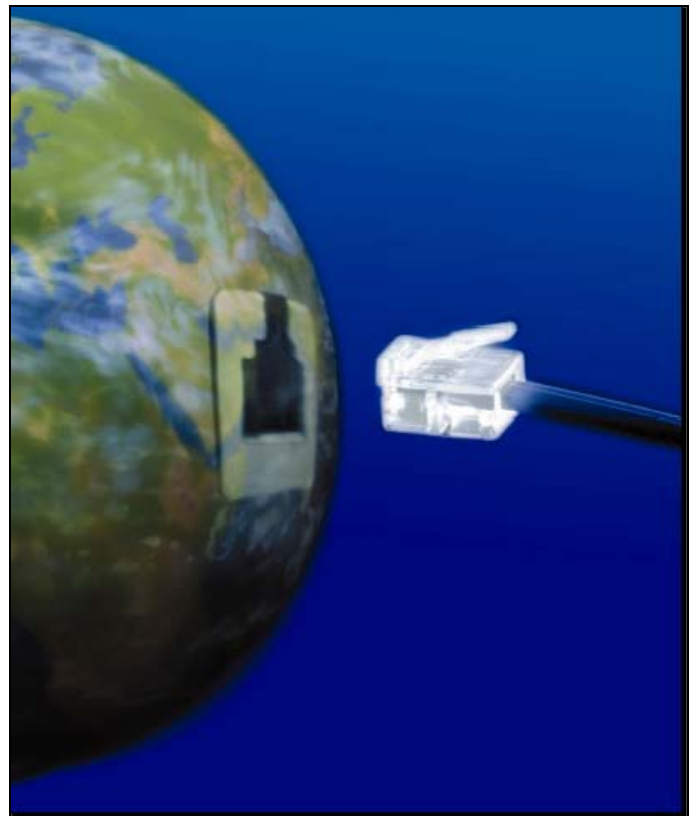


# User guide

# Open Protocol

Atlas Copco Tools and Assembly Systems

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Revision 1



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# 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.

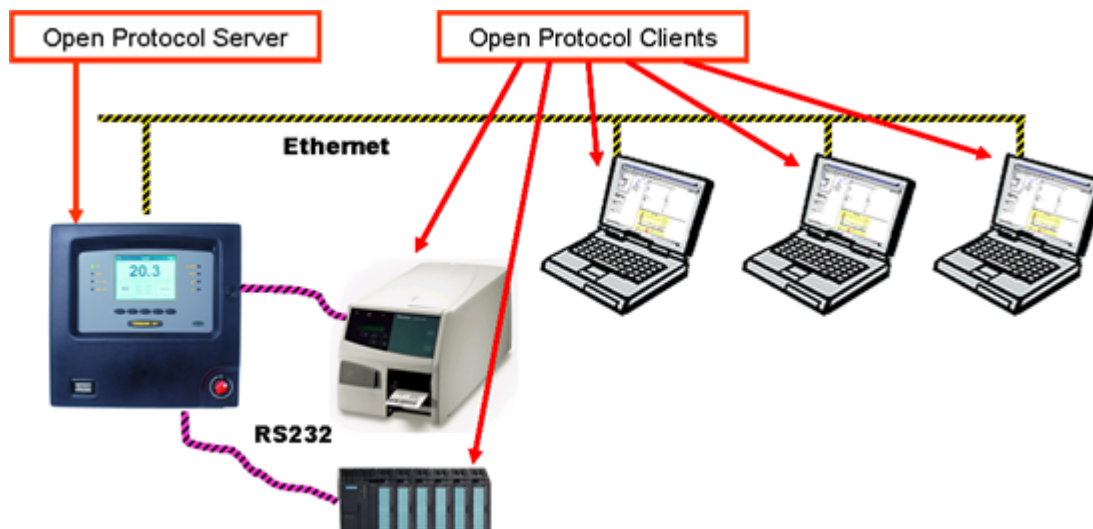


Figure 1 Open Protocol in the network, exemple

## 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.

This is the first release of this user guide. It is a development of the Power Focus Open Protocol user manual.

Apart from editorial updates and corrections, the following revisions have been made since release 7.4.

- Editorial updates to make the information more independent of type of controller
- Added MID 0105-0109, PowerMACS result data
- Added MID 0240-0244, User data
- Added MID 0220, 0221, 0222, 0223 to subscribe for digital input functions
- Added MID 0224 and 0225 to set or reset a digital input function
- Added revision 2 of MID 0038 Select Job
- Added revision 2 of MID 0031 Job ID upload reply

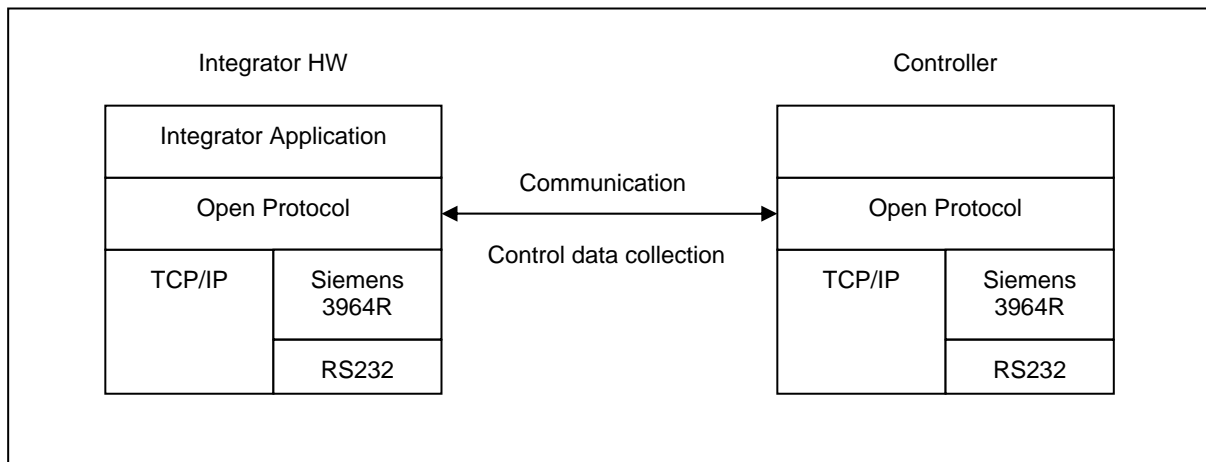
## 1.2 Terminology

The following terminology is used in this manual.

