4.7 Expansion Module MAC00-FP2/FP4

MAC00-FP2
With cable glands

MAC00-FP4
With M12 connectors

TT1010GB

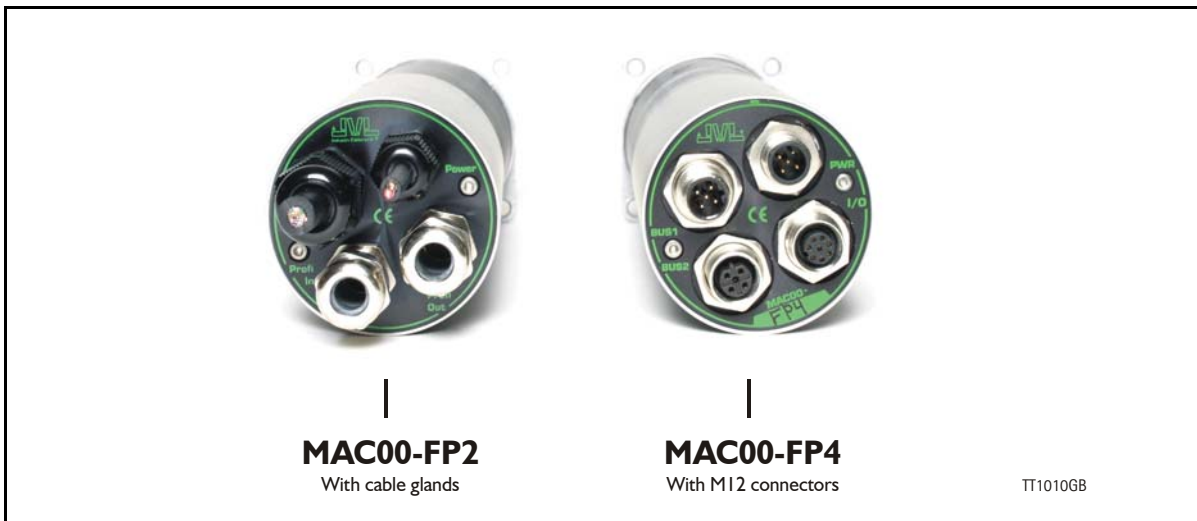### 4.7.1 Profibus module MAC00-FP2 and FP4 Introduction

The MAC00-FP2 and FP4 are Profibus-DP slaves. They are capable of running at Baud-rates up to 12Mbit.

All the registers[1] of the MAC motor can be read and written.

The modules include 6 inputs, 2 of which are end-limit inputs. These can be read from the Profibus-DP. The end-limit inputs can automatically halt the motor. The other inputs can be used to activate different movements.

The MAC motor is controlled by writing to the input data (9 bytes).

The expansion modules MAC00-FP2 and FP4 can be mounted on standard MAC motors MAC50, MAC95, MAC140, MAC141, MAC400 and MAC800.

Both modules offer the same functions but with the following hardware differences:

Type	Protection class	Connectors		
		I/O and interface	Power supply	Bus interface
MAC00-FP2	IP67/IP65*	Cable glands (Mini crimp connec-tors internally	Cable glands (Screw terminals internally)	Cable glands x 2 (Screw terminals internally)
MAC00-FP4	IP67/IP65*	M12	M12	M12 B-coded (x2)

Note*: IP65 on MAC400-800

Both modules are delivered without any cables as standard.
Optionally the MAC00-FP2 module can be delivered with cable in selected lengths. Also cables for the MAC00-FP4 with M12 connectors are available.
The first part of this section deals with the common features of both modules. Please see the latter pages for specific information about each module, such as example connection diagrams.
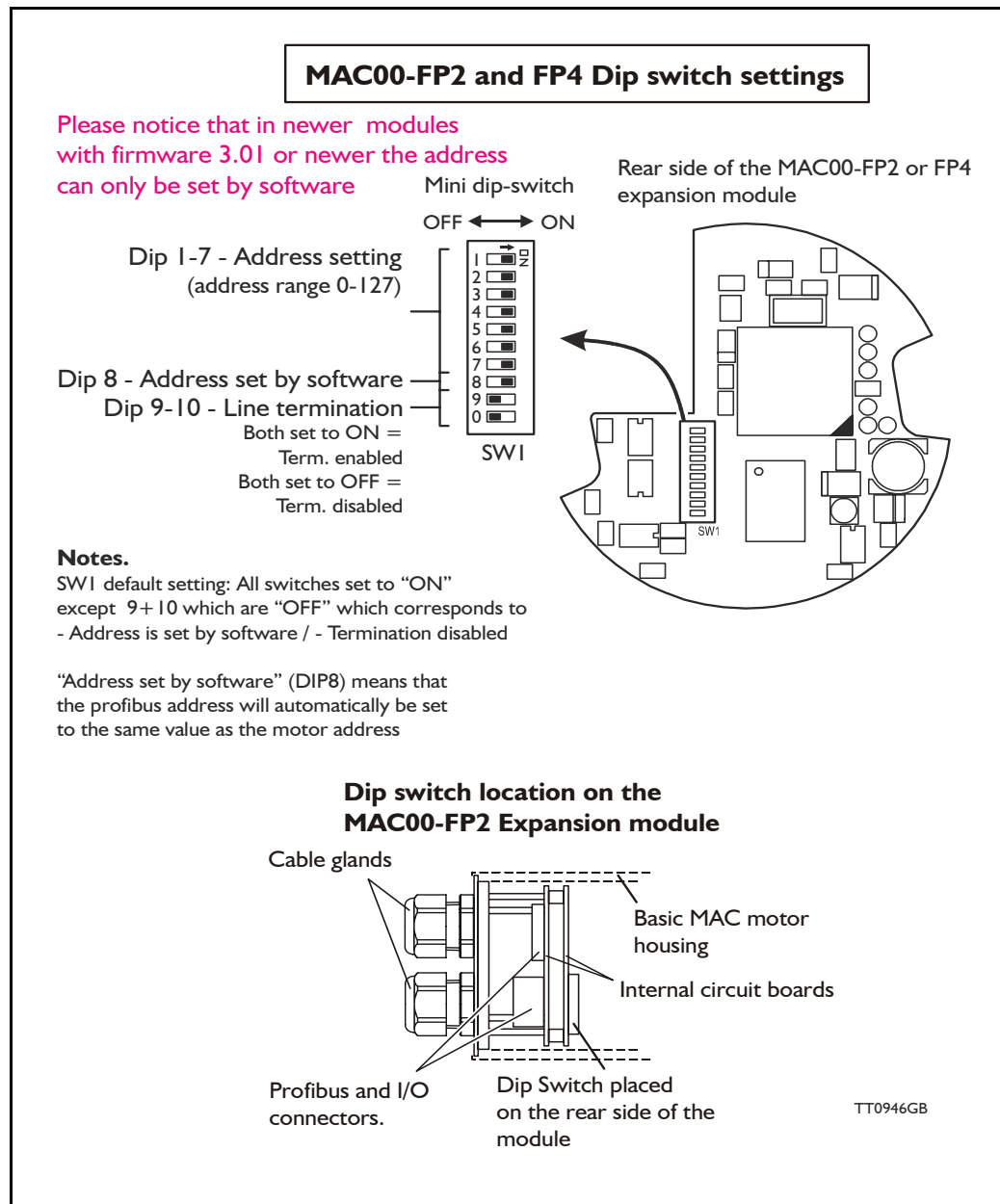
[1] A list of the typically used registers can be found in *Serial Quick Guide (MacTalk proto-col), page 357*.
[2] The FlexMac commands are described in *FastMac commands, page 240*.

