

Technical Information

Energy Efficiency
Communication
Architectures
DIRIS Digiware



1. Introduction

The purpose of this technical note is to describe the **communication architectures** involving multiple **DIRIS Digiware** measurement and monitoring systems.

These architectures offer different approaches in the exchange of data (settings, measurements, alarms, etc.) between measuring points located in one or more electrical cabinets, **depending on the electrical installation** and **communication bus** used:

- Digiware Bus
- RS485 Modbus RTU
- Ethernet Modbus TCP

This list of architectures is not exhaustive and can easily be adapted to the application.

1.1. Glossary

Modbus RTU protocol

- Medium: 2 to 3-wire RS485 link
- Master / Slave mode
- Consists of frames with the slave address, the relevant function (writing, reading), the data and the error checking code

Modbus TCP protocol

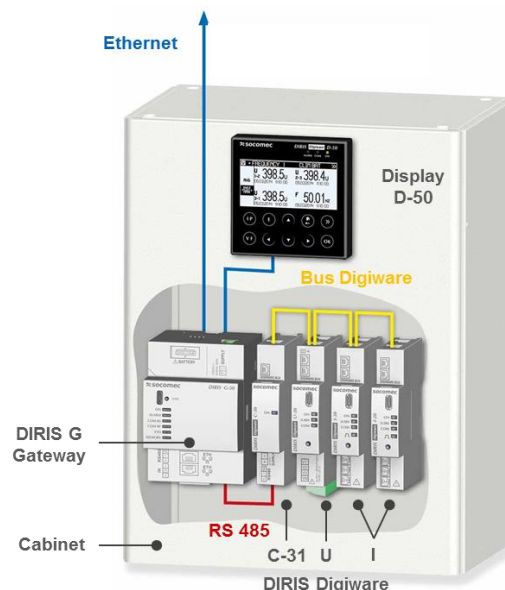
- Medium: Ethernet
- Client / Server mode
- The address of the server is its IP address
- Consisting of frames with the relevant function (writing, reading) and the data

DIRIS Digiware System

- Measurement system consisting of at least 1 voltage measurement module and 1 or more current measurement modules
- Data communication and exchange between modules via Digiware bus with a special RJ45 cable
- Data communication and exchange with external points via the control interface or display with RS485 Modbus RTU or Modbus TCP

1.2. Legend

The following diagram shows the symbols typically used in all the communication architectures presented here.



Note: To keep the diagrams simple, measurement sensors or power supplies are not shown. For more details on the configuration of the products, please refer to their user manuals.

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2. Measurements in a single cabinet

2.1. Centralising on RS485 Modbus Supervisor

In the cabinet, the DIRIS Digiware system exchanges configuration data, measurements and alarms with a supervisor via the RS485 bus using the Modbus RTU protocol.

| Cabinet |
|--|
| <ul style="list-style-type: none"> • 1x RS485 DIRIS Digiware C-31 control interface module • 1x DIRIS Digiware U voltage measurement module • Multiple DIRIS Digiware I current measurement modules |

- The C-31 control interface collects data from the DIRIS Digiware system via the Digiware bus and exchanges it with a supervisor via the RS485 bus using the Modbus RTU protocol.

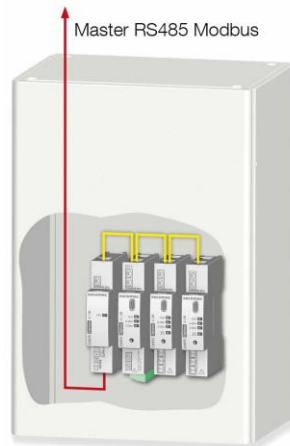


Fig. 1: RS485 Modbus Supervisor

2.2. Centralising on Display

In this cabinet, the display shows the configuration data, measurements and alarms from the DIRIS Digiware via Digiware bus and exchanges it with a supervisor (PC or PLC).

| Cabinet |
|---|
| <ul style="list-style-type: none"> • 1x D-40 or D-50 DIRIS Digiware display • 1x U module • Multiple I modules |

- The display exchanges data from the DIRIS Digiware system via the Digiware bus.
- The display sends measurements to a supervisor via RS485 (D-40) or Ethernet (D-50).



Fig. 2: Centralising on D-40 Display



Fig. 3: Centralising on D-50 Display

2.3. Centralising on WEBVIEW

In the cabinet, the DIRIS Digiware system exchanges configuration data, measurements and alarms with a supervisor via the Ethernet bus using the Modbus TCP protocol.

| Cabinet |
|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules |

- The C-31 control interface collects data from the DIRIS Digiware system via the Digiware bus and exchanges it with the DIRIS G gateway via RS485.
- The gateway sends the data via Ethernet to show it on WEBVIEW, for example.

