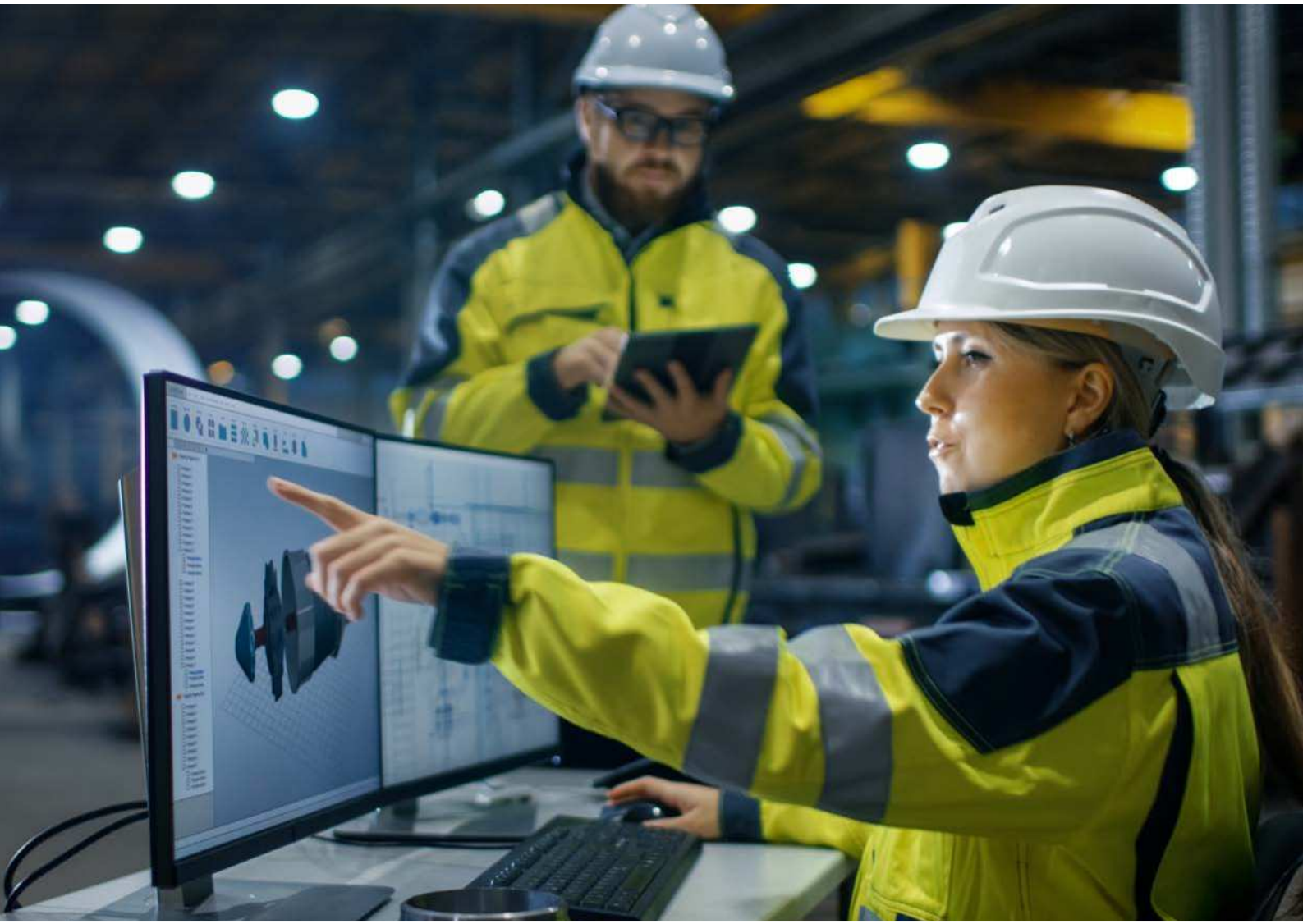
SKF @ptitude Observer



Overview

The combination of SKF @ptitude Observer software with data acquisition devices such as the SKF Microlog Analyzer dBX, SKF Multilog On-line System IMx-1, IMx-8, IMx-16Plus and IMx-Rail delivers a powerful and flexible condition monitoring solution across many industries, including the railways. The expert diagnostics and analyses provide unrivalled application insights to maximise rotating equipment performance (REP). This allows your business to be more agile, deliver greater output, optimise safety, reliability and sustainability.

