INGESYS™ CMS

PRODUCT OVERVIEW.
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1 Introduction

**INGEYS™ CMS** is a rotary machine condition monitoring system. By analysing vibrational measurements taken at specific points on the rotary machine, the system makes it possible to determine its condition, anticipating the appearance of functional anomalies.

The complete **INGEYS™ CMS** solution consists of a hardware system which acquires and handles signals from field sensors (accelerometers, pulse generators, temperature sensors, etc.) and a suite of software tools which helps to configure and parameterise the acquisition, as well as to analyze received data.

**INGEYS™ CMS** hardware system is scalable, flexible and a high-performance condition monitoring platform. Based on the concept of Programmable Automation Controllers (PACs), it fulfils the requirements of the maintenance experts with a complete solution for demanding CMS applications.

A wide range of programming techniques (IEC61131 programming tool based on CODESYS, C++, MATLAB®/SIMULINK®) makes it possible to increase the performance and profitability of the control engineer throughout the different phases of plant automation (programming, commissioning and maintenance).

A modular design fulfilling industry requirements (extreme ambient and vibrational conditions, extended life time, EMC, etc.) guarantees the achievement of low failure rates and high availability.

A complete range of network and fieldbus communication protocols based on standards facilitate the integration of **INGEYS™ CMS** with upper system levels and with low-level field devices.

An internal distributed architecture based on a real-time optical fibre bus makes it possible to optimally adapt the control system to the process’s requirements.
**INGESYS™ CMS PAC Controller Highlights:**

- Control processors and I/O modules designed to fulfill the demands of different application sectors with competitive solutions
- Realtime control
- Advanced programming (IEC 61131-3, C++, MATLAB®/SIMULINK®)
- Integrated PC functional features (Web server, FTP, Flash-based file system, etc.)
- Integrated industry standard de facto Ethernet protocols
- Complete range of industrial fieldbuses (CANopen)
- Vibrations / Shock resistance conforming to EN60068-2-6/EN60068-2-27
- EMC Immunity /emission conforming to EN61000-6-2/EN61000-6-4

**Applications:**

- Renewable energies (Wind, Hydroelectric, Solar)
- Industry automation
- Transport
- Power grid automation
2 System racks

The set of CMS racks provides mechanical support and electrical interconnection to the INGESYS™ CMS controller modules.

Two types of racks are available:

a) Racks including reserved slots for power supply modules.
   Designed for processor or bus terminal modules powered at 3.3V or 5.0V that requires an external power supply module.

   References
<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3503</td>
<td>Power supply + Processor + 4 I/O one-slot modules</td>
</tr>
<tr>
<td>IC3504</td>
<td>Power supply + Processor + 8 I/O one-slot modules</td>
</tr>
<tr>
<td>IC3505</td>
<td>Power supply + Processor + 2 I/O one-slot modules</td>
</tr>
</tbody>
</table>

b) Racks not including reserved slots for power supply modules.
   Designed for processor or bus terminal modules powered at 24V that does not require an external power supply module.

   References
<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3512</td>
<td>Processor /header + 4 I/O one-slot modules</td>
</tr>
<tr>
<td>IC3513</td>
<td>Processor /header + 2 I/O one-slot modules</td>
</tr>
</tbody>
</table>
3 Power supply modules

IC360x power supply modules feed power to the whole system via the backplane. Different input voltages (24Vdc, 125Vdc or 220Vac) are available, depending on the installation requirements.

These modules have been designed for use in the harshest of environments, where low dissipation and high temperature support are needed. For this purpose, new semiconductor and transformer design techniques have been used.

IC360x power supply modules are also prepared for redundancy operation. Two power supplies can be connected in parallel. In case one fails, the second one immediately takes control without any voltage drop. The LEDs of the malfunctioning power supply module will switch off, so that the user can identify and replace it.

Redundancy operation is the well-known N+1 mode. That means that there is neither current sharing nor power sharing. When two power supply modules are connected in parallel the maximum output current is still 5A per output.

General Characteristics:

- 24Vdc, 125Vdc, 220Vac
- Status indication LEDs
- Status monitoring from processor module
- High temperature operation
- N + 1 redundancy support
- Long-life design under extreme operation conditions

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3602</td>
<td>Power supply 24Vdc input</td>
</tr>
<tr>
<td>IC3603</td>
<td>Power supply 88-300Vdc / 85-250Vac input</td>
</tr>
</tbody>
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## Power supply modules

<table>
<thead>
<tr>
<th></th>
<th>IC3602</th>
<th>IC3603</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>14.4Vdc to 31.2Vdc</td>
<td>88Vdc to 300Vdc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85Vac to 285Vac</td>
</tr>
<tr>
<td>Max. Input Current</td>
<td>3.2A</td>
<td>0.75A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.70A</td>
</tr>
<tr>
<td>Output Voltage</td>
<td></td>
<td>3.3V / 5.0V</td>
</tr>
<tr>
<td><strong>Max. Output current</strong></td>
<td>3.3 V</td>
<td>5A</td>
</tr>
<tr>
<td></td>
<td>5.0 V</td>
<td>5A</td>
</tr>
<tr>
<td>Max. Dissipated Power</td>
<td>12W</td>
<td>10W</td>
</tr>
<tr>
<td><strong>Isolation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input-Output</td>
<td></td>
<td>2000Vac @ 60s</td>
</tr>
<tr>
<td>Input-Earth</td>
<td></td>
<td>2000Vdc @ 60s</td>
</tr>
<tr>
<td><strong>Additional Features</strong></td>
<td>Reverse input voltage protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input, 3.3V and 5.0V status indication LEDs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input and output voltage supervision</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power fail indication to processor module</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N + 1 redundancy support</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hot swap</td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>52.25mm x 175mm x 150.5mm</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>540g</td>
<td></td>
</tr>
<tr>
<td><strong>Climatic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to + 70°C</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to + 85°C</td>
<td></td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
<td></td>
</tr>
</tbody>
</table>
4 Processor modules

INGESYS™ CMS processor modules ensure the right solution in terms of performance and robustness at competitive prices for each application field.