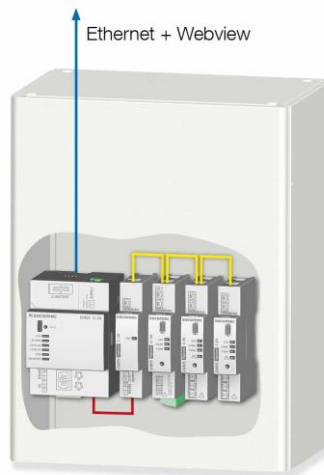


Fig. 4: Centralising on WEBVIEW

A display can also show measurements at the same time.

| Cabinet |
|--|
| <ul style="list-style-type: none"> • 1x D-40 or D-50 display • 1x DIRIS G gateway • 1x C-31 control interface (variant D-50) • 1x U module • Multiple I modules |



Fig. 5: Centralising on WEBVIEW and D-40 Display



Fig. 6: Centralising on WEBVIEW and D-50 Display

3. Measurements in multiple cabinets with blind Com.

3.1. Centralising on RS485 Modbus Supervisor

The DIRIS Digiware system, shared across multiple cabinets, exchanges configuration data, measurements and alarms with a supervisor via the RS485 bus using the Modbus RTU protocol.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • Multiple I modules |

- The C-31 control interface, located in the first cabinet, collects data from the DIRIS Digiware system (shared across multiple cabinets) via the Digiware bus
- The DIRIS Digiware U voltage measurement module is installed in the first cabinet.
- This configuration requires cabinets to be in close proximity (*total distance < 100m. For a distance > 100 m, a C-32 repeater is required*)
- The C-31 exchanges data with a supervisor via RS485.



Fig. 7: Centralising on RS485 Modbus Supervisor – Cabinets in close proximity

If the cabinets are at a distance, RS485 communication is used to communicate between them. This means a C-31 control interface must be installed in each cabinet.

| Cabinets |
|--|
| <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

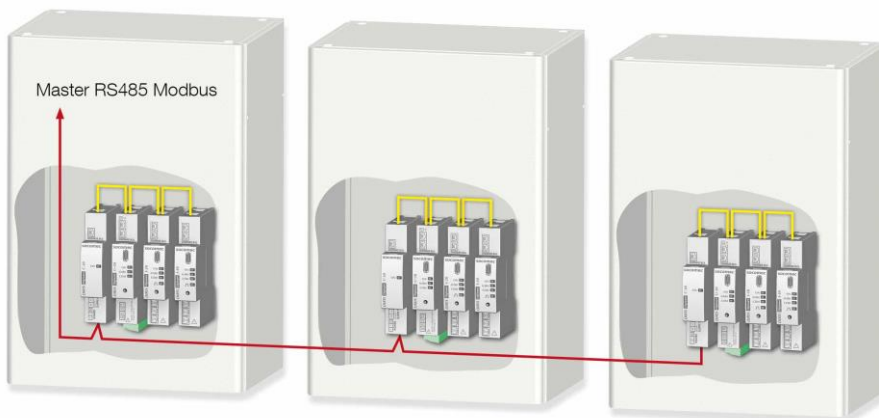


Fig. 8: Centralising on RS485 Modbus Supervisor – Remote cabinets

3.2. Centralising on Ethernet Supervisor

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with a supervisor via the Ethernet bus using the Modbus TCP protocol.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

- In each cabinet, a C-31 control interface collects data from the DIRIS Digiware system via the Digiware bus and exchanges it via RS485.
- The voltage sources can be identical or can vary from one cabinet to the other.
- The data collected via RS485 from the different cabinets is centralised on a DIRIS G gateway located in the first cabinet and transferred via Ethernet.

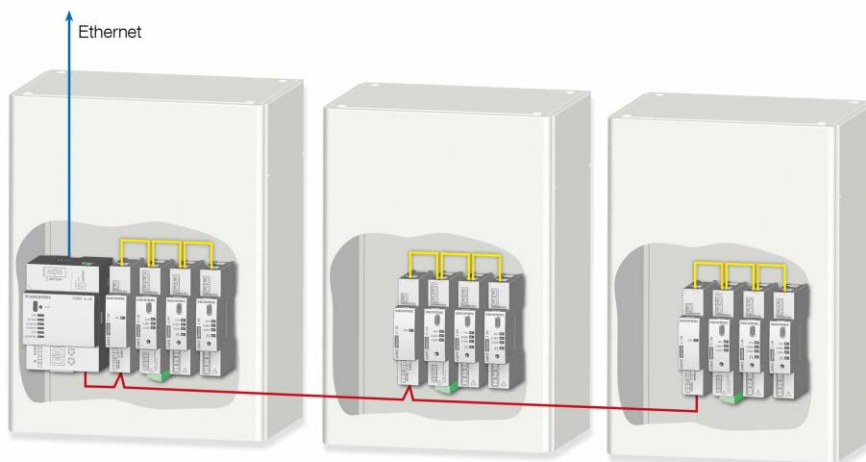


Fig. 9: Centralising on Ethernet Supervisor – Remote cabinets

- If the cabinets are very far away from one another, the Ethernet network is used to communicate between them. This means a DIRIS G gateway must be installed in each cabinet.

