SKF Multilog On-line System IMx-T

Part No. 32096300
Revision F

User Manual

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Introduction

Important Messages and Requirements

The following messages are important information which require special care in order to have a safe and reliable IMx-T system.


Important messages, instructions and information in this manual must be carefully followed. Otherwise, harm might occur to equipment and/or personnel.


In order to ensure a safe system, installation, configuration and maintenance of the system must be done by trained personnel only.


IMx-T unit contains circuit boards that are static sensitive. Therefore, use appropriate precautions to prevent ElectroStatic Discharge (ESD) when handling circuit boards.


Different types of card must be positioned correctly in the rack. The positions of the different types of cards are shown in Front Panel with Labels within Drawings and Connections section.


In general, all signal cables must be routed as far away as possible from the high voltage cables.


It is recommended to always use high quality shielded cables and care must be taken to ensure shield is properly connected to eliminate interference and noise.


Grounding procedure must be handled with special care to prevent ground loops.

In general, it is recommended to connect shield to ground in only one side of the senor/signal cable to avoid ground loops to occur.


IMx-T must be connected to protective earth since surge suppressors are connected between network terminals and protective earth.


Make sure that protective earth is properly connected before connecting any of the input or output terminals of the unit.


IMx-T unit must be situated in a cabinet with a metal bottom or plastic bottom with flammability classification of at least V-1. The cabinet must fulfill at least IP 20.


All wires and cables connected to input and output terminals shall have a flammability rating VW-1, FT-1 or fulfill the requirements according to IEC 60332-1-2 or IEC 60332-2-2.


Because of the redundant power supply, both supply circuits must be disconnected before maintenance.

DIP switch settings must be handled with special care to prevent any damage to IMx-T unit:

- Do NOT change DIP switch settings while the IMx-T unit is powered-up, as this may cause damage and void warranty.
- Before powering up the IMx-T unit, make sure that DIP switch settings are properly set to match the recommendations for the connected sensors. Incorrect settings may cause permanent damage to the IMx-T unit.

IMx-T is a Class A equipment intended for use in an industrial environment.

System Overview

IMx-T is a part of the SKF Multilog On-line System product range. IMx-T is the next generation of powerful, cost-effective solutions for a variety of condition monitoring applications.

In conjunction with SKF @ptitude Observer or Analyst software, Multilog IMx-T provides a complete system for early fault detection and prevention, automatic advice for correcting existing or impending conditions and advanced condition-based maintenance to improve machine reliability, availability and performance.

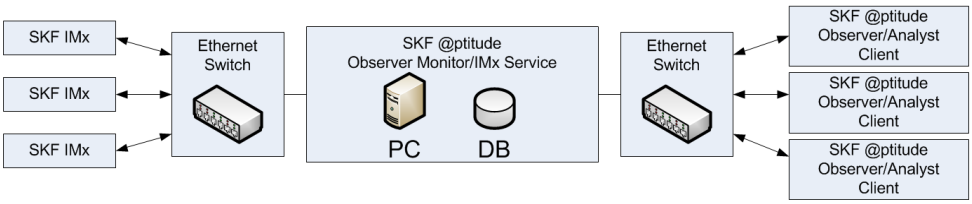


Figure 1-1: System overview, IMx-T with @ptitude Observer/Analyst

The picture above illustrates how IMx-T units are linked together in a network that is connected via a LAN (it can also be a modem or GPRS router) to a @ptitude Observer Monitor or Analyst IMx Service. The @ptitude Observer Monitor or Analyst IMx Service in turn can be connected to e.g. a LAN network making it possible for several of @ptitude Observer or Analyst clients to link to this network.

@ptitude Observer or Analyst clients can also be installed on the same computer as @ptitude Observer Monitor or Analyst IMx Service login software. Through a general interface, also known as ODBC (open database connectivity), it is possible to link @ptitude Observer Monitor or Analyst IMx Service login computer to an existing database for an existing control or processing system, if desired. The @ptitude Observer Monitor or Analyst IMx Service, @ptitude Observer or Analyst clients and the database can be separated from each other as long as they are on the same network where ODBC calls can travel freely.

It is also possible to connect different types of on-line units in the same network, for example, IMx-T together with IMx-S and/or MasCon systems.

IMx-T Unit

Figure 1-2: SKF Multilog On-line System IMx-T

The above picture shows a SKF Multilog On-line System IMx-T with two redundant power supplies and two CPU/IO pair cards mounted.

Designed to fit into a 19" rack enclosure, a Multilog IMx-T is equipped with the following components:

Power supply units

- Two redundant power supply units

CPU/IO pairs

- Up to four pairs of CPU/IO cards
- Analogue channels

  16 to 64 analogue signal inputs.

  The dynamic signal inputs are configurable for a side variety of sensors. Signals, such as acceleration, velocity and displacement or other parameters are easily adopted. Each input can be configured for standard accelerometers, 4–20 mA or ±25 V.

  Several measurement points may be attached to one channel and both AC and DC measurements can be measured on the same channel
- Digital channels

  8 to 32 digital channels which may be used for measuring speed, trigger or digital status e.g. indicating when a measurement can take place.

Storage Capacity

Each IMx-T unit has 8 MB flash memory used for the following:

- 2 MB for firmware, configuration files, etc.
- 2 MB for trend value buffer
  - ✓ About 13 000 vibration trend values can be buffered
  - ✓ Speed and process data use half the space of vibration
- 4 MB for spectra and time signal buffer
  - ✓ About 250 spectra using 1 600 lines with phase and time signal can be buffered

- ✓ If you use more lines, the number of spectrum is reduced.
- ✓ If you use less lines, the number of spectrum is increased

- When the buffer gets full, the oldest data is thrown away.

IMx-T's Unique Features

- Individual conditions for alert and danger may be set for each measurement point.
- Each channel has indicators for alert and danger. Alert and danger levels may be controlled by machine speed or load. However, it is also possible to manually bypass the alert and danger functionality.
- The unit's unique built-in hardware auto-diagnosis system continuously checks all sensors, cabling and electronics for any faults, signal interruption, short circuits or power failure.

Initiating IMx-T

Initiating an IMx-T is simple to carry out.

- This is done through an initiating program, @ptitude Observer or Analyst software, and a (portable) computer using RS232 serial interface.
- All initial network configuration parameters, such as IP address, IMx identification number, etc. are stored first in a separate configuration file, then transferred to the IMx-T memory.
- The configuration is retained in the event of power losses, so that the IMx-T can start automatically when power returns.

LED Indicators

Power Supply

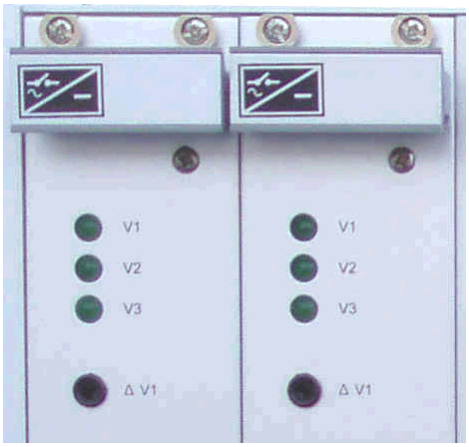


Figure 1-3: Power supply LED indicators

Green LEDs **V1**, **V2** and **V3** of each slot indicate the power presence.

LED Indicator	Behaviour	Description
V1	On	+5 V power Ok
V2	On	+12 V power Ok
V3	On	-12 V power Ok
Δ V1	On	5 V adjustment

Table 1-1: Power supply LED indicators

Important - Because of the nature of the redundant power supply system, it is normal to have only one side of power indicator (V1) on. However, if you have any concerns about the power presence indicator, contact the SKF IMx-T team or personnel from SKF Condition Monitoring Center Luleå.

CPU Card

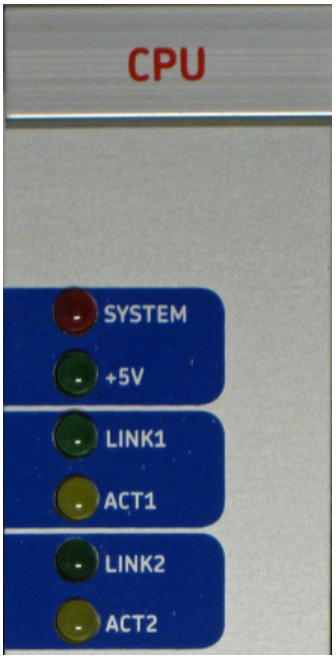


Figure 1-4: CPU card LED indicators

LED Indicator	Behaviour	Description
SYSTEM	Red on	Internal system error
+5V	Green on	Power is Ok
LINK1, LINK2	Green on	Ethernet link connected
ACT1, ACT2	Yellow flash	Traffic on the network

Table 1-2: CPU card LED indicators

2
Installation

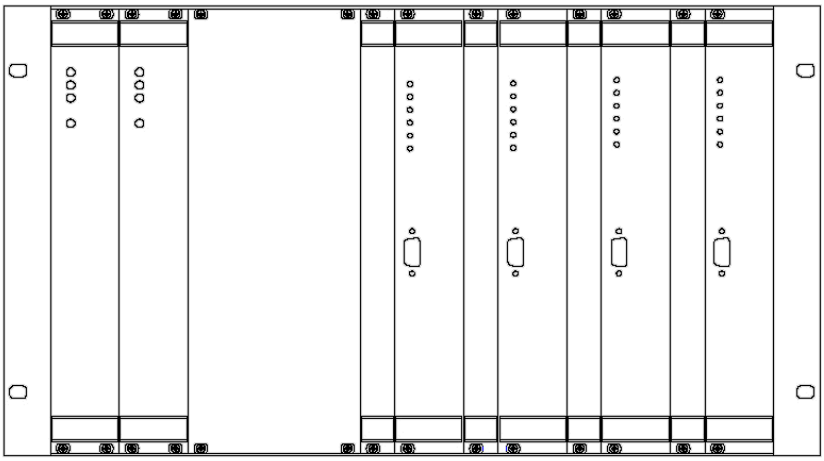


Figure 2-5: Mx-T front view

The installation of an IMx-T must be carried out according to the instructions and advice given in this manual. Any deviation from these directions can be made only after consulting with the SKF Condition Monitoring Center Luleå. Installation errors can lead to a situation where the system does not work as intended and machinery faults go undetected. Therefore, contact the IMx-T application engineer at the slightest doubt during the installation.

