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VM-Series

CANopen Communication Manual

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1 Overview

This document describes the functionality and CANopen communication of the VM-Series of Digital Switching Modules.

1.1 Reference Documents

The following documents are referenced within this document.

- CiA 301
- CiA 401

2 Functionality

The 3- and 6- switch options for the VM-Series module are shown in Figures 1 & 2. Each switch has two physical channels, where the combined status represents each switch position:

- The ‘Pressed-Down’ position (the bottom orientation)
- The ‘Middle’ position (only for three position switches)
- The ‘Pressed-Up’ position (the top orientation)

When no switch is actuated, the VM will send a switch status message over CAN at a default rate of 250 mS. Upon a change in switch status due to actuation, the VM will immediately send out an updated CAN message on change. Each switch on the VM has up to two LEDs for illumination and can be configured as a backlight or function LED depending on the application.

Figure 1

Figure 2

2.1 Power Up Sequence

Upon first power-up and node initialization, the VM will send out a boot-up network management (NMT) message. After, the device will directly switch into an operational state without waiting for a CANopen NMT Master message. At this point, VM-Series module sends out an operational NMT message indicating the device is in 'Run' mode.

2.2 Run Mode

2.2.1 Heartbeat - Transmit

The VM-Series module heartbeat information is sent through a single message every 1000 mS (default).

2.2.2 Switch Pressing Data - Received

The VM-Series module status information is sent through a single message every 250 mS (by default) or upon a change in switch status.

2.2.3 Backlights - Received

The VM will monitor the backlight message sent by the CAB illumination control Unit and adjust the brightness accordingly. The function light can be activated by the related control unit or can be activated by VM-Module itself. This is configurable at run time.

2.3 Sleep Mode

The VM is capable of entering sleep mode in applications where conserving
power is required. To enter and remain in sleep mode, the following conditions are required:
1. No CAN traffic on the bus.
2. No switch actuations.

If the VM is configured for sleep mode (default setting), it will automatically enter this state after 40 seconds if conditions 1 and 2 above are met. Alternatively, the VM can be commanded into sleep mode from run mode using a Mode Change Command.
If a switch is actuated, the VM will temporarily wake up, transmit the update switch status for 10 seconds, and then return to sleep. Any subsequent switch actuations during this time will keep the VM awake and transmitting for an additional 10 seconds.

2.4 Configuration Mode

A VM-Series module can only be configured in configuration mode, which needs a Mode change Command message to switch the mode. In configuration mode, the VM-Series module will not send out the switch status message every 250ms (by default) until it exits the mode through a Mode Change Command message.

3 Communications

3.1 Heartbeat Message

The VM-Series module transmits heartbeat information through a single message every 1000 mS (by default).

3.1.1 Transmission of VM-Series Heartbeat Status			
Description	Transmission of VM-Series Heartbeat Status		
COB-ID	0x700 + Node ID		
DLC	1		
UPDATE RATE	1000MS		
Direction	VM-Series Module → CA		
Start	Length	Description	Value
1.1	1 Byte	Heartbeat state	0 – Boot Up 4 – Stopped 5 – Operational 127 – Configuration Mode

3.2 Process Data Objects (PDOs) - Standard Messages

3.2.1 Transmission of VM-Series Logical Channel Status			
Description	Transmission of VM-Series Logical channel Status		
COB-ID	0x180 + Node ID		
DLC	3		
UPDATE RATE	250MS OR UPON SWITCH STATUS CHANGE		
Direction	VM-Series Module → CA		
Start	Length	Description	Value
1.1	2 Bits	Logical Channel 1 status	00-Logical Channel Off 01- Logical Channel On 10- Logical Channel Error 11- Logical Channel Not Available
1.3	2 bits	Logical Channel 2 status	Same as above
1.5	2 bits	Logical Channel 3 status	
1.7	2 bits	Logical Channel 4 status	
2.1	2 bits	Logical Channel 5 status	
2.3	2 bits	Logical Channel 6 status	
2.5	2 bits	Logical Channel 7 status	
2.7	2 bits	Logical Channel 8 status	
3.1	2 bits	Logical Channel 9 status	
3.3	2 bits	Logical Channel 10 status	
3.5	2 bits	Logical Channel 11 status	
3.7	2 bits	Logical Channel 12 status	

Note that for the VM3, Logical Channels 7-12 are not configurable.
The CA will parse the logical channel status sent by VM-Series module to get the switch status. The default setting for the mapping between the physical channel and logical channel is same channel number, for example, logical channel 1 map to physical channel 1, logical channel 4 map to physical channel 4. The logical channel number sequence in the data field of CAN message cannot be changed. The Physical channel number sequence in a VM-Series product also cannot be changed. The physical channel sequence numbers are shown as Figures 3 & 4.

