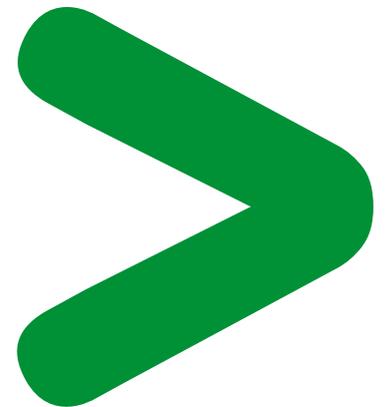
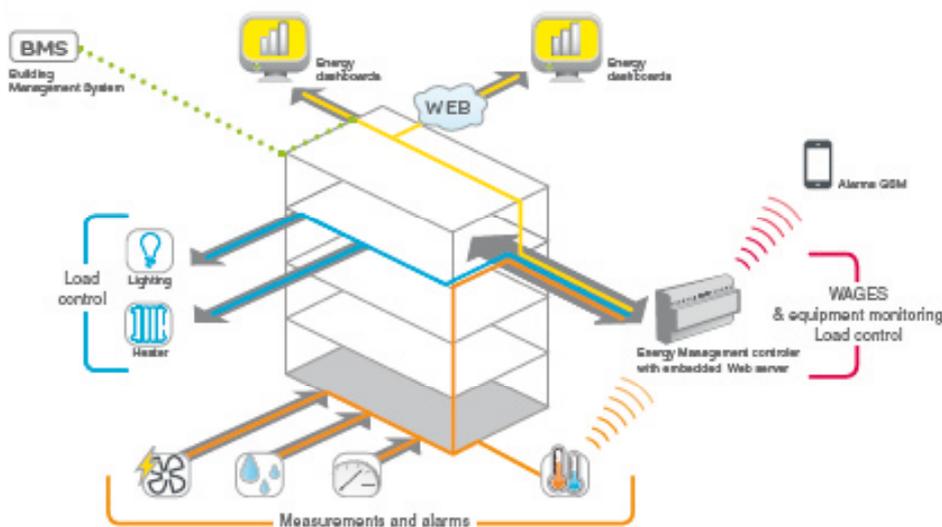


Simple energy management solution

"On site"

3^{ème} maquette
sous Indesign
du 08/09/2010

Installation guide
2010



Scope of application

This document is a compilation of the required procedures for overall start-up of the electrical equipment and monitoring system for the solution energy management on site (energy management data are stored locally on customer plant)

The recommended instructions are classified in chronological order of procedure and supplement the assembly or installation documents supplied with the equipment, and the specific installation guides for each product.

This guide is intended for

- The electrical contractor for the final electrical settings to be configured, specific to the solution implemented, and
- The integrator of the full or advanced solution for installation of the application. It also provides the complete list of checks to be performed before start-up.

Overview

The installation guide contains:

- **The first part:** reminder of typical configuration for on site energy management solution and which configuration possibilities you can have in this kind of architecture.
- **The second part:** implementation
 - Setting of different electrical equipment and monitoring devices
 - Setting of communication gateways
 - Wiring and installation recommendations
 - Setting for iRIO implementation on the solution
 - Setting of energy management functions through iRIO Web page.
- **The third part: maintenance**
 - "List of tests and checks" to be performed for application validation
 - Procedure to update IRIO software.

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Typical configuration for on site solutions

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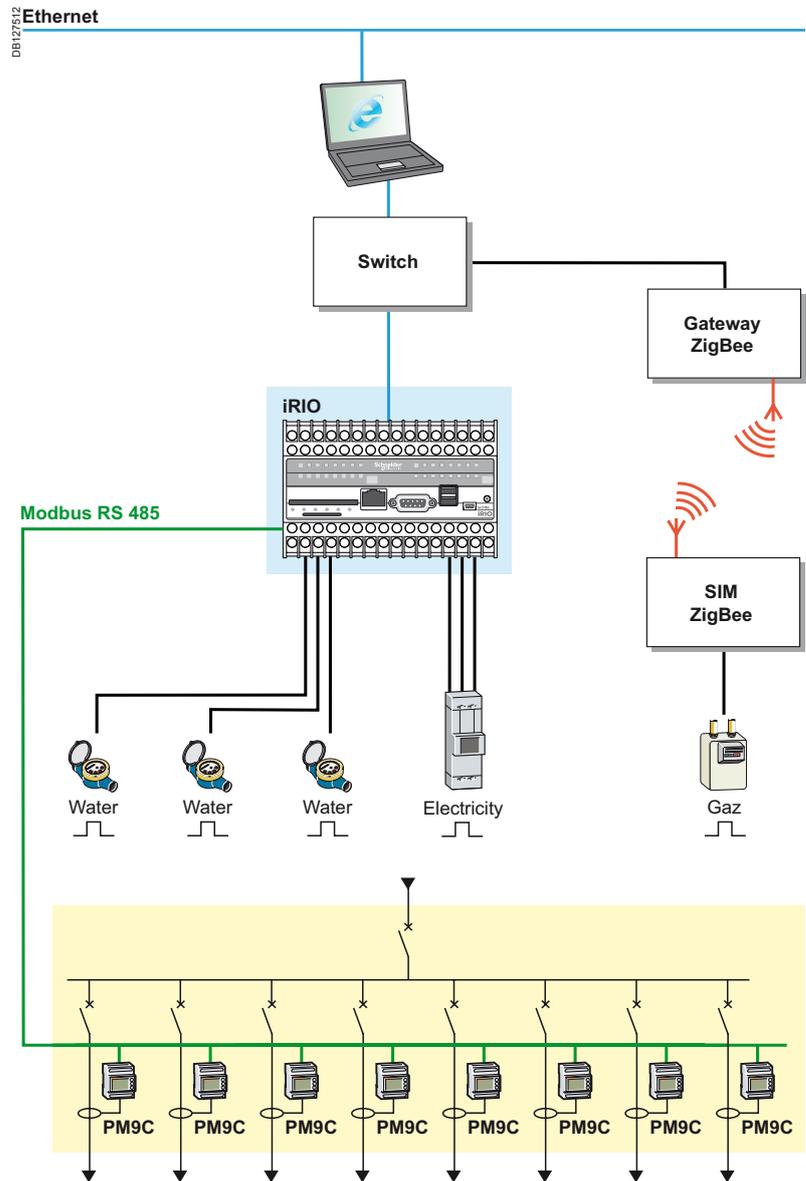
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Into our typical site configuration, you can have one main site where you have the iRIO RTU and in some cases other sites connected on the same Ethernet IP network. For this last configuration you can add Gateway Ethernet EGX100 to collect all information on a separate building.

Example of single site architecture

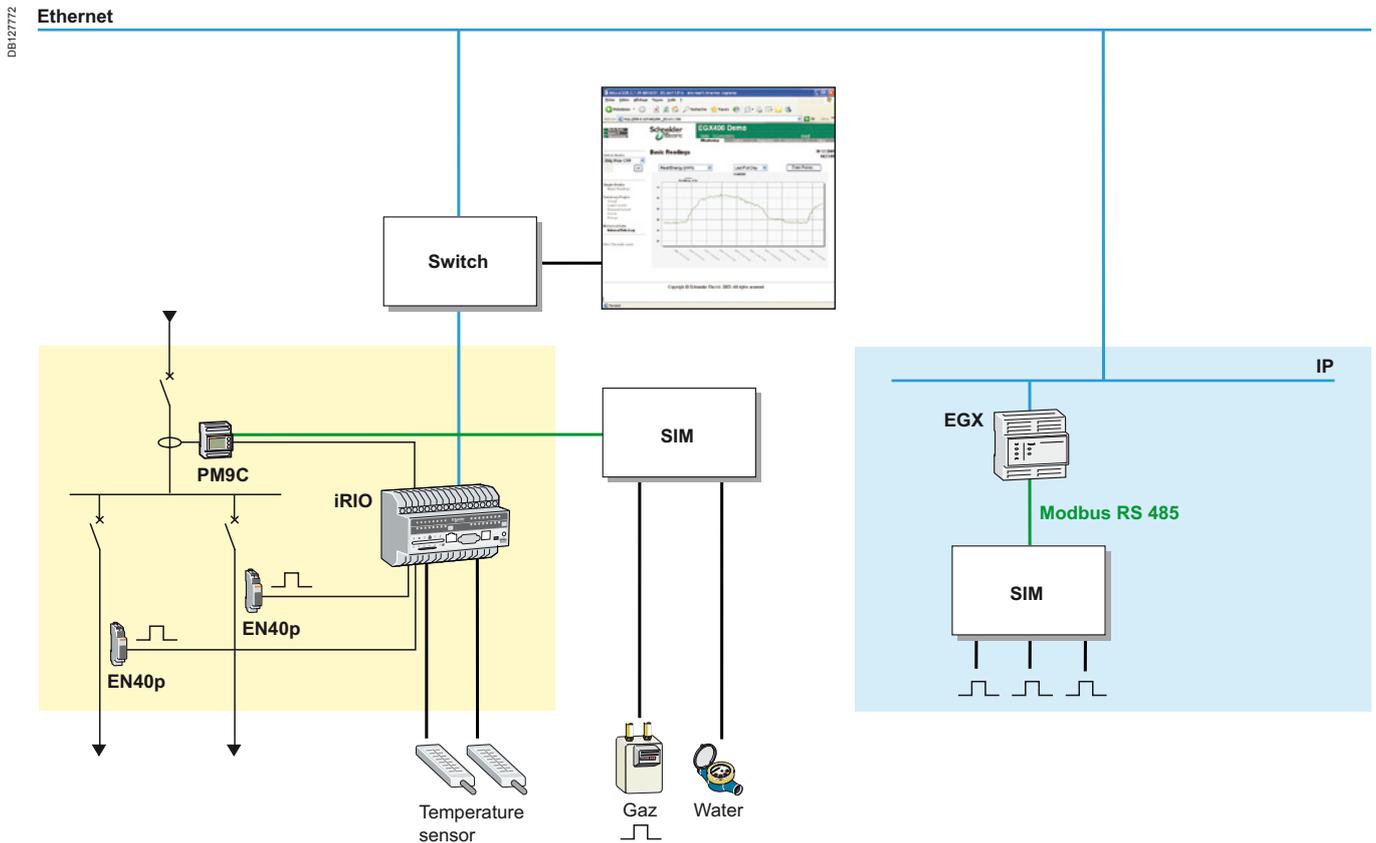


We can collect information from different ways:

- pulse signal
- analog signal
- Modbus connection RS 485
- M-Bus network by a gateway connected to iRIO PLC
- wireless ZigBee by the way of a gateway IP/ZigBee
- control load by logic output.

Note: information can be sent from iRIO by GSM data, Ethernet TCP-IP Modbus connections.

Example of single site architecture



We can collect information from different ways:

- pulse signal
- analog signal
- Modbus connection RS 485
- M-Bus network by a gateway connected to iRIO PLC.
- GSM connection
- wireless ZigBee by the way of a gateway IP/ZigBee
- control load by logic output
- Ethernet IP by a gateway EGX100.

Note: information can be sent from iRIO by GSM data, Ethernet TCP-IP Modbus connections. EGX100 can be used to collect information from Power meters or other meters which are situated in different building and also very far from the iRIO RTU in case of large sites.

Setting electrical equipments and monitoring devices



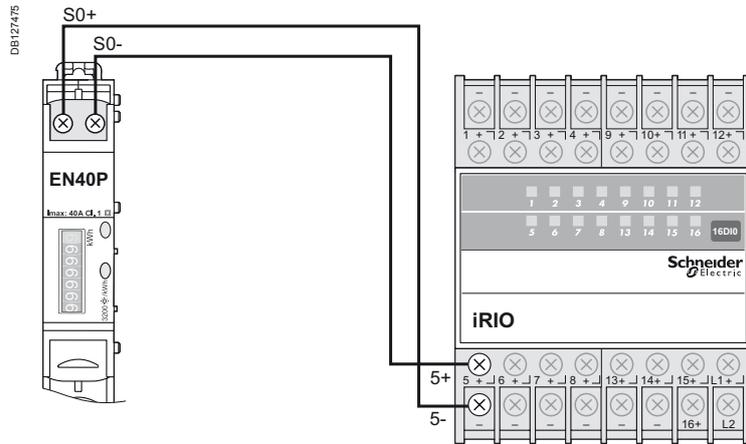
EN40P.

Main product features

- 40 A single phase kilowatt-hour meter.
- Remote transfer of metering impulses (static output).
- Fix configuration pulse width: 100 impulses of 120 ms per kWh.
- Total active power consumption displayed (7 significant digits in kWh).

Note: for power connection link and more technical details about EN40P please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

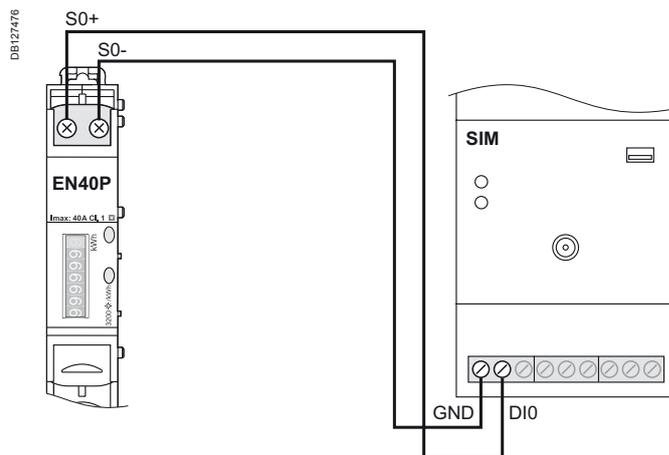
Electrical wiring to iRIO logic input 5 (diagram for card 12 inputs and 4 outputs: 16 DI0)



EN40P front face:
S0+ and S0- pulse output for remote transfer.

iRIO terminal blocks for I/O wiring:
5+ and 5- used here for connection to S0- and S0+ of a EN40P.
Connection can be done with any free couple of input X+, X- (from 5 to 16 DI0 card).

Electrical wiring to Smart Interface Module (SIM) logic input DI0



EN40P front face:
S0+ and S0- pulse output for remote transfer.

SIM logic input DI0.

Setting electrical equipments and monitoring devices

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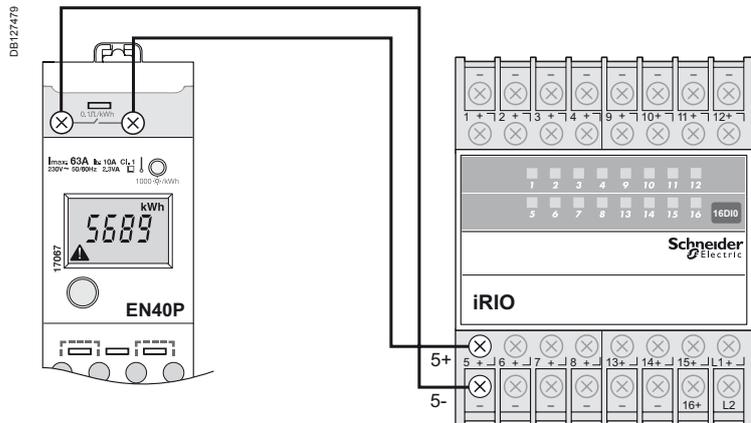
ME1zr.

Main product features

- 63 A single phase kilowatt-hour meter with partial meter.
- Remote transfer of metering impulses (relay output).
- Fix configuration Pulse width: 1 impulse of 200 ms per 10 kWh.
- Total active power consumption displayed (5 significant digits in kWh or MWh. No decimal point in kWh; 2 digits after the decimal point in MWh).

Note: for power connection link and more technical details about ME1zr please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

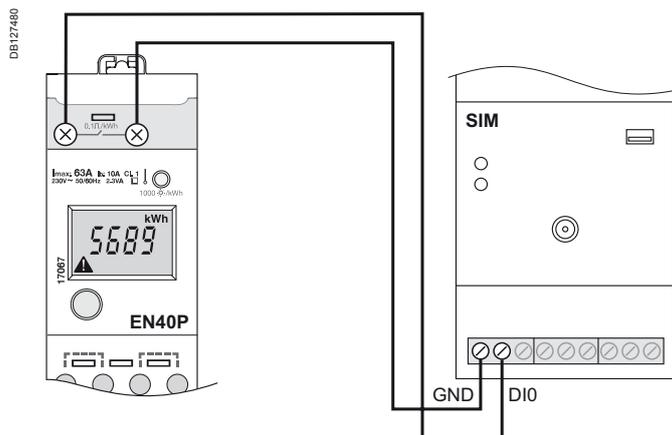
Electrical wiring to iRIO logic input 5 (diagram for card 12 inputs and 4 outputs: 16 DI0)



ME1zr front face: pulse output for remote transfer.

iRIO terminal blocks for I/O wiring: 5+ and 5- input used here for connection of a ME1zr. Connection can be done with any free couple of input X+, X- (from 5 to 16 DI0 card).

Electrical wiring to Smart Interface Module (SIM) logic input DI0



ME1zr front face: pulse output for remote transfer.

SIM logic input DI0.

Note: for more information on instructions of functions on the ME1zr screen consult document ref. [GHE40035AA-01/1](#).

Setting electrical equipments and monitoring devices

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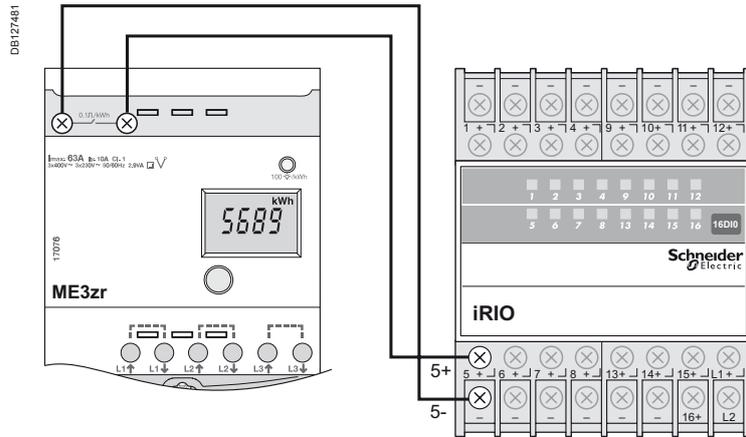
ME3zr.

Main product features

- 63 A three phase kilowatt-hour meter without neutral with partial meter.
- Remote transfer of metering impulses (relay output).
- Fix configuration pulse width: 1 impulse of 200 ms per 10 kWh.
- Total active power consumption displayed (5 significant digits in kWh or MWh. No decimal point in kWh; 2 digits after the decimal point in MWh).

Note: for power connection link and more technical details about ME3zr please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

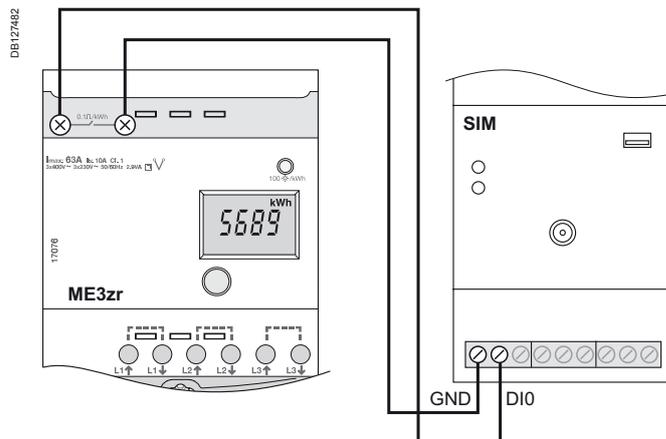
Electrical wiring to iRIO logic input 5 (diagram for card 12 inputs and 4 outputs: 16 DI0)



ME3zr front face: pulse output for remote transfer.

iRIO terminal blocks for I/O wiring: 5+ and 5- input used here for connection of a ME3zr. Connection can be done with any free couple of input X+, X- (from 5 to 16 DI0 card).

Electrical wiring to Smart Interface Module (SIM) logic Input DI0



ME3zr front face: pulse output for remote transfer.

SIM logic input DI0.

Note: for more information on instructions of functions on the ME3zr screen consult document ref. [GHE40037AA](#).

Setting electrical equipments and monitoring devices

PB103462_SE_35



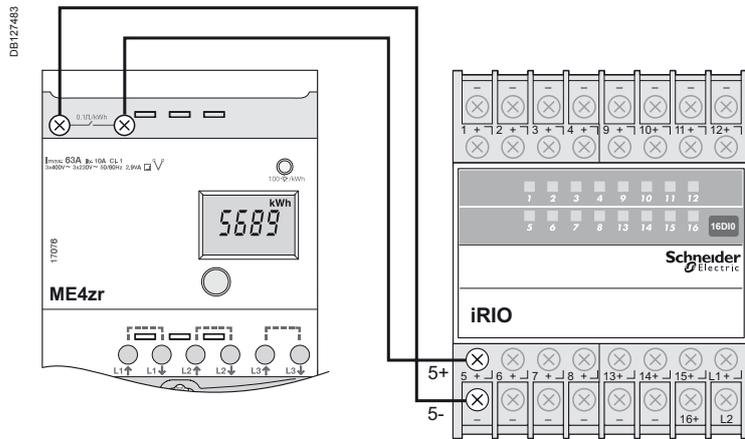
ME4zr.

Main product features

- 63 A three phase + neutral kilowatt-hour meter with partial meter.
- Remote transfer of metering impulses (relay output).
- Fix configuration pulse width: 1 impulse of 200 ms per 10 kWh.
- Total active power consumption displayed (5 significant digits in kWh or MWh. No decimal point in kWh; 2 digits after the decimal point in MWh).

Note: for power connection link and more technical details about ME4zr please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

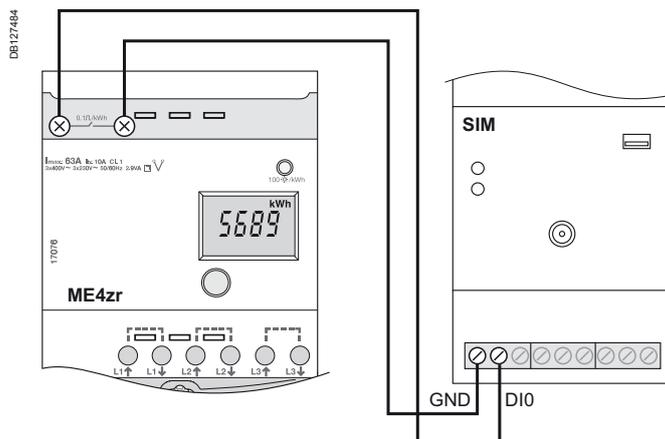
Electrical wiring to iRIO logic input 5 (diagram for card 12 inputs and 4 outputs: 16 DI0)



ME4zr front face: pulse output for remote transfer.

iRIO terminal blocks for I/O wiring: 5+ and 5- input used here for connection of a ME4zr. Connection can be done with any free couple of input X+, X- (from 5 to 16 DI0 card).

Electrical wiring to Smart Interface Module (SIM) logic input DI0



ME4zr front face: pulse output for remote transfer.

SIM logic input DI0.

Note: for more information on instructions of functions on the ME4zr screen consult document ref. [GHE40038AA-01/1](#).

Setting electrical equipments and monitoring devices

PB100646_40



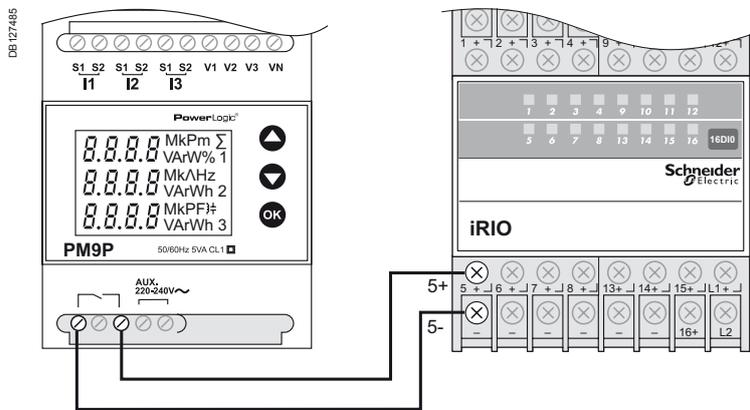
PM9P.

Main product features

- The PM9P is an electrical measuring and metering unit for LV 1P+N, 3P, 3P+N networks. Energy counter total and partial in kWh.
- Remote transfer of metering impulses.
- Adjustable pulse: 0.1 or 1 or 10 or 100 kWh / pulse and 50 or 100 or 200 or 300 ms per pulse.
- Metering functions: instantaneous values (U, V, I, IN, F, PF, total P – in W, var, VA– and P per phase - in W, var).

Note: for power connection link and more technical details about PM9P, please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

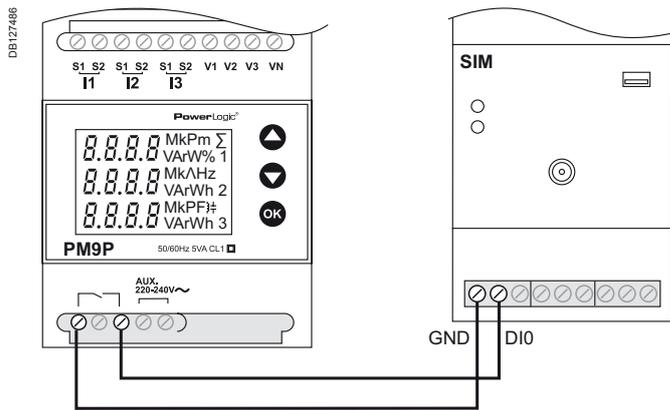
Electrical wiring to iRIO logic input 5 (diagram for card 12 inputs and 4 outputs: 16 DI0)



PM9P front face: pulse output for remote transfer.

iRIO terminal blocks for I/O wiring: 5+ and 5- input used here for connection of a PM9P. Connection can be done with any free couple of input X+, X- (from 5 to 16 DI0 card).

Electrical wiring to Smart Interface Module (SIM) logic input DI0



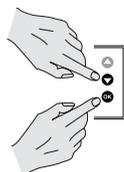
PM9P front face: pulse output for remote transfer.

SIM logic input DI0.

Screen set up of PM9P

1. To enter into settings menu press simultaneously "down arrow" and "OK":
2. Enter pass code: 0010
3. Pulse settings are available into menu: PULS ENER (energy unit selection), PULS UAL (number of kWh per pulse) and PULS dUr (pulse duration).

Note: for more information on instructions of functions on the PM9P screen [consult document ref. GHE12246AC](#).



Setting electrical equipments and monitoring devices

FB100646-40



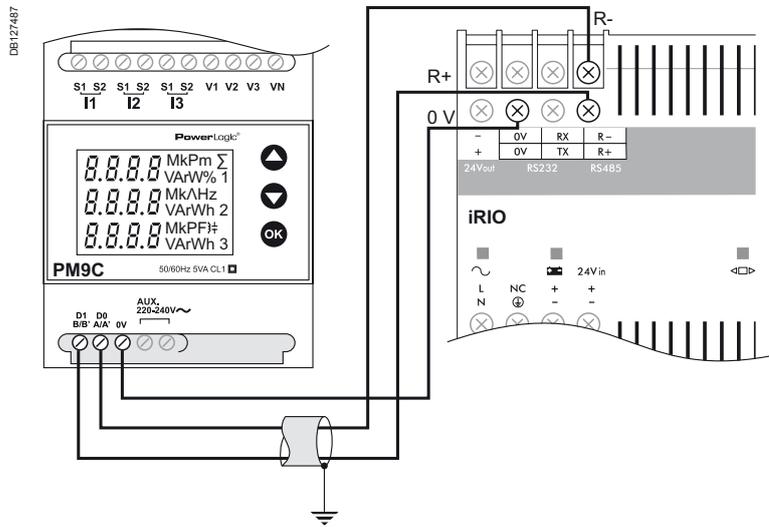
PM9C.

Main product features

- The PM9C is an electrical measuring and metering unit for LV 1P+N, 3P, 3P+N networks. Energy counter total and partial in kWh.
- Remote transfer of metering impulses by RS 485 Modbus communication (3-wire connection).
- Adjustable pulse: 0.1 or 1 or 10 or 100 kWh / pulse and 50 or 100 or 200 or 300 ms per pulse.
- Metering functions: instantaneous values (U, V, I, IN, F, PF, total P – in W, var, VA– and P per phase – in W, var).

Note: for power connection link and more technical details about PM9C please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

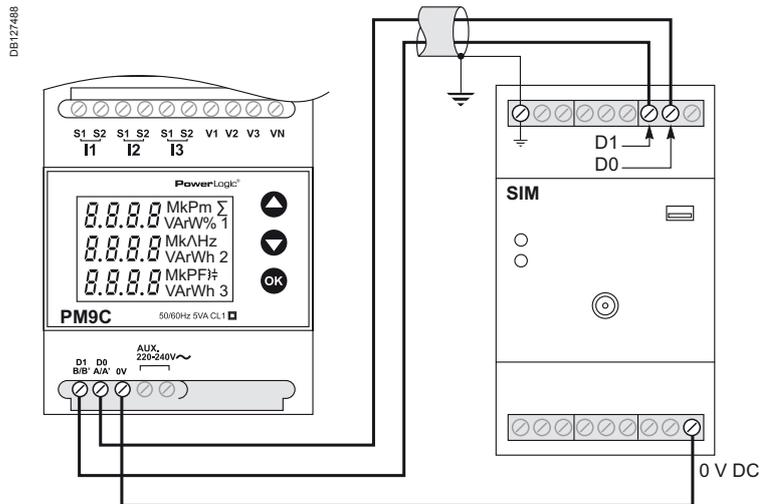
Modbus communication wiring to iRIO RS 485 port



PM9C front face:
D1 D0 pulse output for RS 485 link and 0 V connection.

iRIO RS 485 port and 0 V connection.

Modbus communication wiring to SIM10Z RS 485 port



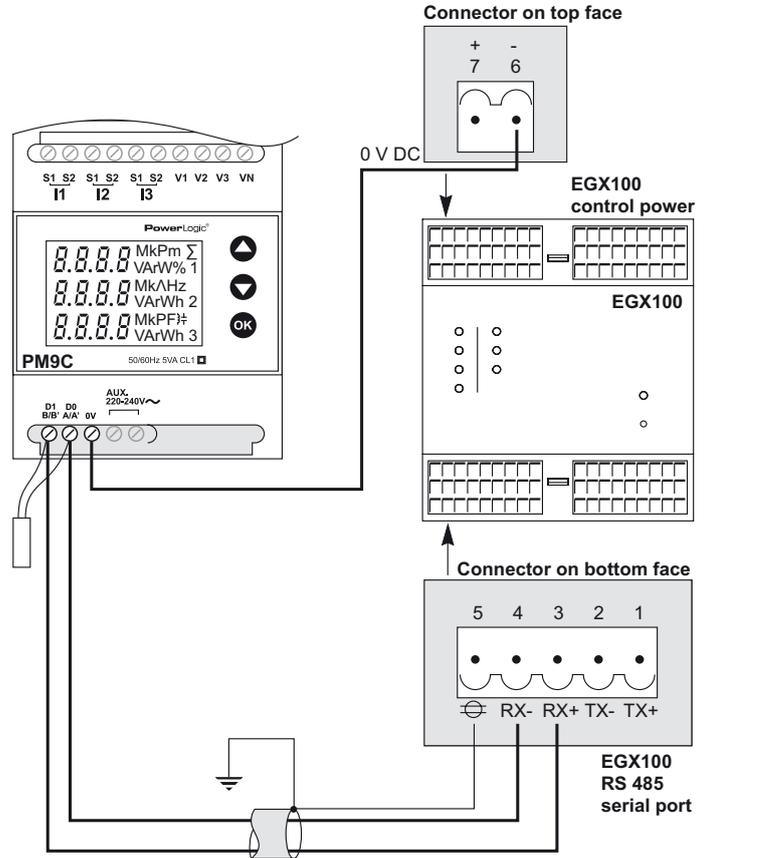
PM9C front face:
D1, D0 pulse output for RS 485 link and 0 V connection.

SIM RS 485 port and 0 V connection.

Note: for more information on instructions of functions on the PM9C screen [consult document ref. GHE12248AC](#).

Modbus communication wiring to EGX100 RS 485 port

DB1127489



PM9C front face:
D1, D0 pulse output for RS 485 link and 0 V connection.

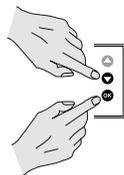
EGX100 RS 485 serial port.

EGX control power.

Note: at the end of your Modbus network put a line terminator on the network signals (resistance 120 Ω to 150 Ω).

For multiple Modbus product connection please see section "Wiring and installation guide -page 60" and for EMC wiring rules see section "Wiring and installation guide -page 60" of this guide.

Screen set up of PM9C



1. To enter into settings menu press simultaneously "down arrow" and "OK":
2. Enter Pass Code: 0010
3. For Modbus parameters: go to menu Addr (address), bAUd (baudrate) and PAR (parity).

Note: for more information on instructions of functions on the PM9P screen [consult document ref. GHE12248AC](#).

Setting electrical equipments and monitoring devices

PE60217



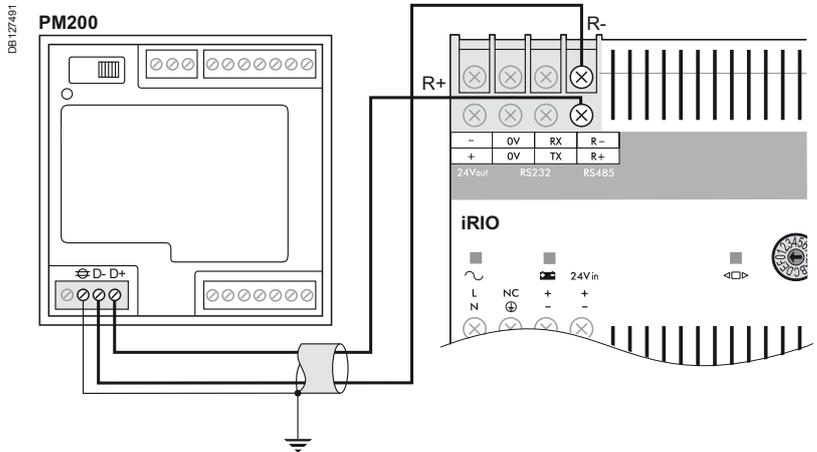
PM210.

Main product features

- The PM200 series power meter is an easy-to-use, cost effective meters that offer basic measurement capabilities required to monitor an electrical installation.
- Remote transfer of metering values by RS 485 Modbus communication (use PM210 product for Modbus network: 2-wire connection)
- Metering information:
 - instantaneous rms values: current per phase, voltage Ph-Ph or Ph-N, frequency, active-reactive-apparent power and power factor
 - energy values: active, reactive and apparent energy
 - demand values: current value and active-reactive-apparent power (present and max. values).

Note: for power connection link and more technical details about PM200 please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

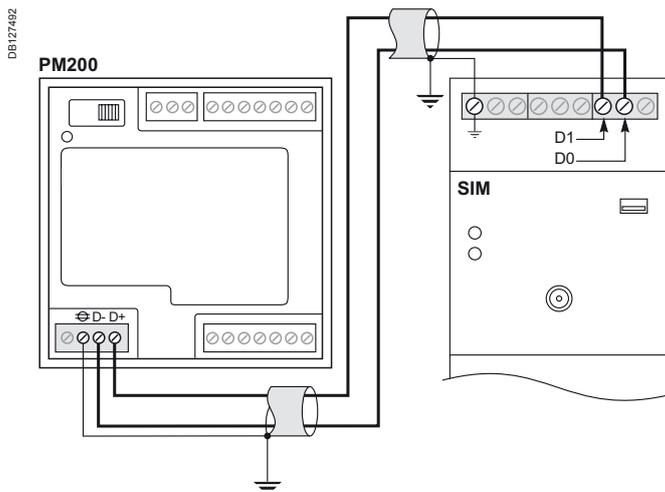
Modbus communication wiring to iRIO RS 485 port



PM210 rear face:
pulse output for RS 485 link.

iRIO RS 485 port.

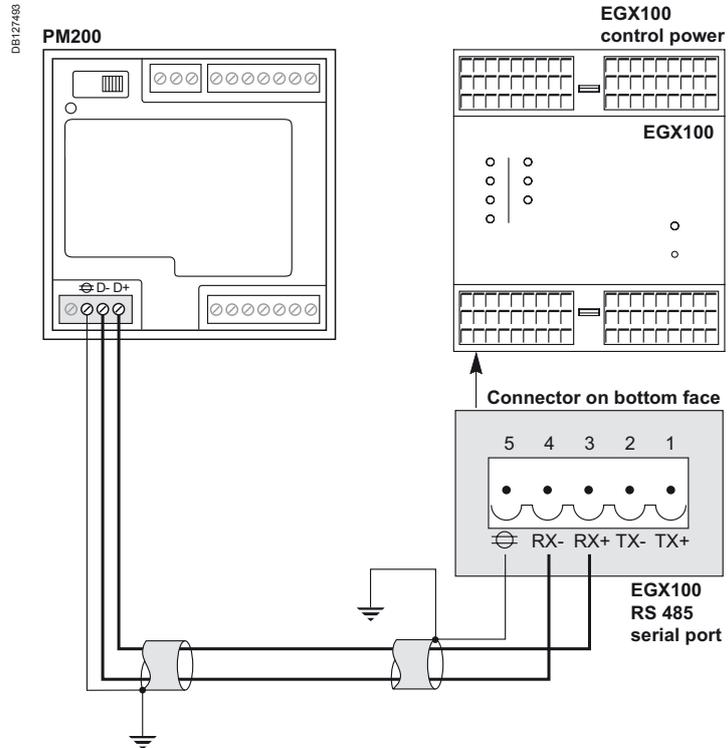
Modbus communication wiring to SIM RS 485 port



PM210 rear face:
pulse output for RS 485 link.

SIM RS 485 port.

Modbus communication wiring to EGX100 RS 485 port



PM210 rear face:
pulse output for RS 485 link.

EGX RS 485 port.

Note: at the end of your Modbus network put a line terminator on the network signals (resistance 120 Ω to 150 Ω).

For multiple Modbus product connection please see section "Wiring and installation guide - page 60" and for EMC wiring rules see section "Wiring and installation guide - page 61" of this guide.

Screen set up of PM210

1. From Home menu, press "...▶", "DIAGN", "SETUP"
2. Enter Pass Code: 0000
3. Press "COM": inside you can set up Baud rate, address and parity.

Note: for more information on instructions of functions on the PM200 screen [consult document ref. 63230-510-205](#).

Setting electrical equipments and monitoring devices

PE86157



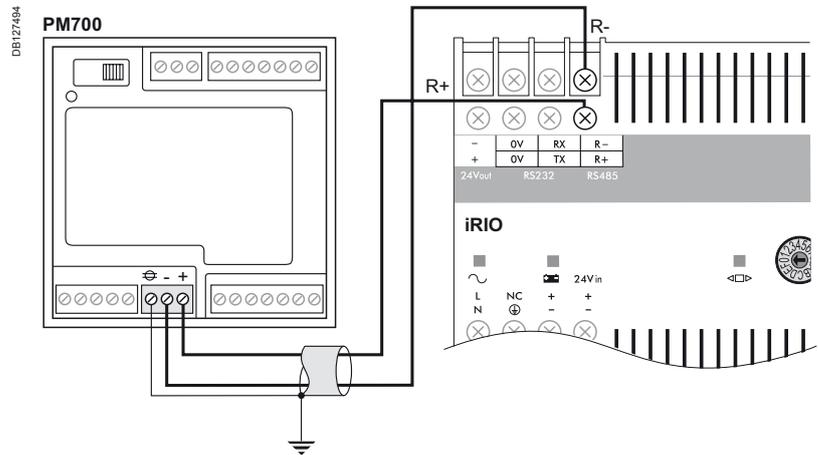
PM700 Series.

Main product features

- The PM700 series meters offer all measurement capabilities required to monitor an electrical installation.
- Remote transfer of metering values by RS 485 Modbus communication (use PM710 and PM750 product for Modbus network: 2-wire connection).
- Metering information:
 - instantaneous rms values: current total or phases and neutral, voltage total or Ph-Ph or Ph-N, frequency, active-reactive-apparent power total or per phase. Last information available is total power factor.
 - energy values: active, reactive and apparent energy
 - power quality measurement: harmonics distortion (current and voltage)
 - demand values: current value and active-reactive-apparent power (present and max. values).

Note: for power connection link and more technical details about PM700 please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

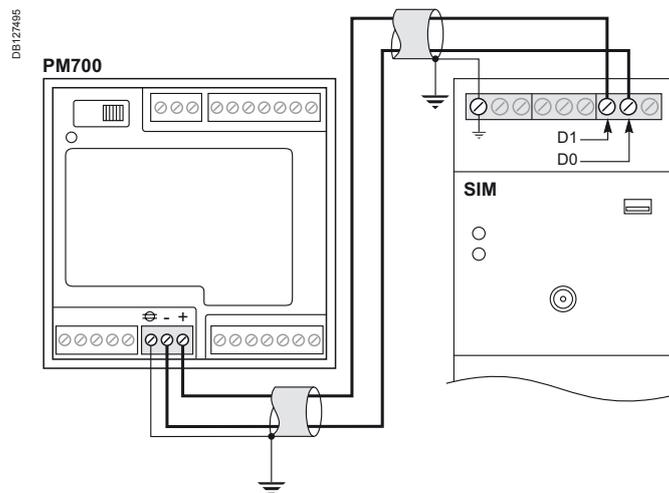
Modbus communication wiring to iRIO RS 485 port



PM710 or 750 rear face:
pulse output for RS 485 link.

iRIO RS 485 port.

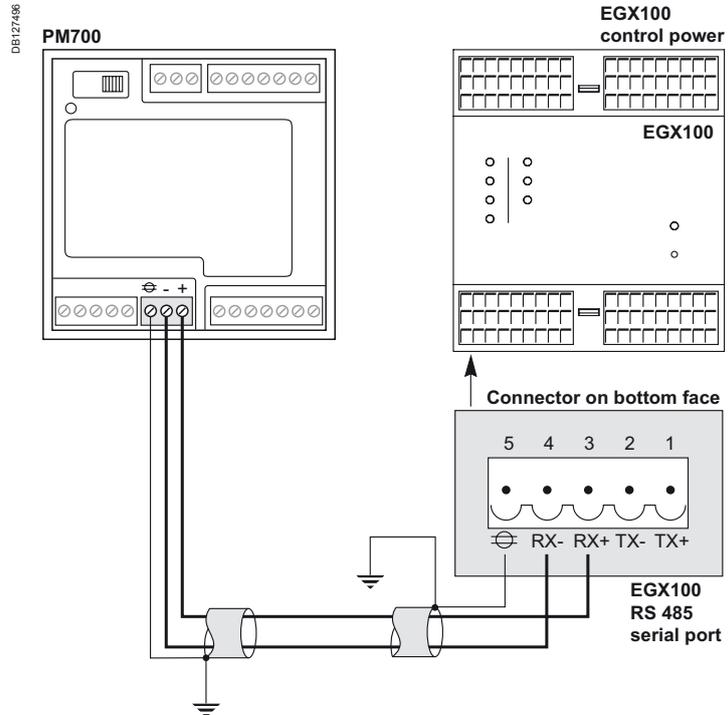
Modbus communication wiring to SIM RS 485 port



PM710 or 750 rear face:
pulse output for RS 485 link.

SIM RS 485 port.

Modbus communication wiring to EGX100 RS 485 port



PM710 or 750 rear face:
pulse output for RS 485 link.

EGX RS 485 port.

Note: at the end of your Modbus network put a line terminator on the network signals (resistance 120 Ω to 150 Ω).

For multiple Modbus product connection please see section "Wiring and installation guide - page 60" and for EMC wiring rules see section "Wiring and installation guide - page 60" of this guide.

Screen set up of PM700

1. From Home menu, press "...▶", "SETUP"
2. Enter Pass Code: 0000
3. Press "...▶" until "COM" is visible: inside you can set up Baud rate, address and parity and which kind of Network (Set MB RTU).

Note: for more information on instructions of functions on the PM700 screen [consult document ref. 63230-501-209A1](#).

Setting electrical equipments and monitoring devices

PE86159-54



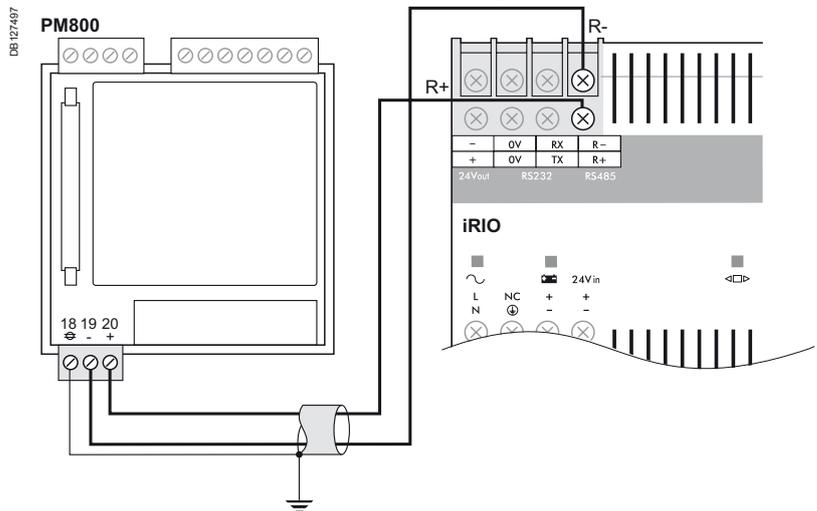
PM800 Series.

Main product features

- The PM800 series meters offer all measurement capabilities required to monitor an electrical installation.
- Remote transfer of metering values by RS 485 Modbus communication network (2-wire connection).
- Metering information:
 - instantaneous rms values: current, voltage, frequency, active-reactive-apparent power total or per phase. Also you have power factor total and per phase
 - energy values: active, reactive, apparent energy and configurable accumulation mode
 - power quality measurement: harmonics distortion and individual harmonics (current and voltage)
 - demand values: current value and active-reactive-apparent power (present and max. values). Also you have predicted active-reactive-apparent power
 - optional modules: Ethernet card (PM8ECC) and Inputs/Outputs card (PM8M26).

Note: for power connection link and more technical details about PM800 please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

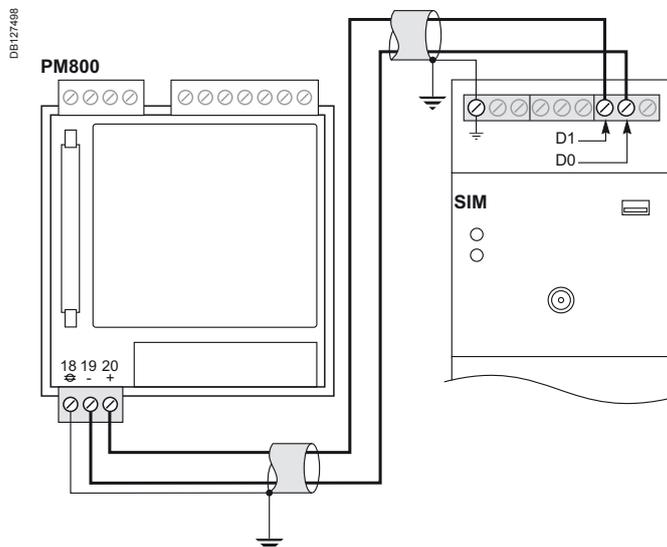
Modbus communication wiring to iRIO RS 485 port



PM800 rear face:
pulse output for RS 485 link.

iRIO RS 485 port.