Important - Installation errors which require the involvement of SKF Condition Monitoring Center Luleå personnel in order to rectify the start-up of the system, might be debited.

Important - In order to ensure a safe system, installation, configuration and maintenance of the system must be done by trained personnel only.

Scenario

It is important to assess and evaluate the current site where the system is to be installed.

Before getting started, draw a plan on a piece of paper how you would like this installation to look like after it is completed, then consider if it is possible to achieve.

The following diagrams are examples of general installation overview of scalable plant wide solutions for machinery monitoring, one for non-hazardous area and the other for hazardous area.

Scalable plant wide solution for machinery monitoring - An example of typical non-hazardous area installation

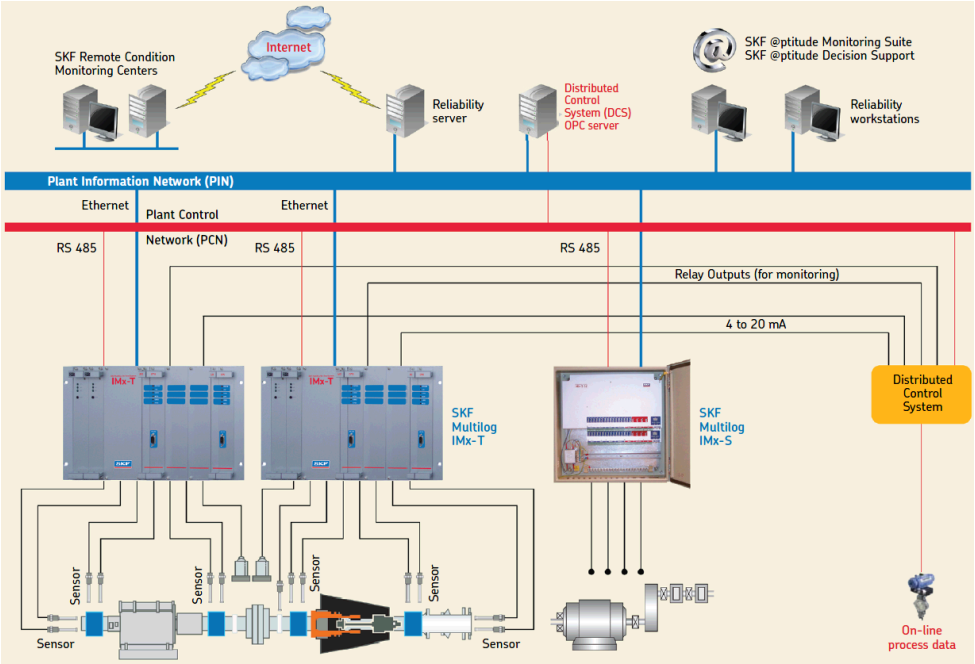


Figure 2-6: Example of typical non-hazardous area installation

Scalable plant wide solution for machinery monitoring - An example of typical hazardous area installation

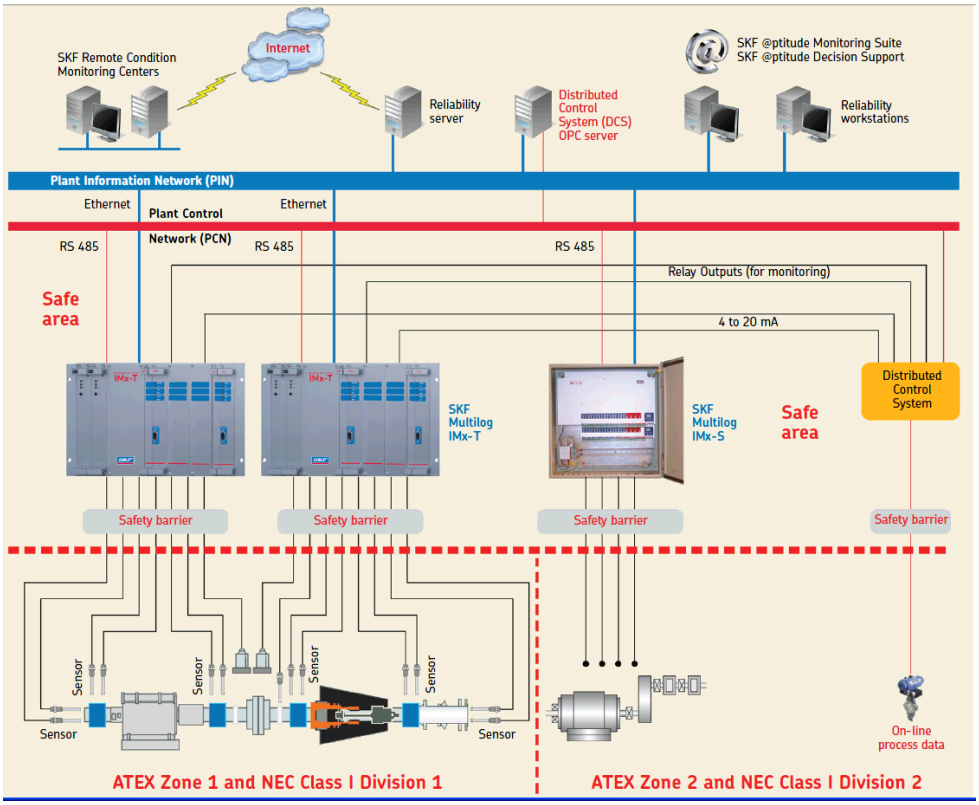


Figure 2-7: Example of typical hazardous area installation

Among other things, consider lengths of cables, where electrical power to the IMx-T units can be connected, where should @ptitude Observer Monitor or Analyst IMx Service be installed and positioned and who should analyse the data measured. Good and thorough planning is the basis for a successful solution and installation.

Make a detailed layout of the equipment, the network, and distances between components. Include specifically the IMx-T units, the @ptitude Observer Monitor or Analyst IMx Service computer, the database server computer and all hubs/routers in the network. Specify network configuration of each components, such as IP addresses and subnet masks. SKF application engineers and service engineers need these information in order to assist.

Note that a CAT5/6 twisted pair (TP) Ethernet cable has maximum working distance of 100 m. If longer cable lengths are needed, fibre optic cables may be used along with needed converters such as converters for fibre optic to CAT5/6 (TP) Ethernet and vice versa.

When GPRS is used, the GPRS routers should be reconfigured as a part of the application to run a lifeline connection with the @ptitude Observer Monitor or Analyst IMx Service computer.

Warning - Failure of this communication path will force the GPRS router to reboot itself constantly, and can hamper the success of the application. This is especially valuable to consider when the GPRS forms a part of the customers internal IP network (VPN). In such case, SKF must be informed of this before ordering the GPRS, so that SKF can disable the lifeline functionality of the GPRS router.

Unit / Cabinet


IMx-T unit contains circuit boards that are static sensitive. Therefore, use appropriate precautions to prevent ElectroStatic Discharge (ESD) when handling circuit boards.

The following are some of the ways to prevent ESD:

- Use an ESD wrist strap when handling circuit boards
- Use a grounding mat when handling circuit boards
- Use correct packaging materials such as antistatic bags when transferring circuit boards

The IMx-T unit should be mounted inside a cabinet at a location where it is not exposed to unnecessary radiant heat or strong magnetic fields.

Mount the IMx-T unit and make sure that it is firmly attached.

The ambient temperature is found in Environmental within Technical Data.

Important - IMx-T unit contains circuit boards that are static sensitive. Therefore, use appropriate precautions to prevent ESD when handling circuit boards.

Important - Different types of card must be positioned correctly in the rack. The positions of the different types of cards are shown in Front Panel with Labels in Drawings and Connections chapter.

Important - IMx-T unit must be situated in a cabinet with a metal bottom or plastic bottom with flammability classification of at least V-1. The cabinet must fulfill at least IP 20.

Electrical Interface

Important - All wires and cables connected to input and output terminals shall have a flammability rating VW-1, FT-1 or fulfill the requirements according to IEC 60332-1-2 or IEC 60332-2-2.

Sensor Cables

When routing a sensor cable, it is important that the cable is firmly fixed. The cable may never be allowed to vibrate or oscillate, since this effects the capacitance of the cable, and thereby the measurement result.

The sensor cable may not be routed or bundled together with supply cables since doing so can generate strong magnetic fields.

To connect IMx-T to sensors, the following cable type is recommended:

- Shielded, twisted pair $2 \times 2 \times 0{,}5$ mm^2 (FKAR-PG $2 \times 2 \times 0{,}50$ mm^2, DUE 4002 or corresponding)
- Cable type shall have a flammability rating VW-1, FT-1 or fulfill the requirements according to IEC 60332-1-2 or IEC 60332-2-2.

Important - In general, all sensor cables must be routed as far away as possible from the high voltage cables. If this cannot be done, care should be taken to use high quality shielded cables.

Important - Grounding procedure must be handled with special care to prevent ground loops. In general, it is recommended to connect shield to ground in only one side of the senor/signal cable to avoid ground loops to occur.

Signal Isolation

Electrical isolated parts, differential inputs:

- Analogue inputs are differential inputs and support common mode up to ±25 V relative to IGND.

Mains Power

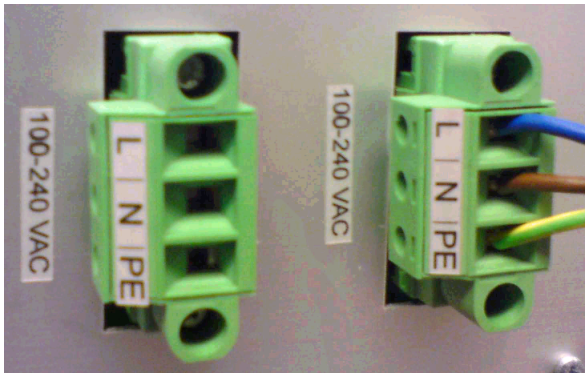


Figure 2-8: Power connection inlets, one for each redundant power supply

An IMx-T unit has two power connectors available, one for each redundant power supply unit. Each power supply unit is independently capable of supplying power for entire monitor system including sensors.

