4.7 Expansion Module MAC00-FS1/FS4

MAC00-FS4
With M12 connectors

MAC00-FS1
With D sub connectors

TT1068GB

4.7.1 High speed serial RS485 module MAC00-FS1 and FS4 Introduction

The MAC00-FS1 and FS4 are used for high speed RS485 communication typically in multi axis systems. They are capable of running at Baud-rates up to 460kbit.
All the registers of the MAC motor can be read and written.

The modules includes a few inputs and outputs, 2 of which can be defined as end-limit inputs. These can be read from the RS485 interface.

The MAC motor is controlled by writing to the internal registers in the motor.

The expansion modules MAC00-FS1 and FS4 can be mounted on the standard MAC motors MAC50, MAC95, MAC140, MAC141, MAC400-800.

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

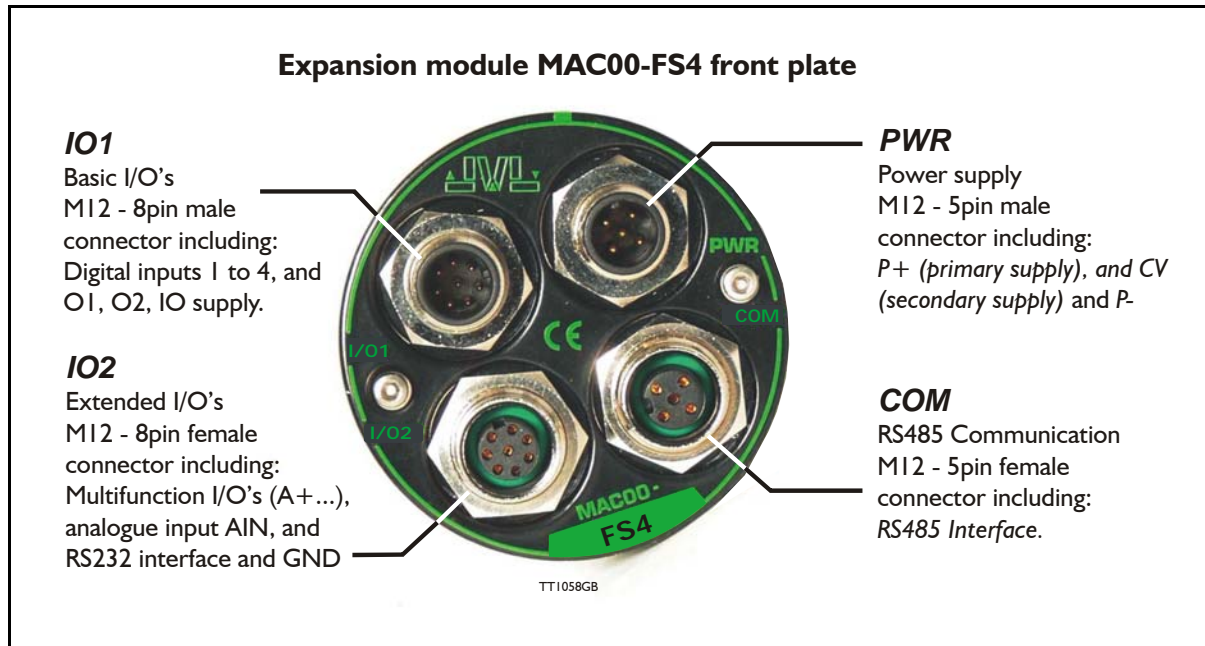| Type	Protection class	Connectors		
		I/O.	Power supply	RS232/485
MAC00-FS1	IP42	DSUB 15 pole	3 pole Phoenix	DSUB 9 pole
MAC00-FS4	IP67/IP65*	M12 connector 8pin male and female	M12 connector 5pin male	M12 connector 5pin female

Note*: IP65 on MAC400-800

Both modules are delivered without any cables as standard.
Optional the MAC00-FS4 module can be delivered with cables in 5 or 20m length.
The pages in the first part of this section concern the common features of both modules.
Please consult the last pages in this section to see specific information about each module such as example connection diagrams.

4.7   Expansion Module MAC00-FS1/FS4

Expansion module MAC00-FS4 front plate

IO1
Basic I/O's
M12 - 8pin male
connector including:
Digital inputs 1 to 4, and
O1, O2, IO supply.

IO2
Extended I/O's
M12 - 8pin female
connector including:
Multifunction I/O's (A+...),
analogue input AIN, and
RS232 interface and GND

PWR
Power supply
M12 - 5pin male
connector including:
*P+ (primary supply), and CV
(secondary supply) and P-*

COM
RS485 Communication
M12 - 5pin female
connector including:
RS485 Interface.