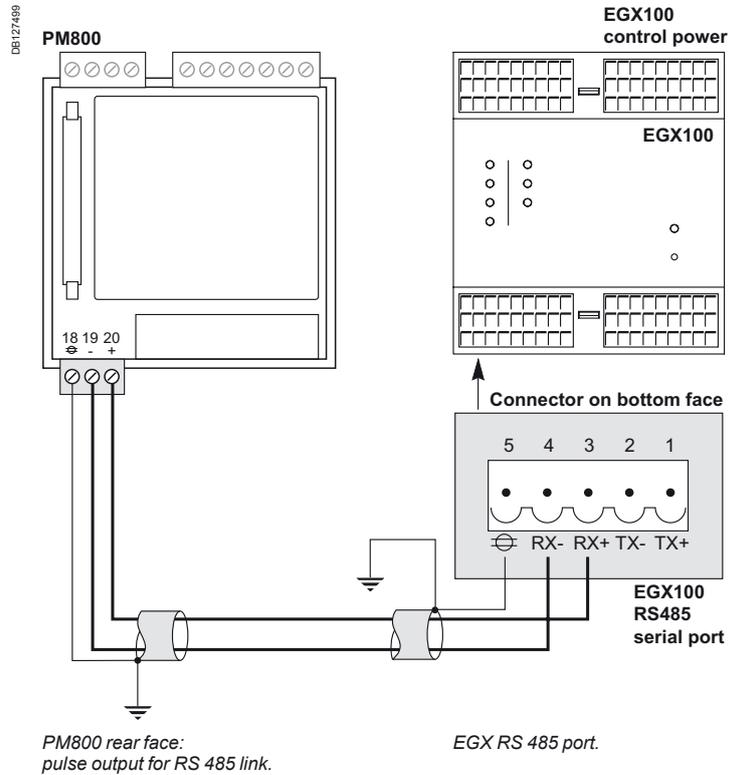
Modbus communication wiring to SIM RS 485 port



PM800 rear face:
pulse output for RS 485 link.

SIM RS 485 port.

Modbus communication wiring to EGX100 RS 485 port



Note: at the end of your Modbus network put a line terminator on the network signals (resistance 120 Ω to 150 Ω).
For multiple Modbus product connection please see section "Wiring and installation guide - page 60" and for EMC wiring rules see section "Wiring and installation guide - page 60" of this guide.

Screen set up of PM800

1. From Home menu, press "...▶", "MAINT"
2. Enter Pass Code: 0000
3. Press "...▶" until "COM" is visible: inside you can set up Baud rate, address and parity and which kind of Network (Set MB RTU).

Note: for more information on instructions of functions on the PM800 screen [consult document ref. 63230-500-225A1](#).

Setting electrical equipments and monitoring devices

PE66260_53

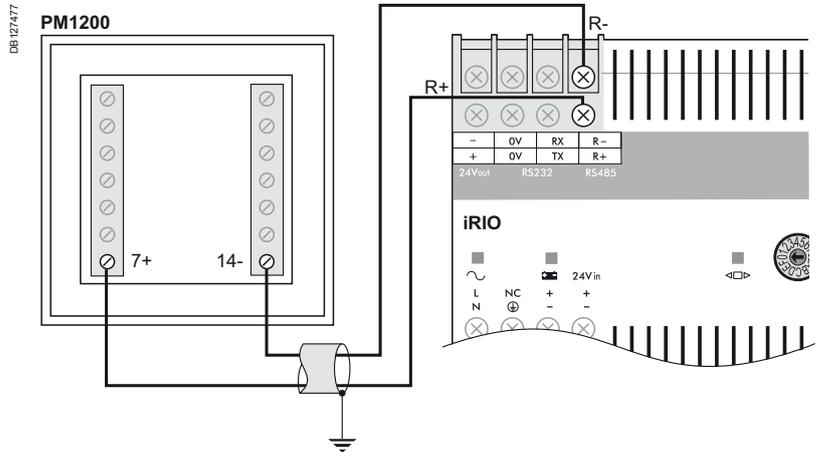


PM1000 Series.

Main product features

- The PM1000 series power meters are easy-to-use, cost effective meters that offer basic measurement capabilities required to monitor an electrical installation.
 - Remote transfer of metering values by RS 485 Modbus communication (here we use PM1200 product for Modbus network: 2-wire connection).
 - Metering information:
 - instantaneous rms values: current, voltage, frequency, active-apparent power, power factor, phase angle, unbalance and RPM.
 - energy values: active, reactive and apparent energy
 - power quality measurement: total harmonics distortion
 - demand values: current value and active-apparent power (present and max. values)
 - optional modules: Ethernet card (PM8ECC) and inputs/outputs card (PM8M26).
- Note:** for power connection link and more technical details about PM700 please consult document ref. [PLSED309005EN PowerLogic catalogue 2010](#).

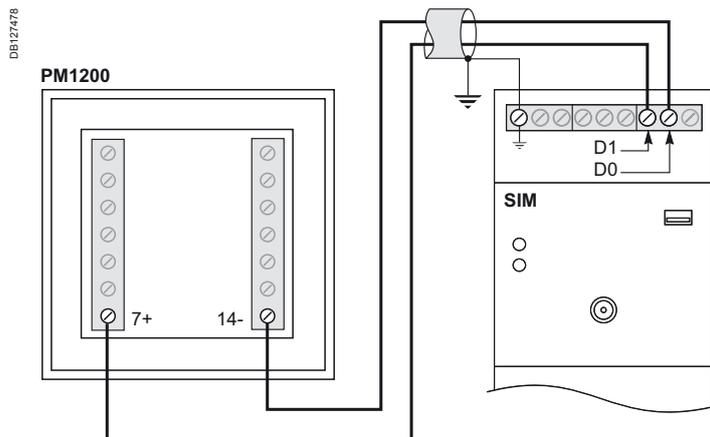
Modbus communication wiring to iRIO RS 485 port



PM1200 rear face:
7+ and 14- pulse output for RS 485 link.

iRIO RS 485 port.

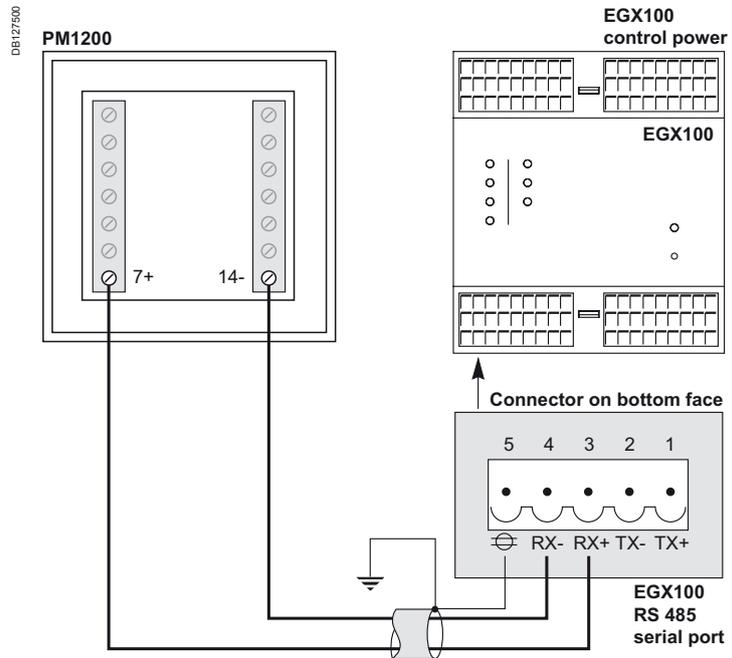
Modbus communication wiring to SIM RS 485 port



PM1200 rear face:
7+ and 14- pulse output for RS 485 link.

SIM RS 485 port.

Modbus communication wiring to EGX100 RS 485 port



PM1200 rear face:
7+ and 14- pulse output for RS 485 link

EGX RS 485 port.

Note: at the end of your Modbus network put a line terminator on the network signals (resistance 120 Ω to 150 Ω).

For multiple Modbus product connection please see section "Wiring and installation guide - page 60" and for EMC wiring rules see section "Wiring and installation guide - page 60" of this guide.

Screen set up of PM1200

By default PM1200 has:

- parity: even
- address: 1
- baud rate: 9600 bauds.

Circuit breakers

Compact NSX

Setting electrical equipments and monitoring devices

PB103287



Compact NSX400/630.

PB103798_40



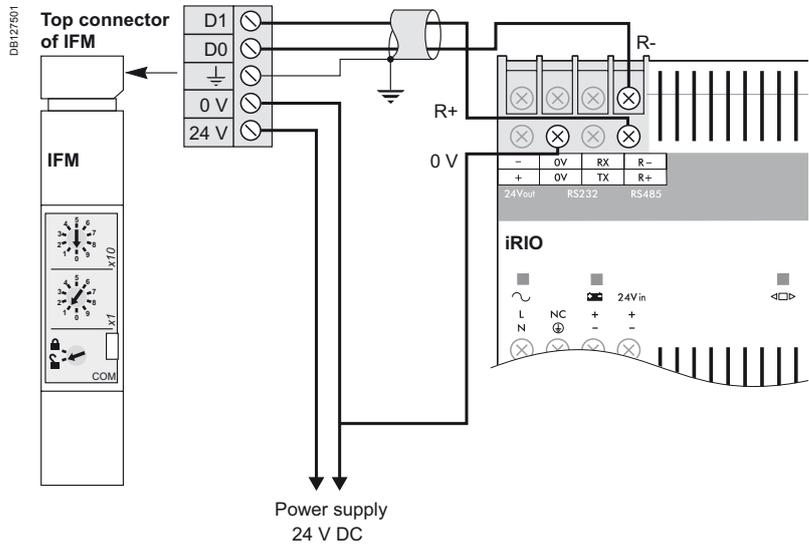
Modbus interface module (IFM).

Main product features

- The Compact NSX is circuit breaker 100 to 630 amps.
- Remote transfer of metering values (for NSX-A and NSX-E) and control (only for NSX-E version) by RS 485 Modbus communication (2 wires for communication and 2 wires for power supply: 24 V DC).
- Metering information:
 - instantaneous values: Current, voltage, frequency, power factor values, active-reactive-apparent powers
 - energy values: Active-reactive-apparent values
 - power quality values: Total Harmonic distortion (THD)
 - demand values: current, active-reactive-apparent values.

Note: for power connection link and more technical details about Compact please consult document ref. [LVPED208001EN](#).

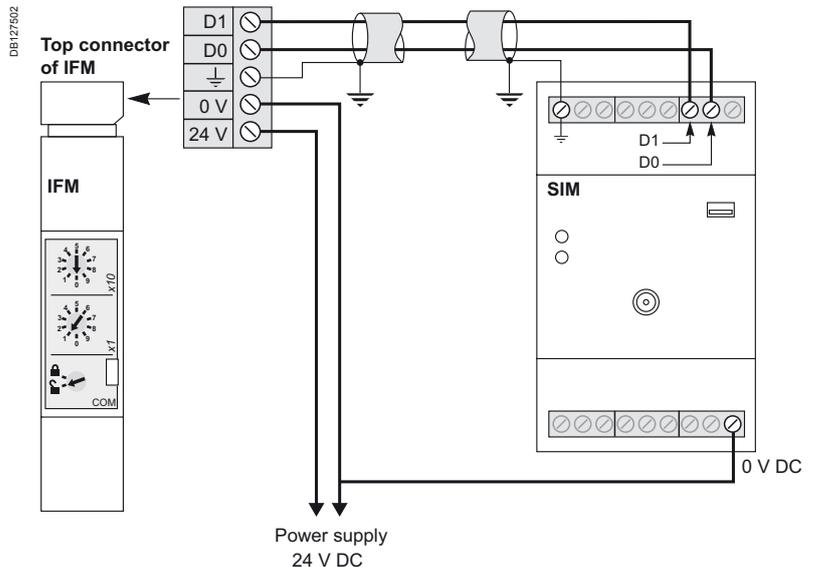
Modbus communication wiring to iRIO RS 485 port



Compact NSX :
top of Modbus interface module (IFM).

iRIO RS 485 port.

Modbus communication wiring to SIM RS 485 port

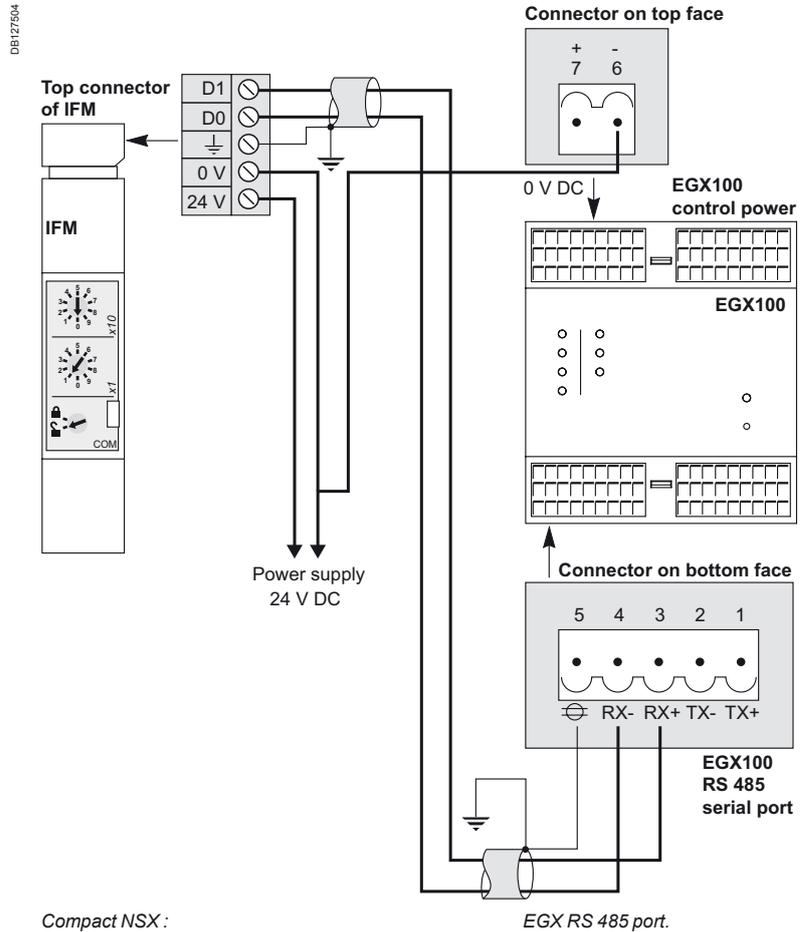


Compact NSX :
top of Modbus interface module (IFM).

SIM RS 485 port.

Setting electrical equipments and monitoring devices

Modbus communication wiring to EGX100 RS 485 port

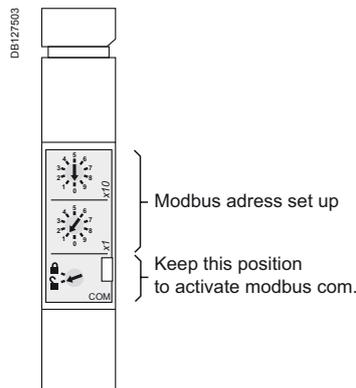


Note: at the end of your Modbus network put a line terminator on the network signals (resistance 120 Ω to 150 Ω).

For multiple Modbus product connection please see section "Wiring and installation guide - page 60" and for EMC wiring rules see section "Wiring and installation guide - page 60" of this guide.

Communication set up of Compact NSX

In front of the BCM module you can set up Modbus address of NSX (for baud rate and parity, these parameters are automatic):



Note: for more information about Modbus communication for Compact NSX consult document ref. LVP38EN.

Circuit breakers

Masterpact

Setting electrical equipments and monitoring devices

PB104378A48



Masterpact NT.

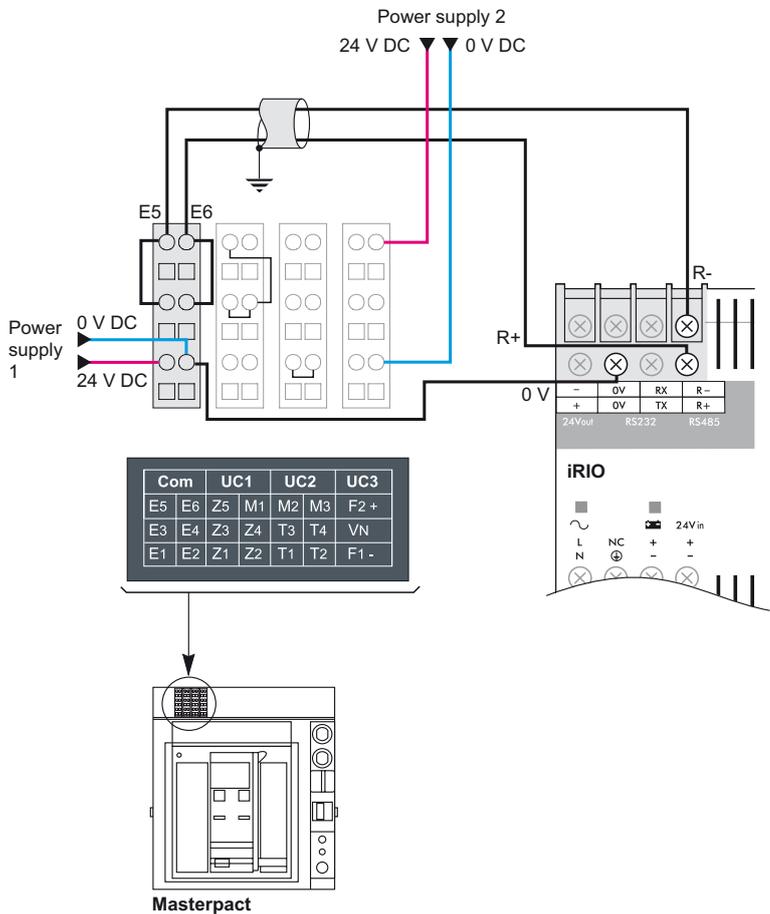
Main product features

- The Masterpact is circuit breaker 800 to 6300 amps.
- Remote transfer of metering values by module with RS 485 Modbus communication (we will keep 2 wires for communication configuration and 2 wires for power supply: 24 V DC).
- Metering information (Micrologic P and H version):
 - instantaneous values: current, voltage, frequency, power factor values, active-reactive-apparent powers
 - energy values: active-reactive-apparent values
 - power quality values: total harmonic distortion (THD) only available for Micrologic H
 - demand values: current, active-reactive-apparent values.

Note: for power connection link and more technical details about Masterpact please consult document ref. [LVPED208008EN](#).

Modbus communication wiring to iRIO RS 485 port

DB 127505

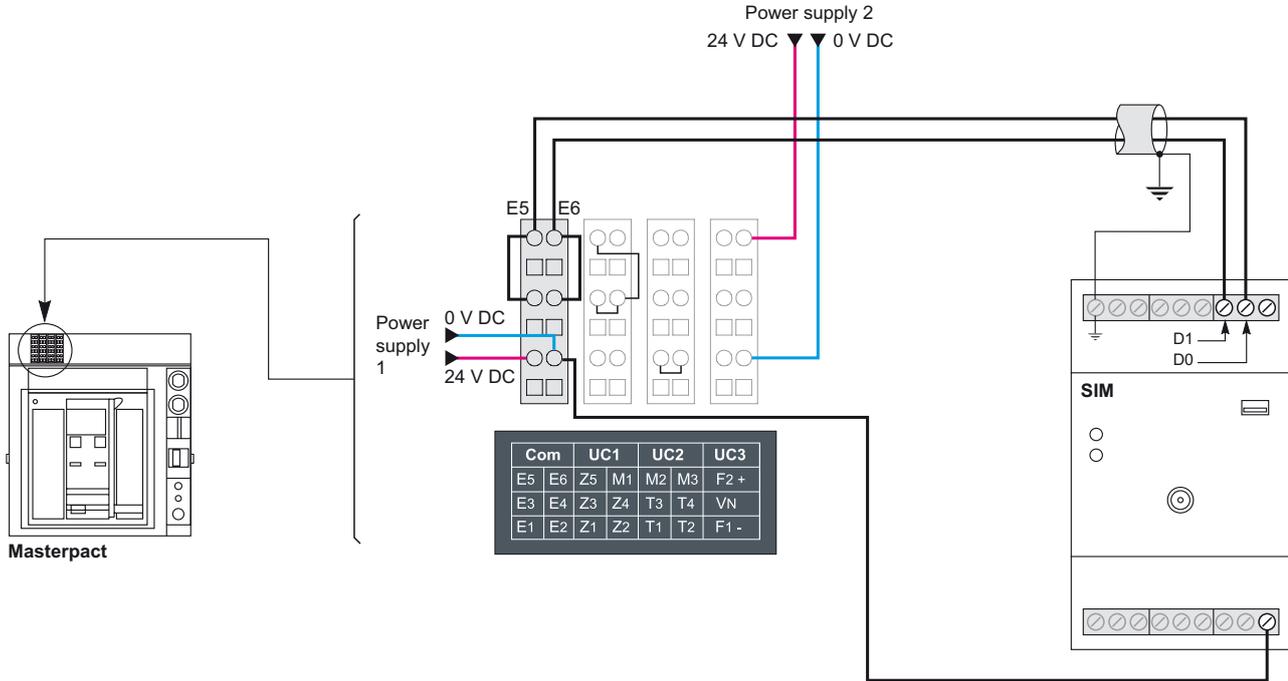


Circuit breakers Masterpact

Setting electrical equipments
and monitoring devices

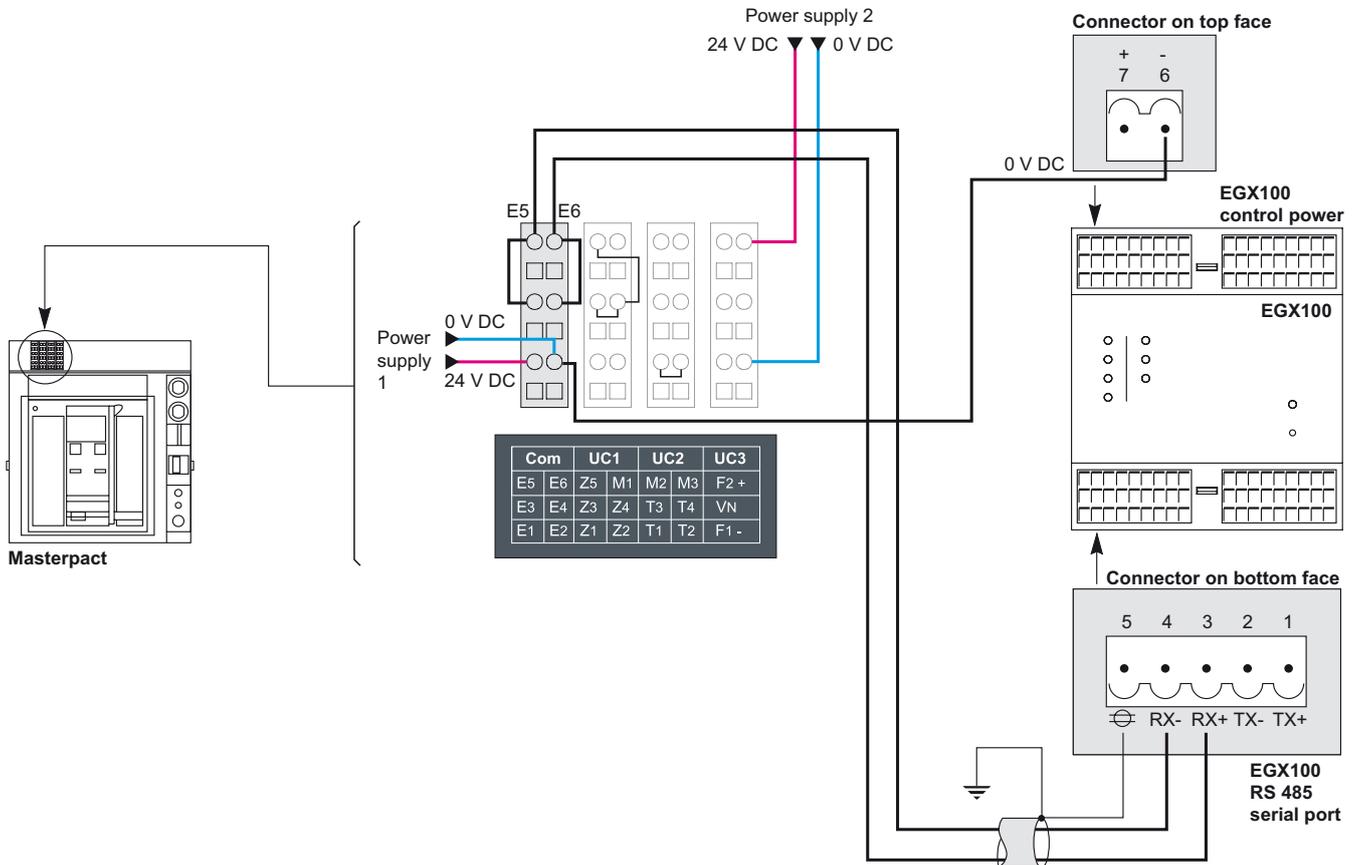
Modbus communication wiring to SIM RS 485 port

DB127508



Modbus communication wiring to EGX100 RS 485 port

DB127509



Note: for multiple Modbus product connection please see section "Wiring and installation guide - page 60" and for EMC wiring rules see section "Wiring and installation guide - page 60" of this guide.

Circuit breakers

Masterpact

Communication set up of Masterpact Micrologic P and H

All Modbus parameters have to be configured by the screen in front of Masterpact:

1. Press " " to access configuration menu.
2. Select "Configure com" then "Parameter com." to display the "Modbus Com" screen.
3. Press the " " and " " keys to select the address setting then the " " key to confirm.
4. Press the " " and " " keys to define the address the " " key to confirm.
5. Go back to step "c" to set the baud rate, then the parity.

Note: for more information about Modbus communication for Masterpact [please consult document ref. LVP38EN](#).

Setting electrical equipments
and monitoring devices

SIM

Smart Interface Modules (SIMs) are IEDs (Intelligent Electronic Devices) used in energy efficiency applications which provide local physical interfaces with buildings WAGES (Water Air Gas Electricity Steam) meters, sensors and actuators and communicate through wired or wireless networks with remote monitoring and control systems.

SIM allows collecting information of physically dispersed WAGES meters that cannot be connected to iRIO RTU or EGX100/300 Gateways because of their location.

SIM communicate with Gateways using:

- wired protocol: Modbus RS 485 SIM modules are connected, using a shielded twisted pair, to ethernet / RS 485 Gateways such as EGX100 or EGX300
- wireless protocol: ZigBee - commonly used for RF (Radio Frequency) WPANS (Wireless Personal Area Networks). SIM modules and routers (depending on distances) are connected, using an RF ZigBee network, to a specific ethernet / ZigBee Gateway.

SIM versions overview

Three versions are available:

SIM Modbus slave: wired Modbus RS 485 connection to Gateway, in slave mode.

- 6 digital inputs
- 2 digital outputs
- 2 analog inputs
- 1 RS 485 Modbus slave link
- 24 V DC powered (safety extra low voltage).

Symbol used:



SIM 10M



SIM 10Z

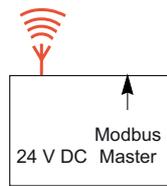


SIM ZigBee Modbus master: RF ZigBee connection to Gateway and 1 RS 485

Modbus Master link

- 6 digital inputs
- 2 digital outputs
- 2 analog inputs
- 1 RS 485 Modbus master link
- 24 V DC powered (safety extra low voltage).

Symbol used:



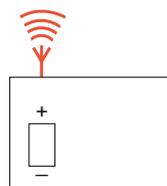
SIM 6BZ



SIM ZigBee Battery: RF ZigBee connection to Gateway, battery powered.

- 6 digital inputs
- 3.6 V DC battery powered.

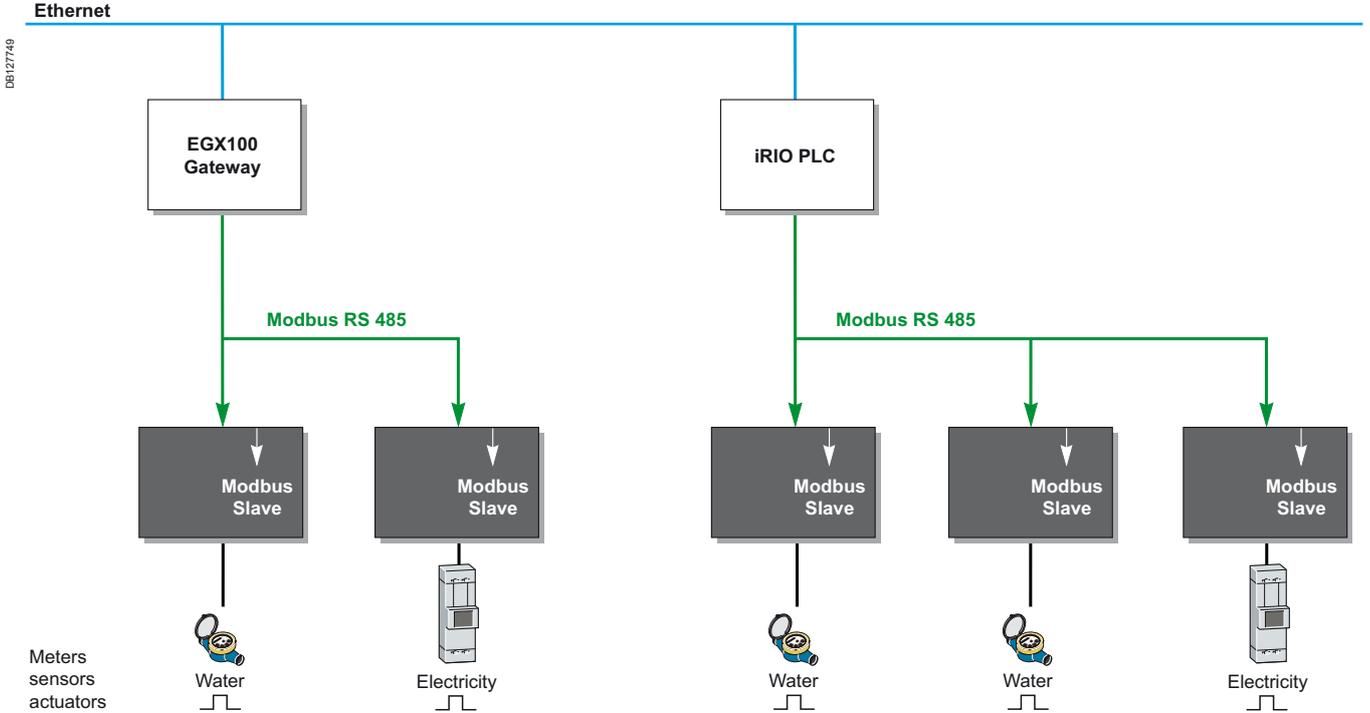
Symbol used:



Setting electrical equipments and monitoring devices

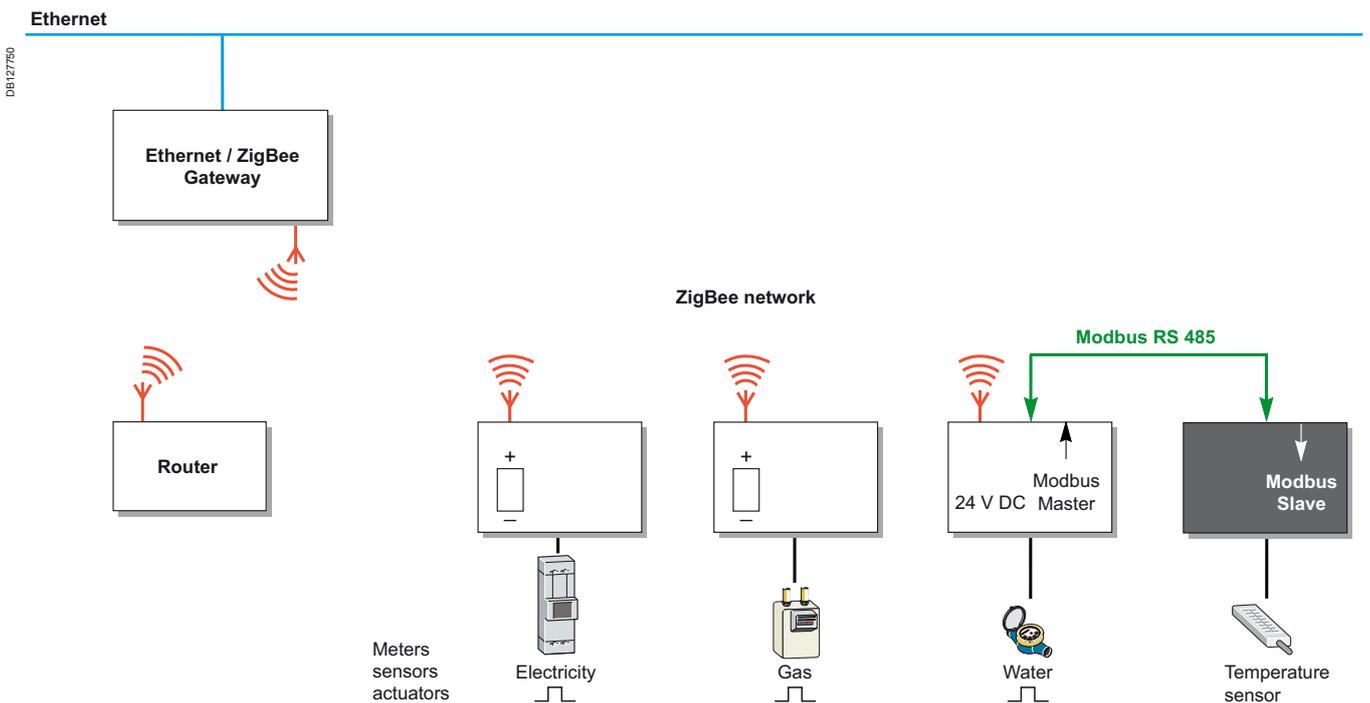
SIM Modbus slave

- SIM Modbus slave version communicates through RS 485 serial line with any Modbus master devices such as EGX100 ethernet / RS 485 Gateways or iRIO PLC.



SIM ZigBee Master 24 V DC and SIM ZigBee battery

- SIM ZigBee 24 V DC or battery powered versions communicate through ZigBee radio frequency network with ethernet / ZigBee Gateways and ZigBee routers.
- SIM ZigBee 24 V DC communicate also through RS 485 serial line with any SIM ZigBee Modbus slave or other Modbus slave device.
- Routers use SIM ZigBee mesh technology to allow RF network extensions.

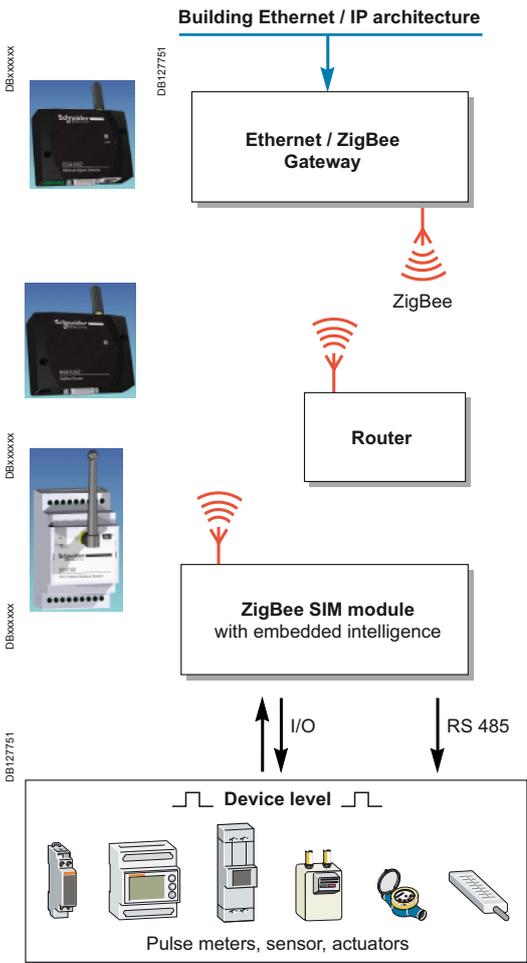


Setting electrical equipments and monitoring devices

Generic architecture with SIM ZigBee versions

- SIM ZigBee 24 V DC or battery powered versions use a radio frequency ZigBee network, WPAN type, to communicate with an ethernet / ZigBee Gateway.
- ZigBee provides a light, low cost, secure and scalable communication infrastructure for meters, sensors and actuators, physically distributed on electrical and other utilities equipment within buildings.
- ZigBee allows the installer to avoid difficult or costly cabling. It provides a flexible complementary alternative to communicate with upper level monitoring and control systems through Gateways.

The generic architecture with SIM ZigBee versions (master or battery) is as follows.



- **Embedded Web server configuration tool** using auto discovery mechanism to detect all connected ZigBee nodes, supporting:
 - **Modbus tunnelling** mode to interface Modbus serial line devices through 24 V DC powered SIM modules.
 - **Modbus emulation** mode for remote I/O handling through battery operated SIM modules.

- **Router ZigBee nodes** to extend RF transmission range and to improve robustness of RF link.

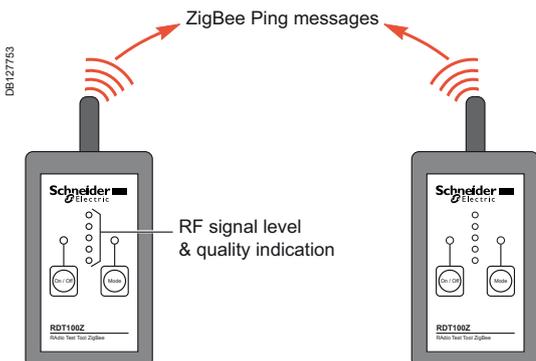
- **Smart interface modules (SIM)** to handle classical I/Os (on/off, meter pulses, analogs...) and Modbus serial line devices.

- **Device level:** meters, sensor actuators.

The implementation of the architecture can be helped thanks to a radio test tool ZigBee to validate the quality of transmission between nodes.

Radio test tool ZigBee

Point to point Installer testing tool to validate RF transmission quality between 2 ZigBee nodes physic allocation.



Setting electrical equipments and monitoring devices



SIM10M: SIM Modbus slave

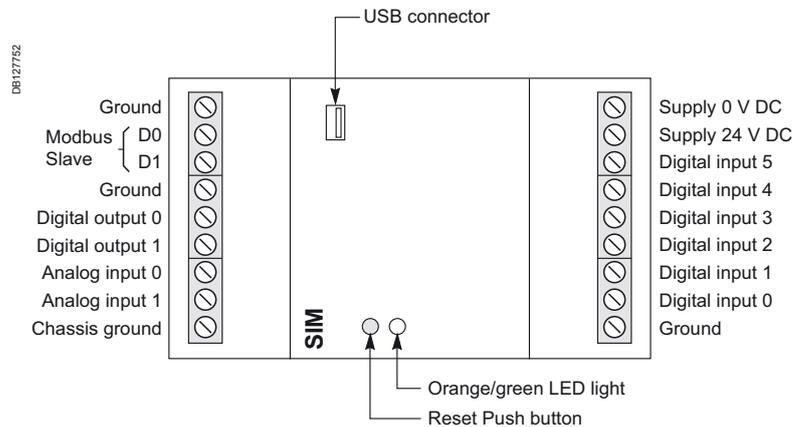
Functions

- Multiplexed acquisition of meter's pulses and circuit breaker's auxiliary tripped or On/Off status.
- Instantaneous power calculation.

Characteristics

- DIN rail / 54 mm width.
- 24 V DC supply.
- 6 digital inputs (pulses acquisition and On/Off detection by internal 3.6 V DC power and pull-up resistors).
- 2 digital outputs (by internal 24 V DC power - 50 mA).
- 2 analog inputs (0-10 V DC externally powered).
- 1 RS 485 Modbus slave link (up to 38400 bits/s).
- 1 orange / green LED light.
- orange: info à venir.
- green: info à venir.
- 1 orange reset button.

The external connectors of SIM Modbus slave are distributed as follows.



Setting electrical equipments and monitoring devices

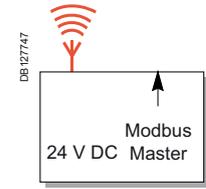


Photo provisoire

SIM10Z: SIM ZigBee Modbus master

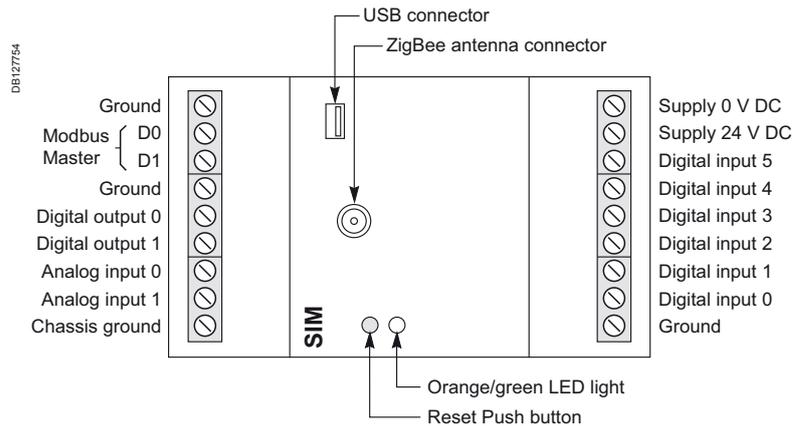
Functions

- Multiplexed acquisition of meter's pulses and circuit breaker's auxiliary tripped or On/Off status.
- Instantaneous power calculation.
- Storage of cumulated counters with battery back-up.

Characteristics

- DIN rail / 54 mm width.
- 24 V DC supply.
- 6 digital inputs (pulses acquisition and On/Off detection by internal 3.6 V DC power and pull-up resistors).
- 2 digital outputs (by internal 24 V DC power 50 mA).
- 2 analog Inputs (0-10 V DC externally powered).
- 1 RS 485 Modbus master link (up to 38400 bits/s).
- 1 RF antenna.
- 1 orange / green LED light:
- **Orange: info à venir.**
- **Green: info à venir.**
- 1 orange reset button.

The external connectors of SIM ZigBee Modbus master are distributed as follows.



Setting electrical equipments and monitoring devices

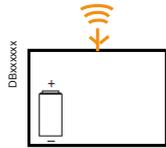


Photo provisoire

SIM6BZ: SIM ZigBee battery

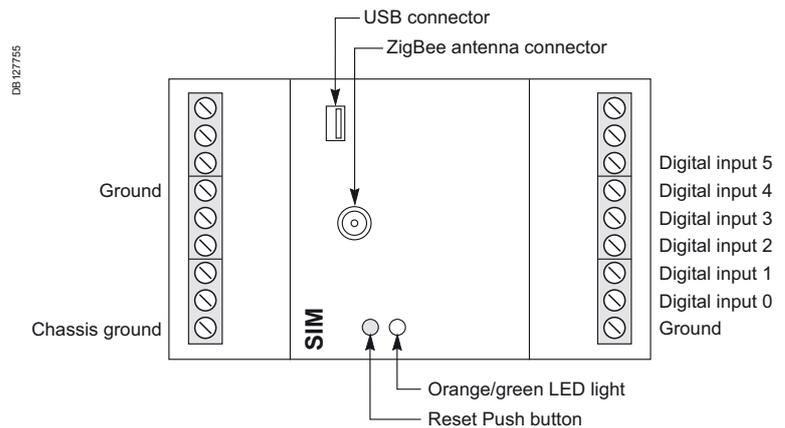
Functions

- Multiplexed acquisition of meter's pulses and circuit breaker's auxiliary tripped or On/Off status.
- Instantaneous power calculation.

Characteristics

- DIN rail / 54 mm width.
- 3.6 V DC battery powered (2 x 1500 mA.h).
- 6 digital inputs (pulses acquisition and On/Off detection by internal 3.6 V DC power and pull-up resistors).
- 1 RF antenna.
- 1 orange / green LED light.
- **Orange: Info à venir.**
- **Green: Info à venir.**
- 1 orange reset button.

The external connectors of SIM ZigBee battery are distributed as follows.



Setting electrical equipments and monitoring devices

Smart Interface Module (SIM)

Ethernet / ZigBee Gateways: EGX105Z

ZigBee router: REP100Z

Radio test tool ZigBee: RDT100Z



EGX105Z

Functions

The ethernet / ZigBee Gateway EGX105 is a Modbus / TCP-IP Web server. It allows:

- remote access to the local I/Os of each SIM ZigBee master or battery module (Modbus emulation mode).
- routing of Modbus frames exchanged with upper level monitoring and control softwares (Modbus tunneling mode).

Characteristics

- IP20-classed plastic housing.
- Easily accessed mounting holes.
- Detachable rubber feet.
- Height x Width x Depth = 63 x 80 x 26 mm.
- 85 g (without batteries).
- DIN rail support option.
- 24 V DC power supplied (100 mA).
- 1 power connector for supply in the 9-30 V DC range.
- 1 ethernet RJ45 connector.
- 1 RS 232 D-Sub (not used).



REP100Z

Functions

Transmission range between two ZigBee nodes can be around 100 meters (line of sight) outside buildings, but they are often much less inside, typically 15-30 meters, dues to concrete or metallic obstacles, walls, floors...

The ethernet / ZigBee router EGX100Z allows:

- reemission of RF signal with the normal level of power.
- automatic routing from tuned SIM to the Gateway.

Characteristics

- IP20-classed plastic housing.
- Easily accessed mounting holes.
- Detachable rubber feet.
- Height x Width x Depth = 63 x 80 x 26 mm.
- 85 g (without batteries).
- DIN rail support option.
- 5 V DC power supplied (round connector).



RDT100Z

Functions

A key issue to ensure optimal operational conditions of a ZigBee communication infrastructure is the quality of its RF transmission between each one of its nodes. Transmission range can be around 100 meters (line of sight) outside buildings, but they are often much less inside, typically 15-30 meters, dues to concrete or metallic obstacles, walls, floors, etc.

A point to point RF testing tool is provided to validate the RF signal level between two ZigBee nodes physical localization. Its use is recommended at the early stage of a project to optimize the number of nodes and necessary routers...

The ZigBee radio test tool RDT100Z allows:

- RF signal level and quality evaluation between two ZigBee nodes
- evaluation based on a five points scale by LEDs.

Characteristics

- Plastic housing.
- Height (including antenna) x Width x Depth of each box = 132 x 65 x 24 mm/120 g.
- ?? V DC power battery supplied.

