

# Yocto net Coordinator E-Wi

## Yocto net and Deca Router E-Wi

## Yocto Bridge E-Wi



**Yocto net Coordinator E-Wi** is a network gateway for connecting simultaneously from different devices as PC, Tablet or Smart Phone to Electrex instruments (Femto, Yocto I-O, Deca sensor, etc.). The instruments can be connected to the Yocto net through a RS485 sub network or wirelessly via the E-Wi protocol. The Yocto net Coordinator E-Wi acts as the coordinator of the wireless network beyond that of data-logging (storage of the data over the functioning time). Its functionalities can be further expanded installing the “Yocto net Upgrade” software implementations.

**Yocto net Router E-Wi** is a network gateway with the same functionalities of the Yocto net Coordinator E-Wi except the coordinator function. In fact the Yocto net Router can also act as a signal repeater. Its functionalities can be further expanded installing the “Yocto net Upgrade” software implementations.

**Deca Router E-Wi** can serve only as an E-Wi signal repeater.

**Yocto Bridge E-Wi** is a network gateway which acts as a wireless bridge between the RS485 network connected to it and the Yocto net Coordinator or an Yocto net Router.

### Yocto net Coordinator and Yocto net Router E-Wi functionalities

Modbus-TCP server (max. 4 simultaneous connections) acting as a bridge between the Ethernet network (Modbus-TCP protocol), the E-Wi devices (E-Wi protocol based on the IEEE 802.15.4 standard) and the RS485 devices in the subnetwork.

WEB Server for configuring the Yocto net through a WEB Browser, FTP server for updating the firmware and access into the Log files.

Arbiter function between the Ethernet port and the RS232 port (Modbus-RTU protocol with the possibility to have an additional connection for a PC, PLC or a Yocto gate) toward the radio transceiving (250kbps and frequency 2.4 GHz) and the RS485 subnetwork.

Clock synchronization by NTP server.

Data logger for 8, 16, 24, 32 and 40 devices depending on the number of the ‘yocto net upgrade log 8’ activated.

On-Off status checking through the 2 digital optoinsulated inputs.

Alarms and activation/deactivation system using 2 digital transistor optoinsulated outputs, rated at 27 Vdc 27 mA following DIN 43864.

Equipped with a LCD display for the configuration. Static or dynamic IP address (DHCP protocol).

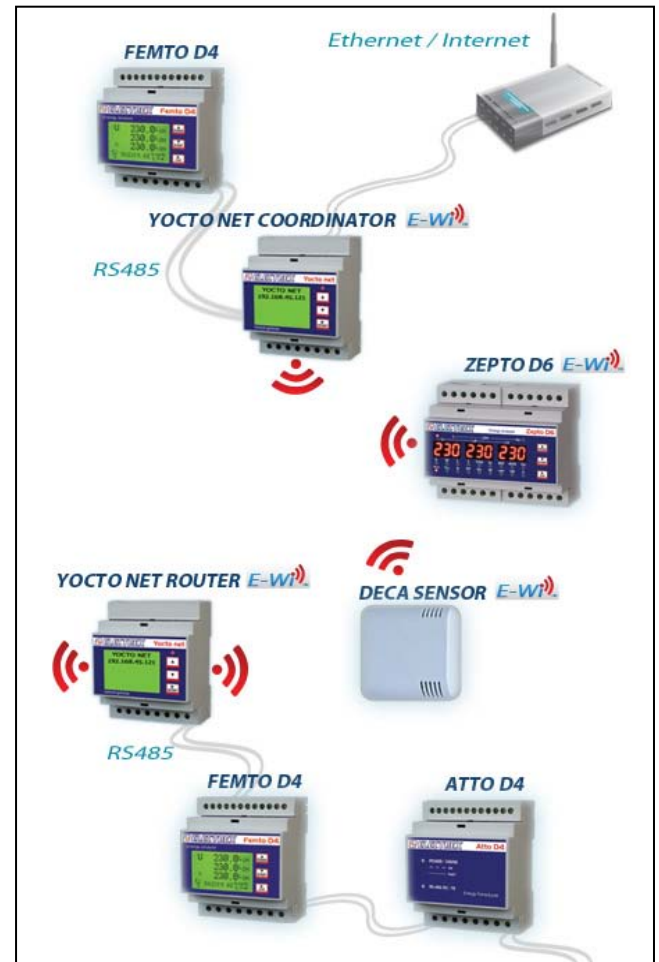
The activation of the “Yocto net upgrade” adds new functionalities to the Yocto net E-Wi Coordinator and Router, as the possibility to manage Web pages, alarms and calendars.