The unit is grounded through the protective earth lead of the power cable. Therefore, it is important to make sure that the earth terminal of the power cable is properly connected to the protective earth lead before connecting any of the input or output terminals of the unit.

Surge suppressors are connected between network terminals and protective earth. Therefore, equipment must be connected to an earthed mains socket-outlet.

In order to attach power cable to the mains power grid, follow the direction below.

Figure 2-9: Power cable connection

1. First connect the (green-yellow) protective earth wire to the PE terminal.
2. Connect the (blue) neutral wire to the N terminal.
3. Connect the (brown or black) live wire to the L terminal.

Refer to Power Supply in Technical Data section for power requirements.

Important - In some countries, you have to be certified in order to connect IMx-T to the power grid.

Important - IMx-T Mains Power Connectors must not be used as a mains power disconnect device.

Important - Make sure that the power is turned off, before touching the power cable. Touching the leads of a powered cable can cause serious injuries.

Important - For permanently connected IMx-T an external all pole power switch must be installed in order to be able to disconnect the IMx-T from the mains power grid. The switch must be labeled "IMx-T" or similar. On/Off position must be clearly marked. The switch must be located close to the IMx-T, within operator's easy reach. If two switches are used, one for each power supply unit, they must be placed close to each other.

Important - Since the unit is grounded through the protective earth lead of the power cable, make sure that the earth terminal of the power cable is properly connected to the protective earth lead before connecting any of the input or output terminals of the unit.

Important - All wires and cables connected to input and output terminals shall have a flammability rating VW-1, FT-1 or fulfill the requirements according to IEC 60332-1-2 or IEC 60332-2-2.

Important - Because of the redundant power supply, all supply circuits must be disconnected before maintenance.

Power Fuses

The power fuse is slow blow 4.0 A (4.0 AT 250 V, 5 X 20 mm).

Supply Cable

To connect IMx-T to the main power grid (110 V AC or 220 V AC), use the following:

- FKLK 3 × 1,5 mm^2 (*16 AWG*) or EKLK 3 × 1,5 mm^2 (*16 AWG*) or corresponding, with minimum voltage requirement 300 V and minimum temperature –40 °C.
- Cable type shall have a flammability rating VW-1, FT-1 or fulfill the requirements according to IEC 60332-1-2 or IEC 60332-2-2.

It is required that the IMx-T must be connected to protective ground/earth (PE). Refer to Mains Power for attaching power cable to the mains power/power grid.

Important - The cross section area of the PE wire must be equal or greater than the cross section area of the power wires. The PE wire should be color labeled green/yellow. However, in some countries, other cable requirements may apply.

Sensor Power Output

Each channel, both analog and digital, has built-in individual 24 V (22–26 V) sensor power supply.

The maximum current output is 30 mA per channel.

Communication Cable

For lengths up to 15 metres, it is recommended to use pre-fabricated Ethernet twisted pair cable FTP type, CAT5/6.

For longer cable lengths, it is recommended to use S-FTP (screened shielded twisted pair) Ethernet cable CAT5/6.

Note that a CAT5/6 twisted pair (TP) Ethernet cable has maximum working distance of 100 m. If longer cable lengths are needed, fibre optic cables may be used along with needed converters such as converters for fibre optic to CAT5 Ethernet and vice versa.

Data Communication

IMx-T unit communications are compliant with the Ethernet standard 10/100 Mbit (half- and full-duplex).

IMx-T has two Ethernet ports which work like an internal network switch.

Ethernet Cable

The Ethernet TP cable on the IMx-T is connected at one of the standard Ethernet RJ45 connectors, labeled J1 and J2.

Both Ethernet ports have auto detection of crossover or straight through Ethernet cable connection. Basically, IMx-T has a built-in Ethernet switch.

It is possible to connect IMx-T in a daisy chain up to 8 units in a single cable layout.

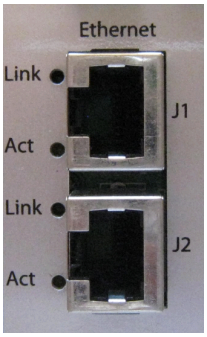


Figure 2-10: IMx-T Ethernet ports

J1	RJ45 Ethernet 1
J2	RJ45 Ethernet 2

Table 2-3: IMx-T Ethernet connectors

There are two LEDs on a RJ45 connector.

- Yellow LED is the Ethernet traffic indicator which flickers whenever there is traffic on the network.
- Green LED is the Ethernet link indicator which lights up when the system is correctly connected to another network device.

3
Unit Configuration

Mount the IMx-T unit and make sure that it is firmly attached. The IMx-T unit should be mounted inside a cabinet at a location where it is not exposed to unnecessary radiant heat or strong magnetic fields.

The ambient temperature is found in Environmental under Technical Data.

In general, when referring to DIP switch settings 0 means Off and 1 means On.

DIP Switch Setting	Definition
0	OFF
1	ON

Table 3-4: DIP switch setting definition

Analogue Inputs

There are three positions (P, A, B) available for each analogue sensor (Ch1 to Ch16) for connecting sensor cables to the IMx-T. However, depending on the sensor type, two or three positions are used. The terminal list is found in Terminal List under Summary chapter.

Important - Do NOT change DIP switch settings while the IMx-T unit is powered-up, as this may cause damage and void warranty.

Important - Before powering up the IMx-T unit, make sure that DIP switch settings are properly set to match the recommendations for the connected sensors. Incorrect settings may cause permanent damage to the IMx-T unit.

The DIP switch settings for analogue sensors must be applied according to the table below. The DIP switches are labeled as ANA1 to ANA16 on the IMx-T I/O board.

Signal	**Terminal**		**DIP switch settings for analogue sensor 1 to 16 (ANA1 to ANA16) Position: 123456**
Standard accelerometer (ICP)	N.C. + Signal/Pwr Com.	P A B	100110
Voltage source	N.C. + Signal Com.	P A B	000000
4–20 mA source	N.C. + Signal – Signal	P A B	000001
B-Sensor (4–20 mA output)	+24 V Signal Com.	P A B	100101
Eddy probe (–24 V)	–24 V Signal Com.	P A B	011000
Voltage powered sensor	+24 V Signal Com.	P A B	100100
4–20 mA (IMx powered)	+ Signal – Signal N.C.	P A B	100101

Table 3-5: Analogue sensor terminal positions and DIP switch settings

N.C. = Not Connected

Digital Inputs

Digital inputs (D1 to D8) terminal list is found in Terminal List under Summary chapter.

Digital inputs 1 to 4 (D1 to D4) are configurable via DIP switch settings. The DIP switches are labeled as DIG1 to DIG4 on the IMx-T I/O board.

Important - Do NOT change DIP switch settings while the IMx-T unit is powered-up, as this may cause damage and void warranty.

Important - Before powering up the IMx-T unit, make sure that DIP switch settings are properly set to match the recommendations for the connected sensors. Incorrect settings may cause permanent damage to the IMx-T unit.

The DIP switch settings for digital sensors must be applied according to the table below.

Signal	Terminal		DIP switch settings for digital sensors 1 to 4 (DIG1 to DIG4)
Tacho 2-wire (24 V internally powered)	+ – N.C.	A B 0	1010
Tacho 3-wire NPN (24 V internally powered)	Brown (+24 V) Black (Signal) Blue (0 V)	A B 0	0100
Tacho 3-wire PNP (24 V internally powered)	Brown (+24 V) Black (Signal) Blue (0 V)	A B 0	1010
Pulse 12–24 V (external power)	+ – N.C.	A B 0	0100
Pulse TTL (external power)	N.C. + -	A B 0	1010

Table 3-6: Digital sensors terminal positions and DIP switch settings
N.C. = Not Connected

Digital inputs 5 to 8 (Dig5 to Dig8) are non-configurable and sensor power is from external source.

They are only used for externally powered signals with signal level of 12 to 24 V, square wave signal.

Signal	Terminal	
Pulse 12–24 V (external power)	+ –	A B

Table 3-7: Digital inputs 5 to 8 terminal list

4-20 mA Output

IMx-T has 16 outputs available for 4–20 mA outputs which are configurable by the @ptitude Observer software. This connection is used for sending any measurement value from IMx-T to the Distributed Control System (DCS).

- Any measurement point can be configured to a 4–20 mA output.
- If a vibration measurement point is configured to a 4–20 mA output, the overall will be sent.
- The configuration of 4–20 mA output is done by @ptitude Observer software through MasCon/IMx units interface which is a part of On-line menu item.
- Note that in order to configure 4–20 mA output(s), the selected channel must have measurement point(s) already created.

The following is an example of how to set up 4–20 mA output in Observer 8.3 or later.

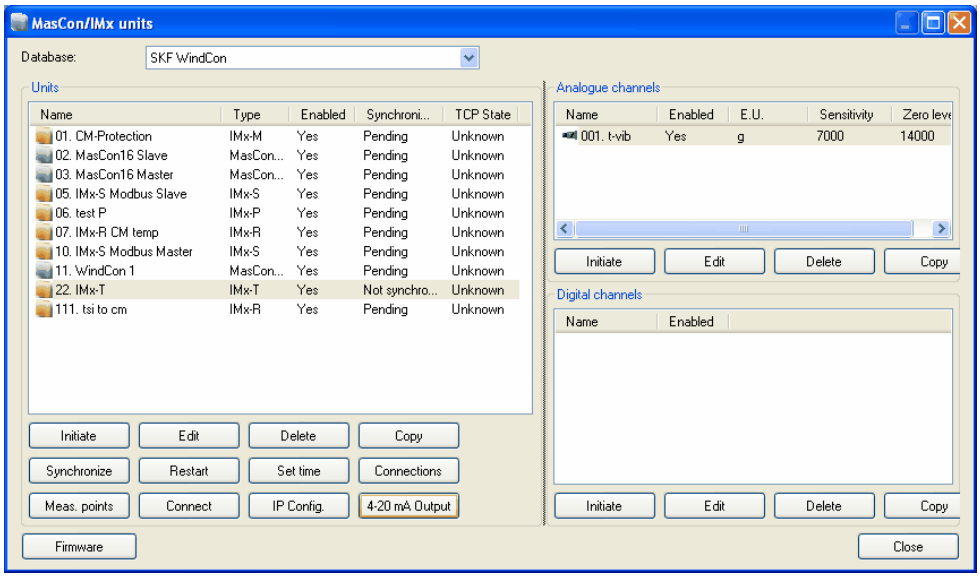


Figure 3-11: Observer On-line MasCon/IMx units interface

1. Through Observer, at MasCon/IMx units interface under On-line menu select an IMx-T unit then click on **4-20 mA Output**.