Term	Definition
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.
Controller	Open Protocol supports Power Focus, and PowerMACS controllers. See Table 68 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.
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.
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 68 for limitations.</p>

## 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).

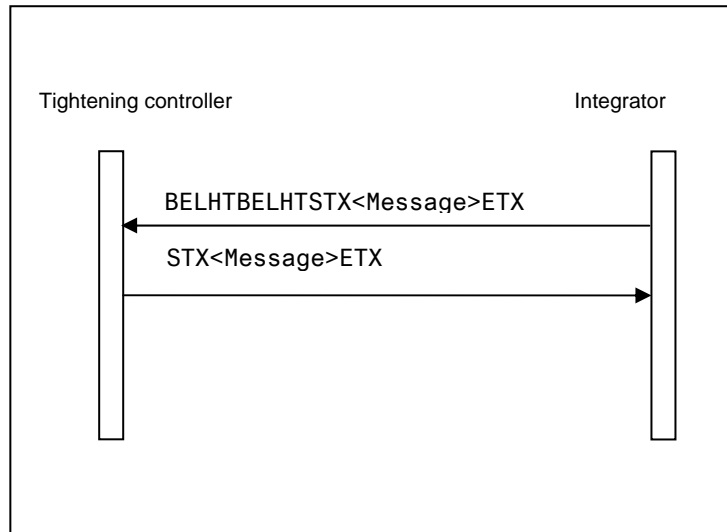


Figure 3 Serial communication protocol

### 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.

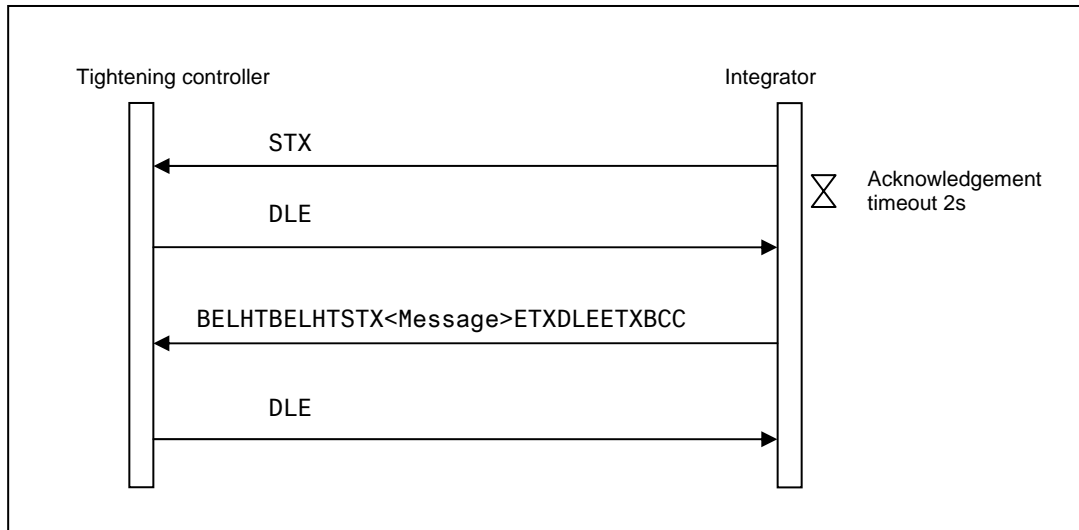
The Procedure 3964R is a transfer protocol between two systems A and B. Every time one of the systems wants to send, the following procedure is initiated.

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

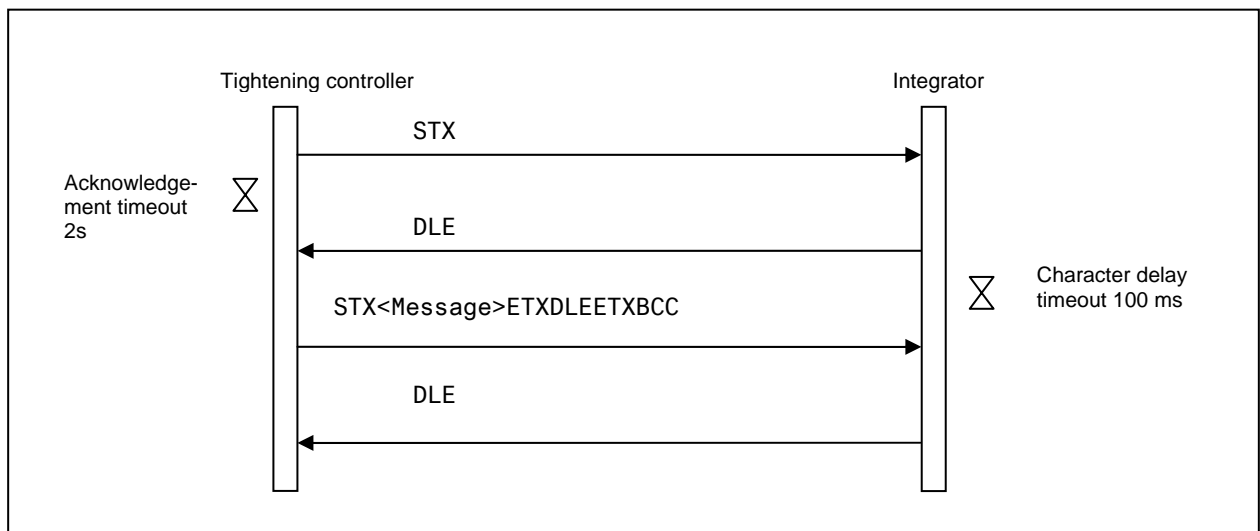
The protocol 3964R allows reliable data as the receiver must first signal to the transmitter that it is ready to receive (communication setup) and then after data interchange must acknowledge correct reception. Data integrity is ensured by an additional block check character (BCC).

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.