4.7 Expansion Module MAC00-FP2/FP4

4.7.2 MAC00-FP2 and FP4 Address and Termination setup

Each unit connected to the Profibus must be set up with a unique address.
The illustration below shows how the address and termination can be set on the internal dip switch. The dip switch is located on the internal circuit board.

MAC00-FP2 and FP4 Dip switch settings

Please notice that in newer modules with firmware 3.01 or newer the address can only be set by software

Mini dip-switch

OFF ◄———► ON

Rear side of the MAC00-FP2 or FP4 expansion module

Dip 1-7 - Address setting
(address range 0-127)

Dip 8 - Address set by software
Dip 9-10 - Line termination
Both set to ON =
Term. enabled
Both set to OFF =
Term. disabled

SW1

Notes.
SW1 default setting: All switches set to "ON" except 9+10 which are "OFF" which corresponds to
- Address is set by software / - Termination disabled

"Address set by software" (DIP8) means that the profibus address will automatically be set to the same value as the motor address

Dip switch location on the MAC00-FP2 Expansion module

Cable glands

Basic MAC motor housing

Internal circuit boards

Profibus and I/O connectors.

Dip Switch placed on the rear side of the module

TT0946GB

Important: On newer modules with firmware 3.01 or 3.02 the dip switch 1 to 8 has been disabled and the address can only be set in software by using for example MacTalk. Please contact your JVL distributor if it is crucial to use the dip switch for address setup.

4.7 Expansion Module MAC00-FP2/FP4

4.7.3 Output data (Master->Slave)

The MAC00-FP2/FP4 module contains 9 bytes of output data.

Address	Name	Description
0	Write data 3 (MSB)	Data to write to register
1	Write data 2	--- " ---
2	Write data 1	--- " ---
3	Write data 0 (LSB)	--- " ---
4	Write register selector	The register to write
5	Read register selector	The register to read
6	Direct register	Direct FlexMac command
7	Command	Bits for commanding reads/write
8	Input setup	Bits for input setup

Write data

For 16 bit registers, the data must be placed in Write data 0 and Write data 1.
For 32 bit registers, the data must be placed in Write data 0-3.

Write register selector

The number of the register to write to should be placed here. The register must be in the range 1-255.

Read register selector

The number of the register to read from should be placed here. The register must be in the range 1-255.

Direct register

This register can be used to execute a FlexMac[2] command. When writing to this Register, the command will be executed immediately. The bit 0-6 is the command, and bit 7 is not used. If the same command is to be executed twice, bit 7 can be toggled. The command is accepted when the "Last direct register", in the input data, has the same value as this register.

4.7 Expansion Module MAC00-FP2/FP4

Command

Bit	7	6	5	4	3	2	1	0
Function	Write Toggle	Read Toggle	Write 32 bit	Read 32 bit	Auto write	Auto read	Reserved	Reserved

Bit 7 (Write toggle) is used for writing data to the selected register (Write register selector). When this bit is toggled, writing is executed. The write command is accepted when Bit 7 in the command status (output data byte 7) is equal to this bit.

Bit 6 (Read toggle) is used for reading data from the selected register (Read register selector). When this bit is toggled, reading is executed. The read command is accepted when Bit 6 in the command status (output data byte 7) is equal to this bit.

Bit 5 (Write 32 bit) Set this to 1 if writing to a 32 bit register and 0 if writing to a 16 bit register.

Bit 4 (Read 32 bit) Set this to 1 if reading from a 32 bit register and 0 if reading from a 16 bit register.

Bit 3 (Auto write) When this bit is 1, the data written in write data 0-3, is transferred to the MAC motor immediately, regardless of the write toggle bit.

Bit 2 (Auto read) When this bit is 1, the data in read data 0-3 is updated all the time, regardless of the read toggle bit.

Bit 1and Bit 0 should be 0.

Input setup

Bit	7	6	5	4	3	2	1	0
Function	-	Reset end limit	PL Enable	NL Enable	Input mode			

Bit 6   (Reset end-limit) When this bit is 1, the end limit condition is reset, if no end limits are activated.

Bit 5   (PL Enable) When this bit is 1, the positive end-limit is enabled.

Bit 4   (NL Enable) When this bit is 1, the negative end-limit is enabled.

Bit 3-0   (Input mode) these bits select the current input mode. See section *Input modes, page 238* for details.

4.7 Expansion Module MAC00-FP2/FP4

4.7.4 Write to a register example

If a new velocity need to be written to the motor it is done after this step by step procedure.