3.2.2 Reception Of The Switch Logical Channel Function Indicator Command			
Description	Reception of the command to control switch logical channel function indicator.		
COB-ID	0x200 + Node ID		
DLC	3		
Update Rate	upon command		
Direction	8		
Update Rate	upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	2 bits	Logical Channel 1 Function Indicator On/Off.	00 -Function indicator Off 01 - Function indicator On 10 - Function indicator flash(error) 11 - N/A
1.3	2 bits	Logical Channel 2 Function Indicator On/Off.	Same as above
1.5	2 bits	Logical Channel 3 Function Indicator On/Off.	
1.7	2 bits	Logical Channel 4 Function Indicator On/Off.	
2.1	2 bits	Logical Channel 5 Function Indicator On/Off.	
2.3	2 bits	Logical Channel 6 Function Indicator On/Off.	
2.5	2 bits	Logical Channel 7 Function Indicator On/Off.	
2.7	2 bits	Logical Channel 8 Function Indicator On/Off.	
3.1	2 bits	Logical Channel 9 Function Indicator On/Off.	
3.3	2 bits	Logical Channel 10 Function Indicator On/Off.	
3.5	2 bits	Logical Channel 11 Function Indicator On/Off.	
3.7	2 bits	Logical Channel 12 Function Indicator On/Off.	

If the VM-Series Module doesn't receive this command, it will set all LEDs to be backlight LEDs, which means there is no function indicator. For the VM3, from 2.5 onwards the Logical Channels will not be possible to configure.

3.2.3 Reception Of The Brightness Percentage Command			
Description	Reception of the Function indicator and backlight percentage command.		
COB-ID	0x300 + Node ID		
DLC	4		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	2 bytes	Indicator brightness control value	0-250, Percentage, 0.4%/bit, data range 0-100%. If this value >250,it will be regarded as 250.
3.1	2 bytes	Backlight brightness control value	All bytes set to 255

If the VM-Series module doesn't receive this command, it will set the backlight illumination percentage to 50%.

3.2.4 Mode Change Command			
Description	Reception of the command to change the mode of VM-Series Module		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	SPN Value
1.1	1 byte	SDO write command	0X2F
2.1	2 bytes	Object Index	0X2000
4.1	1 byte	Object Sub-Index	0X01
5.1	1 byte	Value of changing the mode.	0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 5 – Configuration Mode
6.1	3 bytes	Unused	All bytes set to 0

When the mode is changed by CA, the VM cannot recover the previous mode until it gets a new mode change command from CA or until power cycling the unit.

3.2.5 Transmission of VM Status			
Description	Response to query of VM-Series Module Status		
COB-ID	0x280 + Node ID		
DLC	8		
Update Rate	Upon request		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	2 bits	Logical Channel 1 Status	00-Logical Channel Off 01- Logical Channel On 10- Logical Channel Error 11- Logical Channel Not available
1.3	2 bits	Logical Channel 2 Status	Same as above
1.5	2 bits	Logical Channel 3 Status	
1.7	2 bits	Logical Channel 4 Status	
2.1	1 byte	VM type	00 – 6 Switches 01 – 3 Switches 10 – Reserved 11 – Not Available
3.1	2 bits	Logical Channel 5 Status	00-Logical Channel Off 01- Logical Channel On 10- Logical Channel Error 11- Logical Channel Not available
3.3	2 bits	Logical Channel 6 Status	Same as above
3.5	2 bits	Logical Channel 7 Status	
3.7	2 bits	Logical Channel 8 Status	
4.1	1 byte	Mode Type	0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 5 – COnfiguratiOn Mode
5.1	2 bits	Logical Channel 9 Status	00-Logical Channel Off 01- Logical Channel On 10- Logical Channel Error 11- Logical Channel Not available
5.3	2 bits	Logical Channel 10 Status	Same as above
5.5	2 bits	Logical Channel 11 Status	
5.7	2 bits	Logical Channel 12 Status	
6.1	1 byte	Unused	0x00
7.1	2 bits	Relay 1 Output Control Status	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
7.3	2 bits	Relay 2 Output Control Status	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
7.5	2 bits	Relay 3 Output Control Status	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
7.7	2 bits	Relay 4 Output Control Status	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
8.1	1 byte	Unused	0x00

