                           | 108     | 0=Low, 1=OK, 2=High  |
| Current Monitoring Status | 109-110 | 14   |
|                           | 111     | 0=Low, 1=OK, 2=High  |

| Parameter                        | Byte    | Value   |
|----------------------------------|---------|---|
| Selftap status                   | 112-113 | 15  |
|                                  | 114     | 0=Low, 1=OK, 2=High   |
| Prevail Torque monitoring status | 115-116 | 16  |
|                                  | 117     | 0=Low, 1=OK, 2=High   |
| Prevail Torque compensate status | 118-119 | 17  |
|                                  | 120     | 0=Low, 1=OK, 2=High   |
| Tightening error status          | 121-122 | 18  |
|                                  | 123-132 | <p>Ten bytes long bit field.</p> <p>Tightening error bits show what went wrong with the tightening.</p> <p>Bit 1      Rundown angle max shut off</p> <p>Bit 2      Rundown angle min shut off</p> <p>Bit 3      Torque max shut off</p> <p>Bit 4      Angle max shut off</p> <p>Bit 5      Selftap torque max shut off</p> <p>Bit 6      Selftap torque min shut off</p> <p>Bit 7      Prevail torque max shut off</p> <p>Bit 8      Prevail torque min shut off</p> <p>Bit 9      Prevail torque compensate overflow</p> <p>Bit 10     Current monitoring max shut off</p> <p>Bit 11     Post view torque min torque shut off</p> <p>Bit 12     Post view torque max torque shut off</p> <p>Bit 13     Post view torque Angle too small</p> <p>Bit 14     Trigger lost</p> <p>Bit 15     Torque less than target</p> <p>Bit 16     Tool hot</p> <p>Bit 17     Multistage abort</p> <p>Bit 18     Rehit</p> <p>Bit 19     DS Measure failed</p> <p>Bit 20     Current limit reached</p> <p>Bit 21     EndTime out shutoff</p> <p>Bit 22     Remove fastener limit exceeded</p> <p>Bit 23     Disable drive</p> <p>Bit 24     Transducer lost</p> <p>Bit 25     Transducer shorted</p> <p>Bit 26     Transducer corrupt</p> <p>Bit 27     Sync timeout</p> <p>Bit 28     Dynamic current monitoring min</p> <p>Bit 29     Dynamic current monitoring max</p> <p>Bit 30     Angle max monitor</p> <p>Bit 31     Yield nut off</p> <p>Bit 32     Yield too few samples</p> |
| Torque                           | 133-134 | 19  |
|                                  | 135-140 | The torque value is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.   |
| Angle                            | 141-142 | 20  |
|                                  | 143-147 | The turning angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.   |
| Rundown angle                    | 148-149 | 21  |
|                                  | 150-154 | The tightening angle value reached in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.  |
| Current Monitoring Value         | 155-156 | 22  |

| Parameter           | Byte    | Value   |
|---------------------|---------|---|
|                     | 157-159 | The current monitoring value in percent is three bytes long and is specified by three ASCII digits. Range: 000-999.   |
| Selftap torque      | 160-161 | 23  |
|                     | 162-167 | The selftap torque is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.  |
| Prevail torque      | 168-169 | 24  |
|                     | 170-175 | The prevail torque value is multiplied by 100 and sent as an integer (2 decimals truncated). The prevail torque is six bytes long and is specified by six ASCII digits.   |
| Job sequence number | 176-177 | 25  |
|                     | 178-182 | The Job sequence number is unique for each Job. All tightenings performed in the same Job are stamped with the same Job sequence number. It is specified by five ASCII digits. Range: 00000-65535.  |
| Sync tightening ID  | 183-184 | 26  |
|                     | 185-189 | The sync tightening ID is a unique ID for each sync tightening result.<br>Each individual result of each spindle is stamped with this ID.<br>The tightening ID is incremented after each sync tightening. It is specified by five ASCII digits. Range: 00000-65535. |
| Tool serial number  | 190-191 | 27  |
|                     | 192-205 | The Tool serial number is specified by 14 ASCII characters.   |
| Time stamp          | 206-207 | 28  |
|                     | 208-226 | Time stamp for the tightening. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).   |

**Table 48 MID 0065 Revision 3**

| Parameter          | Byte    | Value   |
|--------------------|---------|---|
| Torque values Unit | 227-228 | 48  |
|                    | 229     | The unit in which the torque values are sent. The torque values unit is one byte long and is specified by one ASCII digit.<br>1=Nm, 2=Lbf.ft, 3=Lbf.In, 4=Kpm<br>5=Kgf.cm, 6=ozf.in, 7=%  |
| Result type        | 230-231 | 49  |
|                    | 232-233 | The result type is two bytes long and specified by two ASCII digits.<br>1=Tightening, 2=Loosening, 3=Batch Increment<br>4=Batch decrement, 5=Bypass parameter set result<br>6=Abort Job result, 7=Sync tightening,<br>8=Reference setup |

**Table 49 MID 0065 Revision 4**

| Parameter                | Byte    | Value  |
|--------------------------|---------|--|
| Identifier result part 2 | 234-235 | 50   |
|                          | 236-260 | The identifier result part 2 is 25 bytes long and is specified by 25 ASCII characters. |
| Identifier result part 3 | 261-262 | 51   |

| Parameter                | Byte    | Value  |
|--------------------------|---------|--|
|                          | 263-287 | The identifier result part 3 is 25 bytes long and is specified by 25 ASCII characters. |
| Identifier result part 4 | 288-289 | 52   |
|                          | 290-314 | The identifier result part 4 is 25 bytes long and is specified by 25 ASCII characters. |

**Note :** The identifier result parts will only be set if the multiple identifier option has been activated in the controller.

**Table 50 MID 0065 Revision 5**

| Parameter                      | Byte    | Value   |
|--------------------------------|---------|---|
| Customer tightening error code | 315-316 | 53  |
|                                | 317-320 | The customer tightening error code is 4 byte long and is specified by 4 ASCII characters. |

**Table 51 MID 0065 Revision 6**

| Parameter                       | Byte    | Value  |
|---------------------------------|---------|--|
| Prevail Torque compensate value | 321-322 | 54   |
|                                 | 323-328 | The PVT compensate torque value. It is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits.  |
| Tightening error status 2       | 329-330 | 55   |
|                                 | 331-340 | Bit field, Tightening error bits 2 shows what went wrong with the tightening.<br>Bit 1 Drive deactivated<br>Bit 2 Tool stall<br>Bit 3 Drive hot<br>Bit 4 Gradient monitoring high<br>Bit 5 Gradient monitoring low<br>Bit 6 Reaction bar failed<br>Bit 7-32 Reserved |

## 5.8 Alarm messages

### 5.8.1 MID 0070 Alarm subscribe

A subscription for the alarms that can appear in the controller.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Alarm subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0070                          |
|              | Revision    | 9-11  | Range: 000-001                |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  | N/A         | 21    | NUL                           |

## 5.8.2 MID 0071 Alarm

An alarm has appeared in the controller. The current alarm is uploaded from the controller to the integrator.

- Message sent by: Controller
- Answer: **MID 0072 Alarm acknowledge**

Example: MID 0071. Alarm E404 appeared on June 12, 2008. The controller and the tool have ready status.

|          |                                      |
|----------|--------------------------------------|
| 00530071 | 01E404021031042008-06-02:10:14:26NUL |
|----------|--------------------------------------|

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0053                          |
|              | MID         | 5-8   | 0071                          |
|              | Revision    | 9-11  | Range: 000-001                |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | Alarm data  | 21-53 | See Table 52                  |
| Message end  | N/A         | 54    | NUL                           |

**Table 52 MID 0070 Alarm data**

| Parameter               | Byte  | Value  |
|-------------------------|-------|--|
| Error code              | 21-22 | 01   |
|                         | 23-26 | The error code is specified by 4 ASCII characters. The error code begins with E and is followed by three digits. Example E851. |
| Controller ready status | 27-28 | 02   |
|                         | 29    | Controller ready status 1=OK, 0=NOK  |
| Tool ready status       | 30-31 | 03   |
|                         | 32    | Tool ready status 1=OK, 0=NOK  |



| Parameter | Byte  | Value   |
|-----------|-------|---|
| Time      | 33-34 | 04  |
|           | 35-53 | Time stamp for the alarm. 19 ASCII characters.<br>YYYY-MM-DD:HH:MM:SS |

### 5.8.3 MID 0072 Alarm acknowledge

Acknowledgement for **MID 0071 Alarm**.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0072           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  | N/A         | 21    | NUL            |

### 5.8.4 MID 0073 Alarm unsubscribe

Reset the subscription for the controller alarms.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Alarm subscription does not exist**

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0073           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  | N/A         | 21    | NUL            |

### 5.8.5 MID 0074 Alarm acknowledged on controller

The message is sent by the controller to inform the integrator that the current alarm has been acknowledged.

- Message sent by: Controller
- Answer: **MID 0075 Alarm acknowledged on controller acknowledge**

Example: MID 0074 Alarm E406 acknowledged on controller.

|          |         |
|----------|---------|
| 00240074 | E406NUL |
|----------|---------|

| Message part | Parameter   | Byte  | Value                 |
|--------------|-------------|-------|-----------------------|
| Header       | Length      | 1-4   | 0024                  |
|              | MID         | 5-8   | 0074                  |
|              | Revision    | 9-11  | Range: 000-001        |
|              | No Ack flag | 12    | N/A                   |
|              | Station ID  | 13-14 | N/A                   |
|              | Spindle ID  | 15-16 | N/A                   |
|              | Spare       | 17-20 | N/A                   |
| Data field   | Error code  | 21-24 | Four ASCII characters |
| Message end  | N/A         | 25    | NUL                   |

## 5.8.6 MID 0075 Alarm acknowledged on controller acknowledge

Acknowledgement of **MID 0074 Alarm acknowledged on controller**.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value          |
|--------------|-------------|-------|----------------|
| Header       | Length      | 1-4   | 0020           |
|              | MID         | 5-8   | 0075           |
|              | Revision    | 9-11  | Range: 000-001 |
|              | No Ack flag | 12    | N/A            |
|              | Station ID  | 13-14 | N/A            |
|              | Spindle ID  | 15-16 | N/A            |
|              | Spare       | 17-20 | N/A            |
| Data field   | N/A         |       | N/A            |
| Message end  | N/A         | 21    | NUL            |

## 5.8.7 MID 0076 Alarm status

The alarm status is sent after an accepted subscription of the controller alarms. This message is used to inform the integrator that an alarm is active on the controller at subscription time.

- Message sent by: Controller
- Answer: **MID 0077 Alarm status acknowledge**

Example: MID 0076. Alarm E404 is active, the controller and the tool are ready.

|          |   |
|----------|---|
| 00560076 | 01102E404031041052008-06-02:10:14:26NUL |
|----------|---|

| Message part | Parameter         | Byte  | Value          |
|--------------|-------------------|-------|----------------|
| Header       | Length            | 1-4   | 0056           |
|              | MID               | 5-8   | 0076           |
|              | Revision          | 9-11  | Range: 000-001 |
|              | No Ack flag       | 12    | N/A            |
|              | Station ID        | 13-14 | N/A            |
|              | Spindle ID        | 15-16 | N/A            |
|              | Spare             | 17-20 | N/A            |
| Data field   | Alarm status data | 21-56 | See Table 53   |
| Message end  |                   | 57    | NUL            |

Table 53 MID 0076 Alarm status data

| Parameter               | Byte  | Value   |
|-------------------------|-------|---|
| Alarm status            | 21-22 | 01  |
|                         | 23    | 0=no alarm is active, 1=an alarm is currently active  |
| Error code              | 24-25 | 02  |
|                         | 26-29 | The error code is specified by 4 ASCII characters. The error code begins with E and is followed by three digits. Example: E851. |
| Controller ready status | 30-31 | 03  |
|                         | 32    | Controller ready status 1=OK, 0=NOK   |
| Tool ready status       | 33-34 | 04  |
|                         | 35    | Tool ready status 1=OK, 0=NOK   |
| Time                    | 36-37 | 05  |
|                         | 38-56 | Time stamp for the alarm. 19 ASCII characters. YYYY-MM-DD:HH:MM:SS  |

### 5.8.8 MID 0077 Alarm status acknowledge

Acknowledgement of **MID 0076 Alarm Status**.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0077          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.8.9 MID 0078 Acknowledge alarm remotely on controller

The integrator can remotely acknowledge the current alarm on the controller by sending **MID 0078**. If no alarm is currently active when the controller receives the command, the command will be rejected.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, No alarm present** or  
**Invalid data**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0078          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

## 5.9 Time messages

### 5.9.1 MID 0080 Read time upload request

Read time request.

- Message sent by: Integrator
- Answer: **MID 0081 Read time upload reply**

| Message part | Parameter          | Byte  | Value         |
|--------------|--------------------|-------|---------------|
| Header       | Length             | 1-4   | 0020          |
|              | MID                | 5-8   | 0080          |
|              | Revision, MID 0081 | 9-11  | Range 000-001 |
|              | No Ack flag        | 12    | N/A           |
|              | Station ID         | 13-14 | N/A           |
|              | Spindle ID         | 15-16 | N/A           |
|              | Spare              | 17-20 | N/A           |
| Data field   | N/A                |       | N/A           |
| Message end  |                    | 21    | NUL           |

## 5.9.2 MID 0081 Read time upload reply

Time upload reply from the controller.

- Message sent by: Controller
- Answer: None

| Message part | Parameter   | Byte  | Value                                    |
|--------------|-------------|-------|--|
| Header       | Length      | 1-4   | 0039                                     |
|              | MID         | 5-8   | 0081                                     |
|              | Revision    | 9-11  | Range 000-001                            |
|              | No Ack flag | 12    | N/A                                      |
|              | Station ID  | 13-14 | N/A                                      |
|              | Spindle ID  | 15-16 | N/A                                      |
|              | Spare       | 17-20 | N/A                                      |
| Data field   | Time        | 21-39 | 19 ASCII characters: YYYY-MM-DD:HH:MM:SS |
| Message end  |             | 40    | NUL                                      |

## 5.9.3 MID 0082 Set Time

Set the time in the controller.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value                                    |
|--------------|-------------|-------|--|
| Header       | Length      | 1-4   | 0039                                     |
|              | MID         | 5-8   | 0082                                     |
|              | Revision    | 9-11  | Range 000-001                            |
|              | No Ack flag | 12    | N/A                                      |
|              | Station ID  | 13-14 | N/A                                      |
|              | Spindle ID  | 15-16 | N/A                                      |
|              | Spare       | 17-20 | N/A                                      |
| Data field   | Time        | 21-39 | 19 ASCII characters: YYYY-MM-DD:HH:MM:SS |
| Message end  |             | 40    | NUL                                      |

## 5.10 Multi-spindle status messages

The multi-spindle messages for Power Focus are always exchanged with a sync Master. For PowerMACS, these messages are exchanged with the station using the IP address of the station TC.

### 5.10.1 MID 0090 Multi-spindle status subscribe

A subscription for the multi-spindle status. For Power Focus, the subscription must be addressed to the sync Master.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Controller is not a sync master/station controller, or**  
**Multi-spindle status subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0090                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.10.2 MID 0091 Multi-spindle status

The multi-spindle status is sent after each sync tightening. The multiple status contains the common status of the multiple as well as the individual status of each spindle.

- Message sent by: Controller

▪ Answer: **MID 0092 Multi-spindle status acknowledge**

Example: Multiple status for two spindles. Common status OK, spindle 1 OK, spindle 2 OK.

|                    |                                  |
|--------------------|----------------------------------|
| 00670091           | 01020200012032001-06-02:10:14:26 |
| 041050120102041NUL |                                  |

| Message part | Parameter          | Byte       | Value                                    |
|--------------|--------------------|------------|--|
| Header       | Length             | 1-4        | 37 bytes + (5 x number of spindles)bytes |
|              | MID                | 5-8        | 0091                                     |
|              | Revision           | 9-11       | Range 000-001                            |
|              | No Ack flag        | 12         | 0=Ack needed, 1=No ack needed            |
|              | Station ID         | 13-14      | N/A                                      |
|              | Spindle ID         | 15-16      | N/A                                      |
|              | Spare              | 17-20      | N/A                                      |
| Data field   | Multi-spindle data | 21-length  | see Table 54                             |
| Message end  |                    | Length + 1 | NUL                                      |

**Table 54 MID 0091 Multi-spindle status data**

| Parameter           | Byte  | Value   |
|---------------------|-------|---|
| Number of spindles  | 21-22 | 01  |
|                     | 23-24 | Number of spindles running in the multiple. The number of spindles is two bytes long and specified by 2 ASCII digits, range 02-10.  |
| Sync tightening ID  | 25-26 | 02  |
|                     | 27-31 | The sync tightening ID is a unique ID for each sync tightening result.<br>Each individual result of each spindle is stamped with this ID.<br>The tightening ID is incremented after each sync tightening. It is specified by five ASCII digits. Range: 00000-65535.   |
| Time                | 32-33 | 03  |
|                     | 34-52 | Time stamp. 19 ASCII characters.<br>YYYY-MM-DD:HH:MM:SS   |
| Sync overall status | 33-54 | 04  |
|                     | 35    | The status of all the spindles. OK if the individual status of each spindle is OK, NOK if at least one spindle status is NOK. One ASCII digit 1=OK, 0=NOK.  |
| Spindle status      | 36-37 | 05  |
|                     | 38-   | 5 × number of spindles.<br>Bytes 1-2: The first two bytes specify the spindle number in the same order as in the sync list. Range 01-99.<br>Bytes 3-4: The next two bytes are the channel ID of the spindle. Range 01-20<br>Byte 5: The fifth byte is the individual overall status of the tightening of each spindle 0=NOK, 1=OK |

### 5.10.3 MID 0092 Multi-spindle status acknowledge

Multi-spindle status acknowledge.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0092          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.10.4 MID 0093 Multi-spindle status unsubscribe

Reset the subscription for the multi-spindle status.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Multi-spindle status subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0093          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |



## 5.11 Multi-spindle result messages

The multi-spindle messages for Power Focus are always exchanged with a sync Master. For PowerMACS, these messages are exchanged with the station using the IP address of the station TC.

### 5.11.1 MID 0100 Multi-spindle result subscribe

A subscription for the multi-spindle status. For Power Focus, the subscription must be addressed to a sync Master.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted or**  
**MID 0004 Command error, Controller is not a sync master/station controller, or**  
**Multi-spindle result subscription already exists**

| Message part | Parameter                             | Byte  | Value                                    |
|--------------|---------------------------------------|---|--|
| Header       | Length                                | 1-4   | 0020                                     |
|              | MID                                   | 5-8   | 0100                                     |
|              | Revision                              | 9-11  | Range: 000-003                           |
|              | No Ack flag                           | 12  | 0=Ack needed, 1=No ack needed            |
|              | Station ID                            | 13-14                                       | N/A                                      |
|              | Spindle ID                            | 15-16                                       | N/A                                      |
|              | Spare                                 | 17-20                                       | N/A                                      |
| Data field   | Data No. System<br>Send only new data | Rev ≤1: N/A<br>Rev 2: 21-30<br>Rev 3: 21-31 | Rev 1: N/A,<br>Rev 2 and 3: See Table 56 |
| Message end  |                                       | Rev ≤1: 21<br>Rev 2: 31<br>Rev 3: 32        | NUL                                      |

**Table 55 MID 0100 Revision 2 and 3**

| Parameter          | Revision | Byte  | Value  |
|--------------------|----------|-------|--|
| Data No. System    | 2 and 3  | 21-30 | Data No System (see MID 0106) is the number for the cycle data to rewind to. The first cycle data will be the cycle data <u>after</u> this point.<br>If the data is not found, or if the value is 0, rewind will be to oldest possible cycle data.   |
| Send only new data | 3        | 31    | Send only new result data.<br>One ASCII digit 0=FALSE, 1=TRUE.<br>If TRUE then only the result data stored after that the subscription is done is sent to the subscriber. Old result data of the unsent result will not be sent to the subscriber.<br>This parameter has higher priorities than "Data No. System". So if this is TRUE, value in byte 21-30 is ignored and not preformed. |

### 5.11.2 MID 0101 Multi-spindle result

The multi-spindle result is sent after each sync tightening and if it is subscribed. The multiple result contains the common status of the multiple as well as the individual tightening result (torque and angle) of each spindle.