The system design supports fast data storage across hundreds of monitored machines and allows an unlimited number of hierarchy levels. Process overviews and workspaces allow users to access the key information needed.

SKF @ptitude Observer provides wizards for users to quickly set up and maintain machine and measurement configurations. Setup functions that would once have required direct access to the data acquisition device can now be accomplished remotely, over TCP/IP.

For data analysis and diagnosis, a good understanding of the dynamics of the machine being monitored is necessary. With SKF @ptitude Observer's machine information database, each plant item is defined by its mechanical components. This allows all machine fault frequencies to be dynamically calculated by the system. The built-in bearing database is an important part of this functionality and information is available for thousands of bearing designations.

In addition to comprehensive plot, display and reporting functions, SKF @ptitude Observer facilitates data sharing by providing a Phoenix internal (self-hosting) web service. This can be used to retrieve data from the Observer database through a web service API.

In SKF @ptitude Observer, there are multiple alarm layers: primary measurement value alarms, secondary machine diagnostic alarms and since Observer 10.5, SKF Protean Diagnoses.

Protean Diagnoses are based on SKF proprietary technology and can be applied to data from the range of SKF online data acquisition devices. No user input is required to setup these diagnoses, all diagnostic rules have been evaluated and fine-tuned on millions of measurements across different industry segments. The built-in rules available to the user include common machine faults such as misalignment, looseness and bearing damage.

Condition monitoring displays

In addition to standard displays such as single Trend, Phase or amplitude Spectrum (FFT), Full Spectrum and Time Waveform, SKF @ptitude Observer has a variety of enhanc ed data plots to assist data analysis and interpretation. These plots provide tools for the analysis of live data, historical data or data captured during Run up / Coast down (transient) events. Combination plots (for example Diagnosis / Spectra / Time waveform) are also available.

History

A History display is used to visualise the variation in machine condition over time, to identify deteriorating condition. The History display supports amplitude spectrum, phase spectrum and time waveform or any combination of these.

Multi trend

Trend plots show not only the overall value but also important, related parameters such as speed, sensor BOV and band data. In a multi trend plot, measurement trends are overlaid and cursor values are displayed as bars, for easy comparison. A Trend List is a report format making this same data available in tabular form.

Bode (Trend)

Vibration amplitude or phase displayed as a function of time, speed or any available process parameter.

Orbit

Uses signals from two transducers at 90° (typically eddy current probes). Orbits can be constructed from the raw signal (true orbit) or from a signal filtered at shaft speed, higher harmonics or a user defined frequency range (filtered orbit).

Shaft centerline

By also using two eddy current transducers at 90°, the shaft radial position relative to the bearing cross-section is displayed. The shaft centerline display is a useful monitoring tool, at machine run-up.

Polar

A polar plot illustrates vibration phase and amplitude in a polar diagram. Alarms are circular and are therefore sensitive to changes in either phase or amplitude.

Power Cepstrum

Power Cepstrum plot is a useful tool designed to detect periodicity in a frequency spectrum. It is particularly effective for analyzing vibration patterns in machine failures, which have multiple harmonics of the fundamental frequency and/or sidebands present, such as in the analysis of gearbox faults.

3D plot

A 3D plot (or waterfall) displays frequency spectra against a z axis of speed, process data or time. Users can freely zoom, rotate, or elevate to change the view perspective.

Topology plot

A Topology plot can be likened to a 3D plot viewed from above, with the amplitudes colour coded to enable variations in machine behaviour to be easily identified.

Profile

The profile plot visualises a vibration time waveform referenced to one revolution of a rotating component. It is particularly useful for analysing data from rolls or felts whose surface condition is critical to their function.

Gear Inspector

Gear Inspector is for detection and visualisation of gear problems and uses colour to represent impact intensity, to assist identification of the location of gear damage.

Event and run cycle capture

Event capture is based around a long time waveform that holds the captured data, “pre and post” a specified event. In SKF Rail Track Monitoring run cycle capture is used to automatically gather track vibration data between stations.