A compact design makes it possible to integrate the most demanding control functionalities (LAN, fieldbus, memory storage, USB, etc.) and ensures the fulfillment of the most demanding industrial requirements.

The different INGESYS™ CMS processor modules are application software compatible enabling the optimisation of software development resources.

The CODESYS-based programming tool with the five IEC61131 programming languages (IL, ST, SFC, LD, FBD), the advanced programming tools (MATLAB®/SIMULINK®, C++) and a powerful range of application-specific software libraries provide the control engineer with the right tool for each requirement.

<table>
<thead>
<tr>
<th>References</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3101</td>
<td>Pentium-based high-performance processor module</td>
</tr>
<tr>
<td>IC3121</td>
<td>ARM-based medium-performance processor module, extended temperature range</td>
</tr>
</tbody>
</table>
4.1 IC3101 Processor module

The IC3101 processor modules enable maximum INGESYS™ CMS functionality and performance, offering a state-of-the-art solution for CMS applications. These processor modules optimally integrate the real-time control characteristics and robustness of industrial PLCs, with advanced control functional features based on PC technology standards (data management, embedded web servers, communications protocols, etc). Their compact, robust design makes is possible to work in an extensive temperature range thanks the passive cooling elements. Different communication interfaces allow INGESYS™ CMS to be integrated with redundant Ethernet networks, remote I/O extensions and RS232/RS485 communication links.

General Characteristics:

- x86 500Mhz processor
- 2/4 Ethernet interfaces (10/100)
- 1 USB host interface
- 1 RS232 serial interface
- 4MB RAM for user application
- 10MB internal Flash for user application
- 62KB NVRAM
- CF slot for user data
- TEST/ON/OFF switch and status LEDs

**Optional**

- RTSX interface
- CAN port
- 2/4/8 TSX channels (local IO)

### References

<table>
<thead>
<tr>
<th>Specific Characteristics</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Ethernet, 8 TSX channels (Local IO), RS-232C, 1 RTSX port (Remote IO)</td>
<td>IC3101BA</td>
</tr>
<tr>
<td>1 Ethernet, 8 TSX channels (Local IO)</td>
<td>IC3101BB</td>
</tr>
<tr>
<td>1 Ethernet, 8 TSX channels, 1 RTSX port</td>
<td>IC3101BC</td>
</tr>
<tr>
<td>2 Ethernet, 8 TSX channels (Local IO), RS-232C, 1 CAN port</td>
<td>IC3101BD</td>
</tr>
<tr>
<td>Functional</td>
<td>IC3101BA</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>CPU</td>
<td>500Mhz Pentium Compatible</td>
</tr>
<tr>
<td>RAM Memory</td>
<td>4Mbytes</td>
</tr>
<tr>
<td>NVRAM Memory</td>
<td>62Kbytes</td>
</tr>
<tr>
<td>Internal Flash Memory</td>
<td>10MB for user application</td>
</tr>
<tr>
<td>CF Slot</td>
<td>CF without size restriction</td>
</tr>
<tr>
<td>Ethernet</td>
<td>2 x 10/100 BaseTX</td>
</tr>
<tr>
<td>Serial</td>
<td>1 x RS232C</td>
</tr>
<tr>
<td>USB</td>
<td>1 x USB 2.0 Host</td>
</tr>
<tr>
<td>CAN</td>
<td>NO</td>
</tr>
<tr>
<td>TSX</td>
<td>8 channels</td>
</tr>
<tr>
<td>RTSX</td>
<td>1 x RTSX port</td>
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<td>IRIG-B</td>
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<table>
<thead>
<tr>
<th>Electrical</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>+3,3V / 5,0V from backplane</td>
</tr>
<tr>
<td>Current Consumption 3,3 V</td>
<td>1A (max.) / 0,75A (typ.)</td>
</tr>
<tr>
<td>Current Consumption 5,0 V</td>
<td>1,5A (max.) / 1,125A (typ.)</td>
</tr>
<tr>
<td>Max. Dissipated Power</td>
<td>11W</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Additional descriptions</th>
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</tr>
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<tbody>
<tr>
<td>Watchdog</td>
<td></td>
</tr>
<tr>
<td>Real-time clock with lithium battery</td>
<td></td>
</tr>
<tr>
<td>3 position working mode switch (TST/ON/OFF)</td>
<td></td>
</tr>
<tr>
<td>3 status indication LEDs</td>
<td></td>
</tr>
<tr>
<td>Internal temperature supervision</td>
<td></td>
</tr>
<tr>
<td>Self-diagnosis</td>
<td></td>
</tr>
<tr>
<td>Hot swap</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>78,5mm x 175mm x 150,5mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1023g</td>
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<table>
<thead>
<tr>
<th>Climatic</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0°C to + 60°C (Fan less)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to + 85°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories (not included)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3805: COMPACT FLASH 64MB</td>
<td></td>
</tr>
<tr>
<td>IC3582: COMPACT FLASH 1GB</td>
<td></td>
</tr>
<tr>
<td>IC3583: COMPACT FLASH 2GB</td>
<td></td>
</tr>
</tbody>
</table>
4.2 IC3121 Processor module

The IC3121 processor modules are designed for medium-performance condition monitoring applications with communications requirements in demanding environmental situations. The software is compatible with the IC3101xx processor and can also work with INGESYS™ CMS’s modules. (I/Os, counter modules, communications modules, etc) offering the same monitoring architecture. Based on ARM processors, these modules make it possible to work in extreme temperature conditions given their very low power dissipation. IC3121 modules have a built-in power supply, capable of feeding power to the backplane, eradicating the need for a power supply module. This family is also capable of communicating via TSX with local IO modules, as well as communicating with remote modules via RTSX. These processor modules also have a built-in Ethernet switch, which can reduce network infrastructure costs in the installation.

