



Littelfuse[®]



Carling Technologies[®]
A Littelfuse[®] Brand



VM-Series

Interface Specification

Revision History

Revision	Description
1.0	Initial Release

Table of Contents

1.	Overview	1
1.1	Reference Documents	1
2.	Functionality	1
2.1	Power up Sequence	3
2.2	Run Mode	3
2.2.1	Heartbeat - Transmit	3
2.2.2	Switching Pressing Data - Transmit	3
2.2.3	Backlights - Recieved	3
2.3	Sleep Mode	3
2.4	Configuration Mode	3
3	Communications.....	4
3.1	Heartbeat Message.....	X
3.1.1	Transmission of VM-Series Heartbeat status	X
3.2	Process Data Objects (PDOs) - Standard Messages	X
3.2.1	Transmission of VM-Series Logical Channel Status.....	X
3.2.2	Reception of the switch logical channel function indicator command.....	X
3.2.3	Reception of the brightness percentage command.....	X
3.2.4	Mode Change Command.....	X
3.2.5	Transmission of VM Status.....	X
3.2.6	Reception of the relays controlled command.....	X
3.2.7	Reception of the switch status query	X
3.3	Service Data Objects (SDOs) - Configuration Messages.....	X
3.3.1	Configuration enter.....	X
3.3.2	Set New Node ID.....	X
3.3.3	Set Baud Rate.....	X
3.3.4	Set the type of physical switch.....	X
3.3.5	Set Backlight LED.....	X
3.3.6	Set Serial Number	X
3.3.7	Function Indicator LEDs default brightness.....	X
3.3.8	Backlight LEDs default brightness.....	X
3.3.9	LED1 brightness factor percent.....	X
3.3.10	LED2 brightness factor percent	X
3.3.11	LED3 brightness factor percent	X
3.3.12	LED4 brightness factor percent	X
3.3.13	LED5 brightness factor percent.....	X
3.3.14	LED6 brightness factor percent.....	X
3.3.15	LED7 brightness factor percent.....	X
3.3.16	LED8 brightness factor percent.....	X
3.3.17	LED9 brightness factor percent.....	X
3.3.18	LED10 brightness factor percent.....	X
3.3.19	LED11 brightness factor percent.....	X
3.3.20	LED12 brightness factor percent.....	X
3.3.21	Set Auto Sleep.....	X
3.3.22	Configuration exit.....	X

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.

- SAE-J1939
- SAE-J1939/11
- SAE-J1939/21
- SAE-J1939/71
- SAE-J1939/81

2 Functionality

The two current options for the VM-Series module are shown as in Figure 1 & 2. There are options for 6 and 3 switches, and each switch has two channels. The status combination of two physical channels of each switch can represent each position of the switches:

- The 'Pressed-Down' position, which is on the bottom of each switch
- The 'Middle' position, which only for three position switch configurations
- The 'Pressed-Up' position, which is the top of each switch

Each switch on the VM has up to two LEDs for illumination, and they can be configured as backlight LED or function LED, depending on customer application. When the switch status change, the VM6 module will send out the CAN message right away. When the VM6 has no switch status change, the VM6 will send the CAN message every 500ms(default setting).

Figure 1



Figure 2



2.1 Power Up Sequence

Upon first power up, the VM-Series module sends out an Address Claimed message. If there is a Name contention and the VM loses arbitration, it will either send another Address Claimed message with a new source address (in the range between 128 and 238 or if the VM-Series module fails on each address claim it will send out the 'Cannot Claim Address' message. If the VM sends out the Cannot Claim Address message it will not enter 'Run' Mode (it will not transmit or act upon any messages) but it still can send the 'Cannot Claim Address' message upon the request for Address Claimed

2.2 Run Mode

2.2.1 Switch Pressing Data - Transmit

The VM-Series module status information is sent through a single message every 500ms (by default) or upon a change in status with a minimum period of 100ms. The VM's PGNs, priority and transmission period can be configured at runtime on the CAN bus.

2.2.2 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

In running mode, if the VM-Series module doesn't receive any messages and the switches haven't been pressed for 1 minute then it will enter sleep mode and all LEDs will be turned off to conserve energy. In sleep mode, the VM-Series module will not send out the switch status message every 500ms (by default), but once it receives any CAN messages or if any switch is pressed then it will exit sleep mode and enter run-mode.

2.4 Configuration Mode

A VM-Series module can only be configured in configuration mode, which needs a Mode Command message to switch the mode. In configuration mode VM-Series module will not send out the switch status message every 500ms (by default) until it exits the mode through receiving a Mode Command message.

