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ServoALL Powerlink

SERVOALL POWERLINK AXIS POSITIONING UNIT

USER AND MAINTENANCE MANUAL

Manual purpose

This manual has been designed by the Manufacturer to provide the necessary information regarding the Servo.ALL to those who are authorized to carry out safely its installation, maintenance, removal and disposal. All the necessary information for the buyers and planners can be found in the Sales documentation. In addition to adopting good technical construction practices, the information should be read carefully and strictly applied. Failure to observe this information could cause risks for the health and safety of people and economical damage. This information, provided by the Manufacturer in the original language (Italian) is also available in other languages to satisfy legislative and/or commercial needs. This manual must be kept in good conditions by a responsible person in an ideal place so that it is always available for consultation. In case this manual is lost or deteriorates, a replacement should be requested directly from the manufacturer indicating the manual's code. This manual reflects the state of the instrument at the time of input on the market: however, the manufacturer reserves the right to make changes, add or improve the manual without further notice.

Identification of the equipment

The identification label is applied on the instrument.

To determine the identification code of the instrument, consult the sales documentation.

Environmental conditions

Temperature range: min. 0°C, max. + 50°C.

It is forbidden to use the instrument other than for its specific use and in potentially explosive conditions or where anti-explosive elements are required.

Storage

Here below are some references to be followed for the storage of the instrument:

Avoid environments with excessive humidity and those exposed to bad weather (avoid open areas).

Avoid putting the instrument directly on the ground.

Store the instrument in its original packaging.

Conformity declaration and EC marking

The instrument respects the following Communitarian Directives:

2014/30/EU Electromagnetic compatibility, 2011/65/EU RoHS.

Maintenance

The instrument does not need particular maintenance except cleaning, only with a soft cloth dampened with ethyl alcohol or water. Do not use hydrocarbon solvents (petrol, thinners, etc.): the use of these products could affect the proper function of the instrument.

Repairs should be done only and exclusively at the FIAMA technical assistance centre.

Calibrations and tests

It is advisable to calibrate the instrument periodically, once every working year.

To conduct calibration, follow the calibration procedure described in the present manual.

Technical Support

For any kind of technical assistance, contact the sales department of the Manufacturer directly indicating the information given on the identification label, the number of hours used and the type of defect.

Manufacturer's responsibility

The manufacturer declines any responsibility in case of:

- Using the instrument contrary to applicable national safety and accident-prevention laws.
- Incorrect installation, inobservance of, or incorrect procedures in contrast with the instructions provided in the present manual.
- Defective electrical power supply.
- Modifications or tampering.
- Operations carried out by untrained or unqualified staff.

The safety of the instrument also depends on the strict observance of the procedures indicated in the manual: always operate the instrument in its functioning capacity and carry out a careful routine maintenance.

- All phases of inspection and maintenance should be carried out by qualified staff.
- The configurations indicated in the manual are the only ones permitted.
- Do not attempt to use the instrument in anyway which is contrary to the indications provided.
- The instructions in this manual do not substitute but are a complement to the obligations of the current legislation regarding safety laws.

Installation

Before installing the instrument, heed the following warnings:

- a) Connect the instrument strictly following the instructions of the manual.
- b) It is the responsibility of the user to check, before using, the correct setting of all parameters of the instrument to avoid damage to persons or things.
- c) The instrument CANNOT function in a hazardous environment (flammable or explosive).
- d) The unit contains parts sensitive to electrostatic charge, therefore handling of the internal electronic cards has to be carried out with appropriate care to avoid permanent damage.

Description

The ServoALL positioning unit consists of a servo motor moving a rotary axis, characterised by ultra compact design, a small footprint, and easy assembly.

ServoALL is a single device, but works as a complete system for decentralised axis control thanks to its features which include a hollow output shaft gearmotor, a measurement transducer, a drive, a controller, a display, and a serial interface to the field bus. After setting a position, the ServoALL reaches it automatically moving in accordance with a number of settable parameters (e.g. fast speed, slow speed, acceleration/deceleration ramp time, etc.).