- Message sent by: Controller
- Answer: **MID 0102 Multi-spindle result acknowledge**

| Message part | Parameter   | Byte       | Value                                  |
|--------------|-------------|------------|--|
| Header       | Length      | 1-4        | 154 bytes+(18xnumber of spindles)bytes |
|              | MID         | 5-8        | 0101                                   |
|              | Revision    | 9-11       | Range 000-003                          |
|              | No Ack flag | 12         | 0=Ack needed, 1=No ack needed          |
|              | Station ID  | 13-14      | N/A                                    |
|              | Spindle ID  | 15-16      | N/A                                    |
|              | Spare       | 17-20      | N/A                                    |
| Data field   | N/A         | 21-length  | See Table 56                           |
| Message end  |             | Length + 1 | NUL                                    |

**Table 56 MID 0101 Multi-spindle result data**

| Parameter          | Byte  | Value   |
|--------------------|-------|---|
| Number of spindles | 21-22 | 01  |
|                    | 23-24 | Number of spindles running in the multiple. The number of spindles is two bytes long and specified by 2 ASCII digits, range 02-10.                        |
| VIN Number         | 25-26 | 02  |
|                    | 27-51 | The VIN number is 25 bytes long and is specified by 25 ASCII characters.  |
| Job ID             | 52-53 | 03  |
|                    | 54-55 | The Job ID is two bytes long and specified by two ASCII digits. Range: 00-99  |
| Parameter set ID   | 56-57 | 04  |
|                    | 58-60 | The parameter set ID is three bytes long and specified by three ASCII digits. Range: 000-999.   |
| Batch size         | 61-62 | 05  |
|                    | 63-66 | This parameter gives the total number of tightening in the batch. The batch size is four bytes long and specified by four ASCII digits. Range: 0000-9999. |
| Batch counter      | 67-68 | 06  |
|                    | 69-72 | The batch counter information is four bytes long specifying and specified by four ASCII digits. Range: 0000-9999.   |
|                    | 73    | 0=Low, 1=OK, 2=High   |
| Batch status       | 74-75 | 07  |
|                    | 76    | The batch status is specified by one ASCII character. 0=batch NOK (batch not completed), 1=batch OK, 2=batch not used.                                    |
| Torque Min limit   | 77-78 | 08  |

| Parameter  | Byte                                | Value   |
|--|-------------------------------------|---|
|  | 79-84                               | The torque min limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.   |
| Torque Max limit                                   | 85-86                               | 09  |
|  | 87-92                               | The torque max limit is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.   |
| Torque final target                                | 93-94                               | 10  |
|  | 95-100                              | The torque final target is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and is specified by six ASCII digits.  |
| Angle Min  | 101-102                             | 11  |
|  | 103-107                             | The angle min value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.   |
| Angle Max  | 108-109                             | 12  |
|  | 110-114                             | The angle max value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.   |
| Final Angle Target                                 | 115-116                             | 13  |
|  | 117-121                             | The target angle value in degrees. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.  |
| Date/time of last change in parameter set settings | 122-123                             | 14  |
|  | 124-142                             | Time stamp for the last change in the current parameter set settings. It is 19 bytes long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).  |
| Time stamp   | 143-144                             | 15  |
|  | 145-163                             | Time stamp. 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).  |
| Sync tightening ID                                 | 164-165                             | 16  |
|  | 166-170                             | The sync tightening ID is a unique ID for each sync tightening result.<br>Each individual result of each spindle is stamped with this ID. The tightening ID is incremented after each sync tightening. 5 ASCII digits, range 00000-65535. |
| Sync overall status                                | 171-172                             | 17  |
|  | 173                                 | The status of all the spindles. OK if the individual status of each spindle is OK, NOK if at least one spindle status is NOK. One ASCII digit 1=OK, 0=NOK.  |
| Spindle status                                     | 174-175                             | 05  |
|  | 176 - 176 + 18 x number of spindles | 18 x number of spindles.  |
|  | Bytes 1-2:                          | Spindle number in the same order as in the sync list. Range 01-99.  |
|  | Bytes 3-4:                          | Channel ID of the spindle. Range 01-20  |
|  | Byte 5:                             | Individual overall status of the tightening of each spindle 0=NOK, 1=OK   |

| Parameter | Byte | Value       |   |
|-----------|------|-------------|---|
|           |      | Byte 6:     | Individual torque status of each spindle. 0=NOK, 1=OK   |
|           |      | Byte 7-12:  | The torque result of each spindle. The torque is multiplied by 100 and sent as an integer (2 decimals truncated). It is six bytes long and specified by six ASCII digits. |
|           |      | Byte 13:    | Individual angle status of each spindle. 0=NOK, 1=OK  |
|           |      | Byte 14-18: | The turning angle value in degrees for each spindle. Each turn represents 360 degrees. It is five bytes long and specified by five ASCII digits. Range: 00000-99999.      |

### 5.11.3 MID 0102 Multi-spindle result acknowledge

Multi-spindle result acknowledge.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0102          |
|              | Revision    | 9-11  | Range 000-003 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.11.4 MID 0103 Multi spindle result unsubscribe

Reset the subscription for the multi spindle result.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Multi spindle result subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0103          |
|              | Revision    | 9-11  | Range 000-003 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

## 5.12 PowerMACS result data

The PowerMACS result data MIDs allow for step data to be sent, as well as most other available PowerMACS result variables. The intention is also that it should be easy to add any new result variables without having to change the protocol specification.

The variables that are sent with Open Protocol are selected in the reporter in PowerMACS. The data needed for the station messages and for the header part of the Bolt messages are always selected. Most of the remaining data is possible to select if it should be sent or not. All data is listed in the Appendix, section PowerMACS data, names for variable identification.

The fields Width and Decimals in the reporter are not accessible; the data is always formatted according to the message specifications.

### 5.12.1 MID 0105 Last PowerMACS tightening result data subscribe

Set the subscription for the rundowns result. The result of this command will be the transmission of the rundown result after the tightening is performed (push function).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Subscription already exists**

| Message part | Parameter                             | Byte  | Value                                     |
|--------------|---------------------------------------|---|---|
| Header       | Length                                | 1-4   | 0020                                      |
|              | MID                                   | 5-8   | 0105                                      |
|              | Revision                              | 9-11  | Range: 000-003                            |
|              | No Ack flag                           | 12  | N/A                                       |
|              | Station ID                            | 13-14                                       | N/A                                       |
|              | Spindle ID                            | 15-16                                       | N/A                                       |
|              | Spare                                 | 17-20                                       | N/A                                       |
| Data field   | Data No. System<br>Send only new data | Rev ≤1: N/A<br>Rev 2: 21-30<br>Rev 3: 21-31 | Rev ≤1: N/A,<br>Rev 2 and 3: See Table 57 |
| Message end  |                                       | Rev ≤1: 21<br>Rev 2: 31<br>Rev 3: 32        | NUL                                       |

Table 57 MID 0105 Revision 2 and 3

| Parameter          | Revision | Byte  | Value   |
|--------------------|----------|-------|---|
| Data No System     | 2-3      | 21-30 | Data No System (see MID 0106) is the system number of the cycle data to rewind to.<br>Two ASCII digits 00.<br>The first cycle data will be the cycle data <u>after</u> this point.<br>If the data is not found, or if the value is 0, rewind will be to oldest possible cycle data.   |
| Send only new data | 3        | 31    | Send only new result data.<br>One ASCII digit 0=FALSE, 1=TRUE.<br>If TRUE then only the result data stored after that the subscription is done is sent to the subscriber. Old result data of the unsent result will not be sent to the subscriber.<br>This parameter has higher priorities than "Data No System". So if this is TRUE, value in byte 21-30 is ignored and not preformed. |

### 5.12.2 MID 0106 Last PowerMACS tightening result Station data

This MID contains the station part and some of the Bolt data of the last result data. After this message has been sent the integrator selects if it also wants to have the Bolt and step data. If this data is requested, then the integrator sends the message **MID 0108 Last PowerMACS tightening result data acknowledge**, with the parameter Bolt Data set to **TRUE**. If only the station data is wanted the parameter Bolt Data is set to **FALSE**.

**Note:** All values that are undefined in the results will be sent as all spaces (ASCII 0x20). This will for instance happen with the Torque Status if no measuring value for Bolt T was available for the tightening.

- Message sent by: Controller
- Answer: **MID 0108 Last PowerMACS tightening result data acknowledge**

| Message part | Parameter   | Byte      | Value         |
|--------------|-------------|-----------|---------------|
| Header       | Length      | 1-4       | Maximum 9999  |
|              | MID         | 5-8       | 0106          |
|              | Revision    | 9-11      | Range 000-003 |
|              | No Ack flag | 12        | N/A           |
|              | Station ID  | 13-14     | N/A           |
|              | Spindle ID  | 15-16     | N/A           |
|              | Spare       | 17-20     | N/A           |
| Data field   | Data        | 21-       | See           |
| Message end  |             | Length +1 | NUL           |

Table 58 MID 0106 Last tightening result Station data

| Parameter            | Byte    | Value  |
|----------------------|---------|--|
| Total no of messages | 21-22   | 01   |
|                      | 23-24   | The total number of messages needed to send all Bolt data for all Bolts. The rest of the messages are of type <b>MID 0107 Last PowerMACS tightening result Bolt data</b> , once for each Bolt. They are only sent on request from the integrator. 2 ASCII digits, range 00-99. |
| Message number       | 25-26   | 02   |
|                      | 27-28   | This parameter is always 01 as this is the first message.  |
| Data No System       | 29-30   | 03   |
|                      | 31-40   | The Data No system is a unique ID for each tightening result within the system. 10 ASCII digits, max value is 4294967295.  |
| Station No           | 41-42   | 04   |
|                      | 43-44   | The station number within the PowerMACS system. 2 ASCII digits, range 01-15.   |
| Station Name         | 45-46   | 05   |
|                      | 47-66   | The station name is 20 bytes long and is specified by 20 ASCII characters.   |
| Time                 | 67-68   | 06   |
|                      | 69-87   | Cycle start time for each tightening sent to the control station. The time is 19 byte long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS)   |
| Mode No              | 88-89   | 07   |
|                      | 90-91   | The mode number used for the tightening. 2 ASCII digits, range 01-50. If undefined, empty spaces are sent.   |
| Mode Name            | 92-93   | 08   |
|                      | 94-113  | The name of the mode used for the tightening. Specified by 20 ASCII characters. If undefined, empty spaces are sent.   |
| Simple status        | 114-115 | 09   |
|                      | 116     | One byte long and is specified by one ASCII digit ('0' or '1'). 0=tightening NOK, 1=tightening OK.   |
| PM Status            | 117-118 | 10   |
|                      | 119     | The status of the tightening, specified by one ASCII digit. 0=OK, 1=OKR, 2=NOK, 3=TERMNOK.   |

| Parameter           | Byte    | Value   |
|---------------------|---------|---|
| Wp. Id              | 120-121 | 11  |
|                     | 122-161 | The Wp. Id is 40 bytes long and is specified by 40 ASCII characters. If undefined, empty spaces are sent.   |
| Number of Bolts     | 162-163 | 12  |
|                     | 164-165 | The total number of Bolts in the tightening, 2 ASCII digits.<br>The Bolt part in this message (indicated with double table border) is repeated Number of Bolt times. The parameter numbers (13-22) are also repeated.   |
| Ordinal Bolt Number | +2      | 13  |
|                     | +2      | The ordinal Bolt number, the Bolts in the station are always numbered from 01 to 50. 2 ASCII digits.  |
| Simple Bolt Status  | +2      | 14  |
|                     | +1      | Specified by one ASCII digit ('0' or '1'). 0=tightening NOK, 1=tightening OK.   |
| Torque Status       | +2      | 15  |
|                     | +1      | Torque status of each Bolt, specified by one ASCII digit<br>0=Bolt T Low<br>1=Bolt T OK<br>2=Bolt T High<br>If undefined, empty spaces are sent.  |
| Angle Status        | +2      | 16  |
|                     | +1      | Angle status of each Bolt, specified by one ASCII digit<br>0=Bolt A Low<br>1=Bolt A OK<br>2=Bolt A High<br>If undefined, empty spaces are sent.   |
| Bolt T              | +2      | 17  |
|                     | +7      | Sent as 7 ASCII digits formatted as a float.<br>The value is sent with 4 decimal places, for example 99.9999 or -9.9999. If the value is larger than 99 the needed number of decimals are removed to fit the integer part, i.e. 12345.123 is sent as "12345.1".<br>The unit is Nm. If undefined, empty spaces are sent. |
| Bolt A              | +2      | 18  |
|                     | +7      | Sent as 7 ASCII digits, formatted as a float, see description for Bolt T.<br>The unit is degrees. If undefined, empty spaces are sent.  |
| Bolt T High Limit   | +2      | 19  |
|                     | +7      | Sent as 7 ASCII digits, formatted as a float, see description for Bolt T. The unit is Nm. If undefined, empty spaces are sent.  |
| Bolt T Low Limit    | +2      | 20  |
|                     | +7      | Sent as 7 ASCII digits, formatted as a float, see description for Bolt T. The unit is Nm. If undefined, empty spaces are sent.  |
| Bolt A High Limit   | +2      | 21  |
|                     | +7      | Sent as 7 ASCII digits, formatted as a float, see description for Bolt T.<br>The unit is degrees. If undefined, empty spaces are sent.  |
| Bolt A Low Limit    | +2      | 22  |



| Parameter                | Byte                                       | Value   |
|--------------------------|--|---|
|                          | +7   | Sent as 7 ASCII digits, formatted as a float, see description for Bolt T. The unit is degrees. If undefined, empty spaces are sent. |
| Number of special values | +2   | 23  |
|                          | +2   | The total number of special values sent in this message. Range 00-99.   |
|                          | + n x<br>number<br>of<br>special<br>values | This section is repeated Number of special values times. If Number of special values=00, this section is not sent.                  |
|                          | Byte 1-20:                                 | Variable name. 20 ASCII characters, see Table 85  |
|                          | Byte 21-22:                                | Type: 2 ASCII characters, see Table 84.   |
|                          | Byte 23-34:                                | Length: 2 ASCII digits.   |
|                          | Byte 25- :                                 | Value: The value of the variable. The format and length depend on the parameters Type and Length.                                   |

**Note:** All fields with strings are left adjusted and padded with spaces. All numerical fields are right adjusted and padded with 0's.

### 5.12.3 MID 0107 Last PowerMACS tightening result Bolt data

This message contains the cycle data for one Bolt, both Bolt data and step data. This message is only sent if the acknowledgement of the message **MID 0106 Last PowerMACS tightening result station data** had the parameter Bolt Data set to **TRUE**. The next Bolt data is sent if the acknowledgement has the parameter Bolt Data set to **TRUE**.

**Note 1:** All values in the fixed part that are undefined in the results will be sent as all spaces (ASCII 0x20). This can happen with the Customer Error Code if this function is not activated.

**Note 2:** The Bolt results and step results are only sent when the value exists in the result. This means, for example, that if no high limit is programmed for Peak T, then the value Peak T+ will not be sent even if limits for Peak T are defined in the reporter.

- Message sent by: Controller
- Answer: **MID 0108 Last PowerMACS tightening result data acknowledge**

| Message part | Parameter   | Byte           | Value         |
|--------------|-------------|----------------|---------------|
| Header       | Length      | 1-4            | Maximum 9999  |
|              | MID         | 5-8            | 0107          |
|              | Revision    | 9-11           | Range 000-001 |
|              | No Ack flag | 12             | N/A           |
|              | Station ID  | 13-14          | N/A           |
|              | Spindle ID  | 15-16          | N/A           |
|              | Spare       | 17-20          | N/A           |
| Data field   | User data   | 21-<br>max 220 | See Table 59  |
| Message end  | N/A         | Length +1      | NUL           |

**Table 59 MID 0107 Last tightening result Bolt data**

| Parameter            | Byte    | Value  |
|----------------------|---------|--|
| Total no of messages | 21-22   | 01   |
|                      | 23-24   | The total number of messages needed to send all Bolt data for all Bolts, including the message MID 0106 Last PowerMACS tightening result Station data, sent with the station data. One message <b>MID 0107 Last PowerMACS tightening result Bolt data</b> is sent for each Bolt. |
| Message number       | 25-26   | 02   |
|                      | 27-28   | This number counts from 02 to Total no of messages and is incremented by 1 for each sent message.<br>The first Bolt message is message number 02, since <b>MID 0106 Last PowerMACS tightening result Station data</b> is number 01. 2 ASCII digits, range 02-99.                 |
| Data No System       | 29-30   | 03   |
|                      | 31-40   | The Data No system is a unique ID for each tightening result within the system. 10 ASCII digits, max value is 4294967295.  |
| Station No           | 41-42   | 04   |
|                      | 43-44   | The station number within the PowerMACS system. 2 ASCII digits. Range 01-15.   |
| Time                 | 45-46   | 05   |
|                      | 47-55   | Cycle start time for each tightening sent to the control station. The time is 19 byte long and is specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS)   |
| Bolt number          | 56-57   | 06   |
|                      | 58-61   | The user defined Bolt number. 4 ASCII digits, range 0001-9999.   |
| Bolt name            | 62-63   | 07   |
|                      | 64-83   | The name of the Bolt. 20 ASCII characters.   |
| Program name         | 84-85   | 08   |
|                      | 86-105  | The name of the program that made the tightening, 20 ASCII characters.   |
| PM status            | 106-107 | 09   |
|                      | 108     | The status of the tightening specified by one ASCII digit. 0=OK, 1=OKR, 2=NOK, 3=TERMNOK.  |
| Errors               | 109-110 | 10   |
|                      | 111-160 | Error codes from the tightening. Formatted in the same way as the E1 special variable, see description in section 6.1.4.   |
| Customer error code  | 161-162 | 11   |
|                      | 163-166 | Customer specific error code. 4 ASCII characters. If undefined, empty spaces are sent.   |

| Parameter              | Byte        | Value  |
|------------------------|-------------|--|
| Number of Bolt results | 167-168     | 12   |
|                        | 169-170     | The total number of Bolt results in the tightening, 2 ASCII digits. The Bolt result part in this message is repeated "Number of Bolt results" times.   |
|                        | 171-        | This section is repeated Number of Bolt results times. If Number of Bolt results=00, this section is not sent.   |
|                        | Byte 1-20:  | Variable name: 20 ASCII characters, see 6.1.1.   |
|                        | Byte 21-22: | Type of the variable. 2 ASCII characters, I[space] for integers or F[space] for float.   |
| Number of step results | Byte 23-29: | Value. The value is sent as a 7 ASCII digits, and the format depends on the type.<br>Type = I, the value is formatted like 9999999 or -999999<br>Type = F, the value is sent with 4 decimal places, i.e. it is formatted like 99.9999 or -9.9999. If the value is larger than 99 the needed number of decimals are removed to fit the integer part, i.e. 12345.123 is sent as "12345.1".<br>The units for torque measurements are Nm and for angle measurements degrees. |
|                        | +2          | 13   |
|                        | +3          | The total number of step results in the tightening, 3 ASCII digits. The step result part in this message is repeated "Number of step results" times.   |

| Parameter                | Byte   | Value  |
|--------------------------|--|--|
| All step data sent       | +2   | 14   |
|                          | +1   | Set to TRUE if all the step data was possible to send, otherwise it is set to FALSE. All step data is not sent if the total amount of data is not possible to fit within the message size of 9999 bytes. This can happen if the program is very long and each step reports a lot of data. For a normal program this will never be a problem. If the step data was not possible to report none of the special values will be reported.<br>One ASCII digit 0=FALSE, 1=TRUE.      |
|                          | +31  | This section is repeated Number of step results times. If Number of step results=000, this section is not sent.  |
|                          |  | Byte 1-20: Specifies the name of the variable. 20 ASCII characters, see Table 83   |
|                          |  | Byte 21-22: Specifies the type of the variable. 2 ASCII characters, I[space] for integers or F[space] for float.   |
|                          |  | Byte 23-29: The value is sent as a 7 ASCII digits, and the format depends on the type.<br>Type = I, the value is formatted like 9999999 or -9999999<br>Type = F, the value is sent with 4 decimal places, i.e. it is formatted like 99.9999 or -9.9999. If the value is larger than 99 the needed number of decimals are removed to fit the integer part, i.e. 12345.123 is sent as "12345.1".<br>The units for torque measurements are Nm and for angle measurements degrees. |
| Number of special values | Byte 30-31: The step number for the result variable. 2 ASCII digits. |  |
|                          | +2   | 15   |
|                          | +2   | The total number of special values sent in this message. Range 00-99.  |
|                          | + n  | This section is repeated Number of special values times. If Number of special values=00, this section is not sent.   |
|                          |  | Byte 1-20 Variable name. 20 ASCII characters, see Table 85   |
|                          |  | Byte 21-22 Type: 2 ASCII characters, see Table 84.   |
|                          |  | Byte 23-24 Length: 2 ASCII digits.   |
|                          |  | Byte 25- Value: The value of the variable. The format and length depend on the parameters Type and Length.   |
|                          |  | Byte n The step number for the result variable, sent as 2 ASCII digits. For values that belong to the Bolt level, Step number is always 00.  |

**Note:** All fields with strings are left adjusted and padded with spaces. All numerical fields are right adjusted and padded with 0's.