**General Characteristics:**

- ARM 400Mhz processor
- RTSX interface
- 1 Ethernet interfaces (10/100)
- 1 USB host interface
- 1,4MB RAM
- 2MB for user Application
- 32KB NVRAM
- TEST/ON/OFF switch and status LEDs

- **Optional**
  - RS232C/485

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3121AA</td>
<td>2 TSX channels, Power Supply</td>
</tr>
</tbody>
</table>
### Functional

<table>
<thead>
<tr>
<th></th>
<th>IC3121AA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>400Mhz ARM</td>
</tr>
<tr>
<td>Program memory</td>
<td>2MB for user application</td>
</tr>
<tr>
<td>RAM memory</td>
<td>1,4MB</td>
</tr>
<tr>
<td>NVRAM memory</td>
<td>32KB for user application</td>
</tr>
<tr>
<td>Ethernet</td>
<td>1 x 10/100 BaseTX</td>
</tr>
<tr>
<td>USB</td>
<td>1 x USB 2.0 Host</td>
</tr>
<tr>
<td>TSX</td>
<td>2 channels</td>
</tr>
</tbody>
</table>

### Electrical

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>11Vdc to 34Vdc</td>
</tr>
<tr>
<td>Input Current</td>
<td>0,9A (max.) (depends on output power to backplane)</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>3,3V / 5,0V (to backplane)</td>
</tr>
<tr>
<td>Max. Total Output Power</td>
<td>4W (Shared between 3,3V and 5,0V )</td>
</tr>
<tr>
<td>Max. Output current 3,3 V</td>
<td>1,1A</td>
</tr>
<tr>
<td>Max. Output current 5,0 V</td>
<td>0,7A</td>
</tr>
<tr>
<td>Max. Dissipated Power</td>
<td>4W</td>
</tr>
<tr>
<td>Isolation</td>
<td>1000V</td>
</tr>
</tbody>
</table>

### Additional descriptions

- Watchdog
- Real-time clock with Lithium battery
- 3 position working mode switch (TST/ON/OFF)
- 3 status indication LEDs
- Internal temperature supervision
- Self-diagnosis
- Hot swap

### Mechanical

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>52,25mm x 175mm x 150,5mm</td>
</tr>
<tr>
<td>Weight</td>
<td>540gr</td>
</tr>
</tbody>
</table>

### Climatic

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40°C to + 70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to + 85°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>

### Accessories (not included)

- IC3565: DC Power Input Plug
5  **Analog input / output modules**

A set of analog input/output modules intended for a TSX bus, fully equips *INGEYSTM CMS* PAC for using analog process signals.

The requirements of different application sectors have been considered, enabling a scalable and optimized solution.

These modules are designed to fulfill demanding industrial environmental conditions, following international standards.

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3356AB</td>
<td>16 analog inputs with +/- 10V and +/- 20mA max input ranges</td>
</tr>
<tr>
<td>IC3357AB</td>
<td>16 PT100 inputs 2 wires TSX</td>
</tr>
<tr>
<td>IC3362AA</td>
<td>8 analogue input channels V/I/PT100/IEPE 8 analogue output channels V/I</td>
</tr>
<tr>
<td>IC3362AB</td>
<td>2 PT100, 2 IEPE 2 analogue output channels V/I</td>
</tr>
<tr>
<td>IC3362AC</td>
<td>8 analogue input channels V/I</td>
</tr>
<tr>
<td>IC3362AD</td>
<td>6 analogue input channels V/I/PT100/IEPE. Channels 0..5 2 analogue input channels thermocouple. Channels 6..7 8 analogue output channels V/I</td>
</tr>
<tr>
<td>IC3394AB</td>
<td>8 IEPE standard inputs, 8 digital input/outputs 4 analog inputs, 2 encoder inputs and 1 SSI channel</td>
</tr>
<tr>
<td>IC3395AB</td>
<td>8 IEPE standard inputs</td>
</tr>
</tbody>
</table>
### 5.1 Analog input modules

**General Characteristics:**

- Fulfill the most demanded analog measurements in the industry
- High resolution
- Self-diagnosis
- High density modules

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3356AB</td>
<td>16 analog inputs with +/- 10V, +/- 20mA ranges</td>
</tr>
<tr>
<td>IC3357AB</td>
<td>16 PT100 inputs. 2 wires</td>
</tr>
<tr>
<td>IC3394AB</td>
<td>8 IEPE standard inputs, 8 digital input/outputs 4 analog inputs, 2 encoder inputs and 1 SSI channel</td>
</tr>
<tr>
<td>IC3395AB</td>
<td>8 IEPE standard inputs</td>
</tr>
<tr>
<td><strong>Functional</strong></td>
<td><strong>IC3356AB</strong></td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Input signal</strong></td>
<td>Voltage / Current</td>
</tr>
<tr>
<td><strong>Number of inputs</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Connection mode</strong></td>
<td>Common GND reference</td>
</tr>
<tr>
<td><strong>Measurement ranges</strong></td>
<td>-20mA to +20mA, 0 to 20mA, +4mA to 20mA, -10V to +10V, -5V to +5V, -1V to +1V, 0 + 5V, 0 + 10V</td>
</tr>
<tr>
<td><strong>Refresh time</strong></td>
<td>5.2ms (max.)</td>
</tr>
<tr>
<td><strong>A/D converter</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Self-diagnosis</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hot swap</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Break down current in current mode</strong></td>
<td>+/- 40mA</td>
</tr>
<tr>
<td><strong>Break down voltage</strong></td>
<td>+/- 18V</td>
</tr>
<tr>
<td><strong>Open circuit voltage</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>PT100 current</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Isolation input to system</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Isolation between inputs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Input impedance, voltage mode</strong></td>
<td>&gt;33KΩ</td>
</tr>
<tr>
<td><strong>Input impedance, current mode</strong></td>
<td>440Ω (min.), 460Ω (max.)</td>
</tr>
<tr>
<td><strong>Current Consumption 3.3V</strong></td>
<td>550mA (max.) / 430mA (typ.)</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions (WxHxD)</strong></td>
<td>26mm x 175mm x 130.41mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>210g</td>
</tr>
<tr>
<td><strong>Slot width</strong></td>
<td>1 slot TSX</td>
</tr>
<tr>
<td><strong>Climatic</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-40°C to + 70°C</td>
</tr>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-40°C to + 85°C</td>
</tr>
<tr>
<td><strong>Relative Humidity</strong></td>
<td>5% to 95% w/o condensing</td>
</tr>
<tr>
<td><strong>Accessories (not included)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Field connection options</strong></td>
<td>Spring terminal plug, 1.5mm² (2 IC3571 per module) or 50 pin flat cable adapter (1 IC3573 per module)</td>
</tr>
</tbody>
</table>
## Functional