The servomotor case is built as an aluminium alloy and anodised piece machined out of a solid block: it houses the direct current motor, the gear motor, the position transducer, control electronics, and the interface to the field bus.

Made of precision gears and protected by a Pronox surface treatment, the gear motor is designed for very low noise motion, high efficiency and long service life.

The magnetic encoder for position control is tapered directly to the hollow output shaft, which helps avoid mechanical plays and fulfil accurate position control. A buffer battery is installed to help the axis stay in position even when power fails. The electronic board controlling the motor communicates with other equipment through field buses such as Powerlink, Powerlink, EthernetIP, and EtherCat: it is designed to control the position, the speed, the torque and all the position parameters of the axis, to provide protection against overtemperature and overcurrent, and to prevent the axis from reaching the end of its stroke, etc.

Its ultra compact dimensions and easy assembly make the ServoALL eligible for application in the most diversified types of industrial machinery - especially for size change in the packaging industry -, in other words it can be used to automate all adjustments that are currently made manually by the operator.

The backlit LCD display has two lines: the first line shows the current position of the machine and the second line shows a message with the current status of the device.

After set-up, all the ServoALL movements can be controlled in: Manual, Semi-automatic, and Automatic mode.

Manual mode When in manual mode, the buttons featured on the display can be used directly to set/control a positioning movement.

Semi-Automatic mode When in semi-automatic mode, control buttons are featured on the bus to set the speed and direction of rotation.

Automatic mode When in automatic mode, the system moves to the pre-set target position independently by pressing the relevant control button on the bus. If, while in automatic mode, problems arise (e.g. problems with forward movement or excessive motor temperature), the system stops and displays the cause of the malfunction.

Powerlink communication

The ServoALL implements the Powerlink protocol for IO-Device units, Ethernet interface. Communication consists of a cyclic part (*Input*, *Output*) and an acyclic part (*Parameters*).

Cyclic communication (Process Data)

The cyclic communication of the ServoALL is designed for the exchange of 12 input bytes and 10 output bytes. A punctual description of each byte is provided later on to make their understanding easier.

Transmit PDO (Slave → Master): 12byte, 6 word

INPUT

Name	Size (byte)	Type	Function
Actual position	4	DINT	Current position: it can take values ranging from <i>Minimum position</i> to <i>Maximum position</i> .
Status word	2	UINT	Word showing the device status (<i>Status word</i> table).
Errors word	2	UINT	Word showing errors identified in the device (<i>Errors word</i> table).
Actual speed	2	UINT	Current speed of hollow output shaft: it can take values ranging from minimum 0 to maximum 100.
reserved	2	--	Reserved

Status word: when moving from 0 to 1, each bit in this word warns about a different status of the device. The meaning of each status is explained below.

Bit	Name	Description
0	Servo ready	Servomotor ready to receive control words
1	Power off	24V power missing
2	Jogging	Jogging in progress
3	Positioning	Positioning in progress
4	Target reached	Target reached
5	Thermal block	<p>ServoALL under thermal block</p> <p>One of bit 2 and bit 3 of the <i>Error word</i>, which indicate whether the max. temperature has been achieved in the motor or in the electronic board, is set to 1 together with this bit.</p> <p>To go back to normal operation, the <i>Thermal block</i> bit must be reset, which happens automatically after the time required for the temperature to drop below the preset limit has elapsed.</p> <p>Before the ServoALL can be controlled again, bit 2 and bit 3 of the <i>Error word</i> need to be reset. This can be done using the <i>Reset alarms</i> control word or setting bit 3 of the <i>Control word</i> to 1.</p>
6	Looping	Backlash compensation in progress
7	Torque limiting	As soon as the torque limit set in parameter <i>Maximum torque</i> (ref. <i>Acyclic</i>

Bit	Name	Description
		<i>communication</i> section) is achieved, the ServoALL operates at constant torque until necessary.
8	Manual mode	ServoALL in manual mode: when this bit is set to 1, the ServoALL is controlled using hard keys. The only two functions enabled are <i>Jog forward</i> and <i>Jog backward</i> .
9	Direction	Actual direction of the ServoALL
10	Target accepted	Target position has been accepted by ServoALL
11		Reserved
12		Reserved
13		Reserved
14		Reserved
15		Reserved

Error word: when moving from 0 to 1, each bit in this word warns about an error in the device. The meaning of each error is explained below.

