Vestamatic

IF SMI RS-485

Art.-no.:
01092810 + 01092811

IF SMI RS-485 LoVo Art.-no.: 01092810

RS-485 SMI-Interface for 16 SMI LoVo motors.

IF SMI RS-485 230VAC Art.-no.: 01092811

RS-485 SMI-Interface for 16 SMI motors.

Installation and Operating Instructions

Contents

1. What is SMI?
2. Safety precautions
3. Technical data
4. Hardware
   - 4.1 Overview IF SMI RS-485
     - 4.1.1 RS-485 BUS
     - 4.1.2 Power supply
     - 4.1.3 SMI BUS
     - 4.1.4 Master Up/Down button
     - 4.1.5 Base Address
   - 4.2 Termination RS-485 BUS
5. Protocol
   - 5.1 Message structure
   - 5.2 CRC16 Calculation
   - 5.3 Steer commands
     - 5.3.1 MSG_UP
     - 5.3.2 MSG_DOWN
     - 5.3.3 MSG_STOP
     - 5.3.4 MSG_STEP_UP
     - 5.3.5 MSG_STEP_DOWN
     - 5.3.6 MSG_SET_POS
     - 5.3.7 MSG_SET_TILT
     - 5.3.8 MSG_SET_POS_STEP_UP
     - 5.3.9 MSG_SET_POS_STEP_DOWN
     - 5.3.10 MSG_GOTO_POS1
     - 5.3.11 MSG_GOTO_POS2
   - 5.4 Maintenance commands
     - 5.4.1 MSG_VERSION
     - 5.4.2 MSG_AUTO_ADDR
     - 5.4.3 MSG_GET_SER
     - 5.4.4 MSG_SET_SMIID
     - 5.4.5 MSG_GET_PAR
     - 5.4.6 MSG_GET_POS1
     - 5.4.7 MSG_SET_POS1
     - 5.4.8 MSG_GET_POS2
     - 5.4.9 MSG_SET_POS2
   - 5.5 Status commands
     - 5.5.1 MSG_GETGENSTAT
     - 5.5.2 MSG_GETDETSTAT
6. PC Test Software
   - 6.1 Communication
   - 6.2 Motor Mask based commands
   - 6.3 Motor ID based commands
   - 6.4 General commands
   - 6.5 Send / Receive
7. Wiring diagrams
   - 7.1 IF SMI RS-485 LoVo
   - 7.2 IF SMI RS-485 230VAC

1. What is SMI?

SMI is the abbreviation for **S**tandard **M**otor **I**nterface. SMI has been developed for the connection of intelligent drives for roller shutters and sun protection systems. SMI enables to transmit telegrams from control system to the drive and vice versa. With SMI it is possible to combine products from different sources together. The SMI Interface should spread high value solutions and promote drives and controls on the market. The applications in roller shutters and sun protection systems require extreme robustness and economic efficiency. SMI has been developed to meet these requirements.

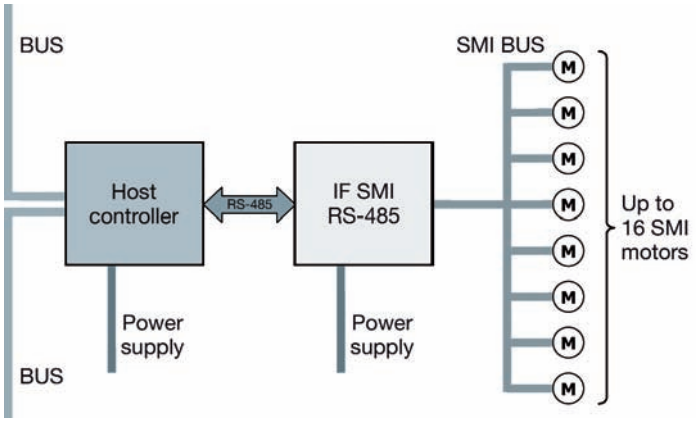
2. Safety precautions

- Contact a professional electrician for installation.
- Check the control system for signs of mechanical damage after unpacking. If you notice any shipping damage, do not start up the control system and notify your supplier immediately.
- The control system should only be used for the purpose specified by the manufacturer (refer to the operating instructions). Any changes or modifications thereof are not permissible and will result in loss of all warranty claims.
- If the control unit cannot be operated without presenting a hazard, it must be switched off and prevented from being switched on unintentionally.
- Turn off the power supply and prevent it from being switched on unintentionally before performing work on any windows, control or sunshades driven by the control system.