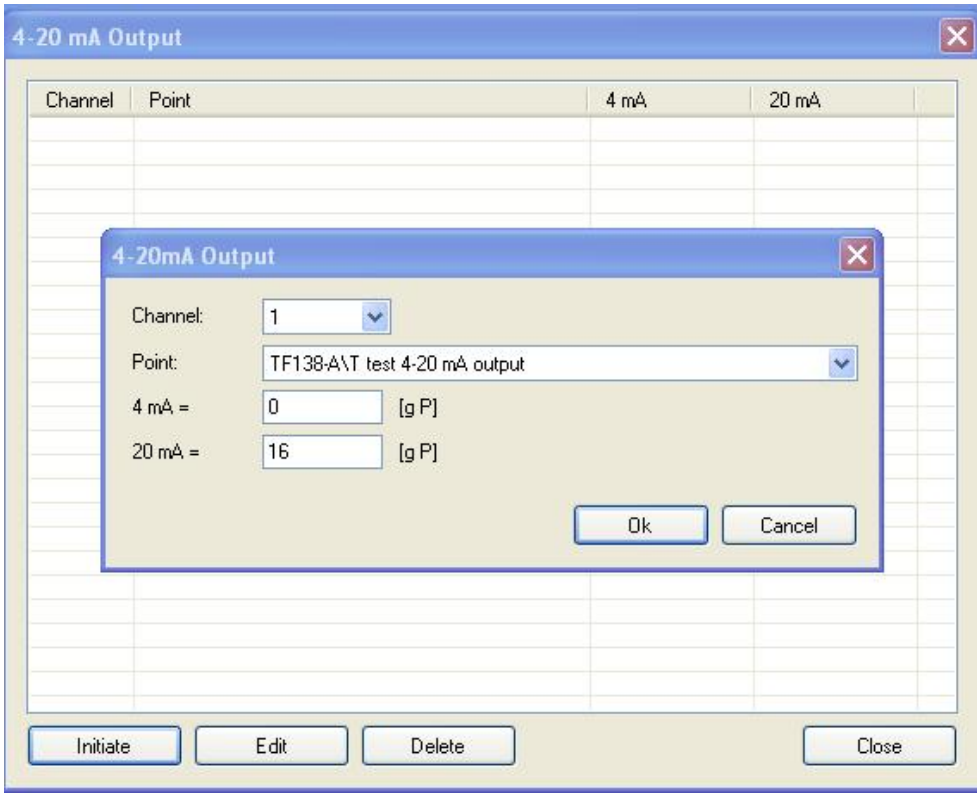


Figure 3-12: Observer On-line interface

2. At 4-20 mA Output screen click on **Initiate** or **Edit** an existing 4-20 mA Output channel in order to configure.

   Note that the channel you select at this screen has to have measurement point(s) already created.

   The 4-20 mA clipping limits are 3,8 mA and 20,2 mA.

   Minimum and maximum scale values are configurable.

   In this example, the minimum is set to 0 and the maximum is set to 16. Which means that;

   0 measurement point value will be 4 mA
   5 measurement point value will be 9 mA
   16 measurement point value will be 20 mA

   Note that if the measurement point is a vibration, the actual vibration value will be according to the overall from trend.

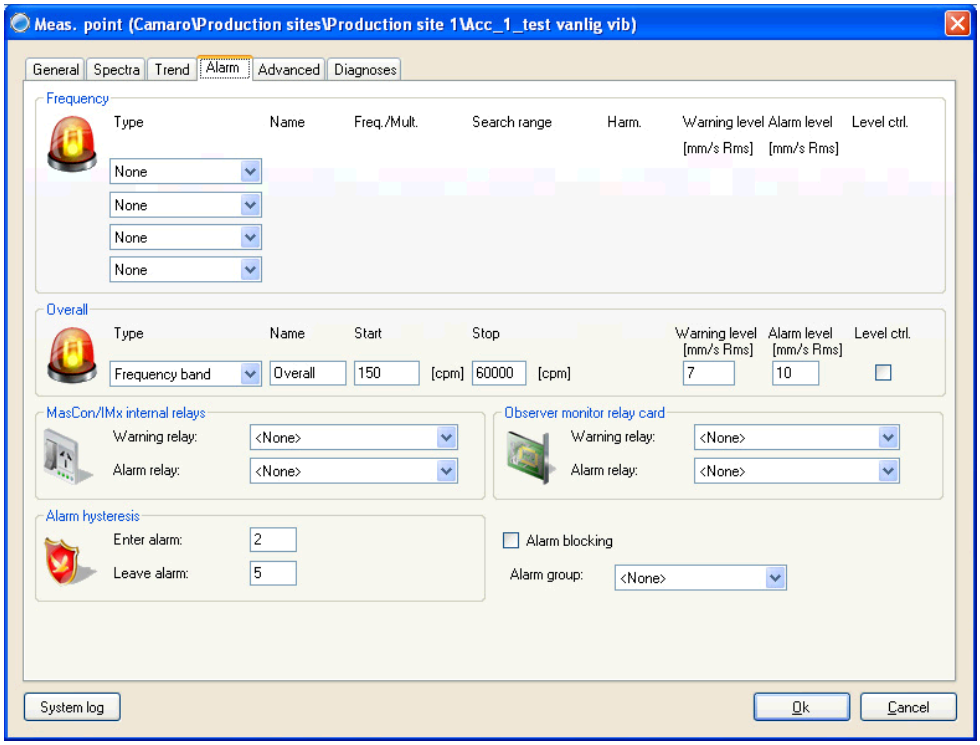


Figure 3-13: Example of Overall in Alarm setting for vibration measurement point

The **Overall** in alarm setting controls the vibration to be present at the 4–20 mA output.

- **Type** must be set to frequency band or time waveform.

The following table shows the pinout of 4-20 mA 37-Pin D-sub on the IMx-T unit along with the corresponding 4–20 mA out channels.

Pin	4–20mA out channel	Pin	4–20mA out channel
1	Ch1+ 4–20mA	20	Ch1- 4–20mA
2	Ch2+ 4–20mA	21	Ch2- 4–20mA
3	Ch3+ 4–20mA	22	Ch3- 4–20mA
4	Ch4+ 4–20mA	23	Ch4- 4–20mA
5	Ch5+ 4–20mA	24	Ch5- 4–20mA
6	Ch6+ 4–20mA	25	Ch6- 4–20mA
7	Ch7+ 4–20mA	26	Ch7- 4–20mA
8	Ch8+ 4–20mA	27	Ch8- 4–20mA
9	Ch9+ 4–20mA	28	Ch9- 4–20mA
10	Ch10+ 4–20mA	29	Ch10- 4–20mA
11	Ch11+ 4–20mA	30	Ch11- 4–20mA
12	Ch12+ 4–20mA	31	Ch12- 4–20mA
13	Ch13+ 4–20mA	32	Ch13- 4–20mA
14	Ch14+ 4–20mA	33	Ch14- 4–20mA
15	Ch15+ 4–20mA	34	Ch15- 4–20mA
16	Ch16+ 4–20mA	35	Ch16- 4–20mA
17	GND	36	GND
18	GND	37	GND
19	GND	-	-

Table 3-8: Pinout of 4-20 mA 37-Pin D-sub

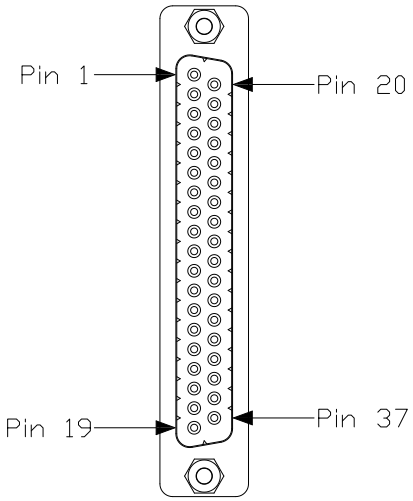


Figure 3-14: Pin numbers for 4-20 mA 37-Pin D-sub (female)

Relay Drivers

The IMx-T has four relay driver outputs (Re 1B to 4B) and a system relay output (Re 5B).

Re 1A Re 1B	Re 4A Re 4B
Re 2A Re 2B	Re 5A Re 5B
Re 3A Re 3B	GND GND

Table 3-9: Relay drivers terminal list

Four relay driver outputs, Re 1B to Re 4B can be connected to relays as shown in the figure below.

Figure 3-15: Relay driver connection of one output

Note that terminals Re 1A to 4A always have the voltage +12 V, whereas terminals Re 1B to 4B are low side drivers known as open collectors.

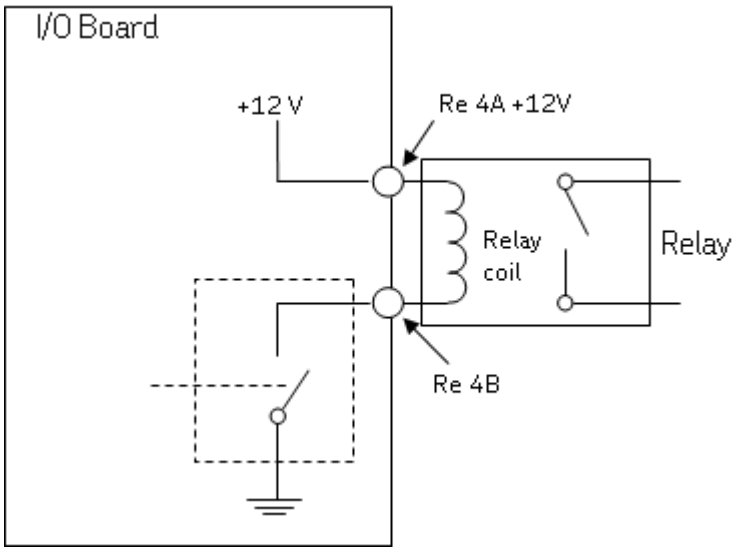


Figure 3-16: Relay open collector driver showing alarm inactive

System Relay Output

The relay output, Re 5B is a system relay out used as an external system indicator.

