SKF Multilog On-line System IMx-16/IMx-16Plus

24/7 condition monitoring to improve machine reliability
The SKF Multilog On-line System IMx-16/IMx-16Plus, provide powerful solutions for condition monitoring applications requiring up to 16-channels, per device. Coupled with SKF software, they provide a complete system for early fault detection and prevention, automatic advice for correcting existing or impending machine conditions and advanced condition based maintenance to improve reliability, availability and performance.

The SKF Multilog IMx-16/IMx-16Plus pack a high specification condition monitoring product into a compact form. They offer 16 analogue inputs, eight constant current accelerometers or voltage inputs and a further eight that in addition have PT1000 compatibility for temperature monitoring. They also have four digital channels available for speed sensor inputs.

Both modules provide easy network access to the vibration and temperature data. An RS485 interface provides a Modbus RTU port for connection to a sensor, or optional GPS receiver, etc. for complementary data.

The SKF Multilog IMx-16/IMx-16Plus integrate easily with SKF’s Cloud service for data storage, data sharing and for SKF Remote Diagnostic Services.

The SKF Multilog IMx-16/IMx-16Plus have several industry specific certifications and can typically be used in the following industries:

• Wind energy
• Marine
• Machine Tool
• Process Industries

Features

• No bigger than a paperback book
• 16 analogue inputs (typically vibration but up to 8 directly connected temperature sensors)
• 4 digital inputs (speed)
• Transducer power
• Simultaneous measurements on all channels
• Ethernet (RJ45) and for IMx-16Plus only: mobile data or Wi-Fi connectivity options
• DHCP client, capable
• On board clock calendar
• Supports NTP time synchronisation protocol
• Modbus TCP/IP (when Ethernet in use)
• Modbus RTU (via RS485 link)
• External (Modbus) GPS module available
• 24–48 V DC and/or Power over Ethernet
• Output relay drivers – alarms and system
• Multi-parameter gating
• Multiple SKF enveloping filters
• Data buffering in non-volatile memory when communication is down
• 2 GB available for vibration, temperature, speed, location and other measurement data
• Integrates to SKF’s Cloud service and SKF Remote Diagnostic Services
• Local access via iOS and Android apps
• Bluetooth
• Multiple industry/environmental approvals:
  – CE
  – WEEE
  – RoHS
  – EMC immunity and emissions
IMx top connectors

DC input power connection
Terminals are provided for the incoming DC power supply. A (2-way) connector is provided.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>24 to 48 VDC</td>
</tr>
<tr>
<td>–</td>
<td>0 V DC</td>
</tr>
</tbody>
</table>

Connect the incoming DC power to the DC terminals, on the IMx-16Plus the lower pair must be used. It is recommended that the supply be protected by a 2 A slow blow fuse. The IMx-16/IMx-16Plus support Power over Ethernet (PoE) via the RJ45 connector and both power options can be applied to provide redundancy.

USB A Host interface (Type A connector)
SKF supply a Bluetooth dongle fitted in USB port A. The dongle supports Bluetooth v4.0 Low Energy.

USB B Service interface (Type mini-B)
SKF can supply an isolated cable for USB port B.

LEDs Pwr – Power (green, normally on)
Sys – System (red, normally off)
Sw – Rescue button (maintenance mode)

D1 to D4 (Digital/tacho input connections)
The digital input channels D1 to D4 support common types of two-, three-wire tacho sensors. For each input, 3-terminals are available:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>GND / Return</td>
</tr>
<tr>
<td>D</td>
<td>Signal</td>
</tr>
<tr>
<td>P</td>
<td>Power</td>
</tr>
</tbody>
</table>

Digital sensor power is always enabled to the ‘P’ terminals. Peak current demand from the sensor should be no greater than the limit stated in the specifications, even if the average demand is less.