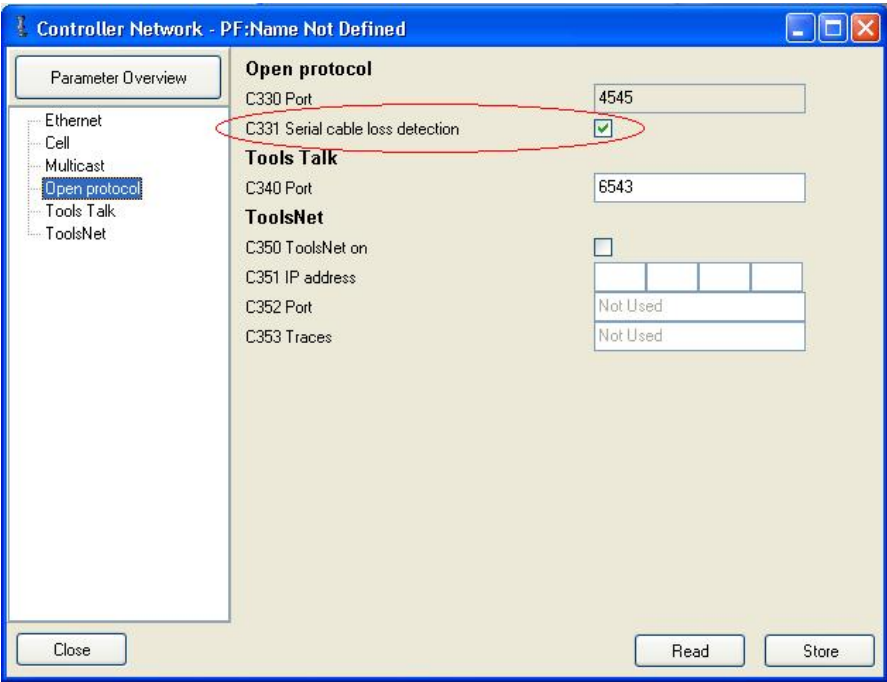



Figure 6 Power Focus Open Protocol settings

 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	01E404021031042001-06-02:10:14:26NUL
----------	--------------------------------------

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. 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'). 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. 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). If set, the controller will only push out the information required without waiting for a receive acknowledgement from the subscriber (unreliable mode).
	13	Station ID	The station the message is addressed to in the case of controller with multi-station configuration. The station ID is 1 byte long and is specified by one ASCII digit ('0'...'9'). One space is considered as station 1 (default value). Only available if not marked with N/A.
	14-15	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.
	16-20	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). ASCII digits ('0'...'9') or ASCII characters between 0x20 and 0x7F Hex. If the Parameter value is specified only by ASCII digits, then the parameter value is padded on the left with the ASCII characters '0'. 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.

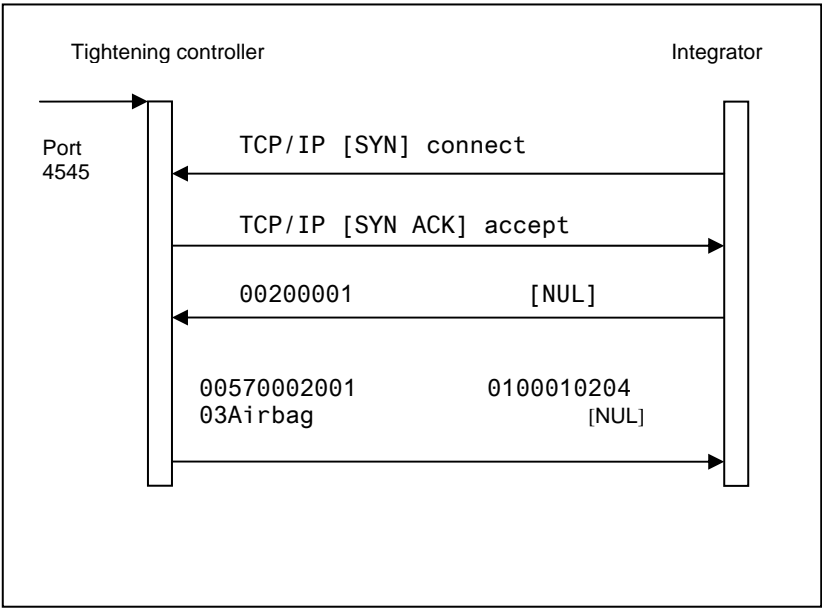
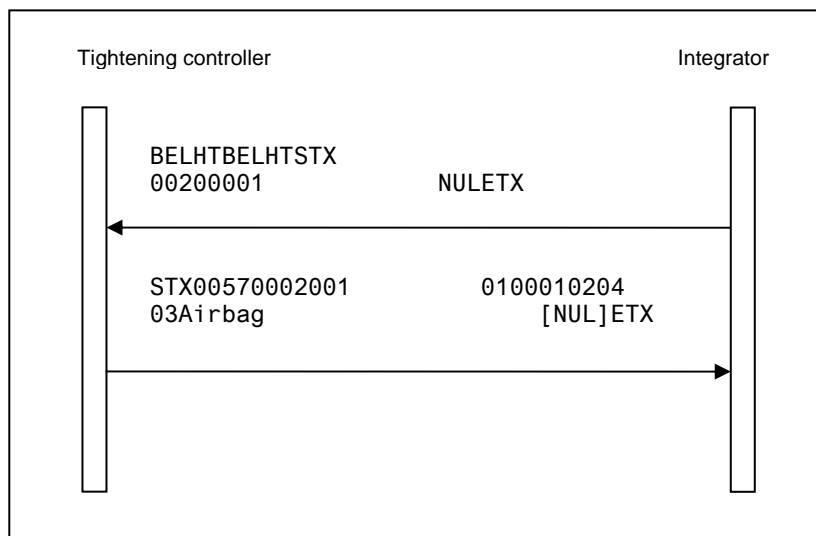