3. Technical data

Supply voltage 230VAC:	230VAC, 50 Hz
Impulse voltage withstand level:	2.5 kV
Rated power:	2 W
Operating temperature:	0 °C (32 °F) to +40 °C (104 °F)
Software class:	A
IP class:	IP 54
Degree of contamination:	2
Dimensions (L × W × D):	115 × 115 × 60 mm
Mark of conformity:	CE

4. Hardware



The IF SMI RS-485 can be used for SMI (230VAC) or SMI LoVo applications.

Important: It is not allowed to use a combination of SMI (230VAC) and SMI LoVo on the same SMI BUS.

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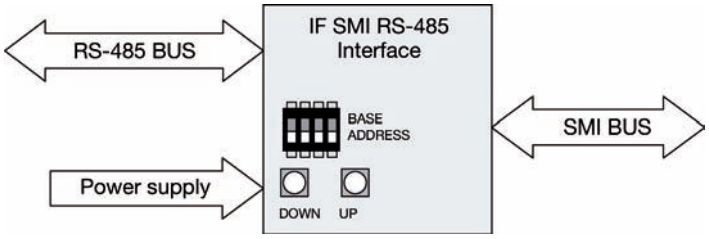
Subject to modifications.

4.1 Overview IF SMI RS-485



The IF SMI RS-485 module is an intelligent module that translates RS-485 commands to SMI commands.

4.1.1 RS-485 BUS

The communication BUS between Host controller and IF SMI RS-485 module is RS-485. The following configuration is used:

- Baud rate: 19200
- Data bits: 8
- Stop bits: 1
- Parity: None
- Signal: -7V to +10V Common-Mode Input Voltage Range

4.1.2 Power supply

The IF SMI RS-485 module needs the following power supply signals:

- L, N (230VAC/50Hz)

4.1.3 SMI BUS

The SMI bus exists out of the following signals:

- I+ (SMI BUS)
- I- (SMI BUS)

4.1.4 Master Up/Down button

The IF SMI RS-485 has an master UP/DOWN button, to operate all connected SMI motors at simultaneously.

4.1.5 Base Address

The IF SMI RS-485 is selected by its base address. Each IF SMI RS-485 module connected to a shared RS-485 BUS must have an unique base address. A maximum of 16 IF SMI RS-485 modules can be connected to the same RS-485 BUS, which makes it possible to control 16 x 16 = 256 SMI motors.

4.2 Termination RS-485 BUS

A terminating resistor is simply a resistor placed at the extreme end or ends of a cable. The value of the terminating resistor is ideally the same value as the characteristic impedance of the cable.

Proper Termination Location RT = Z_0 R_T = 120Ω

Twisted pair with characteristic impedence of Z_0 Example: Z_0 = 120Ω

Proper Termination Location RT = Z_0 R_T = 120Ω

As a general rule moreover, termination resistors should be placed at *both* far ends of the cable. Although properly terminating both ends is absolutely critical for most system designs, it can be argued that in one special case only one termination resistor is needed. This case occurs in a system when there is a single transmitter and that single transmitter is located at the far end of the cable. In this case there is no need to place a termination resistor at the end of the cable with the transmitter, because the signal is intended to always travel away from this end of the cable.

There is a Terminating resistor with a value of 120 Ω delivered by every IF SMI RS-485 module. If the Terminating resistor is recommended than he must be placed between the A and B from the connector on the PCB.

5. Protocol

This chapter describes the communication protocol between the IF SMI RS-485 module and Host controller.

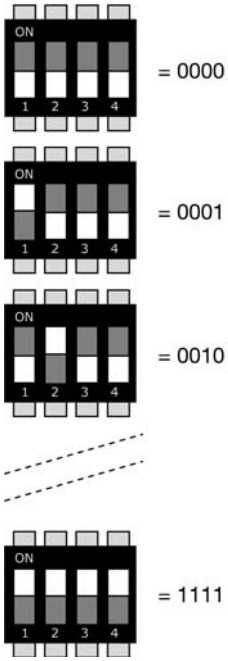
5.1 Message structure

[SID] [LEN] [CMD] [DATA] [CRC16]

SID	Slave ID
LEN	Message length (without CRC)
CMD	Command byte
DATA	Optional data bytes
CRC16	16 bits checksum (LSB first)

The IF SMI RS-485 module has 4 DIP switches, which represents the base address of the module from 0 to 15 (decimal) or 0 to F (hexadecimal). The base address is part of the Slave ID:

DIP switch	Base address	Slave ID
0000	0	0xC0
0001	1	0xC1
0010	2	0xC2
0011	3	0xC3
0100	4	0xC4
0101	5	0xC5
0110	6	0xC6
0111	7	0xC7
1000	8	0xC8
1001	9	0xC9
1010	10	0xCA
1011	11	0xCB
1100	12	0xCC
1101	13	0xCD
1110	14	0xCE
1111	15	0xCF