Bit	Name	Description
0	Encoder fatal error	Internal encoder error: try and reset using the <i>Reset alarms</i> control word (bit 3 of the <i>Control word</i>). If the error persists, contact our service department.
1	Overcurrent	Max. current exceeded: this bit is set to 1 when the current absorbed by the ServoALL exceeds the value of 10A. An attempt can be made to reset the error using the <i>Reset alarms</i> control word (bit 3 of the <i>Control word</i>) in order to understand whether this is a permanent condition. If this is the case, contact our service department as this may be a symptom of a short circuit.
2	Motor overtemperature	Max. motor temperature exceeded: the <i>Thermal block</i> bit of the <i>Status word</i> is set to 1 together with this error. This is a non self-clearing error, meaning it has to be reset using the <i>Reset alarms</i> control word (bit 3 of the <i>Control word</i>). Resetting is possible only after the <i>Thermal block</i> bit of the <i>Status word</i> is back to 0.
3	PCB overtemperature	Max. electronic board temperature exceeded: the <i>Thermal block</i> bit of the <i>Status word</i> is set to 1 together with this error. This is a non self-clearing error, meaning it has to be reset using the <i>Reset alarms</i> control word (bit 3 of the <i>Control word</i>). Resetting is possible only after the <i>Thermal block</i> bit of the <i>Status word</i> is back to 0.
4	Low battery	Battery down - replace as soon as possible. After battery replacement, the ServoALL needs to be restarted for this bit to be reset. We recommend that the battery is replaced immediately to prevent problems resulting in the position being lost.
5	Dead battery	Battery exhausted - the position may no longer be meaningful After battery replacement, the ServoALL needs to be restarted for this bit to be reset. We recommend that the battery is replaced immediately to prevent problems

Bit	Name	Description
		resulting in the position being lost.
6	Wrong target	Wrong target: this bit is automatically reset when a correct <i>Target position</i> is entered (ref. <i>OUTPUT</i> section).
7	Wrong speed	Wrong speed: this bit is not reset automatically, meaning the <i>Reset alarms</i> control word has to be used (bit 3 of the <i>Control word</i>).
8	Under position	Current position below min. position: the movement of the ServoALL is only permitted going up. This bit is automatically reset when the <i>Actual Position (INPUT)</i> exceeds the <i>Minimum position</i> (ref. <i>Acyclic communication</i> section).
9	Over position	Current position above min. position: the movement of the ServoALL is only permitted going down. This bit is automatically reset when the <i>Actual Position (INPUT)</i> is below the <i>Minimum position</i> (ref. <i>Acyclic communication</i> section).
10		Reserved
11		Reserved
12	Over torque	Max. torque exceeded: this bit is activated any time the torque delivered by the ServoALL exceeds the <i>Maximum torque</i> (ref. <i>Acyclic communication</i> section). This error is reset automatically as soon as the ServoALL delivers a torque below the <i>Maximum torque</i> value set by the user.
13	Block	ServoALL shaft is blocked
14		Reserved
15		Reserved

Receive PDO (Master -> Slave): 10 byte, 5 word

OUTPUT

Name	Size (byte)	Type	Function
Target position	4	DINT	Target position to be reached during the positioning cycle. When a new target position is output to the device, the latter checks whether the new position is between the max. and the min. admitted values. If the check outcome is negative, bit 6 of the <i>Error word</i> is increased.
Control word	2	UINT	Word used to command the ServoALL (<i>Control word</i> table).
Target speed	2	UINT	Speed at which the device reaches the target position or at which it moves in manual mode.
reserved	2	--	Reserved

Control word: when moving from 0 to 1, each bit in this word outputs a control word to the ServoALL. The meaning is explained below.

Bit	Description
0	Start new positioning
1	Jog forward
2	Jog backward
3	Reset alarms
4	Enable backlash compensation
5	Emergency stop

Practical examples of control word use

Some examples of data exchanges concerning the main functions of the ServoALL are provided below for better understanding of how the control word is used.

