

# Technical Description

## ***JC6000 PROFIBUS***

Joystick controller with PROFIBUS DP interface

***Efficient sailing***  
***- Safe harbouring!***

### Ownership

All information, including drawings, pictures etc., contained in this document is the sole property of Scana Mar-EI AS. It must not be copied or reproduced wholly or partially in any form or by any means, and the information contained within must not be communicated to a third party, without prior written permission of Scana Mar-EI AS.

### Liabilities

Scana Mar-EI AS strains to ensure that all information in this document are correct and precise, but disclaims liability for any errors or omissions.

### Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

Scana disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

### Improvements

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism. Please send all such in writing to:

Scana Mar-EI AS  
Att: Product improvement  
Storvegen 48  
N-3880 Dalen  
Norway

E-mail: [mar-el@scana.no](mailto:mar-el@scana.no)  
Telephone: +47 35 07 58 00  
Telefax: +47 35 07 58 01  
Web: [www.mar-el.no](http://www.mar-el.no) / [www.scana.no](http://www.scana.no)

### Revision history

<b>Rev.</b>	<b>Description</b>	<b>Initials</b>	<b>Date</b>
-	Initial release	HOK	01.07.2011
A			
B			
C			

JC6000 Profibus - Technical Description 01.07.2011

**Table of Contents**

1	Introduction.....	1
2	Technical specifications .....	2
3	Mechanical layout .....	2
4	Electrical interface and telegram descriptions.....	2
4.1	Electrical connections .....	2
4.2	Address set-up.....	3
4.3	Transmission rates.....	3
4.4	Status indicators .....	3
4.5	Protocol and data unit (DU) definition .....	4
4.6	GSD-file .....	4

## 1 Introduction

The JC6000 PROFIBUS joystick controller is a JC6000 joystick controller from Penny+Giles with an integrated PROFIBUS DP interface from Scana Mar-El AS, giving the benefits of the JC6000 combined with the PROFIBUS DP advantages.

The JC6000 rugged joystick controller is designed for demanding operator control applications in off-highway vehicles and other man-machine interfaces, where strength, reliability, and handle functionality are important.

The JC6000's compact size, high lever strength and superb proportional control are ideal for applications which include operator controls on a wide range of off-highway vehicles, including cranes, loaders, excavators, access platforms, tractors and harvesters.

The JC6000 PROFIBUS is available in one or two axis configurations supplied with long life potentiometer tracks, and can be specified with a choice of handles and grips to increase the functionality of the operator controls. With a choice of push buttons, trigger grips, proportional and switched rockers in a variety of different configurations, users can match their handle selection to suit their unique application.

The PROFIBUS DP interface is fully integrated into the JC6000 joystick controller, with connector for the PROFIBUS DP bus and flying leads for connection to the power supply. Both are located close to the bottom on the rear side of the unit, but may be located on other sides due to custom design.

Through simple interfacing, status LEDs and online diagnostics the JC6000 PROFIBUS enables improved asset management, ensuring lower life cycle costs, better quality and higher productivity.

More information about the JC6000 is given in the JC6000 multi axis joystick controller brochure from Penny+Giles. See this and other specific documentation for information about the JC6000 joystick controller in general and this document for the PROFIBUS DP interface in particular.

A stand-alone PROFIBUS DP interface unit designed for connecting most Penny+Giles joystick controllers is also available. Connecting other equipment fulfilling the technical requirements is also possible.

All requirements for installation, operation, maintenance etc. regarding PROFIBUS DP bus-systems and the JC6000 joystick controller apply unless otherwise specifically described in this document.



## 2 Technical specifications

Specifications for the JC6000 joystick controller itself are given in its specific documentation.

Additional specifications for the PROFIBUS DP interface:

- Power supply: 24VDC +/-10%, 250mA.
- Communication protocol: PROFIBUS DP-V0.
- PROFIBUS DP connection: 9 pin D-sub (DB9), female.
- Electrical transmission: Pursuant to EIA-485 / RS-485.
- Baud rate: Up to 12 Mbit/s. Autoswitching for predefined rates.
- Address range: 3 to 125. Address set-up by DIP-switch.
- Analog input resolution: 10 bits.
- Indicators: Two LEDs, bus status and system/unit status.
- Operating temperature: 0-50°C.
- EMC test standards: EN61000-4-3, IEC945 30M-2GHz and EN 55011 F QP.

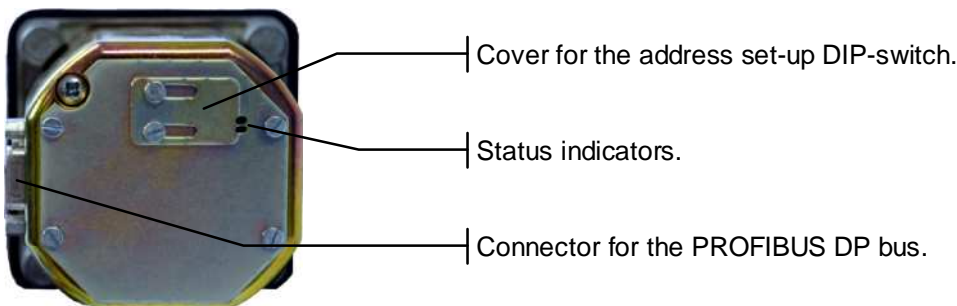
The PROFIBUS DP data unit (DU) depends on the configuration of the joystick controller and the handle option. Specific documentation must be obtained for each individual type.

## 3 Mechanical layout

Overall mechanical dimensions and installation requirements for the JC6000 itself are given in the specific documentation for the JC6000 joystick controller.