5.2 CRC16 Calculation

Example code CRC16 calculation in C-language:

```
#define CRC_CONSTANT    0xA001

word Crc16 (byte* pb, byte len)
{
      byte i;
      word crc;

      for (crc=0xffff; len--; pb++)
      {
            crc ^= (byte)*pb;
            for (i=8; i--; )
                  if (crc & 0x01)
                  {
                        crc >>= 1;
                        crc ^= CRC_CONSTANT;
                  }
                  else
                        crc >>= 1;
      }
      // return crc result
      return crc;
}
```

5.3 Steer commands

```
#define MSG_UP                  0x10
#define MSG_DOWN                0x11
#define MSG_STOP                0x12
#define MSG_STEP_UP             0x13
#define MSG_STEP_DOWN           0x14
#define MSG_SET_POS             0x15
#define MSG_SET_TILT            0x16
#define MSG_SET_POS_STEP_UP     0x17 (Software V10D or higher)
#define MSG_SET_POS_STEP_DOWN   0x18 (Software V10D or higher)
#define MSG_GOTO_POS1           0x19 (Software V10E or higher)
#define MSG_GOTO_POS2           0x1A (Software V10E or higher)
```

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5.3.1 MSG_UP

This message is used to move all, or a set of sun blind, to the **top** position.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.

When bit *n* in mask is set, SMI motor with address *n* is addressed and executes a **UP** command.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.2 MSG_DOWN

This message is used to move all, or a set of sun blind, to the **lower** position.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.

When bit *n* in mask is set, SMI motor with address *n* is addressed and executes a **DOWN** command.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.3 MSG_STOP

This message is used to stop all, or a set of sun blind.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.4 MSG_STEP_UP

This message is used to relatively move all, or a set of sun blind, in **UP** direction.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [NSTEP] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.
[NSTEP]: Number of steps (1..255) in **UP** direction. 1 step is defined as 2° rotation of the output shaft of the SMI motor.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.5 MSG_STEP_DOWN

This message is used to relatively move all, or a set of sun blind, in **DOWN** direction.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [NSTEP] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.
[NSTEP]: Number of steps (1..255) in **DOWN** direction. 1 step is defined as 2° rotation of the output shaft of the SMI motor.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.6 MSG_SET_POS

This message is used to move all, or a set of sun blind, to an absolute position.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [POS0] / [POS1] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.

[MSK1]: MSB of 16-bit mask to select motor address 8..16.
[POS0]: LSB of 16-bit absolute position.
[POS1]: MSB of 16-bit absolute position.

The absolute position value is defined as below:
0x0000 is the top position (0%).
0x8000 is the middle position (50%).
0xFFFF is the bottom position (100%).

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.7 MSG_SET_TILT

This message is used to move all, or a set of venetian blinds, in a absolute tilt orientation.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [TILT] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.
[TILT]: Absolute tilt orientation (0..255).

Absolute tilt orientation is defined as follow:
127 (0x7F) slats completely closed in down direction
0 (0x00) slats completely open (horizontal)
-128 (0x80) slats completely closed in up direction

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

Remark: The MSG_SET_TILT message uses a manufacturer specific SMI command, which is currently only supported by Vestamatic SMI motors.

5.3.8 MSG_SET_POS_STEP_UP

This message is used to move all, or a set of venetian blinds, to an absolute position combined with an relative **up** command.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [POS0] / [POS1] / [NSTEP] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.
[POS0]: LSB of 16-bit absolute position.
[POS1]: MSB of 16-bit absolute position.
[NSTEP]: Number of steps (1..255) in **UP** direction. 1 step is defined as 2° rotation of the output shaft of the SMI motor.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT. The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.9 MSG_SET_POS_STEP_DOWN

This message is used to move all, or a set of venetian blinds, to an absolute position combined with an relative **down** command.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [POS0] / [POS1] / [NSTEP] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.
[POS0]: LSB of 16-bit absolute position.
[POS1]: MSB of 16-bit absolute position.
[NSTEP]: Number of steps (1..255) in **DOWN** direction. 1 step is defined as 2° rotation of the output shaft of the SMI motor.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT. The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

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5.3.10 MSG_GOTO_POS1

This message is used to move all, or a set of venetian blinds, to intermediate position 1.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT. The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.3.11 MSG_GOTO_POS2

This message is used to move all, or a set of venetian blinds, to intermediate position 2.

Message: [SID] / [LEN] / [CMND] / [MSK0] / [MSK1] / [CRC16]

[MSK0]: LSB of 16-bit mask to select motor address 0..7.
[MSK1]: MSB of 16-bit mask to select motor address 8..16.

