BIFFI

tyco flow control

MAN 652-OM9

0.1	21.10.05	Added PNO Certification	C.D.	A.A..
		Added details about Bus Termination and PROFIBUS Address.		
0.0	20.07.05	Instruction for rev. 0.0 PROFIBUS DPV1 Interface	C.D.	A.A..
Rev.	Date	DESCRIPTION	Prepared	Approved

Note:
Biffi Italia has taken every care in collecting and verifying the documentation contained in this Instruction and Operating Manual.
The information herein contained is reserved property of Biffi Italia.

F02
OM9: Profibus DPV1 Additional Module Instruction and Operating Manual

INDEX

1.   Introduction

The **F02_DPV1** is an electronic module that allows connecting the BIFFI electrical actuator F02 to a PROFIBUS DP network. The module has its microprocessor and a program stored internally controls it, it works as a pure bus interface and does not affect the actuator control integrity. It is installed inside the actuator housing and takes the electrical power from the actuator power supply module. The RS 485 interface is located on the module board. The PROFIBUS network is fully isolated from the actuator electronics.

The **F02_DPV1** is designed to support PROFIBUS DPV0 cyclic communication and acyclic communication as per PROFIBUS DPV1 extension.

For details about F02 actuator the reference manual is:
"***F02 Quarter-turn Electric Actuator*** – Instruction Handbook MAN 652".

2.   Operation and storage

The module is designed to work and to be stored in the same environment of the actuator.

3.   Communication features

Communication protocol	PROFIBUS DP according to EN 50170							
Network topology	Line (bus) structure. With repeaters tree structures can also be realised							
Transmission medium	Twisted, screened copper cable according to EN 50 170							
Data rate	9.6	19.2	45.45	93.75	187.5	500	1500	**Kbit/sec**
Cable length without repeater	1200	1200	1200	1200	1000	400	200	**m**
Approx. cable length with repeater	10	10	10	10	6	4	2	**Km**
Station type	DPV0 and DPV1 slave							
Device number	32 devices per segment without repeater (max 126, with repeaters)							
Max repeater number	9							
Bus access	token-passing between masters and polling for slaves							
Electrical power	actuator powered							
Bus termination	available on board via soldering pad							
Temperature	-40°C, +85°C							
EMC protections	EN 50081-2 and EN 50082-2							
Types of operation	cyclic data exchange, sync mode, freeze mode, fail safe mode							
Baud rate	automatic recognition							
Addressing	configurable via on board rotary BCD switches							

4.   F02_DPV1 module

The module consists in a single PCB that is installed inside the actuator housing. It is connected to the F02 base card via flat cable. The internal wiring connects the PROFIBUS data lines to the actuator terminal board.


Jumper JP2

LED DL1 – DL6
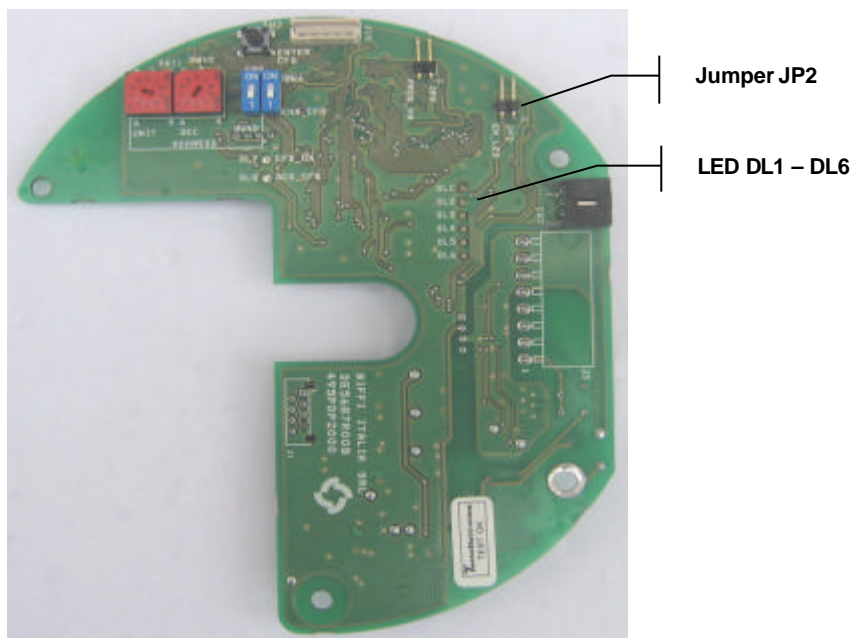
4.1   On Boar Indication

Six LEDs are mounted on the **F02DPV1** to give the following indications for Field service. LEDs indications are active only when jumper JP2 is closed.

DL1 (Red)   Internal comm.:   ON when the internal communication among parts in the interface card is not working properly.
OFF when the all communication are correct.

DL2 (Red)   Fail Safe Action in progress: ON when a Fail Safe Action is in progress due to communication fault on PROFIBUS line.
OFF when PROFIBUS communication are correct.

DL3 (Green) Slave Ready: ON when the interface is ready to communicate to PROFIBUS line.
OFF when the interface is not yet ready .

DL4 (Green) reserved

DL5 (Green) PROFIBUS: ON when PROFIBUS communication has been established and the interface has entered in DATA_EX state.

DL6 (Green) Power: ON when the interface is correctly powered.

4

4.2 Wiring Diagram

The **F02_DPV1** is connected to the actuator terminal board by internal wiring as shown in figure:
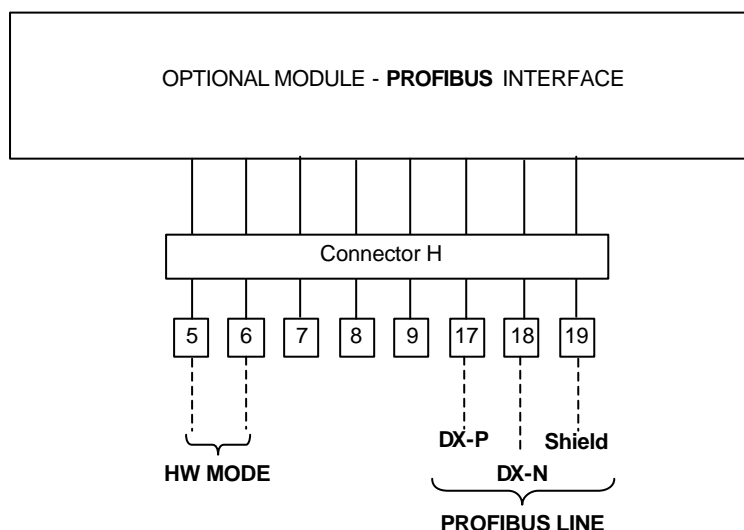
4.3 Bus/Hardwired Mode Selection

The **F02_DPV1** board manages the Bus/Hardwired Mode selection by means of the input indicated with HW MODE.
The physical input accepts from 24 to 125V DC or AC, polarity insensitive.

