MAN 652-OM8

F02-PremiTork_AS-i
AS-Interface

User's Manual

0.0	13.02.06	Instruction for AS-Interface	C.D.	A.A..
Rev.	**Date**	**DESCRIPTION**	**Prepared**	**Approved**

Note:
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1. Introduction

The **F02-PremiTork_AS-i** is an electronic module installed inside the actuator housing that allows to connect the BIFFI electric actuator F02 to an AS-i network.
The module has its own microprocessor acting as a pure bus interface and not affecting the actuator control integrity. The **F02-PremiTork_AS-i** is bus-powered and fully isolated from the actuator electronics.

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

2. Operation and storage

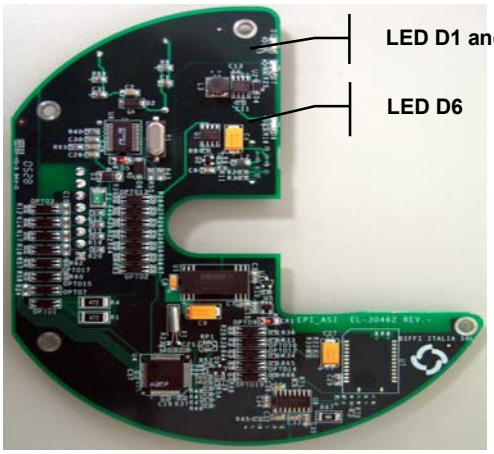
The module is designed to work and to be stored in the same environment as the actuator.

3. Communication features

Communication protocol	AS-Interface according to v2.1 specification
Network topology	Bus, Star, Tree
Transmission medium	Unshielded 2-wire cable for data and power (24Vdc, up to 8A for connected devices)
Data rate	4 bit (net) per slave and message
I/O Count	Up to 4 inputs and 4 outputs per slave
Cable length	100 m for single cable, extendable up to 300 m using repeaters
Device number	31 devices per segment in standard address mode; 62 devices per segment in extended address mode
Electrical power	AS-I interface bus powered
Current consumption	20mA @24Vdc
Temperature	-40°C, +85°C
Addressing	Slave address is set by the Master
EMC protections	EN 50081-2 and EN 50082-2

4. F02-PremiTork_AS-i module

The module consists in a single PCB installed inside the actuator housing. It is connected to the F02 base card by a flat cable. The internal wiring connects the AS-i networks to the actuator terminal board.



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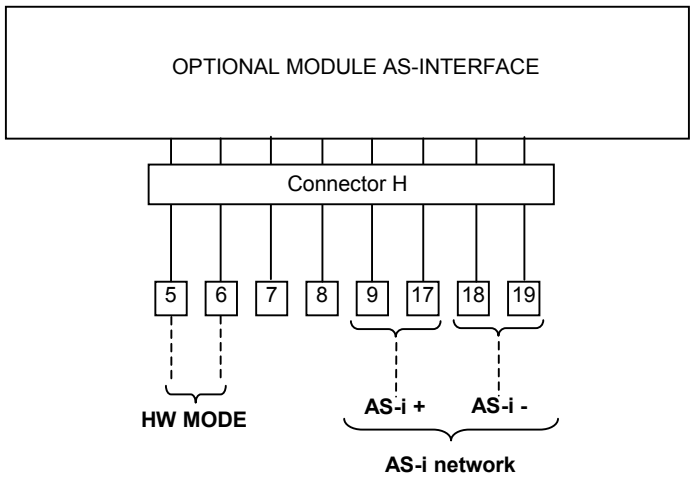
4.1 On Board Indication

Three LEDs are mounted on the **F02-PremiTork_AS-i** to give the following indications for field service.

D1 (Green)	Bus Power:	ON when bus power is present. OFF when bus is not connected or powered off.
D7 (Red)	Fault Condition:	ON when a fault condition is detected by the AS-i chip (e.g. no valid communication). OFF when AS-i communication is correct.
D6 (Amber)	Internal Comm:	ON when the interface is communicating to base card. OFF when the internal communication is not established.