### Accelerometer inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>IEPE standard (ICP) Accelerometer</td>
</tr>
<tr>
<td>Input channels</td>
<td>8</td>
</tr>
<tr>
<td>Connection signals</td>
<td>ASx, AGx, ⊥ (signal, ref. screen)</td>
</tr>
<tr>
<td>Sampling frequency</td>
<td>47,971492Khz</td>
</tr>
<tr>
<td>Connection mode</td>
<td>Single ended</td>
</tr>
<tr>
<td>Configurable gains G, (dB)</td>
<td>0, 3, 6, 9, 12, 20, 23, 26, 29, 32</td>
</tr>
<tr>
<td>Resolution</td>
<td>24bits</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>10V p-p a G=0db at full scale</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>106.5dB (typ.)</td>
</tr>
<tr>
<td>Useful band</td>
<td>0,1Hz to 21Khz</td>
</tr>
<tr>
<td>Sensor diagnosis</td>
<td>Yes</td>
</tr>
<tr>
<td>Current injected to sensor</td>
<td>4mA (typ.)</td>
</tr>
<tr>
<td>Self-diagnosis</td>
<td>TSX internal bus, inputs and outputs and ADC</td>
</tr>
<tr>
<td>Hot swap</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Analog inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input channels</td>
<td>4</td>
</tr>
<tr>
<td>Input signal types</td>
<td>Voltage / Current</td>
</tr>
<tr>
<td>Measurement ranges</td>
<td>-20mA to +20mAa, 0 to 20mA, +4mA to 20mA -10V to +10V, -5V to +5V, -1V to +1V, 0 to +5V, 0 to +10V</td>
</tr>
<tr>
<td>Refresh time</td>
<td>1,6ms (max.)</td>
</tr>
<tr>
<td>Resolution</td>
<td>16 bits</td>
</tr>
<tr>
<td>Break down current in current mode</td>
<td>+/- 40mA</td>
</tr>
<tr>
<td>Break down voltage</td>
<td>+/- 18V</td>
</tr>
<tr>
<td>Isolation input to system</td>
<td>1500Vac, 60s</td>
</tr>
<tr>
<td>Isolation between inputs</td>
<td>No</td>
</tr>
<tr>
<td>Input impedance, voltage mode</td>
<td>&gt;33KΩ</td>
</tr>
<tr>
<td>Input impedance, current mode</td>
<td>440Ω (min.), 460Ω (max.)</td>
</tr>
</tbody>
</table>

### Digital inputs/outputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input/output channels</td>
<td>8</td>
</tr>
<tr>
<td>Input connection mode</td>
<td>One common return for all the signals</td>
</tr>
<tr>
<td>Input low level</td>
<td>0V to 11V</td>
</tr>
<tr>
<td>Input high level</td>
<td>18V to 30V</td>
</tr>
<tr>
<td>Input current</td>
<td>5,5mA</td>
</tr>
<tr>
<td>Output technology</td>
<td>Solid state relay opto isolated</td>
</tr>
<tr>
<td>Max current per output</td>
<td>250mA</td>
</tr>
</tbody>
</table>

### Fast counter inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter channels</td>
<td>Two channels, each with three signals: A0, B0, G0 / A1, B1, G1</td>
</tr>
</tbody>
</table>

### SSI Interface

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>SSI standard</td>
</tr>
</tbody>
</table>
### Electrical

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V power supply voltage for IEPE inputs</td>
<td>24Vdc, +/- 10%</td>
</tr>
<tr>
<td>PSA power supply consumption</td>
<td>250mA (max.) / 125mA (typ.)</td>
</tr>
</tbody>
</table>

### Mechanical

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>52mm x 175mm x 130,41mm</td>
</tr>
<tr>
<td>Weight</td>
<td>225g</td>
</tr>
<tr>
<td>Slot width</td>
<td>2 slot TSX</td>
</tr>
</tbody>
</table>

### Climatic

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40º to + 70ºC</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40ºC to + 85ºC</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>

### Accessories (not included)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field connection options</td>
<td>Spring terminal plug 1,5mm² (4 IC3571 per module)</td>
</tr>
<tr>
<td>Functional</td>
<td>IC3395AB</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Input signal</td>
<td>IEPE standard (ICP) Accelerometer</td>
</tr>
<tr>
<td>Input channels</td>
<td>8</td>
</tr>
<tr>
<td>Connection signals</td>
<td>ASx, AGx, ⊥ (signal, ref. screen)</td>
</tr>
<tr>
<td>Sampling frequency</td>
<td>47,971492Khz</td>
</tr>
<tr>
<td>Connection mode</td>
<td>Single ended</td>
</tr>
<tr>
<td>Configurable gains G, (dB)</td>
<td>0, 3, 6, 9, 12, 20, 23, 26, 29, 32</td>
</tr>
<tr>
<td>Resolution</td>
<td>24bits</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>10V p-p a G=0db at full scale</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>106,5dB (typ.)</td>
</tr>
<tr>
<td>Useful band</td>
<td>0,1Hz to 21Khz</td>
</tr>
<tr>
<td>Sensor diagnosis</td>
<td>Yes</td>
</tr>
<tr>
<td>Current injected to sensor</td>
<td>4mA (typ.)</td>
</tr>
<tr>
<td>Self-diagnosis</td>
<td>TSX internal bus, inputs and outputs and ADC</td>
</tr>
<tr>
<td>Hot swap</td>
<td>Yes</td>
</tr>
<tr>
<td>Electrical</td>
<td></td>
</tr>
<tr>
<td>24V power supply voltage for IEPE inputs (PSA power supply)</td>
<td>24Vdc, +/- 10%</td>
</tr>
<tr>
<td>PSA power supply consumption</td>
<td>250mA (max.) / 125mA (typ.)</td>
</tr>
<tr>
<td>Mechanical</td>
<td></td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>26mm x 175mm x 130.41mm</td>
</tr>
<tr>
<td>Weight</td>
<td>210 g</td>
</tr>
<tr>
<td>Slot width</td>
<td>1 slot TSX</td>
</tr>
<tr>
<td>Climatic</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40º to + 70ºC</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40ºC to + 85ºC</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
<tr>
<td>Accessories (not included)</td>
<td></td>
</tr>
<tr>
<td>Field connection options</td>
<td>Spring terminal plug,1.5mm² (2 IC3571 per module)</td>
</tr>
</tbody>
</table>
5.2 Analog input / output modules