### 5.12.4 MID 0108 Last PowerMACS tightening result data acknowledge

If Bolt Data is set to **TRUE** the next telegram with Bolt data is sent (if there are any left for this tightening). Otherwise no more Bolt data is sent for this tightening.

If only the station data is wanted Bolt Data must be set to **FALSE** in the acknowledgement of **MID 0106 Last PowerMACS tightening result Station data**.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value   |
|--------------|-------------|-------|---|
| Header       | Length      | 1-4   | 0021  |
|              | MID         | 5-8   | 0108  |
|              | Revision    | 9-11  | Range 000-003   |
|              | No Ack flag | 12    | N/A   |
|              | Station ID  | 13-14 | N/A   |
|              | Spindle ID  | 15-16 | N/A   |
|              | Spare       | 17-20 | N/A   |
| Data field   | Bolt data   | 21    | Specifies if Bolt data is requested or not. One ASCII character: 0=false, 1=true. |
| Message end  |             | 22    | NUL   |

### 5.12.5 MID 0109 Last PowerMACS tightening result data unsubscribe

Reset the last PowerMACS tightening result subscription for the rundowns result.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0109          |
|              | Revision    | 9-11  | Range 000-003 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

## 5.13 User interface messages

### 5.13.1 MID 0110 Display user text on compact

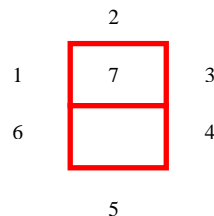
By sending this message the integrator can display a text on the compact display. The text must be maximum 4 bytes long.

The characters that can be displayed are limited due to the hardware of the compact display.

Each character must fit into seven segments. This means for example that it is not possible to display an M on the compact display.

The text will be displayed until next tightening, new parameter set or Job selection, or alarm code.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, User text could not be displayed**



| Message part | Parameter   | Byte  | Value   |
|--------------|-------------|-------|---|
| Header       | Length      | 1-4   | 0024  |
|              | MID         | 5-8   | 0110  |
|              | Revision    | 9-11  | Range 000-001                                   |
|              | No Ack flag | 12    | N/A   |
|              | Station ID  | 13-14 | N/A   |
|              | Spindle ID  | 15-16 | N/A   |
|              | Spare       | 17-20 | N/A   |
| Data field   | User text   | 21-24 | Max four characters, right padded with SPC 0x20 |
| Message end  |             | 25    | NUL   |

### 5.13.2 MID 0111 Display user text on graph

By sending this message the integrator can display a text on the graphic display. The user can furthermore set the time for the text to be displayed and if the text should be acknowledged by the operator or not.

The text is divided into four lines with 25 ASCII characters each. If a line is shorter than 25 characters it must be right padded with blanks (SPC 0x20).

The first line is the text header and is in upper character.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, User text could not be displayed**

| Message part | Parameter   | Byte   | Value         |
|--------------|-------------|--------|---------------|
| Header       | Length      | 1-4    | 0137          |
|              | MID         | 5-8    | 0111          |
|              | Revision    | 9-11   | Range 000-001 |
|              | No Ack flag | 12     | N/A           |
|              | Station ID  | 13-14  | N/A           |
|              | Spindle ID  | 15-16  | N/A           |
|              | Spare       | 17-20  | N/A           |
| Data field   | N/A         | 21-137 | See Table 60  |
| Message end  |             | 138    | NUL           |

**Table 60 MID 0110 Graphic text display**

| Parameter            | Byte    | Value  |
|----------------------|---------|--|
| Text Duration        | 21-22   | 01   |
|                      | 23-26   | Time for the text to be displayed, in seconds. Four ASCII digits, range: 0000-9999 |
| Removal condition    | 27-28   | 02   |
|                      | 29      | 0= acknowledge or wait expiration time<br>1= acknowledge                           |
| Line 1 (text header) | 30-31   | 03   |
|                      | 32-56   | 25 ASCII characters  |
| Line 2               | 57-58   | 04   |
|                      | 59-83   | 25 ASCII characters  |
| Line 3               | 84-85   | 05   |
|                      | 86-110  | 25 ASCII characters  |
| Line 4               | 111-112 | 06   |
|                      | 113-137 | 25 ASCII characters  |

### 5.13.3 MID 0113 Flash green light on tool

By sending this message the integrator can make the green light on the tool flash. The light on the tool will flash until the operator pushes the tool trigger.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0113          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

## 5.14 Job messages, advanced

### 5.14.1 MID 0120 Job line control info subscribe

A subscription for the Job line control information. A message is sent to the integrator when the Job line control is started, for alert level 1, for alert level 2, or when the Job is finished before the alert level 2 (Job line control done).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Job line control info subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0120                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.14.2 MID 0121 Job line control started

This message tells the integrator that Job Line control start has been set in the controller.

- Message sent by: Controller
- Answer: **MID 0125 Job line control info acknowledged**



| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0121                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.14.3 MID 0122 Job line control alert 1

This message tells the integrator that, for example, a car has reached 80% of the station and that the Job line control alert 1 is set in the controller.

- Message sent by: Controller
- Answer: **MID 0125 Job line control info acknowledged**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0122                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.14.4 MID 0123 Job line control alert 2

This message tells the integrator that the Job line control alert 2 is set in the controller.

- Message sent by: Controller
- Answer: **MID 0125 Job line control info acknowledged**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0123                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.14.5 MID 0124 Job line control done

This message tells the integrator that the Job has been completed before the alert level 2 was reached.

- Message sent by: Controller
- Answer: **MID 0125 Job line control info acknowledged**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0124                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.14.6 MID 0125 Job line control info acknowledge

Acknowledgement of Job line control info messages MID 0121, 0122, 0123, and 0124.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0125          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.7 MID 0126 Job line control info unsubscribe

Unsubscribe for the Job line control info messages.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Job line control info subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0126          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.8 MID 0127 Abort Job

Abort the current running Job if there is one.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0127          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.9 MID 0128 Job batch increment

Increment the Job batch if there is a current running Job.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0128          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.10 MID 0129 Job batch decrement

Decrement the Job batch if there is a current running Job. Two revisions are available for this MID. The default revision or revision 1 does not contain any argument and always decrement the last tightening completed in a Job.

The revision 2 contains two parameters; the channel ID and parameter set ID to be decremented.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted or**  
**MID 0004 Command error, Job batch decrement failed (only for MID revision 2)**

| Message part | Parameter                       | Byte                   | Value                                     |
|--------------|---------------------------------|------------------------|---|
| Header       | Length                          | 1-4                    | Revision 1: 0020<br>Revision 2: 0029      |
|              | MID                             | 5-8                    | 0129                                      |
|              | Revision                        | 9-11                   | Range: 000-002                            |
|              | No Ack flag                     | 12                     | N/A                                       |
|              | Station ID                      | 13-14                  | N/A                                       |
|              | Spindle ID                      | 15-16                  | N/A                                       |
|              | Spare                           | 17-20                  | N/A                                       |
| Data field   | Channel ID and parameter set ID | 21-length              | Revision 1 empty, Revision 2 see Table 61 |
| Message end  |                                 | Rev 1: 21<br>Rev 2: 30 |   |

Table 61 MID 0129 Revision 2

| Parameter        | Byte  | Value   |
|------------------|-------|---|
| Channel ID       | 21-22 | 01  |
|                  | 23-24 | The channel ID to be decremented. In case of a cell Job each controller member has a unique channel ID. |
| Parameter set ID | 25-26 | 02  |
|                  | 27-29 | The parameter set ID to be decremented in the Job   |

### 5.14.11 MID 0130 Job off

Set the controller in Job off mode or reset the Job off mode.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value   |
|--------------|-------------|-------|---|
| Header       | Length      | 1-4   | 0021  |
|              | MID         | 5-8   | 0130  |
|              | Revision    | 9-11  | Range: 000-001  |
|              | No Ack flag | 12    | N/A   |
|              | Station ID  | 13-14 | N/A   |
|              | Spindle ID  | 15-16 | N/A   |
|              | Spare       | 17-20 | N/A   |
| Data field   | Data        | 21    | Job off status is one byte long and specified by one ASCII digit:<br>0 = set Job off, 1 = reset Job off |
| Message end  |             | 22    | NUL   |

### 5.14.12 MID 0131 Set Job line control start

The integrator can set the line control start in the controller with this message.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0131          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.13 MID 0132 Set Job line alert 1

The integrator can set the line control alert 1 in the controller with this message.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0132          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.14 MID 0133 Set Job line alert 2

The integrator can set the line control alert 2 in the controller with this message.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0133          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.14.15 MID 0140 Execute dynamic Job request

The integrator requests a dynamical Job to be executed i.e. the Job sent from the integrator is immediately executed (if possible) by the controller but not saved in the memory. A dynamical Job lifetime is the time for the Job to be executed. If the controller is powered off before the completion of the Job, the dynamical Job is lost.

Do note the limitation when sending this message on a serial connection due to the size of the read buffer (256 bytes) in the controller. In such case the number of programs in the Job list is limited.

The following revisions are available for this MID.

- Table 62 MID 0140 Dynamic Job data revision 1
- Table 63 MID 0140 Dynamic Job data revision 999.

Revision 999 is equal to revision 1, but for each program in the Job list (parameter ID 04) the batch counter can be set. With that revision, it is then possible to send a “dynamic Job” not finally completed and already begun to the controller. The tightening already performed in the Job is assumed to be OK.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Not possible to execute dynamic Job**

Note: A more detailed description of the error i.e. faulty Job select source or Job in off mode will be received, if an alarm subscription has been made (MID 0070).

| Message part | Parameter        | Byte      | Value  |
|--------------|------------------|-----------|--|
| Header       | Length           | 1-4       | 71 + no of program x N bytes,<br>Revision 1: N=15, revision 2: N=18. |
|              | MID              | 5-8       | 0140   |
|              | Revision         | 9-11      | Range: 000-001, 999  |
|              | No Ack flag      | 12        | N/A  |
|              | Station ID       | 13-14     | N/A  |
|              | Spindle ID       | 15-16     | N/A  |
|              | Spare            | 17-20     | N/A  |
| Data field   | Dynamic Job data | 21-length | See Table 62 and Table 63  |
| Message end  |                  | Length +1 | NUL  |

**Table 62 MID 0140 Dynamic Job data revision 1**

| Parameter                | Byte                   | Value   |
|--------------------------|------------------------|---|
| Job ID                   | 21-22                  | 01  |
|                          | 23-24                  | The Job ID is specified by four ASCII characters.<br>Range: 0000-9999   |
| Job name                 | 25-26                  | 02  |
|                          | 27-51                  | 25 ASCII characters.  |
| Number of parameter sets | 52-53                  | 03  |
|                          | 54-55                  | The number of parameter sets in the Job list, defined by two ASCII characters, range 00-99.   |
| Job list                 | 56-57                  | 04  |
|                          | 57-<br>(57+<br>N x 15) | A list of parameter sets (N=value from parameter "Number of parameter sets", max 99).<br>Each parameter set is defined by a number of parameters separated by ":" and terminated by ";" (15 bytes) according to:<br>[Channel-ID]:[Program-ID]:[AutoSelect]:[BatchSize] :[Max Coherent NOK];<br>Channel ID = two ASCII characters, range 00-99<br>Program ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999<br>Auto Select = One ASCII character, 1 or 0, 1=Auto Next Change,<br>BatchSize = Two ASCII characters, range 00-99<br>Max Coherent NOK = Two ASCII characters, range 00-99<br>Example: 15:045:0:22:02; |
| Forced order             | +2                     | 05  |
|                          | +1                     | One ASCII character:<br>0=free order, 1=forced order, 2=free and forced   |
| Lock at Job done         | +2                     | 06  |
|                          | +1                     | One ASCII character: 0=No, 1=Yes  |
| Tool loosening           | +2                     | 07  |
|                          | +1                     | Tool loosening. One ASCII character.<br>0=Enable, 1=Disable, 2=Enable only on NOK tightening  |
| Repeat Job               | +2                     | 08  |
|                          | +1                     | One ASCII character: 0=No, 1=Yes  |
| Job batch mode/          | +2                     | 09  |



| Parameter                             | Byte | Value  |
|---------------------------------------|------|--|
| batch count type                      | +1   | The Job batch mode is the way to count the tightening in a Job; only the OK or both OK and NOK. One ASCII character.<br>0=only the OK tightenings are counted<br>1=both the OK and NOK tightenings are counted |
| Batch status at increment / bypass    | +2   | 10   |
|                                       | +1   | Batch status after performing an increment or a bypass parameter set. One ASCII character: 0=OK, 1=NOK   |
| Decrement batch at OK loosening       | +2   | 11   |
|                                       | +1   | One ASCII character: 0=No, 1=Yes   |
| Max time for first tightening         | +2   | 12   |
|                                       | +4   | Four ASCII digits, range 0000-9999, 0000=not used  |
| Max time to complete Job              | +2   | 13   |
|                                       |      | Max time to complete the entire Job.<br>Five ASCII digits, range 00000-99999, 00000=not used   |
| Display result at auto select         | +2   | 14   |
|                                       | +4   | Set the time the tightening result is kept on the display after selecting next parameter set.<br>Four ASCII digits, range 0000-9999 seconds<br>0000=not used * <sup>1</sup>                                    |
| Use line control                      | +2   | 15   |
|                                       | +1   | One ASCII character: 0=No, 1=Yes   |
| Identifier result part 1 <sup>1</sup> | +2   | 16   |
|                                       | +1   | One ASCII character<br>0=Job VIN number, save the identifier that triggered in identifier result part 1<br>1=other   |
| Result of non tightenings             | +2   | 17   |
|                                       | +1   | One ASCII character, save result after increment, bypass.<br>0=No, 1=Yes   |
| Reset all identifiers at Job done     | +2   | 18   |
|                                       | +1   | One ASCII character: 0=No, 1=Yes   |
| Reserved                              | +2   | 19   |
|                                       | +1   | Reserved for Job repair. One ASCII character: 0=E, 1=G   |

<sup>1</sup> For an PF3000/4000 with Open protocol version 1.2.1 or later, this parameter is overridden and “other” is always selected.

MID 0140 Dynamic Job data revision 999 is equal to revision 1 except for parameter ID 04, Job list.

**Table 63 MID 0140 Dynamic Job data revision 999**

| Parameter      | Byte                    | Value  |
|----------------|-------------------------|--|
| See revision 1 | 21-55                   | See revision 1   |
| Job list       | 56-57                   | 04   |
|                | 58-<br>(58 +<br>N x 18) | A list with up to 99 parameter sets where each parameter set is defined by a number of parameters separated by “.” and terminated by “;” (18 bytes) according to:<br>[Channel-ID]:[Program-ID]:[AutoSelect]:[BatchSize]:[Max Coherent NOK]:[Batch Counter];<br>Channel ID = two ASCII characters, range 00-99<br>Program ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999<br>Auto Select = One ASCII character, 1 or 0, 1=Auto Next Change,<br>BatchSize = Two ASCII characters, range 00-99<br>Max Coherent NOK = Two ASCII characters, range 00-99<br>Batch counter = Two ASCII characters, range 00-99<br>Ex: 15:045:0:22:02:10; |
| See revision 1 |                         | See revision 1   |

## 5.15 Multiple identifiers messages

### 5.15.1 MID 0150 Identifier download request

Used by the integrator to send an identifier to the controller.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Identifier input source not granted**

| Message part | Parameter       | Byte      | Value                    |
|--------------|-----------------|-----------|--------------------------|
| Header       | Length          | 1-4       | Max 0100                 |
|              | MID             | 5-8       | 0150                     |
|              | Revision        | 9-11      | Range 000-001            |
|              | No Ack flag     | 12        | N/A                      |
|              | Station ID      | 13-14     | N/A                      |
|              | Spindle ID      | 15-16     | N/A                      |
|              | Spare           | 17-20     | N/A                      |
| Data field   | Identifier data | 21-length | Max 100 ASCII characters |
| Message end  |                 | Length +1 | NUL                      |

### 5.15.2 MID 0151 Multiple identifier and result parts subscribe

This message is used by the integrator to set a subscription for the work order status, optional identifiers and result parts extracted from the identifiers received and accepted by the controller. The identifiers may have been received by the controller from one or several input sources (Serial, Ethernet, Field bus, ST scanner etc.).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Multiple identifier and result parts subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0151                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.15.3 MID 0152 Multiple identifier and result parts

Transmission of the work order status, optional identifier and identifier result parts by the controller to the subscriber.

The identifier contains the status of the maximum four identifier result parts that could be extracted from one or more valid identifiers.