Figure 9 Ethernet connection example

### 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.

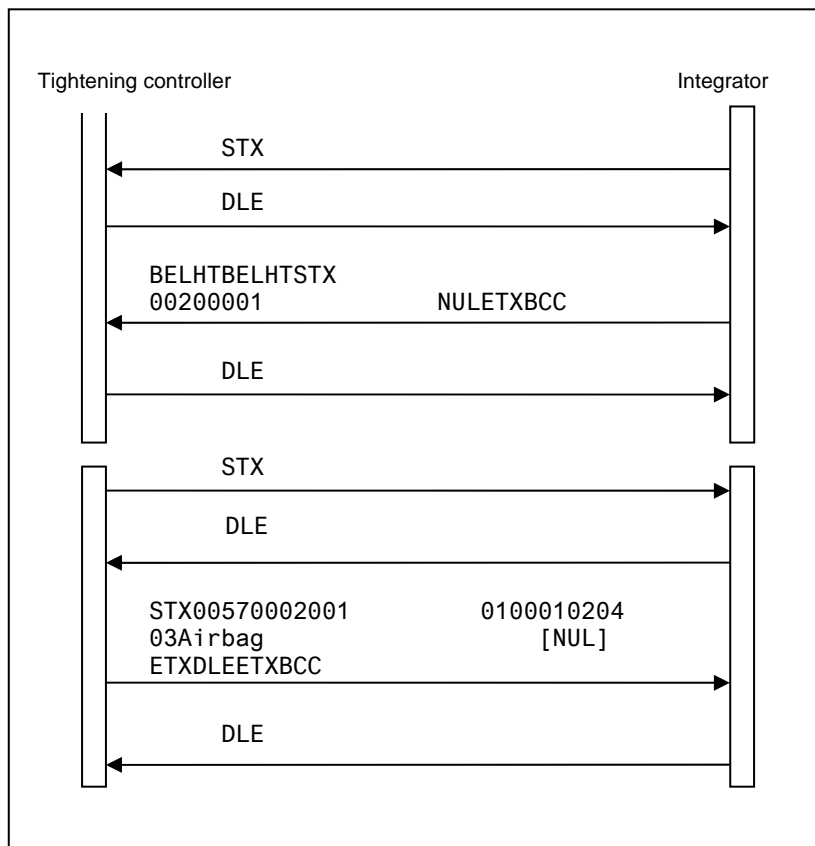


Figure 11 Serial connection with 3964R, example

## 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 21 MID 0061 Revision 1.

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

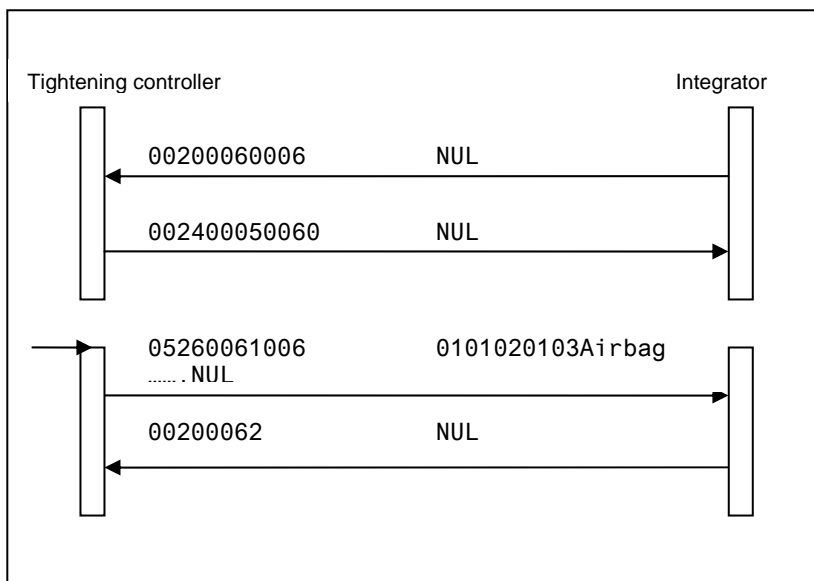


Figure 12 Starting a subscription

### 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 9 MID 0013 Parameter set data

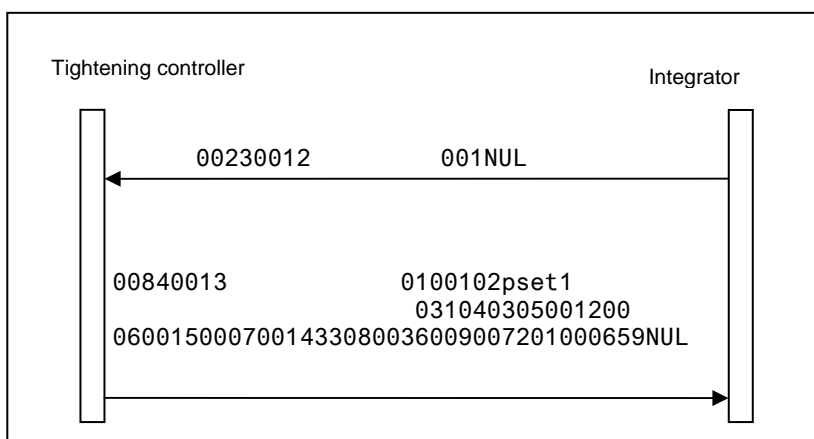


Figure 13 Sending a request

## 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 Message list

The section lists all available messages in Table 4. See Table 68 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				
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
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



ID	Description	Sent by	Request message	Request reply message	Event subscription	Events	Event Acknowledge	Open Protocol command
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
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					
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			

ID	Description	Sent by	Request message	Request reply message	Event subscription	Events	Event Acknowledge	Open Protocol command
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
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				

ID	Description	Sent by	Request message	Request reply message	Event subscription	Events	Event Acknowledge	Open Protocol command
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			
0254	Selector control green lights	Integrator						X
0255	Selector control red lights	Integrator						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			
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: 000-003
	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	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 Rev 2: 0062 Rev 3: 0125
	MID	5-8	0002
	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	Controller information	21-length	See Table 5, Table 6 and Table 7
Message end		Rev 1: 58 Rev 2: 63 Rev 3: 126	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.
Controller software version	84-85	06
	86-104	The software version is specified by 19 ASCII characters.
Tool software version	105-106	07
	107-125	The software version is specified by 19 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	N/A
	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	N/A
	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 8 Error code description.
Message end		27	NUL

**Table 8 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
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
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
58	No alarm present
59	Tool currently in use
60	No histogram available
70	Calibration failed
79	Command failed



ID	Description
80	Audi emergency status subscription exists
81	Audi emergency status subscription does not exist
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	N/A
	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	N/A
	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. 23 + number of parameter sets x3
	MID	5-8	0011
	Revision	9-11	N/A
	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	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	N/A
	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

### 5.3.4 MID 0013 Parameter set data upload reply

Upload of parameter set data reply.

- 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	N/A
	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 9 MID 0013 Parameter set data
Message end		105	NUL

**Table 9 MID 0013 Parameter set data**

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
	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.

### 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	N/A
	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	N/A
	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	N/A
	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	N/A
	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**

Message part	Parameter	Byte	Value
Header	Length	1-4	0023
	MID	5-8	0018
	Revision	9-11	N/A
	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	N/A
	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	N/A
	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

## 5.4 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 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 10 or Table 11
Message end		Length +1	NUL

**Table 10 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 11 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	N/A
	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	21-22	Two ASCII digits, range 00-99.
Message end		23	NUL

#### 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	N/A
	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. See Table 12
Message end		Length +1	NUL

**Table 12 MID 0033 Job data**

Parameter	Byte	Value
Job ID	21-22	01
	23-24	The Job ID is specified by two ASCII characters. Range: 00-99
Job name	25-26	02
	27-51	25 ASCII characters.
Forced order	52-53	03
	54	One ASCII character: 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, 0000=not used
Max time to complete Job	61-62	05