The Yocto net Router is also a signal repeater. Up to 4 units can be used in cascade between the Coordinator E-Wi and the final E-Wi device (eg. Femto, Atto, Zepto, Deca Sensor, etc.). In order to serve also as a data logger for the instruments connected in an RS485 subnetwork it should be connected also to the Ethernet network.

### Yocto Bridge and Deca Router E-Wi functionalities

The Yocto Bridge serves as a bridge between the wireless network and the RS485 subnetwork. It does not have the functionality of the signal repeating and cannot log data from other instruments present in the subnetwork. The Deca Router E-Wi instead serves only as a signal repeater.

### E-Wi network example



In the example here above the Yocto net Coordinator E-Wi, to which is connected in a subnetwork RS485 a Femto D4, acquires via radio the data from the E-Wi devices (Zepto E-Wi and Deca Sensor E-Wi) and from the Yocto Router E-Wi, to which are connected in a subnetwork RS485 the devices: Femto and Atto (in order to download the data from this last two devices, the Yocto net Router E-Wi must be connected also via Ethernet).

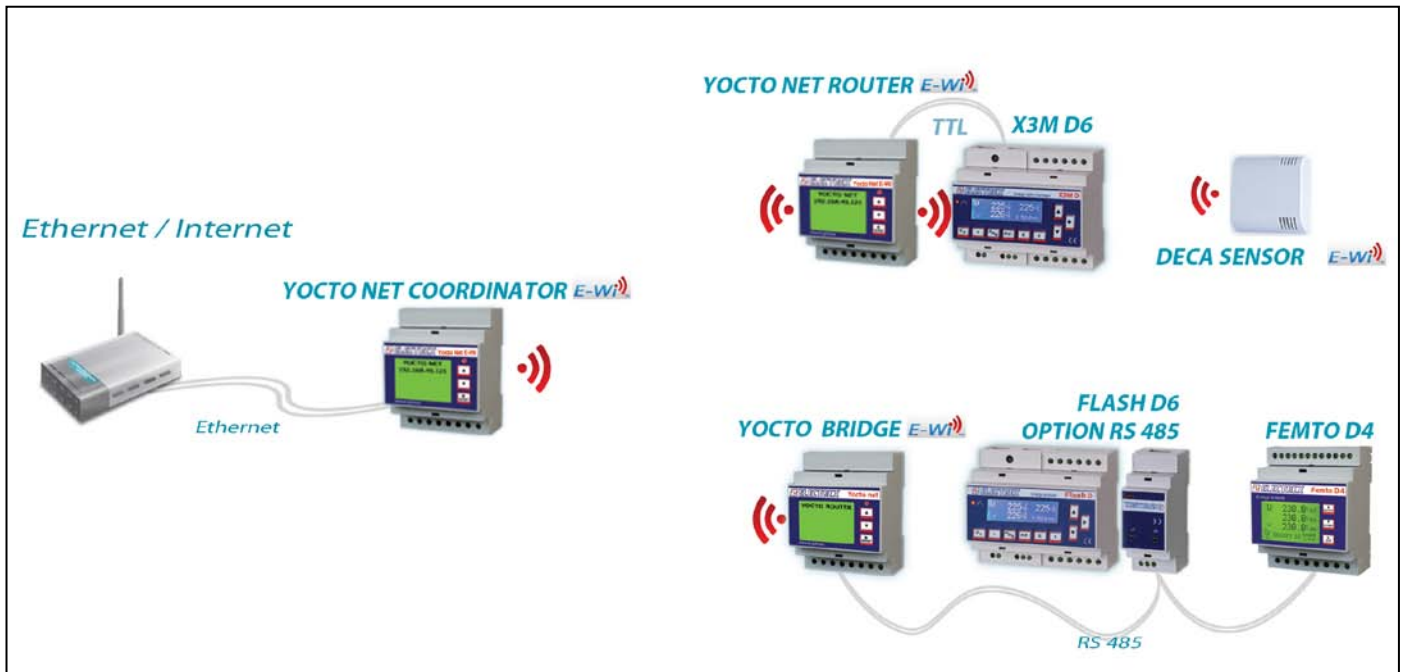
**Simple E-Wi networks examples**



The Yocto net Coordinator E-Wi connected wirelessly to a Deca Sensor E-Wi which measures temperature, humidity, luminosity, etc. The Deca Sensor E-Wi can be powered by a battery or through an external power supplier.

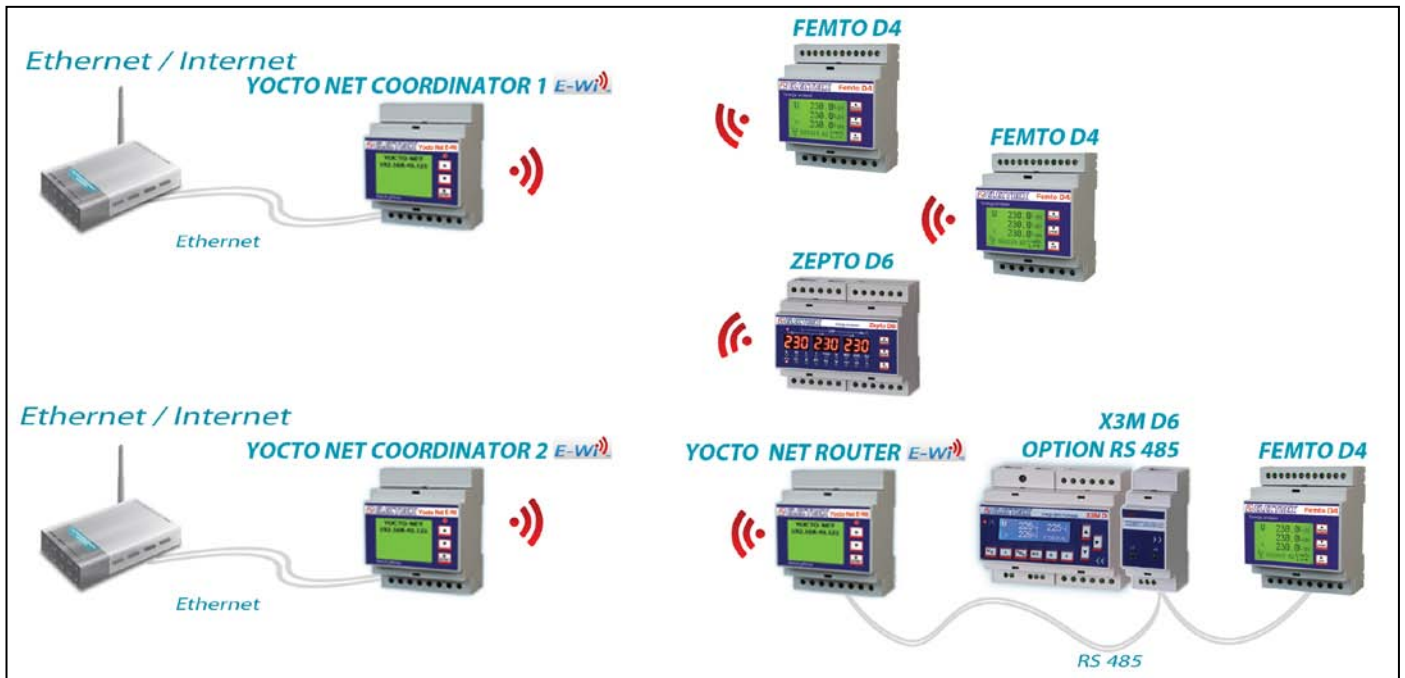


The Yocto net Coordinator E-Wi is connected wirelessly to an E-Wi device as the Femto E-Wi, l'Atto E-Wi, lo Zepto E-Wi, etc.