When the input is left unconnected or no voltage is applied, the actuator is under bus control from which is possible to send commands and read status.

When an appropriate voltage is applied to the HW MODE input, the actuator turns under Hardwired control. In this condition the bus can only read actuator status while the actuator follows the Hardwired Open and Close controls connected to the terminal board.

For further details see the relevant wiring diagram and the user's manual:
"**F02 Quarter-turn Electric Actuator** – Instruction Handbook MAN 652".

5. PROFIBUS DP description

PROFIBUS is a vendor-independent, open field bus standard used in a wide range of application in process automation. Vendor independence and openness are ensured by the international standards EN 50170 and EN 50254. The DP communication profile is designed for data exchange at the field level. The central controllers (as PLC) communicate via serial connection with field devices (as sensors and actuators). Data exchange is mainly cyclic. The central controller (called Master) cyclically reads the input information from the field devices (called Slaves) and cyclically writes the output information to the slaves. In addition PROFIBUS DP provides communication services for parameterisation, alarm handling, and monitoring of intelligent field devices. The maximum number of Master and Slave devices in a bus segment is 32 without repeaters. With repeaters the number can be extended to 126 on one bus. The maximum cable length depends on the speed of transmission. Higher is the speed shorter is the length. For instance, with baud rate 93.75 Kb/sec, the max cable length is 1,200m without repeaters and 10,000 m with repeaters.

Mono-master or multi-master system configuration can be provided. Bus access is controlled by token passing procedure between masters and master-slave procedure (polling) between master and slaves.

Types of devices:

DP Master Class 1 (DPM 1): this is the central controller that cyclically exchange information with the field devices. Typical devices are PLC or PC.

DP Master Class 2 (DPM 2): this devices are necessary for commissioning, maintenance and diagnostics.

Slave: field device such transmitters, actuators, drives, etc.

The figure below shows a PROFIBUS DP configuration with two Master devices and different Slave devices.
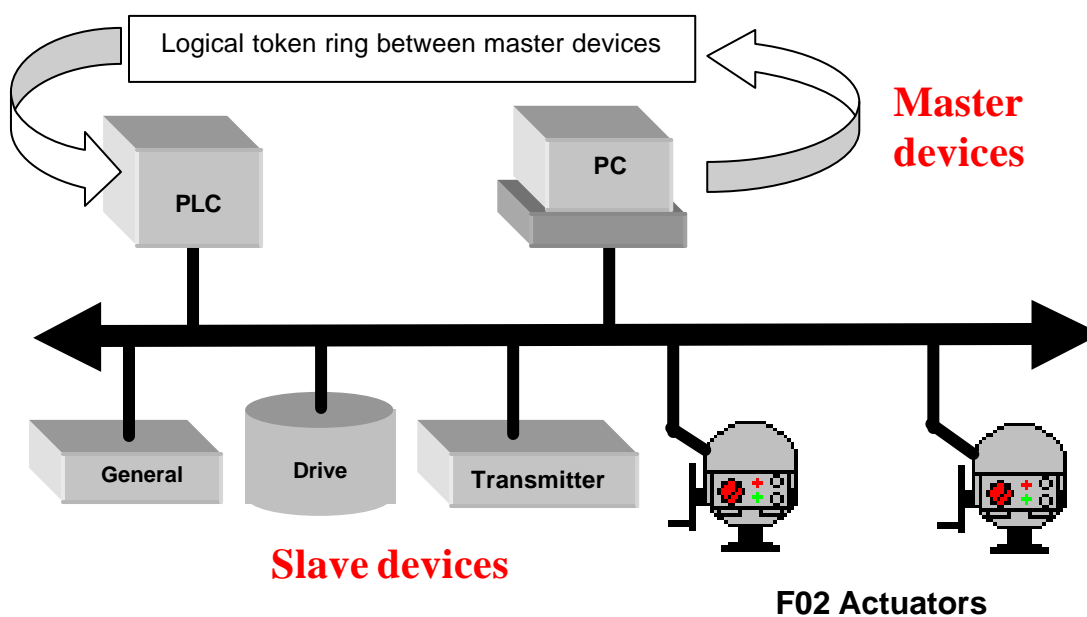
6.   RS485 transmission mode

The **F02_DPV1** module uses a half duplex, multidrop, serial communication line RS485. The module communicates with the Masters via its RS485 interface and the transmission media consists in a shielded twisted pair cable. Transmission speed from 9.6kbit/sec to 1.5Mbit/sec are available. One unique transmission speed is allowed for all devices on the bus when the system works.

All devices are connected in a bus structure. Up to 32 station (Master and Slaves) can be connected in one segment without repeaters. Up to nine repeater can be used to extend the number of device up to 126 and to link the individual bus segment and to enlarge the network area. The following table shows the relationship between baud rate, segment length and total bus length.

Baud rate	Max. segment length (no repeater)	Max. bus length with 9 repeater
9.6 K	1,200 m	10,000 m
19.2 K	1,200 m	10,000 m
45.45 K	1,200 m	10,000 m
93.75 K	1,200 m	10,000 m
187.5 K	1,200 m	10,000 m
500 K	400 m	10,000 m
1500 K	200 m	10,000 m

The bus must be terminated by an active bus terminator at the beginning and at the end of each segment. Only two terminators in one bus segment must be provided. To ensure error-free operation, both bus terminators must be powered. The maximum cable length depends on the transmission speed. Cable lengths indicated in table 2 are based on **Type A** cable, as specified by the EN 50170, having the following characteristics.

- Impedance   from 135 to 165 ohm
- Capacity   < 30 pF/m
- Loop resistance   110 ohm/km
- Wire gauge   0.64 mm
- Conductor area   > 0.34 mm^2

The use of cable of previously used type B is not recommended.

