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ConvertEP4F4, Profinet version

USER AND MAINTENANCE MANUAL

PROTOCOL CONVERTER FOR FIAMA “EP4_RS” AND “F4_RS”

Manual purpose

This manual has been designed by the manufacturer to provide the necessary information regarding the unit ConvertEP4F4 to those who are authorized to carry out safely its installation, maintenance, dismantling and disposal. All the necessary information for the buyers and planners can be found in the Sales catalogue. Other than adopting good technical construction methods, the information should be read carefully and strictly applied. Inobservance of 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. A responsible person in an ideal place must keep this manual in good conditions 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 quoting the manual's code. This manual reflects the state of skill 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 giving any reason to hold the present manual inadequate.

Identification of the equipment

The identification plate represented is applied on the instrument.

To find out the identification code of the instrument, consult the sales catalogue.

Environmental conditions

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

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

Storage

Here below are some references to be followed for the storage of the device.

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 packing.

Conformity declaration and EC marking

The instrument answers to the following Communitarian Directives:

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

Maintenance

The instrument does not need a particular maintenance except cleaning to do only with a soft cloth dampen with water. Do not use hydrocarbon solvents (petrol, diluents, etc.): the using of these products could affect the proper functioning of the instrument.

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

Assistance request procedure

For any kind of technical assistance request, contact the sales department of the Manufacturer directly indicating the information given on the identification plate, 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 the national safety and accident-prevention laws.
- Wrong installation, inobservance or wrong procedures of 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 done by qualified staff.
- The configurations provided in the manual are the only ones permitted.
- Do not try to use it anyway contrary to the indications provided.
- The instructions in this manual do not substitute but accomplish the obligations of the current legislation regarding the safety laws.

Description

The protocol converter is designed to interface proprietary instruments provided with a RTU Modbus output (Fiana EP4_RS or F4_RS) and network types including Profinet, EthernetIP or Powerlink.

The purpose of the ConvertEP4F4 is to centrally collect information received from all the connected sensors to make configuration and reading operations quicker and more convenient.

High scanning speed and customised communication help improve the performances of the connected device which can thus be used in encoder type applications.

Working modes

The ConvertEP4F4 system has two working modes:

- configuration mode;
- operating mode.

The current mode is indicated by a status LED: the LED light is flashing when the device is in configuration mode; it is steady when the device is in operating mode.

Configuration mode

When in this mode, access to the device can be gained using the integrated web server after connecting the device to a computer and allocating an IP address (suggested tool: IPconfig). Key in the IP address of the sensor in any browser to reach the web server.

At this stage, no connection is required to the network Master as configuration operations are entirely performed using the web server.

The ConvertEP4F4 exchanges 7 acyclic parameters in configuration mode.

Name	Index	Type	Range	Access	Function
<i>Number of Sensors</i>	0	UINT	1-16	R/W	Indicates the number of EP4_RS or F4_RS programmable indicators connected to the network. NOTE: check that all sensors connected to the network have rising addresses, i.e. 1 through 16.
<i>Baudrate</i>	1	UINT	0-4	R/W	This constant is used to set up the Baud Rate of serial communication (Table (1)).
<i>Parity</i>	2	UINT	0-2	R/W	This constant is used to set up the parity bits of serial communication (Table (2)).
<i>Read delay [ms]</i>	3	UINT	0-1000	R/W	This constant is used to set up the time span between two consecutive Modbus communications of the ConvertEP4F4. When this time is increased, the network scanning time is increased and the number of missed packets is reduced. The recommendation for applications using long lines (>100m) with high <i>Baudrate</i> values (>=38400) is to apply a <i>Read delay</i> of at least 5 ms.
<i>reserved</i>	4	UINT			
<i>reserved</i>	5	UINT			
<i>Save configuration</i>	6	UINT	16 bit	W	If value 273 is sent, the four parameters set in the flash memory of the device are saved. The device runs an automatic reset cycle and then switches to operating mode if the parameters are set up correctly.

(1) Baud Rate Table

VALUE	Baud rate
0	9600
1	19200
2	38400
3	57600

Recommended value: 38400.

(2) Parity Table

VALUE	Parity
0	Even
1	Odd
2	No parity, 2 stop bit

Please refer to section **QuickStart** at the end of this manual for a practical example.

Operating mode

When in operating mode, the ConvertEP4F4 initialises the configuration parameters stored by the user and starts a network scanning cycle, as a result of which information received from the queried sensors is recorded in the field bus.

It is important to note that I/O configuration is fully dependant on the value preliminarily entered in the field **Number of Sensors**, which is later on referenced with the acronym “**NoS**”.