Parameter	Byte	Value
	63-67	Five ASCII digits, range 00000-99999, 00000=not used
Job batch mode/ batch count type	68-69	06
	70	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. 0=only the OK tightenings are counted 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. 0=Enable, 1=Disable, 2=Enable only on NOK tightening
Reserved	85-86	11
	87	Reserved for Job repair. One ASCII character. 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 ASCII characters, range 00-99.
Job list	92-93	13
	93- N x 12	A list of parameter sets (N=value from parameter "Number of parameter sets", max 99). Each parameter set is defined by a number of parameters separated by ":" and terminated by ";" (12 bytes) according to: [Channel-ID]:[Type-ID]:[AutoValue]:[BatchSize]; Channel-ID = two ASCII characters, range 00-99 Type ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999 Auto Value = One ASCII character, 1 or 0, 1=for Auto Next Change, BatchSize = Two ASCII characters, range 00-99 Example: 15:011:0:22;

### 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	N/A
	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
----------	--

Message part	Parameter	Byte	Value
Header	Length	1-4	0063
	MID	5-8	0035
	Revision	9-11	N/A
	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 Table 13 MID 0035 Job info
Message end		64	NUL

**Table 13 MID 0035 Job info**

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. 0=Job not completed, 1=Job OK, 2=Job NOK.
Job batch mode	28-29	03

Parameter	Byte	Value
	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 0= only the OK tightenings are counted 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 YYYY-MM-DD:HH:MM:SS.

### 5.4.7 MID 0036 Job info acknowledge

Acknowledgement of a Job info message.

- Message sent by: Controller
- Answer: None

Message part	Parameter	Byte	Value
Header	Length	1-4	0020
	MID	5-8	0036
	Revision	9-11	N/A
	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	N/A
	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 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 14 and Table 15
Message end		Rev 1: 23 Rev 2: 25	NUL

**Table 14 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 15 MID 0038 Job ID, revision 2**

Parameter	Byte	Value
Job ID	21-24	The Job ID is specified by four ASCII characters. 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	N/A
	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	21-22	Job ID represented by 2 ASCII digits, range 00-99
Message end		23	NUL

## 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: 000-002
	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		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 Revision 2: 0156
	MID	5-8	0041
	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	Tool data	21-length	See Table 16 and Table 17
Message end	N/A	Rev 1: 82 Rev 2: 157	NUL

**Table 16 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
	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	70-71	04
	72-81	10 ASCII characters



**Table 17 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: 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=STB(offline), 10=STB(online), 11=QST-tool
Motor size	127-128	09
	129-130	The motor size is specified by 2 ASCII digits, range 00-99.
Open end data	131-132	10
	133-135	The open end data is specified by 3 ASCII digits. The first digit represents the “use open end”: 1=true, 0=false. The second digit indicates the tightening direction: 0=CW, 1=CCW. 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.

### 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	N/A
	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	N/A
	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	N/A
	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	N/A
	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 18
Message end		32	NUL

Table 18 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. 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.

## 5.6 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	N/A
	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	21-45	25 ASCII characters.
Message end		46	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 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 19 and Table 20
Message end	N/A	Rev 1: 48 Rev 2: 129	NUL