4.2 Wiring Diagram

The **F02-PremiTork_AS-i** is connected to the actuator terminal board by internal wiring as shown below:



4.3 Bus/Hardwired Mode Selection

The **F02-PremiTork_AS-i** board manages the Bus/Hardwired Mode selection by means of the input indicated with HW MODE.
The physical input accepts 24 to 125V DC or AC, polarity insensitive.

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

When appropriate voltage is applied to the HW MODE input, the actuator switches to Hardwired control. In this condition the bus can only read the 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".

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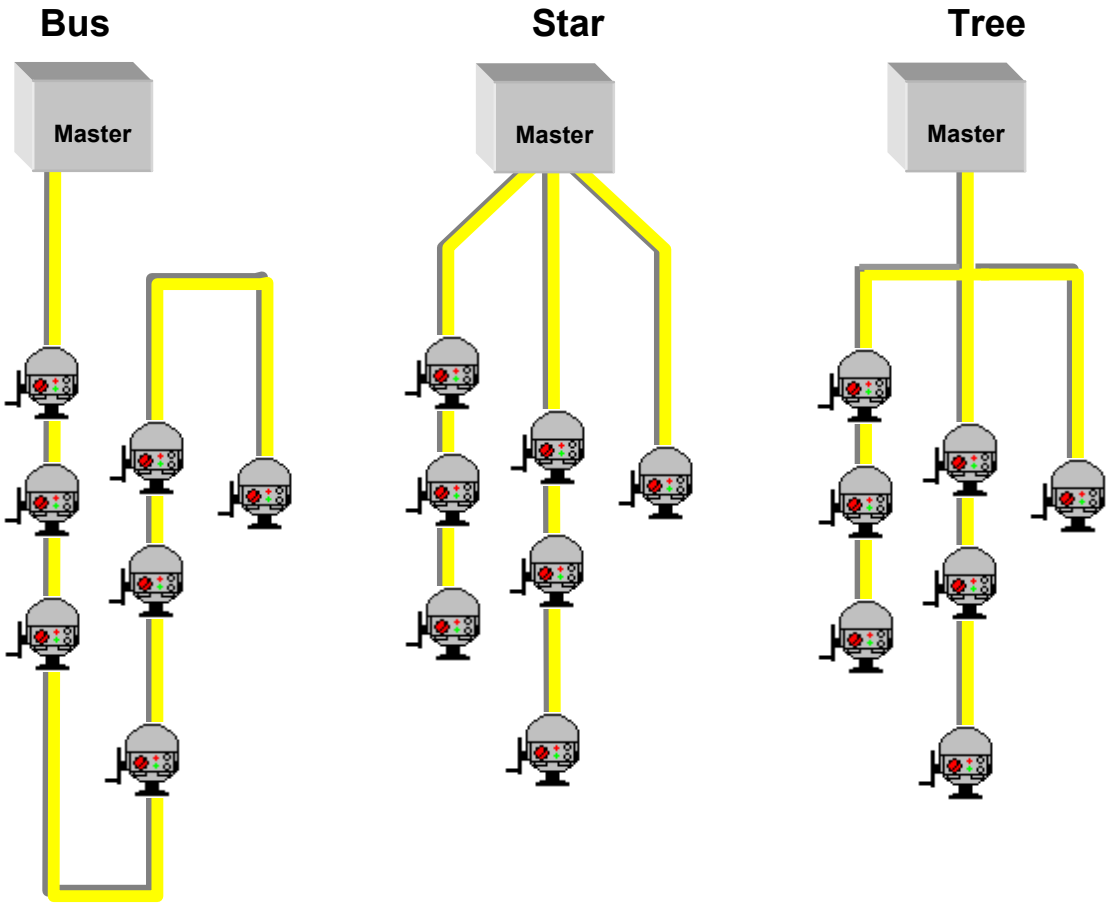
5. AS-Interface protocol

The AS-i (Actuator Sensor Interface) protocol is a typical sensor bus developed in 1994 to establish digital communication to discrete sensors in factory automation industry.
Due to its high power capability, simplicity of installation, operation and maintenance this protocol has been adopted in process industries where it can be integrated with the other fieldbuses by means of low cost gateways available on the market.