| Cabinets |
|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules |

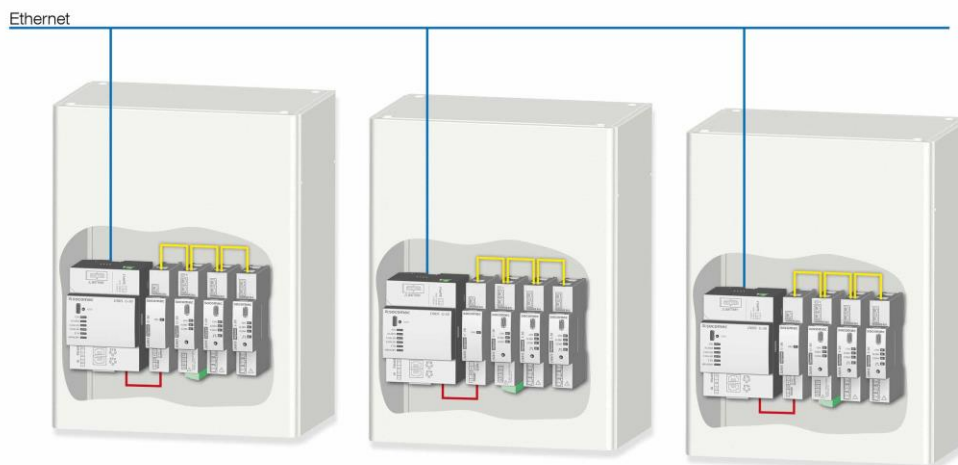


Fig. 10: Centralising on Ethernet Supervisor – Very remote cabinets

4. Measurements in multiple cabinets with Display

4.1. RS485 Modbus supervisor and 1 global Display

The DIRIS Digiware system, shared across multiple cabinets, exchanges configuration data, measurements and alarms with a global display and a supervisor via RS485.

| First cabinet | Subsequent cabinets |
|---|--|
| <ul style="list-style-type: none"> • 1x D-40 display • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • Multiple I modules |

- The C-31 control interface, located in the first cabinet, collects data from the DIRIS Digiware system (shared across multiple cabinets) via the Digiware bus
- The DIRIS Digiware U voltage measurement module is installed in the first cabinet.
- This configuration requires the cabinets to be in close proximity (distance of < 100m. If > 100m a C32 repeater is required) and a single voltage source.
- The C-31 exchanges data with a D-40 display via RS485.
- The DIRIS D-40 display shows all the measurement data and sends it to a RS485 supervisor.

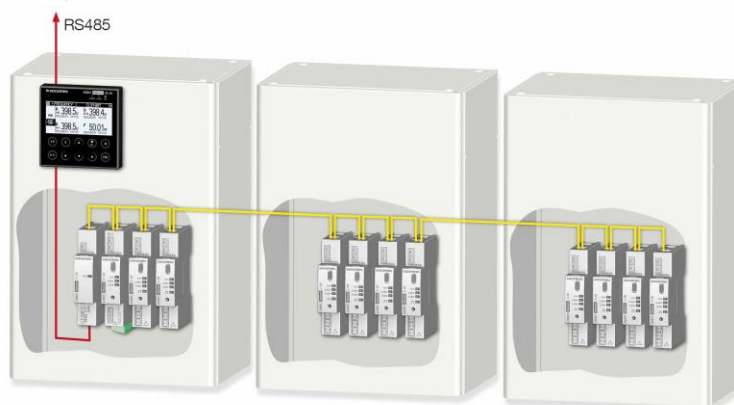


Fig. 11: RS485 Modbus Supervisor and 1 global Display – Cabinets in close proximity

4.2. Ethernet Supervisor and 1 global Display

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with a global display and an Ethernet supervisor.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x D-50 display • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

- The D-50 display, located in the first cabinet, exchanges data from the DIRIS Digiware systems via the Digiware bus (first cabinet) or via RS485 (other cabinets).
- The voltage sources can be identical or can vary from one cabinet to the other.
- The DIRIS D-50 display shows all the measurement data and sends it via Ethernet.

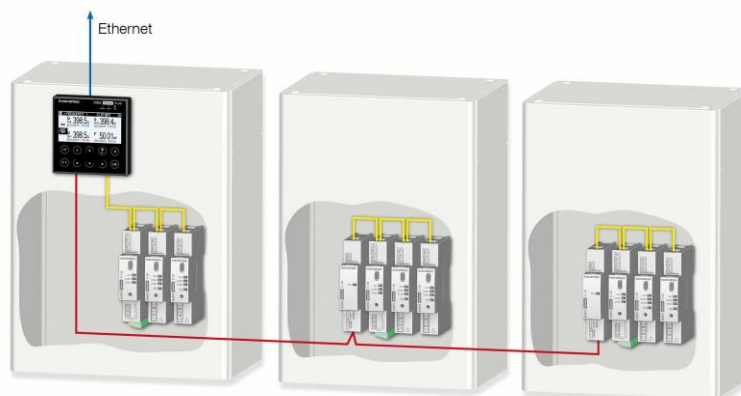


Fig. 12: Ethernet Supervisor and 1 global Display – Remote cabinets

4.3. 1 Supervisor and multiple separate Displays

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with a display installed in each cabinet and a RS485 supervisor.

| Cabinets |
|--|
| <ul style="list-style-type: none"> • 1x D-40 display • 1x U module • Multiple I modules |

- The D-40 display, located in each cabinet, shows data from each DIRIS Digiware system via the Digiware bus.
- Each display can exchange data via RS485.
- The voltage sources can be identical or can vary from one cabinet to the other.
- The data is sent to a single RS485 supervisor.