1. Write the new speed value to the 4 databytes (32 bits) on address 0 to 3.

2. Setup the register number where the data must be written to.
   In this case its the velocity register which is register 5 so this number must be written into the "write register selector" address 4.

3. In the "Command" register at address 7 the "Write 32bit" and the "Write toggle" must be toggled.

4. Wait until the "Write toggle" bit in the "Command status" register is the same as the "write toggle" in the "Command" register. Only when they are equal the write cycle is completely finished.

Definitions:

Toggle: Change to opposite state. (from 0 to 1 or from 1 to 0). On bit level it correspond to making an inverse of the bit.

4.7 Expansion Module MAC00-FP2/FP4

4.7.5 Input data (Slave->Master)

The MAC00-FP2/4 contains 8 bytes of input data.

Address	Name	Description
0	Read data 3 (MSB)	Data read from register
1	Read data 2	--- " ---
2	Read data 1	--- " ---
3	Read data 0	--- " ---
4	Motor status	Status bits for the motor
5	Input status	Status of inputs
6	Last direct register	Last accepted direct FlexMac command
7	Command Status	Status bits for commands

Read Data

For 16 bit registers, the read value will be placed in Read data 0 and Read data 1.
For 32 bit registers, the read value will be placed in Read data 0-3.

Motor status

Bit	7	6	5	4	3	2	1	0
Function	-	Decelerating	Accelerating	In position	-	-	-	Error

Bit 6 (Decelerating) this bit is 1 when the motor is decelerating.

Bit 5 (Accelerating) this bit is 1 when the motor is accelerating.

Bit 4 (In position) this bit is 1 when the motor has reached its commanded position.

Bit 0 (Error) this bit is 1 when a motor error has occurred.

Input status

Bit	7	6	5	4	3	2	1	0
Function	-	-	PL	NL	IN4	IN3	IN2	IN1

Bit 5 (PL) Positive limit input.

Bit 4 (NL) Negative limit input.

Bit 3-0 (INx) user inputs.

Last direct register

See *Direct register, page 234* for details.

4.7 Expansion Module MAC00-FP2/FP4

Command status

Bit	7	6	5	4	3	2	1	0
Function	Write Toggle	Read Toggle	-	-	Status			

Bit 7   (Write Toggle) this bit indicates when writing is completed. See *Command, page 235* for details.

Bit 6   (Read Toggle) this bit indicates when reading is completed. See *Command, page 235* for details.

Bit 3-0   (Status) These bits indicate the status of the MAC00-FP2/FP4. The following status codes are possible:

Code	Description
0	OK – Idle
1	Executing Input
2	Executing Output
3	Limit switch active
4	Profi error
5	Connecting to MAC motor

4.7.6 Input modes

The 4 user inputs can be used to execute different move commands.
The following input modes can be selected:

Mode	Description
0	Passive
1	Absolute+Relative
2-14	Reserved
15	Custom

Passive mode (0)

When this mode is selected, the user inputs are ignored.
The inputs can be read in output data 5 for other purposes.

Absolute + Relative mode (1)

When this mode is selected. the inputs have the following functions:

IN1: Selects the absolute position in position register 1.
IN2: Selects the absolute position in position register 2.
IN3: Moves relative the distance in position register 3.
IN4: Moves relative the distance in position register 4.

The action is executed when an inactive-to-active transition is detected on the input.

Custom mode (15)

When this mode is selected, the action of each input can be selected with the slave parameters. See *Slave parameters, page 239*.

4.7   Expansion Module MAC00-FP2/FP4

4.7.7   Slave parameters

When configuring the profibus, it is possible to set some parameters for the slave. These parameters are setup during startup and cannot be changed during operation.

XX Input level

Using these parameters, the input level of the inputs IN1, IN2, IN3, IN4, NL and PL can be selected.

Possible values:
Active high	: The input will be active, when a signal is applied.
Active low	: The input will be active, when no signal is applied.

End-limit action

Using this parameter, the action taken when an end limit is activated can be selected.

Possible values:
Velocity = 0 :	When the end-limit is activated, the velocity will be set to 0 and the motor will decelerate and stop. If the motor should run again, the user must manually set a new velocity.
Passive mode :	When the end-limit is activated, the actual mode will be changed to passive. In passive mode the motor is short-circuited and can be rotated.

In firmware version 1.4 or higher, the "end-limit action' is also active if the Profibus is going off-line but it needs to be online before it goes off line before the feature is enabled.

Input debounce

Using this parameter, an input filter can be activated.

Possible values:
Disabled	No filtering will be done on the inputs.
Enabled	The inputs are filtered, resulting in better noise immunity but slower response. When the filter is enabled, there will be a delay at the input of about 5ms.

Input x action

Using these parameters, up to 3 actions can be assigned to each input.
These actions are used when the custom input mode is selected. See *Input modes, page 238*.
The action is defined by a FlexMac command. See *FastMac commands, page 240*.

Possible values are 0-127, where 0 represents no action.

4.7 Expansion Module MAC00-FP2/FP4

4.7.8 FastMac commands

Using the FastMac commands, it is possible to activate a set of registers and set the mode of the motor using a single command. The command is composed of two parts. The first part is the mode that the motor will use.
The following 4 modes can be selected:

Value	Motor mode after command	Format
0	Passive	Command = 0 + Register N
32	Velocity	Command = 32 + Register N
64	Position	Command = 64 + Register N
96	<No change>	Command = 96 + Sub-command N

The second part of the command is a register number or sub-command number.
The following table shows the register numbers:

N	Register	N	Register	N	Register	N	Register
0	P1	8	V1	16	A1	24	L1
1	P2	9	V2	17	A2	25	L2
2	P3	10	V3	18	A3	26	L3
3	P4	11	V4	19	A4	27	L4
4	P5	12	V5	20	T1	28	Z1
5	P6	13	V6	21	T2	29	Z2
6	P7	14	V7	22	T3	30	Z3
7	P8	15	V8	23	T4	31	Z4