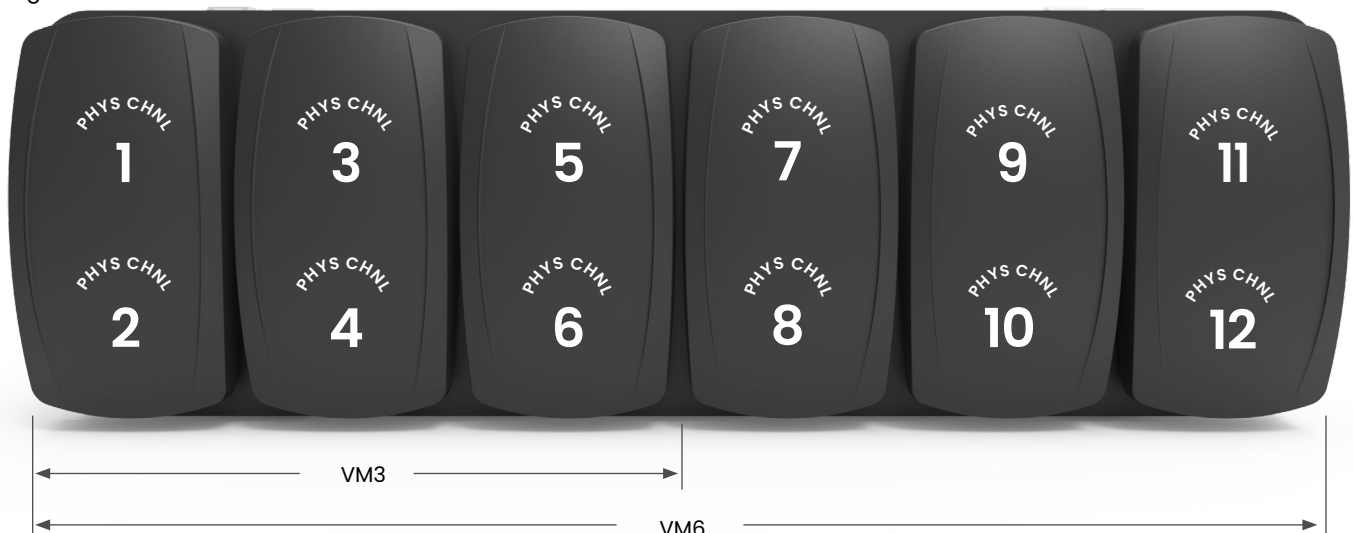
3 Communications

3.1 Standard Message

3.1.1 Transmission of VM-Series Logical Channel Status				
Description	Transmission of VM-Series Logical channel Status			
PF	252			
PS	8			
PGN	64520(0xFC08)			
Default Priority	6			
DLC	8			
Update Rate	500ms or upon switch status change			
Direction	VM-Series Module->CA			
Start	Length	Description	SPN	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		Logical Channel 2 status		
1.5		Logical Channel 3 status		
1.7		Logical Channel 4 status		
2.1		Logical Channel 5 status		
2.3		Logical Channel 6 status		
2.5		Logical Channel 7 status		
2.7		Logical Channel 8 status		
3.1		Logical Channel 9 status		
3.3		Logical Channel 10 status		
3.5		Logical Channel 11 status		
3.7		Logical Channel 12 status		
4.1	5 Bytes	unused		All bytes set to 255

For the VM3, from 2.5 onwards the Logical Channels will not be possible to configure
 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 Figure 3.

Figure 3



3.1.2 Reception of the switch logical channel function indicator command

Description	Reception of the command to control switch logical channel function indicator.			
PF	239			
PS	DA, The source address of VM-Series module.			
PGN	61184(0xEF00)			
DLC	8			
Update Rate	upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		0x38-Switch logical channel function LED on/off control.
2.1	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
2.3		Logical Channel 2 function indicator on/off.		
2.5		Logical Channel 3 function indicator on/off.		
2.7		Logical Channel 4 function indicator on/off.		
3.1		Logical Channel 5 function indicator on/off.		
3.3		Logical Channel 6 function indicator on/off.		
3.5		Logical Channel 7 function indicator on/off.		
3.7		Logical Channel 8 function indicator on/off.		
4.1		Logical Channel 9 function indicator on/off.		
4.3		Logical Channel 10 function indicator on/off.		
4.5		Logical Channel 11 function indicator on/off.		
4.7		Logical Channel 12 function indicator on/off.		
5.1	4 bytes	unused		All bytews set to 255

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 3.5 onwards the Logical Channels will not be possible to configure

3.1.3 Reception of the backlight percentage command				
Description	Reception of the backlight percentage command, J1939-71, Cab Illumination Message			
PF	208			
PS	DA, The source address of the VM-Series module.			
PGN	53248(0xD000)			
Default Priority	6			
DLC	8			
Update Rate	upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Backlight percentage value	1487	0-250, Percentage, 0.4%/bit, data range 0-100%. If this value >250, it will be regarded as 250.
2.1	7 bytes	unused		All bytes set to 255

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

3.1.4 Mode Change Command				
Description	Reception of the command to change the mode of VM-Series Module			
PF	239			
PS	DA, The source address of VM-Series Module.			
PGN	61184(0xEF00)			
Default Priority	6			
DLC	8			
Update Rate	upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Value of changing the mode.		0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 3 – Diagnostic Test Mode 5 – Configuration Mode
2.1	7 bytes	unused		All bytes set to 255

When the mode is changed by CA, the VM cannot recover the previous mode until to get the mode changed command from CA or until power cycling the unit