Setting electrical equipments
and monitoring devices

SIMs power supply

24 V DC for SIM Modbus slave version and SIM ZigBee Modbus master version

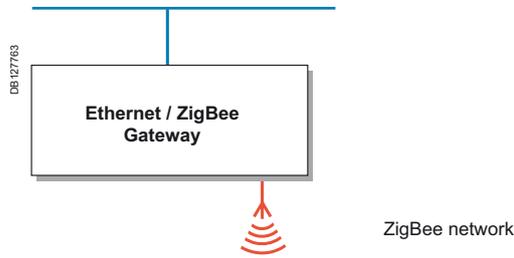
SIM Modbus slave and ZigBee Modbus master versions are powered by a 24 V DC supply. This safety extra low voltage can be provided by a LV/LV transformer connected to a domestic phase to neutral outlet with earth plug.

Battery power for SIM battery powered version

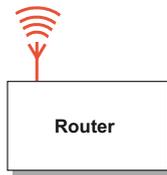
The ZigBee battery version is powered by two 2/3 length AA batteries of 1500 mAh capacity each. It is possible to replace the battery of the SIM through the front hatch, without pulling apart the entire module.

Communication network physical constraints

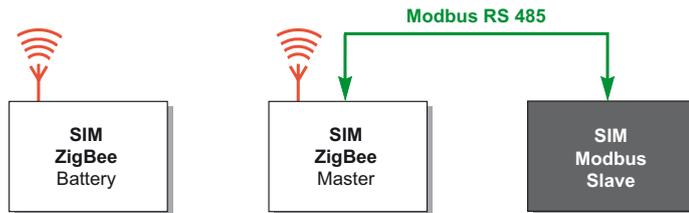
- Possibility to have multiple ethernet / ZigBee Gateways forming many ZigBee clusters connected to the ethernet backbone of the building.
- Limits to consider are the traffic on this ethernet backbone and the need to alternate ZigBee RF channels on adjacent ZigBee clusters (16 possible RF channels).



- Although theoretically unlimited, the number of repeaters used within a ZigBee cluster should not introduce too many hops between the Gateway and the end nodes (ZigBee basic throughput is 250 Kb/s to be shared by all nodes belonging to a same cluster).



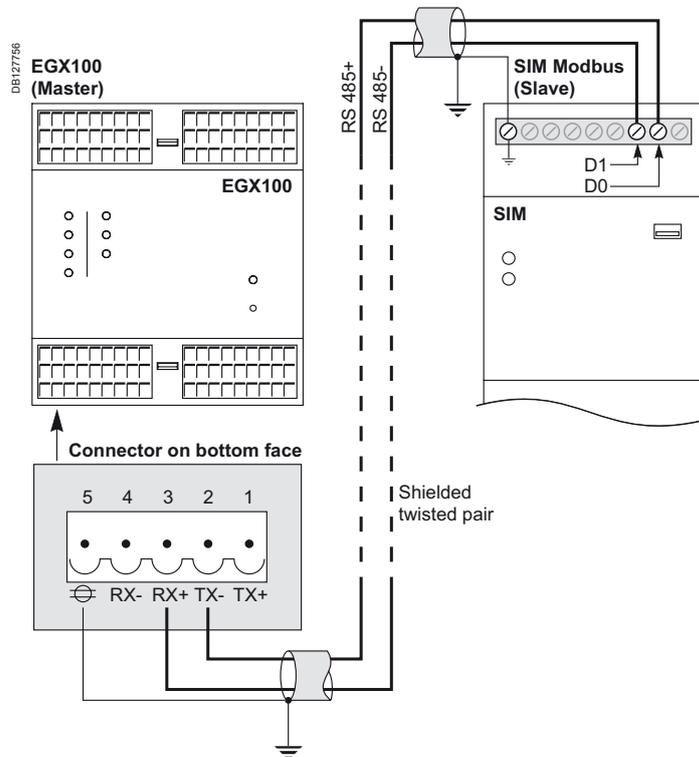
- The total number of nodes seen as Modbus slaves through one ZigBee cluster should be kept reasonable (typically no more than 64 nodes including repeaters, SIM ZigBee nodes and RS 485 Modbus slaves).



Setting electrical equipments
and monitoring devices

Connection of SIM Modbus Slave version: SIM10M

The SIM Modbus slave version is wired to the EGX100 or EGX300 in Modbus slave mode as follows.



RS 485 interface

The RS 485 interface has three connectors which functions are as follows:

Connector	Function	Remark
D1	TxD+ / RxD+	Non inverting pin
D0	TxD- / RxD-	Inverting pin
RS 485 Ground	SC	Reference pin

DIP switch

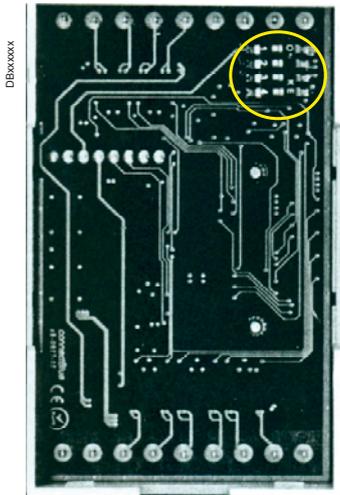
The SIM is equipped with a sliding DIP (Dual In-line Package) switch that is located at the rear side of the main carrier board. There are four contacts that have the following functions:

Switch	Function	Remark	Reminder
1	Battery power	Will turn ON and OFF the battery power. Should always be ON for 24 V DC ZigBee slave modules	ON
2	RS 485 polarization positive (+)	Should be OFF for 24 V DC ZigBee slave modules	OFF
3	RS 485 polarization negative (-)	Should be OFF for 24 V DC ZigBee slave modules	OFF
4	RS 485 termination	Shall be ON and the last node in the RS 485 daisy chain, otherwise OFF	ON* or OFF

(1) In Modbus slave configuration, the termination resistance is necessary for a good communication. So, insure that switch # 4 is ON if there is only one SIM module, which is so the end of the daisy chain.

Smart Interface Module (SIM) Installation

Setting electrical equipments and monitoring devices



DIP switch is located in the internal PCB (Printed Circuit Board) of the SIM which is accessed after removing the back plane of the SIM module.

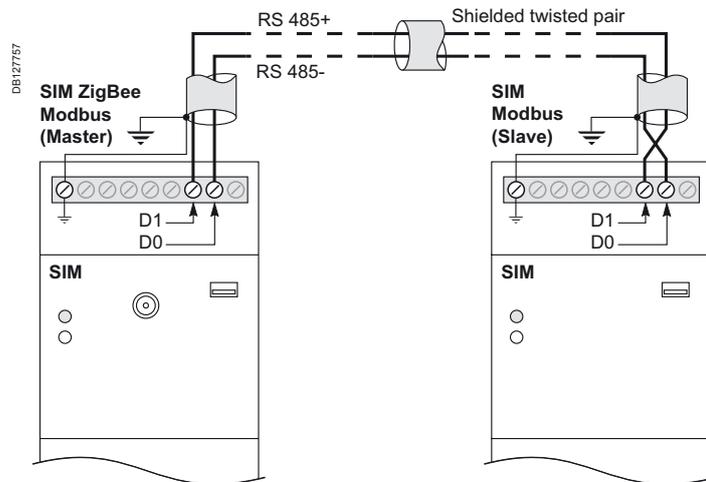
Four contacts DIP switch location, on the PCB of the SIM. Access by removing the back plane of the SIM.



Photos provisoire

Connection of SIM ZigBee Modbus master (SIM10Z) to a SIM ZigBee slave (SIM10M)

The SIM ZigBee Modbus master version communicates in RF with the upper level ethernet/ ZigBee Gateway. It can also be wired to a ZigBee Modbus slave unit as follows.



Smart Interface Module (SIM)

Installation

Setting electrical equipments
and monitoring devices

DIP switch

The SIM is equipped with a sliding DIP (Dual In-line Package) switch that is located at the rear side of the main carrier board. There are four contacts that have the following functions and so must be set as indicated:

Switch	Function	Remark	Master	Slave
1	Battery power	Will turn ON and OFF the battery power. Should always be ON for 24 V DC versions	ON	ON
2	RS 485 polarization positive (+) D1	Should be ON for 24 V DC ZigBee master modules OFF for 24 V DC ZigBee slave modules	ON	OFF
3	RS 485 polarization negative (-) D0	Should be OFF for 24 V DC ZigBee slave modules	ON	OFF
4	RS 485 termination	Shall be ON and the last node in the RS 485 daisy chain, otherwise OFF	ON	ON ⁽¹⁾ or OFF

(1) In Modbus slave configuration, the termination resistance is necessary for a good communication. So, insure that switch # 4 is ON on both modules if there is only one SIM slave module, which is so the end of the daisy chain.

DIP switch is located in the internal PCB (Printed Circuit Board) of the SIM which is accessed after removing the back plane of the SIM module (see view at the end of previous paragraph SIM Modbus slave version).

Connection of SIM ZigBee battery module

The SIM ZigBee Modbus master version communicates in RF with the upper level ethernet / ZigBee Gateway.

So there is no wiring. But the DIP switch must be set as follows:

DIP switch

Switch	Function	Remark	Master
1	Battery power	Will turn ON and OFF the battery power	ON
2	RS 485 polarization Positive (+) D1	Should be OFF (no Modbus connection)	OFF ⁽¹⁾
3	RS 485 polarization Negative (-) D0	Should be OFF (no Modbus connection)	OFF ⁽¹⁾
4	RS 485 termination	Shall be OFF	OFF ⁽¹⁾

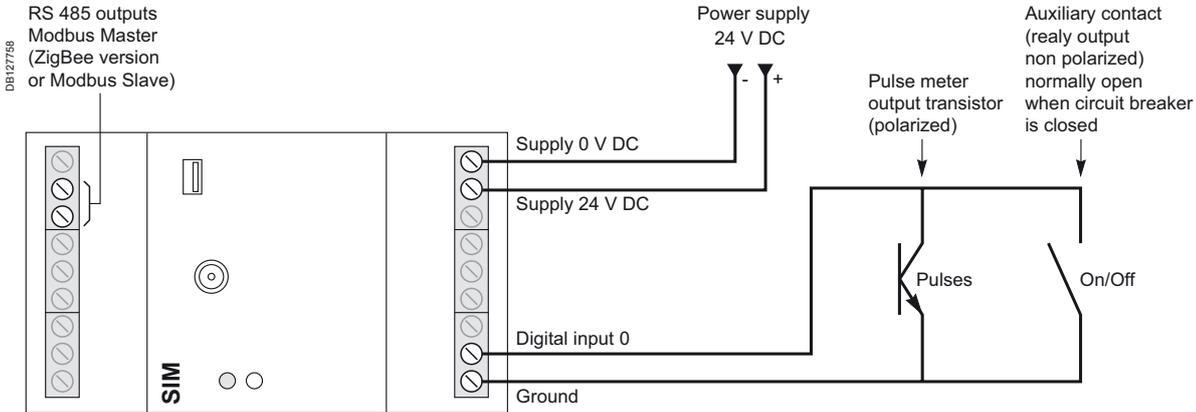
It is important that switches # 2, 3 and 4 are on position OFF for the ZigBee battery version, otherwise the module will consume a lot of battery power.

Setting electrical equipments and monitoring devices

Connection of SIM digital inputs

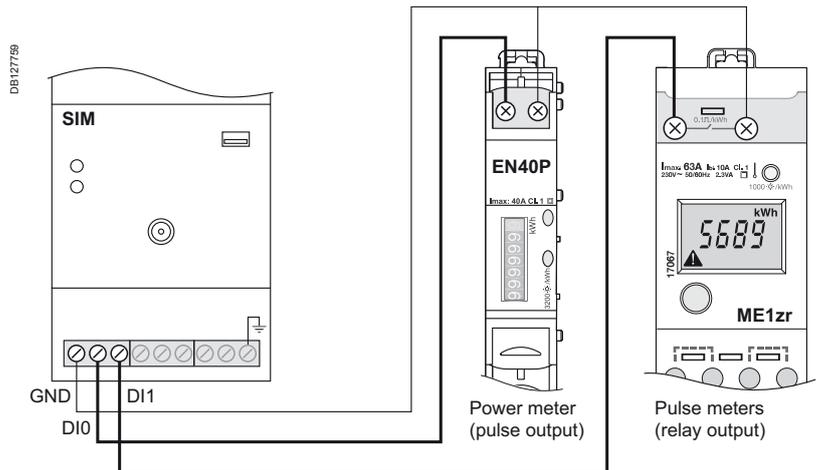
All the SIMs versions have the same 6 digital inputs (DI0). They are connected to pulse meter and state indication auxiliary contacts of circuit breakers as follows:

Connection of 24 V DC SIM Modbus slave or SIM Modbus master version



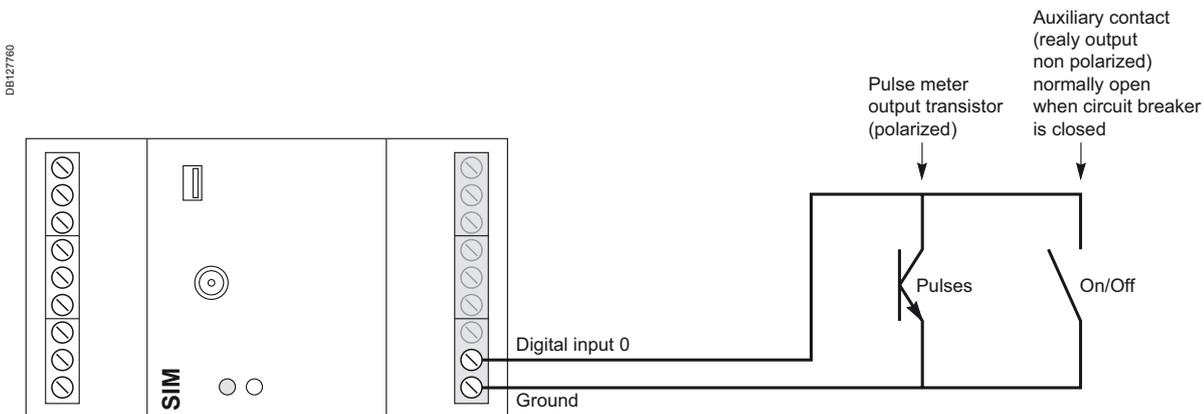
Examples:

- for pulse output, the transistor works as a switch open or closed. When it is "On" (closed, i.e. with through by current resulting of an impulse), the current loop must go from the digital input 1 (connected to output S0+) to the ground (connected to S0-)
- for relay output, the polarization is indifferent
- up to 6 devices can be connected to the 6 digital inputs. All the currents loops close to the ground.



Connection of SIM Modbus battery version

Examples



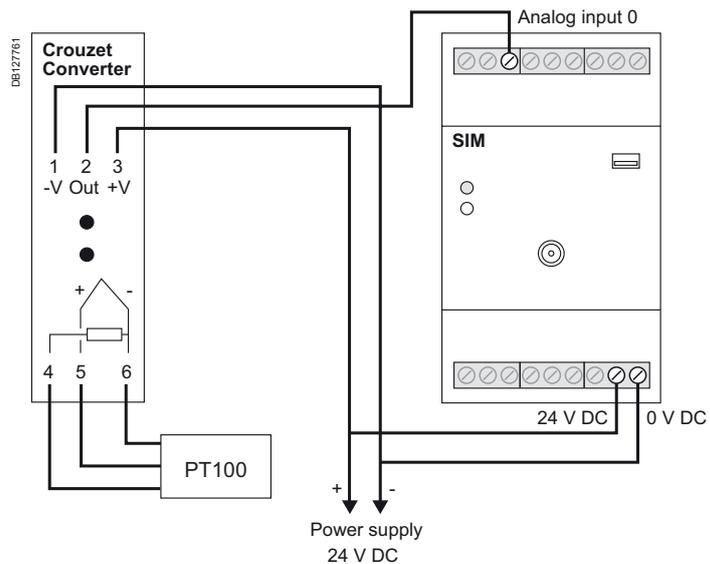
Setting electrical equipments
and monitoring devices

Connection of SIM analog inputs

The SIMs 24 V DC Modbus slave (SIM10M) or ZigBee Modbus master (SIM10Z) versions have the same 2 analog inputs (AI), and 2 corresponding analog outputs. They are connected to sensors (e.g.: temperature sensors) as follows.

Example 1:

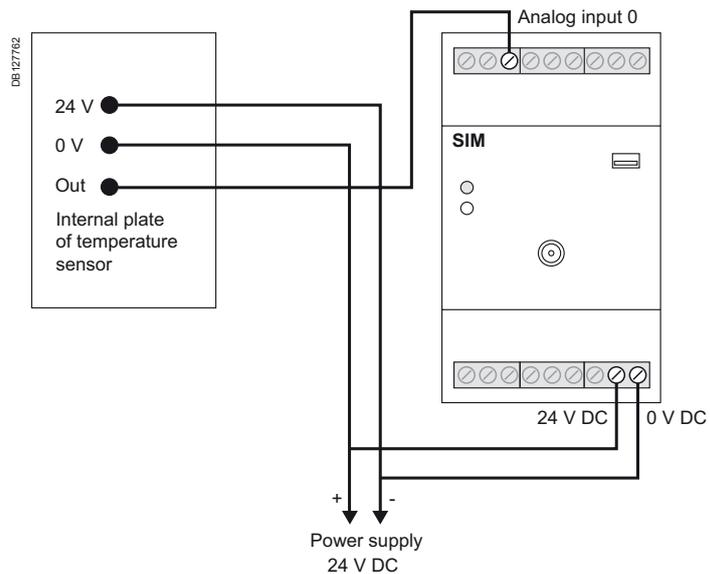
PT100 temperature measurement (by thermistor i.e. a resistor whose resistance varies with temperature) allows an electrical image of temperature from 0 °C to 200 °C. The corresponding output information of a converter is connected to the analog input 1 as indicated below. Here the converter is a Crouzet temperature converter (cat.no.: 88 950 153) with a PT100 (cat no.: 79 696 037).



Example 2:

Temperature sensor provides an electrical image of temperature from -10 °C to 40 °C. The output corresponding information is connected to the analog input 1 as indicated below.

Here the sensor is a Crouzet temperature sensor (cat.no.: 89 750 150 internal, or cat.no.: 89 750 152 external).



Setting electrical equipments and monitoring devices

Once wiring achieved, as described in previous pages, the SIM nodes have to be configured. There are two main types of network architectures using SIM:

- network using SIMs Modbus Slave and RS 485 (see page 27)
- network using SIMs ZigBee Master 24 V DC and SIM ZigBee Battery (see page 27, 28).

The following in this section refers to the Modbus RS 485 networks.

SIM Modbus slave configuration tool

The wired networks using only SIM Modbus slave versions in RS 485 protocol are configured using the "SIM Modbus slave configuration tool" software running on a PC.

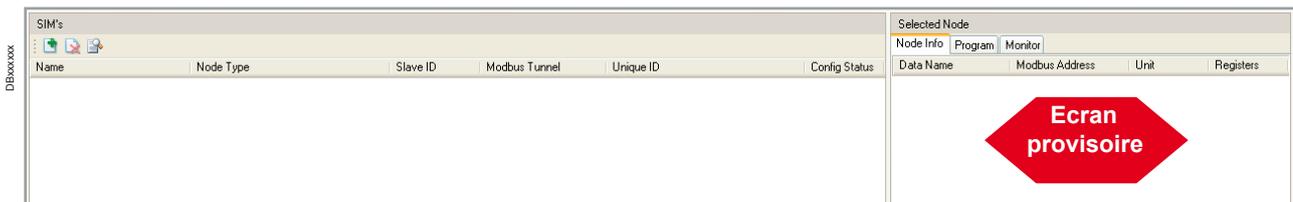
The configuration comprises two main steps:

- first step (remote off line): adding nodes and setting their configuration parameters off line
- second step (on site): downloading from the PC the set parameters to each module using the USB connector. In that step no external power source is required because the necessary power is provided by the USB connection with the PC.

After you have physically connected the SIM Modbus slave modules to the Modbus master devices such as the gateways as described in chapter "Setting of Ethernet - TCP-IP / Modbus RS 485 communication Gateways", EGX100 on page xx.

Creating a new file and saving it

- Switch on your laptop or PC.
- Run the Modbus slave configuration tool software.
- The following home screen displays. Its icons and menus will allow you to add or remove SIMs slave nodes and declare and set the parameters of each node.

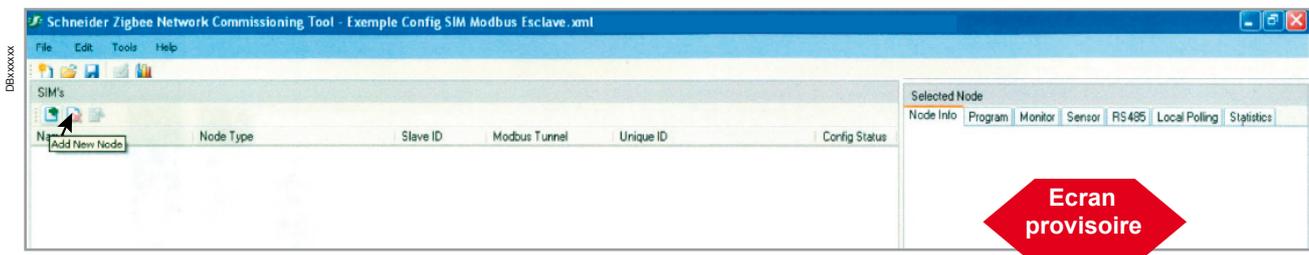


To save the new file:

- click on "File" icon
- save the file giving it any name by the function: "save as"....
- here the name is "Exemple Config SIM Modbus Esclave.xml"
- during the configuration process, think to save from time to time your work.

Adding a new node

- Click on "green plus" icon .
- This will display the message "Add new node".



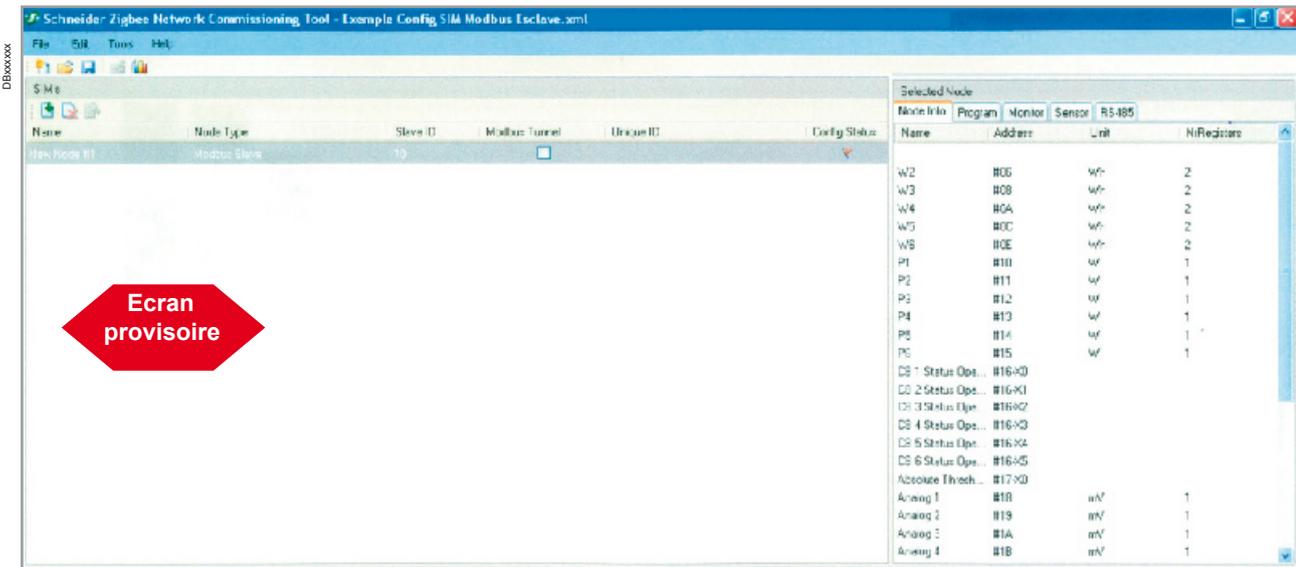
Smart Interface Module (SIM)

Configuration of SIMs in Modbus RS 485 networks

Setting electrical equipments and monitoring devices

- After the click, a default name of the node will be displayed "New Node #1" (automatically incremented for next node, and that can be changed), indicating:
 - node type: slave (automatically affected)
 - slave ID:10 (default ID, automatically incremented for the next node)
 - Modbus tunnel
 - unique IC
 - config status
- On the right part of the screen, the possible parameters for the devices connected to the node are displayed under the "Selected Node" tool bar, with "Node Info" selected by default. They include:
 - name (indicated by default with by W2, W3...CB1 status, CB2 status... Analog1, Analog2...)
 - address (indicated in hexadecimal #06, #08...)
 - unit
 - number of registers: number of registers of the information.

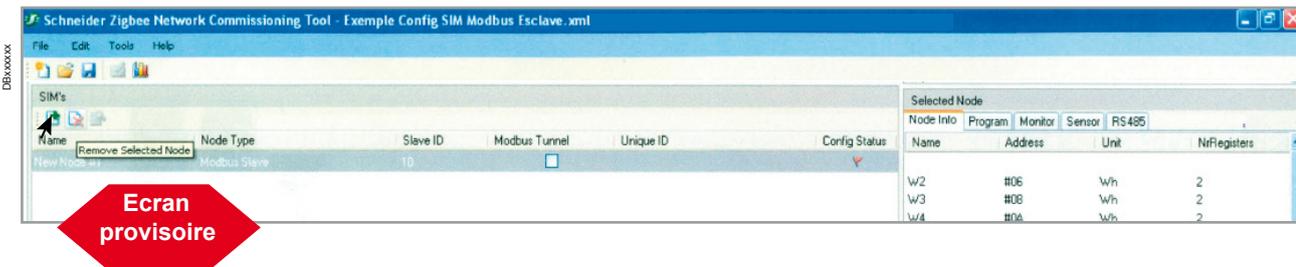
For explanation on the setting of all these parameters see "Setting parameters of a new node", further.



Removing a node

If you want to remove a node from a list:

- select the Gateway in the list
- click on "red cross delete" icon 
- this will display the message "Remove selected Node"
- after the click, the node and its parameters will be deleted from the screen and removed from the configuration.



Setting electrical equipments and monitoring devices

Setting parameters of a new node

Parameters include for the node:

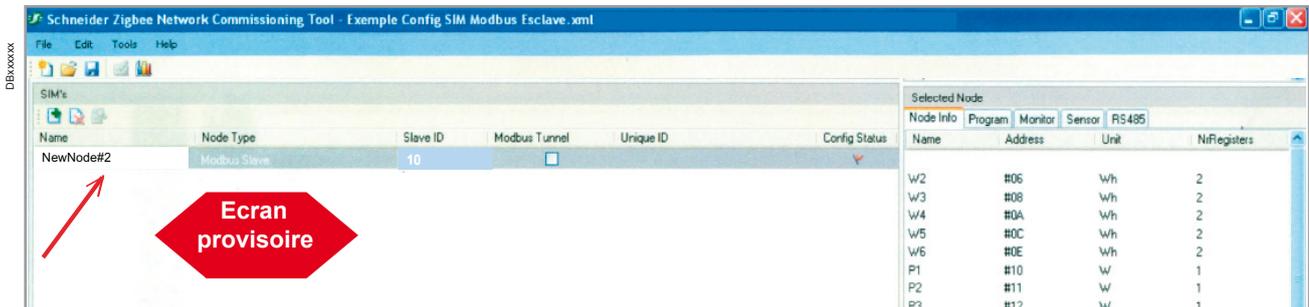
- name: "New Node # 2" (name by default of SIM node)
- slave ID: 10 (identification by default of slave node).

Parameters include for the devices connected to I/O of the selected node:

- name
- address
- unit
- number registers.

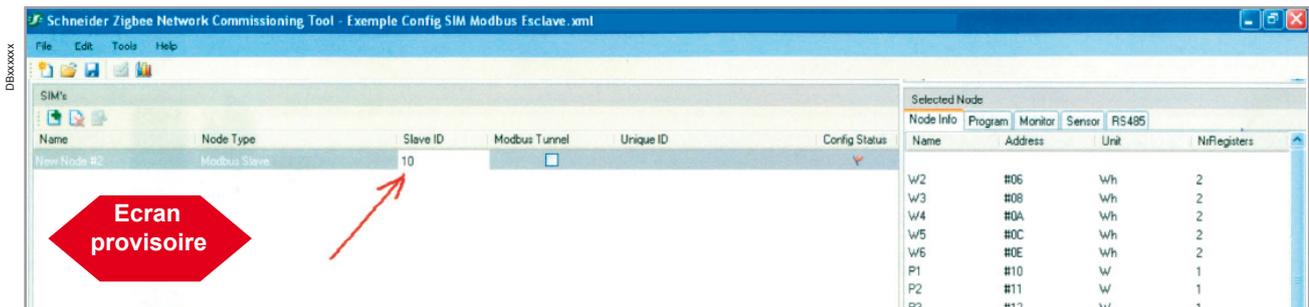
Node name

- click on "Name" to select the corresponding entering zone
- enter, if needed, a new name for the node (e.g. water meter 1, gas meter, etc.).



Slave ID

- Click on "Slave ID" to select the corresponding entering zone.
- Enter, if needed, a new slave ID.



RS 485 connection parameters

- In the tool bar "Selected Node". Click on "RS 485".
- Select and enter, in the corresponding zones: baud, parity, stop bits number for the connection of the node to the Gateway. A scrolling menu of possible values is displayed for each item by clicking on .
- Click on save, to save the three values.

Setting electrical equipments and monitoring devices

Parameters of the sensors connected to SIM input/output (pulses and On/Off)

The sensors connected to the SIM node may use two types of input/output:

6 digital inputs

- Each input receive impulses from a specific meter (electricity, water, Gas...).
- Each impulse of a given meter corresponds to a "Pulse Weight" which depends on the meter and on the energy its measures (e.g. a pulse can correspond to 10 kWh, 1 m³, etc...).
- Each impulse has a pulse length which depends on the meter and on the energy its measures (e.g. 100 ms).
- Some pulses can correspond to status change output relay of a circuit breaker. In that case the impulse is by far longer than that of any of the meters.
- So you must:
 - set the pulse Weight of the maximum 6 meters connected
 - enter the "Max Pulse Length" of these meters, in order to differentiate impulse meters from those from circuit breakers status relay.

2 analog inputs (ZigBee master version)

- Analog inputs are directly wired to the sensor and to the output and require no specific setting.

To set the parameters of digital inputs:

- in the tool bar "Selected Node". Click on "Sensor".
- the following screen displays (<- écran à changer)
- enter "Pulse weight W1", W2....(e.g. 1)
- enter "Units" (e.g. kWh, m³)
- select the mode of calculation:
 - local: the multiplication of pulse by the corresponding unit is done locally (e.g. kWh, m³....), then the result is transmitted
 - remote: only the number of pulse is transmitted
- enter the maximum length of impulsion, to differentiate meter impulses from status of CB
- click on save, to save the values



- repeat these operations for each node.

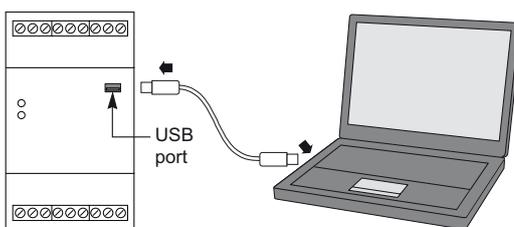
Downloading parameters of Node to SIMs devices

Once you have enter the parameters of all the nodes, you must download them into the SIM. This operation is done On Site, with the laptop, using the USB port of each device.

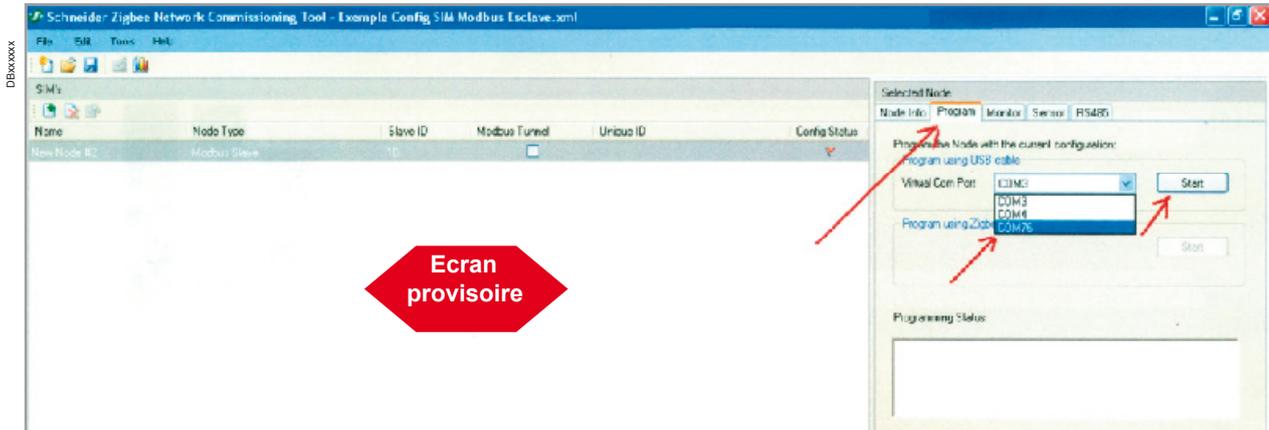
- Connect a USB cord between the laptop and the SIM node you want to charge with the parameters.

Note: that power source is required because the necessary power is provided by the USB connection with the PC.

- Run your "SIM ModBus slave configuration tool".
- Open the file of the configuration.
- Select the node name of SIM module you are connected to
- Click on "Program".
- The following screen displays, indicating the COM port using ZigBee (here COM76). The port is selected automatically.
- Click on start: the configuration is automatically downloaded to the SIM. During the downloading, the green light flashes. (PA: à confirmer ?).



Setting electrical equipments and monitoring devices



When this operation is completed a message is displayed to indicate that its has been achieved with success.



Repeat this operation is for each node of the configuration.

Connecting to the ethernet TCP-IP / Modbus RS 485 Gateway

The connection of the SIM Modbus slaves to the Modbus master devices such as the Gateways done, the parameters of the configuration are directly routed to the Gateway after it has been energized.

Setting electrical equipments and monitoring devices

Once wiring achieved, as described in previous pages, the SIM nodes have to be configured. There are two main types of network architectures using SIMs :

- network using SIM Modbus slave and RS 485 (see page 27)
- network using SIM ZigBee master 24 V DC and SIM ZigBee battery (see page 27 and 28). The following in this section refers to the ZigBee networks.

SIM ZigBee configuration tool

The ZigBee networks, using only SIM in ZigBee protocol can configured using the "SIM ZigBee configuration tool" software running on a PC.

Two methods are possible:

- off line
- on line.

Each is presented in a "General Principle" paragraph, before the corresponding detailed procedure description. The two methods can be mixed at any moment.

Important note

- Both methods need first to set parameters of the gateway. The setting uses the same procedure in the two cases.
- This common procedure is described hereafter, before presenting the other instructions concerning the SIM for each method.

Setting the parameters of the Gateways

In order to allow the automatic tuning of ZigBee nodes to the Gateways at the end of the procedure, you must first allow the connections of your PC with the gateways.

For this proceed as follow:

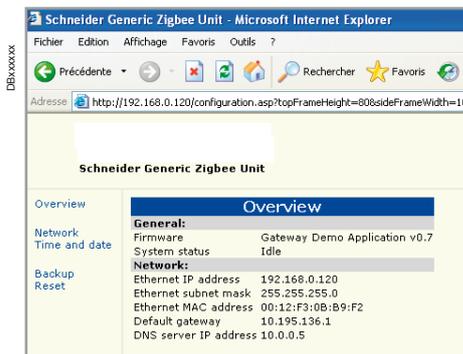
Connection to the gateway

- Power on the PC, which will power also the Gateway thanks to the USB cord.
- Connect a new Gateway to your PC by a USB cord. Each new Gateway is factory set, with a default IP address which is "192.168.0.120".
- Type this address in the field "Address" or of your PC, as in the screen below.



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- Press enter, this will display an overview of the gateway parameters as follow.



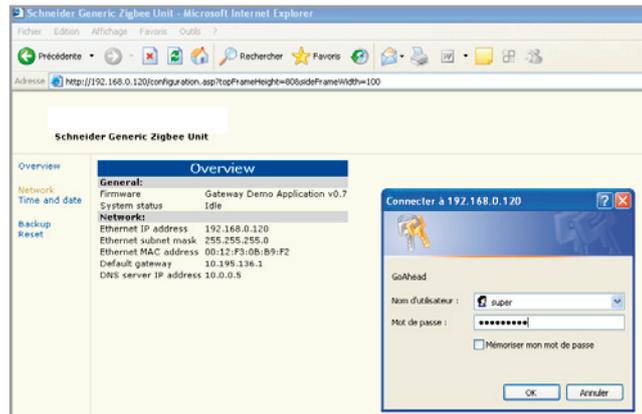
Ecran provisoire

Setting electrical equipments and monitoring devices

Changing a Gateway address

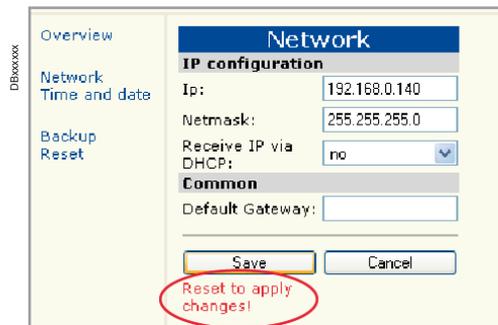
You can change the default gateway IP address "192.168.0.120" for that of the future connection to IP network on site:

- click on "Network" icon on the displayed screen
- a password screen will appear, as below
- enter "User Name" which is by default "super"
- enter "Password" which is by default "admin1234"
- click "OK".



The password screen disappears, and you have access to the "ethernet address" field.

- Enter the new address (e.g. "192.168.0.140").
- Click "OK".
- The following screen displays:



Note that a message warns you to "Reset to apply changes"

To do the reset:

- put the gateway power Off and On
- the change becomes effective.

Changing the other gateway addresses

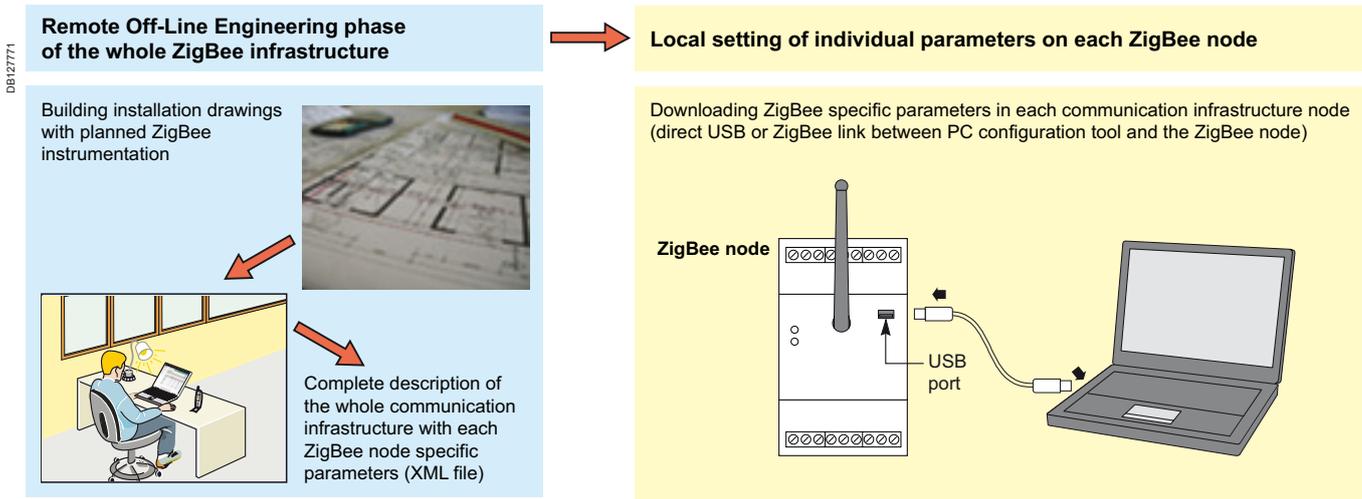
Repeat the previous operations with the other gateways of the configuration.

Setting electrical equipments and monitoring devices

First method: off line option with SIM ZigBee configuration tool

General principle for off line option

A remote pre-configuration engineering phase can be fully completed at PC level and followed by a local configuration phase of each individual ZigBee node before powering up the installation.



Advantages

- This method allows a pre-configuration of all the SIM nodes before their delivery on site, according to their identification on drawings. This can be done in the factory, in an intermediary warehouse, etc.
- After the delivery on site, the SIM nodes are wired according to drawings, between them and with the Gateways.
- After powering up the installation, it will work automatically by recognition and transmission of settings in the network.

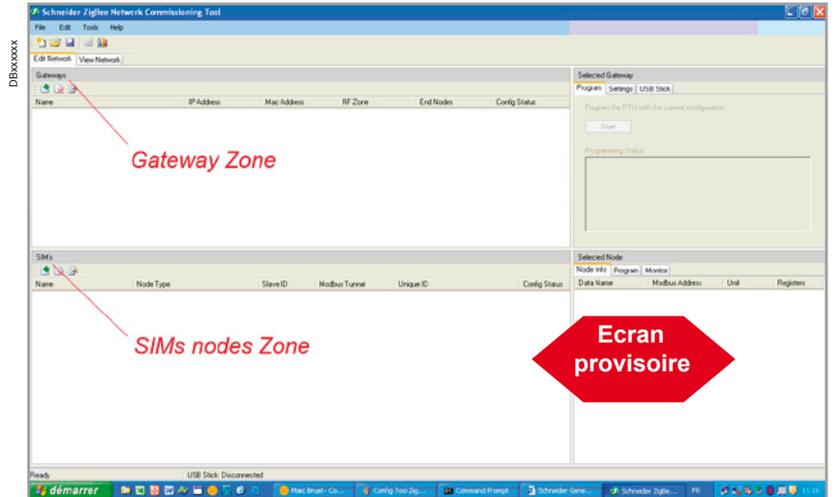
Setting the parameters of the Gateways -> see page 44

Setting electrical equipments and monitoring devices

Running SIM ZigBee configuration tool and working off line

After all the Gateways has their IP address corresponding to the configuration, you have to enter the parameters of the network, i.e of the Gateways and of the nodes connected to them. For this:

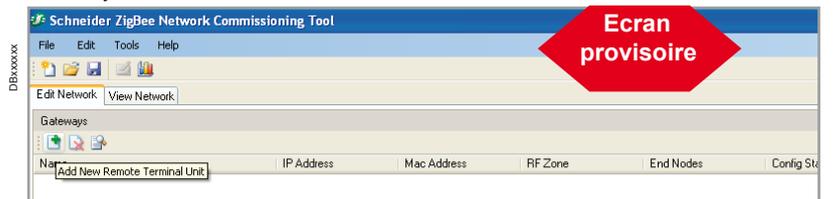
- run the "SIM ZigBee configuration tool" software
- the following "Home screen" displays:
 - the upper part on left is dedicated to Gateways, and on right (selected Gateway) to their parameters
 - the low part on left is dedicated to SIMs nodes, and on right (selected node) to the parameters of the connected sensors of the node.



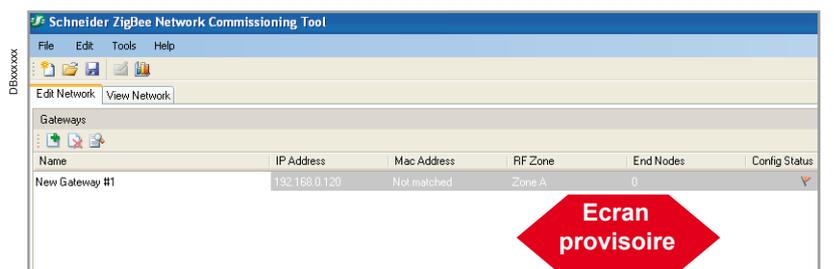
Entering Gateways

Adding a new Gateway

- Click on the "green plus" icon .
- The message "Add New Remote Terminal Unit" indicates you are adding a new Gateway.



- A "New Gateway #1" (default name you can change) line displays:
 - it indicate IP address: default address "192.168.0.120"
 - you must select this zone and enter the new IP address you have entered in the Gateway (e.g. "192.168.0.140").
- Notice that this IP address you have entered will be used for connection by all the SIMs with the Gateway.
- It indicates also:
 - MAC address
 - RF Zone
 - end nodes
 - config status.



Setting electrical equipments and monitoring devices

Gateways list

- Repeat, if the case, this operation with the others Gateways of the configuration.
- The screen will display all the list of Gateways, with the IP address you have entered for each.

Changing the name of a Gateway

If you want to remove a Gateway, among a list:

- select the Gateway in the list
- click on  to select the corresponding entering zone
- enter, if needed, a new name for the Gateway (e.g. Gateway sub-network1).

Removing a Gateway

If you want to remove a Gateway, among a list:

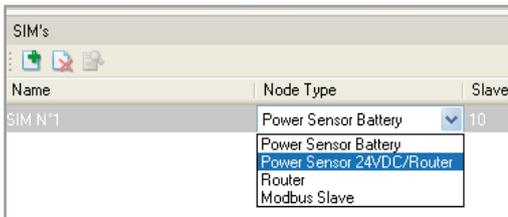
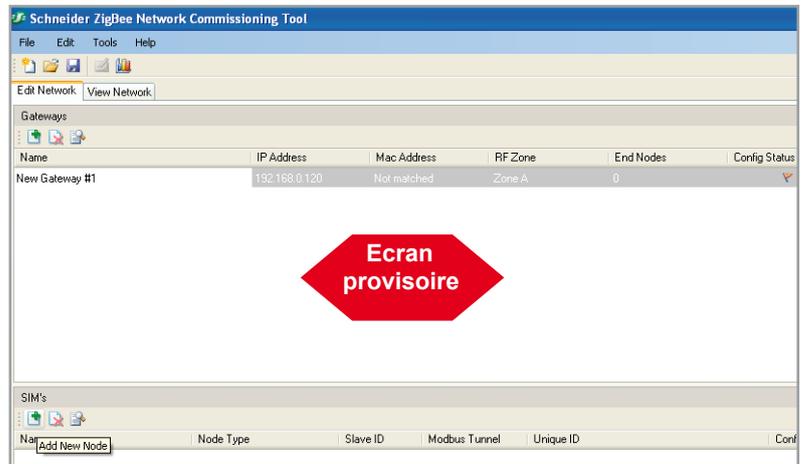
- select the Gateway in the list
- click on "red cross delete" icon 
- this will display the message "Remove selected Node"
- after the click, the node and its parameters will be deleted from the screen and removed from the configuration.

Entering SIMs nodes and their parameters

Now you have to enter, for each Gateway, the parameters of the nodes that will be connected to it.

