

TEEJET CAN BUS VALVE PROTOCOL

CAN BUS VALVE PROTOCOL SHEET

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Basic operation of CAN Bus Valve:

1. CAN bus configuration: (29-bit extended identifier with bit rate of 250,000 bits/sec)
2. The first byte in a message’s data packet is the message identifier (It specifies how the data bytes should be interpreted.)
3. (0xD5) Assigned as CAN Valve Controller address and used to talk to all CAN valves on system.
4. Valve will automatically get its CAN source address on power up (range 0xD8 to 0xF7).
 - a. After getting Source Address the valves will send out the I’m Here message once a second.
 - i. Message includes Serial Number found on the outside of valve and embedded in QR code.
 - ii. Serial number format: TJVxxxxxx
 - iii. Used by operator to determine location of valve on system during system setup.

NOTE: If a new valve is added the CAN addresses of the individual valves on the system might change, so system configuration will need to be checked. System will need to keep track of valve location by using Serial Number of the I’m Here message, not the individual CAN bus source addresses.
5. Valve will try to complete last command received unless minimum or maximum limit is reached (0°, 90°, 180°, etc.) or another command is received before completion.
6. Setting valve “Opened Degrees” to 360 tells valve it can go all the way around.
 - a. This makes it a 360-Degree Valve
7. If Setting valve “Opened Degrees” to less than 360, then is should be set to 340 degrees or less, this forces the valve to stop at the Opened or Closed Degrees values.
8. Valve Direction indicated in CAN messages will reverse depending on valve opening direction, but Open will be equal to one (1) and Close will be equal to zero (0).
 - a. Valve opening direction clockwise.
 - i. Clockwise = 1
 - ii. Counterclockwise = 0
 - b. Valve opening direction counterclockwise.
 - i. Clockwise = 0
 - ii. Counterclockwise = 1

MESSAGES FROM CONTROLLER TO VALVE

Expected 29-bit identifier 0x18EFxxD5. (xx = Valve address and 0xD5 = Controller address)

Table 1: Summary of Controller to Valve Messages

Message Identifier	Description
0x00	Stop
0x01	Manual
0x02	Target Degrees
0x03	Degrees from Position
0x04	Clear Errors
0x05	Milliseconds to Run
0x10	Request Version Information
0x11	Request Position
0x12	Request Temperature
0x13	Request Voltage
0x14	Request Current
0x15	Request Degrees Per Second
0x16	Request Speed and Direction and Opening Direction
0x17	Request Run Time Seconds
0x18	Request Cycle Counts
0x93	Set or Request CAN Baud Rate

Controller to Valve Message Details

This section describes the format of data bytes in each message.

Message Identifier 0x00 (Stop)

1. Stops valve running.
2. Turns off valve drive outputs.

Offset	Length	Description
0	1	Message ID byte (0x00 – Stop)

Message Identifier 0x01 (Manual)

1. Starts valve running.
2. Sets valve speed and direction.
3. If not 360-Degree Valve:
 - a. Runs at specified Valve Speed.
 - i. Stops if Opened or Closed Degrees is reached.
4. If 360-Degree Valve:
 - a. Runs at specified valve speed.

Offset	Length	Description
0	1	Message ID byte (0x01 – Manual)
1	1	Speed percent drive: 0 = stop Range = 1% to 100%

Offset	Length	Description
2	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise

Message Identifier 0x02 (Target Degrees)

1. Starts valve running.
2. Sets valve speed and direction and Target Degree.
3. If not 360-Degree Valve:
 - a. If target is greater than Opened Degrees, target is set to Opened Degrees.
 - b. If target is less than Closed Degrees, target is set to Closed Degrees.
 - c. Valve direction is automatically picked depending on target vs valve position.
 - i. If target is greater than valve position valve rotates open.
 - ii. If target is less than valve position valve rotates closed.
4. If 360-Degree Valve:
 - a. Open or Close or Shortest Path can be used for valve direction.
 - i. If Open selected, valve runs Open until Target Degrees is reached.
 - ii. If Close selected, valve runs Close until Target Degrees is reached.
 - iii. If Shortest Path selected, valve runs Open or Close depending on minimum degrees to target.