3.1.5 Transmission of VM Status

Description	Response to query of VM-Series Module Status			
PF	252			
PS	7			
PGN	64519(0xFC07)			
Default Priority	6			
DLC	8			
Update Rate	upon request			
Direction	VM-Series Module → CA			
Start	Length	Description	SPN	Value
1.1	2 Bits	VM type		00 – 6 Switches 01 – 3 Switches 10 – Reserved 11 – Not Available
1.3	6 bits	Not used		All bits set
2.1	1 byte	Mode Type		0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 3 – Diagnostic Test Mode
3.1	2 bits	Logical Channel 1 status		00-Logical Channel off 01- Logical Channel on 10- Logical Channel error 11- Logical Channel Not available
3.3		Logical Channel 2 status		
3.5		Logical Channel 3 status		
3.7		Logical Channel 4 status		
4.1		Logical Channel 5 status		
4.3		Logical Channel 6 status		
4.5		Logical Channel 7 status		
4.7		Logical Channel 8 status		
5.1		Logical Channel 9 status		
5.3		Logical Channel 10 status		
5.5		Logical Channel 11 status		
5.7		Logical Channel 12 status		
6.1	1 byte	Backlight percentage value		0-250, Percentage, 0.4%/bit, data range 0-100%. Value >250 will be regarded as 250.
7.1	2 bits	Relay 4 output control status		00 – off 01 – on 10 – Reserved 10 – Reserved 11 – Not Available (VM3)
7.3		Relay 3 output control status		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
7.5		Relay 2 output control status		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
7.7		Relay 1 output control status		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
8.1	1 byte	unused		FF

7. The CA uses the PGN request message (PGN 59904) with the first three data bytes which is the same as PGN number 64519 which gets the VM's status

3.1.6 Reception of the relays controlled command				
Description	Reception of the relay controlled command			
PF	239			
PS	DA, The source address of VM-Series Module.			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control byte		0x39-Relays output control
2.1	2 bits	Relay 4 output control		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
2.3		Relay 3 output control		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
2.5		Relay 2 output control		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
2.7		Relay 1 output control		00 – off 01 – on 10 – Reserved 11 – Not Available (VM3)
3.1	6 bytes	Unused		All bytes set to 255

3.2 J1939 Message.

3.2.1 Address Claimed				
Description	Address Claimed, J1939-81			
PF	238			
PS	DA, global address, 255			
PGN	60928(0XEE00)			
Default Priority	6			
DLC	8			
Update Rate	Upon initialization or requested			
Direction	VM-Series Module->CA			
Start	Length	Description	SPN	Value
1.1	21 bits	Identity Number		0 to 2 ²¹ -1
3.6	11 bits	Manufacturer Code		888(default)
5.1	3 bytes	ECU Instance		0(Default)
5.4	5 bits	Function Instance		
6.1	8 bits	Function		222(Default)
7.1	1 bit	Reserved		All bytes set to 255
7.2	7 bits	Vehicle System		0 (Defined by SAE)
8.1	4 bits	Vehicle System Instance		0 (Default)
8.5	3 bits	Industry Group		0 - Global (Default) * 1 - On-Highway Equipment 2 - Agricultural and Forestry Equipment 3 - Construction Equipment 4 - Marine 5 - Industrial-Process Control-Stationary 6 & 7 - Reserved
8.8	1 bit	Arbitrary Address Capable		0 - Not Capable 1 - Capable (Default)

3.2.2 PGN request				
Description	PGN request, J1939-81			
PF	234			
PS	DA, global address, 255			
PGN	59904(0XEA00)			
Default Priority	6			
DLC	3			
Update Rate	Upon initialization or requested			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Byte 1 of PGN being requested (LSB)		0-255
2.1		Byte 2 of PGN being requested		
3.1		Byte 3 of PGN being requested (MSB)		

This is a standard request message, and the following are the supported PGNs that can be requested from the VM-Series module.

- VM-Series Module switch status (PGN 64520)
- Response to query of VM-Series Module status (PGN 64519)
- Address Claimed (PGN 60928)
- ECU Identification Information (PGN 64965)
- software Identification Information (PGN 65242)

This is a standard request message, and the following are the supported PGNs that can be requested from the VM-Series module.

3.2.2 PGN request				
Description	PGN request, J1939-81			
PF	234			
PS	DA, global address, 255			
PGN	59904(0XEA00)			
Default Priority	6			
DLC	4			
Update Rate	Upon initialization or requested			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Byte 1 of PGN being requested (LSB)		0-255
2.1		Byte 2 of PGN being requested		
3.1		Byte 3 of PGN being requested (MSB)		
4.1		Control Byte		

Note: This is not a standard request message, and it only be used in requesting for VM configured information.

Byte 4 is the control byte, and it indicates which message will be requested. It's value is the same as the Control Byte in configuration message in Chapter 4.

3.2.3 Acknowledgment Message					
Description	Acknowledgment Message, J1939-81				
PF	238				
PS	DA, global address, 255				
PGN	59392(0XE800)				
Default Priority	6				
DLC	8				
Update Rate	Upon reception of a PGN that requires this form of acknowledgment				
Direction	VM-Series Module->CA				
Start	Length	Description	SPN	Value	
1.1	1 byte	Control Byte		0 - Positive Acknowledgment 1 - Negative Acknowledgment 2 - Access Denied 3 - Cannot Respond	
2.1		Group Function		Refer to SAE-J1939-21. 0(Default)	
3.1		Reserved by SAE			255(Default)
4.1					
5.1					
6.1		Byte 1 of PGN being requested (LSB)			
7.1		Byte 2 of PGN being requested			
8.1		Byte 3 of PGN being requested (MSB)			