Adding a new node to a Gateway

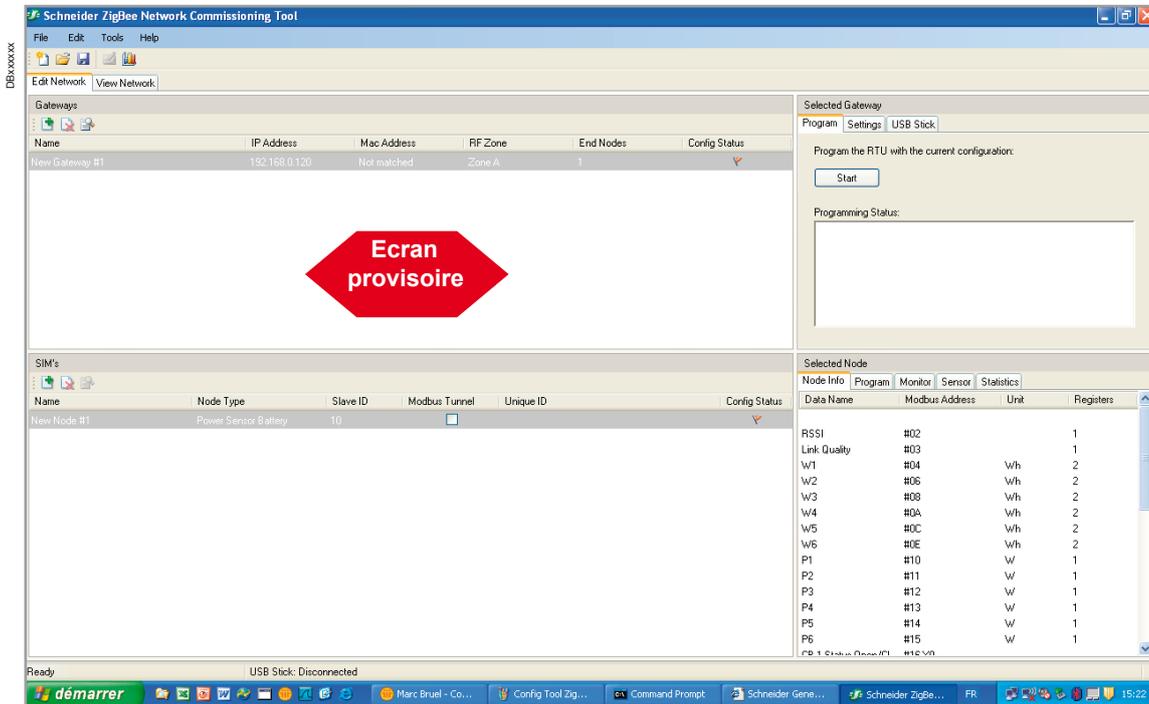
- Select if necessary the "Edit Network" mode to allow modifications.
- Select the Gateway you want to connect to the nodes you are entering.
- Click on "green plus" icon .
- This will display the message "Add New Node".
- Notice that all the nodes you will add will be connected to selected Gateway using the IP address of the Gateway.



- After the click, the screen displays a default name of the node "New Node #1". It is automatically incremented for next node, and can be changed).
- The following information is associated to this name:
 - IP Address: note that it is automatically the ID Address of the selected Gateway
 - node type: select the node type in the scrolling menu (see at left).
- The others information concerns:
 - slave ID: 10 (default ID, automatically incremented for the next node)
 - Mac address: not matched
 - RF zone: zone A (default value)
 - end nodes
 - config status: reg flag, if the node is not configured.
- On the right part of the screen, the possible parameters for the devices connected to the SIM Node are displayed under the "SelectedNode" tool bar, with "Node Info" selected by default. They include:
 - name (indicated by default with by W2, W3...CB1 status, CB2 status...Analog1, Analog2...)
 - address (indicated in hexadecimal #06, #08 ...)
 - unit
 - Nr Registers: number of the register containing the information.

Setting electrical equipments
and monitoring devices

For explanation on the setting of all these parameters see "Setting parameters of a new node", further.



Removing a node

If you want to remove a node, among a list:

- select the Gateway in the list
- click on "red cross remove" icon 
- this will display the message "Remove selected Node", similarly to the Adding procedure
- after the click, the node and its parameters will be deleted from the screen and removed from the configuration.

Setting parameters of a new node

Node name:

- click on "**Name**" to select the corresponding entering zone
- enter, if needed, a new name for the node (e.g. SIM1.).

Node type:

- click on "**Node Type**" to select the corresponding entering zone
- enter, the type of Note, choosing in the scrolling window.

Slave ID:

- click on "**Slave ID**" to select the corresponding entering zone
- enter, the number you want for the Node (according to drawings).

Mode Tunnel:

- click on "**Modbus Tunnel**" case to choose this mode
- the selection of this mode indicates to interface Modbus serial line devices through 24 V DC powered SIM modules.

Unique ID:

- this zone will contain the MAC Address of the SIM module, automatically recovered when downloading settings parameters down to module (see: "Downloading settings in modules on site" operations).

Config status:

- green flag will become green when you have finished configuring the node
- this will happen when you have entered the information of the sensor you want to connect to the node (right part of the SIMs node zone).

Setting electrical equipments and monitoring devices

Setting sensors parameters of sensors connected to the New Node

- Under "Selected Node", click on "Sensor" to access the settings of parameters.

Parameters

- In the tool bar Click on the parameter to set.
- Select and enter, in the corresponding zones: [Liste des menus à fournir avec un écran] number for the connection of the node to the Gateway. A scrolling menu of possible values is displayed for each item by clicking on .
- Click on "Save", to save the three values.



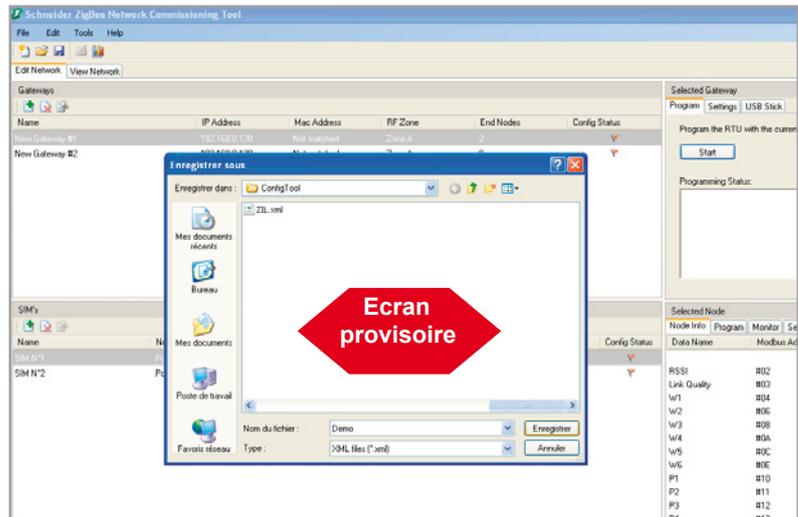
Saving the configuration

Now you have to save the configuration you have entered.

Note: this can be done using the same procedure during the entering of previous parameters from time to time.

- Click on the Windows "File" icon of your screen.
- In the scrolling menu click on "Save as".
- A window "Save as" displays.
- Choose a name for the configuration (e.g. Demo).
- Click on "Save".

Your configuration is saved in a XML file, with the chosen name, in the repertory indicated in the upper part of the window (e.g. Config Tool).



Setting electrical equipments and monitoring devices

First connection to the Gateway on site to recover its MAC address

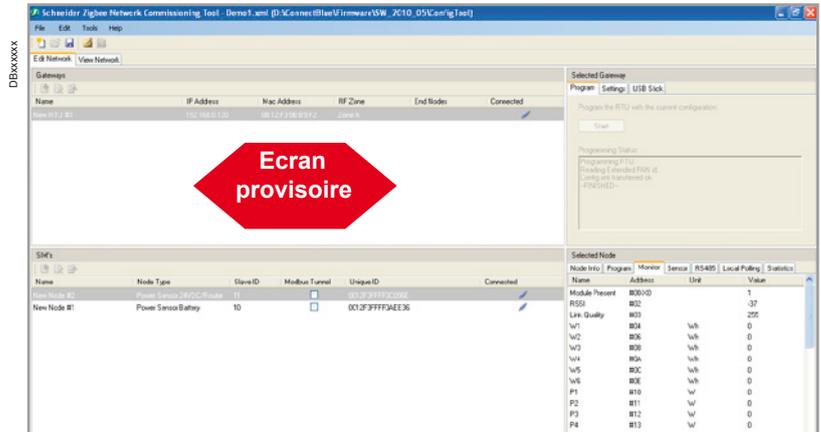
Once your configuration has been set, you must realize the following operations on site. The first step to do is to connect each Gateway which is common to several SIMs modules for which you want to enter the parameters. This will allow the software to read the MAC (Media Access Control) address of the Gateway. The MAC address is a unique identifier assigned by a manufacturer of network interface (such as Gateways) and which is used in Media Access Control protocols sub-layer (such as ZigBee). To do this proceeds as follows.

Connecting Laptop to the Gateway via ethernet

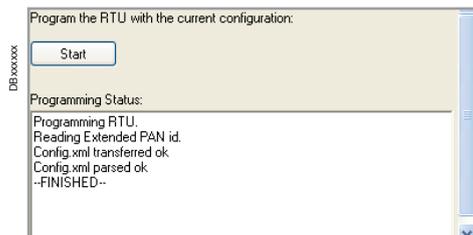
- Run your "SIM Modbus slave configuration tool".
- Open the file of the configuration.
- Connect the PC to the Gateway via ethernet:
 - either via the ethernet network of the enterprise
 - or directly via an ethernet cable.
- The "Home screen" displays, with the configuration you have entered.
- Connect a USB cord between the laptop and the Gateway you want to charge recover the MAC address. Note that power source is required because the necessary power is provided by the USB connection with the PC.
- You will download the MAC address in the software, allowing the SIMs modules affected to the Gateway to find their route for transmission.

To do this:

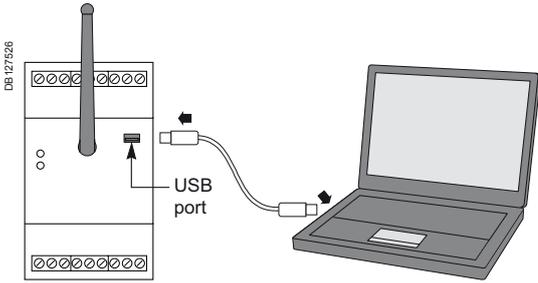
- select the Gateway by clicking on its name, in upper part (Gateways) of the "Home screen"
- this will display in the lower part (SIMs) the nodes you have selected to be connected to that Gateway. The screen is like the one presented below, where two SIM nodes are affected to the Gateway indicated



- below "Selected Gateway", click on "**Program**"
- then press click on "**Start**"
- the loading of MAC address is implemented. A message displays to signal that it has been completed with success, like indicated in the screen below.



Setting electrical equipments and monitoring devices



Downloading settings in Modules on site

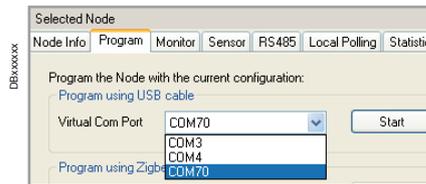
Once the MAC address recovered from the Gateway, you must charge the set parameters of each module that will be connected to the Gateway. For this, operate as follow.

Connecting Laptop to a SIM

- The "Home screen" displays, the nodes connected to the Gateway in configuration you have entered.
- Connect a USB cord between the laptop and a SIM node you want to charge with the parameters. Note that power source is required because the necessary power is provided by the USB connection with the PC.
- You will download the configuration of each node to each corresponding SIM module.

Downloading the configuration to a SIM

- Select the node name of SIM module you are connected to.
- Click on "**Program**".
- The following screen displays, indicating the COM port using ZigBee (here COM70). The port is selected automatically.



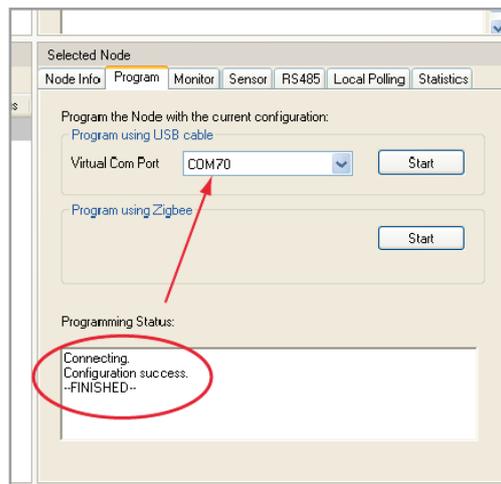
Ecran provisoire

- Click on "**Start**": the configuration is automatically downloaded to the SIM. During the downloading, a green cursor displays.



Ecran provisoire

- When the downloading is finished, a message indicates that it has been completed successfully, like on the following screen.



Ecran provisoire

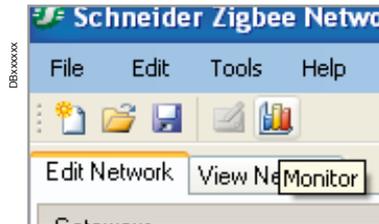
Setting electrical equipments and monitoring devices

Downloading the configuration to other SIMs

- For each SIM, repeat the previous procedure.

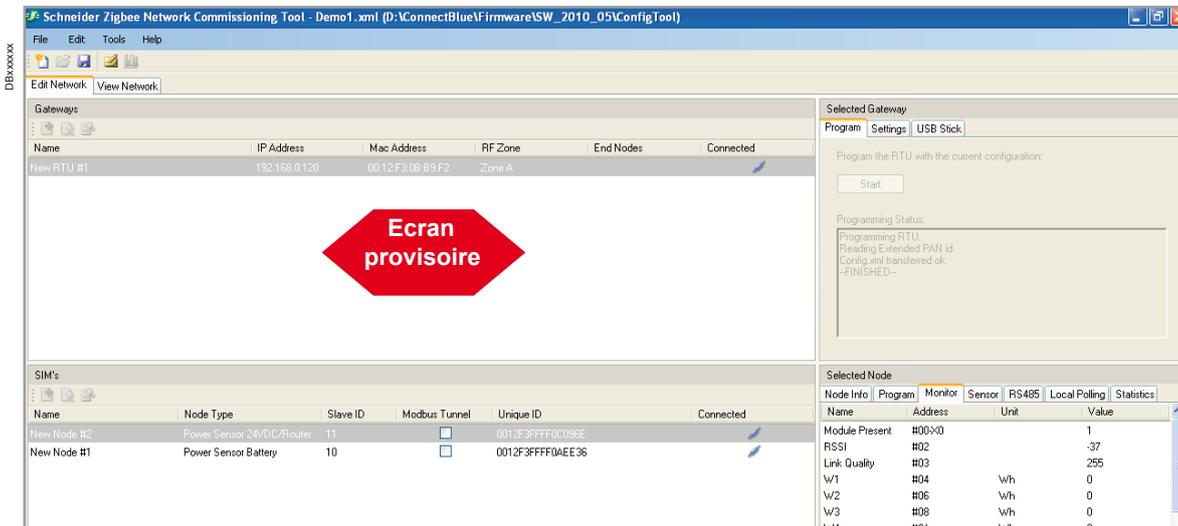
Monitoring the downloaded configuration

- Click on the  icon indicated below, this will select the Monitor Mode as in the screen.



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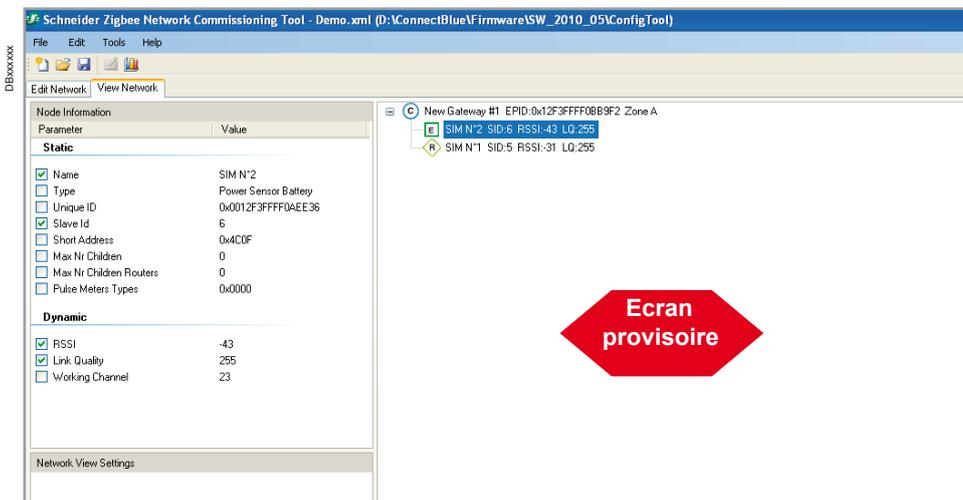
- This will display the following configuration view screen.
- An icon in the column connected indicates that the modules are effectively connected.



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Viewing the ZigBee network

- Clicking on the "View Network" icon.
- The following screen displays, summarizing the ZigBee network.



Ecran provisoire

Setting electrical equipments and monitoring devices

When the installation is powered up, an auto discovery mechanism of each ZigBee node is done.
The operator can individually select which ZigBee nodes he wants to attach to each ethernet / ZigBee Gateway.

Second method - On line option with SIM ZigBee configuration tool

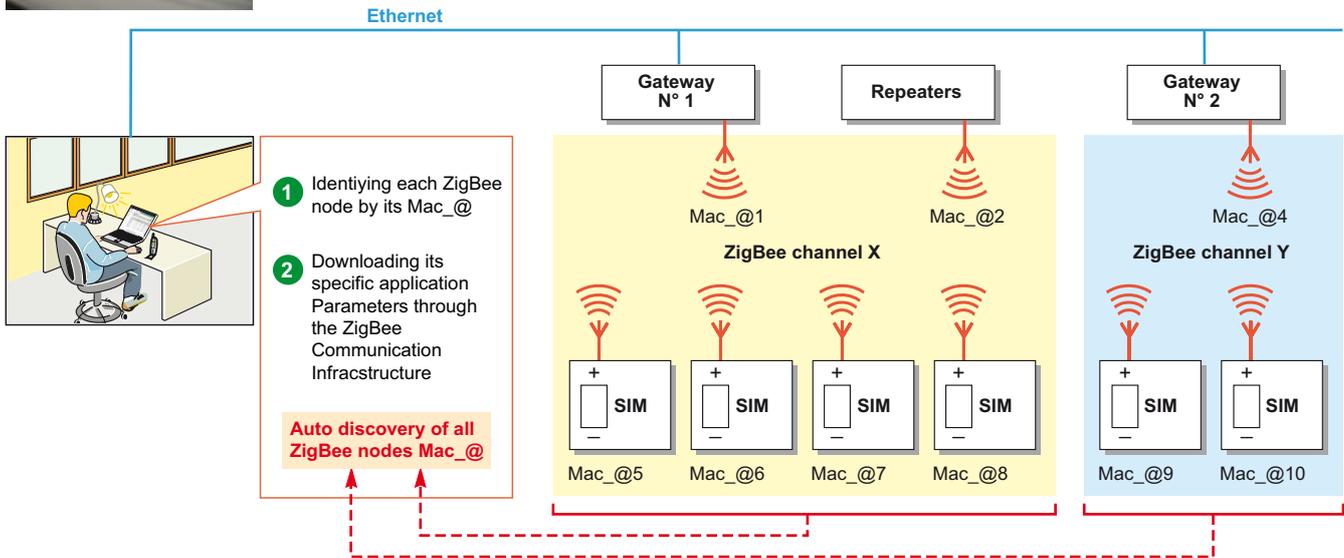
General principle for on line option (auto discovery mode)

At physical installation of each ZigBee node, a paper tag with its unique Mac address can be stuck on the building installation drawing.

Building IP infrastructure



DB127527



Advantages

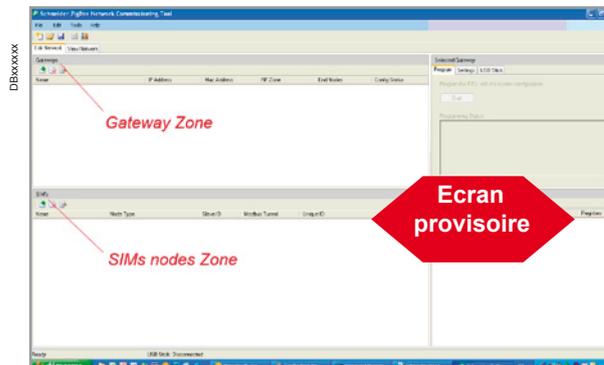
- This method allows an auto-discovery of all the SIM nodes after their wiring on site, according to their identification on drawings. You can work on site nearby the switchboard containing the equipment.
- Before doing this, the SIM nodes must have been wired according to drawings, between them and with the Gateways. A simple label will also be prepared and stuck on each module in order to detached and placed on the drawing during the auto-discovery phase. It will be used to note the Mac address and allow easy connection to modules on site.

Setting the parameters of the Gateways -> see page 44

Running SIM ZigBee configuration tool and working on line

After all the Gateways and nodes have been wired on site, you will use your laptop, charged with the parameters configuration of the network. But instead of entering the parameters necessary to connect each Gateway to its nodes you will use a mode allowing automatic recognition and connection between them.

- Run the "SIM ZigBee configuration tool" software.
- The following "Home screen" displays empty.



Setting electrical equipments
and monitoring devices

First connection to the Gateway on site to recover its MAC address

The first step to do is to connect your laptop to a Gateway which is common to several SIMs modules. This will allow the software to read the MAC (Media Access Control) address of the Gateway. The MAC address is a unique identifier assigned by a manufacturer of network interface (such as Gateways) and which is used in media access control protocols sub-layer (such as ZigBee). To do this proceeds as follows.

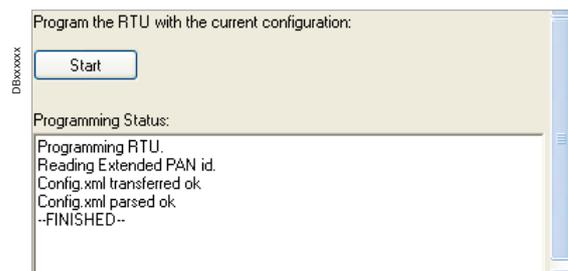
Connecting Laptop to a gateway via Ethernet

After having run your "SIM Modbus ZigBee Configuration Tool":

- connect the PC to the Gateway via ethernet
- either via the ethernet network of the enterprise
- or directly via an Ethernet cable
- the "Home screen" displays, with the configuration you have entered.
- connect a USB cord between the laptop and the Gateway you want to charge recover the MAC address. Note that power source is required because the necessary power is provided by the USB connection with the PC.
- you will download the MAC address in the software, allowing the SIMs modules affected to the Gateway to find their route for transmission.

Automatic downloading of the MAC address

The loading of MAC address is automatically implemented by the connection. A message displays to signal that it has been completed with success, like indicated in the screen below.



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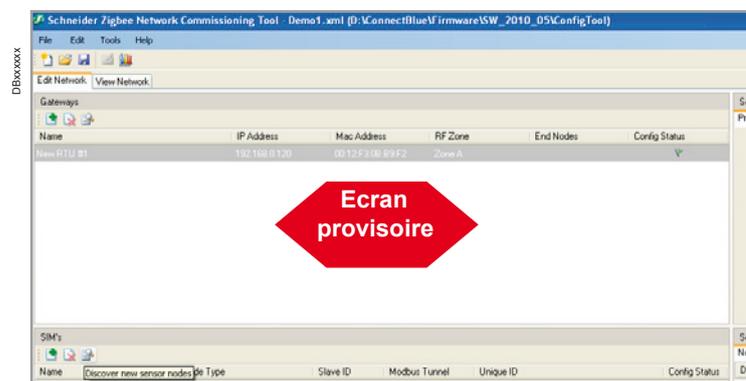
Auto-discovery of SIMs nodes

With the MAC Address recovered in your PC, you can activate Auto-discovery mode of the nodes.

To activate the "Auto-discovery" mode:

- power on the area containing the nodes in order they can emit their research signal
- click on the  icon
- in the scrolling menu select and click on "Discover new sensor nodes".

This launches the Auto-discovery process.



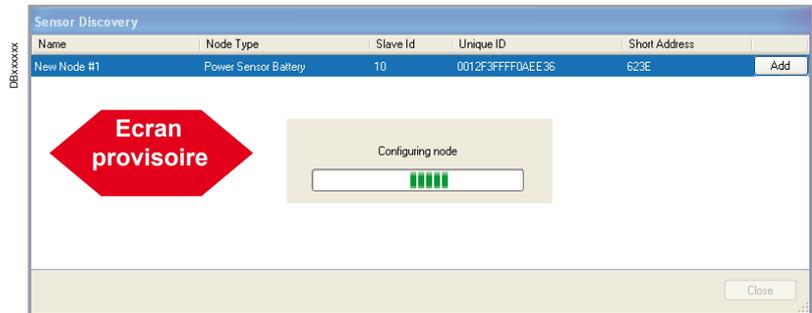
Ecran provisoire

Setting electrical equipments and monitoring devices

- Each time a new sensor node is discovered, it appears in the sensor discovery window as below.



- Click on the Add button to select the node to be associated to the Gateway.

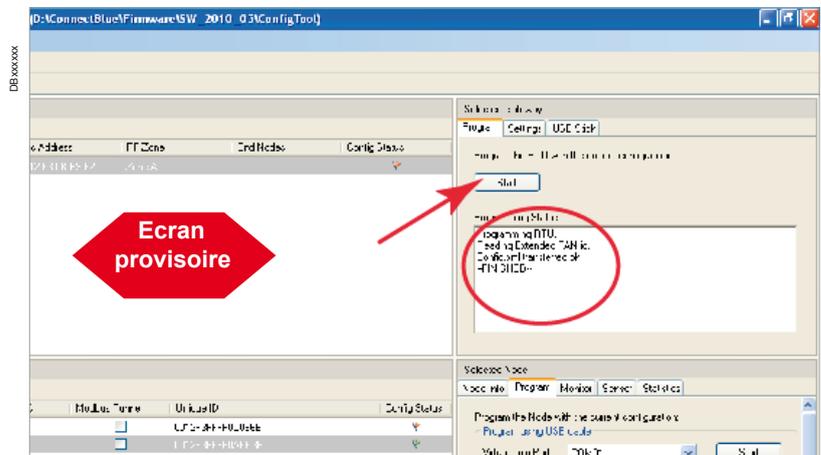


Setting the parameters of each node

Once the individual parameters of the sensor have been set (Node Name, ...Pulse Weight, Physical units, ...) following the procedure see "Setting parameters of a New Node" on page 41 they can be downloaded in each node via the ZigBee link.

Downloading the parameters of each node

At this level, the connection between the gateway and the nodes has been automatically implemented thanks to the auto-discovery mode. The MAC address of each module is known from the Gateway. Now you must download the parameters of each node using the same procedure that in the first method, i.e as follow.



Downloading the configuration to other SIMs

- For each SIM, repeat the previous procedure.

Monitoring the downloaded configuration [see page 53](#).

Viewing the ZigBee network [see page 53](#).

Setting electrical equipments and monitoring devices

Modbus register mapping

The Modbus register set for each SIM / Modbus slave Id, is mapped as follows.

Register Name	Address	Data type	Access	Remark
Module present	0	Bit	R	Not used in the Modbus slave
RSSI	2	16-bit register	R	Not used in the Modbus slave
Link quality	3	16-bit register	R	Not used in the Modbus slave
W1 - Cumulated power 1	4	2 x 16-bit register	R	Unit is Wh
W2 - Cumulated power 2	6	2 x 16-bit register	R	Unit is Wh
W3 - Cumulated power 3	8	2 x 16-bit register	R	Unit is Wh
W4 - Cumulated power 4	10	2 x 16-bit register	R	Unit is Wh
W5 - Cumulated power 5	12	2 x 16-bit register	R	Unit is Wh
W6 - Cumulated power 6	14	2 x 16-bit register	R	Unit is Wh
P1 - Instantaneous power 1	16	16-bit register	R	Unit is W
P2 - Instantaneous power 2	17	16-bit register	R	Unit is W
P3 - Instantaneous power 3	18	16-bit register	R	Unit is W
P4 - Instantaneous power 4	19	16-bit register	R	Unit is W
P5 - Instantaneous power 5	20	16-bit register	R	Unit is W
P6 - Instantaneous power 6	21	16-bit register	R	Unit is W
CB1 - On/Off status 1	22 bit 0	Bit	R	Circuit breaker / trip 1
CB2 - On/Off status 2	22 bit 1	Bit	R	Circuit breaker / trip 2
CB3 - On/Off status 3	22 bit 2	Bit	R	Circuit breaker / trip 3
CB4 - On/Off status 4	22 bit 3	Bit	R	Circuit breaker / trip 4
CB5 - On/Off status 5	22 bit 4	Bit	R	Circuit breaker / trip 5
CB6 - On/Off status 6	22 bit 5	Bit	R	Circuit breaker / trip 6
Absolute threshold alarm	23 bit 0	Bit	R	
Battery critical level alarm	23 bit 1	Bit	R	
Analog 1	24	16-bit register	R	Unit is mV
Analog 2	25	16-bit register	R	Unit is mV
Battery level indicator	26	16-bit register	R	
Long term accumulated data reset	27	Bit	W	Writing 1 will clear all power data stored in flash. Not used in the SIM10M.
Reset W1	28 bit 0	Bit	W	Writing 1 will clear W1.
Reset W2	28 bit 1	Bit	W	Writing 1 will clear W2.
Reset W3	28 bit 2	Bit	W	Writing 1 will clear W3.
Reset W4	28 bit 3	Bit	W	Writing 1 will clear W4.
Reset W5	28 bit 4	Bit	W	Writing 1 will clear W5.
Reset W6	28 bit 5	Bit	W	Writing 1 will clear W6.
Absolute instantaneous power threshold	29	16-bit register	R/W	Unit is W
Relative instantaneous power threshold	30	16-bit register	R/W	Unit 1/10 %
DO0 output	31 bit 0	Bit	R/W	
DO1 output	31 bit 1	Bit	R/W	
Firmware ID	3009	16-bit register	R	
SIM module type	3010	16-bit register	R	
Physical unit for counter 1	3011	16-bit register	R	
Physical unit for counter 2	3012	16-bit register	R	
Physical unit for counter 3	3013	16-bit register	R	
Physical unit for counter 4	3014	16-bit register	R	
Physical unit for counter 5	3015	16-bit register	R	
Physical unit for counter 6	3016	16-bit register	R	
Pulse weight for counter 1	3017	2 x 16-bit register	R	
Pulse weight for counter 2	3019	2 x 16-bit register	R	
Pulse weight for counter 3	3021	2 x 16-bit register	R	
Pulse weight for counter 4	3023	2 x 16-bit register	R	
Pulse weight for counter 5	3025	2 x 16-bit register	R	
Pulse weight for counter 6	3027	2 x 16-bit register	R	

EGX100 Ethernet TCP-IP/ Modbus

Setting of ethernet - TCP/IP / Modbus RS 485 communication Gateways

The EGX100 can allow connecting Modbus devices when you are too far from iRIO master Modbus port. It can be in case of large building or multi building connected under the same IP network or ADSL connection.

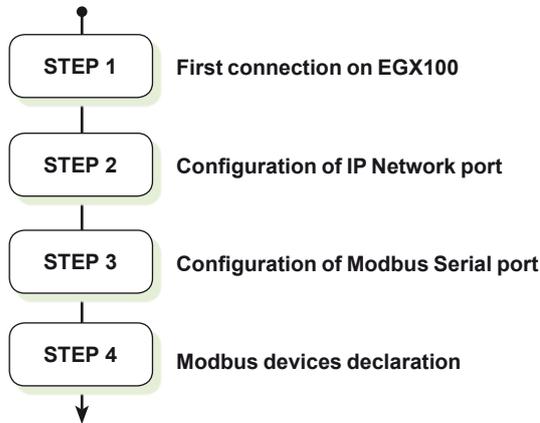
Note: EGX100 has no buffer memory for information transmitted through the Gateway.

The following describes you, with different steps, how to set up the EGX100 and declare the Modbus devices connected below EGX100.

Before doing this section please note:

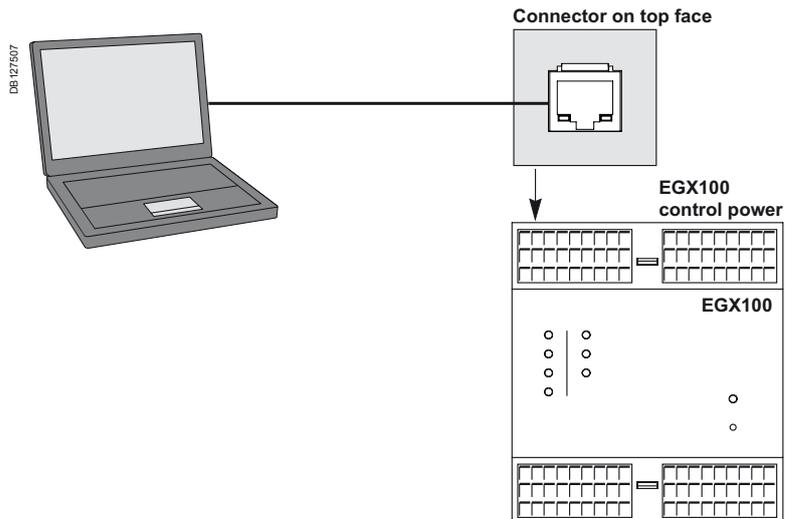
- Modbus product addresses
- Modbus product Baud rate
- Modbus product Parity
- Subnet mask IP where your EGX will be connected
- IP of the router if EGX100 is not connected directly to iRIO network.

Note: to know Subnet mask and Gateway address of your network, you can open an "Ms-Dos" window and write the command "ipconfig /all". After you copy and paste parameters displayed for Subnet mask and Gateway if you have a router.



Step 1: first connection to EGX100

You have to connect your laptop to your EGX by an RJ45 LAN cross cable.



1. By default the IP address of the EGX100 is: 169.254.0.10 (User name: Administrator, Pass code: Gateway).
2. Change the IP of your laptop to be on the same sub network as EGX100.
For example:
Laptop address: 169.254.0.9
Subnet mask: 255.255.255.0
3. Open an internet explorer window and write the default IP address of your EGX100.

Step 2: Configuration of IP Network port

Select "Setup" menu on the top of your window:

Ethernet & TCP/IP
Serial Port
Device List
User Accounts
Web Page Access
Modbus TCP/IP Filtering
SNMP Parameters

Ethernet & TCP/IP

Ethernet

MAC Address: 00:80:67:81:A4:32

Frame Format: Ethernet II

Media Type: 10T/100Tx Auto

IP Parameters

IP Address: 169 . 254 . 0 . 10

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 0 . 0 . 0 . 0

Keep these parameters by default

- IP Address:**
 - select an IP compliant and different with your iRIO IP.
- Subnet Mask:**
 - choose Subnet mask same as your iRIO.
- Default Gateway:**
 - enter IP of your router if your EGX is connected to a router
 - enter 0.0.0.0 if your EGX is directly connected on the same IP network.

Step 3: Configuration of Modbus serial port

Stay into "Setup" menu and go to sub menu "Serial Port":

Serial Port

Mode: Master

Physical Interface: RS485 2-wire

Transmission Mode: Automatic

Baud Rate: 19200

Parity: Even

Response Timeout: 3 (Seconds)

Keep these parameters by default

- Baud Rate:**
 - select Baud Rate fixed for products. This value has to be common for all products.
- Parity:**
 - select parity fixed for products. This value has to be common for all products.
- Response time:**
 - This value depends of your Modbus architecture. This value has to be set up according your product response time, length of network, number of product and number of requests.

Note: each modification into this window has to be validated by "Apply" button.

Step 4: Modbus devices declaration

For each product wired on your application you have to do the configuration described below:

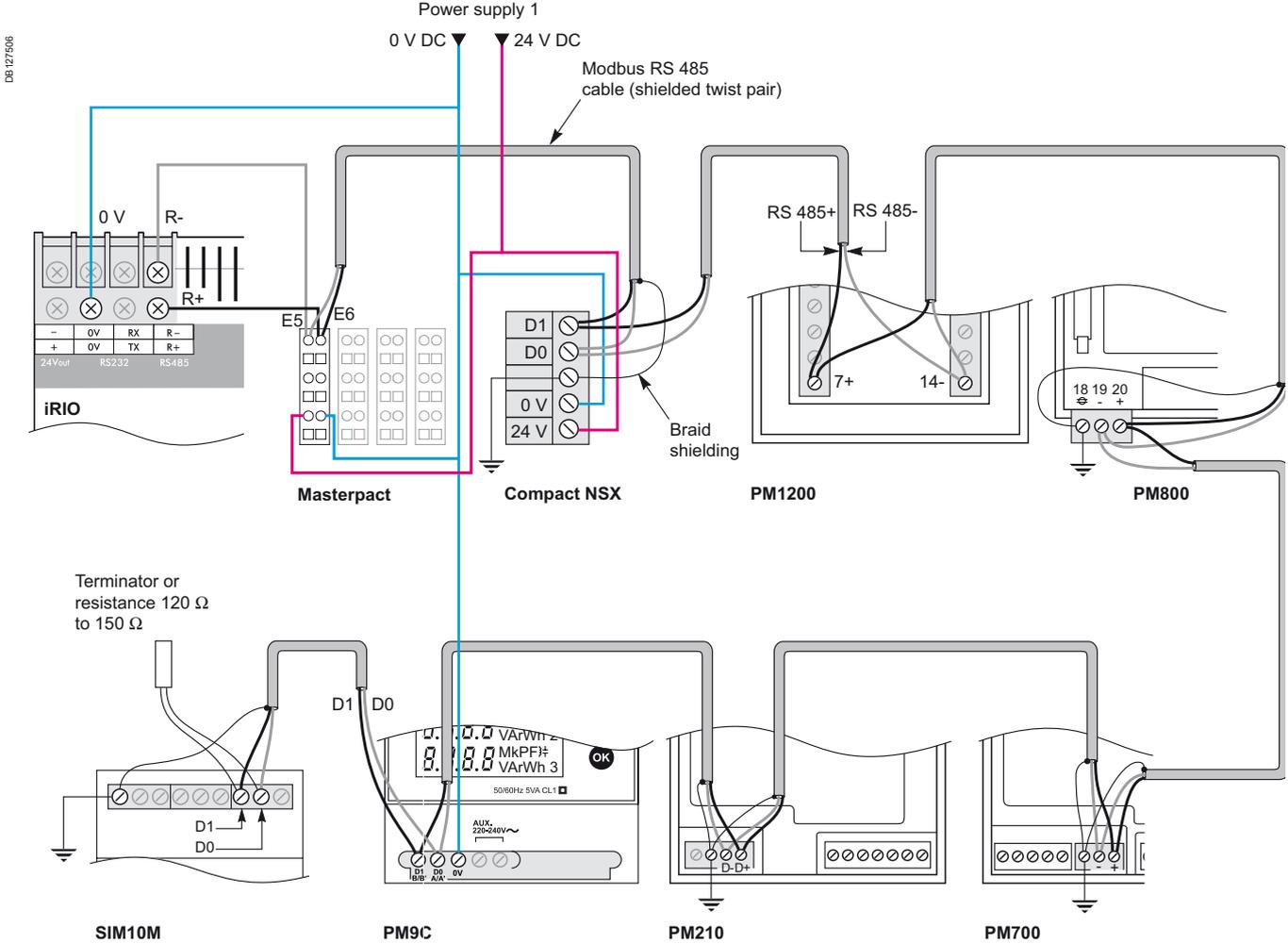
Device List

Number of Viewable Devices: 1

Local ID	Protocol
2	Modbus
	Modbus

Enter the number of Modbus product that you have

- Local ID:**
 - enter for each product the Modbus address of your devices.
- Protocol:**
 - keep "Modbus" selection in each field.



The 0 V DC shall not be connected to the ground; if so, the network could be disturbed.

This kind of wiring diagram is advised if your architecture is not too much disturbed by EMI effects. It is recommended to run the 0 V wire close to the Modbus link to avoid large common mode loops.

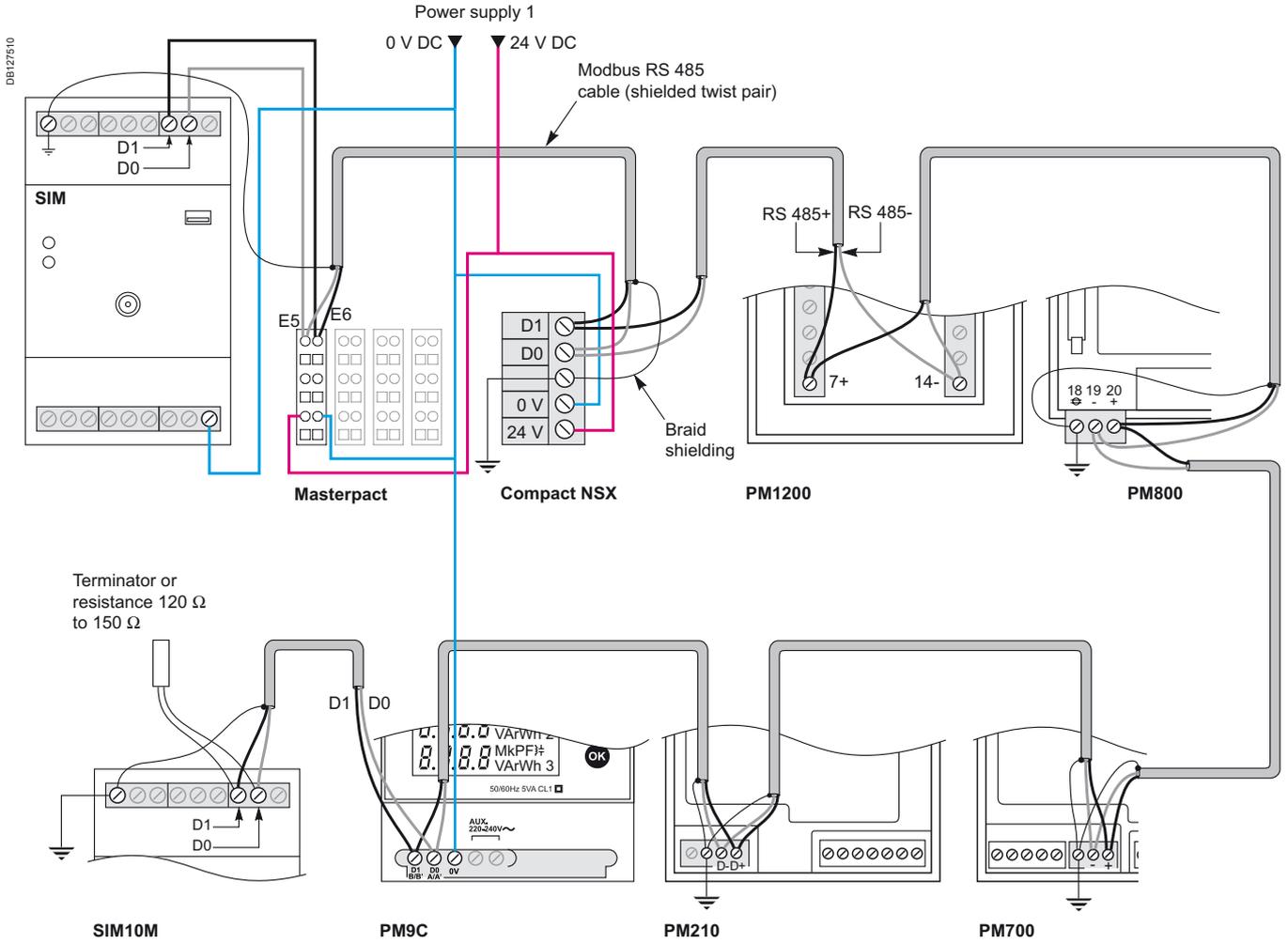
In case of harsh electromagnetic environment, the rules to get a higher immunity are described in section "EMC recommendation on the architecture" [page 63](#).

Note: for information about Modbus you can go on www.modbus.org.

Modbus RS 485 connection on the architecture

Architecture with SIM ZigBee 24 V DC

In this architecture, SIM is the "Master" and the other products are the "slaves". SIM is the line termination.



The 0 V DC shall not be connected to the ground; if so, the network could be disturbed.

This kind of wiring diagram is advised if your architecture is not too much disturbed by EMI effects. It is recommended to run the 0V wire close to the Modbus link to avoid large common mode loops.

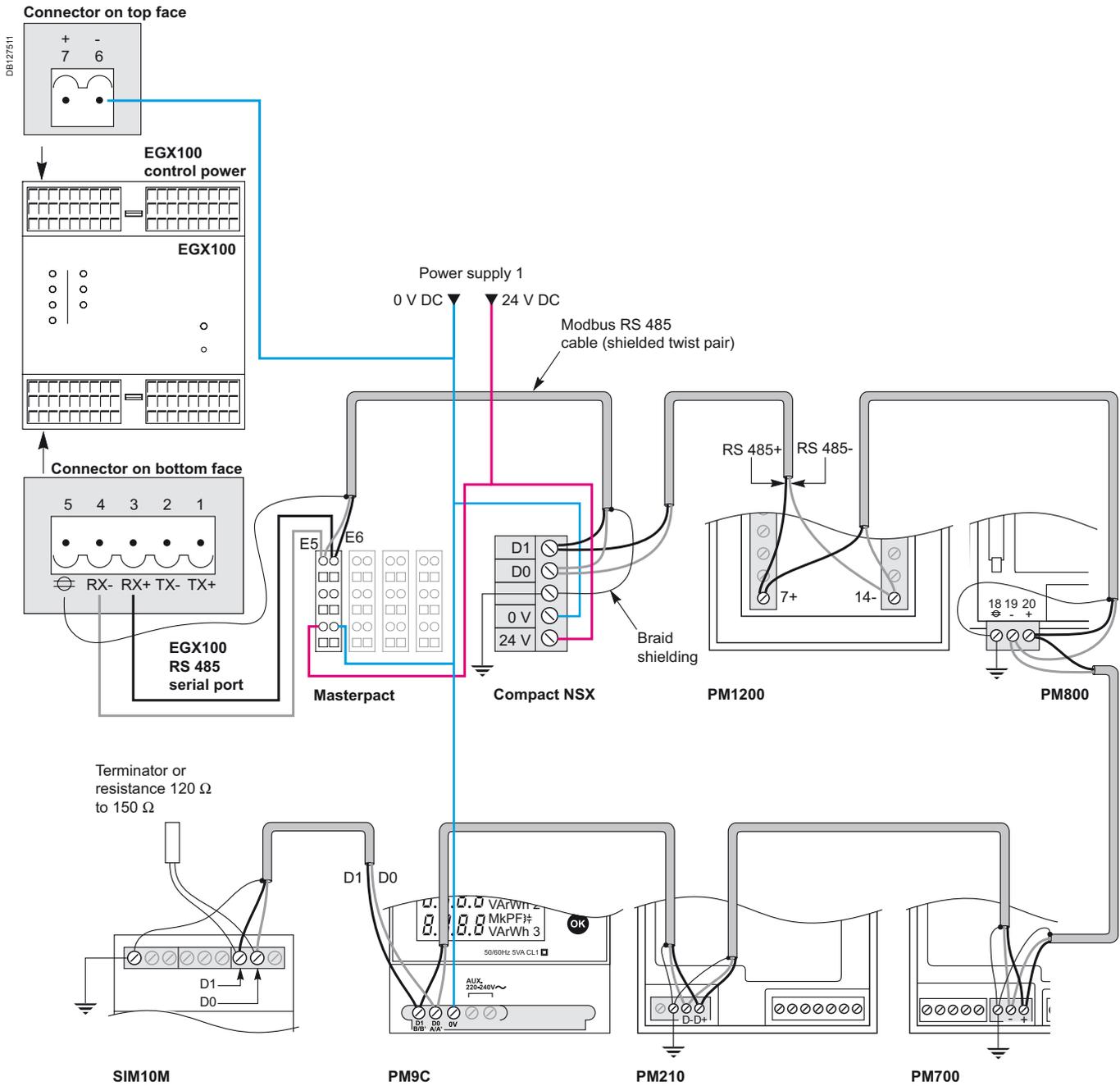
In case of harsh electromagnetic environment, the rules to get a higher immunity are described in section "EMC recommendation on the architecture" [page 63](#).