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT. The position of each sun blind can be obtained by the detailed response message MSG_GETDETSTAT.

5.4 Maintenance commands

```
#define MSG_VERSION     0x20
#define MSG_AUTO_ADDR   0x21
#define MSG_GET_SER     0x22
#define MSG_SET_SMIID   0x23
#define MSG_GET_PAR     0x24
#define MSG_GET_POS1    0x28
#define MSG_SET_POS1    0x29
#define MSG_GET_POS2    0x2A
#define MSG_SET_POS2    0x2B
```

5.4.1 MSG_VERSION

This message is used to check to version number of the application.

Message: [SID] / [LEN] / [CMND] / [CRC16]

Response: [SID] / [LEN] / [CMND / [HARD] / [VMAJ] / [VMIN] / [REV] / [CRC16].

[HARD]: An alphanumeric char to identify the hardware platform.
[VMAJ]: The major software version number (from 0 to 255).
[VMIN]: The minor software version number (from 0 to 255).
[REV]: An alphabetic char to identify the internal revision letter (from A to V), X is reserved for specific test software version.

5.4.2 MSG_AUTO_ADDR

This message is used to start the SMI auto address procedure. Motor address conflicts will be solved and every motor becomes an unique address (0..15). This procedure can take up to 60 seconds to solve all the address conflicts.

Message: [SID] / [LEN] / [CMND] / [CRC16]

The IF SMI RS-485 module responds to this request with a general status message MSG_GETGENSTAT.

5.4.3 MSG_GET_SER

This message is used to return the serial number and the SMI ID of a specific sun blind.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [CRC16]

[SMIID]: SMI address of motor (0..15)

Response: [SID] / [LEN] / [CMND] / [SMIID] / [SER0] / … / [SER3] / [CRC16]

[SMIID]: SMI address of motor (0..15)
[SER0..3]: The serial number of the specified SMI motor. The serial number is always 4 bytes.

5.4.4 MSG_SET_SMIID

This message is used to set the SMI ID of a specific sun blind address by its serial number.

Message: [SID] / [LEN] / [CMND] / [SER0] / … / [SER3] / [SMIID] / [MAN] / [CRC16]

[SER0..3]: The serial number of the specified SMI motor. The serial number is always 4 bytes.
[SMIID]: SMI address of motor (0..15) to set.
[MAN]: Manufacturer ID of SMI motor. Manufacturer ID for a Vestamatic motor is 6.

Response: [SID] / [LEN] / [CMND] / [SER0] / … / [SER3] / [SMIID] / [MAN] / [CRC16]

[SER0..3]: The serial number of the specified SMI motor.
[SMIID]: SMI address of motor (0..15). When high-nibble if SMI ID is 0xF0, an error occurred during SMI ID set.
[MAN]: Manufacturer ID of SMI motor.

It can take up to 60 seconds before the GETGENSTAT response is updated with the new SMI ID.

5.4.5 MSG_GET_PAR

This message is used to get the value of any private protected parameters of a specific motor.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [PAR0] / [PAR1] / [PLEN] / [CRC16]

[SMIID]: SMI address of motor (0..15)
[PAR0..1]: Index of the motor parameter.
[PLEN]: Length of parameter (1, 2 or 4 bytes)

Response: [SID] / [LEN] / [CMND] / [SMIID] / [VAL0] / … / [VALn] / [CRC16]

[SMIID]: SMI address of motor (0..15)
[VAL0..n]: Parameter value (1, 2 or 4 bytes in size)

5.4.6 MSG_GET_POS1

This message is used to get (read) the stored intermediate position 1.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [CRC16]

[SMIID]: SMI address of motor (0..15)

Response: [SID] / [LEN] / [CMND] / [SMIID] / [POS0] / [POS1] / [CRC16]

[SMIID]: SMI address of motor (0..15).
When high-nibble of SMI address is 0xF0, an error occurred during GET_POS1.
[POS0]: LSB of 16-bit intermediate position 1.
[POS1]: MSB of 16-bit intermediate position 1.

The intermediate position value is defined as below:
0x0000 is the top position (0%).
0x8000 is the middle position (50%).
0xFFFF is the bottom position (100%).

5.4.7 MSG_SET_POS1

This message is used to set (write) intermediate position 1.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [POS0] / [POS1] / [CRC16]

[SMIID]: SMI address of motor (0..15)
[POS0]: LSB of 16-bit intermediate position 1.
[POS1]: MSB of 16-bit intermediate position 1.