3.2.4 ECU Identification Information				
Description	ECU Identification Information, J1939-71			
PF	253			
PS	197			
PGN	64965(0XFDC5)			
Default Priority	6			
DLC	variable			
Update Rate	Upon request			
Direction	VM6->CA			
Start	Length	Description	SPN	Value
a	<=110 characters	ECU Part Number	2901	Ex. "17000-08312"
b		ECU Serial Number	2902	Ex. "000001"
c		ECU Location	2903	Ex. "CAB"
d		ECU Type	2904	Ex. "VM6S-24-00000002"

The length of the whole ECU ID should be no more than 120 bytes

3.2.5 Software Identification Information				
Description	Software Identification Information, J1939-71			
PF	254			
PS	218			
PGN	65242(0XFEDA)			
Default Priority	6			
DLC	variable			
Update Rate	Upon request			
Direction	VM-Series Module->CA			
Start	Length	Description	SPN	Value
1	1 byte	Number of Software Identification Fields	965	0-125
2-N	Variable	ECU Serial Number	234	ASCII characters. Each field delimited with an "*" and up to 200 characters.

The length of the entire Software ID should be no more than 80 bytes

3.2.6 Transport Protocol - Connection Management_BAM

Description	Transport Protocol-Connection Management_BAM, J1939-21			
PF	236			
PS	DA, global address, 255			
PGN	60416(0XEC00)			
Default Priority	7			
DLC	8			
Update Rate	Upon request			
Direction	VM-Series Module->CA			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		32-Broadcast Announcement Message
2.1	2 byte	Message length		9-1785
4.1	1 byte	Total number of packets		2-255
5.1		Reserved by SAE		255
6.1	3 bytes	Parameter Group Number of the packet message		LSB at sixth byte, MSB at eighth byte.

3.2.7 Transport Protocol-Data Transfer

Description	Transport Protocol-Data Transfer, J1939-21			
PF	235			
PS	DA, global address, 255			
PGN	60160(0XEB00)			
Default Priority	7			
DLC	8			
Update Rate	Upon request			
Direction	VM-Series Module->CA			
Start	Length	Description	SPN	Value
1.1	1 byte	Sequence Number:		1-255
2.1	7 bytes	Related PGN data		Packetized Data

4 Configuration

Changing the configuration of the VM-Series Module can meet some of the variation of the application requirements without specifically changing the source code, the first byte serves as the control byte. Where applicable, changes take effect immediately and are stored in non-volatile memory.

The configuration PGN is 61184 for all configuration options

4.1 Configuration enter				
Description	Reception of the command to change the mode of the VM-Series Module			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Value of changing the mode.		0 – Boot Mode 1 – Run Mode 2 – Sleep Mode 3 – Diagnostic Test Mode 5 – Configuration Mode
2.1	7 bytes	unused		All bytes set to 255

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

4.2 LEDs default intensity configuration				
Description	LEDs default intensity adjustment			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		128 - LED(backlight) default intensity change of logical channel 1 to 6. 129 - LED(backlight) default intensity change of logical channel 7 to 12. 130 - LED(function indicator) default intensity change of logical channel 1 to 6. 131 - LED(function indicator) default intensity change of logical channel 7 to 12.
2.1		Logical Channel 1 or 7 LED intensity percentage		0-250(0-100%), 0.4%/bit4 251-255, not used.
3.1		Logical Channel 2 or 8 LED intensity percentage		0-250(0-100%), 0.4%/bit4 251-255, not used.
4.1		Logical Channel 3 or 9 LED intensity percentage		0-250(0-100%), 0.4%/bit4 251-255, not used.
5.1		Logical Channel 4 or 10 LED intensity percentage		0-250(0-100%), 0.4%/bit4 251-255, not used.
6.1		Logical Channel 5 or 11 LED intensity percentage		0-250(0-100%), 0.4%/bit4 251-255, not used.
7.1		Logical Channel 6 or 12 LED intensity percentage		0-254(0-100%), 0.4%/bit4 251-255, not used.
8.1		Not used		255

4.3 Set New Source Address				
Description	Set VM-Series Module New Source Address			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		225-Set VM source address
2.1		New source address		0-238, otherwise the VM will send NACK message.
3.1	6 bytes	Not used		0xFFFFFFFFFFFF

Note: The reconfigured source address will not take effect until exiting the configuration mode or power cycling the module

4.4 Set New Priority				
Description	Set VM-Series Module New Priority			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		226-Set the VM's new priority
2.1		New Priority		0-7, otherwise the VM will send the NACK message.
3.1	6 bytes	Not used		0xFFFFFFFFFFFF

Note: The reconfigured source address will not take effect until exiting the configuration mode or power cycling the module

4.5 Set New Transmit Rate				
Description	Set the VM-Series Module's New Transmit Rate			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		227 - Set the VM's New Transmit Rate
2.1		New Transmit Rate		10-250 (The value multiplied by 10ms, range from 100ms to 2.5s). If the value <10 it will be regarded as 10 and if the value >250 it will be regarded as 250
3.1	6 bytes	Not used		0xFFFFFFFF

4.6 Set VM6 New Name Field				
Description	Set VM-Series Module's New Name Field			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		228 - Set the VM's New Name Field
2.1		Sub-Control Byte		0 - ID; 1 - Manufacturer Code 2 - ECU Instance 3 - Function Instance 4 - Function 5 - Vehicle System 6 - Vehicle System Instance 7 - Industry Group 8 - Arbitrary Address Capable
3.1		Data 0		0-255
4.1		Data 1		
5.1		Data 2		
6.1		3 bytes	Not used	