This is a system fault relay that is hardware controlled by watchdog and cannot be configured.

The system relay output is always activated when system is Ok.

Important - Total coil current for all five connected relays (four relay driver outputs Re 1B to Re 4B and the system relay out Re 5B) should not exceed 300 mA.

Network Configuration

All IMx-T units must have an identity number between 1 and 255, unique to the database to which it is connected. It also requires network settings and the IP number and port number of the @ptitude Observer Monitor or Analyst IMx Service to which it should be connected.

Keep in mind that most of the time, all IMx-T units are on the same network and database, therefore units can NOT have the same IP address or the same unit ID.

The network configuration is done through;

- For Observer clients, On-line Device Configurator under SKF @ptitude Monitoring Suite. For detailed information, refer to @ptitude Observer On-line Device Configurator User Manual.
- For Analyst clients, Multilog IMx Configurator in Admin Tools under SKF @ptitude Monitoring Suite.

There are two ways to configure a network and ID configuration:

- by **Software**: is configured by the software via On-line Device Configurator or Multilog IMx Configurator.
- by **Hardware Switches**: is done by configuring HEX rotary switch manually.

by Hardware Switches

If you have decided to configure the network manually by hardware, the following logic must be fulfilled.

- The factory default configuration TCP/IP address is 10.0.0.1XY
- The network configuration requires you to set the first three part of the IP address at Create IMx/MasCon16 Config screen of On-line Device Configurator or Multilog IMx Configurator.
- However, the last part of the IP address will be controlled by the HEX rotary switch on the IMx-T unit. For example, 10.0.0.1XY, where XY will be derived from the HEX rotary switch.

HEX rotary switch HEX1 (x1)	**TCP/IP address/Unit ID of CPU/IO pair slot**			
	Slot 1	Slot 2	Slot 3	Slot 4
0	Software defined	Software defined	Software defined	Software defined
1	01	02	03	04
2	05	06	07	08
3	09	10	11	12
↓	↓	↓	↓	↓
9	33	34	35	36
Factory default configuration TCP/IP address: 10.0.0.1XY				

Table 3-10: TP/IP address/Unit ID when configured by HEX rotary switch

- These last two digits will also form the unit ID.
- The HEX rotary switch setting is manually adjusted.

- The HEX rotary switch for IMx-T is located inside, back of the right-most panel (looking at the rack from the front panel).
- In order to get to the HEX rotary switch, first turn off the power, then take out the right-most panel.

Serial Configuration Interface (RS232)

RS232 interface is used only when the required basic network configuration setup is being done.

Use a serial null modem cable with a 9-pin D-SUB connector. It is recommended to use a short length cable for RS232 interface in order to maintain full communication speed.

RS232 interface connector is located on the front panel of each CPU card.

Important - RS232 connector is used only when the required basic network configuration setup is being done. Therefore, the cable should not be connected to RS232 connector at any other time.

RS232 Connector Pinout	
Pin	**Description**
1	N.C.
2	Rx
3	Tx
4	N.C.
5	GND
6	N.C.
7	N.C.
8	N.C.
9	N.C.

Table 3-11: RS232 connector pinout

N.C. = Not Connected

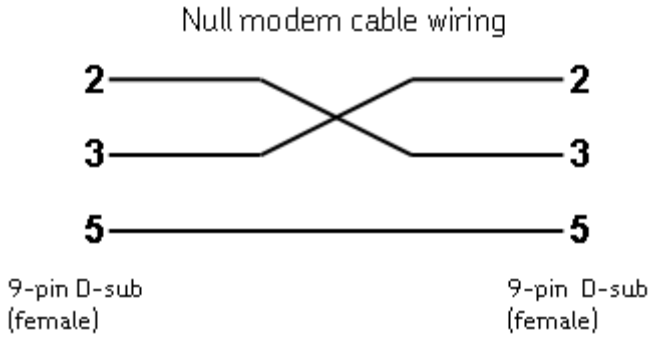


Figure 3-17: Null modem cable wiring

IMx-T Time

IMx-T has a backup power capacitor which keeps the time for at least a month if IMx-T was disconnected from a power inlet.

To correct or set IMx-T time, use one of the following methods.

- **Automatic time synchronization**

  This method is preferable since IMx-T will continuously synchronize the time with the computer that has @ptitude Observer Monitor or Analyst IMx Service running.

  In order to synchronize time IMx-T uses NTP protocol which resides in Windows as a built-in function for NTP time synchronization.

  In order to activate time synchronization, follow the steps below.

  Note that these steps are needed only on the computer where the @ptitude Observer Monitor or Analyst IMx Service is running.

  1. Open Port 123 in the Firewall. This is done a bit differently depending on your operating system and eventually external firewall.
  2. Go to Services and check that “Windows Time” service start-up method is set to “Automatic” and is started.
  3. Double click on the file called "EnableTimeSync.reg" in the Observer DVD or Analyst DVD. This will enter information in the registry to enable the time synchronization service on the computer.
  4. Stop and start "Windows Time" service to make this change take effect.
  5. IMx-T will synchronize the time continuously every 1 000 seconds.

     Note: The IMx-T will synchronize its time directly after a restart or power up.

- **Manual set time**

  Use "Set time" function in SKF @ptitude Observer or Analyst application.

  In @ptitude Observer, the function is found at a tab menu called "On-line", then "MasCon/IMx units" interface.

  In @ptitude Analyst, the function is found at Transfer / Online / Status.

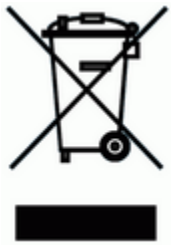
4
Hardware Maintenance

The IMx-T hardware, e.g. the IMx-T unit is maintenance free. However, we advise the customers to conduct a yearly visual inspection of the equipment.

Ventilation Fan

Ventilation fans in the system should be cleaned regularly in order to maintain the full ventilation capacity.

5
Electrical Waste



Electrical waste and electrical equipment should be recycled according to the WEEE-directive and not be placed in the general refuse. Product should be sent to an approved recycling center for safe recycling, recovery, reuse or sent to SKF Condition Monitoring Center AB for proper recycling.

SKF Condition Monitoring Center AB
Aurorum 30
977 75 Luleå
Sweden

6
Troubleshooting Guide

Troubleshooting Guide is intended as an aid when IMx-T system is not functioning correctly.

It is designed for instrumentation engineers and others with sufficient knowledge of electrical troubleshooting in electronic systems with a 110 V/230 V power supply and of the risks what this can mean in case of incorrect procedure.

SKF Condition Monitoring Center Luleå strives to provide information that is as accurate as possible. However, SKF Condition Monitoring Center Luleå cannot be held responsible for any injury or damage to persons or material that can occur in the interpretation of, or due to actions taken on the basis of information in this document.

Important - The guarantee becomes void if IMx-T units are damaged through incorrect intervention in the hardware, or a patently incorrect connection in contravention of directions given.

Problems and Symptoms

Sensor signal disappears or is abnormally changed for single channels

Possible causes:
- Broken sensor cable
- Short circuit in sensor cable
- Sensor fault
- Hardware fault with IMx-T input stage
- Grounding loop

Suggested solution:
- Carry out sensor/cable test.

A sensor repeatedly generates a false alarm or varies abnormally

Possible causes:
- Broken sensor cable/contact
- Incorrectly mounted sensor
- Hardware fault with IMx-T input stage
- Signal disturbed by external noise
- Grounding loop

Suggested solution:
- First carry out sensor/cable test. In addition, check the sensor mounting. If this yields no result, contact SKF Condition Monitoring Center Luleå.

Speed signal unobtainable/faulty for a certain machine

Possible causes:
- Cable fault (short circuit/broken) to speed sensor
- Faulty speed sensor, or faulty installation
- Speed signal too weak/impedance too high for IMx-T
- Faulty IMx-T speed input
- Incorrect setting in hardware

Suggested solution:
- Test speed input.

Analogue input gives faulty/no signal

Possible causes:
- Cable fault (short circuit/break) to sensor
- Faulty sensor
- Faulty earthing
- Incorrect setting in hardware
- Faulty IMx-T input

Suggested solution:
- Carry out control of sensor and cabling.

Load input gives faulty/no input signal

Possible causes:
- Cable fault (short circuit/break) to sensor
- Faulty sensor signal
- Faulty earthing
- Faulty IMx-T load input
- Incorrect setting in software

Suggested solution:
- The load input acts as an analogue input. Therefore, first carry out cabling/input test. Contact SKF Condition Monitoring Center Luleå if this gives no result.

IMx-T alarm relay does not activate despite of warning or alarm

Possible causes:
- Cabling fault from IMx-T to alarm panel
- Configuration error in software
- Hardware fault in IMx-T unit

Suggested solution:
- Check the relay signal. Refer to "Checking relay signal" in Component Check of this chapter.

Monitor ceases to work with a certain IMx-T unit

Possible causes:
- Loss of voltage in IMx-T unit
- Hardware fault in IMx-T unit, such as power supply or processor module
- Break in Ethernet network

Suggested solution:
- Check the voltage of IMx-T unit. In addition, check the Ethernet built-in LED indicator behavior.
- If the problem continues, you may also refer to "Application Note Testing and troubleshooting IMx network connections" in Application notes which is accessible at the top right hand corner of News in Observer screen of @ptitude Observer.

Monitor completely ceases to function

Possible causes:

- Monitor PC non-functional
- Monitor software incorrectly set
- Ethernet switch non-functional
- Cable break in Ethernet network
- Firewall configuration incorrect
- Database non-functional

Suggested solution:

- Refer to "Checking monitor" in Component Check of this chapter.

Component Check

Checking sensor and sensor cabling for analogue channels

1. Determine the unit number and channel number of the channel in question through the measurement point information in the software, or through the list of terminal blocks.
2. Measure the DC voltage between the sensor wires on the IMx-T terminal block using a digital voltmeter. See the table below for the normal voltage values with and without a connected sensor respectively.