**Table 19 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 20 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	N/A
	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	N/A
	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 21 MID 0061 Revision 1
- Table 22 MID 0061 Revision 2
- Table 23 MID 0061 Revision 3. Addition of parameters 47, 48 and 49
- Table 24 MID 0061 Revision 4. Addition of parameters 50, 51, and 52
- Table 25 MID 0061 Revision 5. Addition of parameter 53
- Table 26 MID 0061 Revision 6. Addition of parameters 54 and 55
- Table 27 MID 0061 Revision 998. Addition of multistage information in parameters 56, 57, and 58.
- Table 28, 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
04KPOL3456JKL0897      05000600307000008000009010011112000840
1300140014001200150007391600000170999991800000
1900000202001-06-02:09:54:09212001-05-29:12:34:3322123345675      NUL
```

Message part	Parameter	Byte	Value
Header	Length	1-4	Revision 001: 0231 Revision 002: 0385 Revision 003: 0419 Revision 004: 0500 Revision 005: 0506 Revision 006: 0526 Revision 998: variable length 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 21, Table 22, Table 23, Table 24, Table 25, Table 26, Table 27, Table 28
Message end		Rev 1: 232 Rev 2: 386 Rev 3: 420 Rev 4: 501 Rev 5: 507 Rev 6: 527 Rev 998: length +1 Rev 999: 122	NUL

**Table 21 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 22 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: 00-99
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
	98-99	The strategy currently run by the controller. It is two bytes long and specified by two ASCII digits. Range: 00-99. The corresponding strategies are : 01=Torque control, 02=Torque control / angle monitoring 03=Torque control / angle control AND 04=Angle control / torque monitoring 05=DS control, 06=DS control torque monitoring 07=Reverse angle, 08=Reverse torque 09=Click wrench, 10=Rotate spindle forward 11=Torque control angle control OR 12=Rotate spindle reverse, 13=Home position, 14=EP Monitoring, 15=Reserved, 99=No strategy
Strategy options	100-101	08

Parameter	Byte	Value
	102-106	Five bytes long bit field. Bit 0 Torque Bit 1 Angle Bit 2 Batch Bit 3 PVT Monitoring Bit 4 PVT Compensate Bit 5 Selftap Bit 6 Rundown Bit 7 CM Bit 8 DS control Bit 9 Click Wrench 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.
Batch status	122-123	12
	124	The batch status is specified by one ASCII character. 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
	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

Parameter	Byte	Value
	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
	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

Parameter	Byte	Value
	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
	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.

Parameter	Byte	Value
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. 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 23 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. 1=Nm, 2=Lbf.ft, 3=Lbf.In, 4=Kpm 5=Kgf.cm, 6=ozf.in, 7=%
Result type	416-417	49

Parameter	Byte	Value
	418-419	The result type is two bytes long and specified by two ASCII digits. 1=Tightening, 2=Loosening, 3=Batch Increment 4=Batch decrement, 5=Bypass parameter set result 6=Abort Job result, 7=Sync tightening, 8=Reference setup

**Table 24 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 25 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 26 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 Bit 2 Tool stall Bit 3 Drive hot Bit 4 Gradient monitoring high Bit 5 Gradient monitoring low Bit 6 Reaction bar failed Bit 7-32 Reserved

**Table 27 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. For each completed stage the final torque and the final angle are reported.
Stage result	535-536	58
	537-+11 x number of stage 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. 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 28 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. 0=batch NOK (batch not completed), 1=batch OK, 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.
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).



Parameter	Byte	Value
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	N/A
	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	N/A
	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 29 MID 0065 Revision 1
- Table 30 MID 0065 Revision 2
- Table 31 MID 0065 Revision 3. Addition of parameters 29 and 30
- Table 32 MID 0065 Revision 4. Addition of parameters 31, 32 and 33.
- Table 33 MID 0065 Revision 5. Addition of parameter 34
- Table 34 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 Revision 002: 0226 Revision 003: 0233 Revision 004: 0314 Revision 005: 0320 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 29, Table 30, Table 31, Table 33 MID 0065 Revision 5 , Table 33 and Table 34
Message end	Tightening data	Rev 1: 119 Rev 2: 227 Rev 3: 234 Rev 4: 315 Rev 5: 321 Rev 6: 341	NUL

Table 29 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
	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.

Parameter	Byte	Value
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 30 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
	73-74	The strategy currently run by the controller. It is two bytes long and specified by two ASCII digits. Range: 00-99. The corresponding strategies are : 01=Torque control, 02=Torque control / angle monitoring 03=Torque control / angle control AND 04=Angle control / torque monitoring 05=DS control, 06=DS control torque monitoring 07=Reverse angle, 08=Reverse torque 09=Click wrench, 10=Rotate spindle forward 11=Torque control angle control OR 12=Rotate spindle reverse, 13=Home position, 14=EP Monitoring, 15=Reserved, 99=No strategy
Strategy options	75-76	06

Parameter	Byte	Value
	77-81	Five bytes long bit field. Bit 0 Torque Bit 1 Angle Bit 2 Batch Bit 3 PVT Monitoring Bit 4 PVT Compensate Bit 5 Selftap Bit 6 Rundown Bit 7 CM Bit 8 DS control Bit 9 Click Wrench Bit 10 RBW Monitoring
Batch size	82-83	07
	84-87	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	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. 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
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

Parameter	Byte	Value
	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
	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

Parameter	Byte	Value
	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. 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	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 31 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. 1=Nm, 2=Lbf.ft, 3=Lbf.In, 4=Kpm 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. 1=Tightening, 2=Loosening, 3=Batch Increment 4=Batch decrement, 5=Bypass parameter set result 6=Abort Job result, 7=Sync tightening, 8=Reference setup

Table 32 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
	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 33 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 34 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. Bit 1 Drive deactivated Bit 2 Tool stall Bit 3 Drive hot Bit 4 Gradient monitoring high Bit 5 Gradient monitoring low Bit 6 Reaction bar failed 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	N/A
	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	N/A
	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 35
Message end	N/A	54	NUL

**Table 35 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. 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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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 36
Message end		57	NUL

**Table 36 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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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 37
Message end		Length +1	NUL

**Table 37 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. 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.
Time	32-33	03
	34-52	Time stamp. 19 ASCII characters. 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. Bytes 1-2: The first two bytes specify the spindle number in the same order as in the sync list. Range 01-99. Bytes 3-4: The next two bytes are the channel ID of the spindle. Range 01-20 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	N/A
	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	N/A
	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	N/A
	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

### 5.11.2 MID 0101 Multi-spindle result

The multi-spindle result is sent after each sync tightening. 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	N/A
	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 38
Message end		Length +1	NUL

**Table 38 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
	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	115-116	13

Parameter	Byte	Value
Target	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
	124-142	Time stamp. 19 ASCII characters (YYYY-MM-DD:HH:MM:SS).
Sync tightening ID	143-144	16
	145-149	The sync tightening ID is a unique ID for each sync tightening result. 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	150-151	17
	152	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	153-154	05
	155 - 155 + 18 x number of spindles	18 × 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
		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	N/A
	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	N/A
	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 MID's 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	N/A
	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		Rev 1: N/A Rev 2: 30	Rev 1: N/A, Rev 2: See Table 39
Message end		Rev 1: 21 Rev 1: 31	NUL

Table 39 MID 0105 Revision 2

Parameter	Byte	Value
Data No System	21-30	Data No System (see MID 0106) for the cycle data to rewind to. The first cycle data will be the cycle data <u>after</u> this point. If the data is not found, or if the value is 0, rewind will be to oldest possible cycle data.

### 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	N/A
	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 40 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. 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 0=Bolt T Low 1=Bolt T OK 2=Bolt T High If undefined, empty spaces are sent.
Angle Status	+2	16
	+1	Angle status of each Bolt, specified by one ASCII digit 0=Bolt A Low 1=Bolt A OK 2=Bolt A High If undefined, empty spaces are sent.
Bolt T	+2	17
	+7	Sent as 7 ASCII digits formatted as a float. 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". 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. 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. 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 number of special 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 66
	Byte 21-22:	Type: 2 ASCII characters, see Table 65.
	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	N/A
	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	See Table 41
Message end	N/A	Length +1	NUL

**Table 41 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. 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. Type = I, the value is formatted like 9999999 or -999999 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". 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. 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 64
		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. Type = I, the value is formatted like 9999999 or -9999999 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". 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 66
		Byte 21-22 Type: 2 ASCII characters, see Table 65.
		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	N/A
	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	N/A
	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

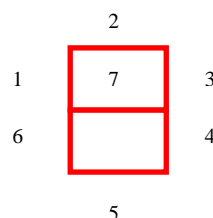
### 5.13.1 MID 0110 Display user text on compact

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	N/A
	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	N/A
	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 42
Message end		138	NUL

**Table 42 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 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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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**

Message part	Parameter	Byte	Value
Header	Length	1-4	Revision 1: 0020 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 43
Message end		Rev 1: 21 Rev 2: 30	

**Table 43 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	N/A
	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: 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	N/A
	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	N/A
	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	N/A
	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 29 MID 0065 Revision 1