General Characteristics:

- Fast acquisition rate up to 100Ks/sec
- ITSX compliant. Intended for fast control application
- High resolution ADC and DAC, up to 16 bits
- Differential inputs
- Analogue Input mode (V/I/Pt100/IEPE) software configurable
- Analogue Output mode (V/I) software configurable

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3362AA</td>
<td>8 analogue input channels V/I/Pt100/IEPE</td>
</tr>
<tr>
<td></td>
<td>8 analogue output channels V/I</td>
</tr>
<tr>
<td>IC3362AB</td>
<td>2 PT100, 2 IEPE</td>
</tr>
<tr>
<td></td>
<td>2 analogue output channels V/I</td>
</tr>
<tr>
<td>IC3362AC</td>
<td>8 analogue input channels V/I</td>
</tr>
<tr>
<td>IC3362AD</td>
<td>6 analogue input channels V/I/Pt100/IEPE. Channels 0..5</td>
</tr>
<tr>
<td></td>
<td>2 analogue input channels thermocouple. Channels 6..7</td>
</tr>
<tr>
<td></td>
<td>8 analogue output channels V/I</td>
</tr>
</tbody>
</table>
### Analog input / output modules

#### Functional

<table>
<thead>
<tr>
<th></th>
<th>IC3362AA</th>
<th>IC3362AB</th>
<th>IC3362AC</th>
<th>IC3362AD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of inputs</strong></td>
<td>8</td>
<td>2 + 2</td>
<td>8</td>
<td>6+2</td>
</tr>
<tr>
<td><strong>Input type and ranges</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>+/-10V , +/-5V , +/-1V, 0 to 10V , 0 to 50V</td>
<td>-</td>
<td>+/-10V , +/-5V , +/-1V , 0 to 10V , 0 to 50V</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>+/-20mA , 0 to 20mA, 4 to 20mA</td>
<td>-</td>
<td>+/-20mA , 0 to 20mA , 4 to 20mA</td>
<td></td>
</tr>
<tr>
<td>Pt100 sensor</td>
<td>-50C to 200C</td>
<td>-</td>
<td>-50C to 200C</td>
<td></td>
</tr>
<tr>
<td>IEPE sensor</td>
<td>+/-5V , +/-1V</td>
<td>-</td>
<td>+/-5V , +/-1V</td>
<td></td>
</tr>
<tr>
<td><strong>Input connection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>Differential for voltage ranges Single ended for current, Pt100 and IEPE</td>
<td>Single ended for Pt100 and IEPE</td>
<td>Differential for voltage ranges Single ended for current</td>
<td>Differential for voltage ranges Single ended for current, Pt100, thermocouple and IEPE</td>
</tr>
<tr>
<td><strong>Sampling rate</strong></td>
<td>Up to 100Ks/sec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Input resolution</strong></td>
<td>Up to 16bits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of outputs</strong></td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td><strong>Output type and range</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>+/-10V , +/-5V , +/-1V , 0 to 10V , 0 to 50V</td>
<td>-</td>
<td>+/-10V , +/-5V , +/-1V , 0 to 10V , 0 to 50V</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>+/-20mA , 0 to 20mA , 4 to 20mA</td>
<td>-</td>
<td>+/-20mA , 0 to 20mA , 4 to 20mA</td>
<td></td>
</tr>
</tbody>
</table>

#### Electrical

| **Isolation**                      |          |          |          |          |
| Front connector to system connector | 1500Vdc 1min |          |          |          |
| Front connector to earth           | 1500Vdc 1min |          |          |          |
| **Max. Input voltage**             | +/-15V from any Aln(+/-) input to M point | -        | +/-15V from any Aln(+/-) input to M point |          |
| **Input Impedance**                |          |          |          |          |
| Voltage mode                       | >500KΩ | -        | >500KΩ |          |
| Current mode                       | 440Ω typ | -        | 440Ω typ |          |
| **Output max load**                |          |          |          |          |
| Voltage mode                       | 1KΩ (min.) | -        | 1KΩ (min.) |          |
| Current mode                       | 500Ω (max.) | -        | 500Ω (max.) |          |
| **Aux. supply voltage**            | 24Vdc +/- 10% |          |          |          |
| **Aux. supply current**            | 450mA (max.) / 310mA (typ.) @ 24Vdc |          |          |          |
| **Current Consumption 3,3V**       | 400mA (max.) / 250mA (typ.) |          |          |          |

#### Mechanical

| **Dimensions (WxHxD)**              | 26mm x 175mm x 130,41mm |          |          |          |
| **Weight**                         | 275g |          |          |          |
| **Slot width**                     | 1 slot TSX |          |          |          |

#### Climatic

| **Operating Temperature**           | -40ºC to + 70ºC (extended range) |          |          |          |
| **Storage Temperature**             | -40ºC to + 85ºC |          |          |          |
| **Relative Humidity**               | 5% to 95% w/o condensing |          |          |          |

#### Accessories (not included)

| **Field connection options** | Spring terminal plug, 1.5mm² (4 IC3593 per module) |          |          |          |
6 Digital input / output modules

INGESYS™ CMS PAC incorporates a complete set of digital input/output modules to access process signals.