After setting up the desired number of sensors, the I/Os of the network Master must be mapped correctly.

Cyclic communication (Process Data)

Process data pertaining to ConvertEP4F4 can be re-mapped. The number of I/Os changes according to the NoS.

Inputs (Slave → Master):

34+4*NoS byte

Outputs (Master → Slave):

28+4*NoS byte

For instance. If parameter NoS is set up with 13, the ConvertEP4F4 is mapped to exchange 86 input bytes and 80 output bytes.

Cyclic I/Os

Name	From→To	Profinet module slot	Type	Access	Function
STATUS	S→M*	1 (fixed)	“STATUS” Table		
CONTROL	M→S*	2 (fixed)	“CONTROL” Table		
Parameter interface status	S→M*	3 (fixed)	“Parameter interface status” Table		
Parameter interface command	M→S*	4 (fixed)	“Parameter interface command” Table		
Position address 1	S→M	5 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 1.
Target position address 1	M→S	6 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 1.
Position address 2	S→M	7 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 2.
Target position address 2	M→S	8 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 2.
Position address 3	S→M	9 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 3.
Target position address 3	M→S	10 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 3.

Name	From→To	Profinet module slot	Type	Access	Function
Position address 4	S→M	11 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 4.
Target position address 4	M→S	12 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 4.
Position address 5	S→M	13 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 5.
Target position address 5	M→S	14 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 5.
Position address 6	S→M	15 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 6.
Target position address 6	M→S	16 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 6.
Position address 7	S→M	17 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 7.
Target position address 7	M→S	18 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 7.
Position address 8	S→M	19 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 8.
Target position address 8	M→S	20 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 8.
Position address 9	S→M	21 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 9.
Target position address 9	M→S	22 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 9.
Position address 10	S→M	23 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 10.

Name	From→To	Profinet module slot	Type	Access	Function
Target position address 10	M→S	24 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 10.
Position address 11	S→M	25 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 11.
Target position address 11	M→S	26 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 11.
Position address 12	S→M	27 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 12.
Target position address 12	M→S	28 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 12.
Position address 13	S→M	29 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 13.
Target position address 13	M→S	30 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 13.
Position address 14	S→M	31 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 14.
Target position address 14	M→S	32 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 14.
Position address 15	S→M	33 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 15.
Target position address 15	M→S	34 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 15.
Position address 16	S→M	35 (mappable)	DINT	R	This is the current position of EP4_RS/F4_RS in Modbus address 16.
Target position address 16	M→S	36 (mappable)	DINT	R/W	This is the target position the network Master sends out to EP4_RS/F4_RS in Modbus address 16.

S→M (ConvertEp4F4 → network Master)
M→S (network Master → ConvertEp4F4)

STATUS Group

Direction: S→M.
Profinet module slot: 1.
Dimension: 24 bytes.

NOTE Each bit in all the following inputs corresponds to a specific Modbus address, as shown in the table below.

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
																	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
																	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
																	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
																	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Parameter	Parameter index	Dimension (byte)	Access	FUNCTION
<i>Status</i>	1	UDINT	R	Indicates the status of each EP4_RS/F4_RS connected to the network. The bit of the corresponding address is set to 1 if the sensor is communicating correctly; it is set to 0 if it is not.
<i>Target reached</i>	2	UDINT	R	Indicates that the target for each address has been reached. The bit of the corresponding address is set to 1 if the current position is within the position window; it is set to 0 if it is not.
<i>Battery low</i>	3	UDINT	R	Indicates that the battery charge is low. The bit of the corresponding address is set to 1 if the battery charge is low; it is set to 0 if it is not. We recommend replacing the battery of the sensor located in the position specified by this parameter.
<i>Battery down</i>	4	UDINT	R	Indicates that the battery is either fully down or malfunctioning. The bit of the corresponding address is set to 1 if an error is sensed; it is set to 0 if no errors are sensed. We recommend that the battery of the sensor located at the address specified by this parameter is immediately replaced and that the sensor is calibrated again as it can no longer store the current position value when 24V power is cut out. The displayed position may not be aligned with the actual machine value.
<i>Reserved</i>	5	UDINT	ND	Reserved
<i>Reserved</i>	6	UDINT	ND	Reserved

CONTROL Group

Direction: M→S.
 Profinet module slot: 2.
 Dimension: 18 bytes.

NOTE Each bit in all the output commands below corresponds to a specific Modbus address.