Single positioning

If automatic positioning needs to be implemented, the control word to use is *Start new positioning*. Before this, however, the following operations have to be performed:

1. set the desired *Target position*;
2. enter the *Target speed* at which the ServoALL has to move to the desired position;
3. set bit 0 of the *Control word* to 1.
4. While getting in position, the ServoALL sets bit 3 of the *Status word* to 1.
5. As soon as the distance between the ServoALL and the target position is inferior to the *Positioning window*, bit 3 of the *Status word* is reset to zero and bit 4 is set to 1, which means *Target reached*.

To set up a new Target position, the *Control word* firstly needs to be reset to zero, after which the procedure above must be repeated.

Single positioning including backlash compensation

Two control word bits need to be activated to start single positioning including backlash compensation. These are: *Start new positioning* and *Enable backlash compensation*. Before this, however, the following operations have to be performed:

1. set the desired *Target position*;
2. enter the *Target speed* at which the ServoALL has to move to the desired position;
3. set the acyclic parameter *Loop Forward* or *Loop Backward* you intend to use (the ServoALL uses *Loop Forward* if positioning requires moving up and *Loop Backward* if positioning requires moving down);
4. set bit 0 and bit 4 of the *Control word* to 1.
5. While getting in position, the ServoALL sets bit 3 of the *Status word* to 1.
6. In addition to bit 3, bit 6 of the *Status word* too is set to 1 in the backlash compensation phase to indicate that the desired backlash compensation is being implemented.
7. As soon as the distance between the ServoALL and the target position is inferior to the *Positioning window*, bit 3 of the *Status word* is reset to zero and bit 4 is set to 1, which means *Target reached*.

As explained in the previous case, to set up a new Target position, the *Control word* firstly needs to be reset to zero, after which the procedure above must be repeated.

Manual mode (Jog)

The control word to use if the positioning movement is to be controlled manually is either *Jog forward* or *Jog backward*, depending on the selected direction. Before this, however, the following operations have to be performed:

1. enter the *Target speed* at which the ServoALL is expected to move;
2. set bit 1 of the *Control word* to 1 to *Jog forward* and set bit 2 to 1 to *Jog backward*.
3. While in motion, the ServoALL sets bit 2 of the *Status word* to 1.

In-ramp stop

In order for the ServoALL to stop in ramp, all the *Control word* bits need to be reset to zero. The ramp time is defined by parameter *Acceleration time* (ref. *Acyclic communication* section).

Emergency stop

In order for the ServoALL to implement an emergency stop, bit 5 of the *Control word* must be set to 1. In so doing, the device stops immediately without taking any acceleration ramp.

ACYCLIC COMMUNICATION

The ServoALL device uses four sets of acyclic parameters, which in turn contain 27 parameters used for device set-up. The first two sets include general set-up parameters and they can also be used as initial parameters. The third set only includes the position and is used for position presetting and resetting; the fourth set includes read only parameters, such as the temperature (motor and PCB) and torque values.

Access to the acyclic parameters is gained via:

- **Web server**- the *Parameters* section is used to either read or write all the parameters;
- **Function blocks** for acyclic access to the variables made available by the different PLC manufacturers.

The parameters can be edited at any time, but the new entered values only become effective if the ServoALL is not running and is ready (bit 0 of Status Word set to 1).

The value of all parameters is always saved in the device's permanent memory to retain the configuration even after the unit is powered off.

Encoder record data

Parameter block index: 5 [26 byte]