- Message sent by: Controller
- Answer: **MID 0153 Multiple identifiers and result parts acknowledge**

| Message part | Parameter       | Byte   | Value                         |
|--------------|-----------------|--------|-------------------------------|
| Header       | Length          | 1-4    | 0148                          |
|              | MID             | 5-8    | 0152                          |
|              | Revision        | 9-11   | Range 000-001                 |
|              | No Ack flag     | 12     | 0=Ack needed, 1=No ack needed |
|              | Station ID      | 13-14  | N/A                           |
|              | Spindle ID      | 15-16  | N/A                           |
|              | Spare           | 17-20  | N/A                           |
| Data field   | Identifier data | 21-148 | See Table 64                  |
| Message end  |                 | 149    | NUL                           |

**Table 64 MID 0152 Multiple identifier and result parts data**

| Parameter                | Byte    | Value  |
|--------------------------|---------|--|
| First identifier status  | 21-22   | 01   |
|                          | 23-52   | Byte 1: Identifier type number: Range 1-4<br>Byte 2-3: Included in work order: 0=No, 1=Yes<br>Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset, 4=Next, 5=Initial<br>Byte 6-30: Result part 1 |
| Second identifier status | 53-54   | 02   |
|                          | 55-84   | Byte 1: Identifier type number: Range 1-4<br>Byte 2-3: Included in work order: 0=No, 1=Yes<br>Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset, 4=Next, 5=Initial<br>Byte 6-30: Result part 2 |
| Third identifier status  | 85-86   | 03   |
|                          | 87-116  | Byte 1: Identifier type number: Range 1-4<br>Byte 2-3: Included in work order: 0=No, 1=Yes<br>Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset, 4=Next, 5=Initial<br>Byte 6-30: Result part 3 |
| Fourth identifier status | 117-118 | 03   |
|                          | 119-148 | Byte 1: Identifier type number: Range 1-4<br>Byte 2-3: Included in work order: 0=No, 1=Yes<br>Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset, 4=Next, 5=Initial<br>Byte 6-30: Result part 4 |

### 5.15.4 MID 0153 Multiple identifiers and result parts acknowledge

Acknowledgement of multiple identifiers and result parts upload.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0153          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.15.5 MID 0154 Multiple identifier and result parts unsubscribe

Reset the subscription for the multiple identifiers and result parts.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Multiple identifiers and result parts subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0154          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.15.6 MID 0155 Bypass Identifier

This message is used by the integrator to bypass the next identifier expected in the work order.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0155          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.15.7 MID 0156 Reset latest Identifier

This message is used by the integrator to reset the latest identifier or bypassed identifier in the work order.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0156          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.15.8 MID 0157 Reset all Identifiers

This message is used by the integrator to reset all identifiers in the current work order.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0157          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

## 5.16 I/O Interface

### 5.16.1 MID 0200 Set externally controlled relays

By using this message the integrator can control 10 relays (externally control relays). The station can set, reset the relays or make them flashing.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted**

Example: Reset relay 1, set relay 2, reset relay 3, flash relay 4, keep relay 5 as it is, reset relay 6, set relay 7, flash relay 8, keep relay 9 as it is, and reset relay 10.

| 00300200     |              | 0102301230NUL |               |
|--------------|--------------|---------------|---------------|
| Message part | Parameter    | Byte          | Value         |
| Header       | Length       | 1-4           | 0030          |
|              | MID          | 5-8           | 0200          |
|              | Revision     | 9-11          | Range 000-001 |
|              | No Ack flag  | 12            | N/A           |
|              | Station ID   | 13-14         | N/A           |
|              | Spindle ID   | 15-16         | N/A           |
|              | Spare        | 17-20         | N/A           |
| Data field   | Relay status | 21-30         | See Table 65  |
| Message end  |              | 31            | NUL           |

**Table 65 MID 0200 Relay status**

| Parameter      | Byte | Value  |
|----------------|------|--|
| Status relay 1 | 21   | Set the status for relay 1. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status |
| Status relay 2 | 22   | Set the status for relay 2. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status |
| Status relay 3 | 23   | Set the status for relay 3. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status |
| Status relay 4 | 24   | Set the status for relay 4. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status |
| Status relay 5 | 25   | Set the status for relay 5. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status |

| Parameter       | Byte | Value   |
|-----------------|------|---|
| Status relay 6  | 26   | Set the status for relay 6. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status  |
| Status relay 7  | 27   | Set the status for relay 7. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status  |
| Status relay 8  | 28   | Set the status for relay 8. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status  |
| Status relay 9  | 29   | Set the status for relay 9. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status  |
| Status relay 10 | 30   | Set the status for relay 10. The relay status is one byte long and specified by 1 ASCII digit. Range 0-3.<br>0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status |

### 5.16.2 MID 0210 Status externally monitored inputs subscribe

By using this message the integrator can set a subscription to monitor the status for the eight externally monitored digital inputs. After the subscription the station will directly receive a status message and then every time the status of at least one of the inputs has changed.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error,**  
**Status externally monitored inputs subscription already exists or**  
**MID 0211 Status externally monitored inputs.**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0210                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  |             | 21    | NUL                           |

### 5.16.3 MID 0211 Status externally monitored inputs

Status for the eight externally monitored digital inputs. This message is sent to the subscriber every time the status of at least one of the inputs has changed.

- Message sent by: Controller
- Answer: **MID 0212 Status externally monitored inputs acknowledge**

Example:



|          |             |
|----------|-------------|
| 00280211 | 00100111NUL |
|----------|-------------|

| Message part | Parameter     | Byte  | Value                         |
|--------------|---------------|-------|-------------------------------|
| Header       | Length        | 1-4   | 0028                          |
|              | MID           | 5-8   | 0211                          |
|              | Revision      | 9-11  | Range 000-001                 |
|              | No Ack flag   | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID    | 13-14 | N/A                           |
|              | Spindle ID    | 15-16 | N/A                           |
|              | Spare         | 17-20 | N/A                           |
| Data field   | DIG/IN status | 21-28 | See Table 66                  |
| Message end  |               | 29    | NUL                           |

**Table 66 MID 0211 Digital input status**

| Parameter       | Byte | Value  |
|-----------------|------|--|
| Status DIG/IN 1 | 21   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 2 | 22   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 3 | 23   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 4 | 24   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 5 | 25   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 6 | 26   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 7 | 27   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |
| Status DIG/IN 8 | 28   | The DIG/IN status is one byte long and specified by 1 ASCII digits. Range 0-1. 0=Off, 1=On |

#### 5.16.4 MID 0212 Status externally monitored inputs acknowledge

Acknowledgement for the message status Externally monitored inputs upload.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0212          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.16.5 MID 0213 Status externally monitored inputs unsubscribe

Unsubscribe for the **MID 0211 Status externally monitored inputs**.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error,**  
**Status externally monitored inputs subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0213          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  |             | 21    | NUL           |

### 5.16.6 MID 0214 IO device status request

Request for the status of the relays and digital inputs at a device, e.g. an I/O expander. The device is specified by a device number.

- Message sent by: Integrator
- Answer: **MID 0215 IO device status** or  
**MID 0004 Command error,**  
**Faulty IO device ID, or IO device not connected**

| Message part | Parameter          | Byte  | Value  |
|--------------|--------------------|-------|--|
| Header       | Length             | 1-4   | 0022   |
|              | MID                | 5-8   | 0214   |
|              | Revision, MID 0215 | 9-11  | Range: 000-002   |
|              | No Ack flag        | 12    | N/A  |
|              | Station ID         | 13-14 | N/A  |
|              | Spindle ID         | 15-16 | N/A  |
|              | Spare              | 17-20 | N/A  |
| Data field   | Device number      | 21-22 | Two ASCII characters (00-15) 00=internal device, 01-15=I/O expanders |
| Message end  |                    | 23    | NUL  |

### 5.16.7 MID 0215 IO device status reply

This message is sent as an answer to the **MID 0214 IO device status request**.

MID 0215 revision 1 should only be used to get the status of IO devices with max 8 relays/digital inputs.

For external I/O devices each list contain up to 8 relays/digital inputs. For the internal device the lists contain up to 4 relays/digital inputs and the remaining 4 will be empty.

MID 0215 revision 2 can be used to get the status of all types of IO devices with up to 48 relays/digital inputs.

- Message sent by: Controller
- Answer: None

| Message part | Parameter     | Byte      | Value  |
|--------------|---------------|-----------|--|
| Header       | Length        | 1-4       | Revision 1: 0092<br>Revision 2: depends on the number of relays and digital inputs |
|              | MID           | 5-8       | 0214   |
|              | Revision      | 9-11      | Range: 000-002   |
|              | No Ack flag   | 12        | N/A  |
|              | Station ID    | 13-14     | N/A  |
|              | Spindle ID    | 15-16     | N/A  |
|              | Spare         | 17-20     | N/A  |
| Data field   | Device number | 21-       | See Table 67, Table 68, Table 69, and Table 70                                     |
| Message end  |               | length +1 | NUL  |

See Table 69 for interpretation of relay numbers and digital input numbers. Note that one or two zeros have to be added in front of the numbers in the list in this MID. For example relay number 13 Job NOK must be entered as 013.

**Table 67 MID 0215 Revision 1**

| Parameter    | Byte  | Value |
|--------------|-------|-------|
| IO device ID | 21-22 | 01    |

| Parameter          | Byte  | Value  |
|--------------------|-------|--|
|                    | 23-24 | The IO device ID specified with two ASCII characters. Range: 00-99. 00=internal device, 01-15=I/O expanders.   |
| Relay list         | 25-26 | 02   |
|                    | 27-58 | A list of 8 relays for the current device ID. Each relay is specified by four bytes.<br>Byte 1-3: Relay number, three ASCII characters, range 000-999<br>Byte 4: Relay status specified by one ASCII character;<br>0=reset, 1=set.                               |
| Digital Input list | 59-60 | 03   |
|                    | 61-92 | A list of 8 digital inputs for the current device ID. Each digital input is specified by four bytes.<br>Byte 1-3: Digital input number, three ASCII characters, range 000-999<br>Byte 4: Digital input status specified by one ASCII character.<br>0=Low, 1=High |

Table 68 MID 0215 Revision 2

| Parameter                | Byte       | Value  |
|--------------------------|------------|--|
| IO device ID             | 21-22      | 01   |
|                          | 23-24      | The IO device number specified with two ASCII characters. Range: 00-99. 00=internal device, 01-15=I/O expanders.   |
| Number of relays         | 25-26      | 02   |
|                          | 27-28      | Number of relays present on the I/O-device.  |
| Relay list               | 29-30      | 03   |
|                          | 31- $X^2$  | A list of relays for the current device ID. Each relay is specified by four bytes.<br>Byte 1-3: Relay number, three ASCII characters, range 000-999<br>Byte 4: Relay status specified by one ASCII character;<br>0=reset, 1=set.                               |
| Number of digital inputs | X+1-X+2    | 04   |
|                          | X+3-X+4    | Number of digital inputs present on the I/O-device.  |
| Digital Input list       | X+5-X+6    | 05   |
|                          | X+7- $Y^3$ | A list of digital inputs for the current device ID. Each digital input is specified by four bytes.<br>Byte 1-3: Digital input number, three ASCII characters, range 000-999<br>Byte 4: Digital input status specified by one ASCII character.<br>0=Low, 1=High |

Table 69 MID 0215 Relay number

| Relay number | Relay function | Tracking event |
|--------------|----------------|----------------|
| 00           | Off            |                |
| 01           | OK             |                |

<sup>2</sup>  $X = 31 + 4 \times \text{Number of relays present}$ <sup>3</sup>  $Y = X + 8 + 4 \times \text{Number of digital inputs present}$

| Relay number | Relay function           | Tracking event |
|--------------|--------------------------|----------------|
| 02           | NOK                      |                |
| 03           | Low                      |                |
| 04           | High                     |                |
| 05           | Low Torque               |                |
| 06           | High Torque              |                |
| 07           | Low angle                |                |
| 08           | High angle               |                |
| 09           | Cycle complete           |                |
| 10           | Alarm                    | Yes            |
| 11           | Batch NxOK               | Yes            |
| 12           | Job OK                   | Yes            |
| 13           | Job NOK                  | Yes            |
| 14           | Job running              | Yes            |
| 15           | Reserved                 | Yes            |
| 16           | Reserved                 | Yes            |
| 17           | Not used                 |                |
| 18           | POWER FOCUS ready        | Yes            |
| 19           | Tool ready               | Yes            |
| 20           | Tool start switch        | Yes            |
| 21           | Dir. switch = CW         | Yes            |
| 22           | Dir. switch = CCW        | Yes            |
| 23           | Tightening direction CCW | Yes            |
| 24           | Tool tightening          | Yes            |
| 25           | Tool loosening           | Yes            |
| 26           | Tool running             | Yes            |
| 27           | Tool running CW          | Yes            |
| 28           | Tool running CCW         | Yes            |
| 29           | Statistic alarm          | Yes            |
| 30           | Tool locked              | Yes            |
| 31           | Received identifier      |                |
| 32           | Running Pset bit 0       | Yes            |
| 33           | Running Pset bit 1       | Yes            |
| 34           | Running Pset bit 2       | Yes            |
| 35           | Running Pset bit 3       | Yes            |
| 36           | Running Job bit 0        | Yes            |
| 37           | Running Job bit 1        | Yes            |
| 38           | Running Job bit 2        | Yes            |
| 39           | Running Job bit 3        | Yes            |
| 40           | Not used                 |                |
| 41           | Not used                 |                |
| 42           | Not used                 |                |
| 43           | Not used                 |                |

| Relay number | Relay function       | Tracking event |
|--------------|----------------------|----------------|
| 44           | Line control OK      |                |
| 45           | Line control alert 1 |                |
| 46           | Line control alert 2 |                |
| 47           | Service indicator    | Yes            |
| 48           | Fieldbus relay 1     | Yes            |
| 49           | Fieldbus relay 2     | Yes            |
| 50           | Fieldbus relay 3     | Yes            |
| 51           | Fieldbus relay 4     | Yes            |
| 52           | Tool red light       | Yes            |
| 53           | Tool green light     | Yes            |
| 54           | Tool yellow light    | Yes            |
| 55           | Reserved             | Yes            |
| 56           | Reserved             | Yes            |
| 57           | Reserved             | Yes            |
| 58           | Reserved             | Yes            |
| 59           | Running Pset bit 4   | Yes            |
| 60           | Running Pset bit 5   | Yes            |
| 61           | Running Pset bit 6   | Yes            |
| 62           | Running Pset bit 7   | Yes            |
| 63           | Running Job bit 4    | Yes            |
| 64           | Running Job bit 5    | Yes            |
| 65           | Running Job bit 6    | Yes            |
| 66           | Running Job bit 7    | Yes            |
| 67           | Sync OK              |                |
| 68           | Sync NOK             |                |
| 69           | Sync spindle 1 OK    |                |
| 70           | Sync spindle 1 NOK   |                |
| 71           | Sync spindle 2 OK    |                |
| 72           | Sync spindle 2 NOK   |                |
| 73           | Sync spindle 3 OK    |                |
| 74           | Sync spindle 3 NOK   |                |
| 75           | Sync spindle 4 OK    |                |
| 76           | Sync spindle 4 NOK   |                |
| 77           | Sync spindle 5 OK    |                |
| 78           | Sync spindle 5 NOK   |                |
| 79           | Sync spindle 6 OK    |                |
| 80           | Sync spindle 6 NOK   |                |
| 81           | Sync spindle 7 OK    |                |
| 82           | Sync spindle 7 NOK   |                |
| 83           | Sync spindle 8 OK    |                |
| 84           | Sync spindle 8 NOK   |                |
| 85           | Sync spindle 9 OK    |                |

| Relay number | Relay function                | Tracking event |
|--------------|-------------------------------|----------------|
| 86           | Sync spindle 9 NOK            |                |
| 87           | Sync spindle 10 OK            |                |
| 88           | Sync spindle 10 NOK           |                |
| 89           | Reserved                      | Yes            |
| 90           | Reserved                      |                |
| 91           | Line Control Start            | Yes            |
| 92           | Job Aborted                   | Yes            |
| 93           | External controlled 1         |                |
| 94           | External controlled 2         |                |
| 95           | External controlled 3         |                |
| 96           | External controlled 4         |                |
| 97           | External controlled 5         |                |
| 98           | External controlled 6         |                |
| 99           | External controlled 7         |                |
| 100          | External controlled 8         |                |
| 101          | External controlled 9         |                |
| 102          | External controlled 10        |                |
| 103          | ToolsNet connection lost      | Yes            |
| 104          | Open Protocol connection lost | Yes            |
| 105          | FieldBus Offline              | Yes            |
| 106          | Home position                 | Yes            |
| 107          | Batch NOK                     | Yes            |
| 108          | Selected Channel in Job       | Yes            |
| 109          | Safe to disconnect tool       | Yes            |
| 110          | Running Job bit 8             | Yes            |
| 111          | Running Pset bit 8            | Yes            |
| 112          | Calibration Alarm             | Yes            |
| 113          | Cycle start                   |                |
| 114          | Low current                   |                |
| 115          | High current                  |                |
| 116          | Low PVT monitoring            |                |
| 117          | High PVT monitoring           |                |
| 118          | Low PVT selftap               |                |
| 119          | High PVT selftap              |                |
| 120          | Low tightening angle          |                |
| 121          | High tightening angle         |                |
| 122          | Identifier identified         |                |
| 123          | Identifier type 1 received    |                |
| 124          | Identifier type 2 received    |                |
| 125          | Identifier type 3 received    |                |
| 126          | Identifier type 4 received    |                |
| 127          | Reserved                      |                |

| Relay number | Relay function                    | Tracking event |
|--------------|-----------------------------------|----------------|
| 128          | Reserved                          |                |
| 129          | Ring button ack.                  |                |
| 130          | DigIn controlled 1                | Yes            |
| 131          | DigIn controlled 2                | Yes            |
| 132          | DigIn controlled 3                | Yes            |
| 133          | DigIn controlled 4                | Yes            |
| 134          | Fieldbus carried signals disabled | Yes            |
| 135          | Illuminator                       | Yes            |
| 136          | New parameter set selected        |                |
| 137          | New Job selected                  |                |
| 138          | Job OFF relay                     | Yes            |
| 139          | Logic relay 1                     | Yes            |
| 140          | Logic relay 2                     | Yes            |
| 141          | Logic relay 3                     | Yes            |
| 142          | Logic relay 4                     | Yes            |
| 143          | Max coherent NOK reached          | Yes            |
| 144          | Batch done                        | Yes            |
| 145          | Start trigger active              | Yes            |
| 146          | Reserved                          | Yes            |
| 150-250      | Reserved                          |                |
| 251          | Completed Batch bit 0             | Yes            |
| 252          | Completed Batch bit 1             | Yes            |
| 253          | Completed Batch bit 2             | Yes            |
| 254          | Completed Batch bit 3             | Yes            |
| 255          | Completed Batch bit 4             | Yes            |
| 256          | Completed Batch bit 5             | Yes            |
| 257          | Completed Batch bit 6             | Yes            |
| 258          | Reserved                          | Yes            |
| 259          | Remaining Batch bit 0             | Yes            |
| 260          | Remaining Batch bit 1             | Yes            |
| 261          | Remaining Batch bit 2             | Yes            |
| 262          | Remaining Batch bit 3             | Yes            |
| 263          | Remaining Batch bit 4             | Yes            |
| 264          | Remaining Batch bit 5             | Yes            |
| 265          | Remaining Batch bit 6             | Yes            |
| 266          | Reserved                          | Yes            |
| 267          | Reserved                          | Yes            |
| 268          | Reserved                          | Yes            |
| 269          | Reserved                          | Yes            |
| 270          | Reserved                          | Yes            |
| 271          | Reserved                          |                |
| 272          | Reserved                          | Yes            |



| Relay number | Relay function                  | Tracking event |
|--------------|---------------------------------|----------------|
| 273          | Reserved                        | Yes            |
| 274          | Reserved                        | Yes            |
| 275          | Open Protocol commands disabled | Yes            |
| 276          | Cycle abort                     |                |
| 277          | Effective loosening             |                |
| 278          | Logic relay 5                   | Yes            |
| 279          | Logic relay 6                   | Yes            |
| 280          | Logic relay 7                   | Yes            |
| 281          | Logic relay 8                   | Yes            |
| 282          | Logic relay 9                   | Yes            |
| 283          | Logic relay 10                  | Yes            |
| 284          | Lock at batch done              | Yes            |
| 285          | Reserved                        |                |
| 286          | Reserved                        |                |
| 287          | Battery low                     | Yes            |
| 288          | Battery empty                   | Yes            |
| 289          | Tool connected                  | Yes            |
| 290          | No tool connected               | Yes            |
| 291          | Reserved                        | Yes            |
| 292          | Reserved                        | Yes            |
| 293          | Function button                 | Yes            |
| 294          | Rehit                           |                |
| 295          | Tightening disabled             | Yes            |
| 296          | Loosening disabled              | Yes            |
| 297          | Positioning disabled            | Yes            |
| 298          | Motor tuning disabled           | Yes            |
| 299          | Open End tuning disabled        | Yes            |
| 300          | Tracking disabled               | Yes            |
| 301          | Reserved                        | Yes            |
| 302          | Automatic mode                  | Yes            |
| 303          | PLUS Emergency mode             | Yes            |
| 304          | Wear indicator                  | Yes            |
| 305          | Direction alert                 | Yes            |
| 306          | PLUS Bolt reworked              |                |
| 307          | Line stop                       | Yes            |
| 308          | Running pset bit 9              | Yes            |
| 309          | Active XML Result Ack           | Yes            |
| 310          | Tool in work space              | Yes            |
| 311          | Tool in product space           | Yes            |
| 312-350      | Reserved                        |                |
| 351          | Middle course trigger active    | Yes            |
| 352          | Front trigger active            | Yes            |

| Relay number | Relay function         | Tracking event |
|--------------|------------------------|----------------|
| 353          | Reverse trigger active | Yes            |