In AS-i protocol the Master cyclically queries all the Slaves connected to the network; each Slave is identified by its own unique address.
In Standard Address Mode up to 31 slave devices can be connected to a segment; each device receives 4 input bits and transmits 4 output bits.
In Extended Address Mode the number of slave devices connected to the network increases to 62, but each device can transmit 3 output bits.
The maximum cable length is 100 meter. With a specific repeater the total cable length may increase to 300 meters.

AS-i network can be implemented in different bus topology:



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6. Communication Interface

The following paragraph describes the input and output communication interface available for **F02-PremiTork_AS-i** interface. Data flowing from actuator to bus are called "**input signal**", while data flowing from bus to slave are called "**output signal**".

6.1 INPUT DATA

The following input data are available :

Input bit 3	Input bit 2	Input bit 1	Input bit 0
Loc /Rem	Alarm	Fully Open	Fully Close

Input	Description
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.
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.
Alarm	This indication is set to 1 when the actuator is in Alarm condition (i.e. at stroke limit). This indication is set to 0 when the actuator is not in Alarm (i.e. normal condition).
Local/ Remote	This indication is set to 1 when the F02 actuator is enabled to receive controls from bus (e.g. when the actuator is equipped with the optional Local Operator Interface and the selector is set on Remote position). It is set to 0 when the optional Local Selector is set to Local position to enable Open/Close local command or when Hardwired Mode is enabled.

6.2 OUTPUT DATA

The Output Data are related to the commands the actuator can execute depending on the selected Operative Mode.

Two different operative modes are available depending on the setting of Bit 0 of the Current Parameter data.

6.2.1 Actuator command in Push-to-Run Mode

In Push-to-Run Mode the movement command is active until the relevant signal is set. When the signal is reset the actuator motor stops where it is.

To select the Push-to-Run Mode the bit 0 of Current Parameter data shall be set to 0:

Parameter bit 3	Parameter bit 2	Parameter bit 1	Parameter bit 0
_	_	_	**Set to 0**

The output data have the following structure:

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Output bit 3	Output bit 2	Output bit 1	Output bit 0
Not active	Not active	Open Command	Close Command

Output	Description
Close Command	❑ When Output 0 is set the actuator moves in closing direction to reach the Fully Close position; ❑ When the command is in progress and another command is received the actuator STOPS; ❑ When Output 0 is reset the actuator stops the movement; ❑ If Output 0 is set together to other output bits the actuator does not move.
Open Command	❑ When Output 1 is set the actuator moves in opening direction to reach the Fully Open position; ❑ When the command is in progress and another command is received the actuator STOPS; ❑ When Output 1 is reset the actuator stops; ❑ If Output 1 is set together to other output bits the actuator does not move.

6.2.2 Actuator command in Self-Maintained Mode

In Self-Maintained Mode the movement command is maintained and active also after the extreme position is reached. After the movement completion the control maintains the current position against incidental deviation (e.g. if the hand-wheel is turned when under Remote control).

To select Self-Maintained Mode the bit 0 of Current Parameter data shall be set to 1:

Parameter bit 3	Parameter bit 2	Parameter bit 1	Parameter bit 0
_	_	_	**Set to 1**

The output data have the following structure:

Output bit 3	Output bit 2	Output bit 1	Output bit 0
Not active	Stop Command	Open Command	Close Command

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Output	Description
Close Command	❑ When Output 0 is set the actuator moves in closing direction to reach the Fully Close position; ❑ When Output 0 is reset the actuator does not stop the movement; ❑ A new command can interrupt the active closing command; ❑ If Output 0 is set together with any other output bit the actuator does not move.
Open Command	❑ When Output 1 is set the actuator moves in opening direction to reach the Fully Open position; ❑ When Output 1 is reset the actuator does not stop the movement; ❑ A new command can interrupt the active opening command; ❑ If Output 1 is set together with any other output bit the actuator does not move.
Stop Command	❑ When Output 2 is set the actuator stops the current movement; ❑ When Output 2 is reset the actuator becomes ready for future commands; ❑ If Output 2 is set together with any other output bit the actuator does not move.

7. Local settings

The **F02-PremiTork_AS-I** board does not require any local settings.

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