Parameter index (Powerlink subindex)	Parameter	Type	Access	Default value	Function
0x01	Position scaling numerator	UDINT	R/W	1	Set of parameters used to programme the value corresponding to one revolution of the hollow shaft that is displayed The displayed value is the result of the formula below: $1000 * \frac{\text{Position scaling numerator}}{\text{Position scaling denominator}}$
0x02	Position scaling denominator	UDINT	R/W	1	
0x03	Encoder direction	UINT	R/W	0	Parameter defining the position counting direction. It can take two possible values: when set to 0, the hollow shaft must be turned anticlockwise to increase the position; when set to 1, the hollow shaft must be turned clockwise to increase the position.
0x04	Button usage	UINT	R/W	000	Reserved
0x05	Minimum position	DINT	R/W	-99999	Min. operating position: positions below this value require bit 8 of the <i>Error word</i> to be set to 1 and the ServoALL is stopped. The only movements allowed in this situation are those to increase the current position value.
0x06	Maximum position	DINT	R/W	99999	Max. operating position: positions above this value require bit 9 of the <i>Error word</i> to be set to 1 and the ServoALL is stopped. The only movements allowed in this situation are those to decrease the current position value.
0x07	Maximum torque	UINT	R/W	600	Max. torque at which the ServoALL is limited When this value is reached, the

Parameter index (Powerlink subindex)	Parameter	Type	Access	Default value	Function
					device tries to operate at a constant torque to maintain the value. The value is indicated in hundredths of a newton meter (cNm)
0x08	Maximum startup torque	UINT	R/W	800	Max. torque at which the ServoALL is limited at the beginning of a positioning movement Normally, the value selected for this parameter is higher than the <i>Maximum torque</i> in order to win the initial resistive torque which is often greater than the torque during movement. The value is indicated in hundredths of a newton meter (cNm)
0x09	Time startup torque	UINT	R/W	1000	Time in <i>ms</i> during which the torque limit of the ServoALL is the <i>Maximum start-up torque</i> . After this time has elapsed from start-up, the software refers to the <i>Maximum torque</i> again as the ServoALL limit.

Positioning record data

Parameter block index 6 [26 byte]

Parameter index (Powerlink subindex)	Parameter	Type	Access	Default value	Function
0x01	Loop forward	UDINT	R/W	0	Parameter used to determine the backlash compensation length to be applied when positioning requires moving up (<i>Target position > Actual position</i>).
0x02	Loop backward	UDINT	R/W	0	Parameter used to determine the backlash compensation length to be applied when positioning requires moving down (<i>Target position < Actual position</i>).
0x03	Positioning window	UINT	R/W	20	Parameter used to set the <i>Target reached</i> bit (bit 4 of the <i>Status word</i>). If (Target position - Positioning window) < Actual position < (Target position + Positioning window) bit 4 of the <i>Status word</i> (<i>Target reached</i>) is set to 1.
0x04	Low speed	UINT	R/W	20	Numerical value indicating the speed that the ServoALL keeps when it is close to the target position in automatic operation. The value is expressed as a percentage.
0x05	Slowing position	UINT	R/W	1	Numerical value at which the ServoALL starts slowing down before it reaches the preset target. This value is expressed as revolutions of the hollow shaft. If the need is for the ServoALL to start slowing down one revolution before reaching the target position, the value to be entered is 1.
0x06	Acceleration time	UDINT	R/W	1000	Time expressed in <i>ms</i> the ServoALL takes to reach the speed value set by the user in parameter <i>Target speed</i> (ref. <i>OUTPUT</i> section of the <i>Cyclic communication</i>).
0x07	Kp	UINT	R/W	1000	Proportional constant of the PID controller for positioning movements in automatic mode. The value is expressed in thousandths.
0x08	Kd	UINT	R/W	0	Differential constant of the PID controller for positioning movements in automatic mode. The value is expressed in thousandths.
0x09	Ki	UINT	R/W	0	Integral constant of the PID controller for positioning movements in automatic mode. The value is expressed in thousandths.
0x0A	Position error	UINT	R/W	2	Parameter indicating the value of the min. distance that the ServoALL is expected to

Parameter index (Powerlink subindex)	Parameter	Type	Access	Default value	Function
					travel in the preset time of 3 seconds in order for it not to be considered stuck. This parameter DOES NOT need to be calibrated again based on the <i>Position scaling numerator</i> and the <i>Position scaling denominator</i> .

Position

Parameter block index: 7 [6 byte]

This set only contains one parameter: Position. The current position may be reset or preset at the desired value using the acyclic access (including via web server).