The data lines must not be reversed. Use of shielded cable is mandatory for having high system immunity against electromagnetic disturbs. The shield should be connected to ground on both sides. The data lines should be kept separate from all other cables. It should be laid in separate, conductive and earthed cable trunking. It must be ensured that there are not voltage difference between individual nodes of PROFIBUS DP.
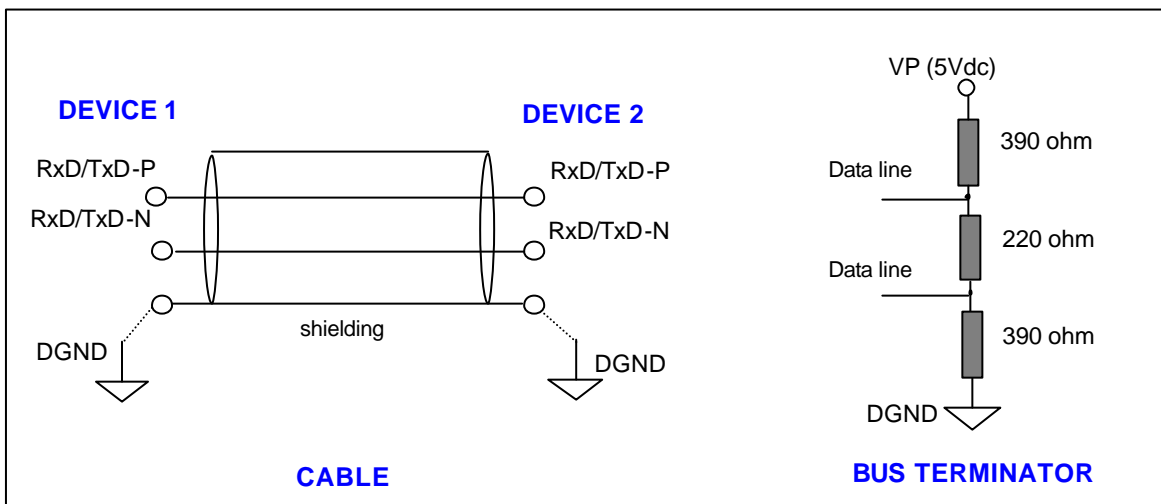
The **F02_DPV1** module takes its electrical supply from the actuator power supply module. The RS485 bus transceiver is isolated from the actuator electronics. Also the voltage supply of the bus terminator is isolated.

The bus terminator is a crucial component to ensure error-free operation: since the PROFIBUS terminators are active circuits it is important that they remain powered also when a part of the field is powered off. Normal practice recommends to use external terminators available on the market and to power them by a separate, safe power supply. Anyway **F02_DPV1** module is equipped with on-board bus terminator that should be used when the actuator is at the beginning or at the end of the bus segment and it is no possible to use external terminators. The bus terminator can be connected on the data lines by means of soldering pad.

The figure below shows the typical PROFIBUS wiring. The terminator must be linked to the data lines only if the actuator is at the beginning or at the end of the bus segment.
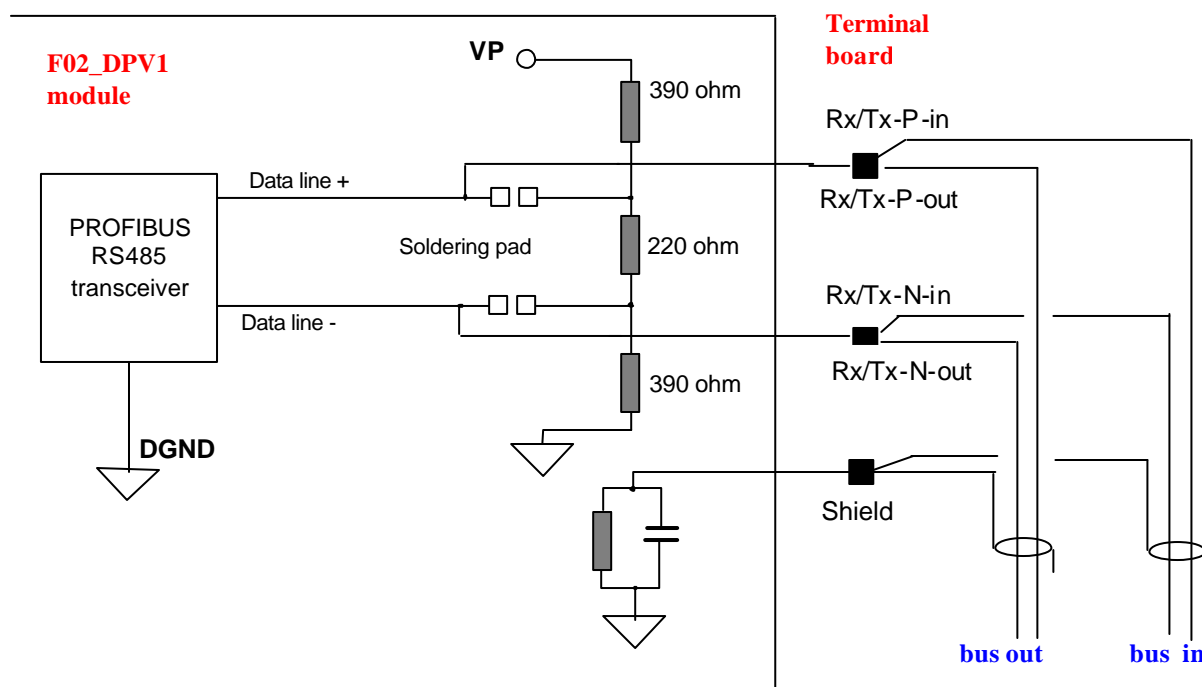
7. F02_DPV1 power-up

On power-up the module checks the baud rate and then it waits for the "**parameterization"** telegram from the Master. The parameterization message contains user information needed for actuator operation and listed in the chapter 8: *'Data exchanged during parameterization'.*
After that the module waits for the "**configuration"** telegram from Master. The configuration message contains the number of input and output bytes reserved in the memory of the Master device for each slave. Only the number of bytes determined in the configuration is transmitted between Master and Slave. This information is called "**module**". The **F02_DPV1** board implements the following modules:

- **Module 1 : 1 byte output; 2 bytes input**
- **Module 2 : 4 byte output; 6 bytes input**
- **Module 3 : 1 byte output; 2 bytes input - Consistent**
- **Module 4 : 4 byte output; 6 bytes input - Consistent**

For example, if Module 2 is selected, the output telegram consists in 4 bytes, and the input telegram in 6 bytes.
It is possible to specify if the selected data has to be processed consistently by the PROFIBUS DP-Master. In this way the data will not change during the reading.

When parameters and configuration are correct, the module enters in "**data exchange mode**" and starts with normal operation. The Master cyclically sends commands to the Slave and read its status.
The following figure shows the state machine of a DP slave:
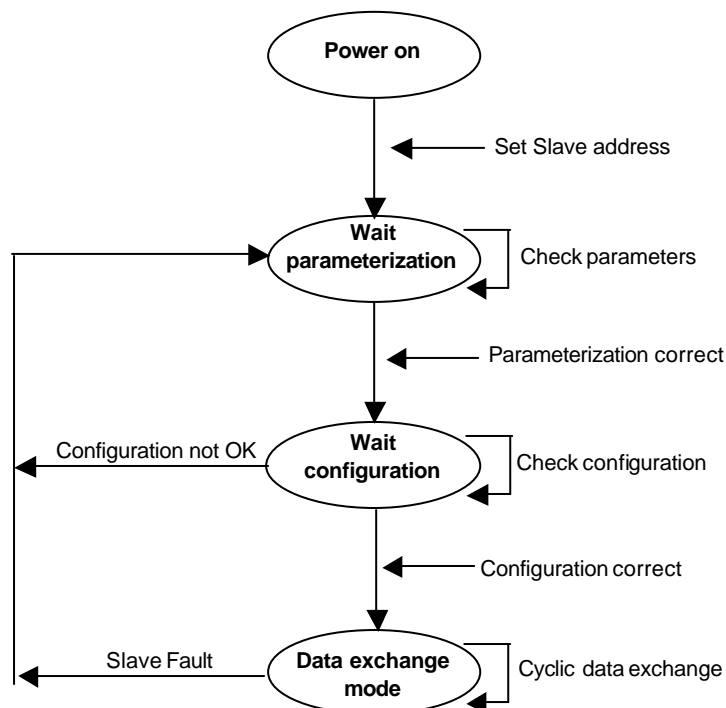
8. Data exchanged during parameterization