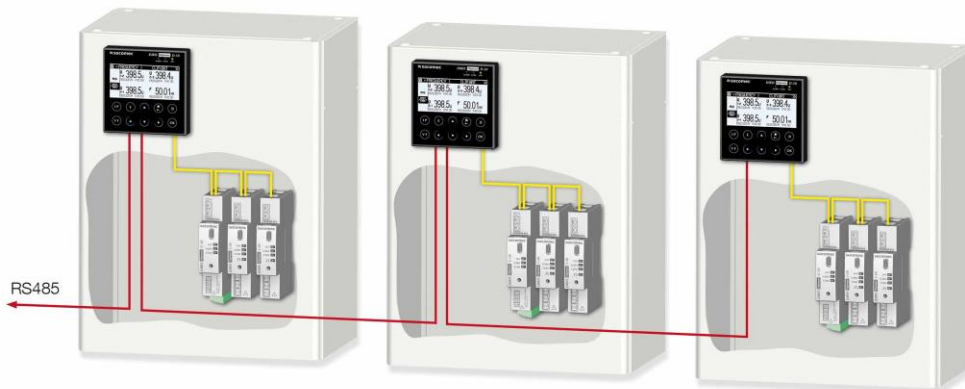


Fig. 13: RS485 Modbus Supervisor and 3 separate Displays – Remote cabinets

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with a display installed in each cabinet and an Ethernet supervisor.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x D-50 display • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x D-40 display • 1x U module • Multiple I modules |

- The D-40 or D-50 display, located in each cabinet, shows data from each DIRIS Digiware system via the Digiware bus.
- Each display can exchange data via RS485.
- The D-50 display is the master and the D-40 displays are slaves.
- The voltage sources can be identical or can vary from one cabinet to the other.
- The data is sent to a single Ethernet supervisor.



Fig. 14: Ethernet Supervisor and 3 separate Displays – Remote cabinets

4.4. Multiple Ethernet Supervisors and multiple separate Displays

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with a display installed in each cabinet and one Ethernet supervisor for each cabinet.

| Cabinets |
|--|
| <ul style="list-style-type: none">• 1x D-50 display• 1x U module• Multiple I modules |

- The D-50 display, located in each cabinet, shows data from each DIRIS Digiware system via the Digiware bus.
- The voltage sources can be identical or can vary from one cabinet to the other.
- Each cabinet sends their data to an Ethernet supervisor via the Ethernet bus of each display.

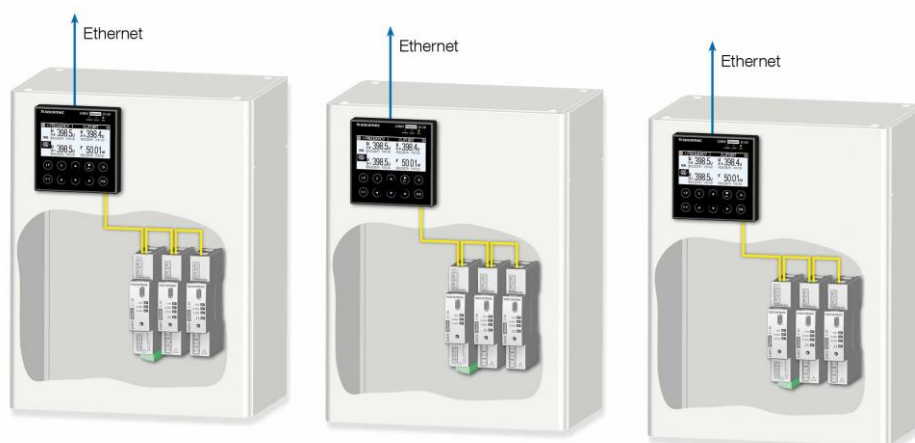


Fig. 15: 3 Ethernet Supervisors and 3 separate Displays – Very remote cabinets

5. Measurements in multiple cabinets with WEBVIEW

5.1. Centralising on 1 global WEBVIEW

The DIRIS Digiware system, shared across multiple cabinets, exchanges configuration data, measurements and alarms with a global WEBVIEW.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • Multiple I modules |

- The C-31 control interface, located in the first cabinet, collects data from the DIRIS Digiware system (shared across multiple cabinets) via the Digiware bus.
- This configuration requires the cabinets to be in close proximity (distance of < 100m. If > 100m a C32 repeater is required).
- The C-31 sends data to the DIRIS G gateway via RS485.
- The gateway collates all the measurements so they can be shown on a WEBVIEW.

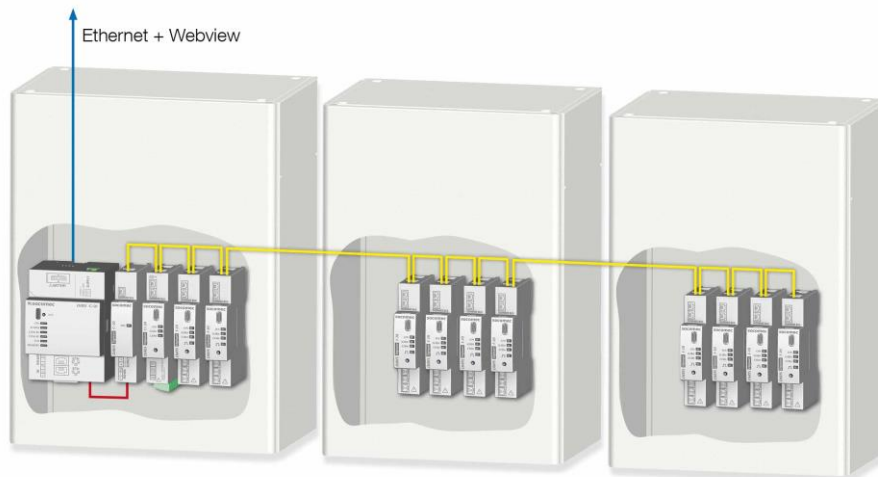


Fig. 16: Centralising with 1 global WEBVIEW – Cabinets in close proximity

If the cabinets are at a distance from one another, a C-31 is installed in each cabinet to communicate between them via RS485.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