Eth (Ethernet)
Connector RJ45 with LED
Network support 10/100 Mbit/s

**Note:** The Ethernet connection is isolated from the enclosure and is unrelated to G.

RS485 (2-wire) for Modbus RTU

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(485) A</td>
<td>RS485 A</td>
</tr>
<tr>
<td>(485) B</td>
<td>RS485 B</td>
</tr>
<tr>
<td>G</td>
<td>GND</td>
</tr>
</tbody>
</table>

SKF provide one 120-ohm RS485 termination resistor (coloured black) with each IMx and another as part of CMON 4135. (Not required when connecting optional GPS module).

**Notes:**

Demountable terminal connectors
For the top connectors, one 11-way, one 6-way and one 2-way are provided.

Interfaces
When a LAN connection is being used, Modbus TCP/IP can also be supported, including some simultaneous use with Modbus RTU and support for multiple Modbus TCP/IP slave functionality.

On a LAN connection, the IMx can be configured as a DHCP client to obtain its IP address automatically.

Optional items
For optional items and accessories, refer to ordering information.

CAN
For vehicle systems interfacing (currently no firmware support)

IMx-16Plus specific

**Wi-Fi**

- Wi-Fi antenna connection.
- Wi-Fi connectivity provides an alternative method for a TCP connection to @ptitude Observer software (Monitor service). The selection of connection method (mobile data or LAN) is a configuration choice. LAN connection is available by either Wi-Fi or RJ45.

<table>
<thead>
<tr>
<th>Standard</th>
<th>802.11n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>Network support</td>
<td>Open/secured</td>
</tr>
<tr>
<td>Security</td>
<td>WPA2-PSK</td>
</tr>
<tr>
<td>Auto connect</td>
<td>To a specified SSID</td>
</tr>
<tr>
<td>Antenna connector</td>
<td>SMA female</td>
</tr>
</tbody>
</table>

Whether mobile data or LAN connectivity is used the connection supports:
DNS – server name lookup
NTP – time synchronisation.

**Micro SIM card slot (Mobile Data)**

Firmware configurable support for physical micro-SIM (this slot) or eSIM.

| Network support | 2G, 3G, 4G |
| Auto switching | Yes |
| Antenna connections | LTE 1 and LTE 2 (SMA female) |

**Additional notes for the IMx-16Plus:**

**Interfaces**
Mobile data and Wi-Fi are alternative options for connection to @ptitude Observer software and multiple interfaces cannot be enabled simultaneously.
IMx bottom connectors

Lower row:
A1 to A8 (Analogue inputs 1-8)
Channels A1 to A8 support constant current accelerometers, current or voltage inputs. Transducer power is enabled by configuration, on a per channel basis.

Pin Description
A Signal
G GND / Return

Relay drivers (Digital outputs)
The IMx-16/IMx-16Plus provides 3 relay driver outputs for system, warning and alarm status annunciation.

Pin Description
24V Relay drive power
RS System relay output
24V Relay drive power
R1 Relay 1 output
24V Relay drive power
R2 Relay 2 output

The RS, R1 and R2 connections are of a type known as ‘open collector’ or ‘open drain’. The system relay is failsafe (alarms on loss of power), R1 and R2 are non-failsafe.

Upper row:
A9 to A16 (Analogue inputs 9-16)
Channels A9 to A16 support accelerometers, current or voltage inputs, as channels 1 to 8. In addition, these channels also support the direct connection of (2-wire) PT1000 temperature sensors.

Pin Description
A Signal
G GND / Return

IMx-16Plus: connections for general use
Pin Description
G GND
G GND
P Power (24V, can be used to power the optional GPS module).
A/B/G Refer notes

Notes:
Demountable terminal connectors
For the bottom connectors, four 8-way (A1 to A16) and one or two 6-way are provided, model dependent.

Current signals
When connecting a 4-20 mA current signal to an analogue input an external load resistor is required. SKF provide a set of 250-ohm load resistors (coloured blue), as part of CMON 4135.

PT1000 sensor inputs
For SAT testing where PT1000 temperature sensors are used, SKF provide one 1 kΩ resistor (colour-coded red), with each IMx device.

