Energy monitoring and management of low voltage/high voltage electrical installations

**Function**

DIRIS A60 are measurement units which can provide all the functions offered by the DIRIS A40, and which also allow the user to detect events that may harm the installation, linking these to a graphic representation. All this information can be used and analysed remotely using quality measurement software.

**Conformity to standards**

- IEC 61557-12
- IEC 62053-22 class 0.5 S
- IEC 62053-23 class 2

**Applications**

In addition to the functions of the DIRIS A40, the DIRIS A60 also:
- shows the current and voltage unbalance
- shows the tangent phi
- stores the load curves (50 days with an interval of 10 minutes) for:
  - Active, reactive and apparent power: $\sum P_{\pm}$, $\sum Q_{\pm}$, $\sum S$
- detects and stores the last 40 events concerning:
  - overvoltage
  - voltage dips
  - outages
  - overcurrent

For each stored event, the DIRIS A60 records the relevant RMS 1/2 interval curves for the voltages V1, V2, V3, U12, U23, U31 and the currents I1, I2, I3, In, giving a total of 400 curves.

Other functions:

**Multimeasurement**

- Current:
  - instantaneous: I1, I2, I3, I12, I23, I31, In, Isystem
  - maximum: I1, I2, I3, In
  - unbalance: I un
- Voltages & frequency:
  - instantaneous: U1, U2, U3, U12, U23, U31, F, Usystem, Usystem
  - maximum: U1, U2, U3, U12, U23, U31, F
  - unbalance: U un
- Powers:
  - instantaneous: $3P$, $3Q$, $3Q$, $3S$, $3S$
  - moyen maximum: $3P$, $3Q$, $3S$, $3S$
  - predictive: $3P$, $3Q$, $3S$
- Power factor:
  - instantaneous: $3PF$, $3PF$
  - total tangent phi
  - maximum: $3PF$

**Temperatures(1)**

- Internal
- external via 3 PT100 sensors

**Metering**

- Active energy: +/- kWh
- Reactive energy: +/- kvarh
- Apparent energy: kW
- Hours:

**Harmonic analysis (level 63)**

- Total harmonic distortion:
  - Currents: thd I1, thd I2, thd I3, thd In
  - Phase-to-neutral voltage: thd U1, thd U2, thd U3
- Phase to phase voltage:
  - thd U12, thd U23, thd U31

**Events(1)**

- Alarms on all electrical values

**Communications(1)**

- Analogue 0/4 - 20 mA
- Digital RS485 (Jbus/Modbus & Profinet)
- Ethernet (modbus/TCP or Jbus/Modbus RTU over TCP and Web server)
- Ethernet with RS485 gateway Jbus/Modbus RTU over TCP

**Inputs / Outputs(1)**

- Pulse metering
- Control/command of devices
- Alarm report
- Pulse report

(1) Available as an option (see the following pages).
Front panel

1. Backlit LCD screen.
2. Pushbutton for currents, temperatures and CT setup wiring correction.
3. Pushbutton for voltages and frequency.
4. Pushbutton for active, reactive, and apparent power and power factor.
5. Pushbutton for maximum and average current and power values.
6. Pushbutton for harmonics.
7. Pushbutton for energies and hour run meter.

Plug-in modules

Pulse outputs
- 2 configurable pulse outputs (type, weight and run) on ±kWh, ±kvarh and kWAr.

JBUS / MODBUS® communication
- RS485 link with JBUS / MODBUS® protocol (speed up to 38400 bauds).

PROFIBUS® DP communication
- RS485 link with PROFIBUS® DP protocol (speed up to 12 Mbauds).

Ethernet communication
- Ethernet link with MODBUS/TCP or JBUS/MODBUS RTU over TCP.

Ethernet communication with RS485 Gateway JBUS/MODBUS
- Ethernet link with MODBUS/TCP or JBUS/MODBUS RTU over TCP.
- Connection of 1 to 247 RS485 JBUS/MODBUS slaves.

