Inductive Power Transfer and Data Coupling Devices (IPT+DC)

IPT+DC Technology Overview and Recent Projects:

Inductive Power Transfer and Data Coupling (IPT+DC) devices are rugged and reliable solutions when electrical power and data (digital and analog sensors) need to be transferred on and off rotating or indexing equipment, to interface with a stationary PLC or PC. As an electronic replacement for mechanical couplings (slip rings), IPT+DC devices eliminate moving brushes, sliding contacts and cable reels. IPT+DC devices are fully potted and excellent for use in harsh environments. With no frictional resistance, power and data are unaffected by rotational speed or time. MESA IPT+DC devices are the all-electronic solution, which overcomes the shortcomings of slip rings.
IPT+DC devices function as a "virtual" slip ring or cable, using inductive coupling, as an open transformer, with an air gap separating the rotating or moving parts from the stationary controls. By combining coupling coils, in a single device both power and data coupling can be accomplished in unison. The IPT+DC system's power and data coils operate at different frequencies, so complete decoupling is possible. The block diagram above shows the basic configuration of a typical MESA IPT+DC system. Between the stationary and the mobile part, the coupling module incorporates the inductive coils for data and power coupling. The coil systems are matched to the transfer frequencies, optimized for low EMI, high efficiency, and minimized cross coupling.

The IPT+DC device transfer power ranging to 350 Watts. A more typical system transfers 5 to 50 Watts. Higher power devices have a small air gaps and are configured axially (a ring facing a ring). Radial devices are typically 5 to 20 Watts, with air gaps up to 5-mm.

Power transfer efficiencies range from 50 to 90% based on air gap and mechanical design. In the stationary module, the supply power is conditioned to an AC voltage. In the rotating module, the AC-power is rectified and regulate to common DC levels.

When data (sensors, serial or CAN bus) is to be transferred, the data is digitized and supplied to a modem, where the binary digits are transformed into frequencies. This type of modulation is referred to as Frequency Shift Keying (FSK). The power-modulated carrier is transferred via the data coils and demodulated on the receiving side. If needed, the direction of the data coupling can be interchanged, offering devices with duplex communications. Simplex or half-duplex coupling are common with data transfer rates up to 250 K baud. Depending on the system, the data on the stationary side or is processed to a convenient analog signal with scaling and amplification. If no processing in required, the serial data stream functions as a null modem. CAN bus is currently being added to some products.

The complete MESA IPT+DC system can replace slip rings or cable reels. Available in many variations, IPT+DC devices range from very small rings (10-mm) to very large (1-meter) rings, produced in segments for convenient mounting.

Please review some of our recent projects and contact MEAS with the details of your application.
MESA Systems Co.

RECENT PROJECTS:

**Application:** Drug Discovery Centrifuge Temperature Monitoring

**PROJECT:** THERMO

Temperature Measurements in a Vacuum Centrifuge for Drug Discovery

**KEY FEATURES:**

- Transmission of four rotating temperature sensor signals
- Integrated processing electronics
- Operating range: –20° to 85°C
- OD \( \Phi \) 100-mm
- The rings are stainless steel with Teflon faces.
- Vacuum potted
- Remote test and interface electronics
**Application:** Rotating Inspection Camera Power Supply

**PROJECT:** KLS-100

Power Transfer System, 24 V DC @ 100-Watt, ring-facing-ring for a rotating camera

**KEY FEATURES:**
- Transmission of four rotating temperature sensor signals
- Integrated electronics
- Operating range: –20°C to 70°C
- ID Ø 280-mm, OD 462-mm
- Aluminium rings
- Remote interface electronics
- 1-mm air-gap
- Bearing mounted

![Graph: Output Voltage vs Load Current](image)

```
<table>
<thead>
<tr>
<th>current [A]</th>
<th>0.00</th>
<th>1.00</th>
<th>2.00</th>
<th>3.00</th>
<th>4.00</th>
<th>5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>30.00</td>
<td>25.00</td>
<td>20.00</td>
<td>15.00</td>
<td>10.00</td>
<td>5.00</td>
</tr>
</tbody>
</table>
```

![Diagram: Ring-facing-ring system](image)
**Application:** Food Process Equipment Data Interface, Underwater

**PROJECT:** DELTA RS 422 24/5

Power Transfer modules. 24 V DC in 5 V DC out, RS 422 serial data transfer half-duplex with control signal.

**KEY FEATURES:**

- Transmission of power and RS 422 serial data
- Integrated electronics
- Operating range: –20°C to 70°C
- M 30 housing 80-mm long
- SS threaded housing
- 19.2 K baud data rate
- 2-mm air-gap
- Used underwater
**Application:** Implanted Power Supply

**PROJECT:** Implant

Power Transfer modules. Battery power 3.5 V DC in 2.2 V DC out. 3-mm air-gap

**KEY FEATURES:**
Transmission and regulation of low power
- Extremely small size
- 10-mm diameter
- 3-4-mm air-gap
### Application: Super Conductor Motor Monitoring

#### PROJECT: AMSC

Inductive Power Transfer: 15 V DC @ 15 Watts. Full duplex RS 232 data interface.

#### KEY FEATURES:

Transmission of power and RS 232 serial data
- Integrated electronics
- Operating range: –20° to 60°C
- Segmented rings
- SS housing
- 115 K baud data rate (RS-232)
- 2-mm air-gap
- 300-mm ID
MESA Systems Co.

<table>
<thead>
<tr>
<th>Application: <strong>Power and Communication Coupling for Robots</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT: KLS 24/24-D-D</td>
</tr>
<tr>
<td>Inductive Power Transfer: 24 V DC @ 24 Watts (1-Amp). Full duplex RS 232 data interface.</td>
</tr>
</tbody>
</table>

**KEY FEATURES:**

- 1 Amp power transmission and RS 232 serial data
- Integrated electronics
- Operating range: –20° to 60°C
- Aluminium housing
- 115 K baud data rate
- 2-mm air-gap
- 100-mm OD
- Optional CAN bus
Application: **Power and Sensor Coupling of Laser Pipe Inspection Robot**

**PROJECT:** Karslrule Project

Inductive Power Transfer: 24 V DC and Four 4…20 mA sensor outputs.

**KEY FEATURES:**

- Power and Four sensors
- Integrated electronics
- Operating range: –20°C to 60°C
- Aluminium housing
- Four, 4…20mA outputs
- 2-mm air-gap
- 100-mm OD
- Optional CAN bus
**Application:** Automotive Painting Robots, 3-Axis Valve Power and Sensor Coupling

<table>
<thead>
<tr>
<th>PROJECT: Painting Robots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three axis coupling of power and data</td>
</tr>
</tbody>
</table>

**KEY FEATURES:**

**Power and Data**
- 3- Axis coupling
- Operating range: –20° to 60°C
- 12-mm diameter housing

**Valve Power**
- 1-mm air-gap

**Hazardous Rating**

---

Most IPT+DC devices are configured to customer’s specific applications, using proven technology. If you would like more details please contact MESA at [www.mesasystemsco.com](http://www.mesasystemsco.com).

-----