TT1058GB

4.7.2   Expansion MAC00-FS4 hardware description

The MAC00-FS4 offers a IP67 on MAC050-141 protection and M12 connectors which makes it ideal for automation applications where no additional protection is desired. The M12 connectors offers a solid mechanical protection and are easy to operate.

The connector layout:

"PWR" - Power input. M12 - 5pin male connector				
Signal name	**Description**	**Pin no.**	**JVL Cable WI1000M12 F5A05N**	**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- is 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.				

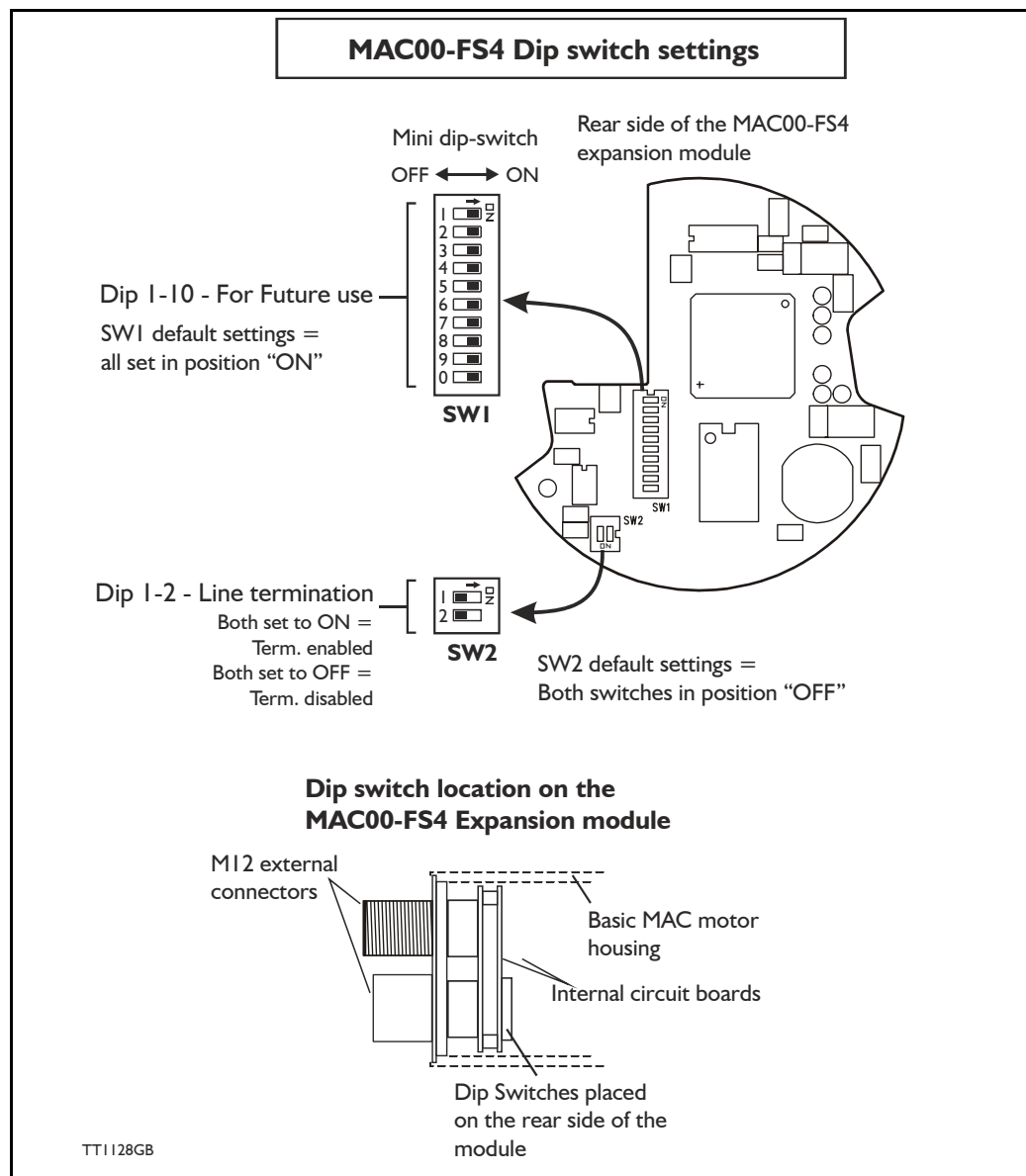| **"COM" - Interface RS485. M12 - 5pin female connector**				
Signal name	**Description**	**Pin no.**	**JVL Cable WI1000M12 M5A05N**	**Isolation group**
-	Leave open	1	Brown	1
-	Leave open	2	White	1
RS485 A-	RS485 interface positive terminal. Leave open if unused	3	Blue	2
RS485 B+	RS485 interface negative terminal. Leave open if unused	4	Black	2
GND	Interface ground	5	Grey	2