**Table 70 MID 0215 DigIn number**

| DigIn number | DigIn function             |
|--------------|----------------------------|
| 00           | Off                        |
| 01           | Reset batch                |
| 02           | Unlock tool                |
| 03           | Tool disable n.o.          |
| 04           | Tool disable n.c.          |
| 05           | Tool tightening disable    |
| 06           | Tool loosening disable     |
| 07           | Remote start puls          |
| 08           | Remote start cont.         |
| 09           | Tool start loosening       |
| 10           | Batch increment            |
| 11           | Bypass Pset                |
| 12           | Abort Job                  |
| 13           | Job off                    |
| 14           | parameter set toggle       |
| 15           | Reset relays               |
| 16           | parameter set select bit 0 |
| 17           | parameter set select bit 1 |
| 18           | parameter set select bit 2 |
| 19           | parameter set select bit 3 |
| 20           | Job select bit 0           |
| 21           | Job select bit 1           |
| 22           | Job select bit 2           |
| 23           | Job select bit 3           |
| 24           | Reserved                   |
| 25           | Reserved                   |
| 26           | Reserved                   |
| 27           | Reserved                   |
| 28           | Line control start         |
| 29           | Line control alert 1       |
| 30           | Line control alert 2       |
| 31           | Ack error message          |
| 32           | Fieldbus digin 1           |
| 33           | Fieldbus digin 2           |
| 34           | Fieldbus digin 3           |
| 35           | Fieldbus digin 4           |
| 36           | Flash tool green light     |
| 37           | Reserved                   |

| DigIN number | DigIN function                |
|--------------|-------------------------------|
| 38           | Reserved                      |
| 39           | Reserved                      |
| 40           | Reserved                      |
| 41           | Reserved                      |
| 42           | Reserved                      |
| 43           | Reserved                      |
| 44           | Reserved                      |
| 45           | parameter set select bit 4    |
| 46           | parameter set select bit 5    |
| 47           | parameter set select bit 6    |
| 48           | parameter set select bit 7    |
| 49           | Job select bit 4              |
| 50           | Job select bit 5              |
| 51           | Job select bit 6              |
| 52           | Job select bit 7              |
| 53           | Batch decrement               |
| 54           | Job restart                   |
| 55           | End of cycle                  |
| 56           | Reserved                      |
| 57           | Reserved                      |
| 58           | Reserved                      |
| 59           | Reserved                      |
| 60           | Reserved                      |
| 61           | Reserved                      |
| 62           | Click wrench 1                |
| 63           | Click wrench 2                |
| 64           | Click wrench 3                |
| 65           | Click wrench 4                |
| 66           | ID Card                       |
| 67           | Automatic mode                |
| 68           | External monitored 1          |
| 69           | External monitored 2          |
| 70           | External monitored 3          |
| 71           | External monitored 4          |
| 72           | External monitored 5          |
| 73           | External monitored 6          |
| 74           | External monitored 7          |
| 75           | External monitored 8          |
| 76           | Select next parameter set     |
| 77           | Select previous parameter set |
| 78           | Reserved                      |
| 79           | Timer enable tool             |

| DigIN number | DigIN function                   |
|--------------|----------------------------------|
| 80           | Master unlock tool               |
| 81           | ST Scan request                  |
| 82           | Disconnect tool                  |
| 83           | Job select bit 8                 |
| 84           | Parameter set select bit 8       |
| 85           | Request ST scan                  |
| 86           | Reset NOK counter                |
| 87           | Bypass identifier                |
| 88           | Reset latest identifier          |
| 89           | Reset all identifier             |
| 90           | Set home position                |
| 91           | DigOut monitored 1               |
| 92           | DigOut monitored 2               |
| 93           | DigOut monitored 3               |
| 94           | DigOut monitored 4               |
| 95           | Disable ST Scanner               |
| 96           | Disable fieldbus carried signals |
| 97           | Toggle CW/CCW                    |
| 98           | Toggle CW/CCW for next run       |
| 99           | Set CCW                          |
| 100          | Reserved                         |
| 101          | Reserved                         |
| 102          | Reserved                         |
| 103          | Reserved                         |
| 104          | Open Protocol commands disable   |
| 105          | Logic digIn 1                    |
| 106          | Logic digIn 2                    |
| 107          | Logic digIn 3                    |
| 108          | Logic digIn 4                    |
| 109          | Logic digIn 5                    |
| 110          | Logic digIn 6                    |
| 111          | Logic digIn 7                    |
| 112          | Logic digIn 8                    |
| 113          | Logic digIn 9                    |
| 114          | Logic digIn 10                   |
| 115          | Reserved                         |
| 116          | Reserved                         |
| 117          | Reserved                         |
| 118          | Reserved                         |
| 119          | Reserved                         |
| 120          | Forced CCW once                  |
| 121          | Forced CCW toggle                |

| DigIN number | DigIN function                               |
|--------------|--|
| 122          | Forced CW once                               |
| 123          | Forced CW toggle                             |
| 124          | Reserved                                     |
| 125          | Reserved                                     |
| 126          | Reserved                                     |
| 127          | Reserved                                     |
| 128          | Reserved                                     |
| 129          | Pset select bit 9                            |
| 130          | Store current tightening program in the tool |
| 131          | Active XML result send                       |
| 132          | Tool in work space                           |
| 133          | Tool in product space                        |
| 134-200      | Reserved                                     |
| 201          | Tool blue light IO controlled                |
| 202          | Tool blue light                              |
| 203          | Tool green light IO controlled               |
| 204          | Tool green light                             |
| 205          | Tool red light IO controlled                 |
| 206          | Tool red light                               |
| 207          | Tool yellow light IO controlled              |
| 208          | Tool yellow light                            |
| 209          | Tool white light IO controlled               |
| 210          | Tool white light                             |

### 5.16.8 MID 0216 Relay function subscribe

Subscribe for one single relay function. The data field consists of three ASCII digits, the relay number, which corresponds to the specific relay function. The relay numbers can be found in Table 69 above. At a subscription of a tracking event, **MID 0217 Relay function** immediately returns the current relay status to the subscriber.

MID 0216 can only subscribe for one single relay function at a time, but still, Open Protocol supports keeping several relay function subscriptions simultaneously.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, The relay function subscription already exists**

| Message part | Parameter    | Byte  | Value   |
|--------------|--------------|-------|---|
| Header       | Length       | 1-4   | 0023  |
|              | MID          | 5-8   | 0216  |
|              | Revision     | 9-11  | Range 000-001   |
|              | No Ack flag  | 12    | 0=Ack needed, 1=No ack needed   |
|              | Station ID   | 13-14 | N/A   |
|              | Spindle ID   | 15-16 | N/A   |
|              | Spare        | 17-20 | N/A   |
| Data field   | Relay number | 21-23 | Three ASCII digits, see Table 69 and add 0 before the number in the list. |
| Message end  |              | 24    | NUL   |

### 5.16.9 MID 0217 Relay function

Upload of one specific relay function status, see Table 69.

For tracking event functions, **MID 0217 Relay function**, is sent each time the relay status is changed. For relay functions which are not tracking events, the upload is sent only when the relay is set high, i.e. the data field “Relay function status” will always be 1 for such functions.

- Message sent by: Controller
- Answer: **MID 0218 Relay function acknowledge**

| Message part | Parameter           | Byte  | Value         |
|--------------|---------------------|-------|---------------|
| Header       | Length              | 1-4   | 0028          |
|              | MID                 | 5-8   | 0217          |
|              | Revision            | 9-11  | Range 000-001 |
|              | No Ack flag         | 12    | N/A           |
|              | Station ID          | 13-14 | N/A           |
|              | Spindle ID          | 15-16 | N/A           |
|              | Spare               | 17-20 | N/A           |
| Data field   | Relay no and status | 21-28 | see Table 71  |
| Message end  |                     | 29    | NUL           |

**Table 71 MID 0217 Relay no and status**

| Parameter             | Byte  | Value   |
|-----------------------|-------|---|
| Relay no              | 21-22 | 01  |
|                       | 23-25 | Three ASCII digits corresponding to a relay function. See Table 69 and add 0 before the number in the list. |
| Relay function status | 26-27 | 02  |
|                       | 28    | One ASCII digit representing the relay function status: 1=active 0=not active.                              |

### 5.16.10 MID 0218 Relay function acknowledge

Acknowledgement of relay function upload.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0218          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.16.11 MID 0219 Relay function unsubscribe

Unsubscribe for a single relay function. The data field consists of three ASCII digits, the relay number, which corresponds to the specific relay function. The relay numbers can be found in Table 69.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, The relay function subscription does not exist**

| Message part | Parameter             | Byte  | Value  |
|--------------|-----------------------|-------|--|
| Header       | Length                | 1-4   | 0023   |
|              | MID                   | 5-8   | 0219   |
|              | Revision              | 9-11  | Range 000-001  |
|              | No Ack flag           | 12    | N/A  |
|              | Station ID            | 13-14 | N/A  |
|              | Spindle ID            | 15-16 | N/A  |
|              | Spare                 | 17-20 | N/A  |
| Data field   | Relay function number | 21-23 | Number shall have three digits and left padded with zeroes if necessary, see Table 69. |
| Message end  | N/A                   | 24    | NUL  |

### 5.16.12 MID 0220 Digital input function subscribe

Subscribe for one single digital input function. The data field consists of three ASCII digits, the digital input function number. The digital input function numbers can be found in Table 70 above. At a subscription of a tracking event, **MID 0221 Digital input function upload** immediately returns the current digital input function status to the subscriber.

MID 0220 can only subscribe for one single digital input function at a time, but still, Open Protocol supports keeping several digital input function subscriptions simultaneously.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, The digital input function subscription already exists**

| Message part | Parameter                     | Byte  | Value   |
|--------------|-------------------------------|-------|---|
| Header       | Length                        | 1-4   | 0023  |
|              | MID                           | 5-8   | 0220  |
|              | Revision                      | 9-11  | Range 000-001   |
|              | No Ack flag                   | 12    | 0=Ack needed, 1=No ack needed   |
|              | Station ID                    | 13-14 | N/A   |
|              | Spindle ID                    | 15-16 | N/A   |
|              | Spare                         | 17-20 | N/A   |
| Data field   | Digital input function number | 21-23 | Three ASCII digits, see Table 70 and add 0 before the number in the list. |
| Message end  | N/A                           | 24    | NUL   |

### 5.16.13 MID 0221 Digital input function

Upload of one specific relay function status. See Table 70.



For tracking event functions, **MID 0221 Digital input function**, is sent each time the digital input function's status (state) is changed. For digital input functions which are not tracking events, the upload is sent only when the digital input function is set high, i.e. the data field "Digital input function status" will always be 1 for such functions.

- Message sent by: Controller
- Answer: **MID 0222 Digital input function upload acknowledge**

| Message part | Parameter                                | Byte  | Value                         |
|--------------|--|-------|-------------------------------|
| Header       | Length                                   | 1-4   | 0028                          |
|              | MID                                      | 5-8   | 0221                          |
|              | Revision                                 | 9-11  | Range 000-001                 |
|              | No Ack flag                              | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID                               | 13-14 | N/A                           |
|              | Spindle ID                               | 15-16 | N/A                           |
|              | Spare                                    | 17-20 | N/A                           |
| Data field   | Digital input function number and status | 21-28 | See Table 72                  |
| Message end  | N/A                                      | 29    | NUL                           |

**Table 72 MID 0221 Digital input no and status**

| Parameter                     | Byte  | Value   |
|-------------------------------|-------|---|
| Digital input function no     | 21-22 | 01  |
|                               | 23-25 | Three ASCII digits corresponding to a digital input function. See Table 70 and add 0 before the number in the list. |
| Digital input function status | 26-27 | 02  |
|                               | 28    | One ASCII digit representing the digital input function status: 1=active 0=not active.                              |

### 5.16.14 MID 0222 Digital input function acknowledge

Acknowledgement of the digital input function upload.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0222          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.16.15 MID 0223 Digital input function unsubscribe

Unsubscribe for a single digital input functions. The data field consists of three ASCII digits, the digital input function number. The digital input function numbers can be found in Table 70 above.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, The digital input function subscription does not exist**

| Message part | Parameter                     | Byte  | Value   |
|--------------|-------------------------------|-------|---|
| Header       | Length                        | 1-4   | 0023  |
|              | MID                           | 5-8   | 0223  |
|              | Revision                      | 9-11  | Range 000-001   |
|              | No Ack flag                   | 12    | N/A   |
|              | Station ID                    | 13-14 | N/A   |
|              | Spindle ID                    | 15-16 | N/A   |
|              | Spare                         | 17-20 | N/A   |
| Data field   | Digital input function number | 21-23 | Three ASCII digits, see Table 70 and add 0 before the number in the list. |
| Message end  | N/A                           | 24    | NUL   |

### 5.16.16 MID 0224 Set digital input function

Set the digital input function with the digital input number. The digital input function numbers are defined in Table 70.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Invalid data**

| Message part | Parameter                     | Byte  | Value   |
|--------------|-------------------------------|-------|---|
| Header       | Length                        | 1-4   | 0023  |
|              | MID                           | 5-8   | 0224  |
|              | Revision                      | 9-11  | Range 000-001   |
|              | No Ack flag                   | 12    | N/A   |
|              | Station ID                    | 13-14 | N/A   |
|              | Spindle ID                    | 15-16 | N/A   |
|              | Spare                         | 17-20 | N/A   |
| Data field   | Digital input function number | 21-23 | Three ASCII digits, see Table 70 and add 0 before the number in the list. |
| Message end  | N/A                           | 24    | NUL   |

### 5.16.17 MID 0225 Reset digital input function

Reset the digital input function with the digital input number. The digital input function numbers are defined in Table 70.

This MID will only affect the digital input functions of tracking type. The digital input functions with the type flank cannot be reset (for example reset the reset batch digital input function will have no effect).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Invalid data**

| Message part | Parameter                     | Byte  | Value   |
|--------------|-------------------------------|-------|---|
| Header       | Length                        | 1-4   | 0023  |
|              | MID                           | 5-8   | 0225  |
|              | Revision                      | 9-11  | Range 000-001   |
|              | No Ack flag                   | 12    | N/A   |
|              | Station ID                    | 13-14 | N/A   |
|              | Spindle ID                    | 15-16 | N/A   |
|              | Spare                         | 17-20 | N/A   |
| Data field   | Digital input function number | 21-23 | Three ASCII digits, see Table 70 and add 0 before the number in the list. |
| Message end  | N/A                           | 24    | NUL   |

## 5.17 PLC user data messages

The automatic/manual mode messages are only available for PowerMACS. This section includes a description on how the PLC user data messages are defined.

Data sent or received with a message is defined as a string of ASCII HEX characters. A string could look like “11223344” where the first byte (counted from the start of the PLC area) shall be given the value 0x11 and the second 0x22 and so on. When declaring variables in the PLC that are of width larger than one byte they are stored in BIG ENDIAN ordering.

Example 1: In the PLC, variables for input and output are setup accordingly:

**Table 73 Example 1 input**

| PLC Variable | Addr            | Data Type         |
|--------------|-----------------|-------------------|
| IN_1         | %IB 13000       | Byte              |
| IN_2         | %IW 13001-13002 | 16Bit Word (int)  |
| IN_3         | %ID 13003-13006 | 32Bit Word (dint) |
| IN_4         | %IB 13007       | Byte              |

**Table 74 Example 1 output**

| PLC Variable | Addr            | Data Type         |
|--------------|-----------------|-------------------|
| OUT_1        | %QB 13000       | Byte              |
| OUT_2        | %QW 13001-13002 | 16Bit Word (int)  |
| OUT_3        | %QD 13003-13006 | 32Bit Word (dint) |
| OUT_4        | %QB 13007       | Byte              |

Both areas occupy 8 bytes each (1 + 2 + 4 + 1) and these bytes are assigned to the variables in the following way:

Input:

|                       |                       |                       |                       |                       |                      |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|
| 13000                 | 13001                 | 13002                 | 13003                 | 13004                 | 13005                | 13006                 | 13007                 |
| IN_1                  | IN_2                  | IN_2                  | IN_3                  | IN_3                  | IN_3                 | IN_3                  | IN_4                  |
| 1:st byte in variable | 1:st byte in variable | 2:nd byte in variable | 1:st byte in variable | 2:nd byte in variable | 3:d byte in variable | 4:th byte in variable | 1:st byte in variable |

Output:

|                       |                       |                       |                       |                       |                      |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|
| 13000                 | 13001                 | 13002                 | 13003                 | 13004                 | 13005                | 13006                 | 13007                 |
| OUT_1                 | OUT_2                 | OUT_2                 | OUT_3                 | OUT_3                 | OUT_3                | OUT_3                 | OUT_4                 |
| 1:st byte in variable | 1:st byte in variable | 2:nd byte in variable | 1:st byte in variable | 2:nd byte in variable | 3:d byte in variable | 4:th byte in variable | 1:st byte in variable |

### Example Cases:

The text within quotation marks denotes the data part of the telegram in ASCII HEX.

**Case 1:** Write to PLC with **MID 0240 User data download** message.

1. Write variable IN\_1 with the value 134 (0x86 ). All other variables zero. “**86**0000000000000000”.
2. Write variable IN\_2 with the value 37567 (0x92bf). All other variables zero. “**0092bf**000000000000”.
3. Write variable IN\_3 with value 2000345 (0x1e85d9). All other variables zero. “00000000**1e85d9**00”.

4. Write variable IN\_3 with value 3000134000 (0xb2d26970). All other variables zero. "000000**b2d2697000**".
5. Write variable IN\_4 with value 255 (0xff). All other variables zero. "00000000000000**ff**".

**Case 2:** Read values of PLC variable from **MID 0240 User data** message.

1. The data "7834**fece5678a2b7**" is received.

- OUT\_1 reads 120 (0x78)
- OUT\_2 reads 13566 (0x34fe)
- OUT\_3 reads 3461773474 (0xce5678a2)
- OUT\_4 reads 183 (0xb7)

### 5.17.1 MID 0240 User data download

Used by the integrator to send user data input to the PLC.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Invalid data, or**  
**Controller is not a sync master/station controller**

|          |             |
|----------|-------------|
| 00280240 | 12345678NUL |
|----------|-------------|

| Message part | Parameter   | Byte       | Value                                       |
|--------------|-------------|------------|---|
| Header       | Length      | 1-4        | Maximum 0220                                |
|              | MID         | 5-8        | 0240  |
|              | Revision    | 9-11       | Range 000-001                               |
|              | No Ack flag | 12         | N/A   |
|              | Station ID  | 13-14      | N/A   |
|              | Spindle ID  | 15-16      | N/A   |
|              | Spare       | 17-20      | N/A   |
| Data field   | User data   | 21-max 220 | Minimum 2 and maximum 200 ASCII characters. |
| Message end  | N/A         | Length + 1 | NUL   |

### 5.17.2 MID 0241 User data subscribe

Subscribe for user data. This command will activate the **MID 0242 User data** message to be sent when a change in the user data output has been detected.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Subscription already exists, or**  
**Controller is not a sync master/station controller**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0241                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  | N/A         | 21    | NUL                           |

### 5.17.3 MID 0242 User data

This message is sent by the controller to the integrator when a change has been detected in the user data.