The JC6000 with integrated PROFIBUS DP interface has one connector for the PROFIBUS DP bus and two flying leads for connection to the power supply. Both are located close to the bottom on the rear side of the unit as shown in the picture on the previous page (may be located on other sides due to custom design).

The picture below shows the JC6000 PROFIBUS seen from the bottom:



## 4 Electrical interface and telegram descriptions

The electrical transmission is pursuant to EIA-485 (RS-485). Power supply is 24VDC.

### 4.1 Electrical connections

PROFIBUS DP connection: 9 pin D-sub (DB9) female connector with standard pin layout as detailed below:

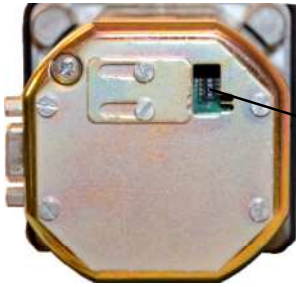
Pin. no.	Description	Remarks
1	Screen	Connected to chassis.
2	Not connected	
3	RxD/TxD+	Receive/Transmit data, line B (RxD/TxD-P).
4	Not connected	
5	DGND	Isolated from the power supply and the internal voltages.
6	DVCC	+5VDC relative to DGND. Only for bus termination.
7	Not connected	
8	RxD/TxD-	Receive/Transmit data, line A (RxD/TxD-N).
9	Not connected	

Power supply connection, flying leads:

- Red: +24VDC.
- Blue: 024VDC.

## 4.2 Address set-up

The address is set-up by an 8 position DIP-switch accessible behind a cover on the bottom of the unit. The picture below shows the JC6000 PROFIBUS seen from the bottom with the cover for the address set-up switch open:



Address set-up DIP-switch.

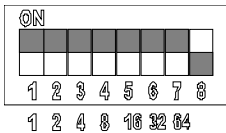
Given the orientation in the picture:

- Position 1 of the DIP-switch is lowest and position 8 upper.
- On is to the left (towards the connector) and Off to the right.

Position 1 to 7 is for the address set-up, binary with LSB in position 1 and MSB in position 7. Position 8 is reserved for factory test mode and shall always be off in normal operation.

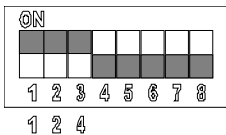
Valid address range is 3 to 125 inclusive (decimal).

Schematic DIP-switch layout and address setting examples:



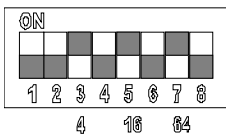
The figure to the left shows the DIP-switch for address setting with the numbers of the individual switches and their respective value when the switch is on (off means 0).

Switch 8 is for factory testing only and shall always be off in normal operation.



Example 1. Setting the address to 7.

The switches 1, 2 and 3 is in on and the rest is off, giving address 7 (1+2+4).



Example 2. Setting the address to 84.

The switches 3, 5 and 7 is on and the rest is off, giving address 84 (4+16+64).

**NB!** Be very careful when operating the address switches as scratches etc. to the components and/or the printed circuit board inside may cause serious damage! Do not use any sharp or needle-shaped devices!

## 4.3 Transmission rates

Supported baud rates: 9,6 kbit/s; 19,2 kbit/s; 45,45 kbit/s; 93,75 kbit/s; 187,5 kbit/s; 500 kbit/s; 1,5 Mbit/s; 3 Mbit/s; 6 Mbit/s; 12 Mbit/s. All with automatic detection.

The maximum cable length depends on the baud rate (from 100 to 1200m) as defined in the PROFIBUS specification.

## 4.4 Status indicators

The JC6000 PROFIBUS has two status indicators (LEDs) visible from the bottom of the unit (see the picture in chapter 3 'Mechanical layout'):

- Green LED: Bus status.
- Red LED: System/unit status.

Status indicators (power applied):

ID	Status	Description
Bus status	Off	No communication / Bus not connected (since power on).
Green LED	On	Communication is or has been OK.
System/unit status	Off	Blink at power up then off indicates system in test mode.
Red LED	Blinking slow	Once per second. System OK, normal operation.
	Blinking fast	Four times per second. Error, e.g. illegal address.

#### 4.5 Protocol and data unit (DU) definition

Supported communication protocol is PROFIBUS DP-V0 with 12 words (16-bits) of data (i.e. 24 bytes).

*Note! The specific content of the data unit (DU) depends on the specification of the joystick controller and the handle option and will normally differ. I.e. specific definition for the actual joystick controller and handle option must be obtained.*

General definition of the data unit (DU):

Word no.	Type	Content	Remarks
0	Digital	Digital in 0 to 12	Bit 0 = digital input 0, bit 1 = digital input 1 etc.
1	Boolean	Heartbeat	Bit 0 toggles two times per second.
2	Analog	Analog in 0	Analog input 0.
3	Analog	Analog in 1	Analog input 1.
4	Analog	Analog in 2	Analog input 2.
5	Analog	Analog in 3	Analog input 3.
6	Analog	Analog in 4	Analog input 4.
7	Analog	Analog in 5	Analog input 5.
8	Analog	Analog in 6	Analog input 6.
9	Analog	Analog in 7	Analog input 7.
10	N/A	N/A	Reserved.
11	N/A	N/A	Reserved.

Analog values: 10-bit unsigned integer, increasing for increasing input voltage, right justified, little-endian.

#### 4.6 GSD-file

A GSD-file covering all joystick controller versions and the stand-alone PROFIBUS DP interface unit is available from Scana Mar-EI.