Offset	Length	Description						
0	1	Message ID byte (0x02 – Target Degrees)						
1	1	Speed percent drive: 0 = stop Range = 1% to 100%						
2	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise						
3	2	Target Degrees (range 0 to 359.9) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Target Degree * 10 (MSB)</td> </tr> <tr> <td>2</td> <td>Target Degree * 10 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Target Degree * 10 (MSB)	2	Target Degree * 10 (LSB)
Byte	Description							
1	Target Degree * 10 (MSB)							
2	Target Degree * 10 (LSB)							

Message Identifier 0x03 (Degrees from Position)

1. Starts valve running.
2. Sets valve speed and direction and degrees to run from current valve position.
3. If not 360-Degree Valve:
 - a. Degrees to Run value (added if opening) or (subtracted if closing) from current position.
 - i. If greater than valve opened degrees, then target value is set to opened degrees.
 - ii. If less than valve closed degrees, then target value is set to closed degrees.
4. If 360-Degree Valve:
 - a. Degrees to Run value (added if opening) or (subtracted if closing) from current position without limit checking.

Offset	Length	Description						
0	1	Message ID byte (0x03 – Degrees from Position)						
1	1	Speed percent drive: 0 = stop Range = 1% to 100%						
2	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise						
3	2	Degrees to Run (range 0 to 359.9) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Target Degree * 10 (MSB)</td> </tr> <tr> <td>2</td> <td>Target Degree * 10 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Target Degree * 10 (MSB)	2	Target Degree * 10 (LSB)
Byte	Description							
1	Target Degree * 10 (MSB)							
2	Target Degree * 10 (LSB)							

Message Identifier 0x04 (Clear Errors)

1. Resets errors and stops valves.

Offset	Length	Description
0	1	Message ID byte (0x04 – Clear Errors)

Message Identifier 0x05 (Milliseconds to Run)

1. Starts valve running.
2. Sets valve speed and direction and Milliseconds to run.
3. If not 360-Degree Valve:
 - a. Runs at specified Valve Speed and Milliseconds and then shuts off.
 - i. Stops if Opened and Closed Degrees is reached first.
4. If 360-Degree Valve:
 - a. Runs at specified Valve Speed and Milliseconds and then shuts off.

Offset	Length	Description						
0	1	Message ID byte (0x05 – Milliseconds to Run)						
1	1	Speed percent drive: 0 = stop Range = 1% to 100%						
2	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise						
3	2	Milliseconds (0 - 65535) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Milliseconds (MSB)</td> </tr> <tr> <td>2</td> <td>Milliseconds (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Milliseconds (MSB)	2	Milliseconds (LSB)
Byte	Description							
1	Milliseconds (MSB)							
2	Milliseconds (LSB)							

Message Identifier 0x10 (Request Version Information)

Offset	Length	Description
0	1	Message ID byte (0x10 – Request Version Information)

Message Identifier 0x11 (Request Position)

Offset	Length	Description
0	1	Message ID byte (0x11 – Request Position)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x12 (Request Temperature)

Offset	Length	Description
0	1	Message ID byte (0x12 – Request Temperature)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x13 (Request Voltage)

Offset	Length	Description
0	1	Message ID byte (0x13 – Request Voltage)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x14 (Request Current)

Offset	Length	Description
0	1	Message ID byte (0x14 – Request Current)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x15 (Request Degrees Per Second)

Offset	Length	Description
0	1	Message ID byte (0x15 – Request Degrees Per Second)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x16 (Request Speed and Direction and Opening Direction)

Offset	Length	Description
0	1	Message ID byte (0x16 – Request Speed and Direction and Opening Direction)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x17 (Request Run Time Seconds)

Offset	Length	Description
0	1	Message ID byte (0x17 – Request Run Time Seconds)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x18 (Request Cycle Counts)

Offset	Length	Description
0	1	Message ID byte (0x18 – Request Cycle Counts)
1	1	Tenth of a second automatic message resend counter. If set to zero, then only send once.

Message Identifier 0x93 (Set or Request CAN Baud Rate)

1. Valve CAN Baud Rate (250k or 500k)

Offset	Length	Description
0	1	Message ID byte (0x93 – Set or Request CAN Baud Rate)
1	1	Value Must be 0xA5 or 0x55 to be valid test message 0xA5 = Set Value – 0x55 to Request Value
2	1	Baud Rate: 0 = 250k Baud Rate 1 = 500k Baud Rate

MESSAGES FROM VALVE TO CONTROLLER

Expected 29-bit identifier 0x18EFD5xx. (0xD5 = Controller address and xx = Valve address)

Table 2: Summary of Valve to Controller Messages

Message Identifier	Description
0x00	I Am Here
0x01	Version Information
0x02	Position
0x03	Temperature
0x04	Voltage
0x05	Run Current
0x06	Degrees Per Second
0x07	Speed and Direction and Opening Direction
0x08	Run Time Seconds
0x09	Cycle Counts
0x10	High Voltage Error
0x11	Low Voltage Error
0x12	High Current Error
0x13	Low Current Error
0x14	High Temperature Error
0x15	Minimum Degrees Per Second Error
0x93	CAN Baud Rate Reply

Valve to Controller Message Details

This section describes the data bytes in each message from the Valve to Controller.