Response: [SID] / [LEN] / [CMND] / [SMIID] / [POS0] / [POS1] / [CRC16]

[SMIID]: SMI address of motor (0..15).
When high-nibble of SMI address is 0xF0, an error occurred during SET_POS1.
[POS0]: LSB of 16-bit intermediate position 1.
[POS1]: MSB of 16-bit intermediate position 1.

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5.4.8 MSG_GET_POS2

This message is used to get (read) the stored intermediate position 2.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [CRC16]

[SMIID]: SMI address of motor (0..15)

Response: [SID] / [LEN] / [CMND] / [SMIID] / [POS0] / [POS1] / [CRC16]

[SMIID]: SMI address of motor (0..15). When high-nibble of SMI address is 0xF0, an error occurred during GET_POS2.

[POS0]: LSB of 16-bit intermediate position 2.
[POS1]: MSB of 16-bit intermediate position 2.

The intermediate position value is defined as below:
0x0000 is the top position (0%).
0x8000 is the middle position (50%).
0xFFFF is the bottom position (100%).

5.4.9 MSG_SET_POS2

This message is used to set (write) intermediate position 2.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [POS0] / [POS1] / [CRC16]

[SMIID]: SMI address of motor (0..15)
[POS0]: LSB of 16-bit intermediate position 2.
[POS1]: MSB of 16-bit intermediate position 2.

Response: [SID] / [LEN] / [CMND] / [SMIID] / [POS0] / [POS1] / [CRC16]

[SMIID]: SMI address of motor (0..15). When high-nibble of SMI address is 0xF0, an error occurred during SET_POS2.

[POS0]: LSB of 16-bit intermediate position 2.
[POS1]: MSB of 16-bit intermediate position 2.

5.5 Status commands

```
#define MSG_GETGENSTAT  0xA0
#define MSG_GETDETSTAT  0xA1
```

5.5.1 MSG_GETGENSTAT

This message requests the general status of the system.

Message: [SID] / [LEN] / [CMND] / [CRC16]

Response: [SID] / [LEN] / [CMND] / [PRES0] / [PRES1] / [RDY0] / [RDY1] / [CRC16].

[PRES0]: The LSB mask of the 8 first motors present on the SMI BUS.
[PRES1]: The MSB mask of the 8 last motors present on the SMI BUS.
[RDY0]: The LSB mask of the 8 first motors ready to operate on the SMI BUS.
[RDY1]: The MSB mask of the 8 first motors ready to operate on the SMI BUS.

Motor can always accept new commands; RDY0/RDY1 indicates if a motor is running (flag cleared) or motor is idle (flag set).

5.5.2 MSG_GETDETSTAT

This message is used to obtain the detailed status of a specified sunblind.

Message: [SID] / [LEN] / [CMND] / [SMIID] / [CRC16]

[SMIID]: SMI address of motor (0..15)

Response: [SID] / [LEN] / [CMND] / [SMIID] / [STATUS] / [POS0] / [POS1] / [TILT] / [CYCLE0] / .. / [CYCLE3] / [CRC16]

[SMIID]: SMI address of motor (0..15)
[STATUS]: Status of the motor
[POS0..1]: 16-bits absolute position value
[TILT]: Orientation of the slats

Remark: Tilt information uses a manufacturer specific SMI command, which is currently only supported by Vestamatic SMI motors. For non Vestamatic SMI-motors, TILT value 0x00 is returned.

[CYCLE0..3]: 32-bits cycle counter of the motor

Status Bit layout								
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Meaning
X	X	X	X	0	X	X	X	MOTOR ERROR OCCURED
X	X	X	X	1	0	0	0	UP + DOWN + STOP
X	X	X	X	1	0	0	1	DOWN + STOP
X	X	X	X	1	0	1	0	UP + STOP
X	X	X	X	1	0	1	1	ALL STOP
X	X	X	X	1	1	0	0	UP + DOWN
X	X	X	X	1	1	0	1	ALL DOWN
X	X	X	X	1	1	1	0	ALL UP
X	X	X	X	1	1	1	1	NOT VALID
1	1	1	1	X	X	X	X	INVALID SMI RESPONSE

6. PC Test Software

For testing your application, a freeware PC Software (Windows®) can be downloaded from our website **http://www.vestamatic.com.**

6.1 Communication

In the **"Communication"** section, select the RS-485 communication port of your PC, that is connected to the IF SMI RS-485 module. Also set the RS-485 base address. This must correspond with the DIP switch settings on the IF SMI RS-485 module. Press the "Open" button to open the communication channel.