Description	Response to query of VM-Series Module Status		
COB-ID	0x380 + Node ID		
DLC	4		
Update Rate	Upon request		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	Function Indicator Brightness percentage value	0-250, Percentage, 0.4%/bit, data range 0-100%. Value >250 will be regarded as 250.
2.1	1 byte	Unused	0x00
3.1	2 bits	Backlight Brightness percentage value	0-250, Percentage, 0.4%/bit, data range 0-100%. Value >250 will be regarded as 250.
4.1	1 byte	Unused	0x00

3.2.6 Reception Of The Relays Controlled Command			
Description	Address Claimed, J1939-81		
COB-ID	238		
DLC	DA, global address, 255		
Update Rate	60928(0XEE00)		
Direction	CA->VM-Series Module		
Start	Length	Description	SPN Value
1.1	2 bits	Relay 1 Output Control	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
1.3	2 bits	Relay 2 Output Control	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
1.5	2 bits	Relay 3 Output Control	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
1.7	2 bits	Relay 4 Output Control	00 – Off 01 – On 10 – Reserved 11 – Not Available (VM3)
2.1	1 byte	Unused	0x00

3.2.7 Reception Of The Switch Status Query			
Description	Reception of the switch status query		
COB-ID	0x500 + Node ID		
DLC	2		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	Status Request	01 – Status Queried Other value – Ignore
2.1	1 byte	Unused	0x00

3.3 Service Data Objects (SDOs) - Configuration Messages

Changing the configuration of the VM-Series Module can meet some of the variation of the application requirements without specifically changing the source code. Where applicable, changes take effect immediately. However, a power cycle is recommended to store the configured values in non-volatile memory.

For easy configuration, refer to Carling's configuration tool and its manual for instructions.
Alternatively, the VM can be configured using the direct CANopen messages in the following sections.

Use Mode Change Command to change current mode to configuration mode.

3.3.1 Configuration Enter			
Description	Command to change the mode of the VM-Series Module		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x01
5.1	1 byte	Value of changing the mode	0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 5 – Configuration Mode
6.1	3 bytes	Unused	All bytes set to 0

When the mode is changed by CA, the VM cannot recover the previous mode until it gets a new mode change command from CA or until power cycling the unit.

3.3.2 Set New Node ID			
Description	Set VM-Series Module New Node Identifier		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x02
5.1	1 byte	New Node ID	1-127
6.1	3 bytes	Unused	0x00

Note: The reconfigured Node ID will not take effect until power cycling the module.

3.3.3 Set Baud Rate			
Description	Set VM-Series Module New Baud rate		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x03
5.1	1 byte	New Baud Rate	4 – Set baud rate of 125 Kbps 3 – Set baud rate of 250 Kbps 2 – Set baud rate of 500 Kbps
6.1	3 bytes	Unused	0x00

Note: The reconfigured baud rate will not take effect until power cycling the module.

3.3.4 Set The Type Of Physical Switch			
Description	Set each type of physical switch on the VM-Series Module		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2B
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x04
5.1	2 bits	Physical Switch 1 type setting	00 - 2 position 01 - 3 position 10 – Disabled 11 - Unused
5.3	2 bits	Physical Switch 2 type setting	Same as above
5.5	2 bits	Physical Switch 3 type setting	
5.7	2 bits	Not used	11
6.1	2 bits	Physical Switch 4 type setting	00 - 2 position 01 - 3 position 10 – Disabled 11 - Unused
6.3	2 bits	Physical Switch 5 type setting	Same as above
6.5	2 bits	Physical Switch 6 type setting	
6.7	2 bits	Not used	11
7.1	2 bytes	Unused	0x00

The setting of the switch type must correspond to the physical switch type, otherwise the software will judge the switch to be in an "error" status. For the VM3, from 5.7 onwards the type of physical switch will not be possible to configure.

3.3.5 Set Backlight LED			
Description	Set Backlight LEDs		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2B
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x05
5.1	1 bit	Set backlight LED of Logical Channel 1	1 - Set LED to backlight 0 - Clear backlight LED
5.2	1 bit	Set backlight LED of Logical Channel 2	Same as above
5.3	1 bit	Set backlight LED of Logical Channel 3	
5.4	1 bit	Set backlight LED of Logical Channel 4	
5.5	1 bit	Set backlight LED of Logical Channel 5	
5.6	1 bit	Set backlight LED of Logical Channel 6	
5.7	1 bit	Set backlight LED of Logical Channel 7	
5.8	1 bit	Set backlight LED of Logical Channel 8	
6.1	1 bit	Set backlight LED of Logical Channel 9	
6.2	1 bit	Set backlight LED of Logical Channel 10	
6.3	1 bit	Set backlight LED of Logical Channel 11	
6.4	1 bit	Set backlight LED of Logical Channel 12	
6.5	4 bits	Unused	0x0
	2 bytes	Unused	0x00

For the VM3, from 5.7 onwards the Backlights of the LEDs will not be possible to configure.