Message Identifier 0x00 (I Am Here)

1. Message is sent once a second forever after capturing a CAN Bus address.
 - a. Used to indicate valve is still operating on CAN Bus.
2. Part Number and Serial Number:
 - a. Part Number not used for now.
 - b. Serial Number
 - c. Serial Number found on valve or read from QR code:
 - i. Helps valve to be identified by operator.
 - ii. Used to help arbitrate CAN address capture at power up.

Offset	Length	Description								
0	1	Message ID byte (0x00 – I’m Here)								
1	3	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Part Number (MSB)</td> </tr> <tr> <td>2</td> <td>Part Number</td> </tr> <tr> <td>3</td> <td>Part Number (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Part Number (MSB)	2	Part Number	3	Part Number (LSB)
		Byte	Description							
		1	Part Number (MSB)							
		2	Part Number							
3	Part Number (LSB)									
4	3	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Serial Number (MSB)</td> </tr> <tr> <td>2</td> <td>Serial Number</td> </tr> <tr> <td>3</td> <td>Serial Number (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Serial Number (MSB)	2	Serial Number	3	Serial Number (LSB)
		Byte	Description							
		1	Serial Number (MSB)							
		2	Serial Number							
3	Serial Number (LSB)									
7	1	Run Mode Flag (0 = Running Application Code 1 = Running Boot Code)								

Message Identifier 0x01 (Version Information)

1. Response to Request Version Information message.
2. Example:
 - a. Software Version Major = 1
 - b. Software Version Minor = 2
 - c. Software Version test character = 'e'
 - d. Software Version = 1.02e.

Offset	Length	Description
0	1	Message ID byte (0x01 – Version Information)
1	1	Application Software Version (Major)
2	1	Application Software Version (Minor)
3	1	Application Software Version (test character – set to 0 for released version)
4	1	Boot Loader Software Version (Major)
5	1	Boot Loader Software Version (Minor)
6	1	Boot Loader Software Version (test character – set to 0 for released version)

Message Identifier 0x02 (Position)

1. Message is automatic resend capable.

Offset	Length	Description						
0	1	Message ID byte (0x02 – Position)						
1	2	Degrees (range 0 to 359.9) adjusted for zero effect: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Target Degree * 10 (MSB)</td> </tr> <tr> <td>2</td> <td>Target Degree * 10 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Target Degree * 10 (MSB)	2	Target Degree * 10 (LSB)
Byte	Description							
1	Target Degree * 10 (MSB)							
2	Target Degree * 10 (LSB)							

Message Identifier 0x03 (Temperature)

1. Temperature range -127°C to +127°C. (8-bit integer)
2. Message is automatic resend capable.

Offset	Length	Description
0	1	Message ID byte (0x03 – Temperature)
1	1	Valve temperature in °C
2	1	Angle Sensor temperature in °C

Message Identifier 0x04 (Voltage)

1. Volts * 10 (Example: value of 120 = 12.0V)
2. Message is automatic resend capable.
3. Range 0 to 16.5 volts.

Offset	Length	Description						
0	1	Message ID byte (0x04 – Voltage)						
1	2	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Volts * 10 (MSB)</td> </tr> <tr> <td>2</td> <td>Volts * 10 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Volts * 10 (MSB)	2	Volts * 10 (LSB)
Byte	Description							
1	Volts * 10 (MSB)							
2	Volts * 10 (LSB)							

Message Identifier 0x05 (Run Current)

1. Actual Valve current * 100.
2. Last Valve Running current * 100 at 100% speed, after inrush time.
3. Message is automatic resend capable.
4. Example: value of 100 = 1.00 amps
5. These values are only calculated at 100% speed and will report 0 as default on power up.