BIT0 -> Modbus address 1

BIT1 -> Modbus address 2

Parameter	Parameter index	Dimension (byte)	Access	Function
<i>Disable addresses</i>	1	UDINT	R/W	<p>This command is designed to disable some devices and exclude them from the Modbus network.</p> <p>If one or multiple bits are set to 1, the corresponding addresses are not queried. The corresponding bits of the status words (<i>Status</i>, <i>target reached</i>, <i>battery low</i> and <i>battery down</i>) are switched back to 0.</p>
<i>Priority addresses</i>	2	UDINT	R/W	<p>This command is designed to prioritise some devices in the Modbus network. When the value of one or multiple bits is increased to 1, the corresponding addresses are queried more frequently; this remarkably reduces their scanning time to the detriment of the total scanning time which, in turn, increases.</p> <p>This function applies when one of the sensors in the network is used as an encoder, for instance to check the position when one part is driven by a motor, with a view to ensuring that the position is updated in just a few milliseconds.</p> <p>NOTE: needless to say, the greater the number of prioritised addresses, the smaller the time benefit of the function.</p>
<i>Mode</i>	3	UINT	R/W	<p>This command is designed to change the procedure to query the sensors fitted in the line.</p> <p>There are 3 possible configurations:</p> <ul style="list-style-type: none"> • Mode=0 → the sensors fitted are always queried to find the current position and all the setup parameters (slow working mode); • Mode=1 → the sensors fitted are always queried to find the current position only (faster working mode, which however does not allow periodic reading of the setup parameters); • Mode=2 → the sensors fitted are queried based on two alternating requests. The prioritised request consists in the reading of the current position, which alternates, at intervals of approx. 20 seconds, with the request of reading all the setup parameters (hybrid working mode consisting of both working modes above). <p>NOTE The common feature to all 3 configurations is the request of reading all the parameters at the time the first scan is run.</p>
<i>Reserved</i>	4	UDINT	ND	Reserved
<i>Reserved</i>	5	UDINT	ND	Reserved

Practical examples

Let's assume that the ConvertEp4F4 is set up to communicate with 16 sensors.

- If you wish to disable reading of addresses 4, 8, and 14, the following value must be parametrised in *Disable addresses*:

0b 0010 0000 1000 1000 (8328 in decimal).

The disabled addresses are immediately reflected in the *Status* value (page 7) where the bits that correspond to the disabled sensors are valued with zero.

- If you wish to prioritise addresses 3 and 7, the following value must be parametrised in *Priority addresses*:

0b 0000 0000 0100 0100 (68 in decimal).

The reading time of the selected addresses is displayed in parameter *Priority address reading time*, a description of which is given in the next page.

- If you wish to change the communication method of the ConvertEp4F4, a value must be attributed to the *Mode* command. The changed communication method is reflected in the change of the total network scan time, as specified in parameter *Total reading time*, a description of which is given on page 14.

“Parameter interface status” Group

Direction: S→M.

Profinet module slot: 3.

Dimension: 10 bytes.

This interface is used to view the acyclic parameters of the ConvertEP4F4 which are read and written using cyclic communication (Parameter interface command).

The *Parameter interface status* includes the features (group, index and value) of the parameter that is being read/written and the ongoing operation (*RW status*).

Parameter	Parameter index	Dimension (byte)	Access	Function
<i>Parameter group</i>	1	UINT	R	Numerical value representing the group of the parameter that is being read/written. Group 1 notably corresponds to <i>Network settings</i> and group 2 to <i>Configuration commands</i> , while groups from 101 to (100+NoS) correspond to the sensors in the network.
<i>Parameter index</i>	2	UINT	R	Numerical value representing the index of the parameter that is being read/written in the group (as identified with <i>Parameter group</i>).
<i>Parameter value</i>	3	DINT	R	Value of the parameter that is being read/written.
<i>RW status</i>	4	UINT	R	Indicates the activity status. It can take the following values: <ul style="list-style-type: none"> 0x0000 → no operation in progress; 0x0001 → operation in progress; 0x0002 → reading completed (data available); 0x0004 → writing completed; 0x0010 → <i>Parameter group</i> incorrect; 0x0020 → <i>Parameter index</i> incorrect; 0x0040 → <i>Parameter value</i> incorrect; 0x0080 → address disabled (the sensor indicated by <i>Parameter index</i> was disabled using the <i>Disable</i> command, as a result of which it cannot be accessed); 0x0100 → address error (the sensor indicated by <i>Parameter index</i> is in error).

“Parameter interface command” Group

Direction: M→S.

Profinet module slot: 4.

Dimension: 10 bytes.

Interface designed for the reading/writing of the acyclic parameters of the ConvertEP4F4 through cyclic communication.

The *Parameter interface command* includes the features (sensor address, index and value) of the parameter that needs to be read/written and the operation to be performed (*RW command*).