The following data are sent to the **F02_DPV1** interface:

Byte	Name	Type	Range	EU	Default
0	Reserved DPV1				
1	Reserved DPV1				
2	Reserved DPV1				
3	Storage format	1 byte	0 1	LSB first MSB first	LSB fist
4	Fail Safe Action	1 byte	0 1 2 3 4	Off Close Open Stayput Go to position	Off
5	Delay before initiating safe oper.	1 byte	0-10	sec	4
6	Safe Position	1 byte	0-100	%	50
7	Dead Band	1 byte	3-20	Tenth of %	15
8	Closing direction	1 byte	0 1	CW CCW	CW
9	Opening Speed set	1 byte	0 … 9	Min … Max	7
10	Closing Speed set	1 byte	0 … 9	Min … Max	7
11	Opening Torque set	1 byte	0 … 9	Min … Max	9
12	Closing Torque set	1 byte	0 … 9	Min … Max	9
13	Open Limit	1 byte	0 1	By torque By position	By position
14	Close Limit	1 byte	0 1	By torque By position	By position
15	LED Colour Code	1 byte	0 1	OP green –CL red OP red –CL green	Green LED lit when in Fully Open

Byte 0-2   Reserved for DPV1

Byte 3   Storage Format
It defines the format of the variables that are transmitted on 2 or 4 bytes. The setting of this parameter affects the format of the following data:

Output Data: (if Module 2 is selected) ……Set point
Input Data: (if Module 2 is selected)…….Current Position
General Data: Slot 1 Index 1………………..Current Position
Value: 0: LSB byte is transmitted first (default setting)
1: MSB byte is transmitted first

Byte 4   Fail Safe Action
It defines the action of the actuator in case of loss of the bus signal. The action takes place only if the local selector is on REMOTE position and if the bus is operating. When the bus signal restores, also the actuator restores at its normal functioning.
Value: 0: Off - disable (default setting)
1: Close
2: Open
3: Stayput
4: Go to position indicated in the parameter 'Safe position'
IMPORTANT: Fail Safe Action is active only if Watchdog control is enabled.

Byte 5   Delay before initiating Fail Safe operation
It defines the delay before execute the programmed Safe Action
Value: minimum   0 sec.
            maximum   10 sec.
            default value: 4 sec.

Byte 6   Safe position
It defines the Safe position when 'Safe Action: go to position' is selected
Value: minimum   0 %
            maximum   100%
            default value: 50%

Byte 7   Dead band
It defines in tenth of % the Dead band of the positioning function available on the modulating actuator. The movement is inhibited until the difference between current position and requested position (position error) is lower than Dead Band.
Value: minimum   3   0,3%
            maximum   20   2,0%
            default value: 15   1,5%

Byte 8   Closing Direction
It defines the Closing direction of the motor
Value: 0: CW – clockwise (default value)
            1: CCW – counter clockwise

Byte 9   Opening Speed set
It defines the speed of the motor when opening
Value: minimum   0
            maximum   9
            default value: 7

Byte 10   Closing Speed set
It defines the speed of the motor when closing
Value: minimum   0
            maximum   9
            default value: 7

Byte 11   Opening Torque set
It defines the opening torque
Value: minimum   0 = 40% of Nominal Torque
            maximum   9= 100% of Nominal Torque
            default value: 9

Byte 12   Closing Torque set
It defines the closing torque
Value: minimum   0 = 40% of Nominal Torque
            maximum   9= 100% of Nominal Torque
            default value: 9

Byte 13   Open Limit
It defines the end of travel setting in Open direction
Value: 0: by Torque
            1: by Position (default setting)

Byte 14   Close Limit
It defines the end of travel setting in Close direction
Value: 0: by Torque
            1: by Position (default setting)

Byte 15   LED Color Code
It defines the color of the LED indicating the Fully Open and Fully Close position
Value: 0: Open: LED=green;   Close: LED=red (default setting)
            1: Open: LED=red;   Close: LED=green

9.   Data exchange mode

The following paragraph describes the input and output messages of **F02- DPV1** interface when working in "data exchange mode" for "cyclic data" and "acyclic data". In all cases it is called "**input signal**" a data flowing from actuator to bus, vice-versa it is called "**output signal**" a data flowing from bus to slave.

9.1   CYCLIC COMMUNICATIONS DPV0

9.1.1   Output Data

The structure of Cyclic Output Data is as follow depending on the Module selected:

Module 1 or Module 3

Byte	b7	b6	b5	b4	b3	b2	b1	b0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Stop Command	Close Command	Open Command

Module 2 or Module 4

Byte	b7	b6	b5	b4	b3	b2	b1	b0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Stop Command	Close Command	Open Command
1	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Positioner Enable
2	Set point							
3								

Command	Description	Position
Open Command	When this bit is set to 1 an Open Command is issued to the actuator. The open command is maintained for all the duration on the movement since the receiving of the bus command until the Open Limit has reach. The open command is reset when a STOP Command is received from bus.	Associated to Output Data **Module 1/3** or **Module 2/4** Byte 0; bit 0
Close Command	When this bit is set to 1 a Close Command is issued to the actuator. The close command is maintained for all the duration on the movement since the receiving of the bus command until the Close Limit has reach. The close command is reset when a Stop Command is received from bus.	Associated to Output Data **Module 1/3** or **Module 2/4** Byte 0; bit 1
Stop Command	When this bit is set to 1 a Stop Command is issued to the actuator. The Stop Command received from bus cause the reset of both open and close command.	Associated to Output Data **Module 1/3** or **Module 2/4** Byte 0; bit 2
Positioner Enable	When this bit is set to 1 it is enabled the on-board positioner. The positioner is enabled until this bit is set to 1.	Associated to **Module 2/4** Byte 1; bit 0
Set point	The Set Point received from the bus is used to produce the open or close commands to the F02actuator as defined in paragraph 9.1.3: 'Positioning algorithm'.	Associated to Output Data **Module 2/4** Byte 2 and 3