Diagnosis

This uses automatic FFT analysis algorithms to eliminate the need for the user to manually analyse FFTs and includes standard rules for common machine faults, such as unbalance, misalignment, bearing faults etc. User defined diagnosis rules can also be easily implemented. SKF @ptitude Observer’s machine diagnostics feature is always active, constantly monitoring, detecting and displaying clear text alarms.

Protean

The SKF Protean diagnosis is a powerful tool which follows the progression of machine condition indicators. All condition indicators are generated by the algorithm with no input from the user. The alarm mechanism is intelligent and can notify the user when the condition of the machine has worsened. In addition, machine indicators will also identify (positive) changes in the machine, like a bearing replacement, and automatically adjust the indicators for a new baseline.

RFT

RFT graph provides a view of all narrow-band enveloping spectra at a glance, making it a valuable tool for quick equipment condition evaluation and in-depth analysis of potential faults (e.g., bearing or gear problems). It is also used to identify the best enveloping bands with the best ‘signal-to-noise’ aspects and to identify the most dominant modulations in different envelopment frequency ranges.

Scalable wireless condition monitoring of production equipment

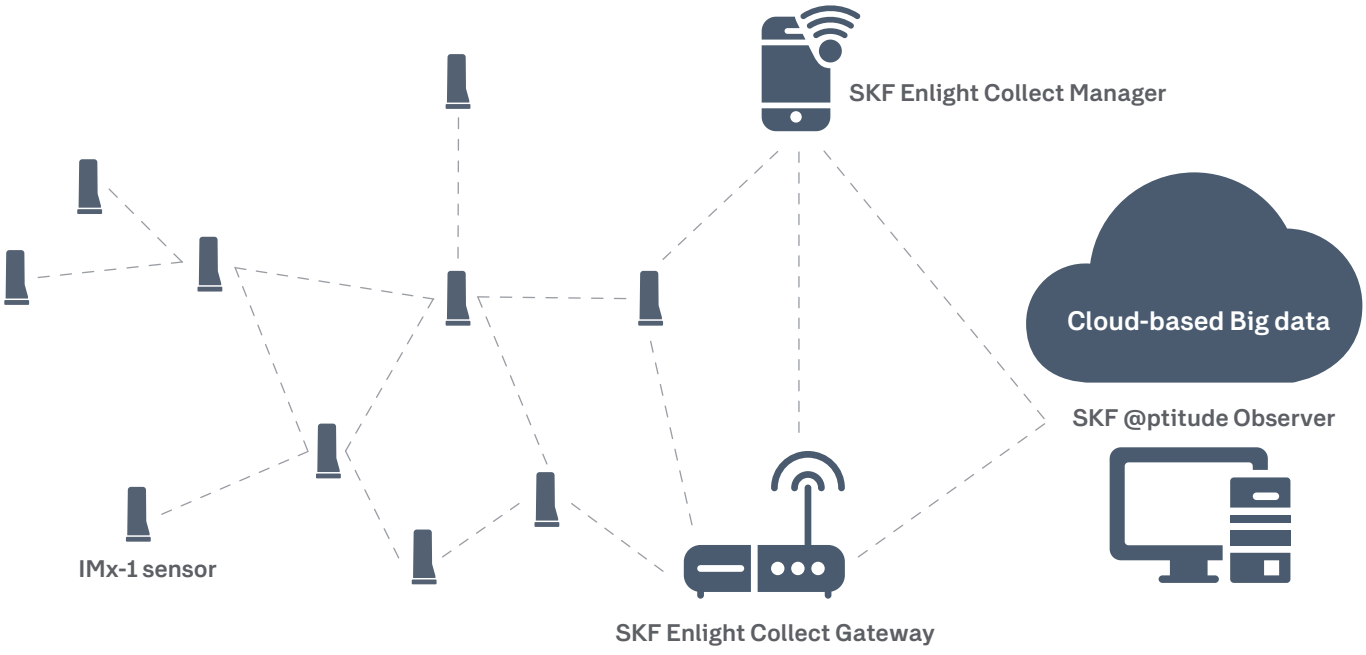
@ptitude Observer software hosting the wireless condition monitoring system IMx-1 creates a powerful and cost-effective tool for managing a wide network of wireless mesh sensors and provides data detection and processing of main issues on numerous machines.

The data collection is performed using a compact battery-driven sensor and presented to visualization and analysis software.