Sensor type	Normal operating bias voltage (DC V)	Open circuit voltage (DC V)
Standard accelerometer	8 to 12 V	+24 V

Table 6-12: Normal voltage

3. Is the voltage within the normal working range?

   YES: The cabling to the sensor is probably Ok, and the sensor electronics have normal input impedance. If the sensor signal is still not perceived to be normal, one should try changing the sensor.

   NO: Continue to step 5.

4. Does the fault remain after changing the sensor?

   YES: The fault may be in the analogue input section of the IMx-T unit. Contact SKF Condition Monitoring Center Luleå for service and further information.

   NO: Sensor fault. The sensor is defective and must be replaced.

5. Is the voltage close to zero (typical < ±0.5 V)?

   YES: There is probably a short circuit in the cable, or the sensor is defective. First, verify that the voltage rises to normal open circuit voltage when one of the sensor cable poles is disconnected from the terminal block of the IMx-T unit.

   NO: Continue to step 9.

6. Did the voltage rise to normal open circuit voltage?

   YES: Continue to step 8.

   NO: The sensor is not receiving power, continue below.

7. Is the sensor a standard type?

   YES: These are powered internally from the IMx-T unit. If the IMx-T unit does not supply open circuit voltage with input open, then the IMx-T input is probably damaged, or the input is not configured to supply a power feed to the sensor. Contact SKF Condition Monitoring Center Luleå.

8. The fault is in the sensor cable or the sensor. Go out to the sensor, and disconnect the cable at this end. Reconnect the cable on the IMx-T terminal block, and again measure the voltage over these two poles. Does the short circuit remain?

   YES: The sensor cable (or contact) has a short circuit. Repair the cabling.

   NO: The sensor is defective. Replace the sensor.

9. Is the voltage close to the open circuit voltage?

   YES: There is a break in the cable or the sensor is damaged. Continue to step 10.

   NO: If the voltage appears to be neither within the normal working range, close to zero nor close to open circuit voltage, then the fault is an unusual one. First, check that the measurement was correctly carried out, then contact SKF Condition Monitoring Center Luleå. Remaining faults can be due to a damaged sensor or a damaged IMx-T input. First, disconnect one pole of the sensor cable, and measure the open circuit voltage to verify whether the open circuit voltage is normal. If it is normal, then the fault is probably in the sensor, otherwise the fault is in IMx-T.

10. Disconnect the connector from the sensor and short circuit the pins in the sensor contact, then remeasure the voltage on the IMx-T terminal block. Did the voltage sink to close to zero (< 0,5 V)?

    YES: There is an internal break in the sensor, or the contact is oxidized. First, try cleaning the contact before replacing the sensor.

    NO: There is a break in the cable. Repair the cabling.

Checking sensor and sensor cabling for analogue channels from application side

1. Determine the unit number and channel number of the channel in question through the measurement point information in the software, or through the list of terminal blocks.
2. Measure the DC voltage between the sensor cable poles on the IMx-T terminal block using a digital voltmeter.
3. Does the terminal block have the expected voltage level (see sensor sensitivity and the current actual value of the measured object)?

   YES: The sensor and cabling are probably Ok. If the actual value is still not perceived to be normal, then the fault is probably in the channel settings, or there is a hardware fault in the IMx-T unit. Continue below.

   NO: Continue to step 5.

4. Check through the current settings for the channel in question in the software. Determine the amplification, zero level, and the conversion to the user's unit. Furthermore, the cable check must be off (N). If this still does not produce the correct actual value, then the input card is probably damaged. Contact SKF Condition Monitoring Center Luleå.
5. The cable or the sensor is probably damaged. Test the cabling by disconnecting at the sensor end and connecting e.g. a 1,5 V battery. Does the input now measure the voltage?

   YES: The sensor is probably not functioning correctly. However, first check that the channel is correctly configured according to the terminating resistor. In the list of terminal blocks, it can be determined whether the channel in question has a terminating resistor for current circuit. Check that this corresponds in reality, and that it corresponds to the sensor's mode of operation.

   NO: The cabling is probably damaged. Continue to step 6.

6. Cable is probably damaged. However, first try disconnecting one of the poles on the cable from the IMx-T terminal block. If the voltage is Ok, then the fault is in the IMx-T unit input stage. Otherwise, the cable is damaged and needs to be repaired.
7. Does the fault remain after replacing the sensor?

   YES: The fault can be in the analogue input part of the IMx-T unit. Contact SKF Condition Monitoring Center Luleå.

   NO: It is a sensor fault. The sensor is defective and must be replaced.

Checking speed input

1. Determine the unit number and speed input of the channel in question through the software measurement point setting or through the list of terminal blocks.
2. Measure the signal on the IMx-T terminal block using an oscilloscope or similar. Make sure to use a potential free oscilloscope.
3. Is there an expected speed signal on the IMx-T terminal block?

   YES: The signal can be too weak at too high impedance for the IMx-T speed input to be triggered. Sufficient voltage ripple (peak to peak) is shown in the electrical specifications. If the signal level is sufficient, then the IMx-T input is defective or the software is incorrectly configured. Check the settings in the program for the unit number and input number of the speed measurement point. Contact SKF Condition Monitoring Center Luleå for consultation.

   NO: The cable is damaged, or the sensor is not sending the correct output signal. Check that the installation of the sensor is correct (is the machine rotating?). If this produces no result, check the cable. The entire chain from cable to input can be tested by linking a signal generator with a suitable frequency and amplitude at the sensor end. However, note that IMx-T normally supplies power to a sensor (as shown in the equipment list), which is why a coupling capacitor must then be connected in series, to avoid ruining the signal generator.

Checking relay signal

1. Determine the unit number of the alarming channel through the software measurement point setting or though the list of terminal blocks.
2. Disconnect the relay connection from the IMx-T unit in question. Carefully check to see if the relay output caused to trip the machines. Measure the voltage between the alarm relay poles.
3. Has the relay been activated (voltage approximately 12 V)?

   YES: The fault is in the cabling or output connections from IMx-T.

   NO: Check the software configuration for measurement point settings to find out whether the channel in question is allowed to activate the alarm relay. If this is not the case, then change the setting. Contact SKF Condition Monitoring Center Luleå, if the channel is permitted to activate the relay, but does not do so.

Checking Monitor

1. Check first, whether the @ptitude Observer Monitor or Analyst IMx Service PC is functioning as it should be.
2. Try restarting the computer, if there is any doubt as to the status of the @ptitude Observer Monitor or Analyst IMx Service software.
3. Check also that the Ethernet network is functioning and that the @ptitude Observer Monitor or Analyst IMx Service computer can write to the server disk.

Checking Modbus sensor

1. Start @ptitude Observer On-line Device Configurator program located in the @ptitude Observer directory.
2. Click **Start serial interface.**
3. On the Serial interface screen, enter the COM port number and type in the word "modbus" in the command box.
4. Statistics on communication and the contents of the import registers will appear on the screen.

   The statistics are:
   - Frame errors (short and long)
   - Checksum errors
   - The number of messages sent
   - The number of messages received
   - The number of timeouts of requests
5. A properly working Modbus communication should exhibit increasing sent and received messages, but not exhibit significant increase of errors or timeouts.
6. In case of errors or timeouts, check that all of the following are correctly installed:

   - Physical connections of RS485 cable wires are done correctly
   - Transmission characteristics are defined correctly
   - The Modbus Master-Slave pair address is entered correctly
   - RS485 termination is done correctly
7. This process of checking Modbus sensor can be done several times during the test to diagnose the communications or lack of it.

7
Technical Data

Environmental

- 19" rack mounted, 6U high
- Size (height s width x depth): 266 × 482 × 240 mm (*10.5 x 19 x 9.4 in.*)
- Weight: 10 kg (*22 lb.*)
- Temperature range:
  –20 to +70 °C (*–4 to +158 °F*) in storage
  0 to +50 °C (*+32 to +122 °F*) in operational mode
- Encapsulation IP 20
- Overvoltage category II
- Pollution degree 2
- Altitude maximum 2 000 m (*6 562 ft.*)

System

- Two slots for power supplies
- Four slots, each mounted in a pair of an input board and a monitoring board
- Screw terminals, RJ45 and D-sub connectors on the back side of each four slots

Power Supply

- 100 to 240 VAC, 50 to 60 Hz, 2.5 A maximum
- Redundant option, individual mains terminals

Analogue Inputs

- 16 analogue differential inputs
- Individual 24 V power supply, max 35 mA per channel
- Selectable standard accelerometer power supply (4 mA)
- Input range: ±25 V
- Impedance: >100 kΩ

Digital Inputs

- Eight digital opto-isolated inputs
- Individual 24 V power supply for four channels, maximum 30 mA per channel

Outputs

- Four relay driver outputs
- 16 software configurable 4–20 mA outputs

Analogue Measurement

- 24-bit AD conversion enabling continuous transient capture (no gain or AC/DC switching required)
- Simultaneous sampling of all 16 channels (no multiplexing)
- Simultaneous sampling of different channels with different sampling rates
- Frequency range: from DC to 40 kHz
- Dynamic range: 120 dB
- Signal to noise ratio: 90 dB
- Cross-talk rejection: 100 dB
- Accuracy amplitude: ±2% (up to 20 kHz), ±5% (20 to 40 kHz)
- Accuracy phase: ±3° (up to 100 Hz)

Digital Measurement

- Frequency range: 0,1 Hz to 12,5 kHz
  - Required pulse width: > 4 μs for electrical positive,
    > 40 μs for electrical negative
- Accuracy frequency: 0,05% of measurement value (typically 0,01% up to 2,5 kHz)
- Pulse counting

Signal Processing

- Time waveform
- Vector analysis with circular alarms
- FFT 100 to 6 400 lines
- SKF Acceleration Enveloping
- Digital Peak Enveloping (DPE)
- Integration/Derivation in frequency domain
- Window function: Hanning
- Customer formulated mathematical equations
- Dynamic alarm levels, active range determined on multiple parameters
- Data storage on time, event or alarm condition
- Data buffering in flash memory when communication link is down
- Detection of sensor and cable fault
- Watchdog and self testing

Interface

- Ethernet: 10/100 Mbit RJ45, TCP/IP, switch functionality
- RS232 service interface

Miscellaneous

- Calibration, traceable to BIPM
- CE certified according to EN61000-6-3 and EN61000-6-2

Quality Control

SKF Condition Monitoring Center Luleå is ISO 9001:2008 certified.