9.1.2 *Input data*

The structure of Cyclic Input Data is as follow depending on the Module selected:

Module 1 or Module 3

Byte	b7	b6	b5	b4	b3	b2	b1	b0
0	Monitor Rele	Intermediate position	Motor Stopped	Fully Close	Actuator Moving	Closing	Opening	Fully Open
1	Reserved	Reserved	Reserved	Reserved	Local Config.	Remote	Local	Hardwired Mode

Module 2 or Module 4

Byte	b7	b6	b5	b4	b3	b2	b1	b0
0	Monitor Relay	Intermediate position	Motor Stopped	Fully Close	Actuator Moving	Closing	Opening	Fully Open
1	Reserved	Reserved	Reserved	Reserved	Local Config.	Remote	Local	Hardwired Mode
2	Current Position							
3								
4	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Positioner active
5	Current Torque							

Command	Description	Position
Fully Open	The Fully Open indication is set to 1 when the F02 actuator is at Fully Open position. This indication reflects the status of the open limit on the F02 actuator.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 0
Opening	The Opening indication is set to 1 when the F02 actuator is moving toward opening direction.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 1
Closing	The Closing indication is set to 1 when the F02 actuator is moving toward closing direction.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 2
Actuator Moving	This indication is set to 1 when the actuator is moving either in opening or in closing direction.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 3
Fully Close	The Fully Close indication is set to 1 when the F02 actuator is at Fully Close position. This indication reflects the status of the close limit on the F02 actuator.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 4
Motor Stopped	This indication is set to 1 when the actuator is not moving and the motor has stopped.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 5
Intermediate position	This indication is set to 1 when the valve is on an intermediate position.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 6
Monitor Relay	This indication is set to 1 when the actuator is available for bus control. Monitor Relay indication means that the local selector is on Remote position and no alarms are present.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 0; bit 7
Hardwired Mode	This indication is set to 1 when the Hardwired Mode is selected.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 1; bit 0
Local	This indication is set to 1 when the optional Local Selector is set on Local position to enable Open/Close local command.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 1; bit 1
Remote	This indication is set to 1 when the F02 actuator is not equipped with the optional Local Selector or when Local Selector is set on Remote position to enable remote commands.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 1; bit 2
Local Configuration	This indication is set to 1 when a Local Configuration in progress.	Associated to Input Data **Module 1/3** or **Module 2/4** Byte 1; bit 3
Current position	The current position read from base card.	Associated to Input Data **Module 2/4** Byte 2 and 3
Positioner active	This indication is set to 1 when the on-board positioner is enabled.	Associated to Input Data **Module 2/4** Byte 4; bit 0
Current torque	The current torque read from base card.	Associated to Input Data **Module 2/4** Byte 5

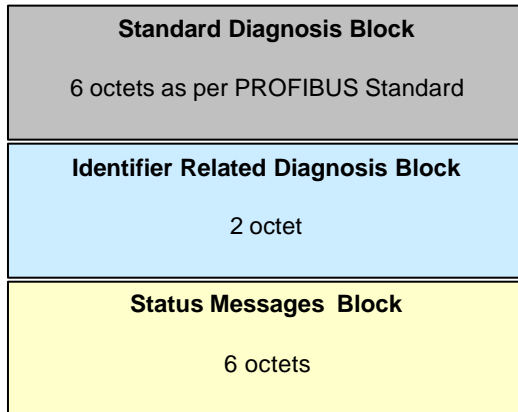### 9.1.3   *Positioning algorithm*

A positioning algorithm (position closed loop control) is implemented on the **F02- DPV1** interface card.
Positioning function consists in comparing the position, received from the base card, with the position request received from bus. If the difference between "position request and present position" is greater than "dead band" an Open or a Close command is send to base card. Dead band is configurable via bus from 0,3 to 2,0%.

14

9.1.4 Diagnostic message

The **F02 _DPV1** interface manages the diagnostics indication coming from the actuator as stated by the PROFIBUS DP V1 standard.

The diagnostic model has the following structure:

Standard Diagnosis Block 6 octets as per PROFIBUS Standard
Identifier Related Diagnosis Block 2 octet
Status Messages Block 6 octets

The **F02 _DPV1** has the following Status message block:

Relative Octect	b7	b6	b5	b4	b3	b2	b1	b0
5	Motor dir. alarm	Opt. loc. cnt. alarm	Strk. limit alarm	Torque CL alarm	Torque OP alarm	Pwr fail alarm	Not Oper Close	Not Oper Open
6	Reserved	Reserved	Reserved	Loc. Config	Hi. temp alarm	Pos. Sen. alarm	HW alarm	Jammed valve

As described in the GSD file, the Status Message gives the following indications:

- **bit 24:** **Not Operative in Open direction**
  This bit is set when the Open Commands are not available due to current alarm trip in open direction.
  The diagnostic indication is cleared when the alarm that has generated the fault disappears.

- **bit 25.** **Not Operative in Close direction**
  This bit is set when the Close Commands are not available due to current alarm trip in close direction.
  The diagnostic indication is cleared when the alarm that has generated the fault disappears.

- **bit 26:** **Power Failure Alarm**
  This bit is set when the main supply is not in the proper range.
  The diagnostic indication is cleared at the next power up if the supply is corrected.

- **bit 27:** **HI-HI Torque in Opening**
  This bit is set when the Torque has reached the programmed limit while the actuator was moving in opening direction.
  The diagnostic indication is cleared by a Close command.

- **bit 28:** **HI-HI Torque in Closing**
  This bit is set when the Torque has reached the programmed limit while the actuator was moving in closing direction.
  The diagnostic indication is cleared by an Open command.

- **bit 29:** **Stroke Limit Alarm**
  This bit is set when the current position is behind the Open or Close limit switches or as result of an incorrect Torque Set..
  The diagnostic indication is cleared when the position return within the limits or after a successful Torque Set procedure.

- **bit 30:** **Alarm on Optional Local Control (Pushbutton)**
  This bit is set when the optional Local Control does not work correctly.
  The diagnostic indication is cleared when the Local Control works without problems.

- **bit 31:** **Motor Direction Alarm**
  This bit is set when the motor drive has recognised an incorrect behaviour.
  The diagnostic indication is cleared by a command in the opposite direction.

- **bit 32:** **Jammed Valve**
  This bit is set when the actuator detects a jammed valve condition.
  The diagnostic indication is cleared by a command in the opposite direction.

- **bit 33** **Hardware Error**
  This bit is set when the actuator detects a general hardware error.
  The diagnostic indication is cleared at the next power up under normal condition.

- **bit 34:** **Position Sensor Failure**
  This bit is set when the actuator detects that executing a command the position sensor is not working properly.
  The diagnostic indication is cleared by a command in the opposite direction.

- **bit 35:** **HI-HI Temperature**
  This bit is set when the internal temperature is out from the operational limits.
  The diagnostic indication is cleared when the internal is within the limits.