4.7 Set soft lock for logical channel					
Description	Set a soft lock for a logical channel				
PF	239				
PS	DA, The source address of VM-Series Module				
PGN	61184(0XEF00)				
Default Priority	6				
DLC	8				
Update Rate	Upon command				
Direction	CA->VM-Series Module				
Start	Length	Description	SPN	Value	
1.1	1 byte	Control Byte		193- Set soft lock for logical channel	
2.1	2 bits	Logical channel 1 soft lock setting		01 - set soft lock 00 - not set Others: Don't care (don't change the current configuration)	
2.3		Logical channel 2 soft lock setting			
2.5		Logical channel 3 soft lock setting			
2.7		Logical channel 4 soft lock setting			
3.1		Logical channel 5 soft lock setting			
3.3		Logical channel 6 soft lock setting			
3.5		Logical channel 7 soft lock setting			
3.7		Logical channel 8 to soft lock setting			1 - set soft lock 0 - not set
4.1		Logical channel 9 to soft lock setting			
4.3		Logical channel 10 to soft lock setting			
4.5		Logical channel 11 to soft lock setting			
4,7		Logical channel 12 to soft lock setting			
5.1	4 bytes	Not used		0xFFFFFFFF	

Each logical channel can be set to have a "soft lock" function, which means this logical channel can only update its state and send to the CA until it's been pressed to be in its "on" state continuously for 3 seconds (by default). This soft lock function can only be applied to momentary physical switch positions on a VM-Series switch module. For the VM3, from 3.5 onwards the Logical Channels will not be possible to configure

4.8 Set VM6 reverse orientation option				
Description	Set VM-Series Module reverse orientation option			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		194- Set VM-Series Module reverse orientation option
2.1		Sub-control Byte		0 - Standard option 1 - Reverse Orientation Others: the VM-Series Module will send a NACK message
3.1		Feature code		0x55, otherwise the VM-Series Module will send a NACK message
4.1				0xAA, otherwise the VM-Series Module will send a NACK message
5.1	4 bytes	Not used		0xFFFFFFFF

4.9 Set the type of physical switch					
Description	Set each type of physical switch on the VM-Series Module				
PF	239				
PS	DA, The source address of VM-Series Module				
PGN	61184(0XEF00)				
Default Priority	6				
DLC	8				
Update Rate	Upon command				
Direction	CA->VM-Series Module				
Start	Length	Description	SPN	Value	
1.1	1 byte	Control Byte		202- Set the type of physical switch	
2.1	2 bits	Physical Switch 1 type setting		00- 2 position 01- 3 position 10 - This switch is unusable. 11- Not used	
2.3		Physical Switch 2 type setting			
2.5		Physical Switch 3 type setting			
2.7		Not used			11
3.1		Physical Switch 4 type setting			00- 2 position 01- 3 position 10 - This switch is unusable. 11- Not used
3.3		Physical Switch 5 type setting			
3.5		Physical Switch 6			
3.7					
4.1	5 bytes	Not used		0xFFFFFFFF	

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 2.7 onwards the type of physical switch will not be possible to configure

4.10 Set the mapping between physical channel to logical channel				
Description	Set the mapping between physical channel and the logical channel			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		203 - Set the mapping between physical channel and the logical channel
2.1	4 bits	Logical channel 1 mapping setting		0000 - Physical channel 1 0001- Physical channel 2 0010 - Physical channel 3 0011- Physical channel 4 0100 - Physical channel 5 0101 - Physical channel 6 0110 - Physical channel 7 0111 - Physical channel 8 1000 - Physical channel 9 1001 - Physical channel 10 1010 - Physical channel 11 1011 - Physical channel 12 1100 - 1110: Error value, and the VM6 will not handle this message and send NACK message. 1111: don't care, will not change current value
2.5		Logical channel 2 mapping setting		
3.1		Logical channel 3 mapping setting		
3.5		Logical channel 4 mapping setting		
4.1		Logical channel 5 mapping setting		
4.5		Logical channel 6 mapping setting		
5.1		Logical channel 7 mapping setting		
5.5		Logical channel 8 mapping setting		
6.1		Logical channel 9 mapping setting		
6.5		Logical channel 10 mapping setting		
7.1		Logical channel 11 mapping setting		
7.5		Logical channel 12 mapping setting		
8.1	1 byte	Not used		255

For the VM3, from 5.1 onwards the logical and physical channel mapping will not be possible to configure

Each logical channel only has one mapping value to physical channel. Conversely, the value cannot be duplicated.

For example, Figures 3 & 4 is the default settings for each physical and logical channel on the VM3 and VM6 Series of Switching Modules. The logical channel's number is equal to physical channel's number.

If we create an alternative mapping where logical channel 1 is mapped to physical channel 11 and logical channel 2 to physical channel 12, then the mapping diagram is shown Figure 5 and 6 on the VM6 and VM3 Series as Switching Modules.

The logical channel value is always sent to CA through a CAN message from logical channel 1 to logical channel 12 in sequence.