The following table shows the sub-commands:

N	Command	N	Command
0	No operation	16	Start search zero
1	Reset error	17	No operation
2	P_SOLL = 0	18	No operation
3	P_IST = 0	19	Reserved
4	P_FNC = 0	20	Select absolute position mode
5	V_SOLL = 0	21	Select relative position mode using P_SOLL
6	T_SOLL = 0	22	Select relative position mode using P_FNC
7	Reset IN_POS, ACC,DEC	23	No operation
8	P_FNC = (FLWERR - P7) * 16	24	No operation
9	P_FNC = (FLWERR - P8) * 16	25	No operation
10	Reserved	26	No operation
11	Reserved	27	No operation
12	Activate P1,V1,A1,T1,L1,Z1	28	No operation
13	Activate P2,V2,A2,T2,L2,Z2	29	No operation
14	Activate P3,V3,A3,T3,L3,Z3	30	Reserved
15	Activate P4,V4,A4,T4,L4,Z4	31	Reserved

4.7   Expansion Module MAC00-FP2/FP4

Examples of FastMac commands

Change velocity mode and activate register V1 :
32 + 8= FastMac command 40

Activate register P5 and change to position mode
64 + 4 = FastMac command 68

Activate register T3 and change to position mode
64 + 22 = FastMac command 86

Activate P0,V0,A0,T0,L0 and Z0 without changing the mode:
96 + 12 = FastMac command 108
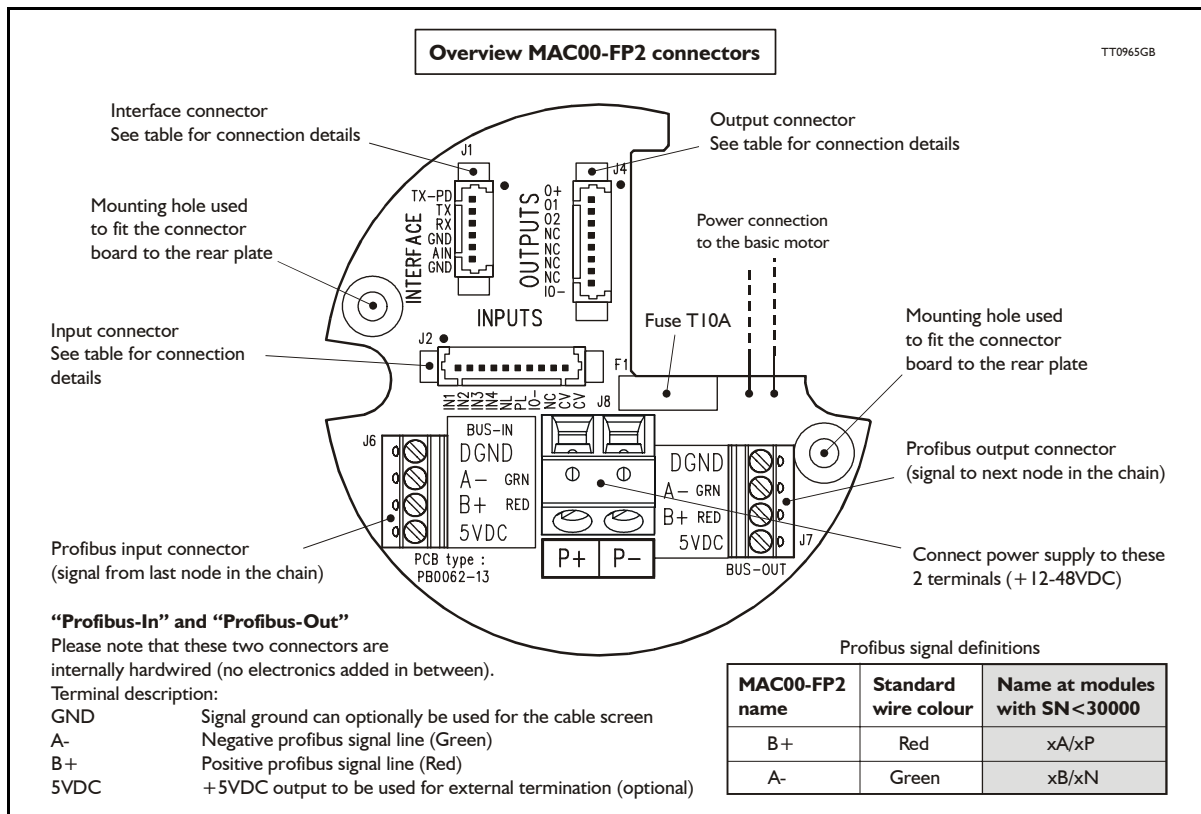
4.7 Expansion Module MAC00-FP2/FP4

4.7.9 MAC00-FP2 and FP4 description of connections

The following pages describe the different aspects of connecting the modules MAC00-FP2 and FP4.

4.7.10 MAC00-FP2 Connectors

MAC00-FP2 rear plate layout:
The illustration below shows all the internal connectors in the module. The profibus and power connectors are easy-to-use screw terminals. If the I/Os are used, they require a JVL cable type WG0402 (2m), WG0410 (10m) or WG0420 (20m). See also the appendix for cable and connector accessories.

4.7   Expansion Module MAC00-FP2/FP4

4.7.11   MAC00-FP2 option with cables (optional)

The MAC00-FP2 type number only covers the basic module, i.e. without any cables.
If a number is added after the basic type number, for example MAC00-B2-10, this suffix
indicates that the module is fitted with 10 m of cable in the I/O. The I/O cable covers all
the signal lines, i.e. RS232, Digital input 1-4, Limit inputs NL and PL and the Digital out-
puts 1-4.
Please note the WG0420 table below is not valid for cables delivered before 1.10.2002.