(Continued next page)

4.7   Expansion Module MAC00-FS1/FS4

(Continued from last page)

"IO1" - Basic I/O's. M12 - 8pin male connector.				
Signal name	**Description**	**Pin no.**	**JVL Cable WI1000-M12 F8A05N**	**Isolation group**
IN1	Digital input 1	1	White	3
IN2	Digital input 2	2	Brown	3
IN3	Digital input 3	3	Green	3
IN4	Digital input 4	4	Yellow	3
O1	Digital output 1 - PNP output	5	Grey	3
O2	Digital output 2 - PNP output	6	Pink	3
O+	Output supply +5-32VDC. Used for O1-4. Not used/necessary for using IN1-8	7	Blue	3
IO-	I/O ground. Used for IN1-8 and O1-4.	8	Red	3
"IO2" - Extended I/O's. M12 - 8pin female connector.				
Signal name	**Description**	**Pin no.**	**JVL Cable WI1000-M12 M8A05N**	**Isolation group**
AIN1	Analogue input +/-10V. Directly connected to basic motor	1	White	1
Tx	RS232 interface - transmit output	2	Brown	1
Rx	RS232 interface - receive input	3	Green	1
GND	RS232 Ground - also used with analogue input	4	Yellow	1
A+	Multifunction I/O terminal A+. Maximum 5V !	5	Grey	1
A-	Multifunction I/O terminal A-. Maximum 5V !	6	Pink	1
B+	Multifunction I/O terminal B+. Maximum 5V !	7	Blue	1
B-	Multifunction I/O terminal B-. Maximum 5V !	8	Red	1

Cable Screen
Some standard cables with M12 connector offers a screen around the cable. This screen is at some cables fitted to the outer metal at the M12 connector. When fitted to the MAC00-FS4 modul this means that the screen will get in contact with the complete motor housing and thereby also the power ground (main ground).

Isolation groups
The MAC00-FS4 offers optically isolation at the digital inputs and outputs (IN1-4 and O1-2). In the table is shown a number for each pin. This number refers to which isolation group the terminal is connected to.
Isolation group 1 means that the terminals refers to the main ground (P-, GND and the motor housing).
Isolation group 2 means that the terminals refer only to the RS485 interface.
Isolation group 3 means that the terminals refer to the I/O ground (IO-).

4.7   Expansion Module MAC00-FS1/FS4

MAC00-FS4 Dip switch settings

Mini dip-switch

OFF ◄──► ON

Rear side of the MAC00-FS4
expansion module

Dip 1-10 - For Future use

SW1 default settings =
all set in position "ON"

SW1

Dip 1-2 - Line termination
Both set to ON =
Term. enabled
Both set to OFF =
Term. disabled

SW2

SW2 default settings =
Both switches in position "OFF"

**Dip switch location on the
MAC00-FS4 Expansion module**

M12 external
connectors

Basic MAC motor
housing

Internal circuit boards

Dip Switches placed
on the rear side of the
module

TT1128GB

4.7 Expansion Module MAC00-FS1/FS4

4.7.3 Cables for the MAC00-FS4

Following cables equipped with M12 connector can be supplied from JVL.

"IO1" 8pin Male	"IO2" 8pin Female	"COM" 5pin Female	"PWR" 5pin Male	Description	JVL Order no.	Picture
				MAC00-FS4 Connectors		
	X			RS232 Interface cable. Connects directly from MAC00-R4 to PC Length: 5m (197 inch)	**RS232-M12-1-5-5**	
			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) Note1		Cable with M12 **male** 5-pin connector loose wire ends 0.35mm² (22AWG) and screen. Length: 5m (197 inch)	**WI1000-M12M5T05N**	
		(X) Note1		Same as above but 20m (787 inch)	**WI1000-M12M5T20N**	
X				Cable with M12 **female** 8-pin connector loose wire ends 0.22mm² (24AWG) and screen. Length: 5m (197 inch)	**WI1000-M12F8T05N**	
X				Same as above but 20m (787 inch)	**WI1000-M12F8T20N**	
	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**	
				Protection caps. Optional if connector(s) needs to be protected 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**	

Note 1: The illustrated cable is not twisted pair and is not recommended for noisy environment. We recommend to use a shielded twisted pair cable for noisy applications. Also it is recommended to use a metal type connector where the screen can be terminated to obtain optimal screening effect.

Important: Please notice that the cables are a standard type. It is not recommended to be used in cable chains or where the cable repeatable are being bended. If this is required use a special robot cable (2D or 3D cable). See also *Accessories, page 289* where additional M12 connectors are shown.