- Message sent by: Controller
- Answer: **MID 0243 User data acknowledge**

| Message part | Parameter   | Byte           | Value  |
|--------------|-------------|----------------|--|
| Header       | Length      | 1-4            | Maximum 0220   |
|              | MID         | 5-8            | 0242   |
|              | Revision    | 9-11           | Range 000-001  |
|              | No Ack flag | 12             | 0=Ack needed, 1=No ack needed  |
|              | Station ID  | 13-14          | N/A  |
|              | Spindle ID  | 15-16          | N/A  |
|              | Spare       | 17-20          | N/A  |
| Data field   | User data   | 21-<br>max 220 | Minimum 2 and maximum 200 ASCII characters.<br>See MID 0240 for a description. |
| Message end  | N/A         | Length +1      | NUL  |

### 5.17.4 MID 0243 User data acknowledge

Acknowledgement of user data.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0243          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.17.5 MID 0244 User data unsubscribe

Unsubscribe for the user data.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Subscription already exists**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0244          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

## 5.18 Selector messages

### 5.18.1 MID 0250 Selector socket info subscribe

Subscribe for the socket information of all socket selectors (connected to the controller). After subscription, every time a socket is lifted or put back, MID 0251 is sent to the subscriber with the device ID of the selector and the current status of each one of the sockets, lifted or not.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, The selector socket info subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0250                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         | 21-23 | N/A                           |
| Message end  | N/A         | 21    | NUL                           |

### 5.18.2 MID 0251 Selector socket info

This message is sent each time a socket is lifted or put back in position. This MID contains the device ID of the selector the information is coming from, the number of sockets of the selector device, and the current status of each socket (lifted or not lifted).

- Message sent by: Controller
- Answer: **MID 0252, Selector socket info acknowledge**

| Message part | Parameter   | Byte       | Value                             |
|--------------|-------------|------------|-----------------------------------|
| Header       | Length      | 1-4        | 10 + 1 x number of sockets, bytes |
|              | MID         | 5-8        | 0251                              |
|              | Revision    | 9-11       | Range 000-001                     |
|              | No Ack flag | 12         | 0=Ack needed, 1=No ack needed     |
|              | Station ID  | 13-14      | N/A                               |
|              | Spindle ID  | 15-16      | N/A                               |
|              | Spare       | 17-20      | N/A                               |
| Data field   | Socket data | 21-length  | See Table 75                      |
| Message end  | N/A         | Length + 1 | NUL                               |

**Table 75 MID 0251 Selector socket data**

| Parameter         | Byte                                    | Value  |
|-------------------|---|--|
| Device ID         | 21-22                                   | 01   |
|                   | 23-24                                   | Two ASCII digits corresponding to the selector device ID.<br>Range 00-99       |
| Number of sockets | 25-26                                   | 02   |
|                   | 27-28                                   | Two ASCII digits representing the selector's number of sockets.<br>Range 00-99 |
| Socket status     | 29-30                                   | 03   |
|                   | 31-<br>(+1×<br>Number<br>of<br>sockets) | 0=socket not lifted<br>1=socket lifted   |



### 5.18.3 MID 0252 Selector socket info acknowledge

Acknowledgement of the **MID 0251 Selector socket info**.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0252          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.18.4 MID 0253 Selector socket info unsubscribe

Unsubscribe for the selector socket info. The subscription is reset for all selector devices.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, The selector socket info subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0253          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.18.5 MID 0254 Selector control green lights

This message controls the selector green lights. The green light can be set (steady), reset (off) or flash. A command must be sent for each one of the selector positions (1-8).

**Note:** This MID only works when the selector is put in external controlled mode and this is only possible when the selector is loaded with software 1.20 or later.

- Message sent by: Integrator

- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Faulty IO device ID**

| Message part | Parameter    | Byte  | Value         |
|--------------|--------------|-------|---------------|
| Header       | Length       | 1-4   | 0034          |
|              | MID          | 5-8   | 0254          |
|              | Revision     | 9-11  | Range 000-001 |
|              | No Ack flag  | 12    | N/A           |
|              | Station ID   | 13-14 | N/A           |
|              | Spindle ID   | 15-16 | N/A           |
|              | Spare        | 17-20 | N/A           |
| Data field   | Green lights | 21-34 | See Table 76  |
| Message end  | N/A          | 35    | NUL           |

**Table 76 MID 0254 Selector green lights**

| Parameter                                       | Byte  | Value   |
|---|-------|---|
| Device ID                                       | 21-22 | 01  |
|   | 23-24 | Two ASCII digits corresponding to the selector device ID.<br>Range 00-99    |
| Green light<br>Command selector position<br>1-8 | 25-26 | 02  |
|   | 27-34 | For each green light, selector position 1-8.<br>0=Off, 1=steady, 2=flashing |

### 5.18.6 MID 0255 Selector control red lights

This message controls the selector red lights. The red light can be set (steady), reset (off) or flash. A command must be sent for each one of the selector positions (1-8).

**Note:** This MID only works when the selector is put in external controlled mode and this is only possible when the selector is loaded with software 1.20 or later.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Faulty IO device ID**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0034          |
|              | MID         | 5-8   | 0255          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | Red lights  | 21-34 | See Table 77  |
| Message end  | N/A         | 35    | NUL           |

Table 77 MID 0254 Selector red lights

| Parameter                        | Byte  | Value   |
|----------------------------------|-------|---|
| Device ID                        | 21-22 | 01  |
|                                  | 23-24 | Two ASCII digits corresponding to the selector device ID.<br>Range 00-99  |
| Red light                        | 25-26 | 02  |
| Command selector position<br>1-8 | 27-34 | For each red light, selector position 1-8.<br>0=Off, 1=steady, 2=flashing |

## 5.19 Tool Location System messages

This message group is only applicable if using the Tool Location System (TLS) system.

### 5.19.1 MID 0260 Tool tag ID request

Used by the integrator to request Tool tag ID information.

- Message sent by: Integrator
- Answer: **MID 0262 Tool tag ID** or  
**MID 0004 Command error, Tool tag ID unknown or MID revision unsupported.**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0260          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         | N/A   | N/A           |
| Message end  |             | 21    | NUL           |

### 5.19.2 MID 0261 Tool tag ID subscribe

Used by the integrator to order a Tool tag ID subscription from the controller.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error,**  
**Tool tag ID unknown , Tool tag ID subscription already exist or**  
**MID revision unsupported.**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0261          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         | N/A   | N/A           |
| Message end  |             | 21    | NUL           |

### 5.19.3 MID 0262 Tool tag ID

Used by the controller to send a Tool tag ID to the integrator.

- Message sent by: Controller
- Answer: **MID 0263 Tool tag ID acknowledge**
  - **None**

| Message part | Parameter   | Byte         | Value           |
|--------------|-------------|--------------|-----------------|
| Header       | Length      | 1-4          | Rev 1: 0030     |
|              | MID         | 5-8          | 0262            |
|              | Revision    | 9-11         | Range 000-001   |
|              | No Ack flag | 12           | N/A             |
|              | Station ID  | 13-14        | N/A             |
|              | Spindle ID  | 15-16        | N/A             |
|              | Spare       | 17-20        | N/A             |
| Data field   | Tool Tag Id | Rev 1: 21-30 | Rev 1: Table 78 |
| Message end  |             | Rev 1: 31    | NUL             |

**Table 78 MID 0262 TLS ST Tool Tag Identity**

| Parameter   | Byte  | Value   |
|-------------|-------|---|
| Tool tag ID | 21-22 | 01  |
|             | 23-30 | Tool tag ID.<br>The ID value has a hexadecimal representation wich should be interpreted as in the following example.<br>Example 3200078D -> 50-0-7-141 |

## 5.19.4 MID 0263 Tool tag ID acknowledge

Acknowledgement of **MID 0262 Tool tag ID**.

- Message sent by: Integrator
- Answer: **None**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0263          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         | N/A   | N/A           |
| Message end  |             | 21    | NUL           |

## 5.19.5 MID 0264 Tool tag ID unsubscribe

Used by the integrator to send a Tool tag ID unsubscription to the controller.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error,**  
**Tool tag ID subscription does not exist or**  
**MID revision unsupported.**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0264          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         | N/A   | N/A           |
| Message end  |             | 21    | NUL           |

## 5.20 Controller messages

### 5.20.1 MID 0270 Controller reboot request

This message causes the controller to reboot after it has accepted the command.

Warning 1: this MID requires **programming control** (see 4.3 Programming control).

Warning 2: the connection will be lost and will need to be reestablished after controller reboot!

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Programming control not granted**

Example: Request for controller reboot.

|          |     |
|----------|-----|
| 00200270 | NUL |
|----------|-----|

| Message part | Parameter            | Byte  | Value         |
|--------------|----------------------|-------|---------------|
| Header       | Length               | 1-4   | 0020          |
|              | MID                  | 5-8   | 0270          |
|              | Revision of MID 0270 | 9-11  | Range 000-001 |
|              | No Ack flag          | 12    | N/A           |
|              | Station ID           | 13-14 | N/A           |
|              | Spindle ID           | 15-16 | N/A           |
|              | Spare                | 17-20 | N/A           |
| Data field   | N/A                  | 0     | N/A           |
| Message end  |                      | 21    | NUL           |

## 5.21 Statistic messages

### 5.21.1 MID 0300 Histogram upload request

Request to upload a histogram from the controller for a certain parameter set.

The histogram is calculated with all the tightening results currently present in the controller's memory and within the statistic acceptance window (statistic min and max limits) for the requested parameter set.

- Message sent by: Integrator
- Answer: **MID 0301, Histogram upload reply**, or  
**MID 0004 Command error, No histogram available or Invalid data**

| Message part | Parameter                        | Byte  | Value         |
|--------------|----------------------------------|-------|---------------|
| Header       | Length                           | 1-4   | 0029          |
|              | MID                              | 5-8   | 0300          |
|              | Revision, MID 0301               | 9-11  | Range 000-001 |
|              | No Ack flag                      | 12    | N/A           |
|              | Station ID                       | 13-14 | N/A           |
|              | Spindle ID                       | 15-16 | N/A           |
|              | Spare                            | 17-20 | N/A           |
| Data field   | Parameter set and histogram type | 21-29 | See Table 79  |
| Message end  | N/A                              | 30    | NUL           |

Example: Upload torque histogram for parameter set 1.

|              |              |
|--------------|--------------|
| 002903000000 | 010010200NUL |
|--------------|--------------|

**Table 79 MID 0300 Parameter set and histogram type**

| Parameter        | Byte  | Value   |
|------------------|-------|---|
| Parameter set ID | 21-22 | 01  |
|                  | 23-25 | The parameter set ID of the requested histogram. Three ASCII digits. Range 000-999  |
| Histogram type   | 26-27 | 02  |
|                  | 28-29 | Histogram type is two bytes long and is specified by two ASCII digits.<br>00=Torque<br>01=Angle<br>02=Current<br>03=Prevail torque<br>04=Self Tap<br>05=Rundown angle |

### 5.21.2 MID 0301 Histogram upload reply

Histogram upload reply for the requested parameter set and for the requested histogram type. The histogram uploaded is made of 9 bars according to Figure 14 Histogram example.

- Message sent by: Controller
- Answer: None

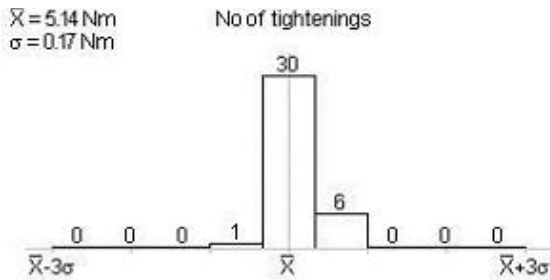


Figure 14 Histogram example

| Message part | Parameter      | Byte   | Value                         |
|--------------|----------------|--------|-------------------------------|
| Header       | Length         | 1-4    | 0107                          |
|              | MID            | 5-8    | 0301                          |
|              | Revision       | 9-11   | Range 000-001                 |
|              | No Ack flag    | 12     | N/A                           |
|              | Station ID     | 13-14  | N/A                           |
|              | Spindle ID     | 15-16  | N/A                           |
|              | Spare          | 17-20  | N/A                           |
| Data field   | Histogram data | 21-107 | See Table 80Table 80 MID 0301 |
| Message end  | N/A            | 108    | NUL                           |

Table 80 MID 0301 Histogram data

| Parameter            | Byte  | Value   |
|----------------------|-------|---|
| Parameter set ID     | 21-22 | 01  |
|                      | 23-25 | The parameter set ID of the requested histogram. Three ASCII digits. Range 000-999  |
| Histogram type       | 26-27 | 02  |
|                      | 28-29 | Histogram type is two bytes long and is specified by two ASCII digits.<br>00=Torque<br>01=Angle<br>02=Current<br>03=Prevail torque<br>04=Self Tap<br>05=Rundown angle   |
| Sigma histogram      | 30-31 | 03  |
|                      | 32-37 | Sigma for all the tightening results (within the statistic acceptance window) currently present in the memory for the parameter set requested. Sigma is multiplied by 100 and sent as an integer (2 decimals truncated). Sigma is six bytes long and is specified by six ASCII digits. Range 000000-999999. |
| Mean value histogram | 38-39 | 04  |



| Parameter   | Byte    | Value  |
|-------------|---------|--|
| (X-bar)     | 40-45   | The mean value for all the tightening results (within the statistic acceptance window) currently present in the memory for the parameter set requested. The mean value is multiplied by 100 and sent as an integer (2 decimals truncated). Mean value is six bytes long and is specified by six ASCII digits. Range 000000-999999. |
| Class range | 46-47   | 05   |
|             | 48-53   | The class range is equal to 6 sigma / 9.<br>The class range is multiplied by 100 and sent as an integer (2 decimals truncated). Mean value is six bytes long and is specified by six ASCII digits. Range 000000-999999.  |
| Bar 1       | 54-55   | 06   |
|             | 56-59   | Number of tightening in bar 1, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
| Bar 2       | 60-61   | 07   |
|             | 62-65   | Number of tightening in bar 2, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 66-67   | 08   |
| Bar 3       | 68-71   | Number of tightening in bar 3, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 72-73   | 09   |
| Bar 4       | 74-77   | Number of tightening in bar 4, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 78-79   | 10   |
| Bar 5       | 80-83   | Number of tightening in bar 5, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 84-85   | 11   |
| Bar 6       | 86-89   | Number of tightening in bar 6, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 90-91   | 12   |
| Bar 7       | 92-95   | Number of tightening in bar 7, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 96-97   | 13   |
| Bar 8       | 98-101  | Number of tightening in bar 8, four bytes long and specified as four ASCII digits. Range 0000-9999.  |
|             | 102-103 | 14   |
| Bar 9       | 104-107 | Number of tightening in bar 9, four bytes long and specified as four ASCII digits. Range 0000-9999.  |

## 5.22 Automatic/Manual mode messages

The automatic/manual mode messages are only available for PowerMACS while automatic disable settings request (MID 410) and reply (MID 411) messages exists both in Power Macs and the Power Focus controllers.

### 5.22.1 MID 0400 Automatic/Manual mode subscribe

A subscription for Automatic/Manual mode. When the mode changes the **MID 0401 Automatic/Manual mode upload** is sent to the integrator.

After a successful subscription the message **MID 0401 Automatic/Manual mode upload** with the current mode status is sent to the integrator.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Automatic/Manual mode subscribe already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0400                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  | N/A         | 21    | NUL                           |

### 5.22.2 MID 0401 Automatic/Manual mode

The operation mode in the controller has changed. The message includes the new operational mode of the controller.

- Message sent by: Controller
- Answer: **MID 0402 Automatic/Manual mode acknowledge**

| Message part | Parameter             | Byte  | Value   |
|--------------|-----------------------|-------|---|
| Header       | Length                | 1-4   | 0021  |
|              | MID                   | 5-8   | 0401  |
|              | Revision              | 9-11  | Range 000-001                                       |
|              | No Ack flag           | 12    | 0=Ack needed, 1=No ack needed                       |
|              | Station ID            | 13-14 | N/A   |
|              | Spindle ID            | 15-16 | N/A   |
|              | Spare                 | 17-20 | N/A   |
| Data field   | Manual/Automatic mode | 21    | One ASCII digit.<br>0=Automatic mode, 1=Manual mode |
| Message end  | N/A                   | 22    | NUL   |

### 5.22.3 MID 0402 Automatic/Manual mode acknowledge

Acknowledgement of automatic/manual mode upload.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0402          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.22.4 MID 0403 Automatic/Manual mode unsubscribe

Reset the subscription for the automatic/manual mode.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Automatic/Manual mode subscribe does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0403          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.22.5 MID 0410 AutoDisable settings request

Request for AutoDisable settings. This request is intended to be used while running single parameter sets with batch and does not provide batch information while running Job.

- Message sent by: Integrator
- Answer: **MID 0411 AutoDisable settings reply**

| Message part | Parameter          | Byte  | Value         |
|--------------|--------------------|-------|---------------|
| Header       | Length             | 1-4   | 0020          |
|              | MID                | 5-8   | 0410          |
|              | Revision, MID 0411 | 9-11  | Range 000-001 |
|              | No Ack flag        | 12    | N/A           |
|              | Station ID         | 13-14 | N/A           |
|              | Spindle ID         | 15-16 | N/A           |
|              | Spare              | 17-20 | N/A           |
| Data field   | N/A                |       | N/A           |
| Message end  | N/A                | 21    | NUL           |

### 5.22.6 MID 0411 AutoDisable settings reply

Information about the setting of AutoDisable tightening in the controller. Also contains information about the currently running batch.

The settings are reserved for single parameter sets with batch and are not available while running Job.

#### Power Macs use:

“OKs to disable station” is a parameter in ToolsTalk PowerMACS and specifies the number of cycles with status OK or OKR that may be run while in Automatic mode before the station is automatically disabled. It is sent as two ASCII digits, a 0 means the function is not in use.

“Current Batch” is two ASCII digits representing the number of OK cycles that have been run in the current batch. If the value is 0 no batch is running at the moment.

#### Power Focus use:

The “Current Batch” contains at which batchcounter value/tightening the parameter set batch was locked/finished if “batchcount” and “lock at batch ok” parameters in ToolsTalk PF was used, otherwise it will contain 0 indicating function not used. If “lock at batch ok” parameter was not used the “Current Batch” is just current.

The “Auto Disable” contains the parameter sets batch size if “batchcount” and “lock at batch ok” parameters was used indicating that AutoDisable function is used. If “batchcount” or “lock at batch ok” was not used the “Auto Disable” is 0.

- Message sent by: Controller
- Answer: None

| Message part       | Parameter           | Byte  | Value   |
|--------------------|---------------------|-------|---|
| Header             | Length              | 1-4   | 0020  |
|                    | MID                 | 5-8   | 0411  |
|                    | Revision            | 9-11  | Range 000-001                                       |
|                    | No Ack flag         | 12    | N/A   |
|                    | Station ID          | 13-14 | N/A   |
|                    | Spindle ID          | 15-16 | N/A   |
|                    | Spare               | 17-20 | N/A   |
| Data field, part 1 | AutoDisable setting | 21-22 | Two ASCII digits. 00= not used, <> 00=in use        |
| Data field, part 2 | Current batch       | 23-24 | Two ASCII digits. Range 00-99. 00=function not used |
| Message end        | N/A                 | 25    | NUL   |

## 5.23 Open Protocol Commands Disabled

When the **Open Protocol commands disable** digital input is active, the commands marked in column Open protocol commands in Table 4 Available messages will be rejected and the message **MID 0004 Command error, Open Protocol commands disabled** (Error 92) will be sent.