Parameter index (Powerlink subindex)	Parameter	Type	Access	Function
0x01	Position	DINT	R/W	Current position
0x02	Reserved	UINT	R/W	internal use. Warning. When an acyclical access has to be performed on the Position parameter block using acyclical functions, it is mandatory to consider this reserved parameter as part of the block. IE, the size of this block is 6 bytes.

Measurements

Parameter set index 8 [14 byte]

All the parameters in this set are accessed in read only mode.

Parameter index (Powerlink subindex)	Parameter	Type	Unit of meas.	Access	Function
0x01	Actual current	UINT	mA	R	Current absorbed by ServoALL
0x02	Actual Torque	UINT	cNm	R	Current torque delivered by ServoALL
0x03	Motor temperature	UINT	°C	R	Motor temperature
0x04	PCB temperature	UINT	°C	R	Electronic board temperature
0x05	Actual RPM	UINT	RPM	R	Current RPM delivered by ServoALL
0x06	Actual speed	UINT	%	R	Current speed (percentage)

Parameter index (Powerlink subindex)	Parameter	Type	Unit of meas.	Access	Function
0x07	Software version	UINT	--	R	Software version

Fiama specific**Parameter block index: 250** [22 byte]

Gruppo di parametri aciclici, sola lettura, riservati al costruttore

Compile date**Parameter block index: 251****Compile time****Parameter block index: 252****Firmware revision****Parameter block index: 253****Hardware revision****Parameter set index: 254**

Manual mode

As an alternative to the PLC, the ServoALL can be controlled using the buttons featured near the display. Switching to manual mode requires entry of a password.

NOTE: when in manual mode, control words given using the buttons prioritise over control words received from the network controller!

Access for password entry is gained by pressing and holding down the button at the centre (○) until the wording "PAS" appears on the display. Now, press the button again: 3 zeroes appear and the first on the right is blinking. Use the button ▲ (increase figure) and button ◀ (select figure) to set the password for manual mode and press the button at the centre (○) to confirm. If the entered password is incorrect, the system exits the current mode.

The password for manual mode is: **273**.

When in this mode, the ServoALL can only be jogged; the torque and current limits are not active.

Description of buttons

- ▲ This button is pressed to increase the numbers when entering the password and to move the ServoALL via a *Jog forward* command. This movement is performed at the same speed as Low speed (ref. *Acyclic communication* section).
- ○ This button is pressed to access the password entry page and to confirm the entered password.
- ◀ This button is pressed to select the numbers when entering the password and to move the ServoALL via a *Jog backward* command. This movement is performed at the same speed as Low speed (ref. *Acyclic communication* section).

There are two different ways to exit manual mode:

- access the password entry page again and set the password **000**. Wait 1 minute, without pressing any button.

Powerlink Address

The Powerlink address (node ID) of the ServoALL unit must be set the buttons featured near the display.

Access for password entry is gained by pressing and holding down the button at the centre (○) until the wording "PAS" appears on the display. Now, press the button again: 3 zeroes appear and the first on the right is blinking. Use the button ▲ (increase figure) and button ◀ (select figure) to set the password for manual mode and press the button at the centre (○) to confirm. If the entered password is incorrect, the system exits the current mode.

Node ID modification password: 111

Once the correct password is entered, the display will show "ADDR." Press the center button ○ again to enter the modification mode. You can now assign a value to the node ID. Allowed values range from 1 to 247.

Web server

The web server is reached using the IP address of the unit. We recommend resorting to one of the applications listed in the “Utility” section to identify and set up the desired address.

The web server can be used to set up the ServoALL parameters. In the DOC section it is also possible to find the instrument User Manuals and the set-up files (XML/EDS).

NB: To set an IP address or access the web server, the ServoALL unit must be disconnected from the Powerlink network and connected exclusively to a non-Powerlink network.

Utility

The IP address and the “device name” must be set up in order for the unit to operate correctly. To do so, you can use the free software by Siemens, [Proneta](#), or alternatively the [Powerlink Commander](#) or [HMS Ipconfig](#) software.

Display

The backlight LCD display has two lines: the first line shows the current position of the machine and the second line shows a message with the current status of the device.