Observer manages all the machine health data and provides complete analytical capabilities turning the collected data into usable maintenance information as well as device management for the IMx-1 wireless system. Data acquisition using Enlight collect IMx-1 together with Observer can be carried in an on-premises software instance or in a cloud-hosted environment.

Some of the benefits of using the IMx-1 system include:

- Replacement of manual machinery health data collection and/or widening monitoring coverage
- Increase of the periodic monitoring coverage from months and weeks to days and hours
- Makes automated data collection easier and more affordable
- Data from machines in inaccessible locations or measurement points behind guarding
- Quick and scalable deployment
- Allows reduction of unplanned downtime by identifying and resolving problems before they result in costly machine failure

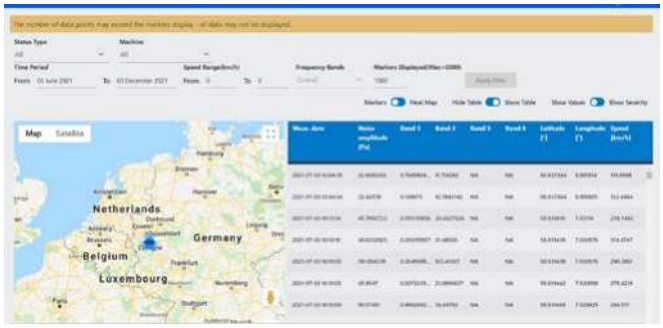


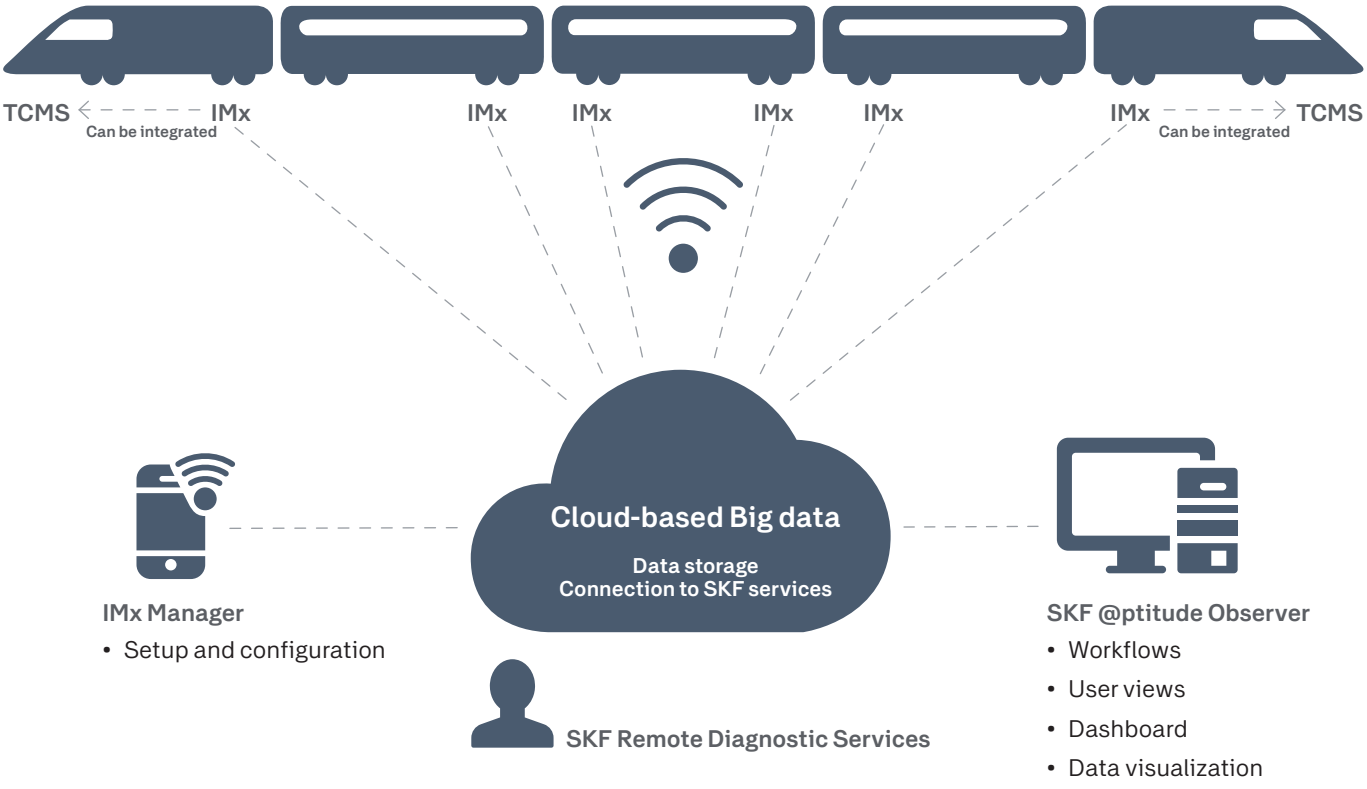
SKF Rail Track Monitoring

SKF Rail Track Monitoring uses data from train mounted SKF Multilog IMx-Rail hardware to monitor the rail condition. These devices support mobile data (LTE/GSM) or Ethernet (RJ45 or Wi-Fi) connectivity.

By specifying the infrastructure in terms of Regions, Lines, Stations, Bounds, Connections, Features and Routes etc., the data received from the IMx-Rail is automatically matched to specific rail sections before processing. An analyst can then access special displays to aid the assessment of track condition; Summary table, Acceleration and Speed Profile and Acceleration for Section graph, as well as the Spectrum (FFT) and Time Waveform for the “raw” data.

Using the Phoenix internal web service, a cloud based or local network hosted web app provides easily viewed status information for the rail infrastructure including Map of Lines, Station Dashboard and Exception reporting and processing.





Features and capabilities

Architecture

SKF @ptitude Observer is a TCP/IP based client / server application and is fully supported in Local Area Network (LAN), Wide Area Network (WAN), thin client (Terminal) environments and cloud computing.

SKF @ptitude Observer software works in conjunction with Microsoft SQL (Database) Server. When using a full version of that software, the database size is virtually unlimited.

All stored measurement data is date and time stamped and data storage parameters can be flexibly configured. This can be based on time, speed or process data variation, alarm status, trend variation or an event or exception occurring.