Figure 3

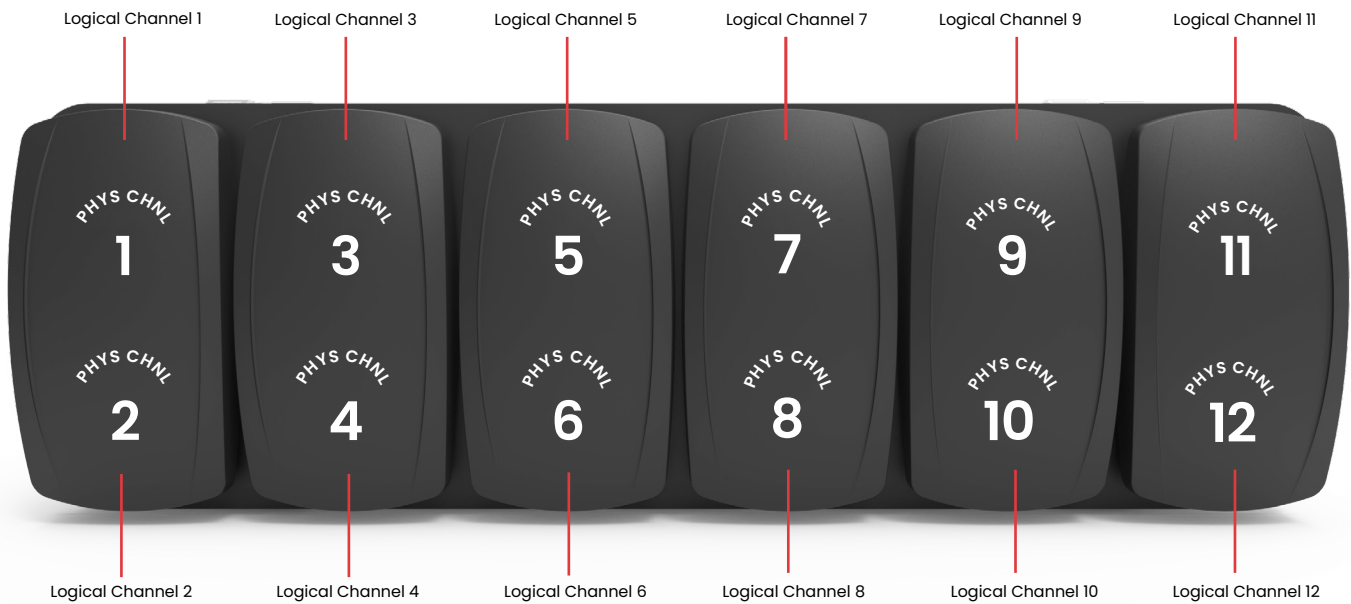


Figure 4

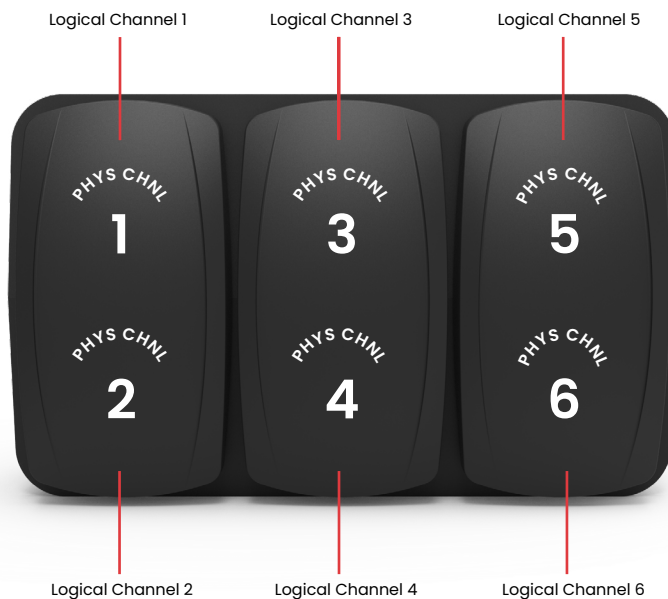


Figure 5

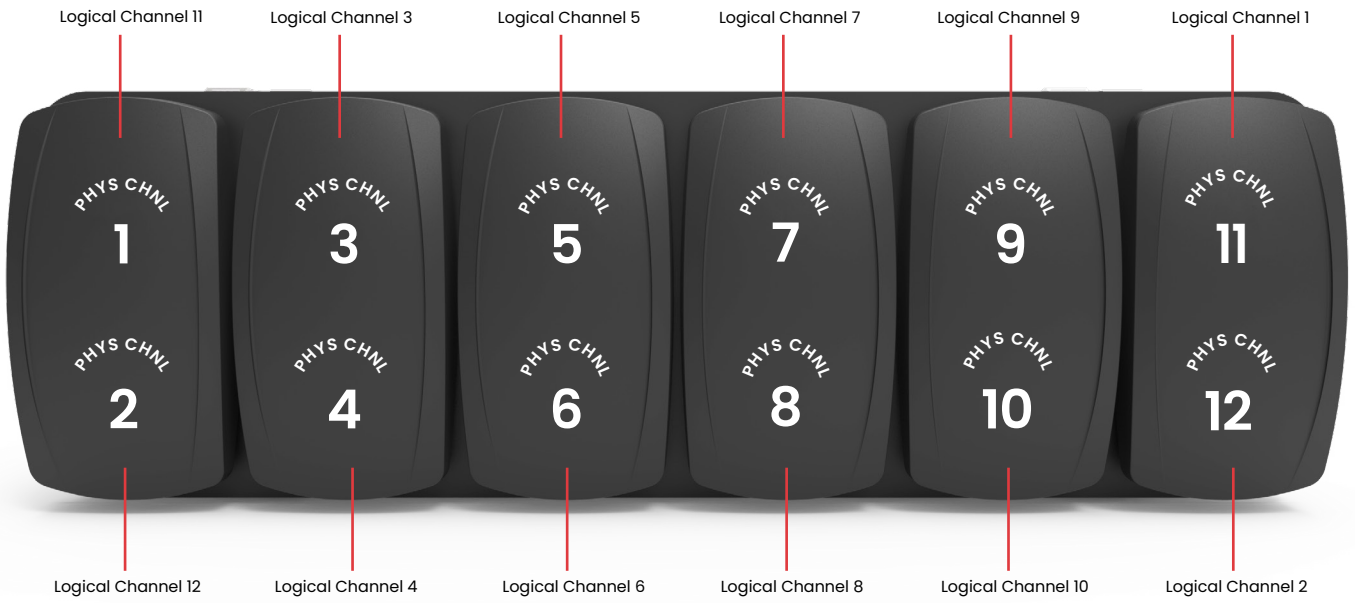
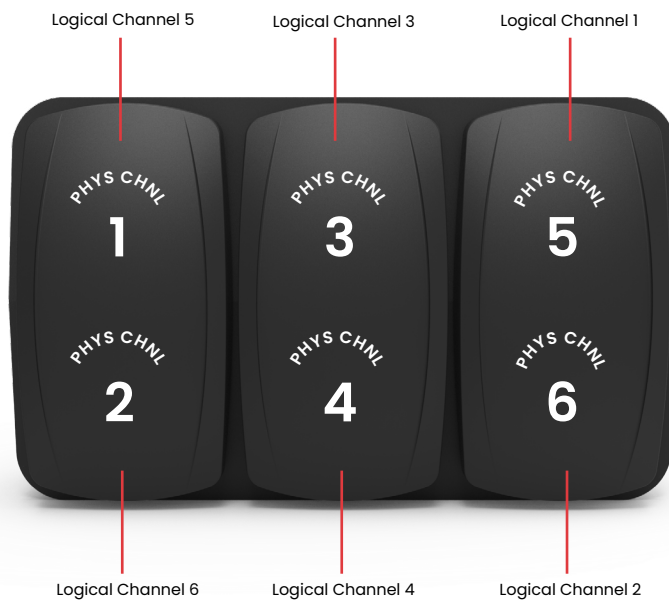


Figure 6



4.11 Set New PGN				
Description	Set New PGN			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		204- Set New PGN
2.1		Sub-control Byte		0 - Set PGN of Transmission of VM Switch Status 1 - Set PGN of Transmission of response to query of VM status.
3.1	3 bytes	New PGN		Variable. It should not be the same as all other valid PGN, otherwise the VM-Series Module will send NACK message.
6.1		Not used		0xFFFFFFFF

4.12 Set Backlight LED				
Description	Set Backlight LEDs			
PF	239			
PS	DA, The source address of VM6.			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM6			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		205 - Set Backlight LED
2.1		Set backlight LED of Logical Channel 1		01 - Set LED to backlight 00 - Clear backlight LED Others: Don't care.
2.3	Set backlight LED of Logical Channel 2			
2.5	Set backlight LED of Logical Channel 3			
2.7	Set backlight LED of Logical Channel 4			
3.1	Set backlight LED of Logical Channel 5			
3.3	Set backlight LED of Logical Channel 6			
3.5	Set backlight LED of Logical Channel 7			
3.7	Set backlight LED of Logical Channel 8			
4.1	Set backlight LED of Logical Channel 9			
4.3	Set backlight LED of Logical Channel 10			
4.5	Set backlight LED of Logical Channel 11			
4.7	Set backlight LED of Logical Channel 12			
5.1	4 bytes	unused		0xFFFFFFFF