- **bit 36:** **Local Configuration in progress**
  This bit is set when the actuator detects that a Local Operator is executing a Local Configuration.
  The diagnostic indication is cleared when the Local Operator finishes the Configuration and the actuator returns to normal operations.

16

9.2 ACYCLIC COMMUNICATION DPV1

This paragraph defines the composition of the acyclic communication defined as per PROFIBUS DPV1 standard.

The data available on acyclic communication are organised as shown in the following table:

Slot	Index	Length	Access	Description
Slot 0: Name Plate Data				
0	0	12 bytes	Only Read	Actuator Serial Number
0	1	12 bytes	Only Read	Actuator Type
0	2	12 bytes	Only Read	Valve Tag name
0	3	28 bytes	Only Read	PROFIBUS Interface
Slot 1: General Data				
1	0	3 bytes	Only Read	General data about current working condition
1	1	3 bytes	Only Read	Position and Torque
1	2	1 byte	Only Read	Temperature
Slot 2: Actuator Configuration Data				
2	0	4 bytes	Read and Write	Torque and Speed set
2	1	1 byte	Read and Write	Dead Band
2	2	6 bytes	Only Read	General Configuration
2	3	3 bytes	Only Read	Fail Safe

9.2.1 *Name plate*

Slot 0, Index 0, length 12 bytes - Only Read: Actuator Serial Number

Byte	Name	Dim	Range	EU
0-11	Actuator Serial Number	12 bytes		String

Slot 0, Index 1, length 12 bytes - Only Read: Actuator Type

Byte	Name	Dim	Range	EU
0-11	Actuator Type	12 bytes		String

Slot 0, Index 2, length 12 bytes - Only Read: Valve Tag name

Byte	Name	Dim	Range	EU
0-11	Valve tag	12 bytes		String

Slot 0, Index 3, length 28 bytes - Only Read: PROFIBUS Interface

Byte	Name	Dim	Range	EU
0-19	Model name	20 bytes		String
20-23	Firmware revision	4 bytes		String
24-27	Hardware revision	4 bytes		String

9.2.2 *General Data*

Slot 1, Index 0, length 3 bytes - Only Read: General data about current working condition

Byte	Name	bit	Description
0	Byte 0	0 1 2 3 4 5 6 7	Fully Open position Opening Closing Actuator Moving Fully Close Motor Stopped Intermediate position Monitor Rele
1	Byte 1	0 1 2 3 4 5 6 7	Hardwired Mode Local Remote Local Config
2	Byte 2	0 1 2 3 4 5 6 7	Positioner active

Slot 1, Index 1, length 3 bytes - Only Read: Position and Torque

Byte	Name	Dim	Range	EU
0-1	Current Position	2 bytes	0 - 1000	0,1%
2	Current Torque	1 byte	0 - 100	%

Slot 1, Index 2, length 1 byte - Only Read: Temperature

Byte	Name	Dim	Range	EU
0	Internal Temperature	1 byte	-128 +127	°C

9.2.3 *Actuator Configuration*

Slot 2, Index 0, length 4 bytes – Read and Write: Torque and Speed set

Byte	Name	Dim	Range	EU
0	Opening Speed set	1 byte	0 … 9	Min … Max
1	Closing Speed set	1 byte	0 … 9	Min … Max
2	Opening Torque set	1 byte	0 … 9	Min … Max
3	Closing Torque set	1 byte	0 … 9	Min … Max

Slot 2, Index 1, length 1 byte – Read and Write: Dead Band

Byte	Name	Dim	Range	EU
0	Dead Band	1 byte	3-20	Tenth of %

Slot 2, Index 2, length 6 bytes – Only Read: General Configuration

Byte	Name	Dim	Range	EU
0	Storage format	1 byte	0 1	LSB first MSB first
1	Closing direction	1 byte	0 1	CW CCW
2	Open Limit	1 byte	0 1	By torque By position
3	Close Limit	1 byte	0 1	By torque By position
4	Nominal Torque	1 byte	0 1 2 3 4 5	63 Nm 125 Nm 250 Nm 500 Nm 1000 Nm 2000 Nm
5	LED color code	1 byte	0 1	OP green – CL red OP red – CL green

Slot 2, Index 3, length 3 bytes – Only Read: Fail Safe

| Byte	Name	Dim	Range	EU
0	Fail Safe Action	1 byte	0 1 2 3 4	Off Close Open Stayput Go to position
1	Delay before initiating safe oper.	1 byte	0-10	sec
2	Safe Position	1 byte	0-100	%

10. Local settings

The **F02_DPV1** board is equipped with a set of switches to allow the operator to configure the PROFIBUS Address.
Furthermore two soldering pads are available to connect the PROFIBUS termination circuit to be used in the case that the external terminator is not available.

To perform the local setting on the **F02_DPV1** board it is necessary to follows carefully the procedures explained in "*F02 Quarter-turn Electric Actuator* – Instruction Handbook MAN 652" at Chapter 6: "ACTUATOR SETTINGS AND CONFIGURATION"

10.1 PROFIBUS Address Setting

PROFIBUS Address is configured by means of the switches indicated in the figure and located on the **F02_DPV1** soldering side, the one on sight when the control unit cover is removed. To enter a new PROFIBUS Address the F02 actuator shall be powered.
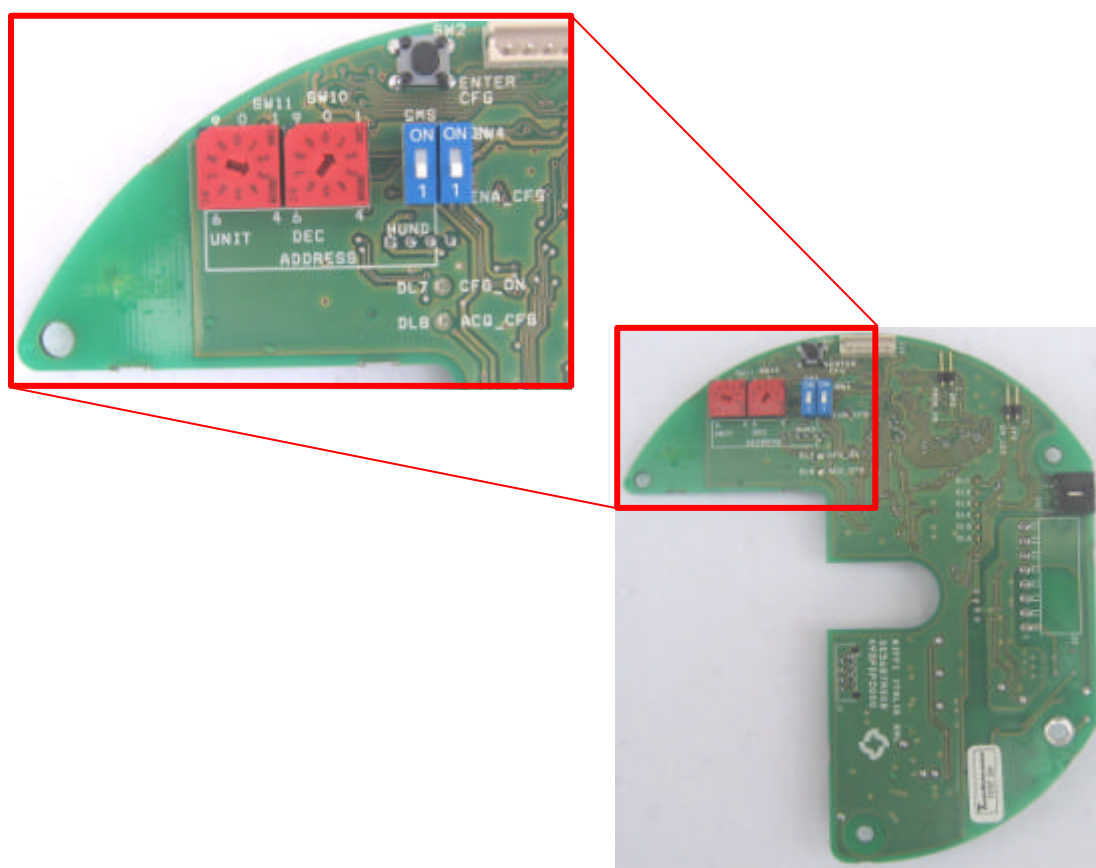
Configuration procedure:

- *Move the dip switch **CFG_ENA** on the ON position: the **CFG_ON** LED is turned ON to indicate that the actuator is entered in Configuration Mode*
- *Set the new PROFIBUS Address on the rotary switches **UNIT** and **DEC** and on the dip switch **HUNDR**. E.g Address 028 correspond to:*
  - *HUNDR. on OFF position*
  - *DEC. on position 2*
  - *UNIT on position 8*
- *Press the pushbutton **ENTER** to confirm the new set: if the new Address is correct the **ACQ_CFG** LED is turned ON*
- *Move the dip switch **CFG_ENA** on the OFF position to exit from Configuration Mode: the **CFG_ON** LED is turned OFF and the **F02_DPV1** restarts with the new Address.*

10.2   PROFIBUS Terminator

On board terminator is located on the component side of the **F02_DPV1** module as shown in figure and is connected to the PROFIBUS network by two soldering path indicated with JP12 and JP13:
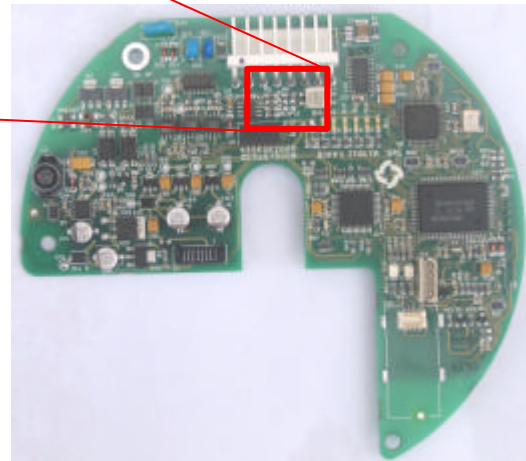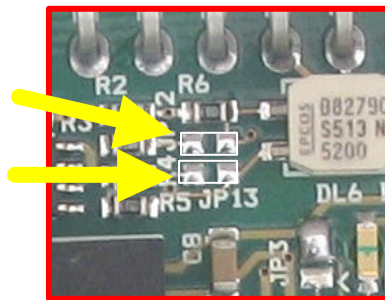
On default the soldering path are left open and the terminator is not active
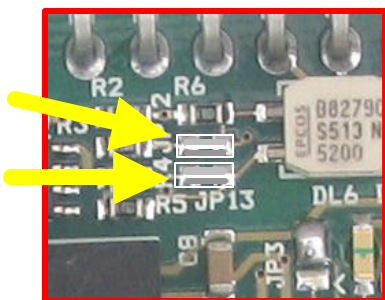
To activate the on board terminator both the soldering path must be closed as indicated.