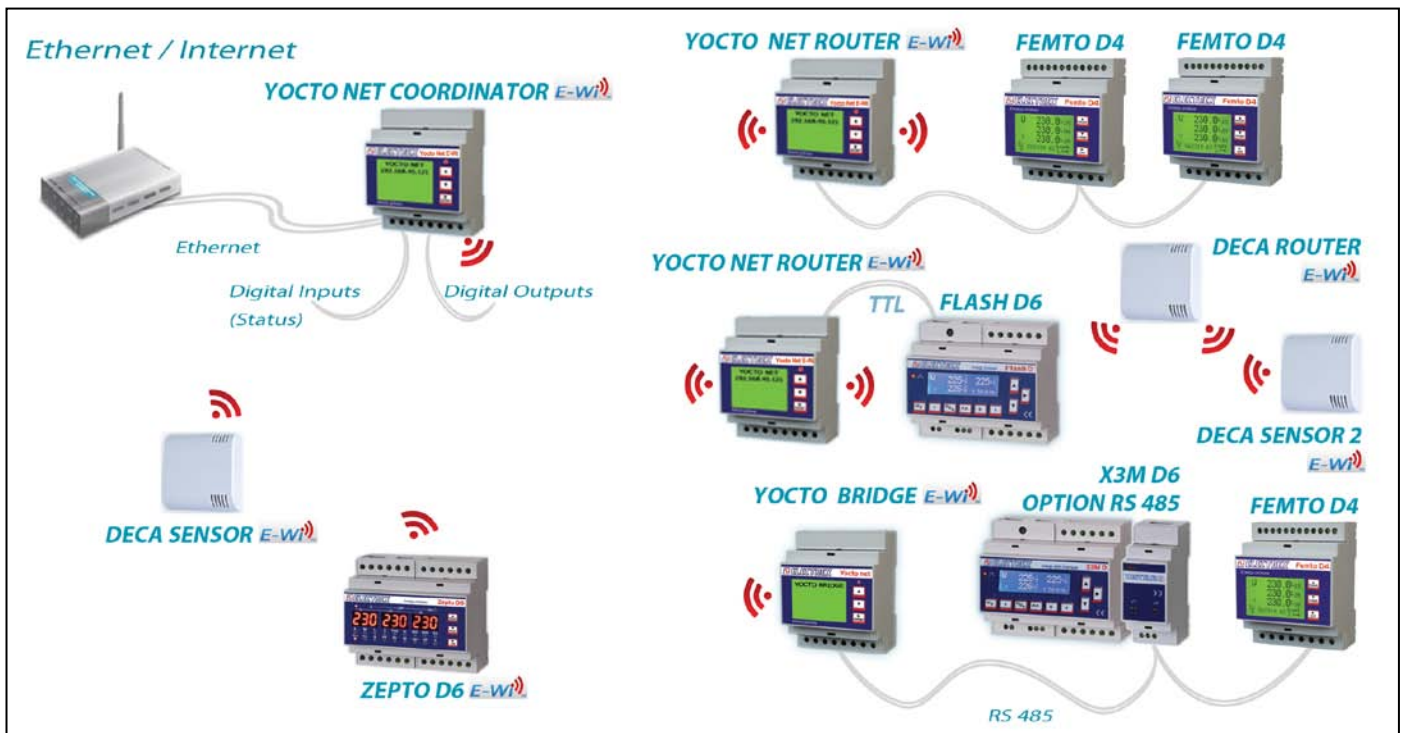
The Yocto net Coordinator E-Wi is connected wirelessly to a Yocto net Router E-Wi (connected to an X3M D6 by the TTL port) and to a Yocto Bridge E-Wi. This last device, to which are connected in a RS485 subnetwork a Flash D6 and a Femto D4, serves as a bridge between the wireless E-Wi network (can connect to the Yocto net Coordinator E-Wi or with the Yocto net Router E-Wi) and the RS485 network (does not log the data of the instruments in the subnetwork and repeat the signal). The Yocto net Router E-Wi instead serves as a E-Wi repeater for the Deca E-Wi which is out or the wireless communication area of the Yocto net Coordinator E-Wi.