Digital Inputs - Internal connector J2			
Signal name	**Pin no.**	**Description**	**Wire colour**
IN1	1	Digital input 1	Red/black
IN2	2	Digital input 2	Green/black
IN3	3	Digital input 3	Violet
IN4	4	Digital input 4	Violet/white
NL	5	Negative limit input - If not used, do not connect.	Grey
PL	6	Positive limit input - If not used, do not connect.	Grey/black
IO-	7	I/O ground. Shared with the output ground (O-)	Pink/black
NC	8	(Reserved)	Black/white
CV	9	Secondary supply. Used during emergency stop *	Light green **
CV	10	Secondary supply. Used during emergency stop *	White
Digital Outputs - Internal connector J4			
Signal name	**Pin no.**	**Description**	**Wire colour**
O+	1	Supply for outputs - Must be connected to an ext. supply.	Red/white
O1	2	Digital output 1 - PNP output - Max. 25mA	Green/white
O2	3	Digital output 2 - PNP output - Max. 25mA	Yellow/black
NC	4	(Reserved)	Blue/white
NC	5	(Reserved)	Orange/white
NC	6	(Reserved)	Brown/white
NC	7	(Reserved)	Pink
IO-	8	I/O ground. This ground is shared with the input ground	Black
Interface - including analogue input - Internal connector J1			
Signal name	**Pin no.**	**Description**	**Wire colour**
TXPD	1	Transmit pull-down (Connect to TX if addr. not used)	Red
TX	2	RS232 Transmit (Connect to TXPD if addr. not used).	Green **
RX	3	RS232 Receive (connect to GND if not used).	Yellow
GND	4	Ground for RS232	Blue
AIN	5	Analogue input +/-10V or Zero sensor input	Orange
GND	6	Ground for AIN	Brown
Cable Screen			
The cable-screen is internally connected to motor housing. Externally it must be connected to earth.			
Unused wire			
Orange/Black - is not used internally. It must be left unconnected.			

* : The VC terminals are only available on modules with serial number >25000
** : The light green wire (CV) can be difficult to distinguish from the green wire (TX) on some cables.

Important: Please note that the cables are a standard type. They are not recommended
for use in cable chains or where the cable is repeatedly bent. If this is re-
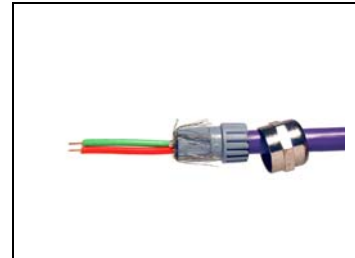quired, use a special robot cable (2D or 3D cable).

4.7 Expansion Module MAC00-FP2/FP4

4.7.12 Assembly instructions for profi cables

Remove the insulation from the cable, as shown in the accompanying picture.

All values in millimetres
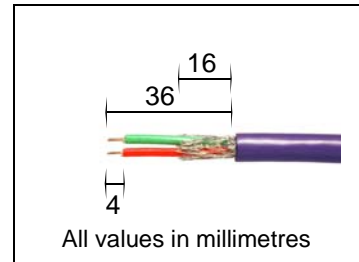
Fit the plastic part of the gland on the cable, and fold the screen around it. Remember to first feed the cable through the nut.

Feed the cables through the cable glands in the rear plate of the module and tighten the nuts.

Screw the wires into the module. The red wire must go into the B+terminal, and the green must go into the A-terminal.
The input and output terminals can be swapped if required. The is no difference between input and output on the board which means that it is purely hard-wired.

Attach the circuit board to the rear plate with the two screws. REMEMBER to use the spring washers included.

The table below shows the difference between Siemens naming conventions and the naming on the MAC00-FPx.

| MAC00-FPx name	Siemens name	Standard wire colour
B+	B	Red
A-	A	Green

IMPORTANT:
use spring washer

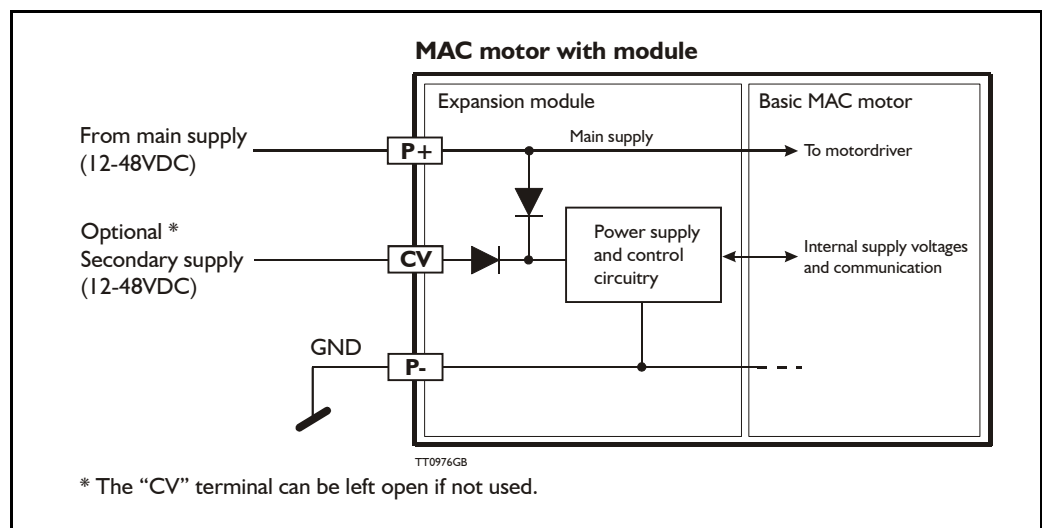# 4.7   Expansion Module MAC00-FP2/FP4

4.7.13   MAC00-FP2 - How to connect the RS232 interface

The illustration below shows how to connect the MAC00-FP2 directly to a PC COM port. The drawing is based on standard cables from JVL, type WG0402, WG0410 or WG0420. See also *Accessories, page 394* for a complete list of cables and connectors. If the MAC motor is connected to the same RS232 line as other motors, the terminal TX-PD should only be connected at one of the motors. If one of JVL's standard RS232 cables (RS232-9-1 or -n) is used between the DSUB connector shown and the PC com port, the RX and TX pins must be swapped since they cross in these standard cables.