11. GSD file

```
; GSD-File  for F02    BIFFI ITALIA srl
; Author: C.Doglio
; Date: 20.07.05
; File: F02_09E3.GSD    rev.0.0
;========================================================
; #Profibus_DP
;
; Prm-Text-Def-List:
;
;Text definition 1
PrmText=1
Text(0)="LSB first"
Text(1)="MSB first"
EndPrmText
;
;Text definition 2
PrmText=2
Text(0)="Off"
Text(1)="Close"
Text(2)="Open"
Text(3)="Stayput"
Text(4)="Go to position"
EndPrmText
;
;Text definition 4
PrmText=4
Text(0)="By Torque"
Text(1)="By Position"
EndPrmText
;
;Text definition 5
PrmText=5
Text(0)="GREEN lit when OPEN"
Text(1)="RED lit when OPEN "
EndPrmText
;Text definition 6
PrmText=6
Text(0)="CW"
Text(1)="CCW"
EndPrmText
;
; Ext-User-Prm-Data-Def-List:
;
ExtUserPrmData=1 "Storage Format"
Unsigned8 0 0-1
Prm_Text_Ref=1
EndExtUserPrmData
ExtUserPrmData=2 "Fail safe action"
Unsigned8 0 0-4
Prm_Text_Ref=2
EndExtUserPrmData
ExtUserPrmData=3 "Fail safe delay"
Unsigned8 4 0-10
EndExtUserPrmData
ExtUserPrmData=4 "Safe position"
Unsigned8 50 0-100
EndExtUserPrmData
ExtUserPrmData=5 "Closing direction"
Unsigned8 0 0-1
Prm_Text_Ref=6
EndExtUserPrmData
ExtUserPrmData=6 "Opening speed set"
Unsigned8 7 0-9
EndExtUserPrmData
```

```
ExtUserPrmData=7 "Closing speed set"
Unsigned8 7 0-9
EndExtUserPrmData
ExtUserPrmData=8 "Opening Torque set"
Unsigned8 9 0-9
EndExtUserPrmData
ExtUserPrmData=9 "Closing Torque set"
Unsigned8 9 0-9
EndExtUserPrmData
ExtUserPrmData=10 "Open limit"
Unsigned8 1 0-1
Prm_Text_Ref=4
EndExtUserPrmData
ExtUserPrmData=11 "Close limit"
Unsigned8 1 0-1
Prm_Text_Ref=4
EndExtUserPrmData
ExtUserPrmData=12 "Dead band"
Unsigned8 15 3-20
EndExtUserPrmData
ExtUserPrmData=13 "LED color code"
Unsigned8 0 0-1
Prm_Text_Ref=5
EndExtUserPrmData
;
; Unit definition list:
;
GSD_Revision=4
;
Vendor_Name="BIFFI ITALIA srl"
Model_Name="F02-PremiTork_DPV1"
Revision="Release 0.0"
Ident_Number=0x09E3
Protocol_Ident=0
Station_Type=0
Hardware_Release="Hardware Release DE5687 rev.0.0"
Software_Release="Software Release SW=0.00"
;
9.6_supp=1
19.2_supp=1
45.45_supp=1
93.75_supp=1
187.5_supp=1
500_supp=1
1.5M_supp=1
;
MaxTsdr_9.6=60
MaxTsdr_19.2=60
MaxTsdr_45.45=60
MaxTsdr_93.75=60
MaxTsdr_187.5=60
MaxTsdr_500=100
MaxTsdr_1.5M=150
;
Implementation_Type="SPC3"
Bitmap_Device="F02_R"
Bitmap_Diag="F02_D"
Bitmap_SF="F02_C"
;
; Slave-Specification:
;
Freeze_Mode_supp=1
Sync_Mode_supp=1
Auto_Baud_supp=1
Set_Slave_Add_supp=0
Min_Slave_Intervall=1
Max_Diag_Data_Len=16
```

```
Slave_Family=0
Fail_Safe=1
;
; UserPrmData: Length and Preset:
;
User_Prm_Data_Len=16
User_Prm_Data=0x00,0x00,0x00,\   ;0-2 Reserved DPV1
0x00,  \                         ;3- Storage Format
0x00,  \                         ;4 -Fail Safe action
0x04,  \                         ;5 -Delay before Fail Safe
0x32,  \                         ;6 -Safe position
0x0f,  \                         ;7 -Dead band
0x00,  \                         ;8 -Closing direction
0x07,  \                         ;9 -Opening speed set
0x07,  \                         ;10 -Closing speed set
0x09,  \                         ;11-Opening Torque set
0x09,  \                         ;12-Closing Torque set
0x01,  \                         ;13-Open limit
0x01,  \                         ;14-Close limit
0x00                             ;15-LED color code
;
Max_User_Prm_Data_Len=16
;
Ext_User_Prm_Data_Const(0)=0
Ext_User_Prm_Data_Const(1)=0
Ext_User_Prm_Data_Const(2)=0
Ext_User_Prm_Data_Ref(3)=1
Ext_User_Prm_Data_Ref(4)=2
Ext_User_Prm_Data_Ref(5)=3
Ext_User_Prm_Data_Ref(6)=4
Ext_User_Prm_Data_Ref(7)=12
Ext_User_Prm_Data_Ref(8)=5
Ext_User_Prm_Data_Ref(9)=6
Ext_User_Prm_Data_Ref(10)=7
Ext_User_Prm_Data_Ref(11)=8
Ext_User_Prm_Data_Ref(12)=9
Ext_User_Prm_Data_Ref(13)=10
Ext_User_Prm_Data_Ref(14)=11
Ext_User_Prm_Data_Ref(15)=13
;
;
Modular_Station=1
Max_Module=1
Max_Input_Len=6
Max_Output_Len=4
Max_Data_Len=10
;
; Slave-Specification:
;
DPV1_Slave=1
;
C1_Read_Write_supp=0
C2_Read_Write_supp=1
C2_Max_Data_Len=240
C2_Response_Timeout=100
C2_Read_Write_required=0
C2_Max_Count_Channels=3
Max_Initiate_PDU_Length=72
Diagnostic_Alarm_supp=0
Process_Alarm_supp=0
Pull_Plug_Alarm_supp=0
Status_Alarm_supp=0
Update_Alarm_supp=0
Manufacturer_Specific_Alarm_supp=0
Extra_Alarm_SAP_supp=0
Alarm_Sequence_Mode_Count=0
Alarm_Type_Mode_supp=0
```

24

```
Diagnostic_Alarm_required=0
Process_Alarm_required=0
Pull_Plug_Alarm_required=0
Status_Alarm_required=0
Update_Alarm_required=0
Manufacturer_Specific_Alarm_required=0
DPV1_Data_Types=0
WD_Base_1ms_supp=1
Check_Cfg_Mode=0
;
;Device related Diagnosis
;
Unit_Diag_Bit(24)="Not Operative Open"
Unit_Diag_Bit(25)="Not Operative Close"
Unit_Diag_Bit(26)="Power Fail Alarm"
Unit_Diag_Bit(27)="HI-HI Torque in Opening"
Unit_Diag_Bit(28)="HI-HI Torque in Closing"
Unit_Diag_Bit(29)="Stroke Limit Alarm"
Unit_Diag_Bit(30)="Local Control Alarm"
Unit_Diag_Bit(31)="Motor Direction Alarm"
Unit_Diag_Bit(32)="Jammed Valve"
Unit_Diag_Bit(33)="Hardware Error"
Unit_Diag_Bit(34)="Postition Sensor Failure"
Unit_Diag_Bit(35)="HI-HI Temperature"
Unit_Diag_Bit(36)="Local Configuration in progress"
;
; Module Definition List
;
Module="Mod.1: 2 B.In, 1 B.Out" 0x11,0x20 1
EndModule
Module="Mod.2: 6 B.In, 4 B.Out" 0x15,0x23 2
EndModule
Module="Mod.3: 2 B.In, 1 B.Out - Cons." 0x91,0x20 3
EndModule
Module="Mod.4: 6 B.In, 4 B.Out - Cons." 0x95,0xa3 4
EndModule
```

26

12. PROFIBUS CERTIFICATE

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

Biffi Italia s.r.l.
Loc. Caselle S. Pietro, 29017 Fiorenzuola D Arda - Piacenza, Italy

the Certificate No.: **Z01111** for the PROFIBUS Slave:

Product Name:	F02-PremiTork_DPV1
Revision:	SW/FW: SW=0.00; HW: DE5687 rev.0.0
GSD:	F02_09E3.gsd, Release 0.0; GSD_Revision 4

This certificate confirms that the product has successfully passed the certification tests with the following scope:

☑	DP-V0	MS0, Sync, Freeze
☑	DP-V1	MS1, MS2
☐	DP-V2	
☐	Profile	

Test Report Number:	**PCN066-DPS-01**
Authorized Test Laboratory:	**PROFIBUS Center Nederland**
Expiry date of Certificate:	**October 12, 2008**

The tests were executed in accordance with the following documents:
"Test Specifications for PROFIBUS DP Slaves, Version 2.3", March 2004.
This certificate is granted according to the document "Framework for testing and certification of PROFIBUS products".

Karlsruhe, October 19, 2005

....
(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

_____   _____
(Klaus-Peter Lindner)   (Prof. K. Bender)

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COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001/2000=

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