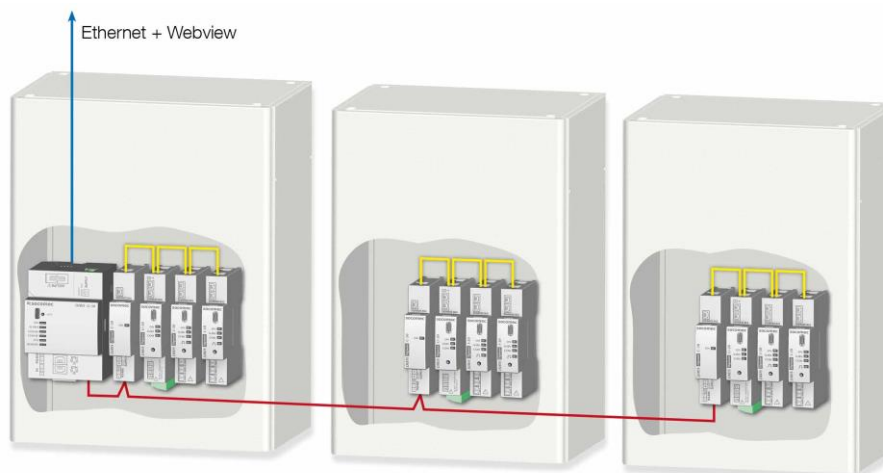


Fig. 17: Centralising with 1 global WEBVIEW – Remote cabinets

If the cabinets are very far away from one another, a DIRIS G gateway is installed in each cabinet to communicate between them directly via Ethernet.

- The voltage sources can be identical or can vary from one cabinet to the other.
- The first cabinet's DIRIS G is the master gateway and the others slaves.
- A WEBVIEW, linked to the first cabinet's gateway, shows all the data from all the cabinets.

| Cabinets |
|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules |

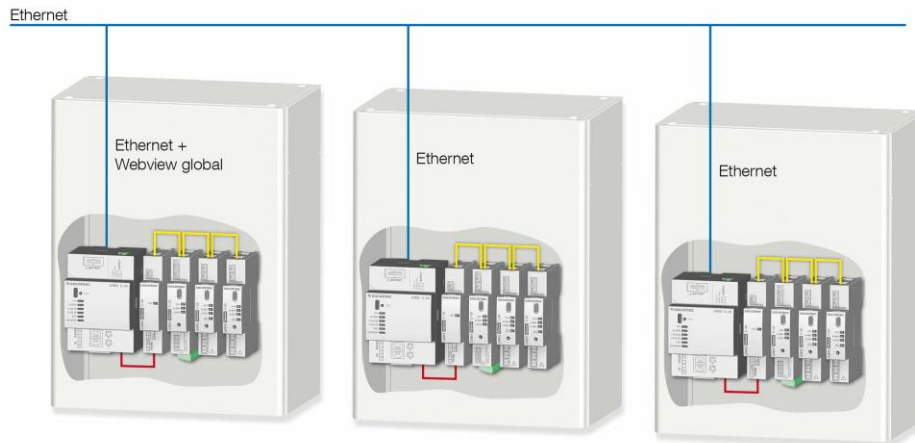


Fig. 18: Centralising with 1 global WEBVIEW – Very remote cabinets

5.2. Decentralising on multiple separate WEBVIEW

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with one separate WEBVIEW per cabinet.

| Cabinets |
|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules |

- The C-31 control interface, located in each cabinet, collects data from each cabinet's DIRIS Digiware system via the Digiware bus.
- The C-31 sends this data to the DIRIS G gateway of each cabinet via RS485.
- The voltage sources can be identical or can vary from one cabinet to the other.
- Each gateway collates all the measurements from each cabinet so they can be shown on one separate WEBVIEW per cabinet.