Parameter	Parameter index	Dimension (byte)	Access	Function
<i>Parameter group</i>	1	UINT	R/W	Numerical value representing the group of the parameter that needs to be read/written. Group 1 notably corresponds to <i>Network settings</i> (access to which is given in read only mode) and group 2 to Configuration commands (access to which is given in write only mode), while groups from 101 to (100+NoS) correspond to the sensors in the network.
<i>Parameter index</i>	2	UINT	R/W	Numerical value representing the index of the parameter that needs to be read/written in the group.
<i>Parameter value</i>	3	DINT	R/W	Value to be given to the selected parameter with <i>Parameter group</i> and <i>Parameter index</i> .
<i>RW command</i>	4	UINT	R/W	This command is used to enable reading/writing and can take the values below: <ul style="list-style-type: none"> • 0x0000 → no operation required; • 0x0001 → reading required; • 0x0002 → writing required. NOTE To enable a new command, write <i>RW command</i> = 0x0000 (<i>No operation required</i>) and wait until the ConvertEP4F4 responds with <i>RW status</i> = 0x0000 (<i>No operation in progress</i>).

PRACTICAL EXAMPLES

READING

If you wish to read the **Visual** parameter of the sensor with **Address = 3**, the *Parameter Interface command* must be set up as follows:

Parameter Interface command → Parameter group = 103;
 Parameter index = 0;
 Parameter value = nd (not required for reading);
 RW command = 0x0001.

In this case, the response of the ConvertEP4F4 would be as follows:

Parameter Interface status → Parameter group = 103;
 Parameter index = 0;
 Parameter value = value stored in *Visual* parameter;
 RW status = 0x0002.

WRITING

If you wish to write the **Count direction** parameter of the sensor with **Address = 5**, the *Parameter Interface command* must be set up as follows:

Parameter Interface command → Parameter group = 105;
 Parameter index = 4 (index of the *Count direction* parameter);
 Parameter value = 1 (value to be entered in *Count direction*);
 RW command = 0x0002.

In this case, the response of the ConvertEP4F4 would be as follows:

Parameter Interface status → Parameter group = 105;
 Parameter index = 4;
 Parameter value = 1;
 RW status = 0x0001 → 0x0004 (the system switches from “operation

in progress” to
 writing completed).

NEW OPERATION

If you wish to perform a new operation which requires switching from one reading/writing process to another, the interface has to be set up as illustrated below:

Parameter Interface command → Parameter group = nd (not required when switching to a new operation);
 Parameter index = nd (not required when switching to a new operation);
 Parameter value = nd (not required when switching to a new operation);
 RW command = 0x0000.

In this case, the response of the ConvertEP4F4 is as follows:

Parameter Interface status → Parameter group = ns (not significant when switching to a new operation);
 Parameter index = ns (not significant when switching to a new operation);
 Parameter value = ns (not significant when switching to a new operation);
 RW status = 0x0000.

A new operation can be carried out as soon as “RW status” is back to “0”.

Acyclic communication

The ConvertEP4F4 unit utilises 2+NoS groups of acyclic parameters. The first two groups (addresses for acyclic access 1 and 2) are overall setup parameters; the other NoS groups (from address 101 onwards) are the setup parameters of each single sensor connected to the ConvertEP4F4.

NOTE As the configuration is saved in the EP4xRS/F4xRS sensors, these sensors do not need to be set up again at every use, provided that the same parameters are required.

Example

If the “*Number of sensors*” is set up with value 13, the number of parameter groups is thirteen, i.e., from address **101** to address **113**, and the setup parameters of the EP4xRS/F4xRS sensor with Modbus address 13 are stored in address 113.

Access to the acyclic parameters is gained in three possible ways:

- **Web server**- the *Parameters* section is used to either read or write all the parameters;
- **Cyclic communication interface** - reference should be made to the sections titled *Parameter interface command* and *Parameter interface status*;
- **PLC** - the function blocks preventing acyclic access to variables are used, as made available by the different manufacturers.

Refer to the EP4_RS and F4_RS manual for a more detailed description of these parameters.

NOTE: the sensors must be energised in order for the parameters to be written in them.

NETWORK SETTINGS

Direction: M→S.

Address for acyclic access through: 1.

Dimension: 16 bytes.

The network setup parameters are included in this group.