8
Summary

Switch Settings

DIP Switch	DIP Switch Description
DIG1 to DIG4	Configurable digital inputs
ANA1 to ANA16	Analogue inputs
ANA21 (switch number 2)	RS485 bus termination
HEX1	TCP/IP address / Unit number

Table 8-13: Summary of IMx-T DIP switches

Signal	Terminal		DIP switch settings for analogue sensor 1 to 16 (ANA1 to ANA16) Position: 123456
Standard accelerometer (ICP)	N.C. + Signal/Pwr Com.	P A B	100110
Voltage source	N.C. + Signal Com.	P A B	000000
4–20 mA source	N.C. + Signal – Signal	P A B	000001
B-Sensor (4–20 mA output)	+24 V Signal Com.	P A B	100101
Eddy probe (–24 V)	–24 V Signal Com.	P A B	011000
Voltage powered sensor	+24 V Signal Com.	P A B	100100
4–20 mA (IMx powered)	+ Signal – Signal N.C.	P A B	100101

Table 3-6: Analogue sensor terminal positions and DIP switch settings

N.C. = Not Connected

DIP switch setting 1 = ON, 0 = OFF

Signal	Terminal		DIP switch settings for digital sensors 1 to 4 (DIG1 to DIG4)
Tacho 2-wire (24 V internally powered)	+ – N.C.	A B 0	1010
Tacho 3-wire NPN (24 V internally powered)	Brown (+24 V) Black (Signal) Blue (0 V)	A B 0	0100
Tacho 3-wire PNP (24 V internally powered)	Brown (+24 V) Black (Signal) Blue (0 V)	A B 0	1010
Pulse 12–24 V (external power)	+ – N.C.	A B 0	0100
Pulse TTL (external power)	N.C. + -	A B 0	1010

Table 3-8: Digital sensors terminal positions and DIP switch settings

N.C. = Not Connected
DIP switch setting 1 = ON, 0 = OFF

RS485 Termination	ANA21 switch number 2
Termination resistor enabled	ON
Termination resistor disabled	OFF

Table 3-13: RS485 bus termination settings

HEX rotary switch HEX1 (x1)	TCP/IP address/Unit ID of CPU/IO pair slot			
	Slot 1	Slot 2	Slot 3	Slot 4
0	Software defined	Software defined	Software defined	Software defined
1	01	02	03	04
2	05	06	07	08
3	09	10	11	12
↓	↓	↓	↓	↓
9	33	34	35	36
Factory default configuration TCP/IP address: 10.0.0.1XY				

Table 3-14: TP/IP address/Unit ID when configured by HEX rotary switch

LED Status

LED Indicator	Behaviour	Description
V1	On	+5 V power Ok
V2	On	+12 V power Ok
V3	On	-12 V power Ok
Δ V1	On	5 V adjustment
SYSTEM	Red On	Internal system error
+5V	Green On	Power is Ok
LINK1, LINK2	Green On	Ethernet link connected
ACT1, ACT2	Yellow flash	Traffic on the network

Table 8-14: Summary of IMx-T LED status

Wire Connections

Mains power	
Pin	**Description**
1	L (Line)
2	N (Neutral)
3	PE (Protective Earth)

Table 8-15: Wire connections for mains power

Analogue input 1 to 4	
Pin	**Description**
1	Analogue in Ch1 (P)
2	Analogue in Ch1 (A)
3	Analogue in Ch1 (B)
4	Analogue in Ch2 (P)
5	Analogue in Ch2 (A)
6	Analogue in Ch2 (B)
7	Analogue in Ch3 (P)
8	Analogue in Ch3 (A)
9	Analogue in Ch3 (B)
10	Analogue in Ch4 (P)
11	Analogue in Ch4 (A)
12	Analogue in Ch4 (B)

Table 8-16: Wire connections for analogue input 1 to 4

Analogue input 5 to 8	
Pin	**Description**
1	Analogue in Ch5 (P)
2	Analogue in Ch5 (A)
3	Analogue in Ch5 (B)
4	Analogue in Ch6 (P)
5	Analogue in Ch6 (A)
6	Analogue in Ch6 (B)
7	Analogue in Ch7 (P)
8	Analogue in Ch7 (A)
9	Analogue in Ch7 (B)
10	Analogue in Ch8 (P)
11	Analogue in Ch8 (A)
12	Analogue in Ch8 (B)

Table 8-17: Wire connections for analogue input 5 to 8

Analogue input 9 to 12	
Pin	**Description**
1	Analogue in Ch9 (P)
2	Analogue in Ch9 (A)
3	Analogue in Ch9 (B)
4	Analogue in Ch10 (P)
5	Analogue in Ch10 (A)
6	Analogue in Ch10 (B)
7	Analogue in Ch11 (P)
8	Analogue in Ch11 (A)
9	Analogue in Ch11 (B)
10	Analogue in Ch12 (P)
11	Analogue in Ch12 (A)
12	Analogue in Ch12 (B)

Table 8-18: Wire connections for analogue input 9 to 12

Analogue input 13 to 16	
Pin	**Description**
1	Analogue in Ch13 (P)
2	Analogue in Ch13 (A)
3	Analogue in Ch13 (B)
4	Analogue in Ch14 (P)
5	Analogue in Ch14 (A)
6	Analogue in Ch14 (B)
7	Analogue in Ch15 (P)
8	Analogue in Ch15 (A)
9	Analogue in Ch15 (B)
10	Analogue in Ch16 (P)
11	Analogue in Ch16 (A)
12	Analogue in Ch16 (B)

Table 8-19: Wire connections for analogue 13 to 16

Relay driver 1 to 3	
Pin	**Description**
1	Re 1A (+12 V)
2	Re 1B
3	Re 2A (+12 V)
4	Re 2B
5	Re 3A (+12 V)
6	Re 3B

Table 8-20: Wire connections for relay driver 1 to 3

Relay driver 4 and 5	
Pin	**Description**
1	Re 4A (+12 V)
2	Re 4B
3	Re 5A (+12 V)
4	Re 5B
5	GND
6	GND

Table 8-21: Wire connections for relay driver 4

Digital input 1 to 4	
Pin	**Description**
1	Digital in Ch1 (A)
2	Digital in Ch1 (B)
3	Digital in Ch1 (0)
4	Digital in Ch2 (A)
5	Digital in Ch2 (B)
6	Digital in Ch2 (0)
7	Digital in Ch3 (A)
8	Digital in Ch3 (B)
9	Digital in Ch3 (0)
10	Digital in Ch4 (A)
11	Digital in Ch4 (B)
12	Digital in Ch4 (0)

Table 8-22: Wire connections for digital in 1 to 4

Digital input 5 to 8 and RS485	
Pin	**Description**
1	Digital in Ch5 (A)
2	Digital in Ch5 (B)
3	Digital in Ch6 (A)
4	Digital in Ch6 (B)
5	Digital in Ch7 (A)
6	Digital in Ch7 (B)
7	Digital in Ch8 (A)
8	Digital in Ch8 (B)
9	RS 484 A
10	RS 485 B
11	GND
12	GND

Table 8-23: Wire connections for digital in 1 to 4

Ethernet 1 and 2	
Pin/LED	**Description**
1	Transmit data (+)
2	Transmit data (–)
3	Receive data (+)
4	N.C.
5	N.C.
6	Receive data (–)
7	N.C.
8	N.C.
Yellow LED	Ethernet traffic indicator
Green LED	Ethernet link indicator

Table 8-24: Wire connections for Ethernet 1 and 2

N.C. = Not Connected

Pin	4–20mA out channel	Pin	4–20mA out channel
1	Ch1+ 4–20mA	20	Ch1- 4–20mA
2	Ch2+ 4–20mA	21	Ch2- 4–20mA
3	Ch3+ 4–20mA	22	Ch3- 4–20mA
4	Ch4+ 4–20mA	23	Ch4- 4–20mA
5	Ch5+ 4–20mA	24	Ch5- 4–20mA
6	Ch6+ 4–20mA	25	Ch6- 4–20mA
7	Ch7+ 4–20mA	26	Ch7- 4–20mA
8	Ch8+ 4–20mA	27	Ch8- 4–20mA
9	Ch9+ 4–20mA	28	Ch9- 4–20mA
10	Ch10+ 4–20mA	29	Ch10- 4–20mA
11	Ch11+ 4–20mA	30	Ch11- 4–20mA
12	Ch12+ 4–20mA	31	Ch12- 4–20mA
13	Ch13+ 4–20mA	32	Ch13- 4–20mA
14	Ch14+ 4–20mA	33	Ch14- 4–20mA
15	Ch15+ 4–20mA	34	Ch15- 4–20mA
16	Ch16+ 4–20mA	35	Ch16- 4–20mA
17	GND	36	GND
18	GND	37	GND
19	GND	-	-

Table 3-11: Pinout of 4-20 mA 37-Pin D-sub

RS232 Connector Pinout	
Pin	**Description**
1	N.C.
2	Rx
3	Tx
4	N.C.
5	GND
6	N.C.
7	N.C.
8	N.C.
9	N.C.