- Table 45 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, 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 44 and Table 45
Message end		Length +1	NUL

**Table 44 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. 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- (57+ N x 15)	A list of parameter sets (N=value from parameter "Number of parameter sets", max 99). Each parameter set is defined by a number of parameters separated by ":" and terminated by ";" (15 bytes) according to: [Channel-ID]:[Program-ID]:[AutoSelect]:[BatchSize] :[Max Coherent NOK]; Channel ID = two ASCII characters, range 00-99 Program ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999 Auto Select = One ASCII character, 1 or 0, 1=Auto Next Change, BatchSize = Two ASCII characters, range 00-99 Max Coherent NOK = Two ASCII characters, range 00-99 Example: 15:045:0:22:02;
Forced order	+2	05
	+1	One ASCII character: 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. 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. 0=only the OK tightenings are counted 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. 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. Four ASCII digits, range 0000-9999 seconds 0000=not used
Use line control	+2	15
	+1	One ASCII character: 0=No, 1=Yes
Identifier result part 1 Result of non tightenings	+2	16
	+1	One ASCII character 0=Job VIN number, save the identifier that triggered in identifier result part 1 1=other
Result of non tightenings	+2	17
	+1	One ASCII character, save result after increment, bypass. 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

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

**Table 45 MID 0140 Dynamic Job data revision 999**

Parameter	Byte	Value
See revision 1	21-55	See revision 1
Job list	56-57	04
	58- (58 + 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: [Channel-ID]:[Program-ID]:[AutoSelect]:[BatchSize]:[Max Coherent NOK]:[Batch Counter]; Channel ID = two ASCII characters, range 00-99 Program ID = parameter set ID or Multistage ID, three ASCII characters, range 000-999 Auto Select = One ASCII character, 1 or 0, 1=Auto Next Change, BatchSize = Two ASCII characters, range 00-99 Max Coherent NOK = Two ASCII characters, range 00-99 Batch counter = Two ASCII characters, range 00-99 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	N/A
	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 80 ASCII characters
Message end		Length +1	NUL

### 5.15.2 MID 0151 Multiple identifiers work order subscribe

This message is used by the integrator to set a subscription for the identifiers received and accepted by the controller during the identifier work order. Those identifiers could have been received by the controller from several input sources (serial, Ethernet, field bus).

- Message sent by: Integrator
- Answer: **MID 0005 Command accepted or  
MID 0004 Command error, Multiple identifiers work order  
subscription already exists**

Message part	Parameter	Byte	Value
Header	Length	1-4	0020
	MID	5-8	0151
	Revision	9-11	N/A
	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 Identifiers work order

Transmission of the identifier work order status by the controller to the subscriber.

The identifier work order contains the status of the maximum four identifier parts that could be present in a work order.

- Message sent by: Controller
- Answer: **MID 0153 Multiple identifiers work order acknowledge**

Message part	Parameter	Byte	Value
Header	Length	1-4	0148
	MID	5-8	0152
	Revision	9-11	N/A
	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 46
Message end		149	NUL

**Table 46 MID 0152 Identifier data**

Parameter	Byte	Value
First identifier in work order	21-22	01
	23-52	Byte 1: Identifier type number: Range 1-4 Byte 2-3: Included in work order: 0=No, 1=Yes Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset Byte 6-30: The identifier is specified by 25 ASCII characters.

Parameter	Byte	Value
Second identifier in work order	53-54	02
	55-84	Byte 1: Identifier type number: Range 1-4 Byte 2-3: Included in work order: 0=No, 1=Yes Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset Byte 6-30: The identifier is specified by 25 ASCII characters.
Third identifier in work order	85-86	03
	87-116	Byte 1: Identifier type number: Range 1-4 Byte 2-3: Included in work order: 0=No, 1=Yes Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset Byte 6-30: The identifier is specified by 25 ASCII characters.
Fourth identifier in work order	117-118	03
	119-148	Byte 1: Identifier type number: Range 1-4 Byte 2-3: Included in work order: 0=No, 1=Yes Byte 4-5: Status in work order: 0=Not accepted, 1=Accepted, 2=Bypassed, 3=Reset Byte 6-30: The identifier is specified by 25 ASCII characters.

### 5.15.4 MID 0153 Multiple Identifiers work order acknowledge

Acknowledgement of multiple identifiers work order upload.

- Message sent by: Integrator
- Answer: None

Message part	Parameter	Byte	Value
Header	Length	1-4	0020
	MID	5-8	0153
	Revision	9-11	N/A
	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 Identifiers work order unsubscribe

Reset the subscription for the multiple identifiers work order.

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

Message part	Parameter	Byte	Value
Header	Length	1-4	0020
	MID	5-8	0154
	Revision	9-11	N/A
	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	N/A
	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	N/A
	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	N/A
	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	N/A
	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 47
Message end		31	NUL

**Table 47 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. 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. 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. 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. 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. 0=Off (reset), 1=On (set, fast), 2=Flashing, 3=Keep current status
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. 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. 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. 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. 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. 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 receive a message 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**

Message part	Parameter	Byte	Value
Header	Length	1-4	0020
	MID	5-8	0210
	Revision	9-11	N/A
	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	N/A
	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 48
Message end		29	NUL



**Table 48 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	N/A
	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	N/A
	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 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 49, Table 50, Table 51, and Table 52
Message end		length +1	NUL

See Table 51 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 49 MID 0215 Revision 1**

Parameter	Byte	Value
IO device ID	21-22	01
	23-24	The IO device ID specified with two ASCII characters. Range: 00-99.
Relay list	25-26	02
	27-58	A list of 8 relays for the current device ID. Each relay is specified by four bytes. Byte 1-3: Relay number, three ASCII characters, range 000-999 Byte 4: Relay status specified by one ASCII character; 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. Byte 1-3: Digital input number, three ASCII characters, range 000-999 Byte 4: Digital input status specified by one ASCII character. 0=Low, 1=High

**Table 50 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.
Number of relays	25-26	02
	27-28	Number of relays present on the I/O-device.
Relay list	29-30	03
	31- +4x Number of relays	A list of relays for the current device ID. Each relay is specified by four bytes. Byte 1-3: Relay number, three ASCII characters, range 000-999 Byte 4: Relay status specified by one ASCII character; 0=reset, 1=set.

Parameter	Byte	Value
Digital Input list	+2	04
	+4 x Number of digital inputs	A list of digital inputs for the current device ID. Each digital input is specified by four bytes. Byte 1-3: Digital input number, three ASCII characters, range 000-999 Byte 4: Digital input status specified by one ASCII character. 0=Low, 1=High

**Table 51 MID 0215 Relay number**

Relay number	Relay function	Tracking event
00	Off	
01	OK	
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

Relay number	Relay function	Tracking event
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	
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	

Relay number	Relay function	Tracking event
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	
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	

Relay number	Relay function	Tracking event
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	
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

Relay number	Relay function	Tracking event
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
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



Relay number	Relay function	Tracking event
304	Wear indicator	Yes

**Table 52 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

### 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 51 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	N/A
	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 51 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 51.

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	N/A
	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 53
Message end		29	NUL

**Table 53 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 51 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	N/A
	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 51.

- 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	N/A
	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	Three ASCII digits, see Table 51 and add 0 before the number in the list.
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 52 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	N/A
	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 52 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 52.

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	N/A
	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 54
Message end	N/A	29	NUL

**Table 54 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 52 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	N/A
	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 52 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	N/A
	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 52 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 52.

- 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	N/A
	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 52 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 52.

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	N/A
	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 52 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 55 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 56 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	N/A
	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	N/A
	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	N/A
	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- max 220	Minimum 2 and maximum 200 ASCII characters. 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	N/A
	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	N/A
	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	N/A
	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	N/A
	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 57
Message end	N/A	Length + 1	NUL

**Table 57 MID 0251 Selector socket data**

Parameter	Byte	Value
Device ID	21-22	01
	23-24	Two ASCII digits corresponding to the selector device ID. Range 00-99
Number of sockets	25-26	02
	27-28	Two ASCII digits representing the selector's number of sockets. Range 00-99
Socket status	29-30	03
	31- (+1x Number of sockets)	0=socket not lifted 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	N/A
	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	N/A
	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	N/A
	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 58
Message end	N/A	35	NUL

**Table 58 MID 0254 Selector green lights**

Parameter	Byte	Value
Device ID	21-22	01
	23-24	Two ASCII digits corresponding to the selector device ID. Range 00-99
Green light Command selector position 1-8	25-26	02
	27-34	For each green light, selector position 1-8. 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	N/A
	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 58
Message end	N/A	35	NUL

Table 59 MID 0254 Selector red lights

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

## 5.19 Statistic messages

### 5.19.1 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	N/A
	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 60
Message end	N/A	30	NUL

Example: Upload torque histogram for parameter set 1.