Parameter	Parameter index	Dimension (byte)	Access	Function
<i>Number of Ep4RS</i>	0	UINT	R	This is the number of EP4_RS/F4_RS programmable indicators with which the network is currently set up.
<i>BaudRate</i>	1	UINT	R	This is the baud rate with which the network is currently set up.
<i>Parity</i>	2	UINT	R	This is the parity with which the network is currently set up.
<i>Read delay</i>	3	UINT	R	This is the latency with which the network is currently set up.
<i>Total reading time</i>	4	UINT	R	This is the scanning time of all the enabled sensors (i.e., how often each address is scanned by the ConvertEP4F4).
<i>Priority address reading time</i>	5	UINT	R	This is the scanning time of the priority addresses (i.e., how often each priority address is scanned by the ConvertEP4F4).
<i>Reserved 1</i>	6	UINT	ND	Reserved
<i>Reserved 2</i>	7	UINT	ND	Reserved

CONFIGURATION COMMANDS

Direction: S→M.

Address for acyclic access: 2.

Dimension: 18 bytes.

This group includes a number of configuration commands that can be sent to the EP4_RS/F4_RS programmable indicators. (Write only)

Parameter	Parameter index	Type	Access	Function
<i>Activate display</i>	0	UDINT	W	<p>This command is used to enable the “display always active” function in the EP4_RS/F4_RS programmable indicators featured in the network. The sensor display stays on even when the 24V power supply is cut out, thanks to which the current position can also be viewed if the machine is off. Each bit of the “Activate display” dword is matched with a Modbus address, as specified in the relevant table above. If a bit is filled with value “1”, the function is enabled in the corresponding address. If the entered value is “0”, no action is triggered.</p> <p>NOTE This is a permanent setting (unless the next command is engaged).</p> <p>NOTE The service life of the battery fitted in each EP4_RS/F4_RS programmable indicator using this function is reduced by approx. 20%.</p> <p>(NOTE: this function is only available in EP4_RS/F4_RS programmable indicators REV5 or higher.)</p>
<i>Deactivate display</i>	1	UDINT	W	<p>This command is used to disable the “display always active” function in the EP4_RS/F4_RS programmable indicators featured in the network. Each bit of the “Deactivate display” dword is matched with a Modbus address, as specified in the relevant table above. If a bit is filled with value “1”, the function is disabled in the corresponding address. If the entered value is “0”, no action is triggered.</p>
<i>Reserved cmd</i>	2	UDINT	ND	Reserved
<i>Reserved cmd 2</i>	3	UDINT	ND	Reserved
<i>Erase configuration</i>	4	UINT	W	<p>When password 273 is entered in this parameter, the current configuration is deleted (i.e. parameters <i>Number of sensors</i>, <i>Baudrate</i>, <i>Parity</i> and <i>Read delay</i>, which are set in configuration mode) and an automatic reset cycle is run in the device.</p> <p>When it is switched on, the ConvertEP4F4 is in configuration mode.</p>

PARAMETERS SENSOR ADDRESS 1

Direction: S↔M.

Address for acyclic access: 101.

Dimension: 34 bytes.

This is the group of setup parameters of the EP4_RS/F4_RS programmable indicator at address 1.

Parameter	Parameter index	Type	Access	Function
<i>Visual</i>	0	UDINT	R/W	Value to be displayed in address 1 after every turn of the hollow shaft (EP4_RS) or after a 10 mm movement (F4_RS).
<i>Visual decimal point</i>	1	UINT	R/W	Position of the decimal point in the “Visual” parameter of the EP4_RS/F4_RS programmable indicator in address 1.
<i>Number of decimal places</i>	2	UINT	R/W	Number of decimal digits appearing on the display of the EP4_RS/F4_RS programmable indicator in address 1.
<i>Button activation mode</i>	3	UINT	R/W	Meaning of buttons for the EP4_RS/F4_RS programmable indicator in address 1.
<i>Count direction</i>	4	UINT	R/W	Encoder count direction relating to the EP4_RS/F4_RS programmable indicator in address 1.
<i>Preset position</i>	5	DINT	R/W	Preset position of the EP4_RS/F4_RS programmable indicator in address 1.
<i>Backlash compensation value</i>	6	DINT	R/W	Position to make up for any play of the EP4_RS/F4_RS programmable indicator in address 1.
<i>Positioning window</i>	7	UINT	R/W	Window for EP4_RS/F4_RS programmable indicator positioning in address 1. This parameter is used to set the distance from the target position. When this distance is achieved, the green LED light on the sensor goes on and bit0 (relating to Modbus address 1) of the status word “ <i>Target reached</i> ” is set to “1”.
<i>Actual position</i>	8	DINT	R/W	Current position of the EP4_RS/F4_RS programmable indicator in address 1.
<i>Target position</i>	9	DINT	R/W	Target position of the EP4_RS/F4_RS programmable indicator in address 1.
<i>Packets exchanged</i>	10	UDINT	R	Number of Modbus packets exchanged between the ConvertEP4F4 and the EP4_RS/F4_RS programmable indicator in address 1.

NOTE: each configured address has its own group of parameters.