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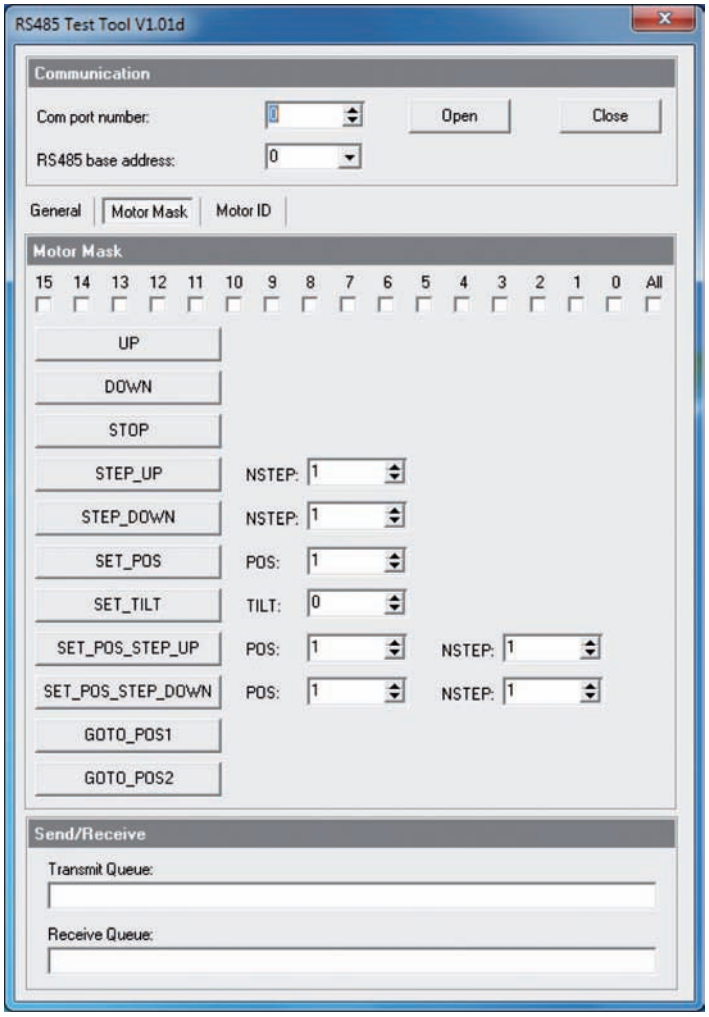
6.2 Motor Mask based commands

On the **"Motor Mask"** tab-sheet, you will find the "motor mask" based commands. With the checkboxes 15 to 0 you can select which motor(s) you want to address, or simply select "All", to address all motors. Next, press a command button, like "UP", "DOWN", "STOP", "STEP_UP", "STEP_DOWN", "SET_POS", "SET_TILT", "SET_POS_STEP_UP", "SET_POS_STEP_DOWN", "GOTO_POS1" or "GOTO_POS2".

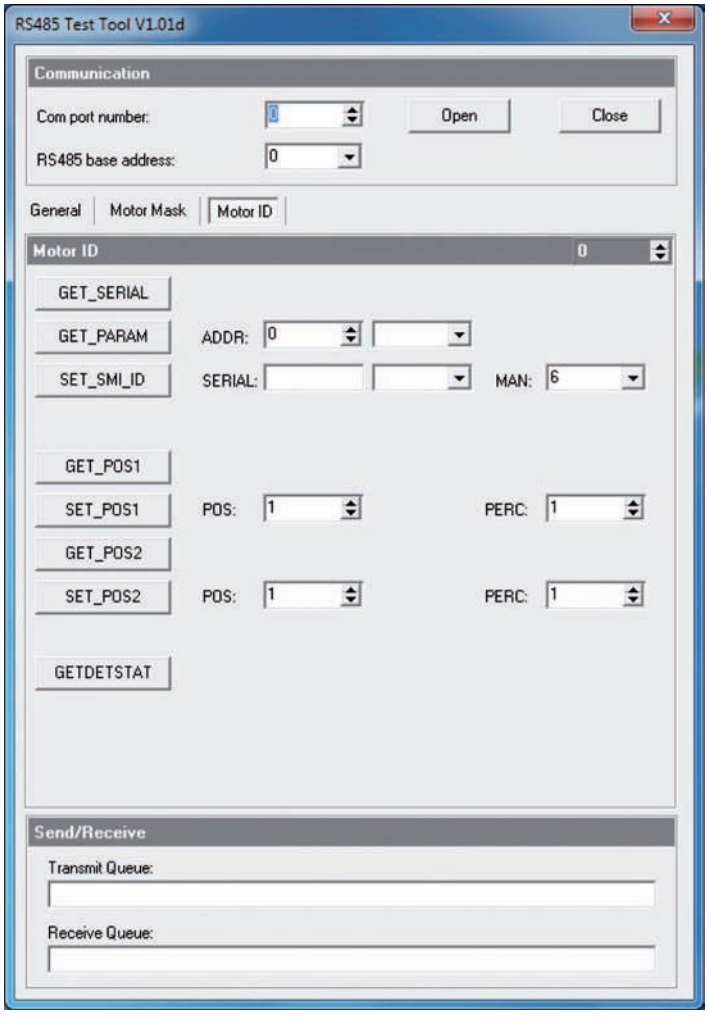
Remark: Some commands need additional parameters. See section **"5. Protocol"** for detailed information.