IMx-16Plus: 485B
The terminals (A and B) are not to be connected, not used. The GND/return terminal (G) can be used if required.
### Specifications

<table>
<thead>
<tr>
<th>Hardware</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power input</strong></td>
<td>24–48 V DC nominal (22 to 50 V DC), recommended supply fuse rating: T2AL 10 W or less typical, 12 W maximum</td>
</tr>
<tr>
<td><strong>Power over Ethernet</strong></td>
<td>PoE nominal voltage 48 V, 13 W maximum</td>
</tr>
<tr>
<td>Available as the main or as a redundant supply source</td>
<td></td>
</tr>
<tr>
<td><strong>Analogue inputs</strong></td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>16 (A1 to A16)</td>
</tr>
<tr>
<td>Input type</td>
<td>Non-isolated, referenced to chassis/enclosure ground</td>
</tr>
<tr>
<td>Input range</td>
<td>Functionally: ±25 V (±28 V without damage)</td>
</tr>
<tr>
<td>Impedance</td>
<td>&gt;100 kΩ</td>
</tr>
<tr>
<td>Supported sensor types</td>
<td>2-wire: Constant current accelerometers Voltage signals (4–20 mA requires external load resistor to be fitted) PT1000 temperature probes (channels A9 to A16 only)</td>
</tr>
<tr>
<td>Analogue sensor power</td>
<td>4 mA constant current per sensor (2.23 mA for channels 9 to 16) Individually software enabled/disabled for each sensor</td>
</tr>
<tr>
<td>Sensor power has short circuit protection</td>
<td></td>
</tr>
<tr>
<td><strong>Analogue/Digital conversion</strong></td>
<td>24-bit (one A/D converter per channel)</td>
</tr>
<tr>
<td><strong>Digital inputs</strong></td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>4 (D1 to D4)</td>
</tr>
<tr>
<td>Input type</td>
<td>Non-isolated, referenced to chassis/enclosure ground</td>
</tr>
<tr>
<td>Input range</td>
<td>Functionally: positive voltages up to 24 V (+27 V without damage)</td>
</tr>
<tr>
<td>Trigger level</td>
<td>2.9 V, hysteresis 0.1 V</td>
</tr>
<tr>
<td>Impedance</td>
<td>1.6 kΩ</td>
</tr>
<tr>
<td>Supported sensor types</td>
<td>2- and 3-wire, including: TTL level and other pulses up to +24 V PNP sensors On-line oil debris sensor (Gastops MetalSCAN)</td>
</tr>
<tr>
<td>Digital sensor power</td>
<td>24 V DC. Maximum, peak demand up to 30 mA per sensor Sensor power always enabled (available on a dedicated terminal)</td>
</tr>
<tr>
<td>Sensor power has short circuit protection</td>
<td></td>
</tr>
<tr>
<td><strong>Digital outputs</strong></td>
<td>Relay driver outputs 3 relay drivers (24 V DC) 2 for measurement alarming and 1 for system alarming Total maximum drive current available: 70 mA Minimum individual coil resistances: 345 Ω (1 relay), 690 Ω (2 relays), 1035 Ω (if 3 relays are in use)</td>
</tr>
<tr>
<td><strong>Physical and environmental</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>DIN rail (35 mm x 7.5 mm ‘top hat’ DIN rail)</td>
</tr>
<tr>
<td><strong>Size (H is across the rail)</strong></td>
<td>Size (H x W x D): 172 1/2 x 104 x 408 mm (6.8 x 4.1 x 1.6 in.) A: Height (H) does not include terminal connectors and Bluetooth dongle B: Depth (D) is unmounted and excluding DIN rail mounting bracket</td>
</tr>
<tr>
<td><strong>Device weights</strong></td>
<td>IMx-16: 571 g (1.26 lb), IMx-16Plus: 582 g (1.28 lb)</td>
</tr>
<tr>
<td><strong>IP rating</strong></td>
<td>IP 30 (IP65 SKF cabinets available)</td>
</tr>
<tr>
<td><strong>Operating temperature range</strong></td>
<td>IMx-16: −40 to +70 °C (−40 to +158 °F), IMx-16Plus: −40 to +65 °C (−40 to +149 °F)</td>
</tr>
<tr>
<td><strong>Storage temperature range</strong></td>
<td>−50 to +85 °C (−58 to +185 °F)</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>95% (relative) non-condensing</td>
</tr>
<tr>
<td><strong>Pollution degree</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Maximum altitude</strong></td>
<td>2 000 m (6 562 ft)</td>
</tr>
<tr>
<td><strong>Measurement category</strong></td>
<td>Cat II</td>
</tr>
<tr>
<td><strong>Vibration tolerance</strong></td>
<td>4 – 13.2 Hz 1 mm 13.2 – 100 Hz 0.7 g Number of axes: 3 mutually perpendicular</td>
</tr>
<tr>
<td><strong>Connectors</strong></td>
<td>Pluggable terminal block connectors The use of bootlace ferrules sized at 1.5 mm² / 16 AWG is recommended System specific connectors are used for LAN, USB and, where applicable, antenna connections</td>
</tr>
</tbody>
</table>
## Specifications cont.