**E-Wi network examples with 2 Coordinators**



The E-Wi devices can be part of a single logical network (with a single coordinator). In the example above the Zepto D6 E-Wi, even if being present in the transceiving wireless of both Yocto net Coordinator E-Wi, has been assigned, using the configuration Web page, only to one of them (in this example to the one in the upper part of the diagram).

**E-Wi network examples with various devices**



The Yocto net Coordinator E-Wi communicates via radio directly to the Yocto net Router E-Wi, the Yocto Bridge E-Wi and the measuring E-Wi devices (Femto, Zepto, Deca Sensor, etc.). If a barrier will not allow the direct communication, the Router E-Wi will serve as a bridge, making possible an indirect re-transmission of the data. Example: a barrier is set between the Zepto D6 E-Wi and the Coordinator, in this case the Zepto E-Wi communicates with the Yocto net Router which in turn communicates with the Yocto net Coordinator E-Wi. The Router E-Wi can serve also as a wireless bridge in order to allow the connection to E-Wi devices which are too distant. In the example the Yocto net Router E-Wi connected to the Flash D6 serves as a bridge for the Deca Router which in turn serves as a bridge for the Deca Sensor 2 E-Wi. The Yocto net Coordinator E-Wi and the Yocto net Router E-Wi are equipped with 2 digital inputs which read the ON-OFF status (for example for alarm functionalities) and 2 digital outputs which can command relays for activating / deactivating for example other appliances.



## E-Wi network structure

In the E-Wi wireless networks each device is identified by a unique address.

Each network has a single Yocto net (hereinafter Coordinator).

The devices can connect directly to the Coordinator or to the Yocto net and Deca Router (hereinafter Router).

The Routers (which relaunch the radio signal) can connect directly to the Coordinator or to other Routers.

The E-Wi devices can be FFD or RFD type:

- FFD (fully functionality device) is a device which is always available for replying to the requests made toward it.
- RFD (reduced functionality device) is a device which results sleepy in most of the time and which only occasionally wakes up in order to communicate with the Coordinator or the Router to which is connected (rendez vous event), named also "fathers". In case the RFD device is queried by the Coordinator, it will be the father of the RFD device which will reply instead. Indeed, the father, conserves in its RAM memory a copy of the info (instantaneous measures and configurations) detected from the RFD device.

To the Coordinator can be connected up to a max of 3 Routers (1st level routers), 31 FFD devices and RFD 31 devices.

To a Router of first level can be connected up to a max of 4 routers (2nd level routers), 31 FFD devices, 31 RFD devices (4 in case of a Deca Router).

To a 2nd level Router can be connected up to a max of 4 routers (3rd level routers), 31 FFD devices, 31 RFD devices (4 in case of a Deca Router).

To a 3rd level Router can be connected up to a max of 4 routers (4th level routers), 31 FFD devices, 31 RFD devices (4 in case of a Deca Router).

To a 4th level Router can be connected up to a max of 31 FFD devices, 31 RFD devices (4 in case of a Deca Router).

The limit of the 31 RFD devices is subordinated to the RAM availability in the Coordinator or in the Routers.

## E-Wi network setup and self-configuration/management of the inactive nodes

In order to have a wireless E-Wi network, it is mandatory that the Coordinator is turned ON. At this point, every time a new wireless device is turned ON, it will send into the network area messages in order to check which are the potential fathers available (the Coordinator or Routers) to connect to.

The potential fathers which receive these messages, will reply with other messages where they introduce themselves communicating the identification data. The new device is able to choose the "best" father to associate to depending on the signal strength level of the received messages.

Once the father to which the device will be associated has been chosen, the device will send to him an association request. After this the data of the new device which has sent the request will be displayed on the specific web page of the Coordinator.

The device will be authorized to be part of the network from the web page too. If not authorized the device will start a new association request procedure in order to

check if other networks are available or if in the meanwhile the association request sent has been accepted.

A device which requests to join a network will be accepted only if the signal strength level of the message sent to the father will be higher than 7%. In case, during the normal functioning, the signal level of a device will be 0% for three consecutive messages, it will be disconnected from the network and should search for a new father device.