What is said above are all the valid configuration messages, and if the received message is not one of them then the VM-Series Module will send a NACK message. For the VM3, from 3.5 onwards the Backlights of the LEDs will not be possible to configure

4.13 Set LED default intensity for backlight(1-6)

Description	Set New PGN			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		128 - Set LED default intensity configuration for the backlight, from logic channel 1 to logic channel 6.
2.1		Set LED default intensity configuration of Logical Channel 1		0-250, Percentage, 0.4%/bit, data range 0-100% 251-255, not used.
3.1		Set LED default intensity configuration of Logical Channel 2		
4.1		Set LED default intensity configuration of Logical Channel 3		
5.1		Set LED default intensity configuration of Logical Channel 4		
6.1		Set LED default intensity configuration of Logical Channel 5		
7.1		Set LED default intensity configuration of Logical Channel 6		
8.1		Not Used		

4.14 Set LED default intensity for backlight(7-12)				
Description	Set New PGN			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		129 - Set LED default intensity configuration for the backlight, from logic channel 7 to logic channel 12
2.1		Set LED default intensity configuration of Logical Channel 7		0-250, Percentage, 0.4%/bit, data range 0-100% 251-255, not used (VM3).
3.1		Set LED default intensity configuration of Logical Channel 8		
4.1		Set LED default intensity configuration of Logical Channel 9		
5.1		Set LED default intensity configuration of Logical Channel 10		
6.1		Set LED default intensity configuration of Logical Channel 11		
7.1		Set LED default intensity configuration of Logical Channel 12		
8.1		Not Used		