Note: for information about Modbus you can go on www.modbus.org.

Modbus RS 485 connection on the architecture

Architecture with EGX100

Wiring and installation guide



The 0 V DC shall not be connected to the ground; if so, the network could be disturbed.

This kind of wiring diagram is advised if your architecture is not too much disturbed by EMI effects. It is recommended to run the 0V wire close to the Modbus link to avoid large common mode loops.

In case of harsh electromagnetic environment and the rules to get a higher immunity, see link for document in section "EMC recommendation on the architecture" [page 63](#).

Note: for information about Modbus you can go on www.modbus.org.

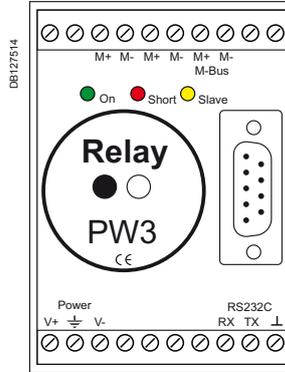
Electromagnetic effects could provide a lot of disturbances to your electronic devices and network connections. Some rules could be applied to minimize these nuisances. It is important to have ground connections.

- For other rules of cabling see the document réf. xxxxxx (see page 1 to 35).

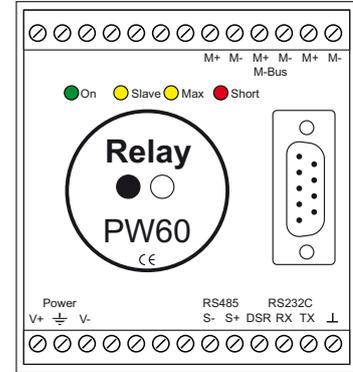


Description

The network M-Bus (Meter-Bus) is provided by a Gateway connected to iRIO RS 232 port:



M-Bus Gateway up to 3 slaves.



M-Bus Gateway up to 60 slaves.

The PW3/PW60 is a level converter (master) for remote feeding and remote reading of up to 3 or 60 slaves. It is resistant to sustained short circuit. It's very flexible in power supply.

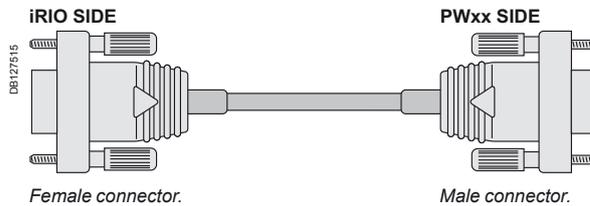
Note: operating ambient temperature is 0 - 50 °C (storage: -10 °C - 70 °C).

Connection PW3/60 to iRIO

The M-Bus is not directly connected to iRIO PLC: you have RS 232 layer network between iRIO and PWxx Gateway and the PWxx delivers M-Bus network for meters.

Connection by cable:

Between iRIO PLC and PWxx you have to use a **RS 232 straight cable** with two SUBD-9 connector (female connector on iRIO side and male connector on PWxx side).

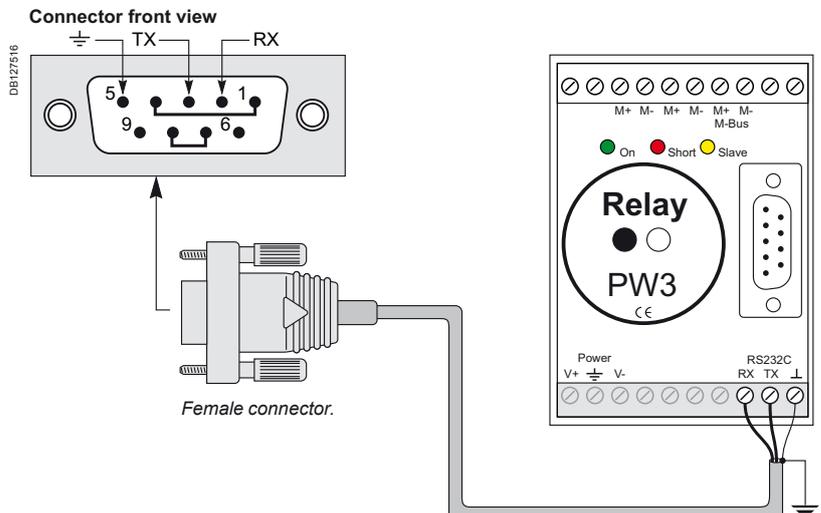


Female connector.

Male connector.

Connection by wiring:

Also you can wire your own cable for connection between iRIO on PWxx Gateway.

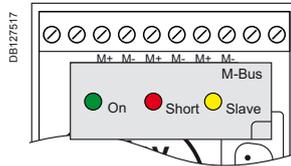


Female connector.

PW3/60 Technical Features

LED indicators

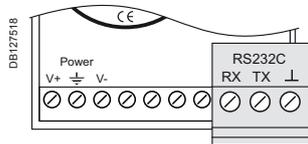
RS 232 interface



On: supply voltage is applied
Short: overcurrent (short-circuit)
Slave: slave transmitting

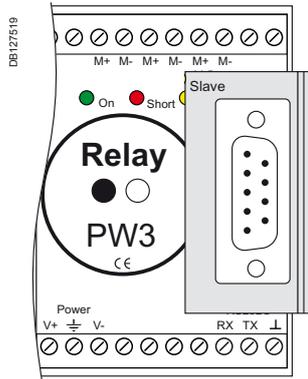
For data request and utilization of the respond data, a control computer is necessary. Therefore an RS 232 interface is available. The RXD, TXD and GND lines are run to screw terminals and to the Sub_D connector in front. Echoes are suppressed. There is no isolation between M-Bus, power supply and RS 232.

RS 232 terminals



RX: data line (PC receive line).
TX: data line (PC transmission line).
⊥: interface reference voltage (GND).

RS 232 terminals



Assignment of DB9 socket

- Pin 1** DCD Linked with pin 4
- Pin 2** RXD Data line (PC receive line)
- Pin 3** TXD Data line (PC transmission line)
- Pin 4** DTR Linked with pin 1
- Pin 5** GND Interface reference voltage
- Pin 6** DSR High level (detection of PW3)
- Pin 7** RTS Handshake line, linked with pin 8
- Pin 8** CTS Handshake line, linked with pin 7
- Pin 9** Not assigned

M-Bus specification

Features for PW3

Number of unit loads	0...3
Quiescent current	0...5 mA
Fixed bit detection level	7...9 mA
Resistance to short circuit	Permanent
Overcurrent interruption:	
■ level	50...70 mA
■ shortest bus switch off time	50 ms
Bus quiescent voltage	30.5 V ±5 %
Internal resistance	< 100 Ω
Transmission speed	300...9600 bauds

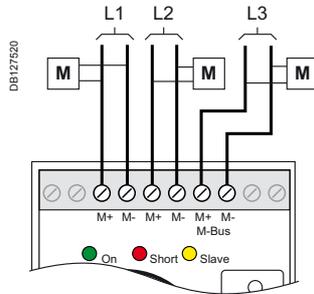
Features for PW60

Number of unit loads	0...60
Bus quiescent current	0...90 mA
Level for max. led	90...110 mA
Level for collision detect	Type 30 mA
Resistance to short circuit	Permanent
Overcurrent interruption	130...160 mA (min. 50 ms)
Bus quiescent voltage	36...41 V
Bus voltage space	24...27 V
Transmission speed	300...9600 bauds

■ **Length recommended**

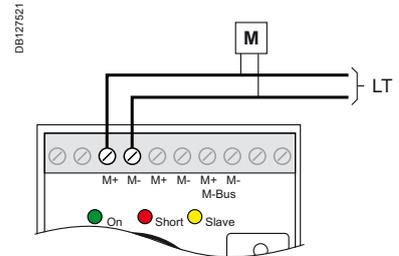
The length recommended depends to the cable used. You have to use a twisted cable (phone cable can be used). The maximum length recommended is 2000 meters for 3 stations (for PW3) or 60 stations (for PW60). In case of 2000 meters the baud rate advised is 2400 bps.

■ **Topology**



Maximum length = 2000 meters
 $L1 + L2 + L3 \leq 2000$ m.

Star topology.



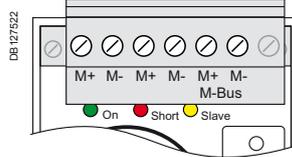
Maxi. LT length = 2000 meters.

Daisy chain topology.

Note: M = meter (gas, electricity...). For more information on M-Bus technology you can consult the site www.M-Bus.com.

M-Bus terminals

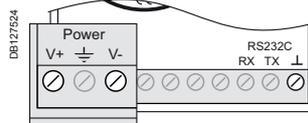
Modbus terminals



M+ M-: there are three terminal pairs, so that the designations M+ M-, serve to differentiate between the M- Bus lines.

Power Supply Terminals

Power supply terminals



V+ V-: terminal for power supply.
 earth symbol : earthing for balancing the M- Bus and for diverting peak voltages (for example if lightning strikes).

Note: that the power supply transformer is supplied into the PW3 and PW60 package.

■ **Features of power supply:**

- supply voltage range AC: 10-27 V AC
- power requirements AC: 6 W
- supply voltage range DC: 10.5-28 V DC
- power requirements DC: 4 W.

Ethernet TCP-IP Modbus connection

Connection Products for Ethernet

Through the layer Ethernet TCP/IP connection we use the protocol Modbus. This connection is used between iRIO, Laptop, EGX105Z and EGX100. The Ethernet TCP/IP part allows our solution to be connected over internet world.

For this solution you can link your devices together with different products:

■ **switch**: it is a computer networking device that connects local network segments together.



Note: you need to put this switch on your local Ethernet network if you need more than one connection to your iRIO.
In case you have only a laptop dedicated to iRIO you do not need a switch.
However if you have an EGX100 or EGX105Z connected on the same Ethernet network you will need it.

■ **router**: it interconnects two or more Ethernet networks. This box isolates your local network to external networks (for example isolate your local network to internet public network: ADSL box has router embedded).



Ethernet TCP-IP Modbus connection

Ethernet TCP-IP Modbus Services

The Ethernet TCP-IP Modbus supports different services:

- **send email** from iRIO to a mail box: to be able to send an email, you need to use the service named **SMTP** (Simple Mail Transfer Protocol).

The process smtp is defined by an electronic address (example of address: smtpauth.schneider.com).

Some provider of IT network locks also the smtp by a login and password. So, you have to see your internet provider to deliver you the address, login and password of your smtp process and you enter these parameters into iRIO to allow iRIO to generate email.

Note: into the mail you can attach a report or create email with a content dedicated to an alarm.

- **transfer of reports** from iRIO to another database:

iRIO can send a report to a directory situated in another database over Ethernet network.

This service is possible by using **FTP** service (File Transfer Protocol).

You have to ask to the owner of the database: the address of its ftp, login, password and the name of the directory under its database to store the report.

- **remote configuration and diagnostic** from internet world between laptop and iRIO (by **HTTP** service: Hyper Text Transfer Protocol).

Ethernet TCP-IP Modbus connection

Addressing on Ethernet TCP-IP Modbus

Each device connected on Ethernet TCP-IP Modbus has three independent connection parameter specified by:

■ **Parameter1: IP address:** this address identifies the device connected on the network Ethernet.

Each IP embeds the services described in section "Connection products for Ethernet" page 67. An IP address is divided in different port which activates the services:

SMTP: 25

FTP: 21

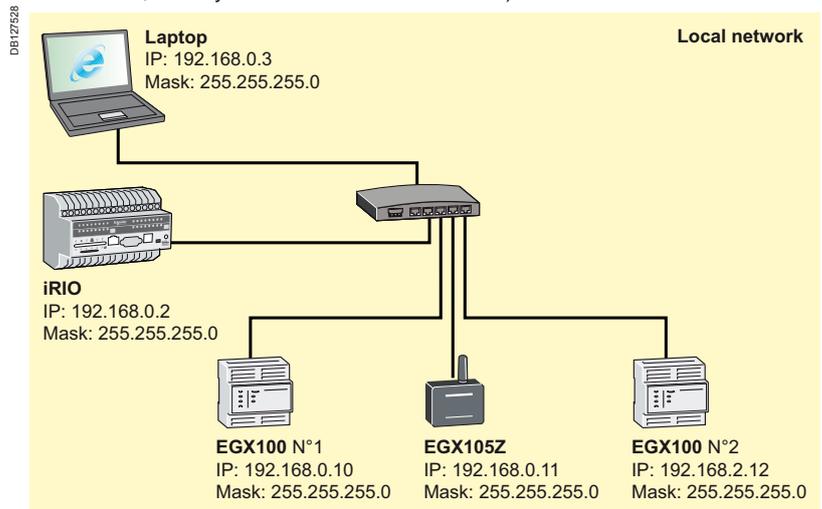
HTTP: 80

Read/write Modbus exchanged between laptop, EGXs and iRIO: 502

For example: you want to read Modbus register on an EGX100 from iRIO. Into the iRIO, you read the IP of EGX100 and access to port 502 to have the values into the Modbus registers of EGX100.

■ **Parameter2: Sub net mask:** this data indicates the address part which specifies the local network where the device is linked. Also Sub net mask determines, for every address, if it is linked to the local network or not.

Below you have an example: we choose sub net mask: 255.255.255.0 and IP for iRIO: 192.168.0.2. This means that all IP address begins by 192.168.0.x with the same prefix will be included into the local network of the iRIO (if sub net mask= 255.255.0.0, we only take into account 192.168.x.x).



The second EGX100 gateway is not included into this local network because the prefix is different so iRIO cannot communicate with EGX100 N°2.

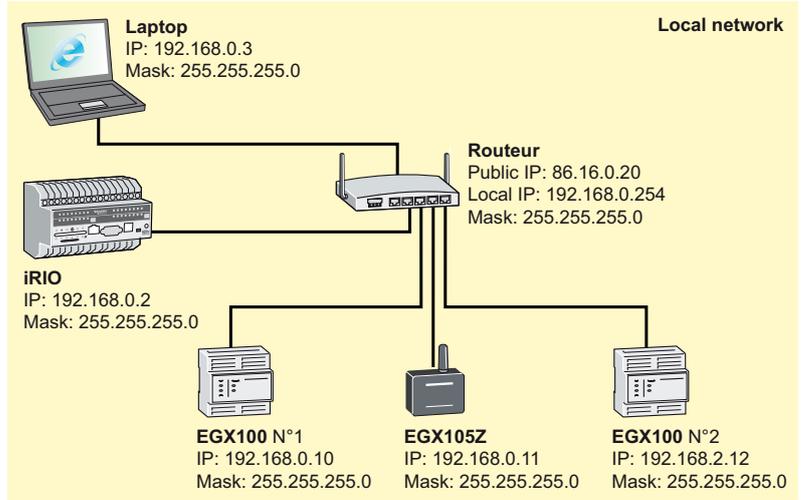
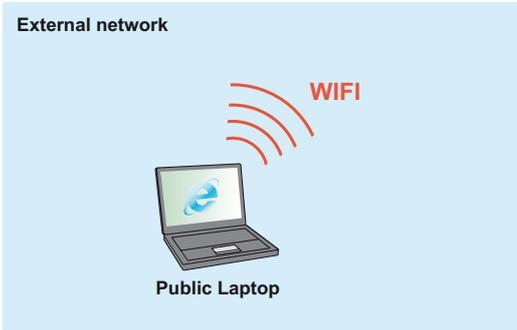
■ **Parameter3: Gateway:** it is the IP address where you have to forward IP information to other devices located outside of the local network. Most of the time the gateway is the internal IP of the router. You have to fill this parameter to access to the services SMTP, FTP and HTTP.

Note: if you do not use router you leave blank the gateway parameter.

Ethernet TCP-IP Modbus connection Topology

Wiring and installation guide

DB12773

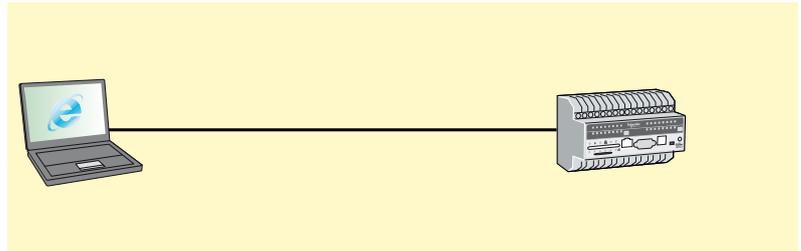


On this configuration we add the internal IP of the router into the gateway address of the iRIO. The iRIO will be ready to send email or reports to external network.

For this solution you can find you can find two kind of topology:

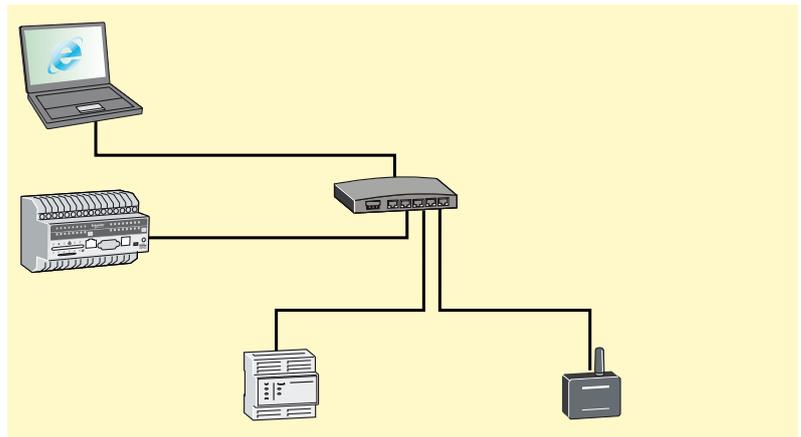
- Point to point (single connection):

DB12774



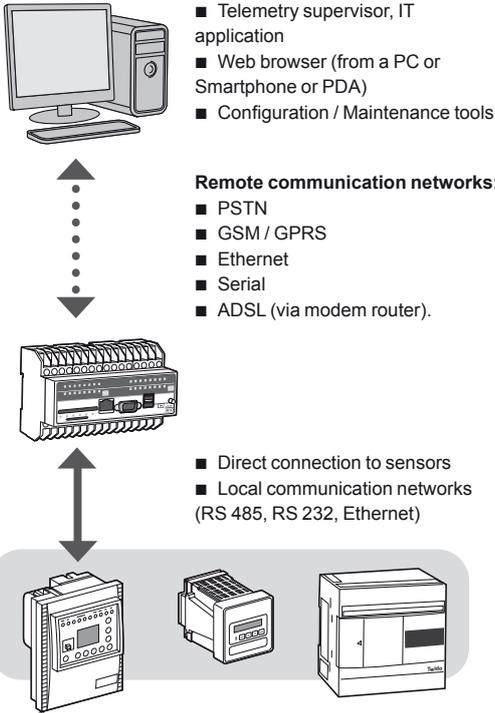
- Star connection:

DB12775



iRIO implementation

DE9421



What is iRIO

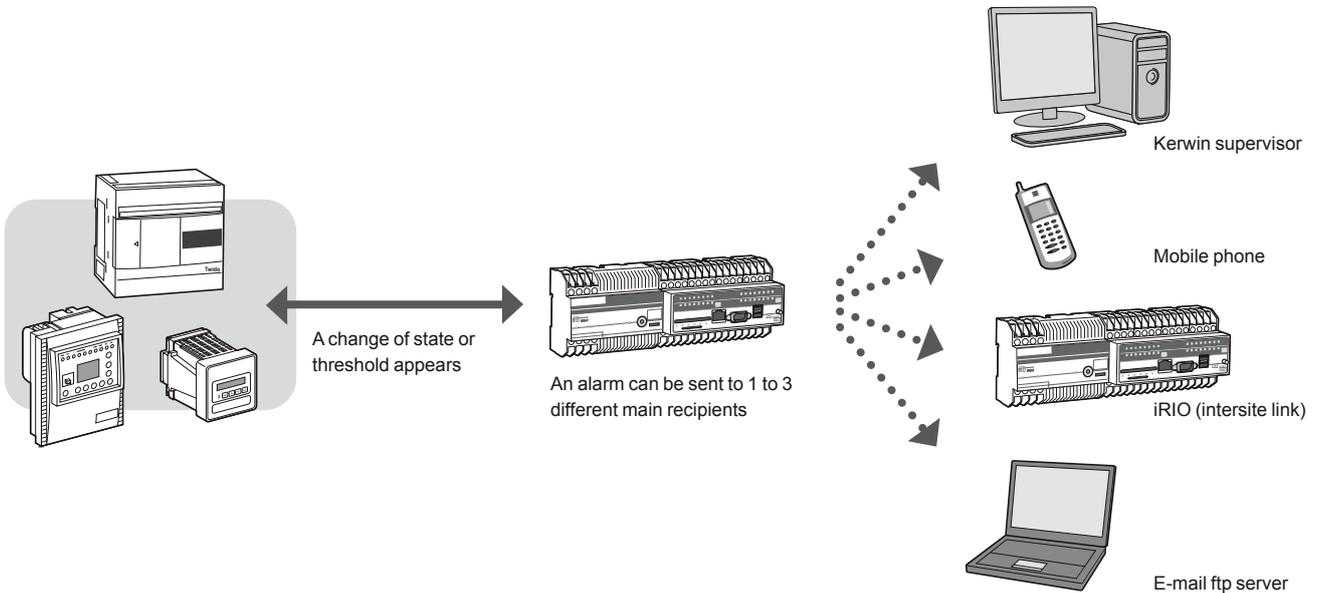
- iRIO is a compact RTU (Remote Terminal Unit) including:
- communication capabilities (upstream to telemetry supervisors, or IT applications, downstream to PLCs, controllers, meters, etc.)
 - physical input and output (digital and analogue type) management
 - acquisition, calculation and storage (with time-tagging) functions
 - alarm detection (and time-tagging) with immediate secure transmission to various recipients (supervisor and on-duty personnel via e-mail or Short Message Service (SMS)).

Typical architecture using iRIO RTU

- Operate, configure and maintain your installations remotely using:
 - Schneider Electric Kerwin telemetry supervisor or a compatible third party supervisor (operation: control and monitoring, alert management)
 - any Web browser (operation and configuration)
 - Kervisu (configuration and maintenance proprietary tool).
- Local operation/configuration using serial RS 232 or Ethernet link: Web browser, configuration/maintenance tool (Kervisu).
- Monitoring/Control via digital or analogue sensors, actuators, PLCs, meters and regulators.

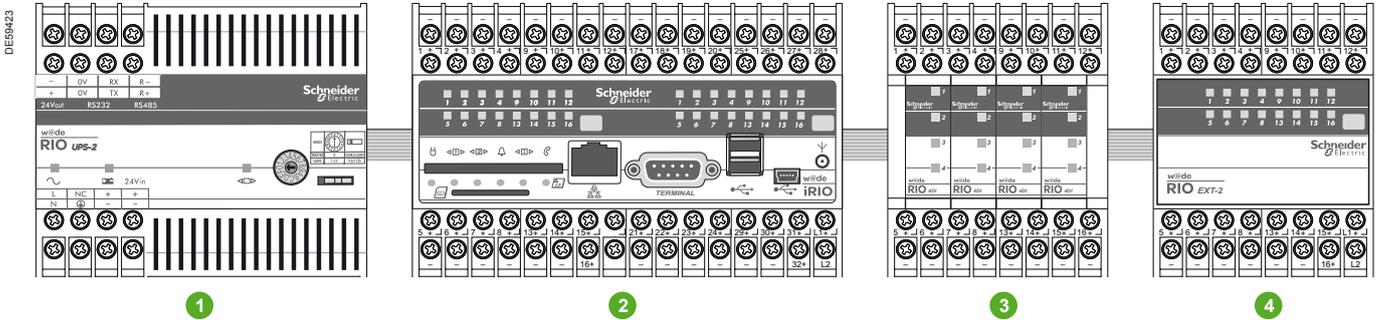
DE9422

Alarm transmission



iRIO implementation

Modularity of the the iRIO range

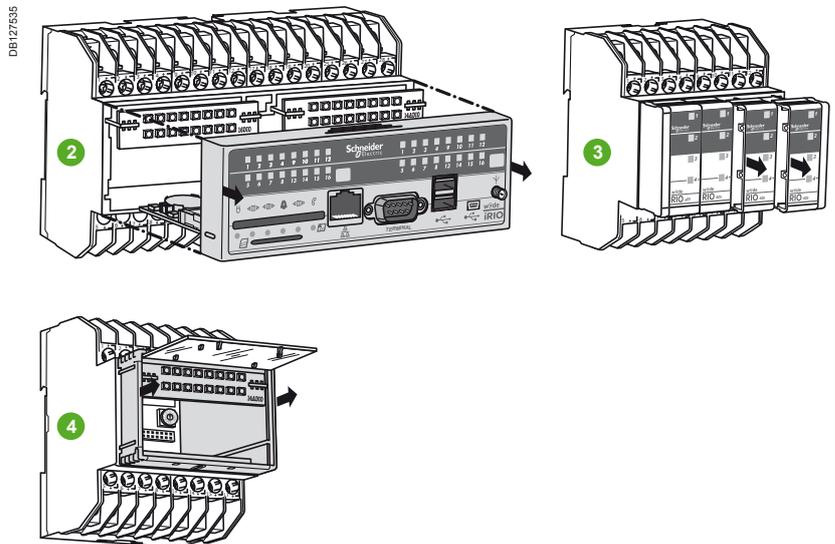


The iRIO range is based on a modular architecture consisting of a central processing unit, a power supply unit and numerous input/output boards.

- 1 Power supply enclosure UPS-2 (W x H x D: 105 x 90 x 55 mm).
- 2 iRIO CPU module (W x H x W: 140 x 90 x 70 mm).
- 3 EXT-1 extension with 4 slots for T1 boards (W x H x D: 70 x 90 x 70 mm).
- 4 EXT-2 extension with 1 slot for T2 board (W x H x D: 70 x 90 x 70 mm).

The iRIO range has great modularity; the boards are interchangeable (except for the CPU board and the power supply board): pull on the board to remove it from its slot. The boards can be positioned and replaced as the user wishes.

Check carefully that the modules are not powered up before removing the front panel of the enclosures.



Technical characteristics

iRIO is a Remote Telemetry Unit based on an Atmel AT91RM9200 (ARM9) CPU/Win CE board running Xflow, Schneider Electric embedded software for telemetry applications.

Hardware

- **Enclosure:** PVC UL94-V0, modular format, DIN rail mount, screw terminal connection, separable electronics.
- **Conditions of use:** temperature: -25 to +70 °C; humidity: 95 %
- **Standards:** conformity IEC 61131-2
- EMC: immunity EN 61000-6-2; disturbance EN 61000-6-4
- Lightning: 61000-4-4; 61000-4-5
- Electrical safety: EN 61950.
- **Warning:** this is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.
- **CPU board:** Atmel AT91RM9200 180 MHz CPU with 16 MB flash, 16 MB DRAM and 2 MB SRAM, running a custom WIN CE (4.2) image.
- **Communications:** 2 RS 485, 1 RS 232 or GSM internal modem, Ethernet 10BaseT/100BaseTx; one of the RS 485 links (RS1-485 (COM3) or RS2-485 (COM4)) is accessible from the power supply enclosure (explained later in this document).
- **Memory expansion:** a Compact Flash device and SD board slots are included, limited to storage board.
- **I/O management:** a complete range of I/O boards can be provided: all these boards are recognized automatically by the iRIO.
- **Third-party equipment I/O management:** PLCs, controllers, meters, inverters, HMIs etc. on various communication links (serial RS 485, RS 232, Ethernet) and protocols (standard or proprietary).
- **A Watchdog device for both hardware and software** prevents iRIO from being in an unknown status. In case of any problem (application or hardware environment), iRIO performs a restart.

Software

The OS layers include a boot utility and a custom image of Win CE 4.2.

The WIN CE TCP/IP is used for Ethernet communications, but the stack used for server and client PPP communications (modem or local RS 232 link) is proprietary.

The application software is Xflow, Schneider Electric embedded software for telemetry applications.

Capacity:

- 2000 variables (I/O variables + internal variables (calculation, system information))
- 1000 alarms
- 50 history files (alarm, event, measurement files, etc.). Each file can save up to 65535 record
- 200 devices (PLC, iRIO I/O boards, inverters, meters, controllers, etc.)
- 50 dashboards
- 200 mimic diagrams
- 50 alert call groups (a call group comprises 1 to 3 main alarm recipients with 2 backup numbers per main recipient)
- 128 users (four access levels + customizable levels)
- 500 annual and weekly time schedules
- 50 applications tasks (application programs independent but managed from Xflow: these programs can be developed by Schneider Electric or by a third-party company).

Operating tools

- Web browser (PC or PDA/Smartphone).
- Kervisu (configuration/maintenance tool).
- Kerwin (Telemetry supervisor).
- Minitel (consultation only).

Process and control functions

- Calculation formulae (one per variable, two per alarm).
- IEC 61131-3 programming (support of the 5 standard languages).
- Application tasks: C programming.

Disks

- SRAMDISK : 2 MB, storage directory for files of measurements, alarms, connections, events, states, outgoing calls and the application configuration.
- SD board and CompactFlash (storage memory expansion) interfaces.
- FLASHDISK: 8 MB, embedded firmware (Xflow), Web profile. Xflow includes notably a Web server, an XML parser and a database. All have been developed and are maintained by Schneider Electric.

The main communication protocols are:

- HTTP (Ethernet and PPP)
- SMTP
- DHCP (can be disabled)
- FTP
- SNTIP
- SOAP (envelope to allow direct XML requests from a third-party IT application)
- Hayes (modem management, including GSM extensions)
- Modbus (modem and serial), Modbus TCP (Ethernet)
- Napbus, which is a proprietary extension of the Modbus protocol (used to communicate with the Kerwin Telemetry supervisor: this protocol supports autodescription of the iRIO database, structured files (timestamped and organized data and raw files transfer, time management, etc.)
- Proprietary protocols: Unitelway, M-BUS, OMRON, Yokogawa, Siemens, TAC, Xantrex, Sunezy, etc.

Security considerations

The iRIO RTU provides remote access to critical data, and possibly networks.

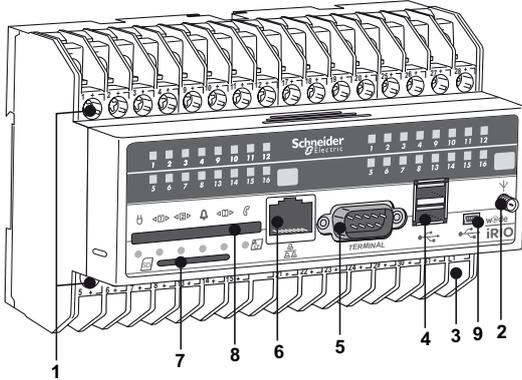
These functions have been secured:

- no access is allowed to the system without prior identification. All connections are logged, and depending upon modem capacities, caller ID is supported. Unsuccessful attempts to connect from Xflow are logged, and delayed to avoid multiple attempts. For each remote connection, a maximum number of outgoing calls per day can be configured
- the operating system is in no way accessible: it is a single binary file loaded at boot in DRAM, and cannot be altered
- the Web server included has been developed by Schneider Electric, and does not allow any access other than to Xflow applications Web pages. No Microsoft components are used except for low-level OS utilities and drivers, and no ActiveX or Java applets are used. The WIN CE image has been built without support for DCOM
- web access to Xflow requires a user name and a password. An RSA encryption is used for the password (private/public keys). A new key is calculated for each new session. A session times out after 20 minutes without any action
- the password never appears in natural language (neither in the Web pages nor in the configuration files)
- the session number is needed in the URL to be sure that the user is still the same. This session number is also encrypted (which means it is not predictable)
- we have not heard of any viruses in WIN CE 4.2 and, if there are any, iRIO does not offer any entry points for them
- there is no need for a regular security patch for the operating system. iRIO may be used as an IP router (modem/Ethernet). This function is only available on order and cannot be activated by configuration.

Schneider Electric has audited Xflow network security: the only critical issue was the IP routing function, which has been since disabled by default and will be provided only for special orders.

iRIO implementation

DE59425



Description of interfaces

1. Terminal blocks for input/output wiring: depend on the I/O boards inserted in the enclosure (maximum 32 I/O)
2. SMA female connector for GSM antenna (case of an internal GSM/GPRS/EDGE modem)
3. Telephone line (case of an internal PSTN modem)
4. 2 USB hosts (history storage extension)
5. RS 232 DB9 male (5 wired signals [Rx, Tx, GND, RTS/CTS]): local connection (PC); PLC; external modem (radio, private line, PSTN, GSM)
6. ETHERNET/RJ45 connector interface (Ethernet 10/100 interface [Intranet, PC, PLC, measurement converter, router modem [ADSL, Satellite, etc.]])
7. SD memory board interface (history storage extension)
8. Compact Flash memory board interface (history storage extension)
9. Mini-USB (not used).

Note 1: 2 serial RS 485 interfaces on the backplane. One (COM3) is dedicated to communication with T1 or T2 I/O boards in CPU module or extensions EXT-1 or EXT-2 connected directly to the CPU module. The second one (COM4) is available through UPS-2 power supply module to communicate with third-party equipment or with distributed EXT-1 or EXT-2 I/O modules.

Note 2: the storage extension (USB hosts, SD memory board, Compact Flash memory) should be less than 1 Go.

RS 232 serial link

Description

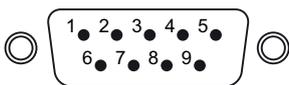
The RS 232 port allows the following links to be established:

- direct link (Rx, Tx, GND, RTS/CTS) for iRIO configuration or third-party equipment connection
- link to an external radio (RS 232)
- link to an external GSM modem (Hayes commands)
- link to an external PSTN modem (Hayes commands).

The following table describes the characteristics of the iRIO serial port.

Characteristics	Description
Connection	SUB-D9 male connector
Physical link	RS 232 serial link (DTE) 1.2 to 115.2 kbauds
Protocols handled	Modbus and proprietary protocols Napbus PPP / HTTP / SOAP / FTP / Mail Hayes commands

DE59430



Presentation of the serial port

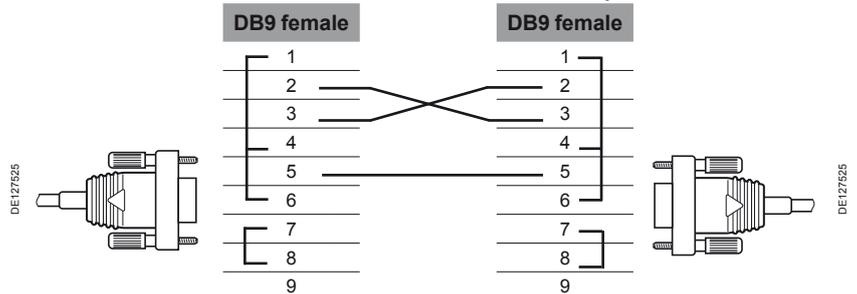
The figure opposite illustrates the RS 232 serial port on the iRIO.

Serial port pin arrangement

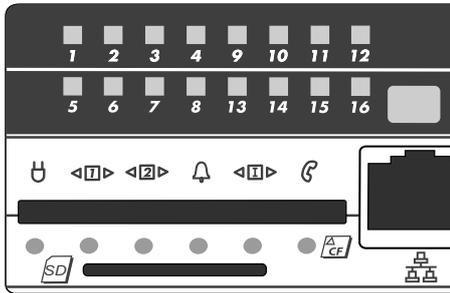
The following table shows the pin arrangement of the iRIO serial port:

2	Input	Rxd: Receive data
3	Output	Txd: Transmit data
5	-	Signal Ground: signal reference earth (0 V)
7	Output	RTS: Request To Send
8	Input	CTS: Clear To Send

Connection of iRIO to a PC DB9 serial port



DE69432



Description of indicators

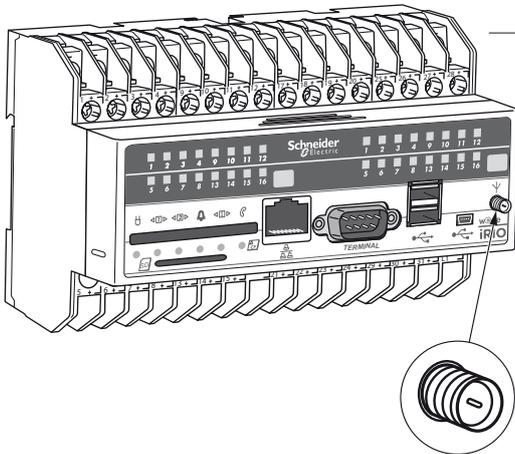
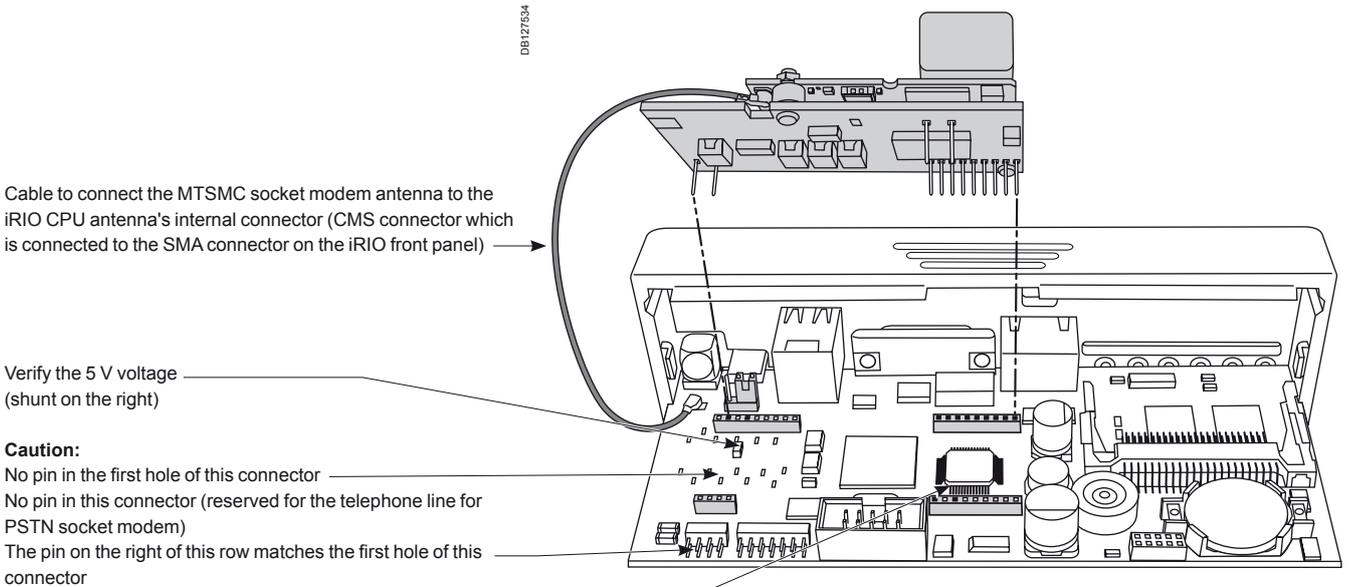
	I/O status	The activation of the 2 groups of LEDs (from 1 to 16) will depend on the type of boards installed inside the iRIO processor module
1 à 16		
	iRIO status	Off: not powered Rapid, continuous flashing: boot mode (StartX) Slow flashing (1 Hz): normal operation
	Alarm status	Off: no alarm currently active Lit steadily: at least one alarm active
	R1 RS 485 status (COM3)	Off: no communication Lit: communication in progress (sending or reception)
	R2 RS 485 status (COM4)	
	Terminal port status	
		Off: modem disconnected Lit: modem connected

Description

iRIO RTU is delivered with the socket modem already installed, depending on the product reference ordered.

The modem is held in position on a socket mounting (on the iRIO CPU board) and is easily interchangeable.

Any operation on the socket modem must be performed in consultation with a Schneider Electric technician. Unless it is necessary, do not remove it.



Presentation of the GSM

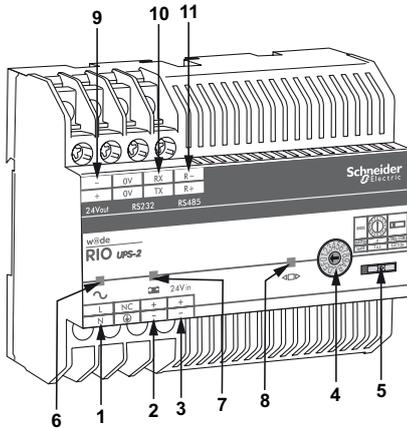
The SIM board slot is accessible by removing the front face of the processor module. The SMA antenna connector permits the connection of the GSM antenna.

Characteristic	Description
Connection	SMA antenna connector SMA board slot
Physical link	■ GSM: 9600 bds
Protocols handled	<ul style="list-style-type: none"> ■ Modbus and proprietary protocols ■ Napbus ■ PPP, HTTP, SOAP, FTP Mail ■ Hayes commands

Hardware description

UPS-2 power supply unit and RS 485 Modbus Master

DIE59438



Description

- 1 - Mains power supply 120 to 230 V AC - 0.3 to 0.085 A - 50 to 60 Hz
- 2 - 13.6 V battery charger (for 12 V 2.1 Ah lead battery)/Load current: 200 mA
- 3 - Low voltage power supply 12 to 24 V DC 1.7-0.8 A
- 4 - Addressing thumbwheel
- 5 - Communication link selector switch
When the enclosure powers the iRIO (e.g. on a master station), the selector switch allows COM3 (RS1-485 link) or COM4 (RS2-485 link) to be recovered on the terminal board 11 (for connection of iRIO Extension or a third-party device).
- 6 - Mains power supply LED indicator:
 - green flashing: mains power supply present
 - red flashing or off: mains power supply absent
- 7 - Battery indicator:
 - green flashing: battery present and charged
 - red flashing or off: battery absent
 - red flashing: short circuit on battery input
 - orange flashing: weak battery voltage
- 8 - Communication link indicator:
 - Off: no communication on the network
 - flashing: green in receive mode, orange in send mode
- 9 - 24 V DC/200 mA output (sensor power supply)
- 10 - RS 232 link (from 1200 to 115200 bps) (Rx, Tx, GND signals)
- 11 - RS 485 link (from 1200 to 115200 bps). Polarized. No daisy chain terminator.
No galvanic isolation (Modbus port for Modbus devices).

Characteristics

Primary unit		
Enclosure		PVC
Conditions of use	Temperature	-25 to +70 °C
	Humidity	95 %
Main power supply	Rated voltage	110/230 V AC
	Limit voltage	85...250 V AC
	Rated frequencies	50...60 Hz
	Rated current	0.3 A at 110 V / 0.085 A at 230 V
	Phase protection	Internal 1.25 A time-delayed
Low voltage power supply	Rated voltage	12-24 V DC
	Rated current	1.7 to 12 V DC and 0.8 A to 24 V DC
	Protection	30 V Polyswitch
Secondary unit		
5 V (internal supply on backplane): iRIO CPV or extension module)	Total power supplied	7.5 W
	Rated voltage	5 V DC
	Rated current	1.5 A
9 - 24 V output (sensors)	Total output power	4.8 W
	Rated voltage	24 V DC
	Rated current	0.20 A
	Protection	Against short circuits and 60 V surge
2 - Battery charger	Rated voltage	13.6 V DC
	Charging current	0.20 A
	Protection	Polarity reversal and discharge cutoff upon threshold
Accessories		
Lead battery	Voltage	12 V
	Current	2.1 Ah

Modbus speed recommendations

We can recommend you some baud rate selection. The baud rate value selected into speed parameter of iRIO depends on your cable length, type of cable and number of products.

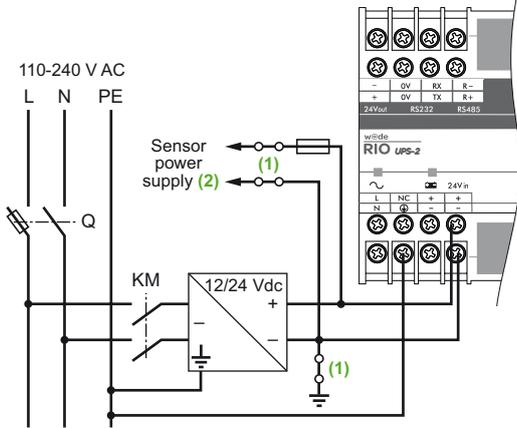
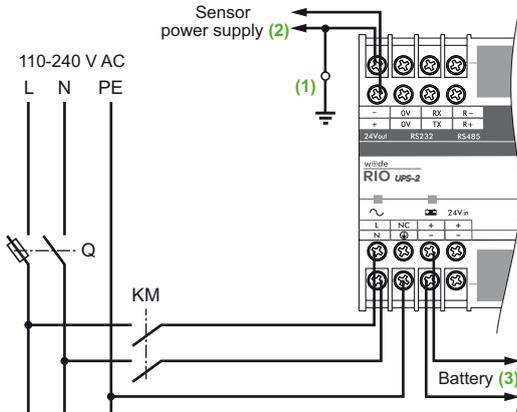
Product number	Speed (or Baud rate)	Maximum length
1	9600	1000 m
10	19200	100 m
31	9600	200 m

Note: for other information about Modbus and recommendations for Modbus, please go www.modbus.org into section technical resources and link **Modbus specification: Modbus serial line protocol and implementation guide line**.

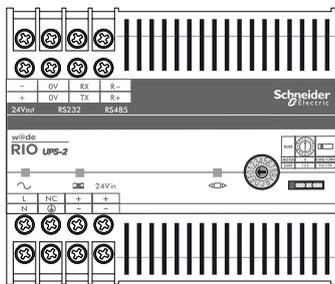
Hardware description

UPS-2 power supply unit and RS 485 Modbus Master

DE59458EN



DE59465



Connection of UPS-2 power supply modules

Do not simultaneously connect 120-230 V AC mains and an external 24 V DC low voltage power supply.