6.3 Motor ID based commands

On the **"Motor ID"** tab-sheet, you will find the "Motor ID" based commands. The motor you want to address, can be selected with the spin edit box (in the dark gray part, behind Motor ID). Motor ID can be set from "0" to "15". Next, press a command button, like "GET_SERIAL", "GET_PARAM", "SET_SMI_ID", "GET_POS1", "SET_POS1", "GET_POS2", "SET_POS2" or "GETDETSTAT".

Remark: Some commands need additional parameters. See section **"5. Protocol"** for detailed information.



6.4 General commands

On the **"General"** tab-sheet, you will find commands that don't have additional parameters.

VERSION: Get software version of IF SMI RS-485 module.

GETGENSTAT: Get general status (motor present / motor ready).

AUTO_ADDR: Start the auto-address sequence, in case of address conflicts.

6.5 Send / Receive

In the **"Send/Receive"** section, you can monitor the communication between PC and IF SMI RS-485 module. You will see the Transmit and Receive data stream.

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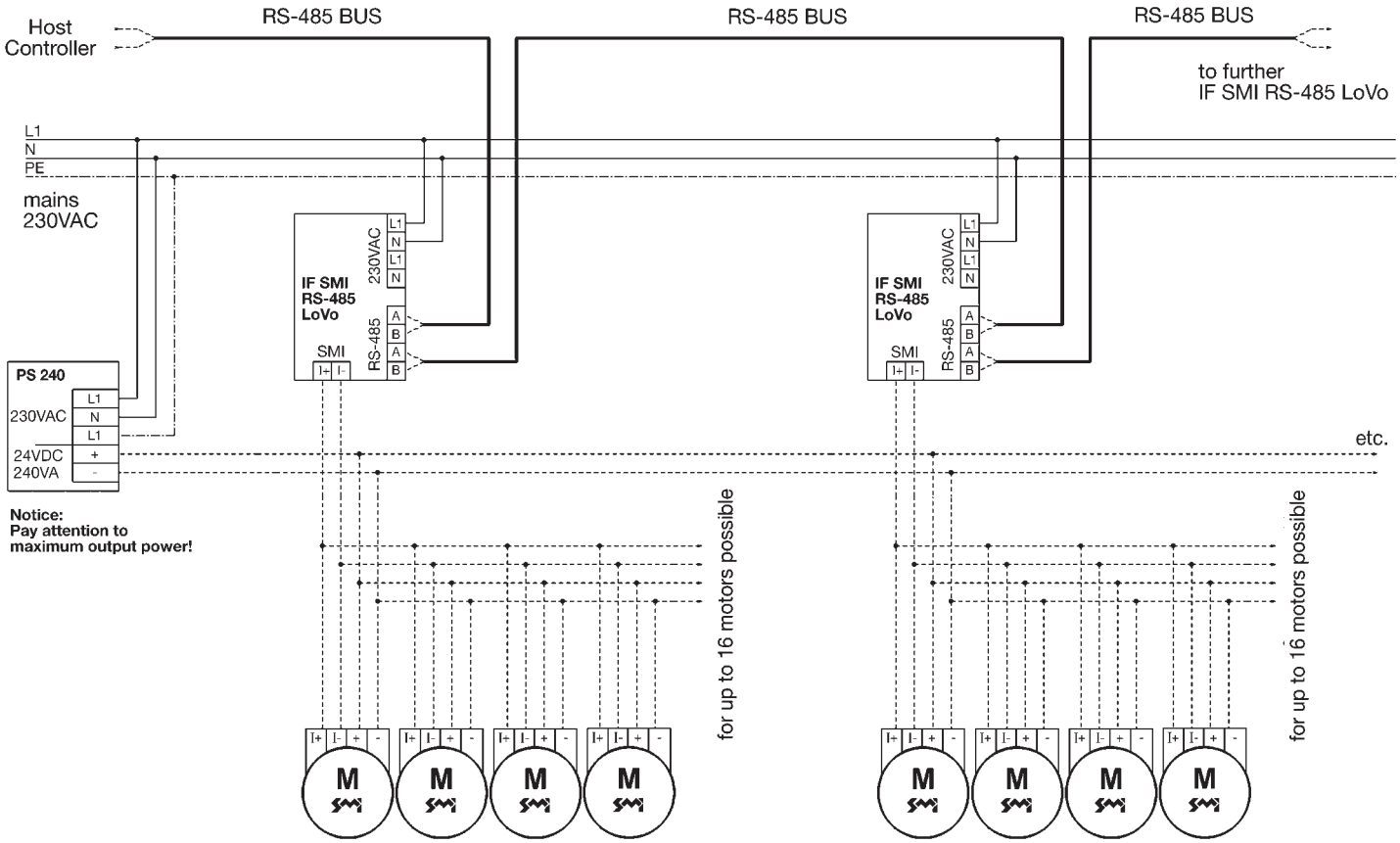
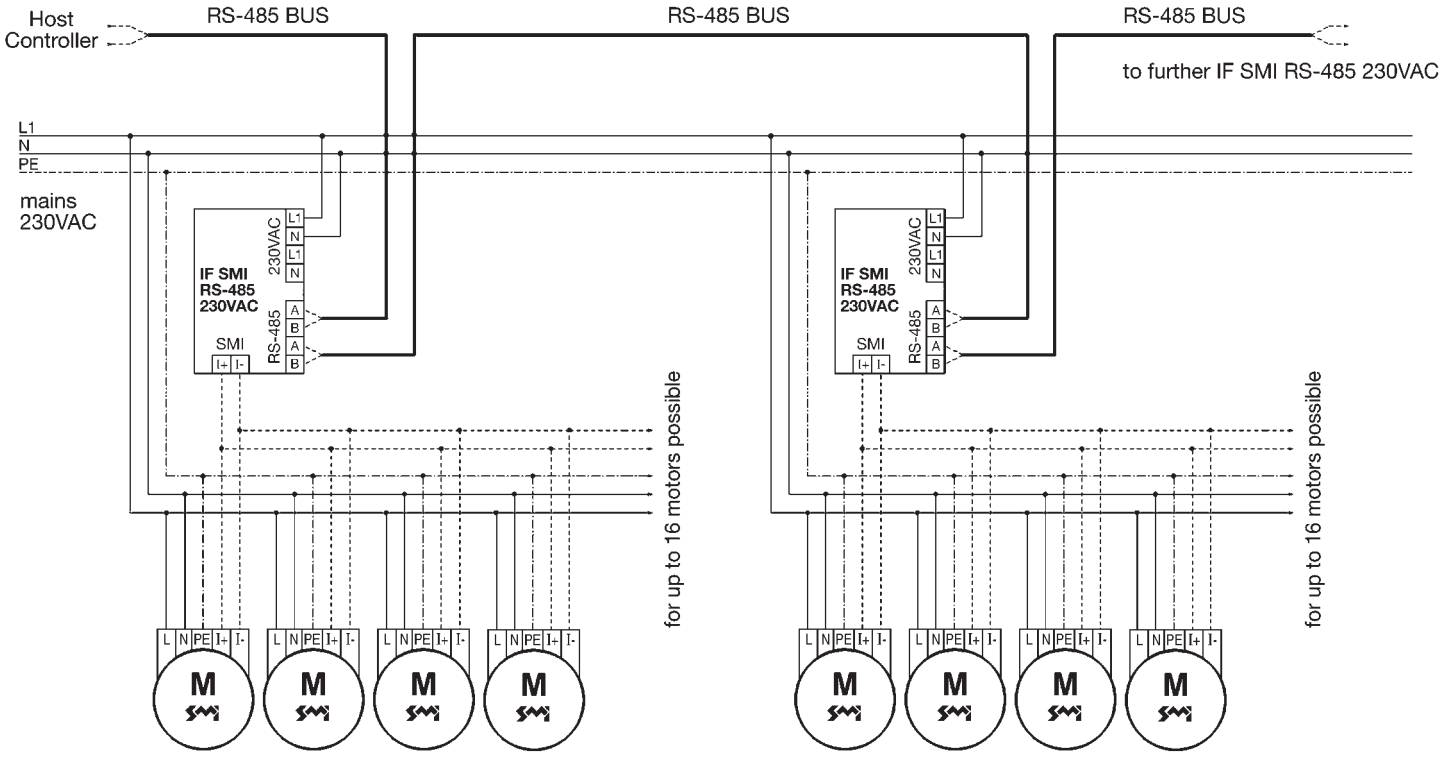
7.1 Wiring diagram – IF SMI RS-485 LoVo



7.2 Wiring diagram – IF SMI RS-485 230VAC



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