### 5.23.1 MID 0420 Open Protocol commands disabled subscribe

Set the subscription for the **Open Protocol commands disable** digital input. This command will result in transmission of the Open Protocol commands disable input status. When a subscription is set the **Open Protocol commands disable** digital input status is once uploaded (MID 0421) automatically. Thereafter, the status is uploaded each time the digital input status changes (push function).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Open Protocol commands disabled subscription already exists**

| Message part | Parameter   | Byte  | Value                         |
|--------------|-------------|-------|-------------------------------|
| Header       | Length      | 1-4   | 0020                          |
|              | MID         | 5-8   | 0420                          |
|              | Revision    | 9-11  | Range 000-001                 |
|              | No Ack flag | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID  | 13-14 | N/A                           |
|              | Spindle ID  | 15-16 | N/A                           |
|              | Spare       | 17-20 | N/A                           |
| Data field   | N/A         |       | N/A                           |
| Message end  | N/A         | 21    | NUL                           |

### 5.23.2 MID 0421 Open Protocol commands disabled

Upload the status of the **Open Protocol commands disable** digital input. The data upload consists of one byte delivering the digital input status. The status is uploaded each time the “Open Protocol commands disable” digital input changes (push function).

- Message sent by: Controller
- Answer: **MID 0422 Open Protocol commands disabled acknowledge**

| Message part | Parameter            | Byte  | Value                         |
|--------------|----------------------|-------|-------------------------------|
| Header       | Length               | 1-4   | 0021                          |
|              | MID                  | 5-8   | 0421                          |
|              | Revision             | 9-11  | Range 000-001                 |
|              | No Ack flag          | 12    | 0=Ack needed, 1=No ack needed |
|              | Station ID           | 13-14 | N/A                           |
|              | Spindle ID           | 15-16 | N/A                           |
|              | Spare                | 17-20 | N/A                           |
| Data field   | Digital input status | 21    | 1=true, 0=false               |
| Message end  | N/A                  | 22    | NUL                           |

### 5.23.3 MID 0422 Open Protocol commands disabled acknowledge

Acknowledgement of Open Protocol commands disabled upload.

- Message sent by: Integrator
- Answer: None

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0422          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

### 5.23.4 MID 0423 Open Protocol commands disabled unsubscribe

Reset the subscription for the **Open Protocol commands disabled** digital input.

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted** or  
**MID 0004 Command error, Open Protocol commands disabled**  
**subscription does not exist**

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 0423          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |

## 5.24 MID 8000, MID 8001

Reserved for Audi, see Audi Appendix.

## 5.25 Keep alive message

### 5.25.1 MID 9999 Keep alive message

The integrator sends a keep alive to the controller. The controller should only mirror and return the received keep alive to the integrator.

## All messages

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The controller has a communication timeout equal to 15s. This means that if no message has been exchanged between the integrator and the controller for the last 15s, then the controller considers the connection lost and closes it.

In order to keep the communication alive the integrator must send a keep alive to the controller with a time interval lower than 15s.

Note: An inactivity timeout is suggested to integrator i.e. if no message has been exchanged (sent or received) during the last 10s, send a keep alive.

- Message sent by: Integrator
- Answer: The same message mirrored by the controller.

| Message part | Parameter   | Byte  | Value         |
|--------------|-------------|-------|---------------|
| Header       | Length      | 1-4   | 0020          |
|              | MID         | 5-8   | 9999          |
|              | Revision    | 9-11  | Range 000-001 |
|              | No Ack flag | 12    | N/A           |
|              | Station ID  | 13-14 | N/A           |
|              | Spindle ID  | 15-16 | N/A           |
|              | Spare       | 17-20 | N/A           |
| Data field   | N/A         |       | N/A           |
| Message end  | N/A         | 21    | NUL           |



## 6 Appendix

### 6.1 PowerMACS data, names for variable identification

This section includes all variables for PowerMACS data handled by the PM result data MIDs in section 5.12.

All variable names ending with a + or – sign are high and low limits. If the name ends with Cp, Cpk or Cam it means that it is a statistical value. The first part of the name for limits and statistical values are always the same as the name of the measurement value. The following sections include:

- Bolt values
- Step values
- Special values in station data
- Special values in Bolt data
- Possible types for special values
- Formatting of error codes

#### 6.1.1 Variable names for Bolt values

The Bolt values available are listed in Table 81 and Table 82. This list will be extended as new result variables are added to the PowerMACS 4000 system.

**Note:** The Bolt variables Bolt T and Bolt A with the corresponding limits are only sent in **MID 0106 Last PowerMACS tightening result station data** and are not possible to get in **MID 0107 Last PowerMACS tightening result Bolt data**.

**Table 81 Variable names for Bolt values**

|                  |
|------------------|
| Spindle No       |
| Op Mode          |
| Failing Step No  |
| Program No       |
| Bolt A Thresh T  |
| Program Strategy |
| Mon A Chan       |
| Mon T Chan       |
| Con A Chan       |
| Con T Chan       |
| Mon Buf 1A       |
| Mon Buf 1T       |
| Mon Buf 2A       |
| Mon Buf 2T       |
| No of Steps      |

**Table 82 Measurement values**

|                     |                      |                      |
|---------------------|----------------------|----------------------|
| Bolt T 2nd          |                      |                      |
| Bolt T 2nd +        | Bolt T 2nd -         |                      |
| Bolt T Cp           | Bolt T Cpk           | Bolt T Cam           |
| Bolt T 2nd Cp       | Bolt T 2nd Cpk       | Bolt T 2nd Cam       |
| Bolt A 2nd          |                      |                      |
| Bolt A 2nd +        | Bolt A 2nd -         |                      |
| Bolt A Cp           | Bolt A Cpk           | Bolt A Cam           |
| Bolt A 2nd Cp       | Bolt A 2nd Cpk       | Bolt A 2nd Cam       |
| Bolt TR1            |                      |                      |
| Bolt TR1 2nd        |                      |                      |
| Bolt TR1 +          | Bolt TR1 -           |                      |
| Bolt TR1 2nd +      | Bolt TR1 2nd -       |                      |
| Bolt TR1 Cp         | Bolt TR1 Cpk         | Bolt TR1 Cam         |
| Bolt TR1 2nd Cp     | Bolt TR1 2nd Cpk     | Bolt TR1 2nd Cam     |
| Bolt TR2            |                      |                      |
| Bolt TR2 2nd        |                      |                      |
| Bolt TR2 +          | Bolt TR2 -           |                      |
| Bolt TR2 2nd +      | Bolt TR2 2nd -       |                      |
| Bolt TR2 Cp         | Bolt TR2 Cpk         | Bolt TR2 Cam         |
| Bolt TR2 2nd Cp     | Bolt TR2 2nd Cpk     | Bolt TR2 2nd Cam     |
| Bolt TR Dev1        |                      |                      |
| Bolt TR Dev1 2nd    |                      |                      |
| Bolt TR Dev1 +      |                      |                      |
| Bolt TR Dev1 2nd +  |                      |                      |
| Bolt TR Dev1 Cp     | Bolt TR Dev1 Cpk     | Bolt TR Dev1 Cam     |
| Bolt TR Dev1 2nd Cp | Bolt TR Dev1 2nd Cpk | Bolt TR Dev1 2nd Cam |
| Bolt TR Dev2        |                      |                      |
| Bolt TR Dev2 2nd    |                      |                      |
| Bolt TR Dev2 +      |                      |                      |
| Bolt TR Dev2 2nd +  |                      |                      |
| Bolt TR Dev2 Cp     | Bolt TR Dev2 Cpk     | Bolt TR Dev2 Cam     |
| Bolt TR Dev2 2nd Cp | Bolt TR Dev2 2nd Cpk | Bolt TR Dev2 2nd Cam |
| Bolt YP T           |                      |                      |
| Bolt YP T 2nd       |                      |                      |
| Bolt YP T +         | Bolt YP T -          |                      |
| Bolt YP T 2nd +     | Bolt YP T 2nd -      |                      |
| Bolt YP T Cp        | Bolt YP T Cpk        | Bolt YP T Cam        |
| Bolt YP T 2nd Cp    | Bolt YP T 2nd Cpk    | Bolt YP T 2nd Cam    |
| Bolt YP A           |                      |                      |
| Bolt YP A 2nd       |                      |                      |
| Bolt YP A +         | Bolt YP A -          |                      |
| Bolt YP A 2nd +     | Bolt YP A 2nd -      |                      |
| Bolt YP A Cp        | Bolt YP A Cpk        | Bolt YP A Cam        |
| Bolt YP A 2nd Cp    | Bolt YP A 2nd Cpk    | Bolt YP A 2nd Cam    |
| Bolt Max T          |                      |                      |
| Bolt Max T +        | Bolt Max T -         |                      |
| Bolt Max T Cp       | Bolt Max T Cpk       | Bolt Max T Cam       |
| Bolt Min T          |                      |                      |

|                 |                  |                  |
|-----------------|------------------|------------------|
| Bolt Min T +    | Bolt Min T -     |                  |
| Bolt Min T Cp   | Bolt Min T Cpk   | Bolt Min T Cam   |
| Bolt CC 01 T    |                  |                  |
| ...             |                  |                  |
| Bolt CC 40 T    |                  |                  |
| Bolt CC 41      |                  |                  |
| ...             |                  |                  |
| Bolt CC 80      |                  |                  |
|                 |                  |                  |
| Bolt CC 01 T +  | Bolt CC 01 T -   |                  |
| ...             |                  |                  |
| Bolt CC 40 T +  | Bolt CC 40 T -   |                  |
| Bolt CC 41 +    | Bolt CC 41 -     |                  |
| ...             |                  |                  |
| Bolt CC 80 +    | Bolt CC 80 -     |                  |
|                 |                  |                  |
| Bolt CC 01 T Cp | Bolt CC 01 T Cpk | Bolt CC 01 T Cam |
| ...             |                  |                  |
| Bolt CC 40 T Cp | Bolt CC 40 T Cpk | Bolt CC 40 T Cam |
| Bolt CC 41 Cp   | Bolt CC 41 Cpk   | Bolt CC 41 Cam   |
| ...             |                  |                  |
| Bolt CC 80 Cp   | Bolt CC 80 Cpk   | Bolt CC 80 Cam   |

## 6.1.2 Variable names for step values

At the moment the following step values are available. This list will be extended as new result variables are added to the PowerMACS 4000 system.

**Table 83 Variable names for step values**

|            |             |             |
|------------|-------------|-------------|
| Step Type  |             |             |
| Speed      |             |             |
| A Chan Con |             |             |
| T Chan Con |             |             |
| Peak T     |             |             |
| Peak T1    |             |             |
| Peak T2    |             |             |
| Peak T3    |             |             |
| Peak T +   | Peak T -    |             |
| Peak T1 +  | Peak T1 -   |             |
| Peak T2 +  | Peak T2 -   |             |
| Peak T3 +  | Peak T3 -   |             |
| Peak T Cp  | Peak T Cpk  | Peak T Cam  |
| Peak T1 Cp | Peak T1 Cpk | Peak T1 Cam |
| Peak T2 Cp | Peak T2 Cpk | Peak T2 Cam |
| Peak T3 Cp | Peak T3 Cpk | Peak T3 Cam |
| Mean T     |             |             |
| Mean T1    |             |             |
| Mean T2    |             |             |

## Appendix

|                 |                  |                  |
|-----------------|------------------|------------------|
| Mean T3         |                  |                  |
| Mean T +        | Mean T -         |                  |
| Mean T1 +       | Mean T1 -        |                  |
| Mean T2 +       | Mean T2 -        |                  |
| Mean T3 +       | Mean T3 -        |                  |
| Mean T Cp       | Mean T Cpk       | Mean T Cam       |
| Mean T1 Cp      | Mean T1 Cpk      | Mean T1 Cam      |
| Mean T2 Cp      | Mean T2 Cpk      | Mean T2 Cam      |
| Mean T3 Cp      | Mean T3 Cpk      | Mean T3 Cam      |
| DT Mean T       |                  |                  |
| DT Mean T Cp    | DT Mean T Cpk    | DT Mean T Cam    |
| DT T            |                  |                  |
| DT T Cp         | DT T Cpk         | DT T Cam         |
| A Win Hi T      |                  |                  |
| A Win Hi T1     |                  |                  |
| A Win Hi T2     |                  |                  |
| A Win Hi T3     |                  |                  |
| A Win Hi T +    | A Win Hi T -     |                  |
| A Win Hi T1 +   | A Win Hi T1 -    |                  |
| A Win Hi T2 +   | A Win Hi T2 -    |                  |
| A Win Hi T3 +   | A Win Hi T3 -    |                  |
| A Win Hi T Cp   | A Win Hi T Cpk   | A Win Hi T Cam   |
| A Win Hi T1 Cp  | A Win Hi T1 Cpk  | A Win Hi T1 Cam  |
| A Win Hi T2 Cp  | A Win Hi T2 Cpk  | A Win Hi T2 Cam  |
| A Win Hi T3 Cp  | A Win Hi T3 Cpk  | A Win Hi T3 Cam  |
| A Win Lo T      |                  |                  |
| A Win Lo T1     |                  |                  |
| A Win Lo T2     |                  |                  |
| A Win Lo T3     |                  |                  |
| A Win Lo T +    | A Win Lo T -     |                  |
| A Win Lo T1 +   | A Win Lo T1 -    |                  |
| A Win Lo T2 +   | A Win Lo T2 -    |                  |
| A Win Lo T3 +   | A Win Lo T3 -    |                  |
| A Win Lo T Cp   | A Win Lo T Cpk   | A Win Lo T Cam   |
| A Win Lo T1 Cp  | A Win Lo T1 Cpk  | A Win Lo T1 Cam  |
| A Win Lo T2 Cp  | A Win Lo T2 Cpk  | A Win Lo T2 Cam  |
| A Win Lo T3 Cp  | A Win Lo T3 Cpk  | A Win Lo T3 Cam  |
| Ti Win Hi T     |                  |                  |
| Ti Win Hi T1    |                  |                  |
| Ti Win Hi T2    |                  |                  |
| Ti Win Hi T3    |                  |                  |
| Ti Win Hi T +   | Ti Win Hi T -    |                  |
| Ti Win Hi T1 +  | Ti Win Hi T1 -   |                  |
| Ti Win Hi T2 +  | Ti Win Hi T2 -   |                  |
| Ti Win Hi T3 +  | Ti Win Hi T3 -   |                  |
| Ti Win Hi T Cp  | Ti Win Hi T Cpk  | Ti Win Hi T Cam  |
| Ti Win Hi T1 Cp | Ti Win Hi T1 Cpk | Ti Win Hi T1 Cam |
| Ti Win Hi T2 Cp | Ti Win Hi T2 Cpk | Ti Win Hi T2 Cam |
| Ti Win Hi T3 Cp | Ti Win Hi T3 Cpk | Ti Win Hi T3 Cam |

|                  |                   |                   |
|------------------|-------------------|-------------------|
| Ti Win Lo T      |                   |                   |
| Ti Win Lo T1     |                   |                   |
| Ti Win Lo T2     |                   |                   |
| Ti Win Lo T3     |                   |                   |
| Ti Win Lo T +    | Ti Win Lo T -     |                   |
| Ti Win Lo T1 +   | Ti Win Lo T1 -    |                   |
| Ti Win Lo T2 +   | Ti Win Lo T2 -    |                   |
| Ti Win Lo T3 +   | Ti Win Lo T3 -    |                   |
| Ti Win Lo T Cp   | Ti Win Lo T Cpk   | Ti Win Lo T Cam   |
| Ti Win Lo T1 Cp  | Ti Win Lo T1 Cpk  | Ti Win Lo T1 Cam  |
| Ti Win Lo T2 Cp  | Ti Win Lo T2 Cpk  | Ti Win Lo T2 Cam  |
| Ti Win Lo T3 Cp  | Ti Win Lo T3 Cpk  | Ti Win Lo T3 Cam  |
| A                |                   |                   |
| A1               |                   |                   |
| A2               |                   |                   |
| A +              | A -               |                   |
| A1 +             | A1 -              |                   |
| A2 +             | A2 -              |                   |
| A Cp             | A Cpk             | A Cam             |
| A1 Cp            | A1 Cpk            | A1 Cam            |
| A2 Cp            | A2 Cpk            | A2 Cam            |
| Time             |                   |                   |
| Time +           | Time -            |                   |
| Time Cp          | Time Cpk          | Time Cam          |
| T/T3             |                   |                   |
| T1/T3            |                   |                   |
| T2/T3            |                   |                   |
| T/T3 +           | T/T3 -            |                   |
| T1/T3 +          | T1/T3 -           |                   |
| T2/T3 +          | T2/T3 -           |                   |
| T/T3 Cp          | T/T3 Cpk          | T/T3 Cam          |
| T1/T3 Cp         | T1/T3 Cpk         | T1/T3 Cam         |
| T2/T3 Cp         | T2/T3 Cpk         | T2/T3 Cam         |
| Relax Angle      |                   |                   |
| Relax Angle Cp   | Relax Angle Cpk   | Relax Angle Cam   |
| Release Angle    |                   |                   |
| Release Angle Cp | Release Angle Cpk | Release Angle Cam |
| Tp1 Peak T       |                   |                   |
| Tp1 Peak T1      |                   |                   |
| Tp1 Peak T2      |                   |                   |
| Tp1 Peak T3      |                   |                   |
| Tp1 Peak T +     | Tp1 Peak T -      |                   |
| Tp1 Peak T1 +    | Tp1 Peak T1 -     |                   |
| Tp1 Peak T2 +    | Tp1 Peak T2 -     |                   |
| Tp1 Peak T3 +    | Tp1 Peak T3 -     |                   |
| Tp1 Peak T Cp    | Tp1 Peak T Cpk    | Tp1 Peak T Cam    |
| Tp1 Peak T1 Cp   | Tp1 Peak T1 Cpk   | Tp1 Peak T1 Cam   |
| Tp1 Peak T2 Cp   | Tp1 Peak T2 Cpk   | Tp1 Peak T2 Cam   |
| Tp1 Peak T3 Cp   | Tp1 Peak T3 Cpk   | Tp1 Peak T3 Cam   |