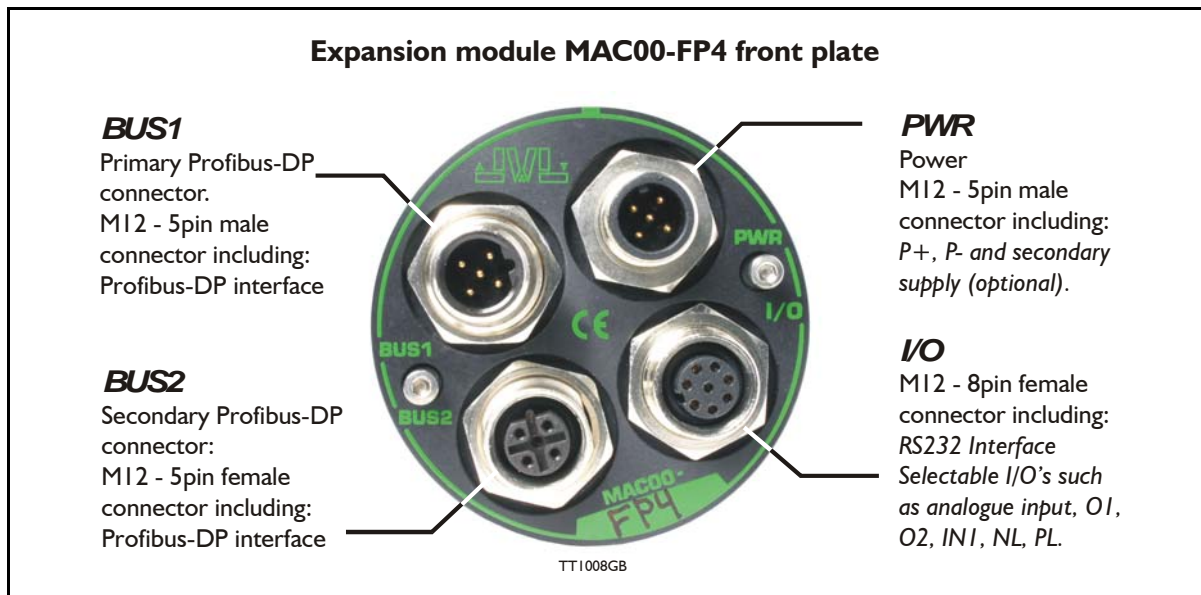

How to connect the MAC00-FP2 RS232 interface
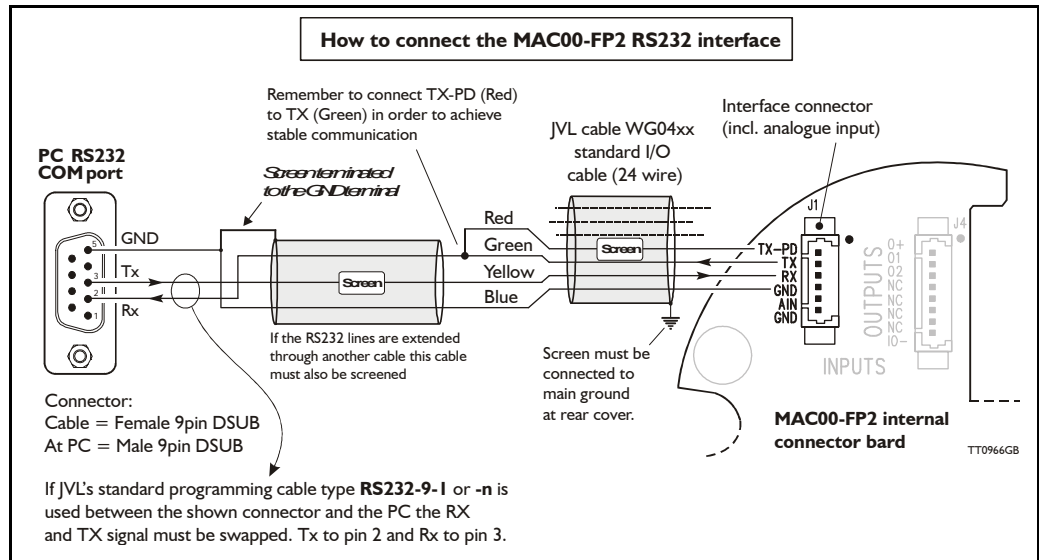
4.7.14   Operation with dual supply for emergency situations

In many applications it is intended that positional data and other setup information is retained during an emergency situation. It is however also required by law in many countries that the main power for energizing the motor is removed in such a situation.
To meet both of these requirements, the MAC motor equipped with a MAC00-FPx module offers a secondary supply input called "CV". If the main supply at the P+ terminal is removed, the internal control circuitry can be kept "alive" by maintaining a supply at the "CV" terminal.

MAC motor with module

* The "CV" terminal can be left open if not used.

4.7 Expansion Module MAC00-FP2/FP4

Expansion module MAC00-FP4 front plate

BUS1
Primary Profibus-DP connector.
M12 - 5pin male connector including:
Profibus-DP interface

BUS2
Secondary Profibus-DP connector:
M12 - 5pin female connector including:
Profibus-DP interface

PWR
Power
M12 - 5pin male connector including:
P+, P- and secondary supply (optional).

I/O
M12 - 8pin female connector including:
RS232 Interface Selectable I/O's such as analogue input, O1, O2, IN1, NL, PL.

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4.7.15   Expansion MAC00-FP4 hardware description

The MAC00-FP4 offers IP67 on MAC050-141 protection and M12 connectors which make it ideal for automation applications where no additional protection is desired. The M12 connectors offer solid mechanical protection and are easy to unplug compared to the FP2 module which has cable glands. The signals available are restricted compared to the FP2 module since only 4 I/O terminals are available. The I/Os connected to these 4 terminals must be selected by a small dip-switch.