For the VM3 you will not be able to set the backlight illumination intensity for logic channels 7 to 12

4.15 Set LED default intensity for function indicator(1-6)

Description	Set New PGN			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		130 - Set LED default intensity configuration for the function indicator, from logic channel 1 to logic channel 6.
2.1		Set LED default intensity configuration of Logical Channel 1		0-250, Percentage, 0.4%/bit, data range 0-100% 251-255, not used.
3.1		Set LED default intensity configuration of Logical Channel 2		
4.1		Set LED default intensity configuration of Logical Channel 3		
5.1		Set LED default intensity configuration of Logical Channel 4		
6.1		Set LED default intensity configuration of Logical Channel 5		
7.1		Set LED default intensity configuration of Logical Channel 6		
8.1		Not Used		

4.16 Set LED default intensity for function indicator(7-12)				
Description	Set New PGN			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM6			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		131 - Set LED default intensity configuration for the function indicator from logic channel 7 to logic channel 12.
2.1		Set LED default intensity configuration of Logical Channel 7		0-250, Percentage, 0.4%/bit, data range 0-100% 251-255, not used.
3.1		Set LED default intensity configuration of Logical Channel 8		
4.1		Set LED default intensity configuration of Logical Channel 9		
5.1		Set LED default intensity configuration of Logical Channel 10		
6.1		Set LED default intensity configuration of Logical Channel 11		
7.1		Set LED default intensity configuration of Logical Channel 12		
8.1		Not Used		

For the VM3 you will not be able to set the default function illumination intensity for logic channels 7 to 12

4.17 Independent LED Control				
Description	Set VM-Series Module new light control command			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM6			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		0xC0- Set VM-Series Module new light control
2.1		Sub-Control Byte		0 - Standard light control option 1 - New light control Orientation Others: the VM-Series Module will send a NACK message
3.1		Feature Code		0x55, otherwise the VM-Series Module will send a NACK message
4.1		Feature Code		0xAA, otherwise the VM-Series Module will send a NACK message
5.1	4 bytes	Not used		0xFFFFFFFF

4.18 Set Independent LED Brightness (1-6)				
Description	Set LED runtime intensity (1-6). Available only if "New light control" enabled			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA->VM6			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		0x3A - Set LED runtime intensity, from logic channel 1 to 6.
2.1		Set LED runtime intensity of Logical Channel 1		0-250, Percentage, 0.4%/bit, data range 0-100% 251-255, not used
3.1		Set LED runtime intensity of Logical Channel 2		
4.1		Set LED runtime intensity of Logical Channel 3		
5.1		Set LED runtime intensity of Logical Channel 4		
6.1		Set LED runtime intensity of Logical Channel 5		
7.1		Set LED runtime intensity of Logical Channel 6		
8.1		Not Used		

4.19 Set Independent LED Brightness (7-12)				
Description	Set LED runtime intensity (7-12). Available only if "New light control" enabled			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA -> VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		0x3B - Set LED runtime intensity, from logic channel 7 to 12.
2.1		Set LED runtime intensity of Logical Channel 7		0-250, Percentage, 0.4%/bit, data range 0-100% 251-255, not used.
3.1		Set LED runtime intensity of Logical Channel 8		
4.1		Set LED runtime intensity of Logical Channel 9		
5.1		Set LED runtime intensity of Logical Channel 10		
6.1		Set LED runtime intensity of Logical Channel 11		
7.1		Set LED runtime intensity of Logical Channel 12		
8.1		Not Used		

4.20 Set Baud Rate				
Description	Set Baud Rate			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA -> VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		234- Set Baud Rate
2.1		Type of Baud Rate		0- Set baud rate of 250K bps 1- Set baud rate of 500K bps.
3.1	6 bytes	Not used		0xFFFFFFFFFFFF

Note: The reconfigured baud rate will not take effect until exiting the configuration mode or power cycling the module

4.21 Set Auto Sleep				
Description	Set Baud Rate			
PF	239			
PS	DA, The source address of the VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA-> VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Control Byte		235 - Set Auto Sleep
2.1		Set Auto Sleep or not		0- Set Auto Sleep 1- Cancel Auto Sleep.
3.1	6 bytes	Not used		0xFFFFFFFFFFFF

When Auto Sleep is valid (the default setting), The VM-Series Module will enter sleep mode a minute later if it doesn't receive any messages from the CAN Bus. Following this it will not transmit the message of its status, and all LEDs will be turned off.

4.22 Configuration exit				
Description	Reception of the command to change the mode of VM-Series Module			
PF	239			
PS	DA, The source address of VM-Series Module			
PGN	61184(0XEF00)			
Default Priority	6			
DLC	8			
Update Rate	Upon command			
Direction	CA-> VM-Series Module			
Start	Length	Description	SPN	Value
1.1	1 byte	Value of changing the mode.		0 - Boot Mode 1 - Run Mode 2 - Sleep Mode 3 - Diagnostic Test Mode 5 - Configuration Mode
2.1	7 Bytes	unused		All bytes set to 255

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