The requirements of different application sectors have been considered, enabling a scalable and optimized solution.

These modules are designed to fulfill demanding industrial environmental conditions, following international standards.

<table>
<thead>
<tr>
<th>References</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3311AAB</td>
<td>32 inputs 24Vdc with diagnosis</td>
</tr>
<tr>
<td>IC3313AAB</td>
<td>32 outputs solid state relay (HSD) with diagnosis</td>
</tr>
<tr>
<td>IC3393AAB</td>
<td>16 inputs, 16 outputs solid state relays (HSD) 24Vdc with diagnosis</td>
</tr>
</tbody>
</table>
6.1 Digital input modules

General Characteristics:

- High density modules. Up to 32 inputs in one-slot width
- Self-diagnosis
- Digital configurable input filters

- Optional
  - 24Vdc rated voltages
  - 110/125Vdc rated voltages
  - Sequence-of-event recording (SoE)

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3311AAB</td>
<td>32 inputs, 24Vdc with diagnosis</td>
</tr>
<tr>
<td>Functional</td>
<td>IC3311AAB</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Number of inputs</td>
<td>32</td>
</tr>
<tr>
<td>Connection mode</td>
<td>One common return for all the signals</td>
</tr>
<tr>
<td>Input polarity</td>
<td>positive</td>
</tr>
<tr>
<td>SoE recording</td>
<td>No</td>
</tr>
<tr>
<td>Input filter</td>
<td>RC</td>
</tr>
<tr>
<td>Input to TSX time</td>
<td>2ms (max.)</td>
</tr>
<tr>
<td>Self-diagnosis</td>
<td>TSX Internal bus and inputs</td>
</tr>
<tr>
<td>Hot swap</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation input to system</td>
<td>2500Vac, 60s</td>
</tr>
<tr>
<td>Isolation between inputs</td>
<td>No</td>
</tr>
<tr>
<td>Rate voltage</td>
<td>24Vdc</td>
</tr>
<tr>
<td>Low level</td>
<td>0V to 11V</td>
</tr>
<tr>
<td>High level</td>
<td>18V to 30V</td>
</tr>
<tr>
<td>Input current</td>
<td>5.5mA (typ.) @ 24V</td>
</tr>
<tr>
<td>Current Consumption 3.3V</td>
<td>160mA (max.) / 110mA (typ.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>26mm x 175mm x 130,41mm</td>
</tr>
<tr>
<td>Weight</td>
<td>210g</td>
</tr>
<tr>
<td>Slot width</td>
<td>1 slot TSX</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Climatic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40ºC to + 70ºC</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40ºC to + 85ºC</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories (not included)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Field connection options</td>
<td>Spring terminal plug, 1,5mm² (2 IC3571 per module)</td>
</tr>
<tr>
<td></td>
<td>or 50 pin flat cable adapter (1 IC3573 per module)</td>
</tr>
</tbody>
</table>
6.2 Digital output modules

**General Characteristics:**
- High density modules
- Self-diagnosis. Failure detection on each output
- Short-circuit protection
- Overheating protection
- **Optional**
  - 32 solid state 24Vdc outputs
  - 16 electromechanical relay outputs

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3331AAB</td>
<td>32 solid state outputs</td>
</tr>
</tbody>
</table>
### Functional

<table>
<thead>
<tr>
<th><strong>IC3331AAB</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of outputs</strong></td>
</tr>
<tr>
<td><strong>Connection mode</strong></td>
</tr>
<tr>
<td><strong>TSX to output time</strong></td>
</tr>
<tr>
<td><strong>Operating rate</strong></td>
</tr>
<tr>
<td><strong>Self-diagnosis</strong></td>
</tr>
<tr>
<td><strong>Hot swap</strong></td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th><strong>Output technology</strong></th>
<th>Solid state relay (SSR) opto isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Isolation output to system</strong></td>
<td>2500Vac, 60s</td>
</tr>
<tr>
<td><strong>Isolation between outputs</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Aux. supply voltage</strong></td>
<td>24Vdc (rated) 19Vdc (min.), 30Vdc (max.)</td>
</tr>
<tr>
<td><strong>Aux. supply current</strong></td>
<td>Sum of all output currents plus 15mA per active output Limited by a 5A internal fuse per block</td>
</tr>
<tr>
<td><strong>Max. current per output</strong></td>
<td>250mA</td>
</tr>
<tr>
<td><strong>Max. short circuit current per output</strong></td>
<td>1A, limited by SSR protection</td>
</tr>
<tr>
<td><strong>Max. total current per module</strong></td>
<td>5A, limited by internal fuse</td>
</tr>
<tr>
<td><strong>Current Consumption 3,3 V</strong></td>
<td>Outputs ON: 400mA (max.) / 350mA (typ.) Outputs OFF: 60mA (typ.)</td>
</tr>
<tr>
<td><strong>Current Consumption 5,0 V</strong></td>
<td>-</td>
</tr>
</tbody>
</table>

### Mechanical

<table>
<thead>
<tr>
<th><strong>Dimensions (WxHxD)</strong></th>
<th>26mm x 175mm x 130,41mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight</strong></td>
<td>220g</td>
</tr>
<tr>
<td><strong>Slot width</strong></td>
<td>1 slot TSX</td>
</tr>
</tbody>
</table>

### Climatic

<table>
<thead>
<tr>
<th><strong>Operating Temperature</strong></th>
<th>-40°C to + 70°C (extended range)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-40°C to + 85°C</td>
</tr>
<tr>
<td><strong>Relative Humidity</strong></td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>

### Accessories (not included)

| **Field connection options** | Spring terminal plug, 1,5mm² (2 IC3571 per module) or 50 pin flat cable adapter (1 IC3573 per module) |
6.3 Digital input / output modules

General Characteristics:

- High density modules
- Self-diagnosis capability
- Short-circuit protection
- Over-temperature protection