The connector layout:

"PWR" - Power input. M12 - 5-pin male connector					
Signal name	**Description**		**Pin no.**	**JVL Cable WI1000M12 F5T05N**	**Isolation group**
P+	Main supply +12-48VDC. Connect with pin 2 *		1	Brown	1
P+	Main supply +12-48VDC. Connect with pin 1 *		2	White	1
P-	Main supply ground. Connect with pin 5 *		3	Blue	1
CV	Control voltage +12-48VDC.		4	Black	1
P-	Main supply ground. Connect with pin 3 *		5	Grey	1
* Note: P+ and P- are each available at 2 terminals. Make sure that both terminals are connected in order to split the supply current in 2 terminals and thereby avoid an overload of the connector.					

"BUS1" - Profibus-DP interface. M12 - 5-pin male connector					
Signal name	**Description**		**Pin no.**	**Cable: user supplied**	**Isolation group**
-	Reserved for future purpose - do not connect		1	-	2
A-	Terminal A (Siemens syntax) for the Profibus-DP interface		2	-	2
DGND	Profibus-DP interface ground		3	-	2
B+	Terminal A (Siemens syntax) for the Profibus-DP interface		4	-	2
SHIELD	Cable shield. Internally conn. to the motor housing.		5	-	2

(Continued next page)

4.7 Expansion Module MAC00-FP2/FP4

MAC00-FP4 connection description - continued.

"BUS2" - Profibus-DP Interface. M12 - 5-pin female connector				
Signal name	**Description**	**Pin no.**	**Cable: user supplied**	**Isolation group**
5VDC	5V output. Can be used for ext. termination (Max 40mA)	1	-	2
A-	Terminal A (Siemens syntax) for the Profibus interface	2	-	2
DGND	Profibus-DP interface ground	3	-	2
B+	Terminal B (Siemens syntex) for the Profibus interface.	4	-	2
SHIELD	Cable shield. Internally connected to the motor housing.	5	-	2

"IO" - I/Os and RS232 interface. M12 - 8-pin female connector.					
Signal name	**Description**	**Function**	**Pin no.**	**JVL Cable WI1000-M12 M8T05N**	**Isolation group**
IOC	I/O terminal C.	DIP 5 = OFF : *PL* input DIP 5 = ON (default) O1 *(output PNP 25mA)*	1	White	3
Tx	RS232 interface - transmit output Important !: **DIP1 must be turned ON**. If addressing is used it must be turned ON at minimum one of the connected motors.		2	Brown	1
Rx	RS232 interface - receive input		3	Green	1
GND	RS232 Ground - also used with analogue input		4	Yellow	1
IOA	I/O terminal A.	DIP 2 = ON(default) and DIP 3 = OFF (default): *AIN* (Analogue in or *Zero search* input) DIP2 = OFF and DIP 3 = ON : *O2* (output 2 / PNP 25mA)	5	Grey	3 (1 when used as AIN)
IOB	I/O terminal B.	DIP 4 = OFF (default): *IN1 (input 1)* DIP 4 = ON : *O1 (PNP 25mA)* (output 1)	6	Pink	3
IO-	I/O ground to be used with IN1, NL, PL, O1, O2		7	Blue	3
IOD	I/O terminal D.	DIP 6 = OFF: *NL* (negative limit input) DIP 6 = ON(default): *O+ (*outp.sup.)	8	Red	3

Cable Screen
Some standard cables with M12 connector offer a screen around the cable. This screen on some cables is fitted to the outer metal at the M12 connector. When fitted to the MAC00-FP4 module, this means that the screen will have contact with the complete motor housing and thereby also the power ground (main ground).

DIP-switch default setting
The Dip-switches are default set to the following positions:
DIP1 (TX-PD)=ON
DIP2 (AIN to IOA terminal) = ON
DIP3 (O2 to IOA terminal) = OFF
DIP4 (O1 to IOB) = OFF
DIP5 (O1 to IOC) = ON
DIP6 (O+ to IOD) = ON

Isolation groups
The MAC00-FP4 offers optical isolation at the digital inputs and outputs (IN1, NL, PL and O1-2). The table shows a number for each pin. This number refers to the isolation group to which the pin is connected.
Isolation group 1 means that the terminal refers to the main ground (P-, GND and the motor housing).
Isolation group 2 means that the terminal refers to the Profibus-DP interface ground (DGND).
Isolation group 3 means that the terminal refers to the I/O ground (IO-)

4.7   Expansion Module MAC00-FP2/FP4

4.7.16   Cables for the MAC00-FP4

The following cables equipped with M12 connector can be supplied by JVL.

MAC00-FP4 Connectors				Description	JVL Order no.	Photo
"BUS1" 5-pin Male B-coded	"BUS2" 5-pin Female B-coded	"I/O" 8-pin Female	"PWR" 5-pin Male			
		X		RS232 Interface cable. Connects directly from MAC00-FP4 to PC Length: 5m (197 inch)	RS232-M12-1-5-8	
			X	Cable (Ø5.5mm) with M12 **female** 5-pin connector loose wire ends 0.35mm² (22AWG) and foil screen. Length: 5m (197 inch)	WI1000-M12F5T05N	
			X	Same as above but 20m (787 inch)	WI1000-M12F5T20N	
		X		Cable with M12 **male** 8-pin connector loose wire ends 0.22mm² (24AWG) and screen. Length: 5m (197 inch)	WI1000-M12M8T05N	
		X		Same as above but 20m (787 inch)	WI1000-M12M8T20N	
	X			Profibus DP cable with M12 male 5-pin connector B-coded, loose ends and screen. Length: 5m (197 inch).	WI1026-M12M5S05R	
	X			Same as above but 15m (591 inch)	WI1026-M12M5S15R	
X				Profibus DP cable with M12 female 5-pin connector B-coded, loose ends and screen. Length: 5m (197 inch)	WI1026-M12F5S05R	
X				Same as above but 15m (591 inch)	WI1026-M12F5S15R	
Loose connectors and termination resistor						
	X			Loose Profibus DP **male** M12 connector. B-coded. Internal screw terminals.	WI1028-M12M5VC1	
X				Loose Profibus DP **female** M12 connector. B-coded. Internal screw terminals.	WI1028-M12F5VC1	
	X			Profibus DP **male** M12 termination resistor. B-coded.	WI1028-M12M4STR3	
Protection caps. Optional if connector is not used, to protect from dust / liquids.						
	X	X		IP67 protection cap for M12 **female** connector.	WI1000-M12FCAP1	
X			X	IP67 protection cap for M12 **male** connector.	WI1000-M12MCAP1	

Important: Please note that the cables are a standard type. They are not recommended for use in cable chains or where the cable is repeatedly bent. If this is required, use a special robot cable (2D or 3D cable). See also *Accessories, page 394* where additional M12 connectors are shown.

