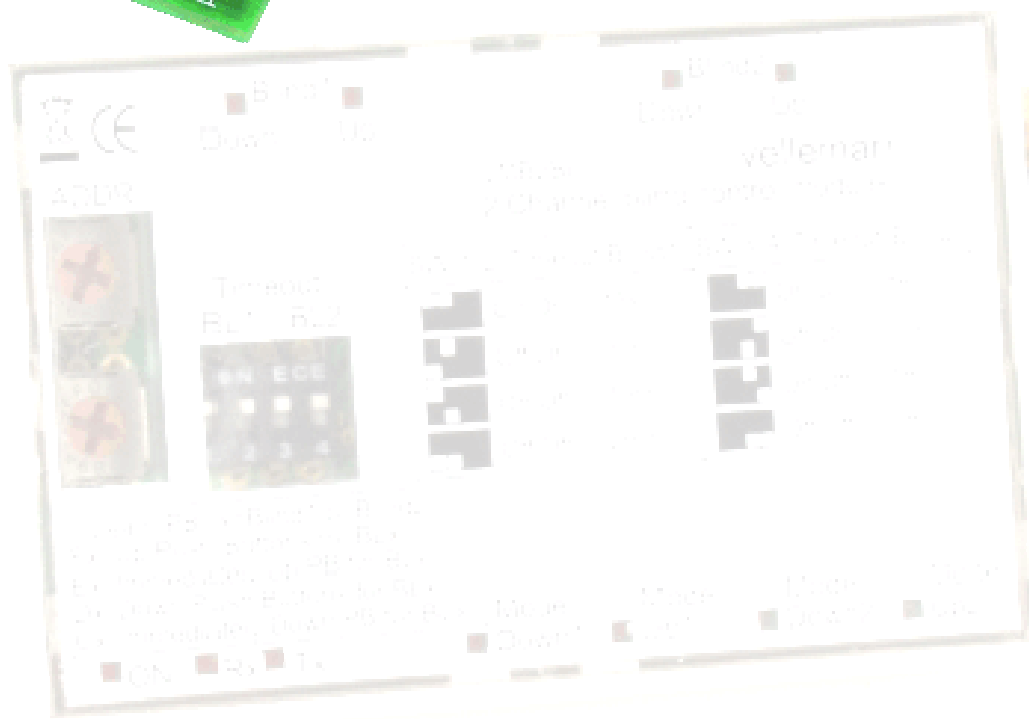# VMB1USB

USB interface
PROTOCOL

Data protocol

<STX><1-1-1-1-1-0-SID10-SID9><SID8...SID1><SID0-RTR-0-0-DLC3...0>
[<DATABYTE1>...<DATABYTE8>]<CHECKSUM><ETX>

Byte	Description
<STX>	start of transmission (H'0F')
<111110-SID10-SID9>	standard identifier bit 10 & 9
<SID8-SID1>	standard identifier bit 8...1
<SID0-RTR-00-DLC3...DLC0>	SID0 = standard identifier bit 0 RTR = remote transmit request DLC3…DLC0 = number of data bytes
<DATABYTE1>...<DATABYTE8>	data
<CHECKSUM>	two's complement of sum of previous bytes
<ETX>	end of transmission (H'04')

'Bus off' message received:
  <STX><H'F8'><H'00'><H'01'><COMMAND_BUS_OFF><CHECKSUM><ETX>
  remark: COMMAND_BUS_OFF = H'09'

'Bus active' message received:
  <STX><H'F8'><H'00'><H'01'><COMMAND_BUS_ACTIVE><CHECKSUM><ETX>
  remark: COMMAND_BUS_OFF = H'0A'

'Receive buffer full' message received:
  <STX><H'F8'><H'00'><H'01'><COMMAND_RX_BUFFER_FULL><CHECKSUM><ETX>
  remark: COMMAND_RX_BUFFER_FULL = H'0B'

'Receive Ready' message received:
  <STX><H'F8'><H'00'><H'01'><COMMAND_RX_READY><CHECKSUM><ETX>
  remark: COMMAND_RX_READY = H'0C'

'Interface status request' send:
  <STX><H'F8'><H'00'><H'01'><CMD_INTERFACE_STATUS_REQUEST><CHECKSUM><ETX>
  remark: CMD_INTERFACE_STATUS_REQUEST = H'0E'
  When the receive buffer of the interface module is full, no interface status will be returned.

VELBUS protocol

Binary format:
<SOF-SID10...SID0-RTR-IDE-r0-DLC3...0-DATABYTE1...DATABYTEn-CRC15...CRC1-CRCDEL-ACK-ACKDEL-EOF7...EOF1-IFS3...IFS1>

bits	Description
SOF	Start Of Frame (always 0)
SID10 & SID9	Priority (00: highest … 11: lowest priority)
SID8…SID1	Address
SID0	Always 0
RTR	Remote Transmit Request
IDE	Identifier Extension (always 0)
r0	reserved (always 0)
DLC3…DLC0	Data Length Code (0…8)
Databyte1	Command
Databyte2	Parameter
Databyte3	Parameter
Databyte4	Parameter
Databyte5	Parameter
Databyte6	Parameter
Databyte7	Parameter
Databyte8	Parameter
CRC15…CRC1	Cyclic Redundancy Checksum
CRCDEL	CRC Delimiter (always 1)
ACK	Acknowledge slot (transmit 1 readback 0 if received correctly)
ACKDEL	Acknowledge Delimiter (always 1)
EOF7...EOF1	End Of Frame (always 1111111)
IFS3...IFS1	InterFrame Space (always 111)