DISPLAY	ServoALL STATUS	
Stb	STANDBY	ServoALL ready and waiting for control words. This condition is achieved if the network master is connected and in operation and the control word is zero.
JOG	JOG	The ServoALL unit is involved in a manual or semi-automatic positioning movement.
POS	POSITIONING	The ServoALL unit is involved in an automatic positioning movement.
Err	ERROR	The ServoALL unit is stuck due to an error. It must be reset via the relevant bit of the control word.
BLH	BLOCK	The ServoALL unit is in thermal block condition.
rEC	BACKLASH COMPENSATION	The ServoALL unit is involved in backlash compensation during an automatic positioning movement.
rSt	RESET	The ServoALL unit is waiting for the network master to be connected. NOTE: the control word needs to be zero for the system to be operational (STB).
Man	MANUAL MODE	The ServoALL unit is in manual mode



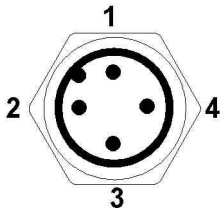
LED Net	Descrizione	Commento
Off	Offline	<ul style="list-style-type: none"> No operating voltage No connection
Green	Online (RUN mode)	<ul style="list-style-type: none"> Online Connection established PLC in run mode
Green flashing fast (50ms on 50 ms off)	Basic state	<ul style="list-style-type: none"> No Powerlink connection
Green flashing 1x	PRE OP 1	<ul style="list-style-type: none"> Only Acyclical connection established
Green flashing 2x	PRE OP 2	
Green flashing 3x	Ready to operate	<ul style="list-style-type: none"> PLC ready to enter run mode
Green flashing slow (200ms on 200ms off)	Online (STOP mode)	<ul style="list-style-type: none"> Powerlink communication stopped (for example when the PLC is turned off)
Red	Network error	<ul style="list-style-type: none"> Powerlink network has an error
LED Mod-	Descrizione	Commento
Off	Offline	<ul style="list-style-type: none"> No operating voltage
Red	Fatal error	Internal error
LED Link-A	Descrizione	Commento
Off	Offline	<ul style="list-style-type: none"> No operating voltage No connection
Green	Link	<ul style="list-style-type: none"> Connection established but no activity – PORT 0
Green flashing	Activity	Connection established and activity– PORT 0
LED Link-B	Descrizione	Commento
Off	Offline	<ul style="list-style-type: none"> No operating voltage No connection
Green	Link	<ul style="list-style-type: none"> Connection established but no activity – PORT 1
Green flashing	Activity	<ul style="list-style-type: none"> Connection established and activity– PORT 1