Offset	Length	Description						
0	1	Message ID byte (0x05 – Run Current)						
1	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Actual Amps * 100 (MSB)</td> </tr> <tr> <td>2</td> <td>Actual Amps * 100 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Actual Amps * 100 (MSB)	2	Actual Amps * 100 (LSB)
		Byte	Description					
		1	Actual Amps * 100 (MSB)					
2	Actual Amps * 100 (LSB)							
3	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Last Running Amps * 100 (MSB)</td> </tr> <tr> <td>2</td> <td>Last Running Amps * 100 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Last Running Amps * 100 (MSB)	2	Last Running Amps * 100 (LSB)
		Byte	Description					
		1	Last Running Amps * 100 (MSB)					
2	Last Running Amps * 100 (LSB)							

Message Identifier 0x06 (Degrees Per Second)

1. Valve degrees per second at 100% speed, after inrush time.
 - a. Range 0 to 359 degrees per second.
2. Message is automatic resend capable.

Offset	Length	Description						
0	1	Message ID byte (0x06 – Degrees Per Second)						
1	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Degrees Per Second (MSB)</td> </tr> <tr> <td>2</td> <td>Degrees Per Second (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Degrees Per Second (MSB)	2	Degrees Per Second (LSB)
		Byte	Description					
		1	Degrees Per Second (MSB)					
2	Degrees Per Second (LSB)							
3	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise						

Message Identifier 0x07 (Speed and Direction and Opening Direction)

1. Valve Speed percent. (8-bit integer)
2. Valve Direction looking at top of valve.
3. Message is automatic resend capable.

Offset	Length	Description
0	1	Message ID byte (0x07 – Speed and Direction and Opening Direction)
1	1	Valve Speed (0 to 100%)
2	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise
3	1	Valve Opening Direction looking from the top: 0 = Counterclockwise 1 = Clockwise

Message Identifier 0x08 (Run Time Seconds)

1. Message is automatic resend capable.
2. Run time seconds are only counted when the valve is being driven, not just turned on.

Offset	Length	Description										
0	1	Message ID byte (0x08 – Run Time Seconds)										
1	4	Run Time Seconds (range 0 to 4,294,967,295) <table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Seconds (MSB)</td> </tr> <tr> <td>2</td> <td>Seconds</td> </tr> <tr> <td>3</td> <td>Seconds</td> </tr> <tr> <td>4</td> <td>Seconds (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Seconds (MSB)	2	Seconds	3	Seconds	4	Seconds (LSB)
Byte	Description											
1	Seconds (MSB)											
2	Seconds											
3	Seconds											
4	Seconds (LSB)											

Message Identifier 0x09 (Cycle Counts)

1. Message is automatic resend capable.
2. Cycle Counts are incremented each time a new run command is received.

Offset	Length	Description										
0	1	Message ID byte (0x09 – Cycle Counts)										
1	4	Run Time Seconds (range 0 to 4,294,967,295) <table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Cycle Counts (MSB)</td> </tr> <tr> <td>2</td> <td>Cycle Counts</td> </tr> <tr> <td>3</td> <td>Cycle Counts</td> </tr> <tr> <td>4</td> <td>Cycle Counts (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Cycle Counts (MSB)	2	Cycle Counts	3	Cycle Counts	4	Cycle Counts (LSB)
Byte	Description											
1	Cycle Counts (MSB)											
2	Cycle Counts											
3	Cycle Counts											
4	Cycle Counts (LSB)											

Message Identifier 0x10 (High Voltage Error)

1. Volts * 10 (Example: value of 120 = 12.0V)

Offset	Length	Description
0	1	Message ID byte (0x10 – High Voltage Error)
1	2	Byte Description
		1 Error Volts * 10 (MSB)
		2 Error Volts * 10 (LSB)
3	2	Byte Description
		1 High Volts Limit * 10 (MSB)
		2 High Volts Limit * 10 (LSB)

Message Identifier 0x11 (Low Voltage Error)

1. Volts * 10 (Example: value of 120 = 12.0V)

Offset	Length	Description
0	1	Message ID byte (0x11 – Low Voltage Error)
1	2	Byte Description
		1 Error Volts * 10 (MSB)
		2 Error Volts * 10 (LSB)
3	2	Byte Description
		1 Low Volts Limit * 10 (MSB)
		2 Low Volts Limit * 10 (LSB)

Message Identifier 0x12 (High Current Error)

1. Amps * 100 (Example: value of 150 = 1.5amps).

a. Measured at 100% speed after inrush time.