Table 3-15: RS232 connector pinout

N.C. = Not Connected

Terminal List

Ch1 P Ch1 A Ch1 B	Ch5 P Ch5 A Ch5 B
Ch2 P Ch2 A Ch2 B	Ch6 P Ch6 A Ch6 B
Ch3 P Ch3 A Ch3 B	Ch7 P Ch7 A Ch7 B
Ch4 P Ch4 A Ch4 B	Ch8 P Ch8 A Ch8 B
Ch9 P Ch9 A Ch9 B	Ch13 P Ch13 A Ch13 B
Ch10 P Ch10 A Ch10 B	Ch14 P Ch14 A Ch14 B
Ch11 P Ch11 A Ch11 B	Ch15 P Ch15 A Ch15 B
Ch12 P Ch12 A Ch12 B	Ch16 P Ch16 A Ch16 B
Re 1A Re 1B	Re 4A Re 4B
Re 2A Re 2B	Re 5A Re 5B
Re 3A Re 3B	GND GND
D1 A D1 B D1 0	D5 A D5 B
D2 A D2 B D2 0	D6 A D6 B
D3 A D3 B D3 0	D7 A D7 B
D4 A D4 B D4 0	D8 A D8 B
	RS485 A RS485 B
	GND GND

Table 8-25: IMx-T terminal list

9
IMx-T Drawings

Rack Drawing

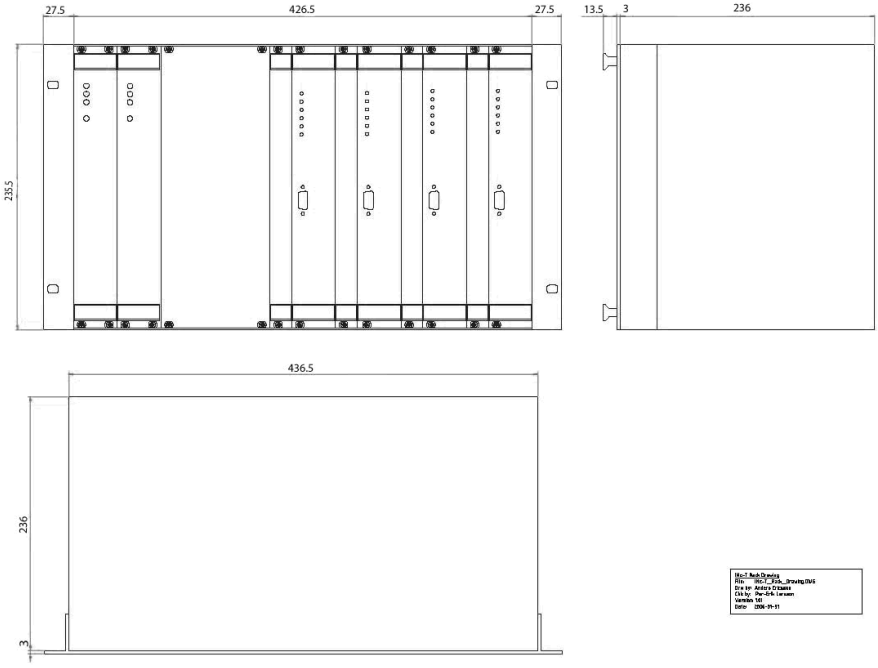


Figure 9-18: IMx-T rack drawing with dimensions

Front Panel with Labels

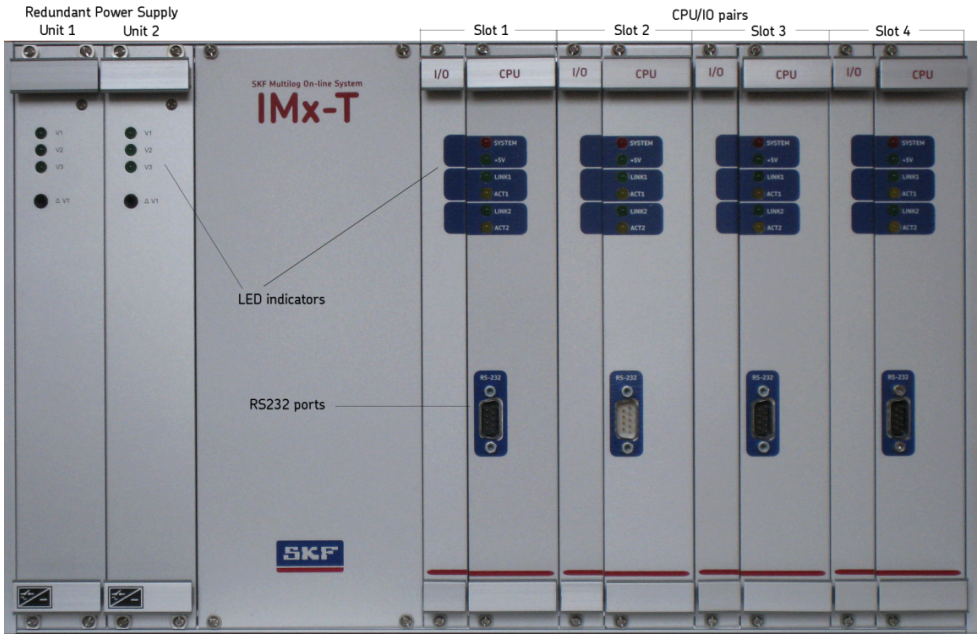


Figure 9-19: IMx-T front panel

Rear Panel with Labels

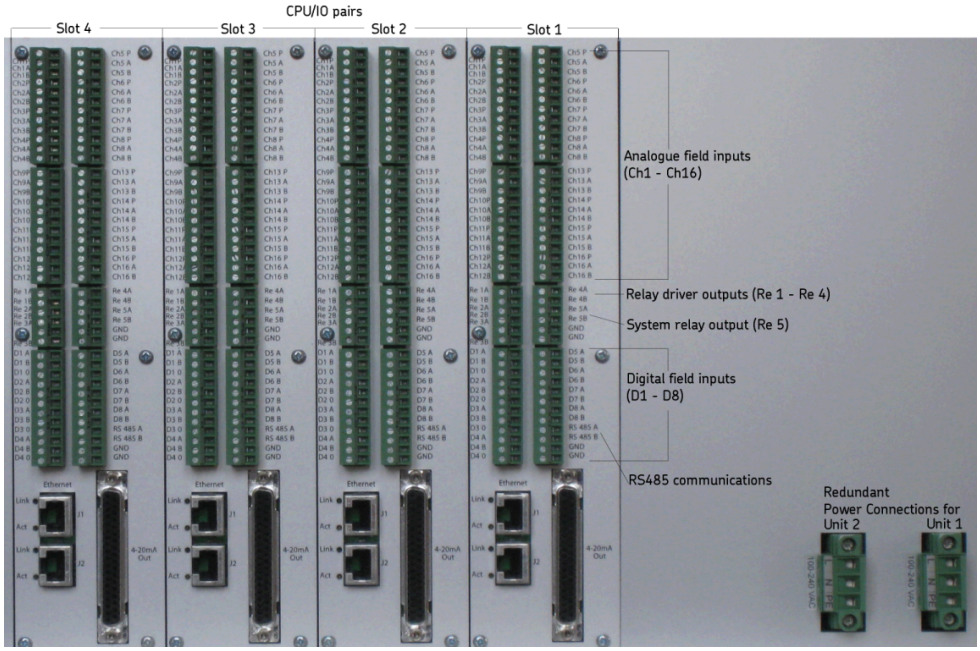


Figure 9-20: IMx-T rear panel

I/O Board

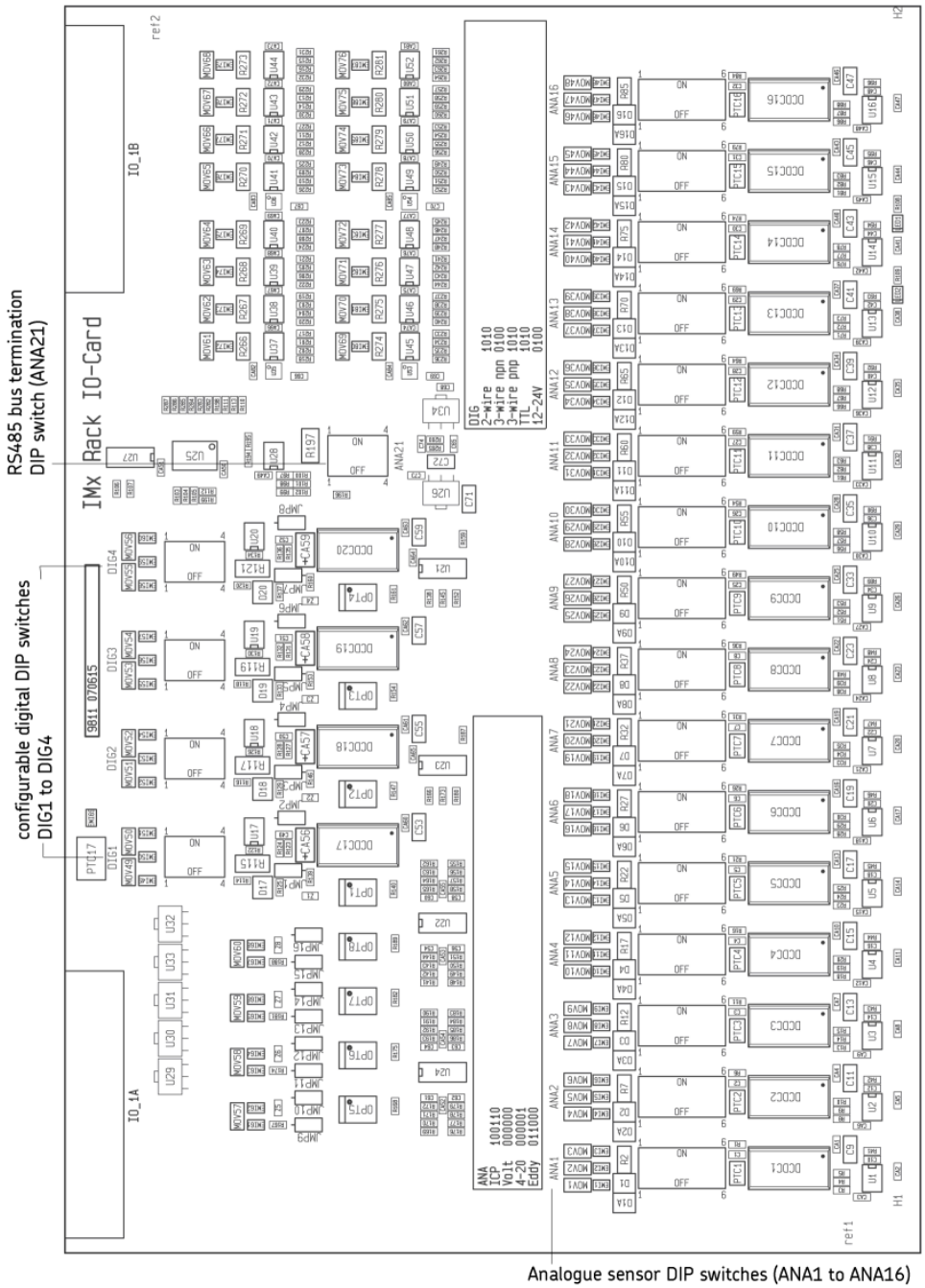


Figure 9-21: IMx-T I/O board drawing