Analogue outputs
- A maximum of 2 modules may be connected, giving 4 analogue outputs.
- 2 outputs assignable to:
  - 3I, 3V, 3U, f, ±3P, ±3Q, ±3S, 3PFL/C, 1 sys, Vsys, Usys, Ppred, Q pred, Spred, internal T°C, T°C 1, T°C 2, T°C 3 and to 17 VDC power supply.

2 inputs - 2 outputs
- A maximum of 3 modules may be connected, giving 6 inputs.
- 2 outputs assignable to:
  - monitoring:
    - 3I, 3V, 3U, f, ±3P, ±3Q, ±3S, 3PFL/C, THD 3I, THD In, THD 3V, THD 3U, Ppred, Qpred, Spred, internal T°C, T°C 1, T°C 2, T°C 3 and hour meter,
    - remotely controlled,
    - timed remote control,
    - 2 inputs for pulse metering.
DIRIS A60 - Accessories

Current transformer
(see page XXX)

Current transformers

IP65 protection

Device embedded
with kit for 144 x 96 mm cutout

Terminals

DIRIS A60

Communication module

RS485 link.
R = 120 Ω: internal resistance for RS485 link.

Pulse output module

1 - 2: pulse output n°1.
3 - 4: pulse output n°2.

Analogue output module

5 - 6: Analogue output n°1.
7 - 8: Analogue output n°2.

2 inputs / 2 outputs module

9 - 10: relay output n°1.
11 - 12: relay output n°2.
13 - 14: opto input n°1.
15 - 16: opto input n°2.

Temperature module

19 - 20 - 21 - 22 - 23 - 24 - 25 - 26 - 27 - 28 - 29 - 30 -

Ethernet module + RS485 gateway
JBUS/MODBUS

Ethernet Module

S1 - S2: Current inputs
AUX: auxiliary power supplies U,
V1 - V2 - V3 - VN: voltage inputs

General Catalogue 2009-2010 SOCOMEC
### Characteristics

#### DIRIS A60

**Current measurement on insulated inputs (TRMS)**

- **CT primary**: 10 000 A
- **CT secondary**: 1 or 5
- **Measurement range**: 0 ... 11 kA
- **Input consumption**: ≤ 0.1 VA
- **Measurement updating period**: 1 s
- **Accuracy**: 0.2 %
- **Sustained overload**: 6 A
- **Intermittent overload**: 10 I, for 1 s

**Voltage measurements (TRMS)**

- **Direct measurement between phases**: 50 ... 700 VAC
- **Direct measurement between phase and neutral**: 28 ... 404 VAC
- **VT primary**: 500 000 VAC
- **VT secondary**: 60, 100, 110, 173, 190 VAC
- **Frequency**: 50 / 60 Hz
- **Input consumption**: ≤ 0.1 VA
- **Measurement updating period**: 1 s
- **Accuracy**: 0.2 %
- **Sustained overload**: 760 VAC

**Current-voltage product**

- **Limitation for 1A CT**: 10 000 000
- **Limitation for 5A CT**: 10 000 000

**Power measurement**

- **Measurement updating period**: 1 s
- **Accuracy**: 0.5 %

**Power factor measurement**

- **Measurement updating period**: 1 s
- **Accuracy**: 0.5 %

**Frequency measurement**

- **Measurement range**: 45 ... 65 Hz
- **Accuracy**: 0.1 %

**Energy accuracy**

- **Active (according to IEC 62053-22)**: class 0.5 S
- **Reactive (according to IEC 62053-23)**: class 2

**Auxiliary supply**

- **AC voltage**: 110 ... 400 VAC
- **AC tolerance**: ± 10 %
- **DC voltage**: 120 ... 350 VDC
- **DC tolerance**: ± 20 %
- **Frequency**: 50 / 60 Hz
- **Consumption**: ≤ 10 VA

**Outputs (alarms / control)**

- **Number of relays**: 2 ... 6
- **Type**: 250 VAC - 5 A - 1150 VA

**Phototransistor inputs**

- **Number**: 2 ... 6
- **Power supply**: 10 ... 30 VDC
- **Minimum signal width**: 10 ms
- **Minimum length between 2 impulses**: 18 ms
- **Type**: phototransistor