```
002900300      010010201NUL
```

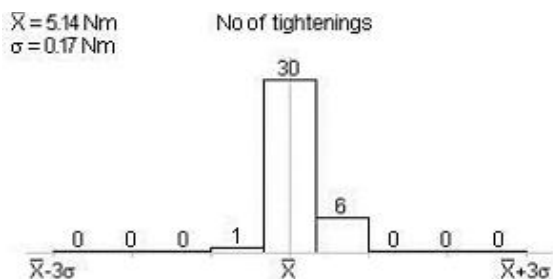
**Table 60 MID 0300 Parameter set and histogram type**

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. 00=Torque 01=Angle 02=Current 03=Prevail torque 04=Self Tap 05=Rundown angle

### 5.19.2 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	N/A
	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 61Table 61 MID 0301
Message end	N/A	108	NUL

**Table 61 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. 00=Torque 01=Angle 02=Current 03=Prevail torque 04=Self Tap 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 (X-bar)	38-39	04
	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. 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.

Parameter	Byte	Value
	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.

## 5.20 Automatic/Manual mode messages

The automatic/manual mode messages are only available for PowerMACS.

### 5.20.1 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	N/A
	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

### 5.20.2 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	N/A
	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. 0=Automatic mode, 1=Manual mode
Message end	N/A	22	NUL

### 5.20.3 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	N/A
	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

### 5.20.4 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	N/A
	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

### 5.20.5 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	N/A
	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

### 5.20.6 MID 0411 AutoDisable settings reply

Information about the setting of AutoDisable 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.

The Auto Disable setting is two ASCII digits corresponding to the setting of “OKs to disable station” in PowerMACS. If the value is 0 the function “OKs to disable station” is not used.

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.

- Message sent by: Controller
- Answer: None

Message part	Parameter	Byte	Value
Header	Length	1-4	0020
	MID	5-8	0411
	Revision	9-11	N/A
	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, 01=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

## 5.21 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.

### 5.21.1 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	N/A
	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

### 5.21.2 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	N/A
	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

### 5.21.3 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	N/A
	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

## 5.21.4 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	N/A
	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 Keep alive message

### 5.22.1 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.

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.

## All messages

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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	N/A
	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 62 and Table 63. 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 62 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 63 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

## 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 64 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		
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		

## Appendix

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
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

### 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 65 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 66 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
ID Res 1	S
ID Res 2	S
ID Res 3	S
ID Res 4	S

**Table 67 Variable names for special values in Bolt data, MID 0107**

Name	Data Type
Total	I
Total OK	I
Total NOK	I
Total Type	I



**Type E2, used for warnings**

This type of error codes consists of 10 bytes. It is formatted like one 10 digit decimal number In this number 32 error bits are stored.

Byte 0 - 9
Integer 0
Error bit 0 – 31

**Type E3, used for compact errors**

This type of error codes consists of 3 bytes. It is formatted like one 3 digit decimal number. In this number 8 error bits are stored.

Byte 0 – 2
Integer 0
Error bit 0 – 7

**Type E4, used for compact errors 2**

This type of error codes consists of 3 bytes. It is formatted like one 3 digit decimal number. In this number 8 error bits are stored.

Byte 0 – 2
Integer 0
Error bit 0 – 7

## 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>W7.5</b>
<b>PF3000</b>	<b>W7.5</b>
<b>PM4000</b>	<b>7.4.0</b>
<b>PM</b>	<b>5.2.8 * (FFCCP)</b>

Table 68 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	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																						
0002	Communication start acknowledge	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																														
0013	Parameter set data upload reply	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	X	X	X	X	X	X	X	X																												

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		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			
	acknowledge																																				
0017	Parameter set selected unsubscribe	X	X	X	X	X	X	X	X																												
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																														
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																														
0033	Job data upload reply	X	X			X	X																														
0034	Job info subscribe	X	X			X	X																														
0035	Job info	X	X			X	X																														
0036	Job info acknowledge	X	X			X	X																														
0037	Job info unsubscribe	X	X			X	X																														
0038	Select Job	X	X			X	X			X	X																										
0039	Job restart	X	X			X	X																														
0040	Tool data upload request	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																										
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																														
0045	Set calibration value 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																										

		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			
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 controller	X	X			X	X																														
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																												

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		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				
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																													
0101	Multi-spindle result	X	X	X	X	X	X	X	X																													
0102	Multi-spindle result acknowledge	X	X	X	X	X	X	X	X																													
0103	Multi-spindle result unsubscribe	X	X	X	X	X	X	X	X																													
0105	Last PowerMACS tightening result data subscribe			X				X				X																										
0106	Last PowerMACS tightening result Station data			X				X																														
0107	Last PowerMACS tightening result Bolt data			X				X																														
0108	Last PowerMACS tightening result data acknowledge			X				X																														
0109	Last PowerMACS tightening result data unsubscribe			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																															
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																															



		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			
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																														
0212	Status external monitored	X	X			X	X																														

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		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				
	inputs acknowledge																																					
0213	Status external monitored inputs unsubscribe	X	X			X	X																															
0214	IO device status request	X	X			X	X																															
0215	IO device status reply	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																															

		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				
0254	Selector control green lights	X	X			X	X																															
0255	Selector control red lights	X	X			X	X																															
0300	Histogram upload request	X	X			X	X																															
0301	Histogram upload reply	X	X			X	X																															
0400	Automatic/Manual mode subscribe	X	X	X	X	X	X	X	X																													
0401	Automatic/Manual mode	X	X	X	X	X	X	X	X																													
0402	Automatic/Manual mode acknowledge	X	X	X	X	X	X	X	X																													
0403	Automatic/Manual mode unsubscribe	X	X	X	X	X	X	X	X																													
0410	AutoDisable settings request	X	X	X	X	X	X	X	X																													
0411	AutoDisable settings reply	X	X	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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