Address 102: PARAMETERS FOR SENSOR ADDRESS 2

Address 103: PARAMETERS FOR SENSOR ADDRESS 3

Address 104: PARAMETERS FOR SENSOR ADDRESS 4

Address 105: PARAMETERS FOR SENSOR ADDRESS 5

Address 106: PARAMETERS FOR SENSOR ADDRESS 6

Address 107: PARAMETERS FOR SENSOR ADDRESS 7

Address 108: PARAMETERS FOR SENSOR ADDRESS 8

Address 109: PARAMETERS FOR SENSOR ADDRESS 9

Address 110: PARAMETERS FOR SENSOR ADDRESS 10

Address 111: PARAMETERS FOR SENSOR ADDRESS 11

Address 112: PARAMETERS FOR SENSOR ADDRESS 12

Address 113: PARAMETERS FOR SENSOR ADDRESS 13

Address 114: PARAMETERS FOR SENSOR ADDRESS 14

Address 115: PARAMETERS FOR SENSOR ADDRESS 15

PARAMETERS FOR SENSOR ADDRESS 16

Direction: S↔M.

Address for acyclic access: 116.

Dimension: 34 bytes.

This is the group of setup parameters of the EP4_RS/F4_RS programmable indicator at address 16.

Parameter	Parameter index	Type	Access	Function
<i>Visual</i>	0	UDINT	R/W	Value to be displayed in address 16 after every turn of the hollow shaft (EP4_RS) or after a 10 mm movement (F4_RS).
<i>Visual decimal point</i>	1	UINT	R/W	Position of the decimal point in the “Visual” parameter of the EP4_RS/F4_RS programmable indicator in address 16.
<i>Number of decimal places</i>	2	UINT	R/W	Number of decimal digits appearing on the display of the EP4_RS/F4_RS programmable indicator in address 16.
<i>Button activation mode</i>	3	UINT	R/W	Meaning of buttons for the EP4_RS/F4_RS programmable indicator in address 16.
<i>Count direction</i>	4	UINT	R/W	Encoder count direction relating to the EP4_RS/F4_RS programmable indicator in address 16.
<i>Preset position</i>	5	DINT	R/W	Preset position of the EP4_RS/F4_RS programmable indicator in address 16.
<i>Backlash compensation value</i>	6	DINT	R/W	Position to make up for any play of the EP4_RS/F4_RS programmable indicator in address 16.
<i>Positioning window</i>	7	UINT	R/W	Window for EP4_RS/F4_RS programmable indicator positioning in address 16. This parameter is used to set the distance from the target position. When this distance is achieved, the green LED light on the sensor goes on and bit15 (relating to Modbus address 1) of the status word “ <i>Target reached</i> ” is set to 16.
<i>Actual position</i>	8	DINT	R/W	Current position of the EP4_RS/F4_RS programmable indicator in address 16.
<i>Target position</i>	9	DINT	R/W	Target position of the EP4_RS/F4_RS programmable indicator in address 16.
<i>Packets exchanged</i>	10	UDINT	R	Number of Modbus packets exchanged between the ConvertEP4F4 and the EP4_RS/F4_RS programmable indicator in address 16.

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 ConvertEP4F4 communication (configuration mode) as well as the parameters of each display connected to the network. It is also used to output commands such as “Display ON/OFF” (each device) and “RESET ConvertEP4F4”.

The “DOC” section contains the sensor user manuals and the configuration files (XML/EDS/XDD) of the ConvertEP4F4, which the user can download.

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 [Profinet Commander](#) or the software [Ipconfig](#) by HMS.