⚠ DANGER

Unexpected equipment behaviour
 UPS-2 modules must be powered either from 120-230 V AC 0.3-0.085 A 50-60 Hz mains or from an external 12-24 V DC 1.7-0.8 A power supply. Simultaneous connection of these two kinds of power supply can cause unexpected equipment behaviour or damage.
 Failure to comply with this instruction can result in death, serious injury or equipment damage.

Connection to an alternating current network 110-240 V AC

- Q** Main disconnect switch
- KM** Line contactor or circuit breaker
- (1)** Isolating link for earthing fault finding
- (2)** Available current of 0.2 A
- (3)** Charger for 12 V/2.1 Ah lead battery (charging current 200 mA)

Note: the UPS-2 power supply modules are provided with a 1.25 A internal protection fuse as original equipment. This fuse, connected to the incoming phase of the alternating current network, is located inside the module and is not accessible.

Connection to a direct current network 24 V DC

- Q** Main disconnect switch
- KM** Line contactor or circuit breaker
- (1)** Isolating link for earthing fault finding

Note: the UPS-2 power supply modules are provided with a 30 V Polyswitch as original equipment. This component, connected to the incoming 12/24 V line, is located inside the module and is not accessible.

Earthing of the UPS-2 module

Earthing of the iRIO unit involves only the power supply module.

Earthing of the power supply module

The (protective earth) terminal located on the UPS-2 power supply module absolutely must be connected to the system's protective earth as follows by a cable independent of the earth cable of the DIN rail and connected directly to the system's protective earth.

⚠ DANGER

RISK OF ELECTRIC SHOCK
 The power supply module must be earthed.
 Connect no other equipment to the power supply earth.
 Failure to comply with these instructions will cause death or severe injury.

UPS-2 configuration

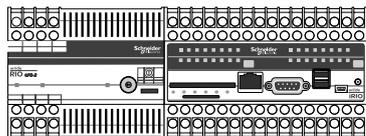
The UPS-2 power supply has 2 working modes:

- **Master:** UPS-2 powers an iRIO CPU + possibly extension units EXT-1/EXT-2.
- **Slave:** UPS-2 powers only extension units EXT-1/EXT-2.

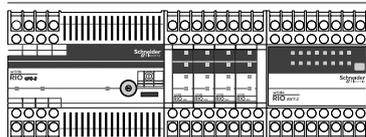
Working mode configuration

Mode	Thumbwheel	Switch
Master	Position 0	Left: COM3 on UPS2 terminal block (115200 bps) Right: COM4 on UPS2 terminal block (data rate depending on iRIO configuration (from 1200 to 115200 bps))
Slave	Position 1 to E	COM3 is routed on UPS-2 terminal block: Left: data rate 9.6 Kb Right: data rate 115.2 Kb

DE59439



DE59440



Note: the UPS-2 power supply modules are delivered in Master operating mode (thumbwheel on 0) and with serial link on the COM4 port (microswitch on the right).

iRIO implementation

Every I/O usually has two connection terminals, the "-" always being outermost on the unit.

⚠ Boards with 16 I/O channels are an exception: channels 14(+), 15(+) and 16(+) have a common connection, 14(-).

Each iRIO I/O board is powered by the iRIO backplane bus (5 V/1.5 A) provided by a UPS-2 power supply module.

Each iRIO I/O board can operate between -25 °C and +70 °C at a relative humidity = 95 %.

In the following, the accuracy is given for a temperature of 25 °C.



Description of iRIO2 16DI terminals

1-	2-	3-	4-	9-	10-	11-	12-
1+	2+	3+	4+	9+	10+	11+	12+
DI 1	DI 2	DI 3	DI 4	DI 9	DI 10	DI 11	DI 12
EXT-2 or left-hand position in iRIO enclosure ⁽¹⁾							
DI 5	DI 6	DI 7	DI 8	DI 13	DI 14	DI 15	
5+	6+	7+	8+	13+	14+	15+	
5-	6-	7-	8-	13-	14-	16+	
							DI 16

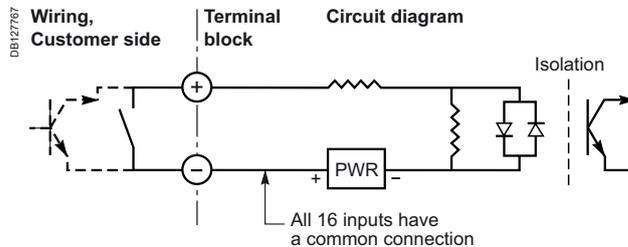
⁽¹⁾ For right-hand position in iRIO enclosure, the I/O wiring is the same: apply an offset of +16 on terminal numbers

iRIO Type 2 (T2) I/O boards

16DI

16 digital inputs/Counters to connect

- Internal power supply.
- Internal power supply of contacts (INT): voltage reading: 10 V; current: 1 mA; power supply "+" on terminal "-" of the input.
- 16 channels at the same potential.
- Counters: 32 bits, 100 Hz, minimum pulse width = 5 ms, values backed up in case of power failure.
- Input impedance: > 5 kΩ.
- Insulation voltage: 1 kV AC.
- Max. current consumption (at 5 V): 90 mA.



Description of iRIO2 16DI0 terminals

1-	2-	3-	4-	9-	10-	11-	12-
1+	2+	3+	4+	9+	10+	11+	12+
DO1	DO2	DO3	DO4	DI 9	DI 10	DI 11	DI 12
EXT-2 or left-hand position in iRIO enclosure ⁽¹⁾							
DI 5	DI 6	DI 7	DI 8	DI 13	DI 14	DI 15	
5+	6+	7+	8+	13+	14+	15+	
5-	6-	7-	8-	13-	14-	16+	
							DI 16

⁽¹⁾ For right-hand position in iRIO enclosure, the I/O wiring is the same: apply an offset of +16 on terminal numbers

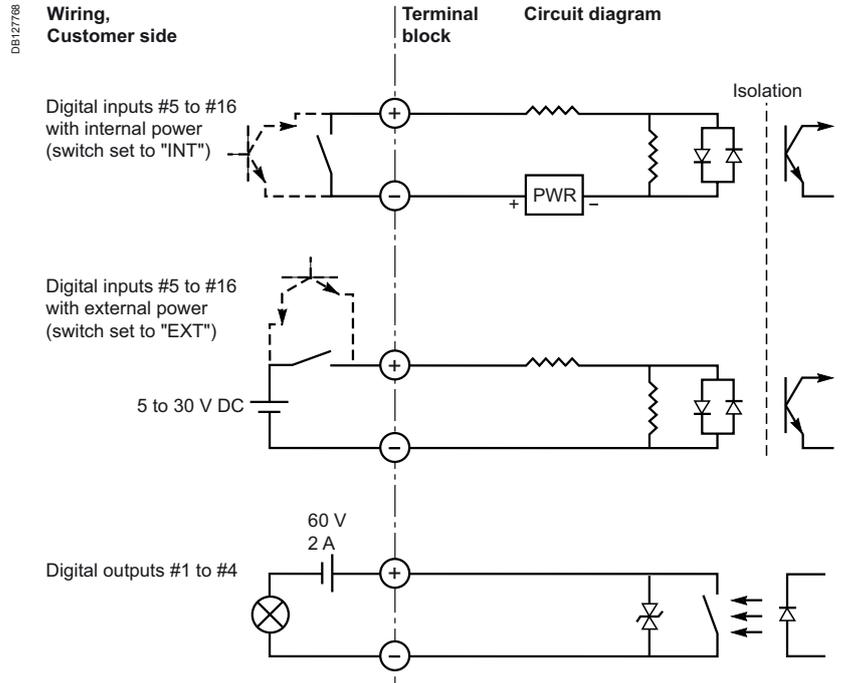
16DI0

12 digital inputs/4 digital outputs (dry contact for output)

Digital inputs: same characteristics as 16DI digital inputs

Digital outputs:

- selection of internal or external power supply by a switch common to all inputs (switch position INT (for dry contact connection) or EXT)
- external power supply (EXT): from 5 V DC to 24 V DC (max. 30 V DC)
- channels isolated from one another
- photoMos technology: max. voltage = 60 V DC (24 V AC); max. current = 1 A
- open state max. leakage current: < 10 μA
- closed state max. voltage: < 0.1 V
- insulation voltage: 2 kV AC
- unlimited number of operations
- max. current consumption (at 5 V): 90 mA.



Description of iRIO2 16AI terminals

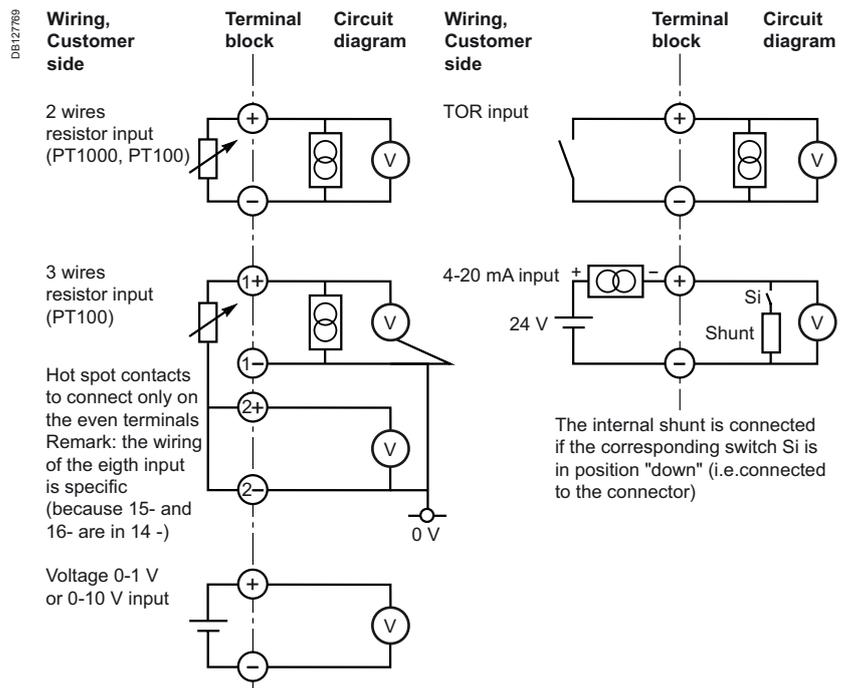
1-	2-	3-	4-	9-	10-	11-	12-
1+	2+	3+	4+	9+	10+	11+	12+
AI 1	AI 2	AI 3	AI 4	AI 9	AI 10	AI 11	AI 12
EXT-2 or left-hand position in iRIO enclosure ⁽¹⁾							
AI 5	AI 6	AI 7	AI 8	AI 13	AI 14	AI 15	
5+	6+	7+	8+	13+	14+	15+	
5-	6-	7-	8-	13-	14-	16+	
							AI 16

⁽¹⁾ For right-hand position in iRIO enclosure, the I/O wiring is the same: apply an offset of +16 on terminal numbers

16AI

16 universal analog inputs

- 0-1 V/0-10 V
- Resistor 0 to 2 kΩ (PT100/PT1000, 2 or 3 wires)
- 4 -20 mA (one selector switch per input)
- Digital
- 16 channels at the same potential
- Resolution: 14 bits (13 bits for temperature)
- Accuracy: 0.1 % at full range; Temperature: 0.2 °C (PT100 or PT1000)
- 4-20 mA mode: internal shunt: 50 Ω (±0.1 %)
- Insulation voltage: 1 kV AC
- Max. current consumption (at 5 V): 100 mA.



iRIO implementation

Description of iRIO2 4AI terminals

1-	2-	3-	4-	9-	10-	11-	12-
1+	2+	3+	4+	9+	10+	11+	12+
AI1	AI2	AI3	AI4				
Left hand position in Type 1 extension enclosure: 4AI							
5+	6+	7+	8+	13+	14+	15+	16+
5-	6-	7-	8-	13-	14-	15-	16-

iRIO Type 1 (T1)

4AI

4 analog inputs

- 0-1 V/0-10 V
- Digital
- 4 channels at the same potential
- Resolution: 14 bits (13 bits for temperature)
- Accuracy: 0.1 % at full range; Temperature: 0.2 °C (PT100 or PT1000)
- Insulation voltage: 1 kV AC
- Max. current consumption (at 5 V): 60 mA.

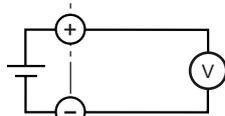
DB12770

Wiring, Customer side

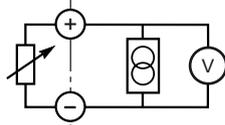
Terminal block

Circuit diagram

Voltage 0-1 V or 0-10 V input



2 wires resistor input (PT1000 or PT100)

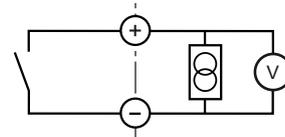


Wiring, Customer side

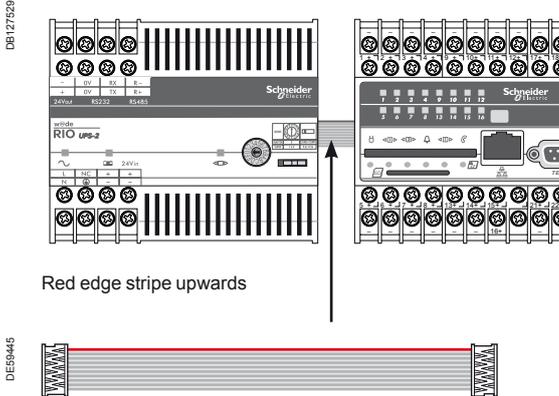
Terminal block

Circuit diagram

Digital input



iRIO implementation



iRIO modules interconnection

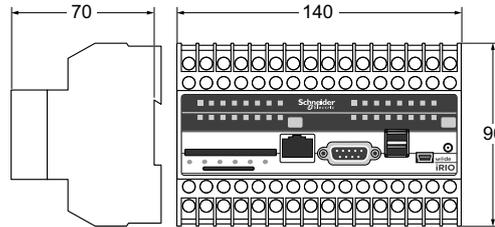
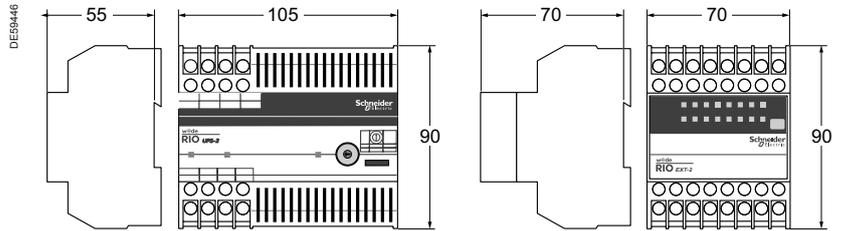
iRIO units are interconnected by flexible ribbon cables fitted with connectors that plug into the back of the housing. Always ensure that connections are made as shown on the diagram. Maximum cable length is 1 m. All iRIO modules are delivered with one 100 mm flexible ribbon cable. It is possible to order a 500 mm flexible ribbon cable separately (Reference: 0RIOKNA00001).

Warning: the red edge stripe must be always positioned upwards. If the iRIO is installed in an environment subject to high vibration, it is recommended to fix the flat cable connectors (using silicone for example).

Dimensions

UPS-2: Width = 105 mm
Height = 90 mm
Depth = 55 mm

EXT-1 or EXT-2: Width = 70 mm
Height = 90 mm
Depth = 70 mm



iRIO: Width = 140 mm
Height = 90 mm
Depth = 70 mm

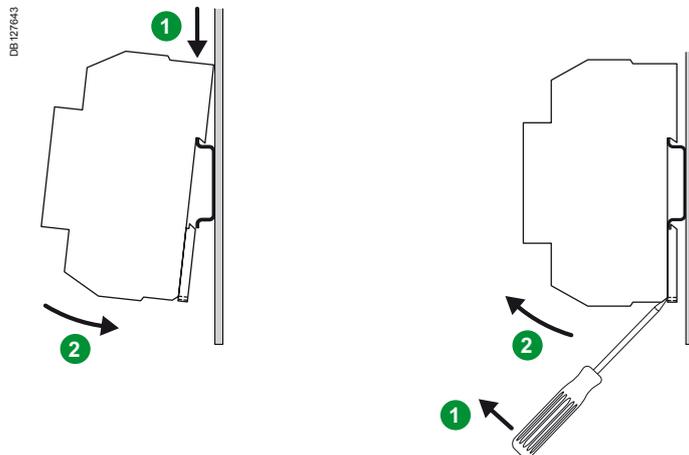
Mounting on DIN rail (Width 35 mm)

iRIO module mounting

Put upper groove of the iRIO module enclosure on the DIN rail (1) and push it (2) until the central bar is engaged.

iRIO module dismounting

Insert a flat screwdriver in the hole of the bar (1). Then tilt the bottom of the iRIO module enclosure forward (2) in order to disconnect the module from the DIN rail.



Wiring recommendations

The typical cable characteristics are given in the table below.

	Characteristics	Dimensions
Power supply (24 Vdc)	Flexible	3 x 0.75 mm ²
Power supply (120 Vac-230 Vac)	Non flexible	3 x 1.5 mm ²
Phone network	Non flexible, 1 2 pairs (screened SYT1 multipair telephone cable)	Core dia. 0.5 mm
Digital input	Non flexible, 1 pair, screened	Core dia. 0.5 mm
Analog inputs	Flexible, 1 pair, shielded	0.6 mm ² to 1.5 mm ²
Digital output	Flexible, 1 pair	0.6 mm ² - 9/10
Analog output	Flexible, 1 pair, shielded	0.6 mm ² min.
RS 485 network	Flexible, 2 pairs, twisted and shielded	0.6 mm ² - 9/10

All the shields should be connected to a solid ground.

A) Input wiring

- The conductors for low level signals such as digital or analog inputs should be remote from those for power supply, phone or commands such as digital outputs. See your local electrical regulations.
- Use a separate cable for each input. Otherwise, multipair cable should be used for one type of measurement: either analog or digital.
- The cable should be shielded for analog data.
- The shield should be connected on the iRIO module side and kept open on the measurement side. The shield should be connected to the ground with a cable of large cross section.
- The screen should be connected to the ground on both sides.

B) Digital output wiring

- It is necessary to take into account the maximum acceptable current and voltage for the unit and the characteristics of the equipment to be controlled.
- If it is not possible to control the equipment directly, some relays should be used. See your local electrical regulations for distances and choice of equipment with the minimum overvoltage at opening.

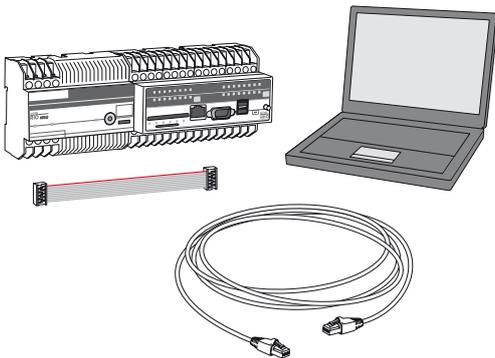
C) Network wiring

- It is recommended to use one pair, and preferably two pairs, of twisted and shielded cable. The second pair is used if the signal ground is needed. In an RS 485 network, the potential difference between the data-pair conductors determines the signal without the ground being officially involved. The system may operate without signal ground connection, but reliability and noise immunity may be sacrificed as a result. Non-optimally isolated links need a signal ground wire to keep the mean voltage of each wire of a node with respect to signal ground (called common-mode voltage) within the -7 to +12 volt range, in order to reduce noise, transient currents and also emissions and disturbances.
- The shields should be connected to the ground on both sides to ensure good protection of RS 485 links, paying attention to the equipotentiality between the two grounds if they are located in two completely different buildings. Electromagnetic-compatibility and application requirements determine whether you need a shield. A shield both prevents the coupling of external noise to the bus and limits emissions from the bus. Generally connect the shield to a solid ground (normally the metal frame around the system or subsystem) with a low impedance at one end and a series RC network at the other end. This arrangement prevents the flow of DC ground-loop currents in the shield. The consequences of connecting remote grounds together must be considered. Only the impedance in the wire connecting the ground limits the current that results from this voltage potential. RS 485 recommends using a 100 Ohm resistor in series with signal ground path in order to limit ground currents.
- Termination should only be used with high data rates and long wiring runs. Termination is used to match the impedance of a node with the impedance of the transmission line being used. When impedances are mismatched, the transmission signal is not completely absorbed and part of it is reflected back into the transmission line. Pre-polarization prevents differential noise causing false frame detection along the network.

iRIO software configuration: Xflow

First connection between laptop and iRIO

DE994448



Start up

Before starting your first connection check the two following points:

Verification of required equipment

Initial connection to the product is performed either via a Web browser.

Equipment required for initial connection:

A microcomputer.

Internet Explorer version 5, 6 or 7, Firefox or Opera for connection via a Web browser. Internet Explorer 5, 6 and 7 allow access to all the functionalities of the embedded Xflow software (this is not the case for other browsers). The universal iRIO-PC serial cable.

An Ethernet "cross" cable (depending on the PC, a direct Ethernet cable can be used).

Note: some of the following actions on PC require an administrator account for the user.

Perform Modbus addressing for the boards

Each acquisition board is a Modbus slave of the iRIO CPU board.

The device is supplied pre-configured. Modbus addressing of the boards is therefore necessary only if you want to change the boards' Modbus addresses (for example: RS 485 connection of a third-party device having the same address as one of the boards).

The addresses are known thanks to the thumbwheels and switch on the various iRIO modules. Please refer to Chapter "iRIO I/O boards" of this document page 80.

The iRIO boards will be automatically recognized by the software embedded in iRIO.

First connection on the embedded Xflow software

Xflow is a remote management software embedded in iRIO. The software can be accessed:

- either via the RS 232 serial communication port (Terminal)
- or via the Ethernet port
- or via modem.

Access in that case takes place:

- via a standard Web browser (HTTP protocol, communication taking place via html pages).

Initial connection is generally performed via a Web browser.

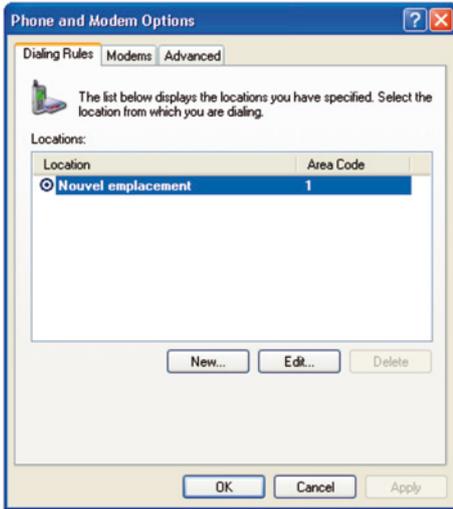
The connection procedure differs depending on your computer's operating system.

Accordingly, RS 232 connection via a Web browser under Windows XP, and Ethernet connection via a Web browser under Windows XP will be described in this manual.

iRIO software configuration: Xflow

First connection between laptop and iRIO

Create a standard modem



RS 232 / Web browser / Windows XP

Start Menu

- Settings
 - Control panel
 - Phone and modem options

Opening of the phone and modem Options window

Modems tab

- Add
- Opening of the wizard. Check "Don't detect my modem; I will select it from a list"
- Select from the drop-down lists:
 - Manufacturer: standard modem types
 - Modem types: standard 56000 bps modem
 - Select the communication port for local connection

Select the modem configured

- Properties

Modem tab

- Select 115200 bps for the maximum port speed
- Advanced settings → Change default preferences tab
- Port speed: 115200
- Select None for flow Control
 - Close the modem Properties window
 - Close the phone and modem Options windows.

Create a remote network access



Start Menu

- Settings
 - Control panel
 - Network connections
 - New connection wizard

Opening of the wizard

- Check local area Connection
- Check remote access Connection
- Choose the standard modem determined previously
- Name the connection (e.g. local Xflow)
- Enter any phone number (e.g. 12345)
- Select connection availability (e.g. for me only)

Opening of the Connection window

- Enter the User Name and Password (user name = TEST ; Password = TEST)

→ Properties

General tab

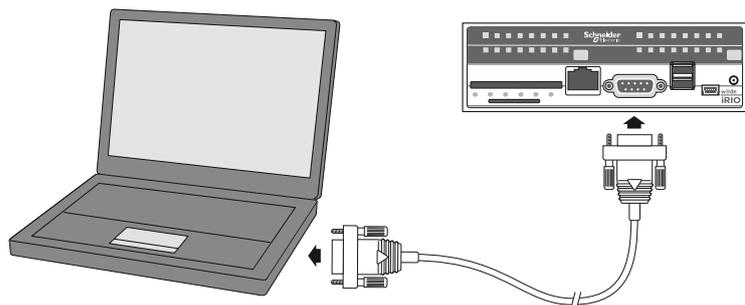
- Configure → Hardware properties
- Check the speed: 115200
- Deselect "Activate hardware flow control"

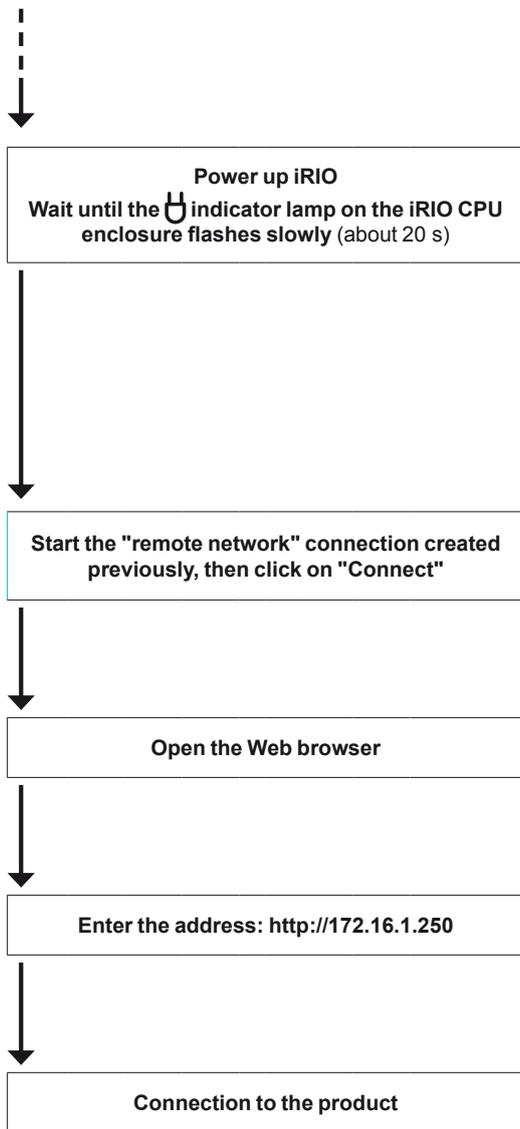
Network management

- Check: Internet TCP/IP protocol, QoS Packet Scheduler and deselect the other components.
- Close the Properties window.

Connect iRio/PC via the universal iRIO-PC serial cable

For the various types of wiring, see earlier chapters in this document.

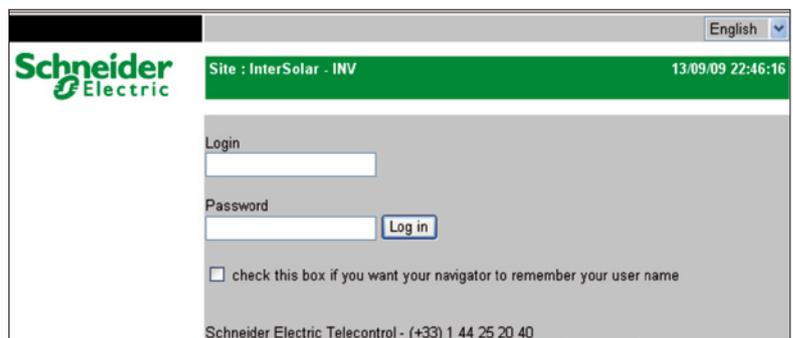




Reminder:
User name: TEST
Password: TEST



User name: TEST
Password: TEST



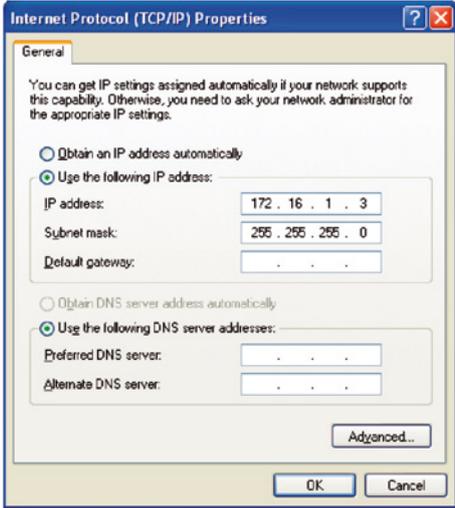
To disconnect from the product, simply close the Xflow window and close the connection by clicking on the icon (in the bottom right-hand) in the task bar, then log out.

iRIO software configuration: Xflow

First connection between laptop and iRIO

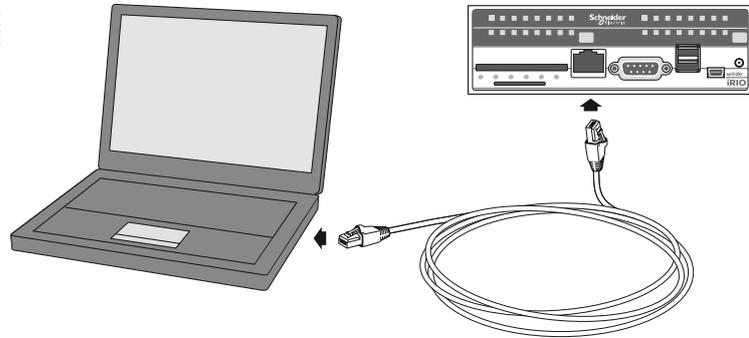
Ethernet / Web browser / Windows XP

Make the PC network settings compatible with those of iRIO



- Start
- Settings
- Control panel
- Network connections
- Click on the right button on "Local area connection" then on **Properties**
- Under the **General** tab, in the "This connection uses the following items" list, click on Internet Protocol (TCP/IP), then Properties.
- Click on "Use the following IP address" and enter a compatible address (for example: IP Address: 172.16.1.3)
- Subnet mask: 255.255.255.0
- Click on OK then on Close.

Connect iRio/PC via an Ethernet cross cable



Power up iRIO
Wait until the  indicator lamp on the iRIO CPU flashes slowly (about 20 s)

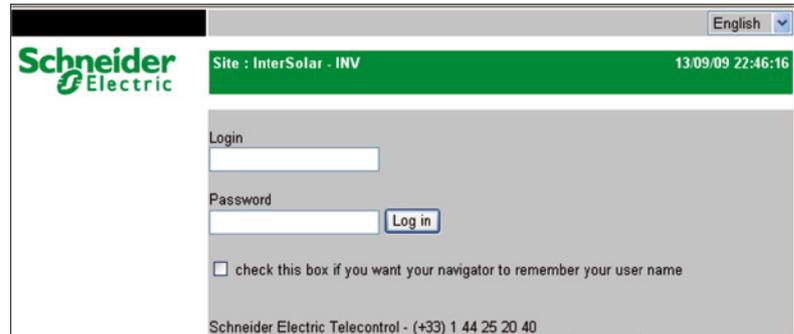
For the various types of wiring, see earlier chapters in this document.

Open the Web browser

Enter the address: <http://172.16.1.250>

Connection to the product

Login: TEST
Password: TEST



Once connection with the iRIO is completed, make sure to redefine the original network settings on your PC.

iRIO Software Configuration: Xflow Registration web page

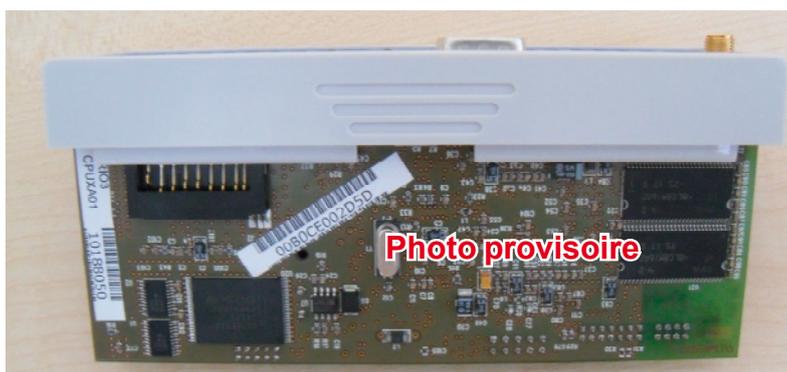
After be connected to iRIO, we will reach in first the registration web page.

You cannot go further until you will be identified on Schneider electric web.

Before going on internet you have to pick up Mac address of iRIO.

You can copy the MAC address on the CPU of iRIO:

- remove front panel of iRIO
- look under the main PCB card fitted into the front panel
- copy the MAC address (see picture below)
- go on Schneider electric web site: www.?????????????
- enter MAC address and all information required
- you will receive an email with the activation key and password for your iRIO.



Mac address on PCB card.

Note: after confirmation the key into Xflow, your first login and password are: login=test, password=test.

iRIO Software Configuration: Xflow

Navigation on iRIO web pages

You can find below some navigation rules:
EACH LABEL DRIVES YOU TO THE MONITORING WEB PAGE:

- Peripherals
- Synoptics
- Dashboard
- Load Control

And you can access to Configuration web page.



iRIO web pages top menu.

Peripherals (top menu)

You display all devices connected to iRIO CPU:

- iRIO cards
- Modbus devices
- ZigBee or Modbus devices connected over Ethernet
- you can read all information linked to the different devices (current, voltage, energy.....).

Note: to add new peripherals you have to go to configuration menu.

Synoptics (top menu)

You display the synoptics created. A Synoptic is a *.JPG picture that you build. You load this picture on iRIO and you can put on this picture different animation:

- values of energy, current, voltage, THD or power factor of the different devices
- you can add charts or create link to dashboards or charts
- you can select a synoptic as a home page.

Note: to create a new synoptic you have to go to configuration menu.

Dashboards (top menu)

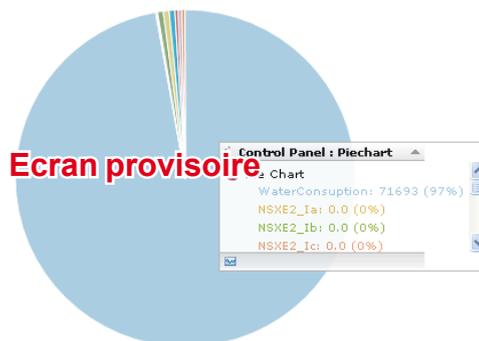
You display the dashboard created. The dashboard function allows you to add all information that you need. For example: you can add all water consumption of your building or add "kwh" energy consumed. You can display the dashboard on table or pie chart format.

Description	Value
WaterConsumption	71590
Ia	0.0 A
Ib	0.0 A
Ic	0.0 A
Temperature	44.80 degC
Temperature	44.80 degC
Temperature	44.80 degC
Uab	403.00 V
Ubc	404.00 V
Uac	403.00 V
Van	232.00 V
Vbn	233.00 V
Vcn	233.00 V
P	0.0 kW
Q	0.0 kVA
S	0.0 kVA

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Creation of a variable Enter a name OK Value : 73632.40
Legend : [Normal] - [Locked] - [In alarm] - [On error]

Dashboard: table format.



Dashboard: pie chart format.

Note: to create a new dashboard you have to go to configuration menu.

iRIO Software Configuration: Xflow

Navigation on iRIO web pages

Load control (top menu)

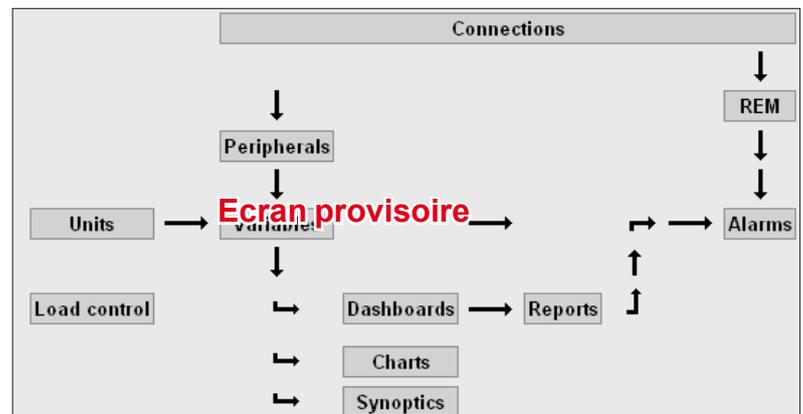
You display the load control configured.

Note: to create a load control you have to go to configuration menu.

Configuration (top menu)

All the settings of iRIO for hardware and energy functions are done in this menu.

- **Connections:** you can display and modify settings of different iRIO's ports (Modbus port UPS-2, SUBD-9 terminal, Ethernet RJ45 port and Modem).
- **Peripherals:** you can add new devices
- **REM:** into this webpage you can configure a report to Schneider Electric Energy database (REM database)
- **Units:** you add new units of measure for your informations recorded into iRIO.
- **Variable:** you can read all information (named variable) linked to the different peripherals detected on Modbus, Ethernet, ZigBee or internal cards.
- **Dashboards:** you add a new dashboard and select the information that you want to add into a same dashboard.
- **Charts:** you create a chart (in bar graph or curves format) to display a value or different values for different period (10 minutes until year resolution)
- **Synoptics:** you build a synoptic dedicated to your application
- **Load control:** you create your program of load control on day, week and month periods.
- **Reports:** you create a report for a list of information that you want inside (current, voltage, energy values etc per product)
- **System Parameter:** you can configure main information for the software of iRIO and also IP settings of the RJ45 port.



Configuration menu in configurator mode.

IMPORTANT:

It is strongly advised to use iRIO software in "Configurator" access level. This mode was designed to help the user to configure easily and quickly iRIO (see next section to create "configurator" access).

iRIO Software Configuration: Xflow Users Access

The first time you access to iRIO you are in Administrator access.
You can see the access level into Configuration web page (top menu selection):



We will create users for the 3 other access level:

- go into "Users" sub menu
- select "add a user":

The screenshot shows the 'Users' configuration page with the breadcrumb 'Home page → Configuration → Users → USE00006'. The form contains the following fields:

- Name:** USE00006
- New password:** (empty text box)
- Confirm password:** (empty text box)
- Type:** Administrator (dropdown menu)
- Profile:** napac (dropdown menu)
- Rows of data per page:** 20
- Display in home page:** synoptic (dropdown menu)

Annotations include:

- A red arrow pointing to the 'Administrator' dropdown menu, which is open to show options: Administrator, Configurator, Operator, and Consultant.
- A bracket next to the 'Profile' and 'Rows of data per page' fields with the text 'Select napac' and 'Number of information displayed per page' respectively.
- A red arrow pointing to the 'Display in home page' dropdown with the text: 'You can choose if you want to have in home page a synoptic or a dashboard. Also you can dedicate a synoptic or dashboard to the user.'

- fill the different area required
- click on "Finish" to validate the user creation
- create a user for levels Configurator, Exploitant and Consultant.

iRIO Software Configuration: Xflow Users Access

Features of access level

Configurator

CAN:

- read all variable and configure all the settings related to iRIO application
- add or delete peripherals and connection
- add or delete variable
- add or delete units
- convert an existing variable to have another unit of measure or add a factor to the existing variable
- acknowledge an alarm
- add or delete dashboards and charts
- modify settings for reports sending through GSM or Ethernet TCP-IP Modbus.
- add or delete a synoptic.

Operator

CAN:

- read all variable and settings
- add variable into a dashboard
- convert an existing variable to have another unit of measure or add a factor to the existing variable
- acknowledge an alarm.

CANNOT:

- modify a setting of iRIO application
- add or delete peripherals and connection
- add or delete variable
- add or delete units
- add or delete dashboards and charts
- manage the load control
- add or delete a synoptic
- modify settings for reports sending through GSM or Ethernet TCP-IP Modbus.
- modify threshold of alarm.

Consultant (configuration top menu is hidden)

CAN ONLY:

- read all variable and settings
- add variable into a dashboard
- convert an existing variable to have another unit of measure or add a factor to the existing variable.

None parameters or settings can be modified and read in this mode.

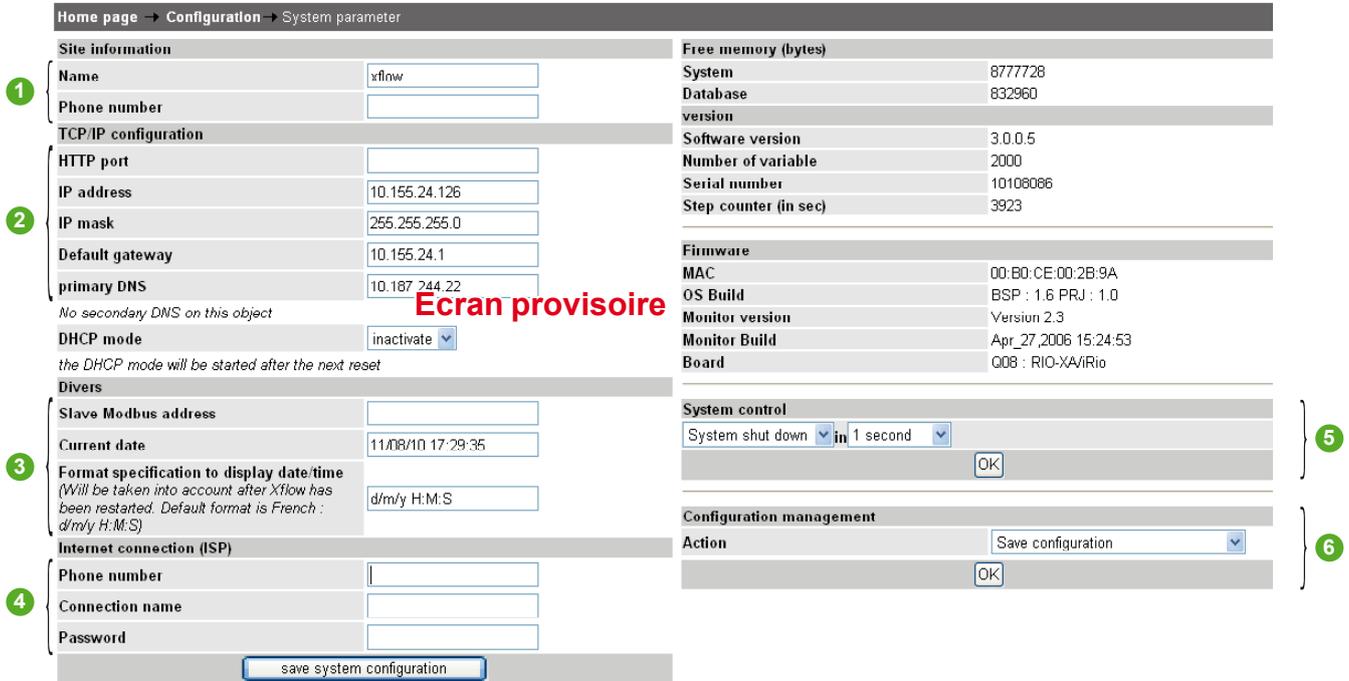
Note:

we do not give information for administrator access because this solution is dedicated for configurator, operator and consultant access. The only task that you will do into administrator access is user access creation.

Do not forget to deliver to your end user "consultant and operator" access with passwords.

iRIO Software Configuration: Xflow System parameter web page

The aim of this page is to configure the features of iRIO software for the web pages:



Description of System parameter web page

1 Site information

- **Name:** you fill name of your site where your iRIO is installed
- **Phone Number** (optional): you fill phone number in case of using GSM connection.

Note: "Name and Phone number" parameters are not significant for iRIO connection settings. These parameters are important for report generation: these informations will be copied into the report.

2 TCP/IP configuration

- **HTTP port** (optional): http port of the WEB server. By default, the WEB is on standard port 80. You can change it if you have another WEB server that is already running on your machine (for the NT version).
- **IP address:** IP of iRIO (default IP: 172.16.1.250).
- **IP mask:** Sub net mak of iRIO (default sub net mask: 255.255.255.0).
- **Default gateway:** you enter here internal IP of the router (if you have one else leave this area blank).
- **Primary DNS** (optional): fill if your network has DNS management else leave this area blank.

3 Divers

- **Current date:** enter date for all the system of iRIO (information recorded and report generation).
- **Format specification to display date/time:** format of the date can be customized.

Note: for report content, the date and time format will be fixed to English format for recorded values from meters/counters).

4 Internet connection (ISP) (has to be delivered by your GSM provider with SIM card Machine to Machine).

These parameters connect your modem to internet world.

- **Phone number:** it is a dedicated phone number for internet connection related to your SIM card (it is not your voice SIM card phone number).
- **Connection name:** login of the connection.
- **Password:** password of the connection.

iRIO Software Configuration: Xflow

System parameter web page

5 System control

The options available are:

- **system shut down:** allows the shutting down of the Xflow application
- **system reset:** allows the shutting down and the automatic restarting of the Xflow software
- **run the boot mode:** allows the device to move into boot mode for maintenance operations (this action is reserved to Schneider Electric technician).

6 Configuration management

The options available are:

■ download configuration

Once this option is selected, then click "OK": a dialog box will ask you what to do with the file: open it or save it where you want.

Note: regarding your OS and its configuration, this dialog box can appear in a different language than the one selected on the Xflow web interface. As an example, my Windows XP is a French one, so you can have the picture above shows a dialog box in French.

■ Send a configuration file

Once you make this choice, some warning will appear. As you can read when the file is uploaded, Xflow will restart for the new configuration to take effect. To select the configuration file, click on the "browse" button. Then click the big green "OK" button. And wait.

Note: the current configuration is saved in the file Xflow.wst.

■ Save configuration in flash memory or Save configuration

This is a way to help Xflow restart with a known configuration in case it lost it (because of a big ESD [Electro Static Discharge] as an example)

This operation means:

- Xflow saves its current configuration
- then it makes a backup of that configuration in its flash disk: a disk build on a flash component that don't need power to retain its content.

In case Xflow loses its configuration, it will start with that backup.

To do so, select "Save configuration in flash memory".

If you want to start with that backup, just select "remove configuration file". This choice will make Xflow to stop, remove its entire configuration file then restart. If a backup is found, Xflow will run with it.

■ Remove configuration files

This choice will make Xflow to stop, remove its entire configuration file then restart. If a backup is found, Xflow will run with it.

The file that will be removed:

- configuration file: xflow.wst in the sramdisk only
- measure file in the sramdisk only
- log file.

Note: Xflow will not remove the backup configuration as discussed in Save configuration.

iRIO Software Configuration: Xflow

Configuration connections: Terminal, GSM, Ethernet and Modbus

Configurations and status

By default you should display the connections (R1_485: internal network of iRIO cards, R2_485: Modbus port RS485-UPS2, Terminal: front SUBD-9 connector and Ethernet-TCP: RJ45 port) below:

Status	Name	Type	Incoming protocol(s)
	R1-485	Local serial line	No
	R2-485	Local serial line	No
	TERMINAL	Local serial line	napbus PPP
	ETHERNET-TCP	TCP	No
	MODEM	Local GSM modem	napbus PPP

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} Optional

[add a connection]

Connection web page view.