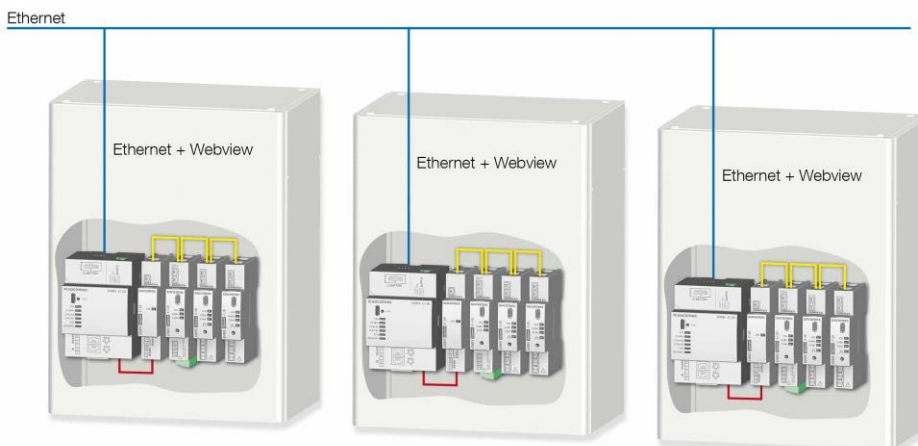


Fig. 19: Decentralising with multiple separate WEBVIEW – Very remote cabinets

6. Measurements in multiple cabinets with WEBVIEW and display

6.1. Centralising on 1 WEBVIEW and 1 global Display

The DIRIS Digiware system, shared across multiple cabinets, exchanges configuration data, measurements and alarms via Ethernet and through a display.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x D-40 display • 1x DIRIS G gateway • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • Multiple I modules |

- The D-40 display, located in the first cabinet, collects and shows data from the DIRIS Digiware system (shared across multiple cabinets) via the Digiware bus.
- This configuration requires the cabinets to be in close proximity (distance of < 100m. If > 100m a C32 repeater is required).
- The D-40 sends the data to the DIRIS G gateway via RS485.
- The gateway collates all the measurements so they can be shown on a global WEBVIEW.

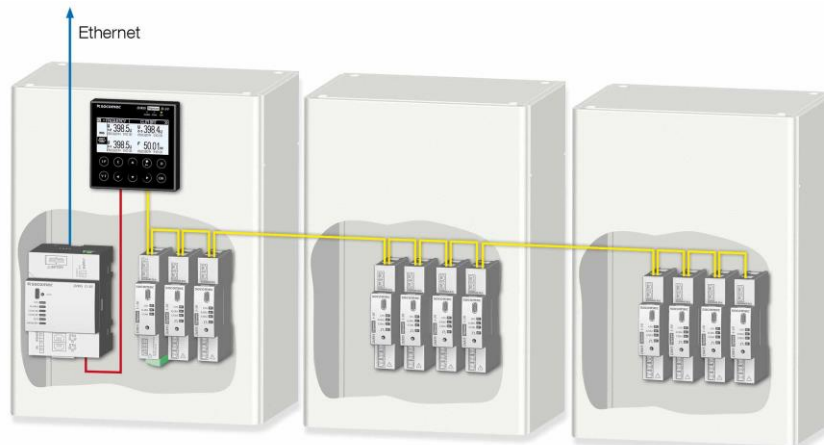


Fig. 20: Centralising with 1 WEBVIEW and 1 global Display – Cabinets in close proximity

If the cabinets are at a distance, RS485 communication is used to communicate between them. This means a C-31 control interface must be installed in each cabinet.

| First cabinet | Subsequent cabinets |
|---|--|
| <ul style="list-style-type: none"> • 1x D-50 display • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

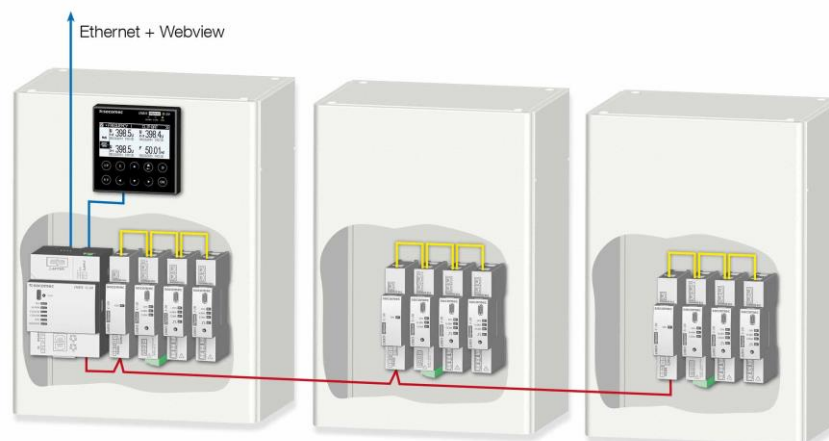


Fig. 21: Centralising with 1 WEBVIEW and 1 global Display – Remote cabinets

If the cabinets are very far away from one another, the Ethernet network is used to communicate between them. This means a DIRIS G gateway must be installed in each cabinet.

| First cabinet | Subsequent cabinets |
|---|--|
| <ul style="list-style-type: none"> • 1x D-50 display • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules |

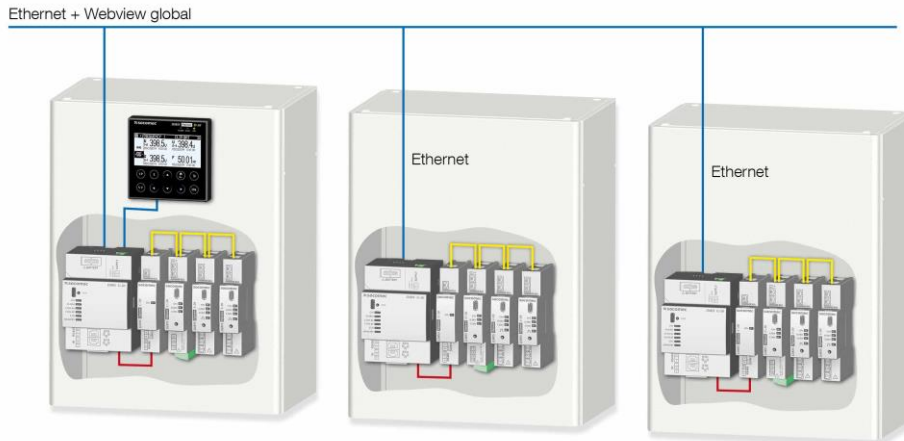


Fig. 22: Centralising with 1 WEBVIEW and 1 global Display – Very remote cabinets

6.2. Centralising on 1 WEBVIEW and multiple Displays

The DIRIS Digiware systems, installed in multiple cabinets, exchange configuration data, measurements and alarms with 1 global WEBVIEW and 1 separate display for each cabinet.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x D-40 display • 1x DIRIS G gateway • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x D-40 display • 1x U module • Multiple I modules |

- The D-40 display, located in each cabinet, shows data from each DIRIS Digiware system via the Digiware bus.
- Each display can exchange data via RS485.
- The voltage sources can be identical or can vary from one cabinet to the other.
- The gateway collates all the measurements so they can be shown on a WEBVIEW.

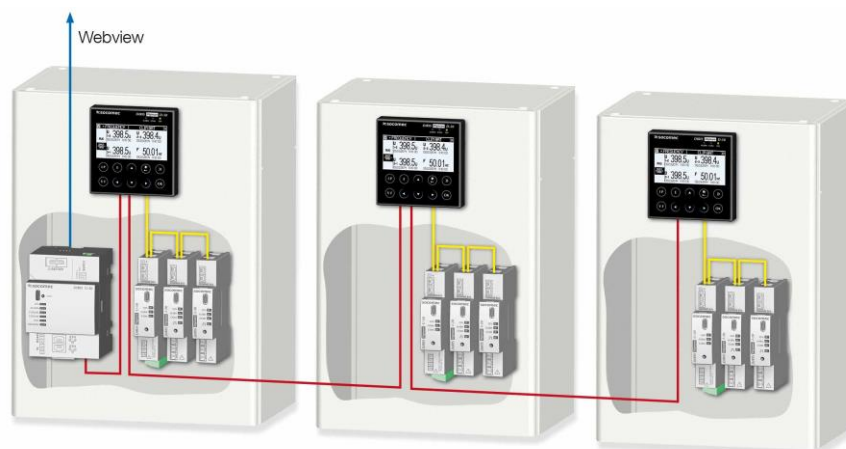


Fig. 23: Centralising with 1 WEBVIEW and multiple separate Displays – Remote cabinets

If the cabinets are very far away from one another, the Ethernet network is used to communicate between them. The cabinets send their data via the Ethernet bus of each display.

| First cabinet | Subsequent cabinets |
|--|--|
| <ul style="list-style-type: none"> • 1x D-50 display • 1x DIRIS G gateway • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x D-50 display • 1x U module • Multiple I modules |

- The D-50 display, located in each cabinet, shows data from each DIRIS Digiware system via the Digiware bus.
- Each display can exchange data via Ethernet.
- The voltage sources can be identical or can vary from one cabinet to the other.
- The gateway collates all the measurements so they can be shown on a global WEBVIEW.

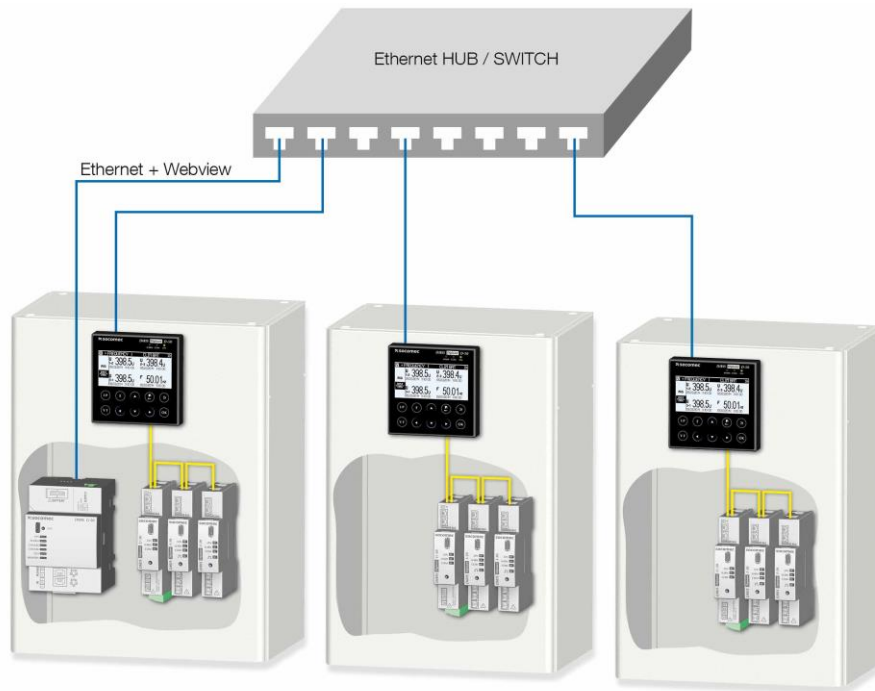


Fig. 24: Centralising with 1 WEBVIEW and multiple separate Displays – Very remote cabinets

7. Measurements with Double Source coupling

7.1. Centralising on 1 global Display

The DIRIS Digiware systems, installed in two cabinets, exchange configuration data, measurements and alarms for Source 1 and Source 2. A global display installed in one cabinet shows the data.

| Source 1 cabinet | Source 2 cabinet |
|---|--|
| <ul style="list-style-type: none"> • 1x D-50 display • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

- The C-31 control interface, located in each cabinet, collects data from each cabinet's DIRIS Digiware system via the Digiware bus.
- The D-50 display, located in the Source 1 cabinet, exchanges data from the two DIRIS Digiware systems via RS485 for Source 1 and Source 2.
- The DIRIS D-50 display shows all the measurement data and sends it via Ethernet.