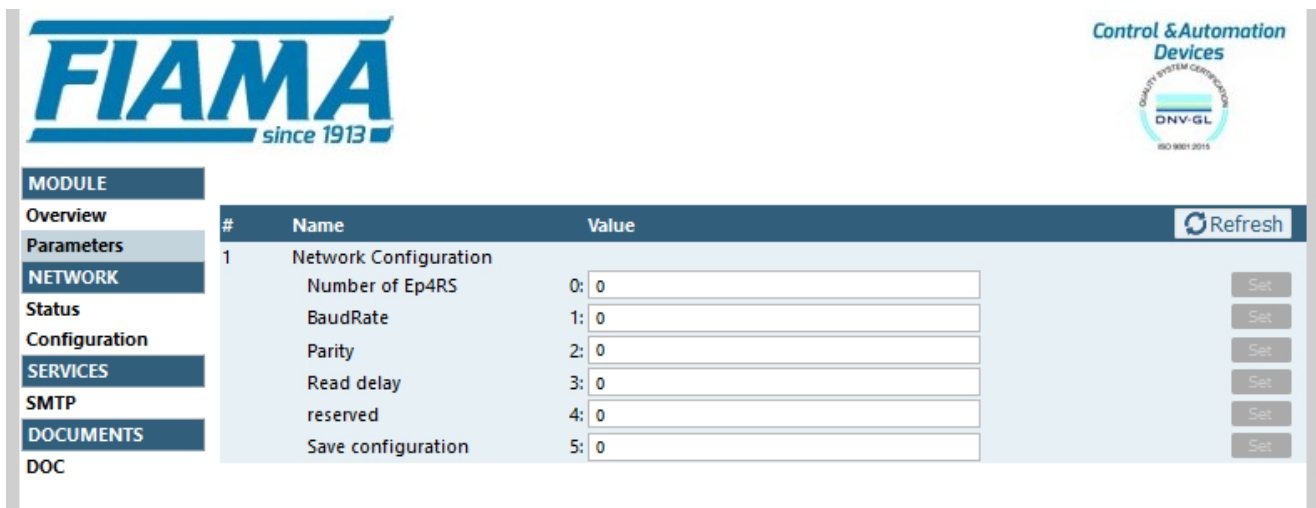
QuickStart

EP4_RS / F4_RS devices

- 1) How to energise the sensors
- 2) Following the instructions provided in the relevant manual, access the menu of each sensor and set a Modbus address, included in the 1 to 16 range (use addresses in rising order, i.e. from 1 to NoS), as well as the desired baud rate and parity.

ConvertEP4F4

- 1) Energise the ConvertEP4F4 using inputs (1) and (2) in the terminal board.
- 2) Connect the ConvertEP4F4 to a computer using one of the two RJ45 ports available.
- 3) Check that the device is in configuration mode (*status* LED light flashing).
- 4) With the help of the IPconfig tool (or equivalent) attribute an IP address to the device.
- 5) Access the web page of the device and then enter the parameters section. The following screen appears.



The screenshot displays the web interface of the ConvertEP4F4 device. At the top left is the FIAMA logo with 'since 1913'. At the top right is the 'Control & Automation Devices' logo with a circular 'QUALITY SYSTEM CERTIFICATION' badge for 'DNV-GL' and 'ISO 9001:2015'. On the left is a vertical menu with options: MODULE, Overview, Parameters, NETWORK (highlighted), Status, Configuration, SERVICES, SMTP, DOCUMENTS, and DOC. The main area shows a table for 'Network Configuration' with a 'Refresh' button. The table has columns for '#', 'Name', and 'Value'. It lists five parameters: Number of Ep4RS (0: 0), BaudRate (1: 0), Parity (2: 0), Read delay (3: 0), and reserved (4: 0). A 'Save configuration' row (5: 0) is at the bottom. Each row has a 'Set' button on the right.

#	Name	Value	
1	Network Configuration		
0:	Number of Ep4RS	0	Set
1:	BaudRate	0	Set
2:	Parity	0	Set
3:	Read delay	0	Set
4:	reserved	0	Set
5:	Save configuration	0	Set

- 6) Enter the required parameters (one at a time) and press "set". Refer to the relevant tables to enter the baud rate and parity values.
- 7) Key in all the setup parameters and then enter value 273 in the field *Save configuration*. Press "set": the device runs an automatic reset cycle. Wait until the LED *status* light switches back to green and then upload the web page again (DO NOT press the refresh button in the web server).
- 8) If the configuration process is completed successfully, the device gets started in working mode. Go back to the *Parameters* section where you will be able to view all the I/Os described in the chapters above (the section may take a few seconds to upload). Now, you can edit the operating parameters of each display (EP4_RS/F4_RS) connected to the network. The configuration is saved permanently in the sensors, so there is no need for it to be run again.
- 9) The only thing left now is to map in the network Master the correct number of I/Os featured in the ConvertEP4F4.

LED lights

The meaning of the first three LED status lights does not depend on the communication protocol used by the ConvertEP4F4.

LED status light

LED Power	Description	Comment
Off	Power OFF	<ul style="list-style-type: none"> No power supplied
Green	Power ON	<ul style="list-style-type: none"> Interface ON

LED status light	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied Communication module error
Green	OP Mode	<ul style="list-style-type: none"> Interface running in operating mode
Green, flashing	CONFIG Mode	<ul style="list-style-type: none"> Interface running in configuration mode

LED error light	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied No error
Red	Flash Error	<ul style="list-style-type: none"> Error experienced while saving configuration Reset required
Red, flashing (1x)	Modbus Error	<ul style="list-style-type: none"> At least one Modbus address fails to respond or all Modbus addresses are disabled.
Red, flashing (10x)	Module Error	<ul style="list-style-type: none"> Communication module internal error

The meaning of the 6 communication LED lights depends on the implemented protocol.