Cloud solution

SKF @ptidute Observer can be hosted on SKF cloud giving engineers the possibility for remote data access. The SKF cloud solution is cost-effective, reliable and provides secure communication.

Data sharing and integration

SKF @ptitude Observer can integrate to external/third party systems at many levels. In addition to the Phoenix internal (self-hosting) web service:

Using OPC UA, measurement data can be exchanged with an OPC UA server. This is fully bi-directional and capable of receiving complementary (typically process) data from, or providing trend data or alarm status to, external systems.

UFF file export, provides a means to exchange measurement data related to investigations of structural response and potential resonance conditions. By using the “Universal File Format”, data can be ported into software that can provide animations to support Operating Deflection Shape (ODS) analyses.

Calculated Machine Speed

Helps in vibration analysis of both fixed speed and variable speed machines in cases where a physical speed sensor or Modbus speed signal is unavailable in the data acquisition device. The Calculated Machine Speed is post-processed in Observer.

It uses data stored in dynamic database measurements (FFT spectrum) from SKF online systems IMx-S, IMx-8/16, IMx-1 or external sources of speed readings as input for speed extraction and association of speed with the asset’s dynamic vibration measurements. This function should be applied mainly for machines with low-speed deviations during the measurement data set to avoid inaccurate speed association.

Modbus connectivity

This can be used to import data from external systems or sensors and/or export IMx measurement data. SKF @ptitude Observer supports enhanced Multilog IMx Modbus communication capabilities including configuration of the IMx device as:

- a TCP or RTU master
- with the possibility of multiple Modbus instances
- as simultaneous RTU (slave) and TCP (master/slave)
- and with support for multiple slave devices

With Direct Modbus, TCP slave sensors can be added directly to an @ptitude observer system. Direct Modbus does not use any of IMx’s 32 external channel capabilities.

Operating conditions

Effective condition monitoring requires knowledge of operating parameters and conditions that may influence how data is interpreted or analysed.

SKF @ptitude Observer supports data tagging, in which a text string can be appended to measurements either via manual input or automatically through OPC UA.