**Outputs (pulses)**

- **Number of relays**: 2
- **Type**: 100 VDC - 0.5 A - 10 VA
- **Max. number of operations**: ≤ 10⁷

**Outputs (analogue)**

- **Number of outputs**: 2 ... 4
- **Type**: insulated
- **Range**: 0 / 4 ... 20 mA
- **Charging resistance**: 600 Ω
- **Maximum current**: 30 mA

**Communication**

- **Link**: RS485
- **Type**: 2 ... 3 half duplex wires
- **Protocol**: JBUS/MODBUS® in RTU mode
- **JBUS/MODBUS® speed**: 1400 ... 38400 bauds
- **PROFIBUS® speed**: 9,8 kbauds ... 12 Mbauds

**Ethernet communication**

- **Link**: RJ45
- **Speed**: 10 base T / 100 base T
- **Protocol**: MODBUS TCP or JBUS/MODBUS RTU over TCP

**Temperature inputs**

- **Type**: PT100
- **Link**: 2 or 4 wires
- **Range**: - 20°C ... 150°C
- **Accuracy**: +/- 1 digit
- **Maximum length**: 300 cm

**Operating conditions**

- **Operating temperature**: - 10 ... + 55°C °C
- **Storage temperature**: - 20 ... + 85°C °C
- **Relative humidity**: 95 %

**Case**

- **Type**: panel mounting
- **Dimensions W x H x D**: 96 x 96 x 60 mm
- **Case protection rating**: IP30
- **Front protection rating**: IP52
- **Display type**: LCD
- **Terminal blocks type**: fixed or pull-out
- **Voltage and other connection section**: 0.2 ... 2.5 mm²
- **Current connection section**: 0.5 ... 6 mm²
- **Weight**: 400 g
**DIRIS A60 - Connection**

**Recommendation:** While disconnecting the DIRIS, the secondaries of each current transformer must be short-circuited. This operation can be carried out automatically from a product in the SOCOMEC catalogue, PTI. Please consult us.

**Low voltage balanced network for DIRIS A60**

3/4 wires with 1 CT

Use of 1 CT reduces by 0.5% the accuracy of the phases whose current is worked out by vector calculation.

**Low voltage unbalanced network for DIRIS A40**

3/4 wires with 3 CTs

Use of 2 CTs reduces by 0.5% the accuracy of the phase whose current is worked out by vector calculation.

**Connection of voltage transformer for HV networks**

It is recommended that the auxiliary power supply be protected by the use of 500 mA gG fuses.

**Additional information**

Communication via RS485 link

Connection of voltage transformer for HV networks
### Standard device

<table>
<thead>
<tr>
<th>Auxiliary power supply U&lt;sub&gt;c&lt;/sub&gt;</th>
<th>DIRIS A60 Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4825 0207</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP65 protection</td>
<td>4825 0088</td>
</tr>
<tr>
<td>Panel mounting kit for a 144 x 96 mm cutout</td>
<td>4825 0088</td>
</tr>
</tbody>
</table>

### Optional features

<table>
<thead>
<tr>
<th>Plug-in modules&lt;sup&gt;(1)&lt;/sup&gt;</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse outputs</td>
<td>4825 0090</td>
</tr>
<tr>
<td>RS485 JBUS / MODBUS® communication</td>
<td>4825 0092</td>
</tr>
<tr>
<td>Analogue outputs</td>
<td>4825 0093</td>
</tr>
<tr>
<td>2 inputs / 2 outputs</td>
<td>4825 0094</td>
</tr>
<tr>
<td>RS485 PROFIBUS®/DP communication</td>
<td>4825 0205</td>
</tr>
<tr>
<td>Ethernet communication</td>
<td>4825 0203</td>
</tr>
<tr>
<td>Ethernet communication + RS485 gateway JBUS/MODBUS</td>
<td>4825 0204</td>
</tr>
<tr>
<td>Temperature inputs</td>
<td>4825 0206</td>
</tr>
</tbody>
</table>

<sup>(1)</sup> Ease of integration for additional functions (maximum 4) by clutches modules on the rear side of the device, by the user at any moment.