Once the network has been structured, periodically the coordinator device will send various messages within the network in order to verify that the FFD devices or the associated routers are still present and functioning. If an FFD node will not reply to 5 consecutive messages it will be considered not active and will be canceled from the list of the FFD nodes connected to the network.

The more the period between the messages (editable) will be short the more the coordinator will be reactive in checking if any node is not communicating and the more fast it will restructure the network. In the same time anyway a very short period will generate more communication traffic in the network.



## EDA (External Directional Antenna) versions

The EDA versions of the Yocto net Coordinator and Yocto net Router are meant to be used in the cases where problems of communication connected to signal strength may occur. These versions are equipped with a connector for mounting an external antenna. This last can be installed directly on the Yocto or distant from the device using extension wires. The PFC3533 External Directional Antenna can also be mounted in various directions in order to assure the best signal strength available.

## Software implementations

You can install the following software implementations on the Yocto net Coordinator E-Wi and Yocto net Router E-Wi :

**Yocto net Upgrade Log 8:** Performed by field PUK code entry, it adds 1 storage service to the Yocto Net and to the Yocto Net Log (e.g. log of powers and energies only in import from 8 different Electrex power meters). It is possible to manage up to 5 services of log for each Yocto Net or Yocto Net Log. In order to serve also as a data logger for the devices connected via wireless network and / or RS485 subnetwork the Yocto net Coordinator and Router E-Wi must be connected also to the Ethernet network.

- **Yocto net Upgrade Web:** enables HTML WEB pages displaying real-time measurements on-line, from any of the instruments connected to the Yocto net.

- **Yocto net Upgrade Web Open:** it adds the possibility to customize the real-time measurements WEB pages.

- **Yocto net Upgrade Mail Alarm:** it adds the possibility to send e-mails and/or SMS (in this case the Yocto net should be connected to an Yocto Gate) to several recipients if a previously set event occurs.

- **Yocto net Upgrade Calendar:** it adds the possibility to manage functionalities of Energy Automation as turning on/off, alarms/alerts/notifications and automations based on a yearly calendar configurable also on a minute/hour/day/month basis.

- **Yocto net Upgrade Charts:** it adds the possibility to display on a WEB page the daily charts of electric energy, temperature, humidity, luminosity, etc.

## Yocto net Coordinator and Yocto net Router E-Wi hardware characteristics

*E-Wi HI radio transceiving:*

*transmission ..... up to 13,7dBm  
(further, up to 20 dBm only where allowed)  
receiving..... -102dBm*

*N. 1 RS-485 standard serial port galvanic insulation on a three poles terminal (COM1) with fail-safe and termination integrated (configurable via dip-switches).*

*N. 1 RS-232 standard serial port on D-Sub 9 poles male connector (COM2) for the connecting to a Yocto gate GSM, and a PLC or a PC Modbus supervision software (eg. Energy Brain or other SCADA).*

*N. 1 TTL port (COM3) galvanic insulation for a direct connection (via Power Cable code PCAFL00-00) to an Electrex instrument model Flash-D / Fast / X3M-D. For the models X3M 96 and Flash N 96 except the Power Cable it is needed also adapter cable (Adapter Cable code PCADL00-00). Only in this modality, using only the TTL port, an external power supplier for the Yocto is not needed.*

*N.1 Ethernet 10/100 BASE-TX (RJ45) Auto-MDIX port .*

*N. 2 Digital inputs:*

- External power supply needed
- Galvanic insulation
- ON-OFF status detection

*N. 2 Digital outputs:*

- Conform to DIN 43864 (27Vdc, 27mA) norms
- Galvanic insulation
- Alarm notification, command outputs

*N. 1 LCD Display with energy efficiency turning off system*

*Power supply: 15–36Vac/18-60Vdc*

*Consumption: ≤ 3VA*

*Flash memory (non volatile) used for the Web pages and/or the data-logging and/or alarms management via email.*

*Clock/Calendar with a battery backup and automatic management of the time zones and of the solar and legal time.*