Offset	Length	Description
0	1	Message ID byte (0x12 – High Current Error)
1	2	Byte Description
		1 Error Amps * 100 (MSB)
		2 Error Amps * 100 (LSB)
3	2	Byte Description
		1 High Amps Limit * 100 (MSB)
		2 High Amps Limit * 100 (LSB)

Message Identifier 0x13 (Low Current Error)

1. Amps * 100 (Example: value of 150 = 1.5amps).
 - a. Measured at 100% speed after inrush time.

Offset	Length	Description						
0	1	Message ID byte (0x13 – Low Current Error)						
1	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Error Amps * 100 (MSB)</td> </tr> <tr> <td>2</td> <td>Error Amps * 100 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Error Amps * 100 (MSB)	2	Error Amps * 100 (LSB)
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		1	Error Amps * 100 (MSB)					
2	Error Amps * 100 (LSB)							
3	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low Amps Limit * 100 (MSB)</td> </tr> <tr> <td>2</td> <td>Low Amps Limit * 100 (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Low Amps Limit * 100 (MSB)	2	Low Amps Limit * 100 (LSB)
		Byte	Description					
		1	Low Amps Limit * 100 (MSB)					
2	Low Amps Limit * 100 (LSB)							

Message Identifier 0x14 (High Temperature Error)

1. Temperature range (0 to 127°C).

Offset	Length	Description
0	1	Message ID byte (0x14 – High Temperature Error)
1	1	Error Temperature in °C
2	1	High Temperature limit in °C

Message Identifier 0x15 (Minimum Degrees Per Second Error)

1. Valve minimum degrees per second error at 100% speed, after inrush time.
 - a. Range 0 to 359 degrees.

Offset	Length	Description						
0	1	Message ID byte (0x15 – Minimum Degrees Per Second Error)						
1	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Error Degrees Per Second (MSB)</td> </tr> <tr> <td>2</td> <td>Error Degrees Per Second (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Error Degrees Per Second (MSB)	2	Error Degrees Per Second (LSB)
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		1	Error Degrees Per Second (MSB)					
2	Error Degrees Per Second (LSB)							
3	2	<table border="1"> <thead> <tr> <th>Byte</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Minimum Degrees per Second Limit (MSB)</td> </tr> <tr> <td>2</td> <td>Minimum Degrees per Second Limit (LSB)</td> </tr> </tbody> </table>	Byte	Description	1	Minimum Degrees per Second Limit (MSB)	2	Minimum Degrees per Second Limit (LSB)
		Byte	Description					
		1	Minimum Degrees per Second Limit (MSB)					
2	Minimum Degrees per Second Limit (LSB)							
5	1	(NOTE: Open = 1 and Close = 0) Valve Direction looking from the top: Valve set to open Clockwise 0 = Counterclockwise 1 = Clockwise Valve set to open Counterclockwise 0 = Clockwise 1 = Counterclockwise						

Message Identifier 0x93 (CAN Baud Rate Reply)

1. CAN Bus Baud Rate (250k or 500k).

Offset	Length	Description
0	1	Message ID byte (0x93 – CAN Baud Rate Reply)
1	1	Value must be 0xA5 to be valid test message
2	1	CAN Bus Baud Rate: 0 = 250k baud rate 1 = 500k baud rate

REVISION HISTORY

Revision	Date	Description	Author
0	February 28th, 2020	Initial revision	Steve Stone
1	October 30th, 2020	-	Steve Stone
2	February 10th, 2022	-	Steve Stone
3	February 14th, 2024	-	Steve Stone
4	October 3rd, 2024	<ol style="list-style-type: none"> Added Revision History Added Inrush Current to “Valve Run Current” message Added limits for “Target Degrees” and “Milliseconds to Run” messages Clarified direction for “Target Degrees” message 	Nathan Pacholski
5	October 15th, 2024	<ol style="list-style-type: none"> Added “High Inrush Current Error” message Added “Low Inrush Current Error” message Removed “Valve” from message names Changed degrees request and response message names to position Fixed byte numbering for “Run Time in Seconds” and “Cycle Counts” messages Fixed byte offset for “Run Current” message Shrunk Part and Serial Number bytes of “I Am Here” message into single rows Changed “Request Volts” and “Request Amps” message names to “Request Voltage” and “Request Current” Updated “Clear Errors”, “Request Version Information”, “Request Temperature”, “Request Voltage”, “Request Current”, “Request Degrees Per Second”, “Request Run Time Seconds”, “Run Time Seconds”, and “Minimum Degrees Per Second Error” messages to match name in summary Changed “Software Version Information” to “Version Information” Changed all instances of “in-rush” to “inrush” 	Nathan Pacholski
6	October 21st, 2024	<ol style="list-style-type: none"> Removed “High Inrush Current Error” message Removed “Low Inrush Current Error” message Removed Inrush Current from “Valve Run Current” message 	Nathan Pacholski