PORT 0: right connector

PORT 1: left connector

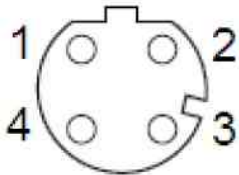
Connection diagram

24VDC POWER CONNECTOR
M12x1 Male, 4 poles, code A



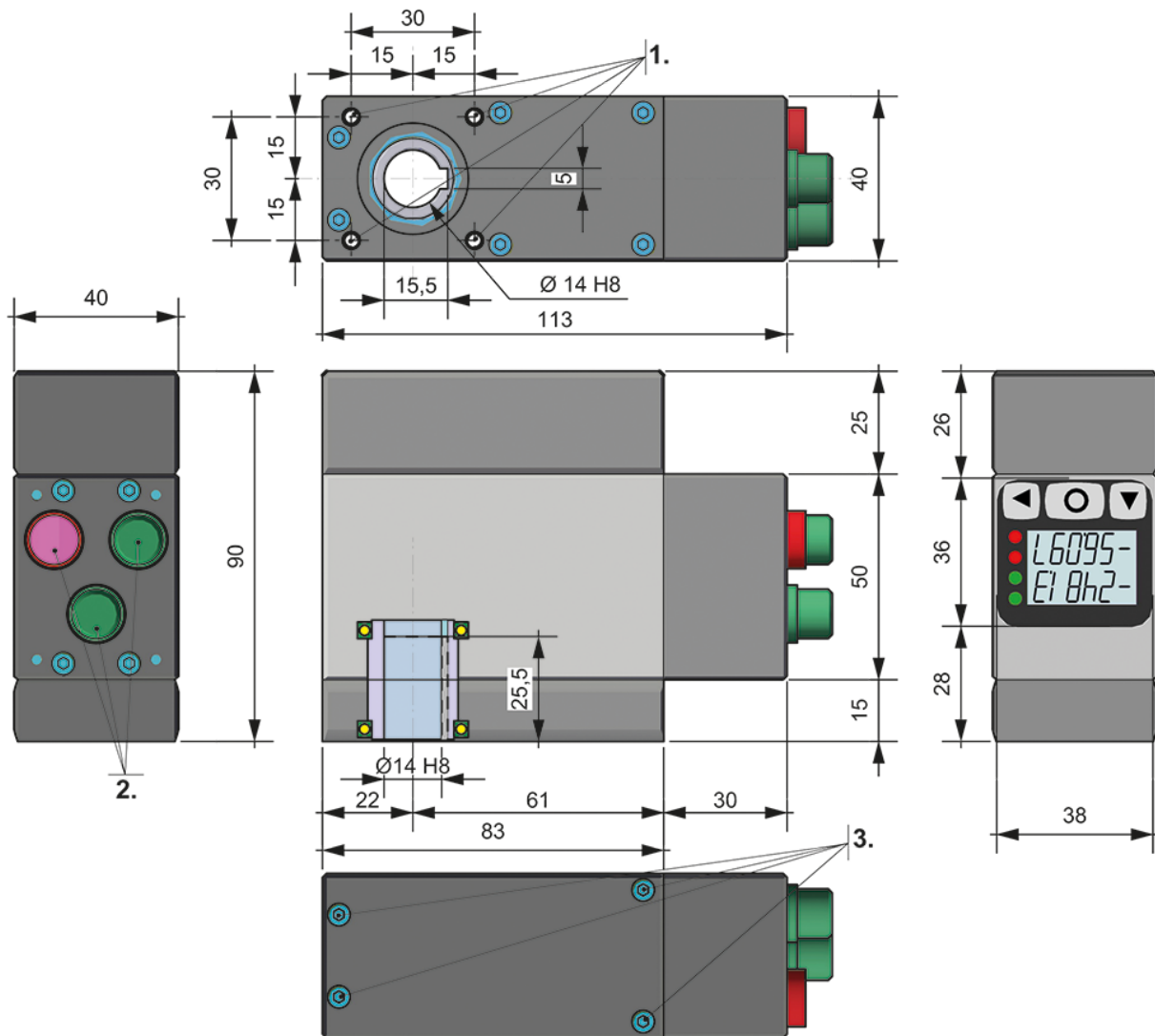
PIN	DESCRIPTION
1	GND Power/Logic
2	GND Power/Logic
3	+24VDC Power
4	+24VDC Logic

POWERLINK/ETHERNET CONNECTORS
M12x1 Female, 4 poles, code D



PIN	DESCRIPTION
1	TX DATA +
2	RX DATA +
3	TX DATA -
4	RX DATA -
CASE	SHIELD

Overall dimensions



Technical specifications

Power voltage	24Vdc \pm 20%
No-load speed	90 RPM
Torque, speed, absorbed current, duty cycle	4Nm, 75 RPM, 2,5A, 50% 6.5Nm, 65 RPM, 3.5A, 20% 9Nm, 55RPM, 5.5A, 10%
Max. current absorption	6 A
Hollow output shaft	Ø14mm, H7, with 5mm lowered key
Position transducer	Magnetic encoder, 1000 pulses/rev, tapered to output shaft
Buffer battery for encoder	3.6V, format ½ AA Service life 6 to 8 years (depending on conditions of use)
Field bus	Powerlink, Powerlink, EthernetIP, EtherCat
Electrical connection	M12 connectors for power line and field bus
Weight	800g
Protection rating	IP54
Working temperature	0 to 60°C
Relative humidity	10-85%
Electromagnetic compatibility	2014/30/EU
RoHS	2011/65/EU

Manufacturer

All correspondence with the manufacturer shall be sent to:

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FIAMA srl shall not be liable for damage to property or harm to persons resulting from tampering and misuse, as well as non-compliant use with the sensor specifications.