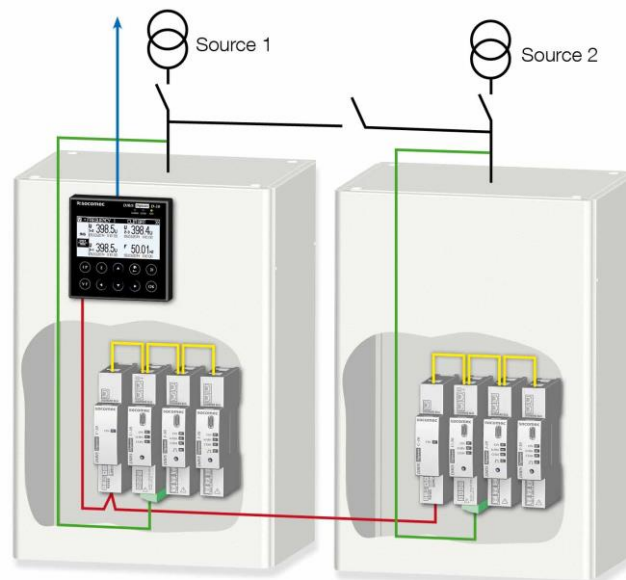


Fig. 25: Double Source centralisation with 1 global Display – Remote cabinets

7.2. Centralising on 1 global WEBVIEW

The DIRIS Digiware systems, installed in two cabinets, exchange configuration data, measurements and alarms for Source 1 and Source 2. A global WEBVIEW shows the data.

| Source 1 cabinet | Source 2 cabinet |
|--|--|
| <ul style="list-style-type: none"> • 1x DIRIS G gateway • 1x C-31 control interface • 1x U module • Multiple I modules | <ul style="list-style-type: none"> • 1x C-31 control interface • 1x U module • Multiple I modules |

- The C-31 control interface, located in each cabinet, collects data from each cabinet's DIRIS Digiware system via the Digiware bus.
- The DIRIS G gateway, located in the Source 1 cabinet, exchanges data from the 2 DIRIS Digiware systems via RS485 for Source 1 and Source 2.
- The gateway collates all the measurements so they can be shown on a global WEBVIEW.

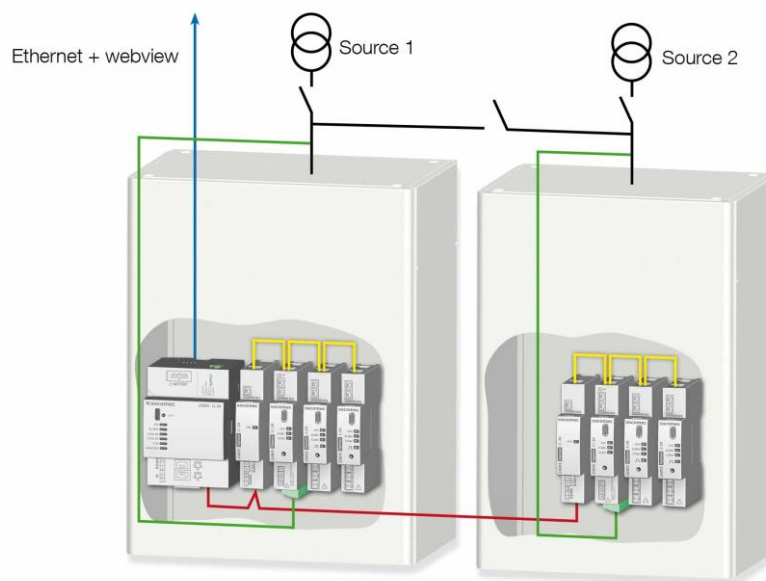


Fig. 26: Double Source centralisation with 1 WEBVIEW – Remote cabinets

8. In summary

The flexibility of DIRIS Digiware means you can opt from several different **communication architectures**, **adjusting them to your electrical system setup** and the communication buses available.

These architectures can be **completely centralised**, **partially centralised** or **decentralised** according to use and application.



HEAD OFFICE

SOCOMEK GROUP

SAS SOCOMEK capital 10 816 800 €
R.C.S. Strasbourg B 548 500 149
B.P. 60010 - 1, rue de Westhouse
F-67235 Benfeld Cedex - FRANCE

www.socomec.com

INTERNATIONAL SALES
DEPARTMENT

SOCOMEK

1, rue de Westhouse - B.P. 60010
F - 67235 Benfeld Cedex - FRANCE
Tel. +33 (0)3 88 57 41 41
Fax +33 (0)3 88 74 08 00
info.scp.isd@socomec.com

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