4.7 Expansion Module MAC00-FP2/FP4

4.7.17 GSD file for the MAC00-FP2 and FP4

The GSD file must be used to configure the PLC or master controller used for the Profibus communication. The file is shown here but is also available on disc. Please contact your nearest JVL representative.

GSD file:

```
; COM PROFIBUS V 3.3, GSD'-Xport
; Time Stamp: 01/31/00, 12:36:39
#Profibus_DP
; <Unit-Definition-List>
GSD_Revision=1
Vendor_Name='JVL IND EL'
Model_Name='MAC00-FP'
Revision='0.0'
Ident_Number=0x06BC
Protocol_Ident=0
Station_Type=0
Hardware_Release='1.1'
Software_Release='1.2'
9.6_supp=1
19.2_supp=1
93.75_supp=1
187.5_supp=1
500_supp=1
1.5M_supp=1
3M_supp=1
6M_supp=1
12M_supp=1
MaxTsdr_9.6=60
MaxTsdr_19.2=60
MaxTsdr_93.75=60
MaxTsdr_187.5=60
MaxTsdr_500=100
MaxTsdr_1.5M=150
MaxTsdr_3M=250
MaxTsdr_6M=450
MaxTsdr_12M=800
Implementation_Type='VPC3'
Bitmap_Device='DPLINK_'

; Slave-Specification:
Freeze_Mode_supp=0
Sync_Mode_supp=0
Auto_Baud_supp=1
Min_Slave_Intervall=1
Max_Diag_Data_Len=8
Modul_Offset=0
Slave_Family=0
OrderNumber='MAC00-FPx'
```

4.7 Expansion Module MAC00-FP2/FP4

```
; UserPrmData: Length and Preset:
PrmText=1
Text(0)='Active low'
Text(1)='Active high'
EndPrmText

PrmText=2
Text(0)='Velocity = 0'
Text(1)='Passive mode'
EndPrmText

PrmText=3
Text(0)='Disabled'
Text(1)='Enabled'
EndPrmText

ExtUserPrmData=1 'IN1 Input level'
Bit(0) 1 0-1
Prm_Text_Ref=1
EndExtUserPrmData

ExtUserPrmData=2 'IN2 Input level'
Bit(1) 1 0-1
Prm_Text_Ref=1
EndExtUserPrmData

ExtUserPrmData=3 'IN3 Input level'
Bit(2) 1 0-1
Prm_Text_Ref=1
EndExtUserPrmData

ExtUserPrmData=4 'IN4 Input level'
Bit(3) 1 0-1
Prm_Text_Ref=1
EndExtUserPrmData

ExtUserPrmData=5 'NL Input level'
Bit(4) 1 0-1
Prm_Text_Ref=1
EndExtUserPrmData

ExtUserPrmData=6 'PL Input level'
Bit(5) 1 0-1
Prm_Text_Ref=1
EndExtUserPrmData

ExtUserPrmData=7 'Endlimit action'
Bit(0) 0 0-1
Prm_Text_Ref=2
EndExtUserPrmData

ExtUserPrmData=8 'Input 1 Action'
UnSigned8 0 0-255
EndExtUserPrmData
```

4.7 Expansion Module MAC00-FP2/FP4

ExtUserPrmData=9 'Input 2 Action'
UnSigned8 0 0-255
EndExtUserPrmData

ExtUserPrmData=10 'Input 3 Action'
UnSigned8 0 0-255
EndExtUserPrmData

ExtUserPrmData=11 'Input 4 Action'
UnSigned8 0 0-255
EndExtUserPrmData

ExtUserPrmData=12 'Input debounce'
Bit(1) 0 0-1
Prm_Text_Ref=3
EndExtUserPrmData

ExtUserPrmData=13 'Input noise filter'
Bit(2) 0 0-1
Prm_Text_Ref=3
EndExtUserPrmData

Max_User_Prm_Data_Len=15
User_Prm_Data_Len=15
User_Prm_Data=0x0,0x3F,0x0,0,0,0,0,0,0,0,0,0,0,0,0

Ext_User_Prm_Data_Const(0) = 0x0,0x3F,0x0,0,0,0,0,0,0,0,0,0,0,0,0
Ext_User_Prm_Data_Ref(1)=1
Ext_User_Prm_Data_Ref(1)=2
Ext_User_Prm_Data_Ref(1)=3
Ext_User_Prm_Data_Ref(1)=4
Ext_User_Prm_Data_Ref(1)=5
Ext_User_Prm_Data_Ref(1)=6
Ext_User_Prm_Data_Ref(2)=7
Ext_User_Prm_Data_Ref(2)=12
Ext_User_Prm_Data_Ref(2)=13
Ext_User_Prm_Data_Ref(3)=8
Ext_User_Prm_Data_Ref(4)=8
Ext_User_Prm_Data_Ref(5)=8
Ext_User_Prm_Data_Ref(6)=9
Ext_User_Prm_Data_Ref(7)=9
Ext_User_Prm_Data_Ref(8)=9
Ext_User_Prm_Data_Ref(9)=10
Ext_User_Prm_Data_Ref(10)=10
Ext_User_Prm_Data_Ref(11)=10
Ext_User_Prm_Data_Ref(12)=11
Ext_User_Prm_Data_Ref(13)=11
Ext_User_Prm_Data_Ref(14)=11

; <Module-Definition-List>
Module='MAC00-FP' 0x13,0x10,0x10,0x10,0x10,0x23,0x20,0x20,0x20,0x20,0x20
EndModule