### Measurement capabilities

#### Analogue channels
- **Frequency range**: DC to 40 kHz
- **Maximum sampling frequency**: 102.4 kHz
- **Crosstalk rejection**: -110 dB at 1 kHz
- **Vibration measurement accuracy**:
  - Amplitude: ±2% (up to 20 kHz), ±5% (20 to 40 kHz)
  - Phase: ±3° (up to 100 Hz)
- **Temperature measurement range**: –50 to +100 °C (–58 to +212 °F)
- **Temperature measurement accuracy**: ±4 °C (excluding cable influence)

#### Measurement types
- **Overall**: Acceleration, velocity, acceleration enveloping (gE*)
  - *SKF enveloping filters 1 to 4, for bearing damage detection*
- **Detection**: RMS, true peak and peak-peak
- **FFT resolution**: 100 to 6400 lines, integration/differentiation in the frequency domain
- **FFT window function**: Hanning
- **Time waveform (TWF)**: 256 to 16384 points (equivalent to FFT lines above)
- **Acquisition types**: Fixed frequency range or order tracking
- **Synchronous measurements**: Configurable across (up to) all 16-channels

#### Alarm capabilities
- **Overall value**: Warning and alarm (window), scalar or vector (circular, amplitude/phase)
- **Adaptive alarming**
- **Alarm group support**

#### Other measurement types
- **Modbus external channels**: 32 available
- **IMx derived points**: Calculated values based on measurement data

#### Digital channels
- **Frequency range**: From 0.016 Hz to 20 kHz (1 cpm – 1.2 Mcpm)
- **Speed accuracy**: 0.05% of measurement value (typically 0.01% up to 2.5 kHz)
- **Other capabilities**: Pulse counting
  - Configurable pulses per rev. The product of pulses per rev and rotational speed is subject to the maximum frequency range, limitation.

#### System interfaces
- **IMx-16Plus top connectors**: LTE antenna, LAN (Wi-Fi antenna and RJ45) and RS485 terminals
- **IMx-16 top connectors**: RJ45 connector and RS485 terminals
- **USB A dongle provides**: Bluetooth v4.0 Low Energy

#### Communication protocols
- **Modbus RTU, Modbus TCP/IP**
- **IEC 61850** (for communications networks in a sub-station environment)

#### Measurement data storage
- **Modes**: Data storage on time, associated measurement value or alarm condition
- **Data time stamping support**:
  - Internal clock calendar (backup power capacitor for about 1 week)
  - (S)NTP time synchronisation protocol
- **On-board/internal buffering**: 4 GB (non-volatile/Flash memory):
  - 1 GB for trend and dynamic data
  - 1 GB for event capture and run cycles
  - 2 GB reserved