Operating classes, (another SKF @ptitude Observer feature), are different operating conditions in which a machine normally operates. By using multiple gating measurement points, different alarm levels can be set depending on which operating class, it is detected, a machine is in. SKF @ptitude Observer supports two “active” operating classes (and effectively a third passive, “no operating class”).

Machine parts module

Create a model of a machine – an intuitive drag and drop design kinematics tool.

These models can include components, such as shafts, gearboxes, motors, pulleys, impellers, bearings etc.

Ingenuous and effective identification of which machine component is generating a particular anomaly.

The system can automatically calculate fault indicators of each part, or the user can simulate the machine’s fault frequencies.

Other features and capabilities

- Multiple language support
- Preferences for each individual user
- User rights management
- Pre-configured user roles
- Automatic e-mail or SMS generation
- Password encryption for database login
- TLS encryption for secure connectifity
- Each new session, starts from where that user's last session ended
- SKF @ptitude Observer Monitor, supervision
- On-line device supervision
- Automatic remote firmware upgrade of all on-line devices
- Sensor BOV (bias output voltage), monitoring
- Event logging
- Choice of English or metric units
- Wizards, to simplify routine tasks
- Auto-linking of displays and active hierarchy
- Linear or log amplitude scaling
- Orders, Hz or cpm, frequency scaling
- FFT post process (integration/differentiation)
- Support for derived points
- Multiple gating points (MGP)
- Run-out compensation
- Multi-plane balancing
- Baseline FFT storage
- Enveloping (gE)
- Plots can be used in Live mode
- Live update of process overviews (mimics)
- Advanced data gating
- Adaptive alarming
- Scalar and vector alarms (as appropriate)
- Alarms based on multiple measurements
- DiagX: the probability that particular machine parts are linked to a disturbance frequency

Hardware requirements

There are three basic scenarios to be considered:

Network configuration – Network Client

A computer running only the SKF @ptitude Observer client software.

Network configuration – Server

A computer running the Monitor service and hosting the Microsoft SQL Server database.

Stand-alone configuration

A single computer running the SKF @ptitude Observer client software, the Monitor service and hosting the SQL Server database.

Processor: For stand-alone and network client installations, a minimum of dual-core CPU with 2.5 GHz or higher.

For an SQL/network server, at least four-core CPU with 2.5 GHz or higher.

Note that the above recommendations are for a "dedicated PC". Simultaneously running other applications may degrade performance.

RAM: For stand-alone and network server configurations, a minimum of 8 GB, with more recommended.

For an SQL/network client, 4 GB or higher.

HDD free space: For stand-alone and network server configurations, a minimum of 1.2 GB for the software installation is required. Note that additional storage space for data is required.

For each network client, 1 GB or more is recommended, 0.5 GB minimum.

Other requirements: Stand-alone and network clients require a display with a minimum resolution of 1366 × 768 with 1920 × 1200 or larger recommended. Note that SKF @ptitude Observer is designed for a default Windows font size (smaller:100%). Using a larger font size may result in display anomalies in some interfaces/forms.

An effective backup system and procedure is highly recommended.

Software requirements

SKF @ptitude Observer client software and the Monitor service support all Windows versions from Windows 7, including server operating systems, and with each @ptitude Observer release, the aim is to support any newly introduced versions.

Whilst @ptitude Observer supports 32 and 64-bit operating systems, the Monitor service requires 64-bit. It is always recommended to install the latest available service packs.

Note that an admin-level account will be required to install the software and run the Monitor Manager tool.

For stand-alone and network server installations, Microsoft SQL server 2014, 2016, 2017, 2019 or 2022 is required. Microsoft SQL server software has its own operating system requirements, depending on the version.

SKF @ptitude Observer software, includes the following components:

- @ptitude Observer
- @ptitude Observer database administrator
- @ptitude Observer Monitor
- @ptitude Observer on-line device configurator
- @ptitude Observer Data Bridge

Online device compatibility

SKF @ptitude Observer software, works with all SKF Multilog On-line System IMx devices and MasCon 16 devices, except the IMx-M (version 10.5 and later).

Ordering information

Please contact your local SKF representative for ordering information and support for specific configurations, site licences and upgrades.

Your local SKF representative can also provide information on Product Support Plans (PSP), installation and training services.

Alternatively contact SKF at:
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