- Optional
  - 16DI + 16DO 24Vdc optocoupler
  - 8DI 24Vdc + 4DO relay
  - 8DI 48Vdc + 4DO relay
  - 8DI 125Vdc + 4DO relay
  - 8DI 250Vdc + 4DO relay
  - Sequence-of-event recording (SoE)

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3393AAB</td>
<td>16 inputs + 16 outputs. 24Vdc with diagnosis</td>
</tr>
<tr>
<td><strong>Functional</strong></td>
<td>IC3393AAB</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Number of inputs</td>
<td>16</td>
</tr>
<tr>
<td>Connection mode</td>
<td>One common return</td>
</tr>
<tr>
<td>Input polarity</td>
<td>Positive</td>
</tr>
<tr>
<td>Input filter</td>
<td>RC</td>
</tr>
<tr>
<td>SoE recording</td>
<td>No</td>
</tr>
<tr>
<td>Input to TSX time</td>
<td>2ms (max.)</td>
</tr>
<tr>
<td>Number of outputs</td>
<td>16</td>
</tr>
<tr>
<td>Outputs connection mode</td>
<td>Common high side drive</td>
</tr>
<tr>
<td>Internal bus to output time</td>
<td>2ms (max.)</td>
</tr>
<tr>
<td>Output switching rate</td>
<td>1KHz (max.)</td>
</tr>
<tr>
<td>Self-diagnosis</td>
<td>TSX internal bus, inputs and outputs</td>
</tr>
<tr>
<td>Hot swap</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electrical</strong></th>
</tr>
</thead>
</table>

**Inputs**

<table>
<thead>
<tr>
<th>Isolation input to system</th>
<th>2500Vac, 60s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation between inputs</td>
<td>No</td>
</tr>
<tr>
<td>Input Rated voltage</td>
<td>24Vdc</td>
</tr>
<tr>
<td>Input Low level</td>
<td>0V to 11V</td>
</tr>
<tr>
<td>Input High level</td>
<td>18V to 30V</td>
</tr>
<tr>
<td>Input current</td>
<td>5,5mA (typ.) @ 24V</td>
</tr>
<tr>
<td>Current Consumption 3,3 V</td>
<td>160mA (max.) / 110mA (typ.)</td>
</tr>
</tbody>
</table>

**Outputs**

<table>
<thead>
<tr>
<th>Output technology</th>
<th>Solid state relay (SSR) opto isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation output to system</td>
<td>2500Vac, 60s</td>
</tr>
<tr>
<td>Isolation between outputs</td>
<td>No</td>
</tr>
<tr>
<td>Aux. supply voltage</td>
<td>24Vdc (rated) 19Vdc (min.), 30Vdc (max.)</td>
</tr>
<tr>
<td>Aux. supply current</td>
<td>Sum of all the output currents plus 15mA per active output Limited by 5A internal fuse</td>
</tr>
</tbody>
</table>
**Digital input / output modules**

<table>
<thead>
<tr>
<th><strong>IC3393AAB</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical</strong></td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
</tr>
<tr>
<td>Max current per output</td>
</tr>
<tr>
<td>Max short circuit per output</td>
</tr>
<tr>
<td>Max total per module</td>
</tr>
<tr>
<td>Current Consumption 3,3 V</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Current Consumption 5,0 V</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Slot width</td>
</tr>
<tr>
<td><strong>Climatic</strong></td>
</tr>
<tr>
<td>Operating Temperature</td>
</tr>
<tr>
<td>Storage Temperature</td>
</tr>
<tr>
<td>Relative Humidity</td>
</tr>
<tr>
<td><strong>Accessories (not included)</strong></td>
</tr>
<tr>
<td>Field connection options</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
7 Counter modules

The counter function modules are designed to manage binary signals with high frequency rates.

Different counter modules are available integrating different functional features and additional I/Os.

General Characteristics:
- Three types of incremental encoders
- Up to 1 Million counts per second
- Fully configurable counters: set-points, presets, etc.
- High resolution position and speed measurements

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3325AB</td>
<td>6 general-purpose configurable counters</td>
</tr>
<tr>
<td></td>
<td>Position and speed measurement by pulse encoders</td>
</tr>
</tbody>
</table>

References
### Functional

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of counters</td>
<td>6</td>
</tr>
</tbody>
</table>
| Encoders supported                 | A, B signals phase shifted 90°  
  A for up and B for down  
  A for count and B for up/down |
| Number of signals                  | 6 A/B pairs + 8 (general purpose) |
| Count speed                         | 10⁶ counts/sec |
| Hot swap                           | Yes           |

### Electrical

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter Signals standard</td>
<td>24V HTL</td>
</tr>
<tr>
<td>SSI signals</td>
<td>-</td>
</tr>
<tr>
<td>Isolation input to system</td>
<td>2500Vac, 60s</td>
</tr>
<tr>
<td>Isolation between inputs</td>
<td>No</td>
</tr>
<tr>
<td>Current Consumption 3,3V</td>
<td>250mA (max.)</td>
</tr>
</tbody>
</table>

### Mechanical

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>26mm x 175mm x 130,41mm</td>
</tr>
<tr>
<td>Weight</td>
<td>220g</td>
</tr>
<tr>
<td>Slot width</td>
<td>1 slot TSX</td>
</tr>
</tbody>
</table>

### Climatic

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>

### Accessories (not included)

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
</table>
| Field connection options           | Spring terminal plug, 1,5mm² (2 IC3571 per module)  
  or 50 pin flat cable adapter (1 IC3573 per module) |
8 Fieldbus communication modules

INGEYSTM CMS PAC offers a wide range of fieldbus-compatible modules, covering a wide number of monitoring applications.

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3251AB</td>
<td>3 serial RS232/RS485 ports, D-Sub9 connector&lt;br&gt;Extended Temperature Range</td>
</tr>
<tr>
<td>IC3261AB</td>
<td>CANopen Master. 2 Ports, D-Sub9 male connector&lt;br&gt;Extended temperature range</td>
</tr>
</tbody>
</table>
8.1 Serial communications modules

INGEYS™ CMS offers different possibilities to interface external devices via serial links. RS232 or RS485 (half or full duplex) with the most standard serial protocols are offered to satisfy the demands of industrial applications.