*Working temperature range..... -10/+50 °C*

*Relative humidity .....95% non-condensing*

*Enclosure ..... Self-extinguishing plastic material*

*Protection degree .....IP40 front panel, IP20 terminals side*

*Size ..... 4 DIN modules (70 x 90 x 58 mm)*

*Mount ..... DIN rail*

*Terminals .screw connector (for the power supply and RS485)*

*Max cable size ..... 1,5 mm<sup>2</sup> (stranded cable)*

*.....2,5 mm<sup>2</sup> (solid cable)*

## Yocto Bridge E-Wi hardware characteristics

E-Wi HI radio transceiving:  
 transmission up to 13,7dBm  
 (further, up to 20 dBm only where allowed)  
 receiving -102dBm

N. 1 RS-485 standard serial port galvanic insulation on a three poles terminal

N. 1 LCD Display with energy efficiency turning off system

Power supply: 230/240Vac +/- 10% 50/60Hz

Consumption: ≤ 3VA

Working temperature range -10/+50 °C

Relative humidity 95% non-condensing

Enclosure.....Self-extinguishing plastic material

Protection degree ..... IP40 front panel, IP20 terminals side

Size..... 4 DIN modules (70 x 90 x 58 mm)

Mount ..... DIN rail

Terminals screw connector (for the power supply and RS485)

## Deca Router E-Wi hardware characteristics

E-Wi HI radio transceiving:  
 transmission up to 13,7dBm  
 (further, up to 20 dBm only where allowed)  
 receiving -102dBm

Power supply: 5Vdc

Connection: Spring clamp max. 1,5 mm<sup>2</sup>

Installation: Wall mounting

Connection: Spring clamp max. 1,5 mm<sup>2</sup>

Enclosure: White or black in polycarbonate

Size (l x w x h):: 80 x 80 x 25 mm

## Order codes

Type	Code
Yocto net Coordinator D4 E-Wi HI 15÷36V 2DI 2DO..	PFA94DH-06
Yocto net Coordinator Web D4 E-Wi HI 15÷36V 2DI 2DO	
.....	PFA94DH-97
Yoctonet Coordinator Web Log 8 Mail Calendar D4 E-Wi HI	
.....	PFA94DH-98
Yocto net Router D4 E-Wi HI 15÷36V 2DI 2DO.....	PFA94DH-16
Yocto Bridge D4 E-Wi HI 230-240V .....	PFA94DH-22
Yocto net Coordinator D4 E-Wi EDA 15÷36V 2DI 2DO	
.....	PFA94DA-06
Yocto net Router D4 E-Wi EDA 15÷36V 2DI 2DO.....	PFA94DA-16
Yocto Bridge D4 E-Wi EDA 230-240V .....	PFA94DA-22
Dual band stilo antenna SMA/M.....	PFC3530
External directional antenna.....	PFC3533
Cable extension 2,4GHz 1,0 M .....	PFC3568
Cable extension 2,4GHz 5,0 M .....	PFC3569
Deca Router E-Wi 5V.....	PFATU0H-0C
Yocto net upgrade Log 8 (PUK) *	PFSW940-01
Yocto net upgrade Web (PUK) *	PFSW940-05
Yocto net upgrade Web Open (PUK) *	PFSW940-10
Yocto net upgrade Mail Alarm (PUK) *	PFSW940-15
Yocto net upgrade Calendar (PUK) *	PFSW940-20
Yocto net upgrade Bundle Mail Alarm + Calendar (PUK)*	
.....	PFSW940-21
Yocto net upgrade Charts (PUK) *	PFSW940-30
Yocto net upgrade 4You (PUK) *	PFSW940-25
Yocto net upgrade New Features *	PFSW940-40
Power Cable Yocto net / X3M e Flash D6.....	PCAFL00-00
Switching Power Supply D1 24VDC 400mA.....	PCAFL00-00
Switching Power Supply 5VDC 600mA.....	PFTP000-R2

\* NOTE: more info on the functionalities on the activation of the "Yocto net upgrade" is available on the datasheet of the Yocto net.

Subject to modification without prior notice.  
 Data sheet Yocto net Coordinator, Router and Bridge E-Wi 2012 06 04-ENG

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