#### Self-diagnostics
- **Built-in**: Automatic hardware monitoring and diagnosis (watchdog and self-testing)
- **Remote access**: Hardware, firmware identification and status information
### Software/database/app support

**Main software**  
SKF @ptitude Observer

**Software capabilities**  
Measurement configuration, data storage, assessment, analysis, reporting

**Automatic (IMx device) firmware update**

**Supporting software tool**  
SKF @ptitude Observer Online device configurator

**Tool capabilities**  
Network configuration

**Supporting software**  
SKF Multilog IMx Manager apps for iOS and Android

**App capabilities**  
Network configuration, Measurement configuration, SAT (Site Acceptance Test) and installation support, Firmware update, Report generation and data viewer, Set device time/date

### Data repositories

**Customer specific repository**  
Machine (asset) templates

**Network configurations**

**Firmware**

**Customer security/protection**  
IMx devices and repository users are associated only to specific companies  
Data is encrypted

### Certifications and approvals

**IMx-16 - all approvals are pending**

**CE directive**  
EMC Directive 2014/30/EU

**EMC Emissions**  
EN 61000-6-2:2005

**EMC Immunity**  
EN 61000-6-4:2007/A1:2011

**DNV GL Renewables**  
GL-IV-4:2013, Guidance for the Certification of Condition Monitoring Systems for Wind Turbines

**Marine type approvals**  
DNV GL

**Ordering information**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMON 4116</td>
<td>SKF Multilog IMx-16</td>
</tr>
<tr>
<td>CMON 4116-PLUS</td>
<td>SKF Multilog IMx-16Plus</td>
</tr>
<tr>
<td>CMON 4133</td>
<td>Mini USB cable (isolated) for all IMx-8 and IMx-16 variants</td>
</tr>
<tr>
<td>CMON 4134</td>
<td>SKF Bluetooth dongle for all IMx-8 and IMx-16 variants</td>
</tr>
<tr>
<td>CMON 4135</td>
<td>Set of double deck connectors and resistors for Modbus termination, 4–20 mA inputs and PT1000 inputs for all IMx-8 and IMx-16 variants*</td>
</tr>
<tr>
<td>CMON 4136</td>
<td>Analogue isolator module (4–20 mA to voltage) for all IMx-8 and IMx-16 variants</td>
</tr>
<tr>
<td>CMON 4137</td>
<td>DIN rail mounted power supply for all IMx-8 and IMx-16 variants</td>
</tr>
<tr>
<td>CMON 4139</td>
<td>External GPS module for all IMx-8/IMx-16 variants</td>
</tr>
<tr>
<td>CMON 4142</td>
<td>External antenna for SKF Multilog IMx-Rail/IMx-8Plus/IMx-16Plus</td>
</tr>
<tr>
<td>CMON 4144</td>
<td>Screw-in type connectors for any IMx-8 or IMx-16 variant</td>
</tr>
<tr>
<td>CMON 4145</td>
<td>Screwless plug-in type connectors for any IMx-8 or IMx-16 variant</td>
</tr>
<tr>
<td>CMON 4146</td>
<td>HMI Display for all IMx-8/IMx-16 variants</td>
</tr>
<tr>
<td>CMON 4150</td>
<td>IP65 cabinet with pre-drilled holes for any IMx-8 or IMx-16 variant</td>
</tr>
<tr>
<td>CMON 4151</td>
<td>IP65 cabinet without pre-drilled holes for any IMx-8 or IMx-16 variant</td>
</tr>
</tbody>
</table>

*PT1000 inputs are only supported by the IMx-16/IMx-16Plus and the associated resistors are required for a SAT test. This accessory kit provides load resistors for up to eight channels of 4–20 mA signals.

IMx variants included in the “any” or “all” descriptions above are the IMx-8, IMx-8Plus, IMx-16 and IMx-16Plus.