General Characteristics:

- Three software-configurable serial ports
- RS-232/RS-485 (half/full duplex)
- TX/RX LEDs per channel
- Intelligent modules
- FIFO buffer UART

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3251AB</td>
<td>3 serial RS232/RS485 ports, D-Sub9 connector</td>
</tr>
<tr>
<td></td>
<td>Extended Temperature Range</td>
</tr>
</tbody>
</table>
### Functional

<table>
<thead>
<tr>
<th>Feature</th>
<th>IC3251AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Serial RS232/RS485 (Half and Full duplex)</td>
</tr>
<tr>
<td>Number of ports</td>
<td>3</td>
</tr>
<tr>
<td>Connection type</td>
<td>Female DB9</td>
</tr>
<tr>
<td>Physical medium</td>
<td>Copper</td>
</tr>
<tr>
<td>Maximum transmission speed</td>
<td>RS-232 Up to 64 Kbit/s RS485: Up to 500 Kbit/s</td>
</tr>
<tr>
<td>Signals/Diagnosis</td>
<td>Yes</td>
</tr>
<tr>
<td>Transmission LEDs</td>
<td>Yes</td>
</tr>
<tr>
<td>Diagnosis LEDs</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th>Feature</th>
<th>IC3251AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply consumption</td>
<td></td>
</tr>
<tr>
<td>3,3V</td>
<td>420mA (max.) / 400mA (typ.)</td>
</tr>
<tr>
<td>5,0V</td>
<td>-</td>
</tr>
<tr>
<td>Dissipated power</td>
<td>1,4W (max.)</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>500Vdc between field signals and internal logic</td>
</tr>
<tr>
<td>Isolation technology</td>
<td>Using transformer</td>
</tr>
</tbody>
</table>

### Mechanical

<table>
<thead>
<tr>
<th>Feature</th>
<th>IC3251AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>26mm x 175mm x 130,41mm</td>
</tr>
<tr>
<td>Weight</td>
<td>220g</td>
</tr>
<tr>
<td>Slot width</td>
<td>1 slot TSX</td>
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<table>
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<tr>
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</tr>
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<tbody>
<tr>
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</tr>
<tr>
<td>Relative Humidity</td>
<td>5% to 95% w/o condensing</td>
</tr>
</tbody>
</table>
8.2 CANopen master modules

IC3261 module incorporates the CANopen master functional feature in *INGEYSYS™ CMS*, following the profiles given in the CiA 301 specification released by CAN in Automation.

The use of CANopen eases technical details, simplifying the control engineer’s task of developing the application and improving reliability.

**General Characteristics:**

- CANopen master module
- Copper
- Max. transmission speed 1Mbit/s
- Hot swap
- Extended temperature

<table>
<thead>
<tr>
<th>References</th>
<th>Specific Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3261AB</td>
<td>CANopen Master. 2 Ports, D-Sub9 male connector</td>
</tr>
<tr>
<td></td>
<td>Extended temperature range</td>
</tr>
<tr>
<td>Functional</td>
<td>IC3261AB</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Communication Protocol</td>
<td>CANopen</td>
</tr>
<tr>
<td>Number of channels</td>
<td>2</td>
</tr>
<tr>
<td>Connection type</td>
<td>D-Sub9 male</td>
</tr>
<tr>
<td>Physical medium</td>
<td>Copper</td>
</tr>
<tr>
<td>Max. transmission speed</td>
<td>Up to 1Mbit/s (Cable length dependent)</td>
</tr>
<tr>
<td>Diagnosis LEDs</td>
<td>Yes</td>
</tr>
<tr>
<td>Self-diagnosis</td>
<td>Yes</td>
</tr>
<tr>
<td>Hot swap</td>
<td>Yes</td>
</tr>
<tr>
<td>Electrical</td>
<td></td>
</tr>
<tr>
<td>Data link and physical layer</td>
<td>CAN</td>
</tr>
<tr>
<td>Current Consumption 3,3V</td>
<td>250mA (max.) / 230mA (typ.)</td>
</tr>
<tr>
<td>Current Consumption 5,0V</td>
<td>50mA (max.) / 30mA (typ.)</td>
</tr>
<tr>
<td>Mechanical</td>
<td></td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>26mm x 175mm x 130,41mm</td>
</tr>
<tr>
<td>Weight</td>
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<td>Slot width</td>
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<td>Climatic</td>
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</table>
## ACCESSORIES

<table>
<thead>
<tr>
<th>References</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC3598A</td>
<td>32 POINTS INTERFACE + PS DISTRIBUTION NO SWITCHABLE W/O FUSES PLASTIC ENCLOSURE</td>
</tr>
<tr>
<td>IC3565</td>
<td>DC POWER INPUT PLUG FOR IC3121XX</td>
</tr>
<tr>
<td>IC3571</td>
<td>18 PIN TERMINAL PLUG (max. CABLE SECTION 1,5mm²)</td>
</tr>
<tr>
<td>IC3573</td>
<td>TERMINAL SOCKET/ FLAT CABLE ADAPTER (32 POINTS)</td>
</tr>
<tr>
<td>IC3574</td>
<td>10 PIN TERMINAL PLUG (max. CABLE SECTION 1,5 mm²)</td>
</tr>
<tr>
<td>IC3575</td>
<td>TSX SLOT COVER</td>
</tr>
<tr>
<td>IC3805</td>
<td>COMPACT FLASH 64MB</td>
</tr>
<tr>
<td>IC3582</td>
<td>COMPACT FLASH 1GB</td>
</tr>
<tr>
<td>IC3583</td>
<td>COMPACT FLASH 2GB</td>
</tr>
<tr>
<td>IC3593</td>
<td>13 PIN SCREW TERMINAL PLUG (max. CABLE SECTION 2,5mm²)</td>
</tr>
<tr>
<td>IC3595</td>
<td>18 PIN SCREW TERMINAL PLUG (max. CABLE SECTION 2,5mm²)</td>
</tr>
</tbody>
</table>
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