Into column you have different status of the connection you can have:

	Link busy
	Link connected
	Incoming call
	Faulty modem
	Start-up failure

Note: for more details see "Third party maintenance" section "iRIO connection status".

In case of a connection missed into the list see below connection configuration advised:

Home page → Configuration → Connections → Connection R1_485	
Name	R1-485
Status	Use in progress
Type	Local serial line
Incoming proto	No
Port	COM3
Trace	stop
Number of outgoing calls per day	0 (0 = unlimited)
Number of bytes received	412950
Number of bytes sent	1475264

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R1_485: iRIO Internal network for input/output cards.

Name	R2-485
Status	Use in progress
Type	Local serial line
Incoming protocol(s)	No
Port	COM4
Trace	stop
Number of outgoing calls per day	0 (0 = unlimited)
Number of bytes received	0
Number of bytes sent	1174888

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R2_485: UPS-2 Modbus Master port connection.

iRIO Software Configuration: Xflow

Configuration connections: Terminal, GSM, Ethernet and Modbus

Name	TERMINAL
Status	OK
Type	Local serial line
Incoming protocol(s)	napbus PPP
Port	COM1
Speed in rest	115200
Electrical interface in rest	RS232
Trace	stop
Number of outgoing calls per day	0 (0 = unlimited)
Number of bytes received	0
Number of bytes sent	0

TERMINAL: SUBD-9 port for RS 232 laptop connection.

Name	ETHERNET-TCP
Status	OK
Type	TCP
Number of outgoing calls per day	0 (0 = unlimited)
Number of bytes received	0
Number of bytes sent	0

Ethernet TCP: RJ45 port for Ethernet TCP-IP Modbus connection.

Name	MODEM
Status	OK
Type	Local GSM modem
Incoming protocol(s)	napbus PPP
Port	COM2
Speed in rest	9600
Modem init string	+HPR=9600
Modem dialing type	Tone
Number of ringings	5
PIN code	0000
Trace	loop
Number of outgoing calls per day	0 (0 = unlimited)
Number of bytes received	94142
Number of bytes sent	823063
PIN code error number	0
SIM reference	OXSIM=59 6640 2867 9710
GSM level of reception (dB)	-71

Modem GSM connection (in case of GSM option).

Procedure in case of missing or incorrect connection

In case, you do not have a connection required (click on "add a connection") or different parameters (enter into the connection and select "modify"), please follow the procedure following (from connection web page).

R1_485: iRIO Internal network for input/output cards

1. Click on "add a connection".
2. Enter Name "R1_485".
3. Keep "Local serial line" for Type.
4. Disable all Incoming protocols.
5. Select "COM3" (COM3 is internal network).
6. Keep all other parameter by default.

R2_485: UPS-2 Modbus Master port connection

1. Click on "add a connection".
2. Enter Name "R2_485".
3. Keep "Local serial line" for Type.
4. Disable all Incoming protocols.
5. Select Port "COM4" (COM4 is UPS-2 RS485 port for Modbus serial line network).
6. Keep all other parameter by default.

iRIO Software Configuration: Xflow

Configuration connections: Terminal, GSM, Ethernet and Modbus

TERMINAL: iRIO to Laptop connection with RS 232 cable

1. Click on "**add a connection**".
2. Enter Name "TERMINAL".
3. Keep "Local serial line" for Type.
4. Enable Incoming protocols: nabus and PPP.
5. Select Port "COM1" (COM1 is sub-D9 front connector in RS 232).
6. Select Speed in rest: 115 200.
7. Select Electrical interface in rest: RS 232.
8. Keep Trace: Stop.

Ethernet TCP: RJ45 port for Ethernet TCP-IP Modbus connection

1. Enter Name "ETHERNET_IP".
2. Select "TCP" for Type.
3. Keep others parameters by default.

Modem: GSM connection

1. Click on "**add a connection**".
2. Enter Name "MODEM".
3. Keep "Local GSM modem" for Type.
4. Enable Incoming protocols: nabus and PPP.
5. Select Port "COM2" (COM2 is an internal port between CPU and SIM card).
6. Select Speed in rest: 9600.
7. Enter into Modem init string: +IPR=9600.
8. Keep Modem dialing type: Tone.
9. Enter Number of ringings: 5.
10. Enter PIN code delivered by your provider.
11. Enter Trace: loop.

The GSM connection will work only if GSM level of reception is: between -100 db and 0 db. You can read this information into Connection menu and MODEM link.

You can move GSM antenna to have a better reception in case of bad reception.
Also do not forget to enter your ISP parameters into System parameter web page (see previous section "System parameter web page") **else you cannot send email or file to another database.**

Note: you have to configure the modem if you receive an iRIO package with GSM modem integrated.

iRIO Software Configuration: Xflow

Peripherals: Equipment on Logic/Analog Input/Output

Detection of logic and analog I/O cards with Auto detection mode

To use your internal cards of iRIO you have to add them into your configuration. You can detect your logic and analog cards for inputs and outputs with Auto detection mode:

1. click on "**Connection**" (see configuration menu)
2. click "**R1_485**" (connection linked to COM3)
3. click on "**find peripherals**"
4. keep "iRIO devices" into Search Type
5. click "**Start**".

Xflow launches auto detection and your cards will be detected.

Once the cards are added into peripherals menu, you can add variable for each information provided by the input/output card. Here the information is either a digital output control -DOx- of the card or digital input counting (or status) -DIx-:

6. click on the card detected "**add a variable - MULTIPLE**"
7. on the bottom of the page, click -Enter **variable name** of the input or output in front of each way (output or input).

For example: DI5 -Digital Input 5- (see table below).

#	Status	I/O	Variable
No variable found			
check variables and select an action <input type="button" value="OK"/>			
Variable	Description		
	DO1		
	DO2		
	DO3		
	DO4		
EN40p floor 1	DI5		
	DI6		

8. click on "**Create**".

Description of variables linked to Logic/Analog Input/Output cards

Variables for Card RI016DI0 (Card by default)

- DOx (Output x=1 to 4): control variable for the digital Output x
- DIx (Input x=5 to 16): is on if contact status, connected to the input x, is closed
- FIx (Input x=5 to 16): increases each time the input x receives a pulse.

Variables for Card RI04AI

- Cx (0-20mA): Not applicable into this solution
- Rx (pt100): value returned for resistor input 2 wire PT100
- Rx (pt1000/Ni/Qad): value returned for resistor input 2 wire PT1000
- Vx (0-10V): value returned for sensor 0-10 V
- Vx (0-1V): value returned for sensor 0-1 V
- EDIx: **same as DIx but for 10 V signal**
- DIx: is on if contact status, connected to the input x, is closed.

Variables for Card RI016DI

- DIx: is on if contact status, connected to the input x, is closed
- FIx: increases each time the input x receives a pulse.

Variables for Card RI016AI

- Cx (0 ou 4-20mA intern.): value returned for resistor input 4-20 mA
- Cx (0 ou 4-20mA on 50ohms): value returned for resistor input 4-20 mA
- R3F x (pt100, Input x=1 to 8): value returned for resistor input 3 wire PT100
- R3F x (pt1000, Input x=1 to 8): value returned for resistor input 3 wire PT1000
- Rx (pt100): value returned for resistor input 2 wire PT100
- Rx (pt1000/Ni/Qad): value returned for resistor input 2 wire PT1000
- V10DIFF x (Input x=1 to 8): ??????????
- V1DIFF x (Input x=1 to 8): ??????????????
- Vx (0-10V): value returned for sensor 0-10 V
- Vx (0-1V): value returned for sensor 0-1 V
- EDIx: **same as DIx but for 10 V signal**
- DIx: is on if contact status, connected to the input x, is closed.

Note:

IMPORTANT: each input or output values will be stored into iRIO only if they have a variable name.

Each time you want to delete an iRIO card you have to remove in first all variable linked to this card else you will not be allowed to remove card.

The complete procedure described above is the same for Analog card.

iRIO Software Configuration: Xflow

Peripherals: Equipment on Logic/Analog Input/Output

Detection of Modbus devices cards with Auto detection mode or manual mode

To monitor information from devices connected on UPS-2 RS 485 Modbus port, you have to add them into your configuration. You can detect your Modbus devices by two ways: in Auto detection mode or in manual mode.

AUTO DETECTION MODE: Modbus products registered into iRIO library

1. Click on **"Connection"** (see configuration menu).
2. Click **"R2_485"** (connection linked to COM4: UPS-2 port).
3. Click on **"find peripherals"**.
4. Select **"Other Modbus devices"** into Search Type.
5. Select your baud rate into **"Connection speed"** (see sections **"Setting Electrical Equipments and monitoring device"** – section **"power Meter PM9C"** and the following sections for baud rate, address number and parity selection of each device).
6. Select **"RS 485"** for Electrical interface.
7. Into **Communication parameter** it is **8 bits** and select the common parity that you enter into your Modbus devices.
8. **"Delay of failure"** (in ms): we advise you to enter **1000** (it is the maximum time that you wait an answer from the Modbus devices during auto detection).
9. **Modbus addresses to scan**: enter the first and last Modbus address configured into a Modbus device.
10. Click **"Start"**.

Name	R2_485
Type	Local serial line
Port	COM4
Search type	Other Modbus devices ▼
Connection speed	Ecran provisoire 9600 ▼
Electrical interface	RS485 ▼
Communication parameter	8bits even parity ▼
Delay of failure (in ms)	1000
Modbus addresses to scan	1 - 30

Example of Auto detection configuration.

Xflow launches auto detection and your Modbus devices will be detected. Once the products are added into peripherals menu, you can add variable for each information provided by the product (current, voltage, power factor, THD, energy, power values...):

11. Click on the device detected
12. on the bottom of the page, click **"add a variable - MULTIPLE"**
13. Enter a **variable name** of each pre defined information (current, voltage, power and energy information). For example: Ia which is current phase 1 for a PM800 series (see table below)

Variable	Description
Phase1_Floor2	Ia
	Ib
	Ic
	in
	Uab
	Ubc
	Uac
	Van

14. Click on **"Create"**.

Note:

IMPORTANT: each value from Modbus devices will be stored into iRIO only if they have a variable name.

Each time you want to delete a device you have to remove in first all variable linked to this device else you will not be allowed to remove the modbus product.

iRIO Software Configuration: Xflow

Peripherals: Equipment on Logic/Analog Input/Output

MANUAL MODE: Modbus products NOT registered into iRIO library

You can add other Modbus products which are not pre defined.

For this you have:

1. Click on "**Connection**" (see configuration menu).
2. Click "**R2_485**" (connection linked to COM4: UPS-2 port).
3. Click on "**add a peripheral**".
4. Enter a Name.
5. Select into Type "PLC Modbus".
6. Enter your product Modbus address into field **Address**.
7. Select your Speed.
8. Select your parity and choose 8 bits into communication parameter
9. For Electrical Interface select RS 485.
10. Keep PARM interface "No".

As it was did before for Auto detection, you have to add, manually, your variables linked to your Modbus device (the procedure is different because the products for this solution are pre defined).

Follow these steps for each variable required:

11. Go on the Modbus device created.
12. Click on "**add a variable**".
13. Enter the Name of your variable.
14. Keep peripherals selected.
15. Into Address field, enter the Modbus register address of the information that you want to access. This Modbus address has to be provided by the user guide of the Modbus product into the mapping section.
16. Select the Reading format of the value contained into the register address (For example, most of Schneider Electric products are in DIEEE). The format is provided by the Modbus product user guide for the information required. For more details, please see at the end of this section.
17. Select the Unit required for the variable.
18. For **Refresh period**, keep Automatic.
19. Select Operation that you want to apply on the variable (see section "variables management" further in this chapter).
20. Click on "**Create**".

iRIO Software Configuration: Xflow

Peripherals: Equipment on Logic/Analog Input/Output

Details on Reading format parameter

Boolean	NAME	Description	Size				
word	Bit	Basic entity (0 or 1)	1 bit				
word [i]	Word	Value between 0 and 65535. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> </tr> </table> </div>	b0..b7	b8..b15	2 bytes		
b0..b7	b8..b15						
int 16	Inverted word	Value between 0 and 65535. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b0..b7</td> </tr> </table> </div>	b8..b15	b0..b7	2 bytes		
b8..b15	b0..b7						
int 16 [i]	Signed word	Value between -32768 and 32767. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> </tr> </table> </div>	b0..b7	b8..b15	2 bytes		
b0..b7	b8..b15						
int 32	Inverted signed word	Value between -32768 and 32767. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b0..b7</td> </tr> </table> </div>	b8..b15	b0..b7	2 bytes		
b8..b15	b0..b7						
dword	Signed double word	Value between -2147483648 and 2147483647. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b24..b31</td> </tr> </table> </div>	b0..b7	b8..b15	b16..b23	b24..b31	4 bytes
b0..b7	b8..b15	b16..b23	b24..b31				
dword [i]	Double word	Value between 0 and 4294967295. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b24..b31</td> </tr> </table> </div>	b0..b7	b8..b15	b16..b23	b24..b31	4 bytes
b0..b7	b8..b15	b16..b23	b24..b31				
dword [sw]	Inverted double word	Value between 0 and 4294967295. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b24..b31</td> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b0..b7</td> </tr> </table> </div>	b24..b31	b16..b23	b8..b15	b0..b7	4 bytes
b24..b31	b16..b23	b8..b15	b0..b7				
dword [i sw]	Swapped double word	Value between 0 and 4294967295. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b24..b31</td> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> </tr> </table> </div>	b16..b23	b24..b31	b0..b7	b8..b15	4 bytes
b16..b23	b24..b31	b0..b7	b8..b15				
IEEE	Swapped inverted double word	Value between 0 and 4294967295. The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b24..b31</td> <td style="padding: 2px 10px;">b16..b23</td> </tr> </table> </div>	b8..b15	b0..b7	b24..b31	b16..b23	4 bytes
b8..b15	b0..b7	b24..b31	b16..b23				
IEEE [i]	Decimal (IEEE)	Floating between 1.5×10^{-45} and 3.4×10^{38} . The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b24..b31</td> </tr> </table> </div>	b0..b7	b8..b15	b16..b23	b24..b31	4 bytes
b0..b7	b8..b15	b16..b23	b24..b31				
IEEE [sw]	Inverted decimal (IEEE)	Floating between 1.5×10^{-45} and 3.4×10^{38} . The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b24..b31</td> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b8..b15</td> <td style="padding: 2px 10px;">b0..b7</td> </tr> </table> </div>	b24..b31	b16..b23	b8..b15	b0..b7	4 bytes
b24..b31	b16..b23	b8..b15	b0..b7				
IEEE [i sw]	Swapped decimal (IEEE)	Floating between 1.5×10^{-45} and 3.4×10^{38} . The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">b16..b23</td> <td style="padding: 2px 10px;">b24..b31</td> <td style="padding: 2px 10px;">b0..b7</td> <td style="padding: 2px 10px;">b8..b15</td> </tr> </table> </div>	b16..b23	b24..b31	b0..b7	b8..b15	4 bytes
b16..b23	b24..b31	b0..b7	b8..b15				
DIEEE	Decimal (DIEEE)	Floating between xxx and xxx . The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px; color: red;">b0..b7</td> <td style="padding: 2px 10px; color: red;">b8..b15</td> <td style="padding: 2px 10px; color: red;">b16..b23</td> <td style="padding: 2px 10px; color: red;">b24..b31</td> </tr> </table> </div>	b0..b7	b8..b15	b16..b23	b24..b31	8 bytes
b0..b7	b8..b15	b16..b23	b24..b31				
DIEEE [i]	Inverted decimal (DIEEE)	Floating between xxx and xxx . The byte order is as follows: <div style="text-align: center;"> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px; color: red;">b0..b7</td> <td style="padding: 2px 10px; color: red;">b8..b15</td> <td style="padding: 2px 10px; color: red;">b16..b23</td> <td style="padding: 2px 10px; color: red;">b24..b31</td> </tr> </table> </div>	b0..b7	b8..b15	b16..b23	b24..b31	8 bytes
b0..b7	b8..b15	b16..b23	b24..b31				

iRIO Software Configuration: Xflow

Peripherals: Equipment on Ethernet TCP-IP Modbus connection

In case of using an EGX105Z or EGX100, you can read information from Modbus or ZigBee devices. This section will explained you how to read the information form these devices connected remotely through Ethernet TCP-IP Modbus network. There is no Auto detection mode for Ethernet TCP-IP Modbus communication.

Follow these steps to add a Modbus product or ZigBee product connected on a gateway:

1. Click on "**Connection**" (see configuration menu).
2. Click **ETHERNET** (connection linked to TCP).
3. Click on "**add a peripheral**".
4. Enter a Name.
5. Select into Type the product required into the list (PM800, NSX-E.....).
6. Enter your product address into field Address.

Note:

IMPORTANT: the product address can be Address for Modbus product address connected on EGX100, Address of SIM6BZ or SIM10Z connected on EGX105Z or Address of Modbus device connected on SIM10Z in tunneling mode.

7. Enter IP address of EGX100 or EGX105Z.

You have to add variable for each information that you want to read:

8. Go on the Modbus device or ZigBee device created.
9. On the bottom of the page, click "**add a variable - MULTIPLE**".
10. Enter a **variable name** of each pre defined information (current, voltage, power and energy information). For example: Ia which is current phase 1 for a PM800 series (see table below).

Variable	Description
Phase1_Floor2	Ia
	Ib
	Ic
	In
	Uab
	Ubc
	Uac
	Van

Ecran provisoire

11. Click on "**Create**".

Note:

IMPORTANT: each value from Modbus devices will be stored into iRIO only if they have a variable name.
 Each time you want to delete a device you have to remove in first all variable linked to this device else you will not be allowed to remove the Modbus product.
 As it is possible for Modbus, with Ethernet connection, you can add other Modbus product connected through EGX100. You have to select into **Type**, the product "**PLC Modbus TCP**" (follow the same procedure as MANUAL MODE in [section 2.4.3.8](#)).

iRIO Software Configuration: Xflow Create an Alarm

Alarm function is used to execute an action regarding a condition:

- send an email
- send a report
- send a text message
- display a message regarding a loss of communication for a device or a threshold for a value returned by a product (for example: maximum current limit). This is the procedure to create an alarm.

Common beginning part of the procedure to create an alarm

1. Click on Alarm sub menu into configuration menu.
2. Click on "add an alarm".
3. Enter Name.
4. Select "ALARM" into File.
5. Select the **Origin** of the alarm:

Variable	Alarm relating to a variable
Peripheral	Alarm relating to a peripheral
Recipient	Alarm relating to a destination
System	System alarm (start-up, etc.)

According to your choice continue the procedure as follows (step f -) for the corresponding case

Continued of the procedure if you select Origin=Variable

6. Into Reference select the variable that you want to control.
7. Report field, keep by default.
8. Into Type select the control that you want to do:

Type	Origin	Description	Associated parameters
< =	Variable	Alarm if the value of the variable is less than or equal to a threshold	Alarm threshold
> =	Variable	Alarm if the value of the variable is greater than or equal to a threshold	Alarm threshold
=	Variable	Alarm if the value of the variable is equal to a state or threshold <i>(parameter to be chosen for a logicvariable)</i>	Alarm threshold or state
Within range	Variable	Alarm if the value of the variable is within a limited range (limits included)	Lower and upper threshold of the range
Outside range	Variable	Alarm if the value of the variable is outside the range (limits included)	Lower and upper threshold of the interval
Timer	Variable	Transmission of the variable's value at a set time	Call period. Time of next call
Discordance	Variable	Alarm if there is a difference between the value of the "Reference" variable and that of the "Discordance" variable	Discordance variable, absolute deviation or relative deviation (in %) (absolute deviation has priority)
Different	Variable	Alarm if the value of the variable is different from the threshold value	Threshold

9. Fill the different levels of value (threshold, **hysteresis**...).

Note: Hysteresis is only for alarms relating to a variable. Delta to be added or removed from the value to trigger a return to normal. This prevents the phenomenon of fluctuation around the threshold value.

Example: you have configured a "> =" alarm with 20 as the threshold (the alarm is triggered when the variable exceeds 20) and a hysteresis of 2. The return to normal will take place when the value falls below 18.

10. Keep optional fields by default.
11. Click on "finish".

Note: this alarm is interesting to read a message an alarm message on Xflow. Also you can send Text message on a cell phone or email regarding a specific value.

iRIO Software Configuration: Xflow Create an Alarm

Continued of the procedure if you select Origin=Recipient

6. Into Reference **BUGS BUGS**.
7. Report field, keep by default.
8. Into Type select the control that you want to do:

Type	Origin	Description	Associated parameters
Blacklisted	Recipient	Alarm if the destination is blacklisted. You are advised to parameter all the alarm recipient on blacklisted no.s. (cf. Alarm recipient chapter)	Name of recipient
Max. number of failures on No.	Recipient	Alarm if the destination takes the state "Max. failures reached" (cf. Alarm recipients chapter)	Name of recipient
Ack. failure on No.	Recipient	Alarm if the destination takes the state "Acknowledgement failure" (cf. Alarm recipients chapter)	Name of recipient
Failure on No	Recipient	Summary alarm of the three previous faults on the Recipient. Alarm if the destination takes the state "blacklisted" or "Max. failures reached" or "Acknowledgement failure" (cf. Alarm recipients chapter)	Name of recipient

Continued of the procedure if you select Origin=Peripheral

9. Click on "**Continue**".
10. On the same page select into Reference the peripherals where you want to apply an alarm.
11. Keep all other parameters by default.
12. Click on "**finish**".

Note: here the alarm has no type because the only purpose of this alarm is detected when product stops working. This alarm can be used for product loss of communication (for example loss of communication for Modbus products connected on UPS-2: COM4).

Continued of the procedure if you select Origin=System

6. Keep Report field by default.
7. Into Type select which kind of alarm you want:

Type	Origin	Description	Associated parameters
Cyclical call	System	Cyclical call alarm on peripheral period	Call period; time of next call
Start-up	System	Alarm on each start-up of the Xflow software	None
Shut down	System	Alarm on each shut-down of the Xflow	None
Modem fault	System	Alarm if a modem type link initialises incorrectly (the modem no longer responds correctly to the initialisation strings sent by Xflow)	None

8. In case of Cyclical call, enter a sending period for the alarm into "**Period**" parameter (unit is in minutes).
9. In case of Cyclical call, enter into Next Call field: the time when you want to send the first message (you can leave blank the area if you want to start sending directly after the creation). For example: 18/08/10 10:23:00.

*Note: this alarm has to be used (with **Cyclical call** option) to send a report, with variable historic, cyclically to a database or to REM (Remote Energy Management Database of Schneider Electric). For more information please see sections "Send a report to database" and "Create and send a report to REM".*

Common end of the procedure

Once the alarm is created do not forget to enable the alarm into the alarm generated:
10. Click on "unlock this alarm".

Note: once an alarm is created you can check its status (see in "Third part", chapter "Trouble shooting and diagnostic" - section "iRIO connection status").

iRIO Software Configuration: Xflow

Create and Send a Text message (SMS)

You can send a SMS on regarding a threshold on a value detected (for example: peak of power detected by a Modbus device). Below you have the different steps to create and send a SMS:

Step 1: Create a recipient

The recipient will be the cell phone number who you send the message with the message content.

1. Go into Home page.
2. Click on the label "**recipients**" into System synthesis board.
3. Select "add a recipient".
4. Enter a Name for your recipient (for example: Phone_David).
5. Select "GSM/SMS" into Type.
6. Into **Connection** select the Modem.
7. Keep Transmit on normal return to "no".
8. Keep "Acknowledgement attempt(s)" at automatic acknowledgement.
9. Enter your SMS message.
10. Enter voice phone number where you want to receive the SMS into Phone Number field.
11. Keep Modem init. String blank.
12. Click on "**finish**" to create your recipient.
13. Stay into this last page for the step 2.

Note: once the recipient is achieved you can read its status into the recipient menu (see in "Third part", chapter "Trouble shooting and diagnostic" - section "iRIO connection status").

Step 2: Create the alarm procedure

Into Xflow a procedure is the process that will link the alarm to the recipient. Thanks to that you can tell which recipient you select for the alarm.

1. Click on "**see all procedures**" at the bottom of the page.
2. Select "add a procedure".
3. Enter a procedure Name.
4. Select into Main the recipient created into Step1. It will be linked to this procedure.
5. Click on "**Ok**" and stay into the next page for the step 3.

Note: First backup, Second backup and max. switching time are optional parameters:

First backup: the recipient who will receive the alarm if the main recipient is unavailable.

Second backup: the recipient who will receive the alarm if the main recipient and the first backup are unavailable.

Max. switching time: time (seconds) after which an alarm switches to the next group in the event of failure to the main recipient. This means that you don't have to wait for the end of a group's backup calls (which may take several minutes) to move to the next group.

Step 3: Create the alarm which will launch the message

1. From the procedure page click on "**show all alarms**".
2. Click on "**Add an alarm**".
3. Enter Name .
4. Select into File "Alarm".
5. Select Origin to "**Variable**" (you will send your text message regarding a value returned by a device)

*Note: if you want to send SMS an others conditions please see section 2.4.3.10 for **Origin Alarm** parameter.*

6. Select into Reference the variable Name related to the information monitored.
7. Select the procedure created for this alarm in step2.
8. Keep Report to "No".
9. Select the Type of the logic operation.
10. Enter your different thresholds.
11. Keep optional fields by default.
12. Click on "**finish**".

Step 4: Enable the alarm

Once the alarm is created do not forget to enable the alarm into the alarm generated:

1. Click on "**unlock this alarm**".

iRIO Software Configuration: Xflow

Create a report

Into iRIO a report is a file on CSV format which contains a list of variables (information recorded from the system of iRIO: devices information, dashboard, energy values.....).

Types of report

There is two type of report:

- **Historic report:** inside you have the historic of the variables selected. The recording period of these variables can be defined and you can set up when you wish to send this report (each one hour, one week, on month...).
- **Dashboard report:** it is instantaneous value when you send the report.

A report can contain a maximum of 50 variables.

Selection of a report

To select a report, proceed as follows:

1. Go into **Reports** sub menu into configuration menu.
2. Select "add a report".
3. Enter report Name.
4. Click on "**add an element**".
5. Enter element Name.
6. Select which Type of report you want: **historic or dashboard** information.

Case 1: Historic selection

7. Into **Format** select if you want US or French (FR) format.
8. Enter into Duration what will the frequency of information recorded into the report (for example: put 10 and minutes to record inside all variables each 10 minutes).

Case 2: Dashboard selection

7. Into **Format** select if you want US or French (FR) format.
8. Once it is finished, click on "define an alarm" to mention which alarm will launch the report sending.
9. Create an alarm.
10. Select Origin "System".
11. Into **Report** select the report name created.
12. Select "Cyclic call" into Type.
13. Into **Period** enter what is the cycle of report sending (for example: period=60 means that you will send a report each 60 minutes with the same variable content and recording values for period of 60 minutes).
14. **Next call:** time when you want to start the first sending (you can leave blank the area if you want to start sending directly after the creation). For example: 18/08/10 10:23:00.

Où sont les variables a selectionner, a t on besoin d une procedure?????



Note: a report can be sent by email, to another database or to REM (Remote Energy Management) services (see sections following).

iRIO Software Configuration: Xflow

Send an email

You can send an email regarding a threshold on a value detected as did for SMS (see section "Create and Send a Text message (SMS)") or cyclically (for example: each one hour).

For this part you need:

- server SMTP address from your internet provider (Ethernet connection) or SIM card provider (Modem connection)
- login of the SMTP (can be optional according to the provider)
- password of the SMTP (can be optional according to the provider)
- ISP parameters in case of Modem connection only (see chapter "System parameter web page") delivered by SIM card provider.

Below you have the different steps to send an email cyclically.

Step 1: Create a recipient

The recipient will be the mail address where you want to receive the mail.

1. Go into Home page.
2. Click on the label "**recipients**" into System synthesis board.
3. Select "add a recipient".
4. Enter a **Name** for your recipient (for example: Email_Boss).
5. Select "EMAIL" into **Type**.
6. Select "Text" into **Format**.
7. Into **Connection** select the **Modem** (or **ETHERNET** if you want to send email by Ethernet TCP-IP Modbus port).
8. Keep **Transmit on normal return** to "no".
9. Keep "**Acknowledgement attempt(s)**" at **automatic acknowledgement**.
10. Enter the **Subject** and the **Message** for your email.
11. **linked files?????**
12. Fill the mail address of the receiver into the **Email address**.
13. Fill **Email address of the sender**.
14. Fill **Login** and **Password** (optional parameters).
15. Fill SMTP address into "Mail server IP address" (DO NOT write the port number at the end of the address as it is requested into this field).

Notes: if you leave this area blank for Email address of the sender, iRIO has an email address by default: xflow@napac.fr.

IMPORTANT: check that the SMTP of your provider does not lock this address if you do not enter Email address of the sender. Depending to the provider you need a mail address compliant with the SMTP so enter into "Email of the sender" a mail address deliver by your provider of SIM card or IT manager. (For example: smtp.myprovider.fr with Email address of the sender: John@myprovider.fr).

Step 2: Create the alarm procedure

Into Xflow a procedure is the process that will link the alarm to the recipient.

Thanks to that you can tell which recipient you select for the alarm.

1. Click on "**see all procedure**" at the bottom of the page.
2. Select "add a procedure".
3. Enter a procedure **Name**.
4. Select into **Main** the recipient created into Step1. It will be linked to this procedure.
5. Click on "**Ok**" and stay into the next page for the step 3.

Note: First backup, Second backup and max. switching time are optional parameters:

First backup: the recipient who will receive the alarm if the main recipient is unavailable.

Second backup: the recipient who will receive the alarm if the main recipient and the first backup are unavailable.

Max. switching time: time (seconds) after which an alarm switches to the next group in the event of failure to the main recipient. This means that you don't have to wait for the end of a group's backup calls (which may take several minutes) to move to the next group.

iRIO Software Configuration: Xflow

Send an email

Step 3: Create the alarm which will launch the message

1. From the procedure page click on "**show all alarms**".
2. Click on "**Add an alarm**".
3. Enter Name.
4. Select into File "**Alarm**".
5. Select Origin to "**System**" (you will send your email cyclically).

Note: if you want to send the email an others conditions please see section "Create an alarm" for Origin Alarm parameter.

6. Select into **Procedure** the procedure created in step 2.
7. **Keep Report to "No"**
8. Select "**Cyclic Call**" into Type
9. Enter into "**Period**" the sending period of your email (unit is in minutes, for example 60 means send an email each 1 hour)
10. Fill Next Call: the time when you want to send the first email.
11. Keep other parameters by default.
12. Click on "finish".

Step 4: Enable the alarm

Once the alarm is created do not forget to enable the alarm into the alarm generated:

1. Click on "**unlock this alarm**".

Note: once an alarm is created you can check its status (see in "Third part", chapter "Trouble shooting and diagnostic" - section "iRIO connection status").

iRIO Software Configuration: Xflow

Send a report to a database

You can send a report to a database over Ethernet or GSM connection to a FTP database.

For this part you need:

- your FTP address (check that the FTP gives the rights to receive files from iRIO)
- login of the FTP
- password of FTP
- directory and Name of the FTP folder where the file will be sent from iRIO
- ISP parameters in case of Modem connection only (see part 2.4.3.5) delivered by SIM card provider.

Step 1: Create a recipient

The recipient will be the FTP database.

1. Go into Home page.
2. Click on the label "**recipients**" into System synthesis board.
3. Select "add a recipient".
4. Enter a Name for your recipient (for example: FTP_Company).
5. Select "Ftp" into Type.
6. Select "Text" into Format.
7. Into **Connection** select the ETHERNET (or Modem if you want to send email by GSM modem).
8. Keep **Transmit on normal return** to "no".
9. Keep "Acknowledgement attempt(s)" at automatic acknowledgement.
10. **Message???**
11. **linked files?????**
12. Into **Options** you can add into the file Name the Date and/or Site Name that you enter into System Parameter web page.
13. Enter into **Remote FTP directory**, the directory of the folder where you send the file on the FTP database.
14. Fill Login and Password of the FTP.
15. Fill FTP address or FTP IP number into IP address of FTP server (DO NOT write the port number at the end of the address as it is requested into this field).

Step 2: Create the alarm procedure

Into Xflow a procedure is the process that will link the alarm to the recipient.

Thanks to that you can tell which recipient you select for the alarm.

1. Click on "**see all procedure**" at the bottom of the page.
2. Select "add a procedure".
3. Enter a procedure Name.
4. Select into **Main** the recipient created into Step1. It will be linked to this procedure.
5. Click on "**Ok**" and stay into the next page for the step 3.

Note: First backup, Second backup and max. switching time are optional parameters:

First backup: the recipient who will receive the alarm if the main recipient is unavailable.

Second backup: the recipient who will receive the alarm if the main recipient and the first backup are unavailable.

Max. switching time: time (seconds) after which an alarm switches to the next group in the event of failure to the main recipient. This means that you don't have to wait for the end of a group's backup calls (which may take several minutes) to move to the next group.

iRIO Software Configuration: Xflow

Send a report to a database

Step 3: Create the alarm which will launch the message

1. From the procedure page click on "**show all alarms**".
2. Click on "**Add an alarm**".
3. Enter Name.
4. Select into File "**Alarm**".
5. Select "**Origin**" to "**System**" (you will send your email cyclically).

Note: if you want to send a report another condition please see section "Create an alarm" for **Origin Alarm** parameter.

6. Select into **Procedure** the procedure created in step 2.
7. Keep Report to "No".
8. Select "**Cyclic Call**" into Type.
9. Enter into "**Period**" the sending period of your email (unit is in minutes, for example 60 means send an email each 1 hour).
10. Fill Next Call: the time when you want to starting sending the first report.
11. Keep other parameters by default.
12. Click on "**finish**".

Step 4: Enable the alarm

Once the alarm is created do not forget to enable the alarm into the alarm generated:

1. Click on "**unlock this alarm**".

Note: once an alarm is created you can check its status (see in "Third part", chapter "Trouble shooting and diagnostic" - section "iRIO connection status").

Page à venir

iRIO Software Configuration: Xflow Variable management

Each variable is added automatically by the different interface of Xflow. A variable is an information where you have a value: for example linked to a peripheral (current, voltage value...). You go into Variable sub menu into configuration mainly to modify a variable or to create a new one:

Variable menu

Search a variable by number #

Search a variable by name

Search a variable by state

Search a variable by peripherals

Status: see third section "iRIO variable status"

Home page → Configuration → Variables

Variables with state on a peripheral OK

#	Status I/O	Variable	Description	Value	
0		Floor1_Energy P	DI5	0	Convert this variable
1	⊗	Current_Phase1	la	0.0 A	Convert this variable

check variables and select an action OK

3 [add a variable]

Variable selection

Type :

1 Input

Output

Input/Output

Action to be performed on the variables selected:

- Lock
- Unlock
- Authorise control by formula
- Disable control by formula

Legend : Normal - Locked - In alarm - On error

2 To convert a variable (see below)

ON PEUT FAIRE DES FORMULES SUR LES VARIABLES ???

Description of different parts of Menu

1 Input/Output

- Input: the variable is read on each acquisition period.
- Output: the variable is written on each acquisition period.
- Input/Output: the variable is read on each acquisition period and is written on each remote command ("one shot").

If the variable is an input, it follows the following path:

Sensor/PLC ⇒ V ⇒ signal type ⇒ VC ⇒ operation ⇒ VO ⇒ formula ⇒ Vf=VS

- V = Value returned by the PLC.
- VC = Value modified depending on the type of signal.
- VO = Value modified after the operation.
- Vf = Value after the formula.
- VS = Stored value.

If the variable is an output, it follows the following path:

VS ⇒ formula ⇒ Vf ⇒ reverse operation ⇒ VO ⇒ reverse signal type ⇒ VC=V.

Note: for an input/output variable, the order of writing has priority over the reading of other variables. The calculation formula is not executed.

iRIO Software Configuration: Xflow Variable management

2 To convert a variable

Click on "Convert this variable". You access to the following window:

By selecting one of the option displayed you can access to another sub window among the following.

- You can apply on a variable a "Change of decade":

Parameters description:

- "Keep the initial value": if you check "yes", the variable will be kept and a new one will be created with the name you entered in the field "name of the new variable"
- "Multiplier": the coefficient to use to convert the variable. You can use the list or enter you own value typed in the blank field next to the list.
- You can apply on a variable a "Change of dimension" (example: J to Wh):

<input checked="" type="radio"/> J	→ Wh
<input type="radio"/> J	→ kWh
<input type="radio"/> Wh	→ J
<input type="radio"/> kWh	→ J
<input type="radio"/> tce (ton of coal equivalent)	→ Wh
<input type="radio"/> tce (ton of coal equivalent)	→ kWh
<input type="radio"/> toe (ton oil equivalent)	→ Wh
<input type="radio"/> toe (ton oil equivalent)	→ kWh
<input type="radio"/> kWh	→ g of CO2
<input type="radio"/> g of CO2	→ hectare of forest
<input type="radio"/> kg of CO2	→ hectare of forest
<input type="radio"/> ton of CO2	→ hectare of forest

This page will help user to convert a variable between some common dimensions. You can keep the variable (modify it) or create a new one.

Notes: Xflow doesn't check anything about dimensions, it can't know if the variable is really an energy in J or whatever, because this is not an information managed by Xflow. The only one to know that the variable Xflow is reading in a PLC is an energy is the user, not Xflow. Use this page on "Change of decade".

iRIO Software Configuration: Xflow Variable management

■ You can apply on a variable a "Pulse weight":

Home page → Configuration → Variables → Convert this variable → Pulse weightCurrent_Phase1	
Current value of this variable	0.0 A
Pulse current weight (if operation = slope)	
Keep the initial value	<input checked="" type="radio"/> yes <input type="radio"/> no
Name of the new variable	<input type="text" value="Ecràn provisoire"/>
Value of the slope (The manual coefficient is priority)	<input type="text" value="0.001"/>
Other coefficient	<input type="text"/>

This page will help user to configure pulse weight of a variable (assuming the variable is a pulse unless it has no meaning) . You can keep the variable (modify it) or create a new one.

Notes: Xflow doesn't check anything about the variable, it can't know if the variable is really a pulse, because this is not an information managed by Xflow. The only one to know that the variable Xflow is reading in a PLC is a pulse is the user, not Xflow. Use this page on "Change of decade".

3 To add a variable

Click on "add a variable".

We show you the steps to create manually a variable with the description of the different fields:

1. Enter a **Name**
2. Select the **Peripheral** linked to the variable that you are creating.
Special peripherals:
The **virtual** peripheral: the variable is not physically read from a peripheral. Instead its value is calculated via a calculation formula.
The **system** peripheral: the value of the variable is provided through system data from the Xflow. This data is not physically read from a peripheral but corresponds to information internal to the Xflow software (very rarely necessary).
3. **Formula** (in case of virtual selection only)
4. **Changeable value** (in case of virtual selection only)
5. **Channel**: select which information you want to read or write (not available in virtual selection):
 - Input/Output ways (cards, Modbus devices...) for physical device only (you can add other Modbus register: see at the end of this section)
 - a system status (in case of **system** selection only: see at then end of this section)
6. **Storage Format**: it is format for displaying the read value in the dashboards, the alarm and the event historians: In the majority of cases, choose: **Boolean** for a logic variable (TOR), **IEEE** for an analog variable, **DWORD** for a meter variable. (see at the end of this section "Format details").
7. Select the **Unit** associated to this variable.
8. Keep **Refresh period in automatic**.
9. Select the **Operation** that you want to apply on the variable (see "operation description" at the end of this section for more details).
10. Select "Finish".

5. Channel description details

■ System channels

trouve pas d'explication

■ Edit a new address

Thanks to this option, you can add other Modbus register address linked to your devices. By default we report current, voltage, energy, power, THD and power factor values. You can read/write other information where are available into the product mapping which is not included into the pre defined list (for product mapping see user guide of the device required). For reading format and Schneider electric product it is **Word[i]** or **Dword[i]**.

trouve pas d'explication

iRIO Software Configuration: Xflow Variable management

6. Storage format details

You have the choice for:

- Boolean bit, logic value (0 or 1)
- Byte byte, integer (without decimal point) from 0 to 255
- Char character, integer (without decimal point) from – 128 to 127
- Int16 integer from –32768 to 32767
- Int32 signed integer (positive or negative) from –32768 to 32767
- Word 16 bit word, integer from 0 to 65535
- Dword 32 bit word, positive integer from 0 to 4294967295
- IEEE floating, simple precision decimal value (decimal point)
- DIEEE floating, double precision decimal value
- Date the value represents the date

7. Operation description details

The acquisition of the variable may be enhanced by operations carried out when the variable is read.

In the case of a variable on a peripheral, the operation is applied to the value read from the peripheral (after any scaling connected with the signal type).

For writing, the reverse operation is applied to the variable's value before it is sent to the peripheral (with, if necessary, the reverse scaling connected with the signal type).

In the case of a virtual variable, the operation only applies if the value is modified via its own formula.

List of operations	Description																						
Slope	<p>Allows the scaling and correcting of the variables' rough values. Enter the a and b values such that $y = ax + b$ with:</p> <ul style="list-style-type: none"> ■ y = "corrected value" ■ a = straight line directing coefficient ■ x = "read value" ■ b = original coordinate 																						
Mask	<p>Used to isolate bits within words Calculated value = read value AND value of the mask. Above all used for reading a bit within a word. Only the Boolean and Dword storage formats are permitted with this operation. In boolean format, the result has the value 1 if the corresponding bit (or at least one of the bits) within the mask is 1 in the read value. In Dword format, the value is the result of the operation AND bit to bit between the read value and the mask. Example: reading of bit 5 in a 16 bit word</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Bit</td> <td>15</td> <td>...</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>Hidden value</td> <td>32768</td> <td>...</td> <td>128</td> <td>64</td> <td>32</td> <td>16</td> <td>8</td> <td>4</td> <td>2</td> <td>1</td> </tr> </table> <p>The mask must therefore be set at 16. <i>N.B. On the calling of this operation the storage format must be boolean, otherwise the value stored will not be 0 or 1 but the result of the operation (in our example 0 or 16).</i></p>	Bit	15	...	7	6	5	4	3	2	1	0	Hidden value	32768	...	128	64	32	16	8	4	2	1
Bit	15	...	7	6	5	4	3	2	1	0													
Hidden value	32768	...	128	64	32	16	8	4	2	1													
Interval timer	<p>The storage format recommended for the variable is Dword. The variable's value is the number of seconds during which the value read on the peripheral is in the state entered. The time obtained is multiplied by <i>the multiplying coefficient</i>. Accordingly, with a coefficient of 0.0000277 (1/3600): returns the time in hours. This operation only applies to outputs. In the case of an input/output the modification of the variable's value allows the interval timer's index to be modified but does not send an order of writing to the peripheral.</p>																						

iRIO Software Configuration: Xflow Variable management

List of operations	Description
Delayed holding	<p>The storage format MUST BE boolean.</p> <p>With a front edge (transition to 1), the variable takes the value 1 for at least the number of seconds of the <i>holding period</i>.</p> <p>With a back edge (transition to 0), the variable takes the value 0 for at least the number of seconds of the <i>holding period</i>.</p> <p>If the state on the peripheral is held beyond the holding period, the variable's value is also held.</p> <p>The following timing charts illustrate the holding time in read mode with a <i>front edge</i>:</p>
Edge change	<p>The storage format MUST BE boolean.</p> <p>With a <i>front edge</i>, the state change variable (0 or 1) on the transition of the value read to 1.</p> <p>With a <i>back edge</i>, the state change variable (0 or 1) on the transition from the value read to 0.</p> <p>The following timing charts illustrate the edge change operation in read mode with <i>front edge</i>:</p>
Edge meter	<p>The storage format recommended for the variable is Dword.</p> <p>The variable's value is number of times that the value read on the peripheral changes from 0 to 1 with a <i>front edge</i>, or from 1 to 0 with a <i>back edge</i>. The metering result is multiplied by the <i>multiplying coefficient</i>.</p> <p>This operation does not apply to outputs.</p> <p>In the case of an input/output, modifying the variable's value allows the modifying of the edge meter index but does not send an order of writing to the peripheral.</p>
Differential	<p>Difference between the current value and the read value at the previous acquisition period.</p> <p>Calculated val = (Read val – Previous read val) x <i>multiplying coefficient</i></p> <p>How frequently reading takes place depends on the acquisition period.</p> <p>This difference occurs on the rough value of the read variable. It does not take into account any calculation formulae that may modify its value.</p>
Gradient (or differential coefficient)	<p>Variation in the variable over the last acquisition period (differential coefficient).</p> <p>Calculated value = ((instant value – previous value) / (current time – previous time)) x <i>multiplying coefficient</i></p> <p>In other words: the variable's value is the differential coefficient (difference divided by the time in seconds) of the value read on the peripheral multiplied by the multiplying coefficient. The differential coefficient period depends on the acquisition period.</p> <p>This operation ONLY applies to inputs.</p>
Inversion	<p>Inversion of the read value (only for logic values)</p>

iRIO Software Configuration: Xflow Variable management

List of operations	Description
4-20 mA sensor min-max	<p>Only for reading/writing on a 4-20 mA sensor. Enter the <i>min</i> value as 4mA and the max value as 20 mA.</p> <p>Example: Signal type = 4-20 mA. Value for 4 mA (min value): -100 °C Value for 20 mA (max value): +100 °C -100 should therefore be set in Min value and +100 in Max value.</p>
Pulse	<p>The storage format MUST BE boolean.</p> <p>With a <i>front edge</i>, on the transition to 1, the variable takes the value 1 for the <i>holding time</i> in seconds.</p> <p>With a <i>back edge</i>, on the transition to 0, the variable takes the value 0 for the <i>holding time</i> in seconds.</p> <p>If the state on the peripheral is held beyond the holding time, the value of the variable returns to the initial state (0 if <i>front edge</i>, 1 if <i>back edge</i>).</p> <p>The following timing charts illustrate the pulse operation in read mode with the <i>edge</i> at 1:</p>

iRIO Software Configuration: Xflow

Unit of measure management

Adding a measure unit

You can add the unit of measure that you need. For this:

1. Go into configuration menu.
2. Select Units link.
3. Click on **"add a unit"** (see bottom of the page).

Linking a measure unit to variable(s)

Each unit can be linked to a variable or multiple variables:

1. Go into configuration menu.
2. Select "Variables".
3. Click on one variable created.
4. Select **Modify** for area Unit:

Channel	Ecran provisoire	D15	
Value	0	from 16/09/10 11:50:08[refresh this page]	[modify]
Unit			
Refresh period		automatic (46ms)	

5. Select the unit that you want to associate to your variable:

Name	Floor1_Energy P
Description	D15
Peripheral	RIO 16DIO@2
Channel	D15
Unit / State	m3H <input type="button" value="add a unit"/>
Refresh period	automatic
Operation	no Unit kWh MWh m3H

Note: if you access to a unit created you can delete it (see Units sub menu into configuration web page). This process is allowed only if the unit is not linked to a variable.

Dashboard

Configure a dashboard

Settings of Energy Management and monitoring functions

The dashboard function will allow you to add different variable together (for example: add all power energy kWh together to have the global power consumed...).