3.3.6 Set Serial Number			
Description	Set VM-Series module's new Serial Number		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x23
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x06
5.1	4 bytes	New Serial Number	0x00000000 – 0xFFFFFFFF

3.3.7 Function Indicator LEDs Default Brightness			
Description	Function Indicator LEDs default brightness adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x07
5.1	1 byte	Default brightness value for all Function Indicator LEDs	0 – 250 (0 - 100%) 0.4% / bit > 250, treated as 100%.
6.1	3 bytes	Unused	0x00

3.3.8 Backlight LEDs Default Brightness			
Description	Backlight LEDs default brightness adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x08
5.1	1 byte	Default brightness value for all Backlight LEDs	0 – 250 (0 - 100%) 0.4% / bit > 250, treated as 100%.
6.1	3 bytes	Unused	0x00

3.3.9 LED1 Brightness Factor Percent			
Description	LED1 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x09
5.1	1 byte	LED1 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

3.3.10 LED2 Brightness Factor Percent			
Description	LED2 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x0A
5.1	1 byte	LED2 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

3.3.11 LED3 Brightness Factor Percent			
Description	LED3 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x0B
5.1	1 byte	LED3 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

3.3.12 LED4 Brightness Factor Percent			
Description	LED4 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x0C
5.1	1 byte	LED4 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

3.3.12 LED5 Brightness Factor Percent			
Description	LED5 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x0D
5.1	1 byte	LED5 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

3.3.12 LED6 Brightness Factor Percent			
Description	LED6 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x0E
5.1	1 byte	LED6 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

3.3.15 LED7 Brightness Factor Percent			
Description	LED7 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x0F
5.1	1 byte	LED7 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

For the VM3, LED7 brightness factor will not be possible to configure.

3.3.16 LED8 Brightness Factor Percent			
Description	LED8 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x10
5.1	1 byte	LED8 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

For the VM3, LED8 brightness factor will not be possible to configure.

3.3.17 LED9 Brightness Factor Percent			
Description	LED9 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x11
5.1	1 byte	LED9 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

For the VM3, LED9 brightness factor will not be possible to configure.

3.3.18 LED10 Brightness Factor Percent			
Description	LED10 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x12
5.1	1 byte	LED10 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

For the VM3, LED10 brightness factor will not be possible to configure.

3.3.19 LED11 Brightness Factor Percent			
Description	LED11 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x13
5.1	1 byte	LED11 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

For the VM3, LED11 brightness factor will not be possible to configure.

3.3.20 LED12 Brightness Factor Percent			
Description	LED12 brightness factor adjustment		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x14
5.1	1 byte	LED12 brightness factor percent value	0 – 250 (0 - 100%) 0.4% / bit
6.1	3 bytes	Unused	0x00

For the VM3, LED12 brightness factor will not be possible to configure.

3.3.21 Set Auto Sleep			
Description	Set Auto sleep		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x15
5.1	1 byte	Set Auto Sleep or not	0- Set Auto Sleep 1- Cancel Auto Sleep.
6.1	3 bytes	Unused	0x00

When Auto Sleep is set (the default setting), The VM-Series Module will automatically enter sleep mode after 40 seconds if it doesn't see any CAN messages on the bus or not seen any switch actuations. Following this, it will not transmit the message of its status, and all LEDs will be turned off.

Use the Mode Change Command to change current mode to 'Run' mode or 'Sleep' mode to exit the configuration

3.3.22 Configuration Exit			
Description	Command to change the mode of the VM-Series Module		
COB-ID	0x600 + Node ID		
DLC	8		
Update Rate	Upon command		
Direction	CA->VM-Series Module		
Start	Length	Description	Value
1.1	1 byte	SDO write command	0x2F
2.1	2 bytes	Object Index	0x2000
4.1	1 byte	Object Sub-Index	0x01
5.1	1 byte	Value of changing the mode	0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 5 – Configuration Mode
6.1	3 bytes	Unused	All bytes set to 0