LED lights, Profinet version

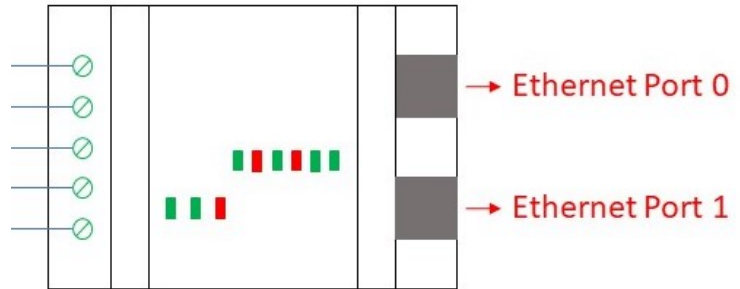
LED Net-1	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied No connection
Green	Online (RUN mode)	<ul style="list-style-type: none"> Connection successful PLC in RUN mode
Green, flashing	Online (STOP mode)	<ul style="list-style-type: none"> Connection successful PLC in STOP mode
Green, flashing (2x)	DCP Service	<ul style="list-style-type: none"> Node identification using PLC
LED Net-2	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied No connection No error sensed
Red	Fatal error	<ul style="list-style-type: none"> Internal error
Red, flashing (1x)	Name station error	<ul style="list-style-type: none"> Node name not set or incorrect
Red, flashing (2x)	IP error	<ul style="list-style-type: none"> IP address not set
Red, flashing (3x)	Configuration error	<ul style="list-style-type: none"> Configuration file incorrect
LED Mod-1	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied Communication module setup in progress
Green	Normal operation	<ul style="list-style-type: none"> Communication module in operation
Green, flashing (1x)	Diagnostic event	<ul style="list-style-type: none"> Diagnostic event identified
LED Mod-2	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied No error
Red	Fatal error	<ul style="list-style-type: none"> Internal error
LED Link-A	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied No connection
Green	Link	<ul style="list-style-type: none"> Connection established, but no communication – PORT 0
Green, flashing	Activity	<ul style="list-style-type: none"> Connection established and communication active – PORT 0
LED Link-B	Description	Comment
Off	Offline	<ul style="list-style-type: none"> No power supplied No connection
Green	Link	<ul style="list-style-type: none"> Connection established, but no communication – PORT 1
Green, flashing	Activity	<ul style="list-style-type: none"> Connection established and communication active – PORT 1

PORT 0: RH connector (front connector view)

PORT 1: LH connector (front connector view)

Connection diagram

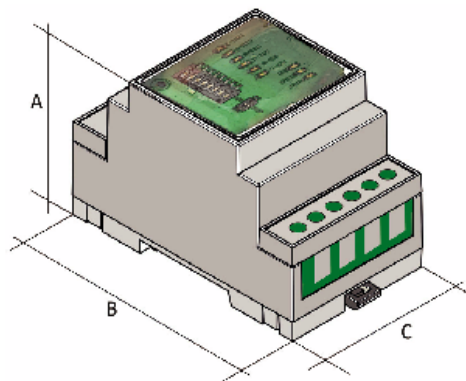
RS485 positive serial port RS+
RS485 negative serial port RS-
RS485 reference COM
Power supply negative GND
Power supply positive 10-30VDC



We recommend that electrical connections be made with utmost care: the device gets damaged if the feet of the serial port are energised.

Overall dimensions

A = 62 mm
B = 90 mm
C = 53 mm



Technical specifications

Power	10 - 30 Vdc, max 200mA
Field bus	Profinet, EthernetIP, Powerlink
Serial port	RS485, RTU Modbus protocol
Ethernet port connector	2xRJ45, female
Power/serial input connector	5-Position terminal board
Max. Modbus scanning speed	12ms per sensor
Max. no. sensors supported	16
Enclosure	Plastic, Noryl UL94 V-0, self-extinguishing
Enclosure colour	Gray RAL 7035
Mounted on	DIN EN50022 rail, pursuant to standards 43880
Dimensions	3M (3 module), 90 x 62 x 53
Working temperature	0 to 50°C
Electromagnetic compatibility	2014/30/EU
RoHS	2011/65/EU

Manufacturer

All correspondence with the manufacturer shall be sent to:

FIAMA s.r.l., Via G. Di Vittorio, 5/A - 43016 San Pancrazio (Parma) - Italy

Tel. (+39) 0521 672341 - Fax. (+39) 0521 672537 - E-mail: info@fiama.it - www.fiama.it

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.