Here you have process to create a dashboard:

1. Click on "add a dashboard".
2. Enter Name.
3. Enter Description.
4. Click on "add a variable".
5. Select the variable required (current, voltage, power, water consumption, gas consumption ...).
6. Select "show this dashboard" to display your dashboard.

Home page → Dashboard DB_Test

show this dashboard refresh every [\[select as home page\]](#) [\[modify this dashboard\]](#)

Status	Variable	Description	Value
	MSPH_1_Ep	Ep	3732.00 kWh
	NSXE_2_Ep	Ep	197.20 kWh
	PM9C_11_Ep	Ep	387.00 kWh

Creation of a variable Value : 4316.20

Legend : - - -

Value
3733.00 kWh
197.20 kWh
387.00 kWh

2 Creation of a variable Value : 4317.20

Legend : - - - 1

Example of dashboard.

1 Value

You have the sum of the variable selected (there is no control of the value added regarding unit of measure of each variable selected). The only exception is the dashboard function cannot add: boolean values, string values or date/time values regarding the variable format.

2 Creation of a variable

Enter a variable name for the dashboard **Value**. For example: this variable can be re used into another dashboard so you will have "dashboard of dashboard". Following this example, you can create a dashboard for each section of a hotel (one dashboard for Floor1, one dashboard for Floor2 and one dashboard for Floor3). After, you create a last dashboard of the whole hotel.

Notes: you can display your dashboard as home page by the button "select as home page" or into Users web page into configuration menu (only available with Administrator access).

This sum can be retrieved through a formula in another variable. The formula is simple, just enter the name of the dashboard in the field 'formula'. In order to help you create that variable with the formula, you can do it from the web page that show a dashboard. This is shown on the previous screen shot. The sum is shown in the standard dashboard web page.

Dashboard

Settings of Energy Management and monitoring functions

Draw directly a pie chart from a dashboard

A dashboard can be shown as a pie-chart.
 From the web page that show a dashboard, you can alternate between the dashboard and its pie-chart representation.
 Here is a standard dashboard view:

Home page → Dashboard DB_Test

show this dashboard refresh every [select as home page] [modify this dashboard]

Status	Variable	Description	Value
	MSPH_1_Ep	Ep	3732.00 I
	NSXE_2_Ep	Ep	197.20 I
	PM9C_11_Ep	Ep	387.00 I

Creation of a variable Value : 431

Legend : - - -

Click on "Display as pie" to toggle to a pie-chart view:

refresh every [select as home page]

Control Panel : Piechart

- MSPH_1_Ep: 3733.00 (86%)
- NSXE_2_Ep: 197.20 (5%)
- PM9C_11_Ep: 387.00 (9%)

A graphic can be created from the web page where you configure a dashboard.

Home page → Configuration → Dashboards → **sumdash**
←

Name	sumdash	[modify]
Description	this dashboard can compute.	

Variables in this dashboards [\[add a variable\]](#)

Name	Description	
zero		[delete]
ten		[delete]
fortytwo		[delete]

Users with this dashboard as home page select as home page for user TEST OK

No user use this dashboard as home page

[Click on this link to configure a chart based on that dashboard](#)

[show this dashboard]
[create a chart from this dashboard]

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Settings of Energy Management and monitoring functions

1. Click on **Load control** sub menu into Configuration menu.
2. Click on "**look the list of area**".
3. Click on "**add an area**".
4. Enter Name and Comment.

Configuration screen

From Configuration menu, click on "Charts" and select your options in the configuration screen belows:

Creating the chart

You will create a chart in different steps:

1. Fill the different areas of the web page for Name, Description and Displayed period.
2. Select the variables that you want to introduce into your chart by "add variable" command.
3. Check if cumulative value: according to the box selection you display cumulative value or differential value.
4. Operation: you link a **Normalization** or **Valorization** operation (see parts 2.5.2. and 2.5.3.).
5. Click on "Finish".
6. Select "Show this chart".

Details for parameters

1. "Displayed period"

Daily: record data every 10 minutes, 2 days deep

Monthly: record data every end of the day, 365 days deep

Yearly: record data every last day of the month, 10 years deep

Lasting several years: record data every years, 10 year deep

3. "Check if cumulative value"

Example of cumulative value: power consumption read from a PMxxx, **NSX** or **MasterPact devices**: P, Q and S channels)

■ Case 1: box enabled

If the variable selected in the chart is a cumulative value and you want to display the difference between two records (actually two periods).

Each time a record will be done, the value recorded will be the difference between "now" and the value recorded previously.

For a selection "daily" period and you tick "Check if cumulative value", then the value recorded will be the differential value for every 10 minutes period.

■ Case 2: box disabled

The raw value of the variable, the cumulative value in our example, will be recorded directly without any control and differential operation applied.

Notes: you can display the chart only once the first recordings are stored into iRIO.

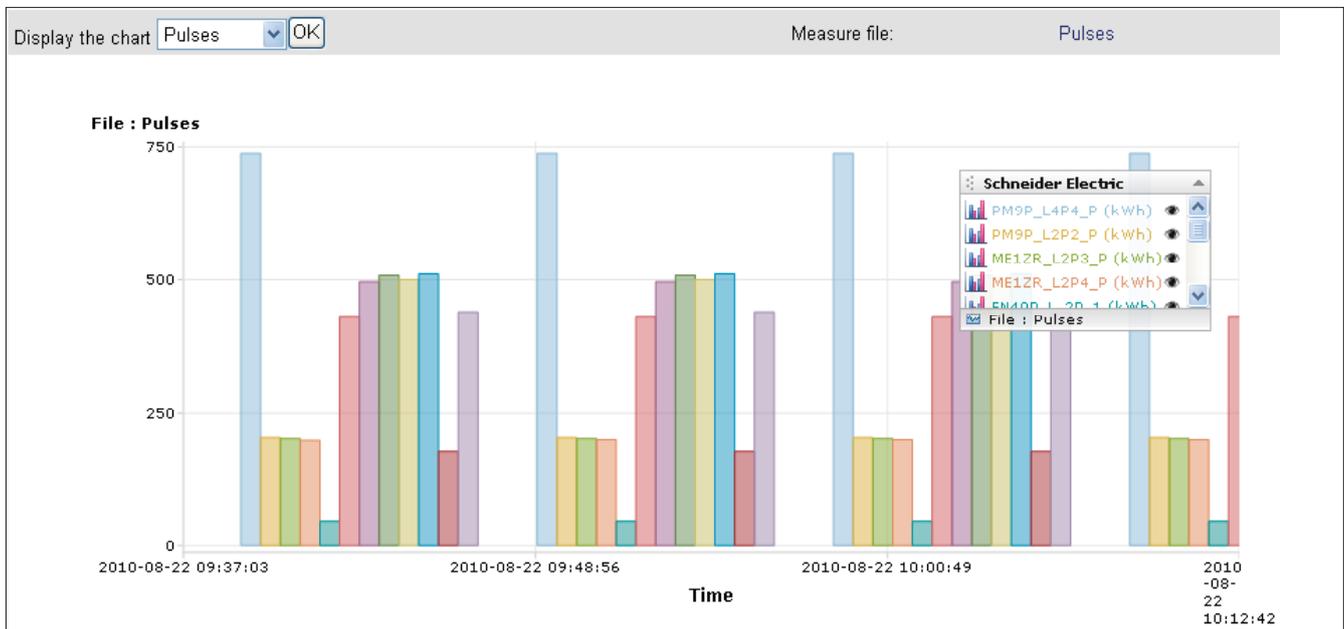
The button "Interrupt the recording" stops the recording of all variables into the chart selected.

Chart formats: bargraph, curve, pie chart or SVG

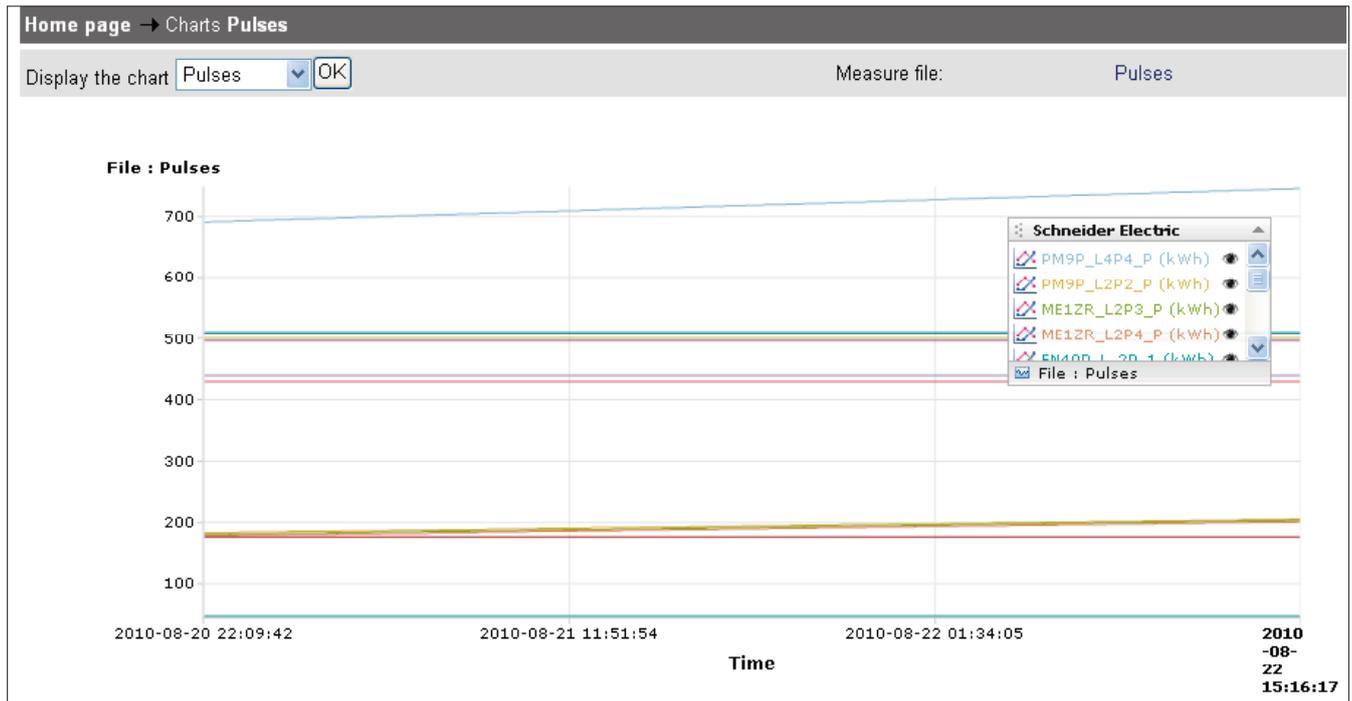
All the charts displayed with their tool box:

- 1 You can display your graphic by a number of points recorded (you have a record number according to the interval of period selected into parameter Display by periods). In this example, you have 248 records with one record per minute.
- 2 Adjust the start of the graphic on a date/time by or on the first recording of the chart by "Select".
- 3 Adjust the end of the graphic on a date/time by or on the last recording of the chart by "Select".
- 4 You can adjust which interval period you want to display on your graphic. According to this interval the number of records is automatically adjusted.
- 5 In case you modify default parameters value, you can store these new values into chart configuration.

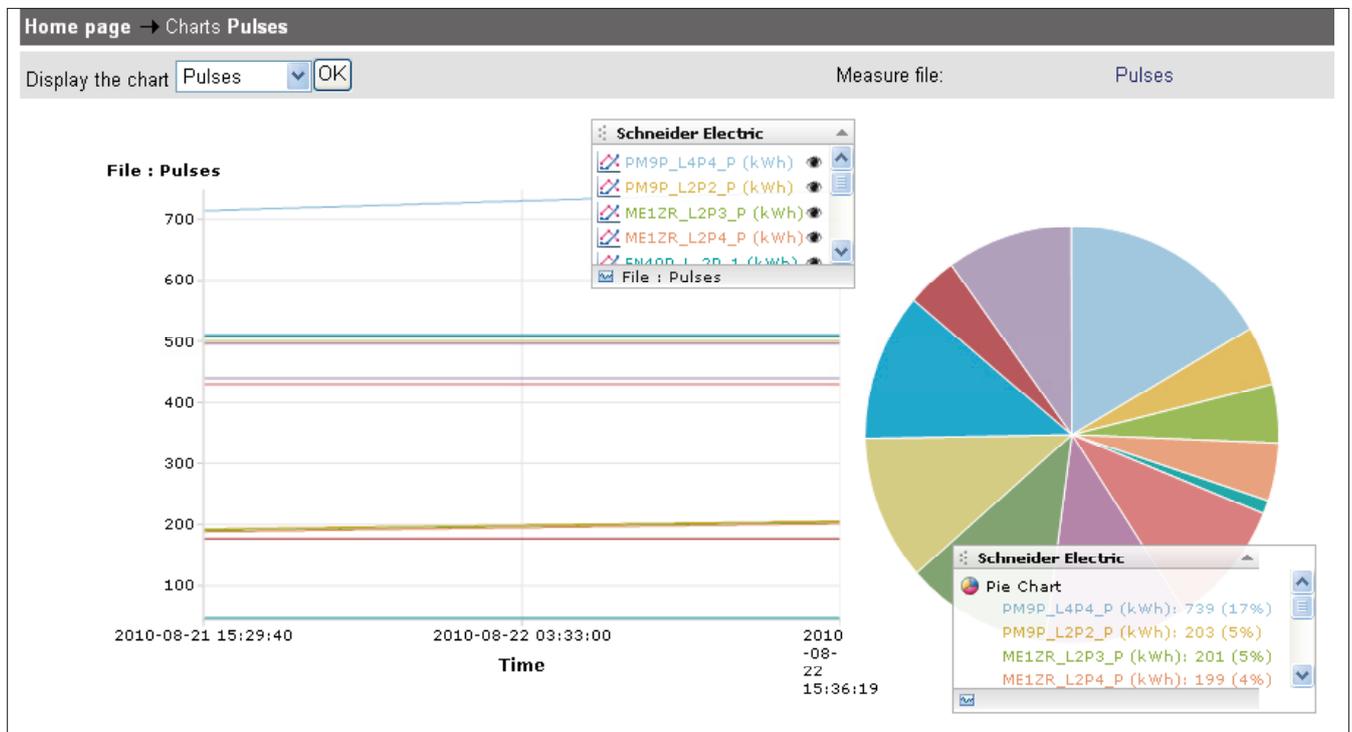
By default, each time you create a new chart, the informations are displayed in Bargraph format. You can have others formats by selecting on the chart generated "Modify this chart". After, select the "modify" field corresponding to Type parameter.



Example of Bargraph format.



Example of curve format.



Example of Pie chart format.



En attente

Example of SVG format.

Settings of Energy Management and monitoring functions

From Configuration menu, click on "Synoptic" and select "add a synoptic".

- 1 Name: fill your synoptic name that you can select into Synoptic top menu.
- 2 Description: fill the purpose of this synoptic
- 3 Background picture: it is a library where you can find all background picture that you need to build your synoptic
- 4 Send a picture: you send a picture from your laptop to Background picture library
- 5 Delete a picture: you delete a picture into background library
- 6 It is a command to view the picture selected.

- 7 add: you can execute different actions:
 - a variable: you can add a value corresponding to peripherals (current, voltage, energy, power, power factor or THD values).
 - a peripheral: you can have a link to peripherals information on your synoptic (you can display this link by the name of the peripherals or a picture associated)
 - a synoptic: you can have a link to another synoptic. It can be interesting to do links between synoptics, displayed on Synoptic top menu, as link by between pages.
 - a dashboard: you can have a link to a dashboard or displayed it
 - a chart: you can add a chart on the synoptic grid
 - a picture: you can add a picture from the background picture library.

Synoptics

Add a variable

Settings of Energy Management and monitoring functions

You can put a variable into a synoptic to display a value.

By default the variable is in number format, but can be also drawn in Gauge format:

1. Add a variable to a synoptic.
2. Select the "gauge" checkbox.
3. Set the minimum and the maximum values for the gauge.

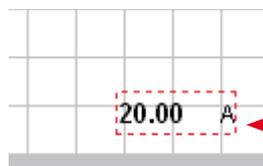
The variable will be rendered as a gauge, the current value is used to move the needle on the gauge between the minimum and the maximum values you configured.

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
MSPH_1_Ia	variable	<input checked="" type="radio"/> no <input type="radio"/> yes		<input type="checkbox"/> yes	0 OK	20 OK	150 OK	336 OK

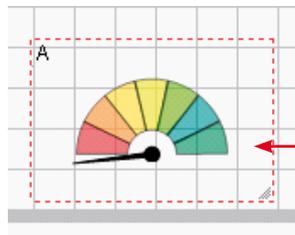
Show where is the variable into the grid (the variable blinks)

You define minimum and maximum values limit for gauge

Position of the gauge or the variable into the grid

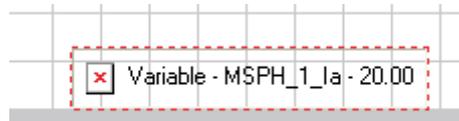


Variable in number format



Variable in gauge format

The variable can be displayed by a picture if you select "yes" (you can enter a picture's name prefix):



Settings of Energy Management and monitoring functions

By adding a peripheral, you add a link to the configuration window of peripheral selected.

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
 PM800@10	Peripheral	<input checked="" type="radio"/> no <input type="radio"/> yes					34 <input type="text"/> <input type="button" value="OK"/>	335 <input type="text"/> <input type="button" value="OK"/>

Show where is the peripheral into the grid (the peripheral blinks)

Position of the peripheral link into the grid



Peripheral link in letter format

The peripheral link can be displayed by a picture if you select "yes" (you can enter a **picture's name prefix**):



Synoptics

Add a synoptic

Settings of Energy Management and monitoring functions

By adding a synoptic, you can put a link to other synoptic already created.

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
MainLVPanel	synoptic	<input checked="" type="radio"/> no <input type="radio"/> yes					24 <input type="button" value="OK"/>	334 <input type="button" value="OK"/>

Show where is synoptic into the grid (the synoptic blinks)

Position of the synoptic link into the grid



Synoptic link in letter format

The synoptic link can be displayed by a picture if you select "yes" (you can enter a **picture's name prefix**):



Settings of Energy Management and monitoring functions

By adding a dashboard, you can put a link to the dashboard selected or displayed it in Pie Chart format

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
 MainLVPanel	synoptic	<input checked="" type="radio"/> no <input type="radio"/> yes					24 <input type="button" value="OK"/>	334 <input type="button" value="OK"/>

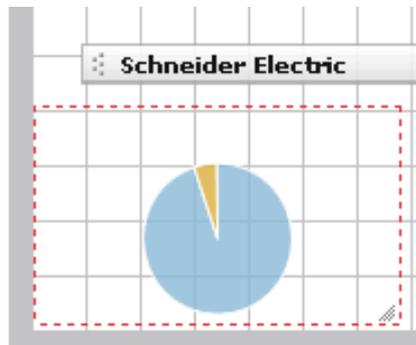
Show where is dashboard into the grid (the dashboard blinks)

Position of the dashboard link or Pie chart into the grid



Dashboard link in letter format

If you select "yes", the dashboard link is disabled and you display directly in pie chart with the current values reported:



Note: in case that the pie chart contains boolean, string or time variable type; the pie chart will be not loaded and will be displayed in grey with an error message.

Synoptics

Add a chart

Settings of Energy Management and monitoring functions

By adding a chart, you can put a link to a chart or display it directly on the synoptic.

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
Consumpt	Graph	<input checked="" type="radio"/> no <input type="radio"/> yes					11 <input type="button" value="OK"/>	91 <input type="button" value="OK"/>

Show where is chart into the grid (the chart blinks)

Position of the chart link or chart window into the grid

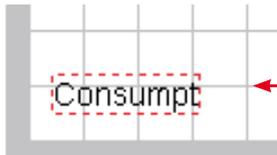
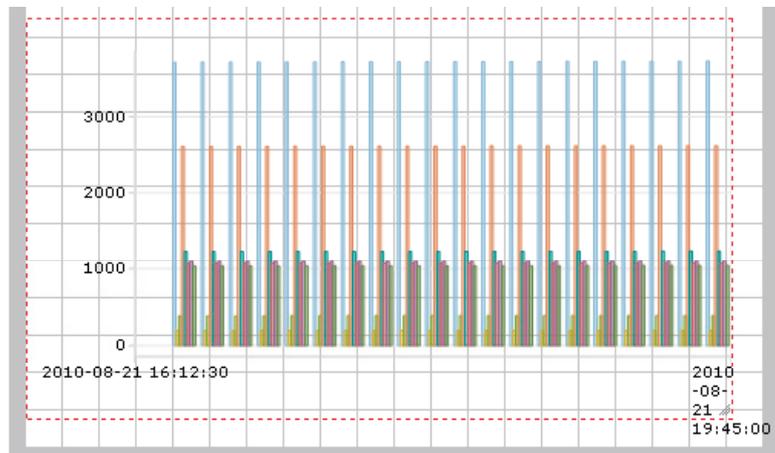


Chart link in letter format

If you select "yes", the chart link is disabled and you display directly the chart into the synoptic window:



Settings of Energy Management and monitoring functions

You can add a list picture available by default. In case you need more pictures see [section 2.5.4.1](#). to download into the pictures library new images.

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
 off.gif	Picture	<input type="radio"/> no <input checked="" type="radio"/> yes	off.gif <input type="button" value="OK"/>				55 <input type="button" value="OK"/>	318 <input type="button" value="OK"/>

→ Show where is picture into the grid (the dashboard blinks)

← Position of the picture link or chart window into the grid



← Example of picture

Settings of Energy Management and monitoring functions

By default, into iRIO you have 4 digital outputs. After auto detection of the card **RIO 16DIO**, you have 4 variables for the 4 digital outputs (see DO1, DO2, DO3 and DO4). In this case you add the variable linked to one of the iRIO logic outputs:

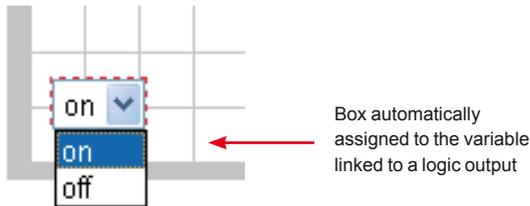
Select the variable to add:

Variables on peripheral

ID	Variable	Description
437	MainLVDB_3P3W	DO1
438	MainLVDB_3P4W	DO2
439	MainLVDB_1P	DO3
440	Masterpac_XF	DO4

You will have automatically into the grid a box to select "on" or "off" control for the output selected:

Name	Type	Picture	Picture's name prefix	Gauge	Min	Max	X	Y
<input type="text" value="MainLVDB_3P3W"/>	variable	<input checked="" type="radio"/> no <input type="radio"/> yes		<input type="checkbox"/> yes	<input type="text" value="0"/> <input type="button" value="OK"/>	<input type="text" value="0"/> <input type="button" value="OK"/>	<input type="text" value="20"/> <input type="button" value="OK"/>	<input type="text" value="330"/> <input type="button" value="OK"/>



Settings of Energy Management and monitoring functions

Each synoptic created can be linked to a user into his home page of Xflow.

For this function you have two choices either you select "select as home page" into synoptic web page (see Synoptic web page from top menu) or define your synoptic into **Users** into configuration menu (this link is only available in Administrator level access used during your first connection).

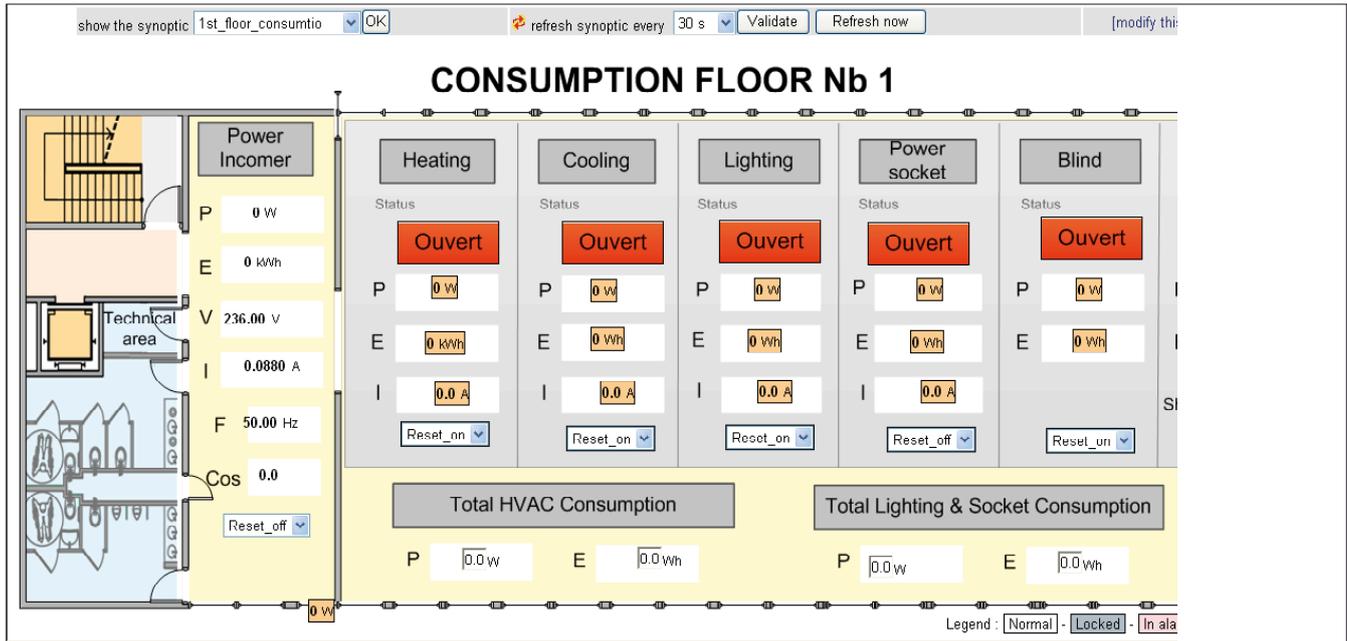
Synoptic web page (from top menu).

Users web page (only in administrator access).

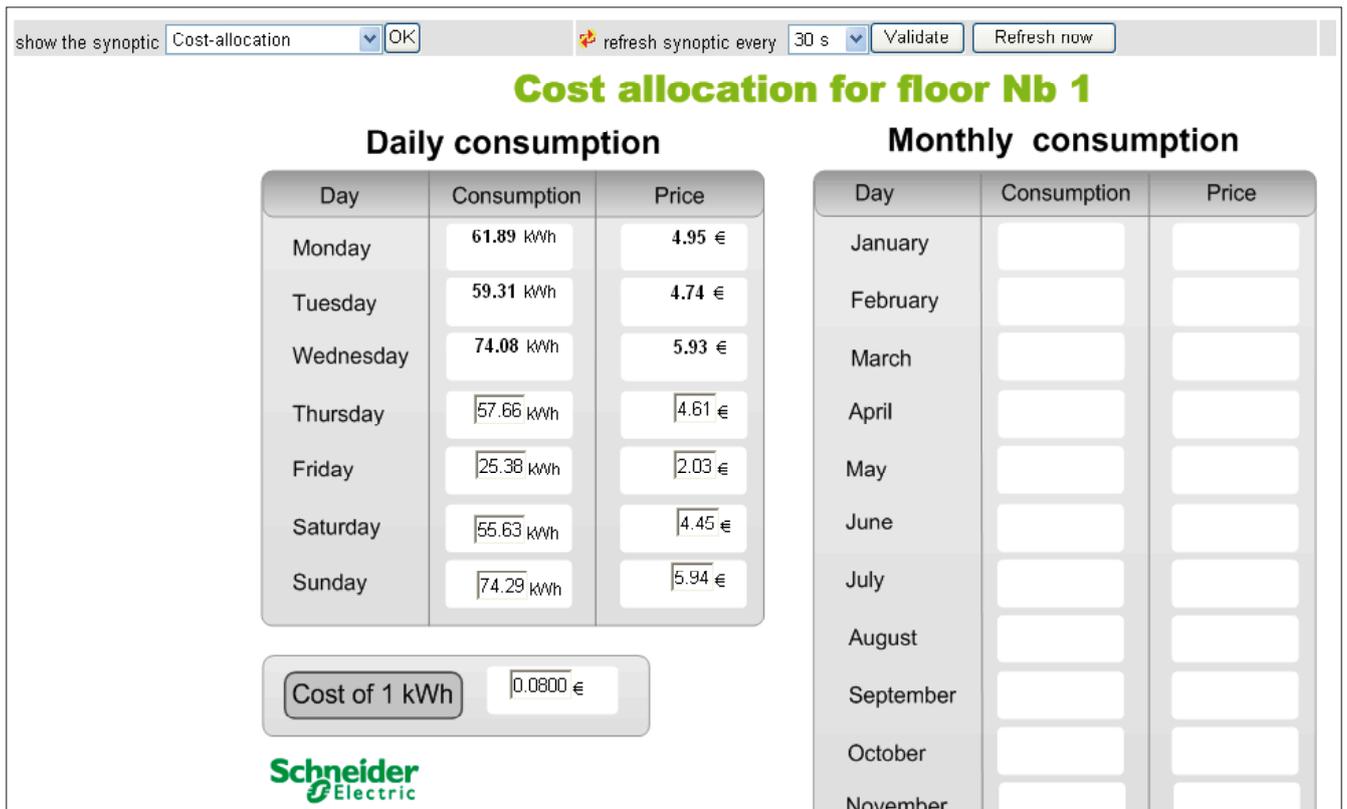
Synoptics

Example of Synoptics created

Settings of Energy Management and monitoring functions



Consumption Synoptic.



Cost Allocation Synoptic.

Settings of Energy Management and monitoring functions

Home page → Synoptic Ecologic_Dash

show the synoptic Ecologic_Dash OK refresh synoptic every 30 s Validate Refresh now [mo]

 <h3>€uros Saving</h3> <p>587.95 €</p> <p>(compared to last year without solution installed)</p>	 <h3>Forests Saving</h3> <p>0.280 Hectares</p> <p>(since solution was installed)</p>
 <h3>CO₂ Saving</h3> <p>0.560 t</p> <p>(thanks to electricity saved with the solution)</p>	 <h3>Number of trees saved</h3> <p>2797 trees</p> <p>(thanks to electricity saved with the solution)</p>

Legend : Normal - Locked -

"Green" Synoptic.

Resident Daily Consumption Comparison



<p>Day Before Previous Day</p> <p>25.38 kWh</p>	<p>Amount of Energy Reduced</p> <p>-22.17 %</p>	 <p>Keep Up The Good Work</p>
<p>Previous Day</p> <p>74.08 kWh</p>		

Benchmarking Consumption.

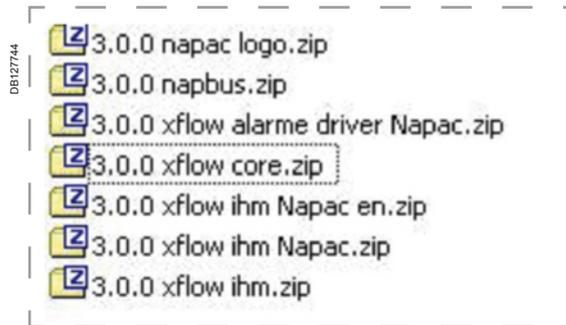
Note: in order to build this kind of synoptic it is advised to create the picture (the one loaded behind the grid) with software for image and pictures and after add to the library background mentioned into 2.5.4.1.

Before leaving customer plant some important points has to be tested and checked to be sure that application works properly.

Check list	Checked	Problem
Each pulse meters/counters has to return a pulse to iRIO PLC		
Each temperature sensor has to return a relevant values		
Each Modbus product connected has no loss of communication detected and returned one relevant information per device.		
Each product connected over IP network has to return a relevant information		
For GSM connection check that wireless connection has a good reception level (see in part one: chapter "Smart Interface Module (SIM)" § "ZigBee RF Testing Tool")		
For Zigbee connection check that wireless level is good on your SIM software (see in part one: chapter "Smart Interface Module (SIM)" § "xxxxxxxxxxxx")		
Configure end user Laptop to be connected to iRIO PLC and deliver him IP address for connection.		
Deliver to your end user different user name and password for iRIO PLC for access level operator and consultant.		
Deliver to the customer the user guide document.		

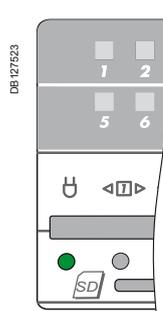
For updating your iRIO software in case of new release to have more functionality follow the procedure following:

- take a compact flash empty
- unzip the file received
- copy directly all the files (you should have 7 zip files) into your compact flash (do not create a folder on the card for these 7 zip files).



Example of compact flash content.

- Plug the card into iRIO.
- Power down and up your iRIO.
- The green led will blink fast.



Front side of iRIO PLC.

- Wait until the green led is coming back to 1 Hz blinking (this means that iRIO software is ready): procedure will take maximum 5 minutes.
- Unplug the card and remove the release package to avoid your iRIO software will launch again the upgrading procedure.

Troubleshooting and diagnostic

iRIO connection status

	Connection busy	The connection is being used
	Connection connected	The connection is connected. The modems have "picked up"
	Incoming call	A ring has been detected on the telephone line (only if the link is a "Local modem" type link)
	Faulty modem	The modem has not responded to the Hayes initialisation commands (only if the link is a Local modem or GSM link) If the connection is a GSM Modem, the modem's status may be faulty for the following additional reasons: <ul style="list-style-type: none"> ■ "(no SIM card)" ■ "(incorrect PIN card)" ■ "(SIM card blocked)"
	Connection not initialised	The connection was not initialised correctly. The link is unusable. On PC Xflow, check that the communication port associated with the connection is not already being used by another application.

Into Alarm web page you can read alarm status:

State	
	Locked
	active
	inhibited (by another enabled alarm)

Note: in case of alarm locked, you have to unlock it into the alarm created if you want to enable it.

Troubleshooting and diagnostic

iRIO recipient status

	Locked	The recipient is locked; no calls can leave.
	Redial waiting time	There must be a waiting period before the recipient is called again. The waiting time can be found in the "Time" column.
	Alarm sending failure	The recipient could not be reached. The direction is unavailable (blocked) for 1 hour. The waiting time before the next sending attempt can be found in the "Time" column.
	Blacklisted recipient	The recipient is has been blacklisted. Calls can no longer be made in this direction. Manual re-enabling is required by the user (by clicking on the recipient in question and then on the "Re-validate this recipient" button so that this direction becomes operational again.

A recipient is said to be "unavailable"  if it is no longer called to receive an alarm. This unavailability may be temporary or permanent (*blacklisted recipient* ). In this last case the user must intervene to "Re-validate this recipient". If a recipient is unavailable (or blacklisted) the alarms waiting to be sent are transferred to the backuprecipient (see alarm procedures chapter). The following table presents the details of the various states that a recipient may assume:

State	Description
blacklisted	The recipient has been blacklisted  . The operator MUST connect to the Xflow to re-enable it manually so that alarms are sent to it once more. This state is reached after 4* consecutive <i>protocol failures</i> or 4* consecutive calls with a loss of carrier signal.
Max. failures reached	The recipient is unavailable  for 1 hour . The operator has an hour in which to connect to the Xflow to re-enable this recipient. This state is reached after 4 consecutive instances of call <i>failure</i> or <i>line busy</i> .
Acknowledgement failure	The recipient is unavailable  for 1 hour . The operator has an hour in which to connect to the Xflow to re-enable this recipient. This state is reached after the sending of N <i>acknowledgement</i> attempts without the alarm being effectively acknowledged by a user.
Acknowledgement waiting time	The recipient is suspended for the acknowledgement waiting time until a user acknowledges the alarm. After this time the alarm is again sent to the recipient the number of times set in <i>acknowledgement attempt(s) - 1</i> .
Protocol failure	The recipient's configuration results in a protocol failure. The recipient is suspended for 10 minutes before a new call attempt is made. After 4* successive attempts resulting in protocol failures, the recipient is blacklisted with the state <i>blacklisted</i> .
Line busy	The recipient's call results in a busy telephone line. The recipient is suspended for 5 minutes before a new attempt is made. After 4* successive attempts resulting in a busy line the recipient is unavailable with the state <i>Max. failures reached</i> .
Call failure	All other cases of call failure. The recipient's call has failed. It is "suspended" for 2 minutes before another attempt is made. After 4* consecutive failures the recipient is unavailable with the state <i>Max. failures reached</i> .
Legal redial waiting time	The recipient's call is successful. A minimum time of 2* minutes between two consecutive calls to the same recipient has been respected.  To be taken into account on alarm testing. There may not be 2 consecutive calls less than 2 minutes apart; a new call can be triggered before 2 minutes has passed by clicking on "Re-validate this recipient".

(*): Default values commonly accepted on Xflow (prevents repeated failed calls). For certain exceptional circumstances of use (private lines, etc), these values may be modified. Seek advice from a NAPAC technician.

Troubleshooting and diagnostic

iRIO variable status

Picto à modifier

Name	<p>Names the variable with a tag. Define a clear name allowing the unambiguous identifying of the variable for the rest of the configuration process. Choose a short name (12 characters maximum), without spaces, punctuation marks or characters representing an operator in the calculation formulae. By default the name is in the form VAR000xx.</p> <p> Each name must be unique. No other variable, alarm, weekly programme or yearly programme must have the same name, on pain of generating errors in the calculation formulae. Indeed these formulae use the names in their syntax.</p>	
State		<p>Variable locked The interrogating of this variable has been blocked by the user.</p>
		<p>Faulty variable Impossible to communicate with the variable. Check the wiring and the state of the associated link.</p>
		<p>Variable in alarm mode The variable has been allocated to an alarm, which has been triggered (crossing of threshold or alarm state).</p>
		<p>Configuration error An inconsistency has been detected in the configuration of the variable.</p>
		<p>Unrefreshed The variable was not refreshed during the previous cycle. This state may be permanent if the physical saturation of the system is reached (too many variables with higher priority (i.e. acquisition periods that are too short in relation to the total number of variables)): the problem is eliminated by only entering an acquisition period if this is necessary; if it is not sufficient the periods must be adjusted. This state may only be temporary if the variable belongs to a "slow" peripheral.</p>
		<p>Variable referenced in at least one formula To view all the formulae referencing this variable, just click on the link associated with this pictogram.</p>
		<p>Control by formula disabled Allows the variable to be changed to manual control; stopping of automatic control to force a value or carry out operating tests.</p>
		<p>Formula compilation error The formula is incorrect (syntax, incorrect reference, etc).</p>
		<p>Formula execution error The formula is correct, but an error occurred during its execution (illegal calculation, etc).</p>
		<p>State "Straton" variable This variable is used by the Straton application during execution.</p>
Description	<p>Provides an extended description. Use a specific phrase describing the nature and content of the variable. The description must be understandable by all the system's operators (31 characters maximum).</p>	
Peripheral	<p>Indicates the peripheral on which the variable will be read and/or written. The list contains the peripherals configured in the previous chapter.</p> <p>Special peripherals:</p> <ul style="list-style-type: none"> ■ the virtual peripheral: the variable is not physically read from a peripheral. Instead its value is calculated via a calculation formula. ■ the system peripheral: the value of the variable is provided through system data from the Xflow. This data is not physically read from a peripheral but corresponds to information internal to the Xflow software (very rarely necessary). 	

Important notes

The following paragraphs describe the hardware configuration on the various modules for setting the Modbus slave address of said modules (UPS-2 and I/O boards).

You will have to change the default hardware configuration only if you have more than 1 extension unit connected locally to the iRIO central unit and/or at least one remote extension unit (as slave substations).

Moreover, the iRIO central unit is able to detect automatically all UPS-2 and I/O boards connected on both its RS 485 serial networks (COM3 and COM4). iRIO also knows all the Modbus mapping of each of those devices. The user does not have to configure the Modbus slave address of the UPS-2 and iRIO I/O boards nor the Modbus address of the information to get/set.

UPS-2 module Modbus address

UPS-2 has its own Modbus slave address.

The following information is available for the iRIO central processing unit:

- mains power supply presence: 0103 h
- battery voltage level: 0102 h (x 0.1 V) (h = hexadecimal coding)
- supply voltage: 0101 h (x 0.1 V)
- internal temperature: 0100 h (x 0.1 °C)
- the thumbwheel sets the Modbus slave address of the UPS-2 module and takes part in construction of the Modbus slave address of the I/O boards powered by it.

UPS-2 thumbwheel position	UPS-2 Address (Hexa)	Address of the I/O boards powered by this UPS-2 (XY*) (Hexa)
0 (Master station)	FF (255)	0Y
1	F1 (241)	1Y
2	F2 (242)	2Y
3	F3 (243)	3Y
4	F4 (244)	4Y
5	F5 (245)	5Y
6	F6 (246)	6Y
7	F7 (247)	7Y
8	F8 (248)	8Y
9	F9 (249)	9Y
A	FA (250)	AY
B	FB (251)	BY
C	FC (252)	CY
D	FD (253)	DY
E	FE (254)	EY

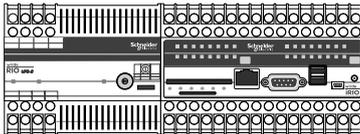
Note: calculation detailed in the table below.

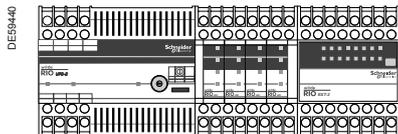
Slaves addresses of the I/O boards inserted in the iRIO CPU (master station ⇒ X = 0)

	Value of Y	
	Left-hand board (size T2)	Right-hand board (size T2)
CPU enclosure backplane thumbwheel		
0	10 ⁽¹⁾	1
1	10 ⁽¹⁾	1
2	2	3
3	2	3
4	4	5
5	4	5
6	6	7
7	6	7
8	8	9
9	8	9
A	A	B
B	A	B
C	C	D
D	C	D
E	E	F
F	E	F

⁽¹⁾ Special cases: the board address will be XY, where X = (thumbwheel of the UPS power supply +1) and Y = 0.

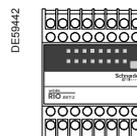
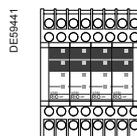
DE59439





Note: The thumbwheel of the iRIO CPU enclosure and the EXT-2 enclosure can be accessed by removing the front of the enclosures. The switches of the EXT-1 enclosure can be accessed by removing the board located furthest left in the enclosure

Slaves addresses of the I/O boards in extension modules



Value of Y for EXT-1 extension modules

Value of Y for EXT-2 extension modules

Enclosure backplane switches EXT-1

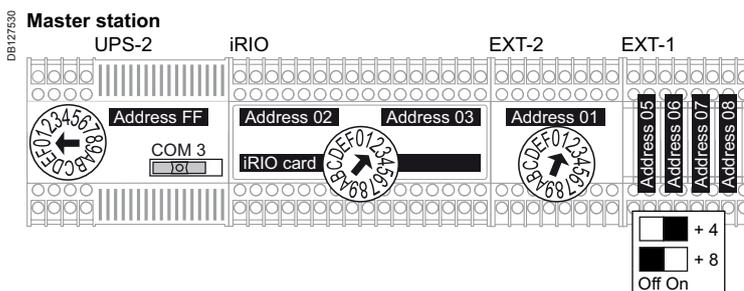
Board pos. 1 Board pos. 2 Board pos. 3 Board pos. 4

Enclosure backplane thumbwheel Board

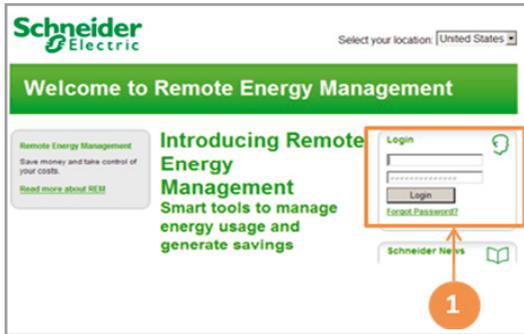
<input type="checkbox"/> +4	1	2	3	4	0	10 ⁽¹⁾
<input type="checkbox"/> +8					1	1
Off On					2	2
					3	3
<input type="checkbox"/> +4	5	6	7	8	4	4
<input type="checkbox"/> +8					5	5
Off On					6	6
					7	7
<input type="checkbox"/> +4	9	A	B	C	8	8
<input type="checkbox"/> +8					9	9
Off On					A	A
					B	B
<input type="checkbox"/> +4	D	E	F	10 ⁽¹⁾	C	C
<input type="checkbox"/> +8					D	D
Off On					E	E

⁽¹⁾ Special cases: the board address will be XY, where X = (thumbwheel of the UPS power supply + 1) and Y = 0

An example of a master station architecture and a slave station architecture and the board addressing is shown below.



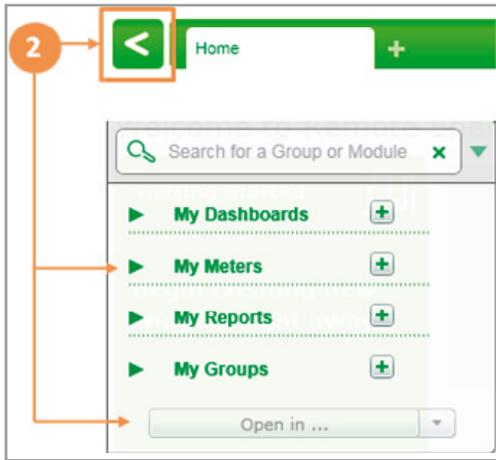
RS 485 cable: 1 x 0.9 mm² twisted pair (max. 1 km)
 Speed: 9.6 kb (115.2 kb if the distance is short)
 Format: 8 bits even parity



Getting Started

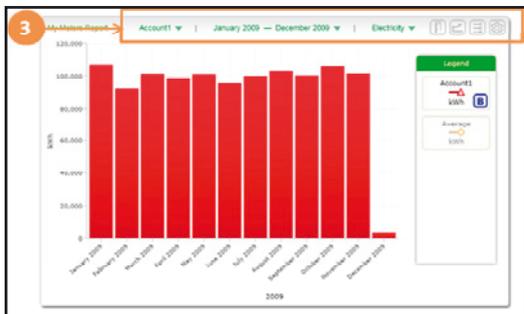
1 Login at www.rem.schneider-electric.com. Enter your user name and password in the Login box.

Once you have logged into the system, you will have access to your energy usage information and be able to view it in a variety of report formats.



2 Navigate to the main menu by selecting the arrow symbol. Then select meters and Open in...

The Open in drop down will display the reports that are available.



3 Report options allow you to change the parameters of the report such as time period and which meters and commodities are displayed.



4 Create a personalized dashboard containing your favorite reports and widgets from the Widget Library.

Modbus Speed recommendations (introduce at the end of Hardware description UPS-2)

We can recommend you some baud rate selection. The baud rate value selected into speed parameter of iRIO depends on your cable length, type of cable and number of products:

Product number	Speed (or Baud rate)	Maximum Length
1	9600	1000 m
10	19200	100 m
31	9600	200 m

Note: for other information about Modbus and recommendations for Modbus, please go www.modbus.org into section technical resources and link **Modbus specification: Modbus serial line protocol and implementation guide line**.

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