## Appendix

|                |                 |                 |
|----------------|-----------------|-----------------|
| TP2 Peak T     |                 |                 |
| TP2 Peak T1    |                 |                 |
| TP2 Peak T2    |                 |                 |
| TP2 Peak T3    |                 |                 |
| TP2 Peak T +   | TP2 Peak T -    |                 |
| TP2 Peak T1 +  | TP2 Peak T1 -   |                 |
| TP2 Peak T2 +  | TP2 Peak T2 -   |                 |
| TP2 Peak T3 +  | TP2 Peak T3 -   |                 |
| TP2 Peak T Cp  | TP2 Peak T Cpk  | TP2 Peak T Cam  |
| TP2 Peak T1 Cp | TP2 Peak T1 Cpk | TP2 Peak T1 Cam |
| TP2 Peak T2 Cp | TP2 Peak T2 Cpk | TP2 Peak T2 Cam |
| TP2 Peak T3 Cp | TP2 Peak T3 Cpk | TP2 Peak T3 Cam |
| TP3 Peak T     |                 |                 |
| TP3 Peak T1    |                 |                 |
| TP3 Peak T2    |                 |                 |
| TP3 Peak T3    |                 |                 |
| TP3 Peak T +   | TP3 Peak T -    |                 |
| TP3 Peak T1 +  | TP3 Peak T1 -   |                 |
| TP3 Peak T2 +  | TP3 Peak T2 -   |                 |
| TP3 Peak T3 +  | TP3 Peak T3 -   |                 |
| TP3 Peak T Cp  | TP3 Peak T Cpk  | TP3 Peak T Cam  |
| TP3 Peak T1 Cp | TP3 Peak T1 Cpk | TP3 Peak T1 Cam |
| TP3 Peak T2 Cp | TP3 Peak T2 Cpk | TP3 Peak T2 Cam |
| TP3 Peak T3 Cp | TP3 Peak T3 Cpk | TP3 Peak T3 Cam |
| YP Angle       |                 |                 |
| YP Angle1      |                 |                 |
| YP Angle2      |                 |                 |
| YP Angle +     | YP Angle -      |                 |
| YP Angle1 +    | YP Angle1 -     |                 |
| YP Angle2 +    | YP Angle2 -     |                 |
| YP Angle Cp    | YP Angle Cpk    | YP Angle Cam    |
| YP Angle1 Cp   | YP Angle1 Cpk   | YP Angle1 Cam   |
| YP Angle2 Cp   | YP Angle2 Cpk   | YP Angle2 Cam   |
| SO T           |                 |                 |
| SO T1          |                 |                 |
| SO T2          |                 |                 |
| SO T3          |                 |                 |
| SO T +         | SO T -          |                 |
| SO T1 +        | SO T1 -         |                 |
| SO T2 +        | SO T2 -         |                 |
| SO T3 +        | SO T3 -         |                 |
| SO T Cp        | SO T Cpk        | SO T Cam        |
| SO T1 Cp       | SO T1 Cpk       | SO T1 Cam       |
| SO T2 Cp       | SO T2 Cpk       | SO T2 Cam       |
| SO T3 Cp       | SO T3 Cpk       | SO T3 Cam       |
| TR T           |                 |                 |
| TR T1          |                 |                 |
| TR T2          |                 |                 |
| TR T3          |                 |                 |

|              |               |               |
|--------------|---------------|---------------|
| TR T +       | TR T -        |               |
| TR T1 +      | TR T1 -       |               |
| TR T2 +      | TR T2 -       |               |
| TR T3 +      | TR T3 -       |               |
| TR T Cp      | TR T Cpk      | TR T Cam      |
| TR T1 Cp     | TR T1 Cpk     | TR T1 Cam     |
| TR T2 Cp     | TR T2 Cpk     | TR T2 Cam     |
| TR T3 Cp     | TR T3 Cpk     | TR T3 Cam     |
| TR Dev T     |               |               |
| TR Dev T1    |               |               |
| TR Dev T2    |               |               |
| TR Dev T3    |               |               |
| TR Dev T +   |               |               |
| TR Dev T1 +  |               |               |
| TR Dev T2 +  |               |               |
| TR Dev T3 +  |               |               |
| TR Dev T Cp  | TR Dev T Cpk  | TR Dev T Cam  |
| TR Dev T1 Cp | TR Dev T1 Cpk | TR Dev T1 Cam |
| TR Dev T2 Cp | TR Dev T2 Cpk | TR Dev T2 Cam |
| TR Dev T3 Cp | TR Dev T3 Cpk | TR Dev T3 Cam |
| Grad T       |               |               |
| Grad T1      |               |               |
| Grad T2      |               |               |
| Grad T3      |               |               |
| Grad T +     | Grad T -      |               |
| Grad T1 +    | Grad T1 -     |               |
| Grad T2 +    | Grad T2 -     |               |
| Grad T3 +    | Grad T3 -     |               |
| Grad T Cp    | Grad T Cpk    | Grad T Cam    |
| Grad T1 Cp   | Grad T1 Cpk   | Grad T1 Cam   |
| Grad T2 Cp   | Grad T2 Cpk   | Grad T2 Cam   |
| Grad T3 Cp   | Grad T3 Cpk   | Grad T3 Cam   |
| Errors       |               |               |
| Step Name    |               |               |
| Delta T      |               |               |
| Delta T1     |               |               |
| Delta T2     |               |               |
| Delta T3     |               |               |
| Delta T +    | Delta T -     |               |
| Delta T1 +   | Delta T1 -    |               |
| Delta T2 +   | Delta T2 -    |               |
| Delta T3 +   | Delta T3 -    |               |
| Delta T Cp   | Delta T Cpk   | Delta T Cam   |
| Delta T1 Cp  | Delta T1 Cpk  | Delta T1 Cam  |
| Delta T2 Cp  | Delta T2 Cpk  | Delta T2 Cam  |
| Delta T3 Cp  | Delta T3 Cpk  | Delta T3 Cam  |
| Backl A      |               |               |
| Backl A1     |               |               |
| Backl A2     |               |               |

|                    |                     |                     |
|--------------------|---------------------|---------------------|
| Backl A +          | Backl A -           |                     |
| Backl A1 +         | Backl A1 -          |                     |
| Backl A2 +         | Backl A2 -          |                     |
| Backl A Cp         | Backl A Cpk         | Backl A Cam         |
| Backl A1 Cp        | Backl A1 Cpk        | Backl A1 Cam        |
| Backl A2 Cp        | Backl A2 Cpk        | Backl A2 Cam        |
| Sp ZO 1            |                     |                     |
| Sp ZO 2            |                     |                     |
| Sp ZO 1 +          | Sp ZO 1 -           |                     |
| Sp ZO 2 +          | Sp ZO 2 -           |                     |
| Sp ZO 1 Cp         | Sp ZO 1 Cpk         | Sp ZO 1 Cam         |
| Sp ZO 2 Cp         | Sp ZO 2 Cpk         | Sp ZO 2 Cam         |
| Sp ZO diff 1       |                     |                     |
| Sp ZO diff 2       |                     |                     |
| Sp ZO diff 1 +     |                     |                     |
| Sp ZO diff 2 +     |                     |                     |
| Sp ZO diff 1 Cp    | Sp ZO diff 1 Cpk    | Sp ZO diff 1 Cam    |
| Sp ZO diff 2 Cp    | Sp ZO diff 2 Cpk    | Sp ZO diff 2 Cam    |
| Sp Shunt 1         |                     |                     |
| Sp Shunt 2         |                     |                     |
| Sp Shunt 1 +       | Sp Shunt 1 -        |                     |
| Sp Shunt 2 +       | Sp Shunt 2 -        |                     |
| Sp Shunt 1 Cp      | Sp Shunt 1 Cpk      | Sp Shunt 1 Cam      |
| Sp Shunt 2 Cp      | Sp Shunt 2 Cpk      | Sp Shunt 2 Cam      |
| Sp Shunt diff 1    |                     |                     |
| Sp Shunt diff 2    |                     |                     |
| Sp Shunt diff 1 +  |                     |                     |
| Sp Shunt diff 2 +  |                     |                     |
| Sp Shunt diff 1 Cp | Sp Shunt diff 1 Cpk | Sp Shunt diff 1 Cam |
| Sp Shunt diff 2 Cp | Sp Shunt diff 2 Cpk | Sp Shunt diff 2 Cam |
| Position A         |                     |                     |
| Position A +       | Position A -        |                     |
| Position A Cp      | Position A Cpk      | Position A Cam      |
| Low spot T         |                     |                     |
| Low spot T1        |                     |                     |
| Low spot T2        |                     |                     |
| Low spot T3        |                     |                     |
| Low spot T +       | Low spot T -        |                     |
| Low spot T1 +      | Low spot T1 -       |                     |
| Low spot T2 +      | Low spot T2 -       |                     |
| Low spot T3 +      | Low spot T3 -       |                     |
| Low spot T Cp      | Low spot T Cpk      | Low spot T Cam      |
| Low spot T1 Cp     | Low spot T1 Cpk     | Low spot T1 Cam     |
| Low spot T2 Cp     | Low spot T2 Cpk     | Low spot T2 Cam     |
| Low spot T3 Cp     | Low spot T3 Cpk     | Low spot T3 Cam     |
| Null Pos A         |                     |                     |
| Half Pos A         |                     |                     |
| Peak Pos A         |                     |                     |
| Low Pos A          |                     |                     |



|               |                |                |
|---------------|----------------|----------------|
| Null Pos A Cp | Null Pos A Cpk | Null Pos A Cam |
| Half Pos A Cp | Half Pos A Cpk | Half Pos A Cam |
| Peak Pos A Cp | Peak Pos A Cpk | Peak Pos A Cam |
| Low Pos A Cp  | Low Pos A Cpk  | Low Pos A Cam  |
| Step CC 01 T  |                |                |
| ...           |                |                |
| Step CC 40 T  |                |                |
| Step CC 41    |                |                |
| ...           |                |                |
| Step CC 80    |                |                |

### 6.1.3 Special values in Station and Bolt data

At the moment the following special values are available for Station and Bolt data. This list will be extended as new result variables are added to the PowerMACS 4000 system.

This section includes a table describing the types of special values and tables listing the special values for Station and for Bolt data.

**Table 84 Special values type**

| Type | Length   | Description   |
|------|----------|---|
| I    | 10       | The value is an unsigned integer. Sent as 10 ASCII digits, possible values are 0 to 4294967295.               |
| S    | Variable | The value is a string. Sent as ASCII characters, the length of the data fits the actual length of the string. |
| T    | 19       | A time specified by 19 ASCII characters (YYYY-MM-DD:HH:MM:SS)   |
| E1   | 50       | Tightening errors   |
| E2   | 10       | Tightening warnings   |
| E3   | 3        | Compact errors 1  |
| E4   | 3        | Compact errors 2  |
| B    | 1        | A boolean value, one ASCII digit, 0 = FALSE and 1 = TRUE  |

**Table 85 Variable names for special values in Station data, MID 0106**

| Name            | Data Type |
|-----------------|-----------|
| Total           | I         |
| Total OK        | I         |
| Total NOK       | I         |
| Free Str        | S         |
| Free No 1       | I         |
| Free No 2       | I         |
| Free Str 2      | S         |
| Free Str 3      | S         |
| Data No Station | I         |
| Station QO      | I         |
| Station SA      | I         |
| Station AB      | S         |

| Name     | Data Type |
|----------|-----------|
| ID Res 1 | S         |
| ID Res 2 | S         |
| ID Res 3 | S         |
| ID Res 4 | S         |
| ID Res 5 | S         |
| ID Res 6 | S         |

**Table 86 Variable names for special values in Bolt data, MID 0107**

| Name                 | Data Type |
|----------------------|-----------|
| Total                | I         |
| Total OK             | I         |
| Total NOK            | I         |
| Total Type           | I         |
| Total Type OK        | I         |
| Total Type NOK       | I         |
| RM Errors            | E1        |
| Warnings             | E2        |
| Compact Errors       | E3        |
| Spindle Serial No    | S         |
| Compact Errors 2     | E4        |
| Program Time         | T         |
| Spindle Name         | S         |
| Customer error code  | S         |
| Spindle Art. No      | S         |
| Sp. total cycles     | I         |
| Sp. cycl since serv. | I         |
| Sp. cycl to serv.    | I         |
| Spindle Type         | S         |
| Data Missing         | B         |
| Errors               | E1        |
| Step Name            | S         |

### 6.1.4 Formatting of error codes

This section describes the types of error codes.

**Note:** For error bit definition, see the PowerMACS 4000 manual.

#### Type E1, used for errors and RM errors

This type of error codes consists of 50 bytes. It is formatted like five 10 digit decimal numbers placed side by side. In each 10 digit number 32 error bits are stored.

|              |              |              |              |            |
|--------------|--------------|--------------|--------------|------------|
| Byte 40 - 49 | Byte 30 - 39 | Byte 20 - 29 | Byte 10 - 19 | Byte 0 - 9 |
|--------------|--------------|--------------|--------------|------------|

Integer 1 = 32

Integer 3 = 1

0

## 6.2 MID limitations

This section lists MID and controller limitations.

Note that PowerMACS classic uses FFCCP protocol. See the PowerMACS user guide for more information.

This table is valid for the following releases.

|               |                        |
|---------------|------------------------|
| <b>PF4000</b> | <b>W10.3</b>           |
| <b>PF3000</b> | <b>W10.3</b>           |
| <b>PM4000</b> | <b>10.4.0</b>          |
| <b>PM</b>     | <b>5.2.8 * (FFCCP)</b> |

Table 87 MID limitations

|      |                                    | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |         |  |  |  |
|------|------------------------------------|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--|--|--|
| ID   | Description                        | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |  |  |  |
| 0001 | Communication start                | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0002 | Communication start acknowledge    | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      | X      |    | X      | X      | X      |    | X      | X      |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0003 | Communication stop                 | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0004 | Command error                      | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0005 | Command accepted                   | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0010 | Parameter set ID upload request    | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0011 | Parameter set ID upload reply      | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0012 | Parameter set data upload request  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0013 | Parameter set data upload reply    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0014 | Parameter set selected subscribe   | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0015 | Parameter set selected             | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0016 | Parameter set selected acknowledge | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |
| 0017 | Parameter set selected             | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |  |  |  |

|      |                                       | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |
|------|---------------------------------------|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--------|--------|----|
| ID   | Description                           | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |        |        |    |
|      | unsubscribe                           |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0018 | Select Parameter set                  | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0019 | Set Parameter set batch size          | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0020 | Reset Parameter set batch counter     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0021 | Lock at batch done subscribe          | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0022 | Lock at batch done upload             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0023 | Lock at batch done upload acknowledge | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0024 | Lock at batch done unsubscribe        | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0025 | Reserved                              |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0030 | Job ID upload request                 | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0031 | Job ID upload reply                   | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0032 | Job data upload request               | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0033 | Job data upload reply                 | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0034 | Job info subscribe                    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0035 | Job info                              | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0036 | Job info acknowledge                  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0037 | Job info unsubscribe                  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0038 | Select Job                            | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0039 | Job restart                           | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0040 | Tool data upload request              | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0041 | Tool data upload reply                | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0042 | Disable tool                          | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0043 | Enable tool                           | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0044 | Disconnect tool request               | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |

Appendix

|      |  | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |
|------|--|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--------|--------|----|
| ID   | Description                                  | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |        |        |    |
| 0045 | Set calibration value request                | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0046 | Set primary tool request                     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0050 | Vehicle ID number download request           | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0051 | Vehicle ID number subscribe                  | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0052 | Vehicle ID number                            | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0053 | Vehicle ID number acknowledge                | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0054 | Vehicle ID number unsubscribe                | X      | X      | X      | X  | X      | X      | X      | X  | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0060 | Last tightening result data subscribe        | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X       |        |        |    | X       | X      |        |    |
| 0061 | Last tightening result data                  | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X       |        |        |    | X       | X      |        |    |
| 0062 | Last tightening result data acknowledge      | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X       |        |        |    | X       | X      |        |    |
| 0063 | Last tightening result data unsubscribe      | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X       |        |        |    | X       | X      |        |    |
| 0064 | Old tightening result upload request         | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |         |        |        |    |         |        |        |    |
| 0065 | Old tightening result upload reply           | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |         |        |        |    |         |        |        |    |
| 0070 | Alarm subscribe                              | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0071 | Alarm  | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0072 | Alarm acknowledge                            | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0073 | Alarm unsubscribe                            | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0074 | Alarm acknowledged on controller             | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0075 | Alarm acknowledged on controller acknowledge | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0076 | Alarm status                                 | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0077 | Alarm status acknowledge                     | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0078 | Acknowledge alarm remotely on                | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |

|      |   | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |
|------|---|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--------|--------|----|
| ID   | Description                                       | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |        |        |    |
|      | controller  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0080 | Read time upload request                          | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0081 | Read time upload reply                            | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0082 | Set time  | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0090 | Multi-spindle status subscribe                    | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0091 | Multi-spindle status                              | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0092 | Multi-spindle status acknowledge                  | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0093 | Multi-spindle status unsubscribe                  | X      | X      | X      | X  | X      | X      | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0100 | Multi-spindle result subscribe                    | X      | X      | X      | X  | X      | X      | X      | X  |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0101 | Multi-spindle result                              | X      | X      | X      | X  | X      | X      | X      | X  |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0102 | Multi-spindle result acknowledge                  | X      | X      | X      | X  | X      | X      | X      | X  |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0103 | Multi-spindle result unsubscribe                  | X      | X      | X      | X  | X      | X      | X      | X  |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0105 | Last PowerMACS tightening result data subscribe   |        |        | X      |    |        |        | X      |    |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0106 | Last PowerMACS tightening result Station data     |        |        | X      |    |        |        | X      |    |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0107 | Last PowerMACS tightening result Bolt data        |        |        | X      |    |        |        | X      |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0108 | Last PowerMACS tightening result data acknowledge |        |        | X      |    |        |        | X      |    |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0109 | Last PowerMACS tightening result data unsubscribe |        |        | X      |    |        |        | X      |    |        | X      |        |    | X      |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0110 | Display user text on compact                      | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0111 | Display user text on graph                        | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0113 | Flash green light on tool                         | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0120 | Job line control info subscribe                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0121 | Job line control started                          | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |

Appendix

|      |   | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |
|------|---|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--------|--------|----|
| ID   | Description                                 | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |        |        |    |
| 0122 | Job line control alert 1                    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0123 | Job line control alert 2                    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0124 | Job line control done                       | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0125 | Job line control info acknowledge           | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0126 | Job line control info unsubscribe           | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0127 | Abort Job                                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0128 | Job batch increment                         | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0129 | Job batch decrement                         | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0130 | Job off                                     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0131 | Set Job line control start                  | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0132 | Set Job line control alert 1                | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0133 | Set Job line control alert 2                | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0140 | Execute dynamic Job request                 | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    | X       | X      |        |    |
| 0150 | Identifier download request                 | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0151 | Multiple identifiers work order subscribe   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0152 | Multiple identifiers work order             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0153 | Multiple identifiers work order acknowledge | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0154 | Multiple Identifiers work order unsubscribe | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0155 | Bypass identifier                           | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0156 | Reset latest identifier                     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0157 | Reset all identifiers                       | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0200 | Set external controlled relays              | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0210 | Status external monitored inputs subscribe  | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0211 | Status external monitored inputs            | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |



|      |  | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |
|------|--|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--------|--------|----|
| ID   | Description                                  | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |        |        |    |
| 0212 | Status external monitored inputs acknowledge | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0213 | Status external monitored inputs unsubscribe | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0214 | IO device status request                     | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0215 | IO device status reply                       | X      | X      |        |    | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0216 | Relay function subscribe                     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0217 | Relay function                               | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0218 | Relay function acknowledge                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0219 | Relay function unsubscribe                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0220 | Digital input function subscribe             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0221 | Digital input function                       | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0222 | Digital input function acknowledge           | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0223 | Digin function unsubscribe                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0224 | Set digital input function                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0225 | Reset digital input function                 | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0240 | User data download                           |        |        | X      |    |        | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0241 | User data subscribe                          |        |        | X      |    |        | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0242 | User data                                    |        |        | X      |    |        | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0243 | User data acknowledge                        |        |        | X      |    |        | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0244 | User data unsubscribe                        |        |        | X      |    |        | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0250 | Selector socket info subscribe               | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0251 | Selector socket info                         | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0252 | Selector socket info acknowledge             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0253 | Selector socket info unsubscribe             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |
| 0254 | Selector control green lights                | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |

Appendix

|      |   | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000 | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM | PF4000  | PF3000 | PM4000 | PM |  |
|------|---|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|--------|--------|--------|----|---------|--------|--------|----|---------|--------|--------|----|--|
| ID   | Description                                 | Rev 0  |        |        |    | Rev 1  |        |        |    | Rev 2  |        |        |    | Rev 3  |        |        |    | Rev 4  |        |        |    | Rev 5  |        |        |    | Rev 6  |        |        |    | Rev 998 |        |        |    | Rev 999 |        |        |    |  |
| 0255 | Selector control red lights                 | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0260 | Tool Tag ID request                         | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0261 | Tool Tag ID subscribe                       | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0262 | Tool Tag ID                                 | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0263 | Tool Tag ID acknowledge                     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0264 | Tool Tag ID unsubscribe                     | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0270 | Controller reboot request                   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0403 | Automatic/Manual mode unsubscribe           |        |        | X      | X  |        |        | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0410 | AutoDisable settings request                | X      | X      | X      | X  |        |        | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0411 | AutoDisable settings reply                  | X      | X      | X      | X  |        |        | X      | X  |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0420 | Open protocol commands disabled subscribe   | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0421 | Open protocol commands disabled             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0422 | Open protocol commands disabled acknowledge | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 0423 | Open protocol commands disabled unsubscribe | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 8000 | Audi emergency status subscribe             | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 8001 | Audi emergency status                       | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 8002 | Audi emergency status acknowledge           | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 8003 | Audi emergency status unsubscribe           | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |
| 9999 | Keep alive open protocol communication      | X      | X      |        |    | X      | X      |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |        |        |        |    |         |        |        |    |         |        |        |    |  |





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