

IPC4022

Fault Detector with Remote Terminal Unit Functionality



IPC4022 is a fault detector for overcurrent and earth faults with integrated remote terminal unit functionality. It has I/O for indications and watchdog function. The system interfaces are IEC 60870-5-101 and -104.

Since the algorithm for earth fault detection does not require any voltage measurement, IPC4022 provides cost efficient fault detection with high sensitivity for pass through faults, also in networks where the earth fault currents are low.

IPC4022

Fault Detection

Overcurrent, I_> and I_{>>}

Settings overcurrent 0.0 – 10 000.0 A, 0 – 10 000 ms.
One stage can be configured for inverse time (IEC).

Earth Fault, I₀>

Ensto Protrol's patented *Fault Pass Through* earth fault detection for all indirectly earthed networks. Capable of detecting high impedance and arcing earth faults. Note that no voltage measurement is necessary for good selectivity at very low currents. The sensitivity is comparable with that of a directional earth fault protective relay.

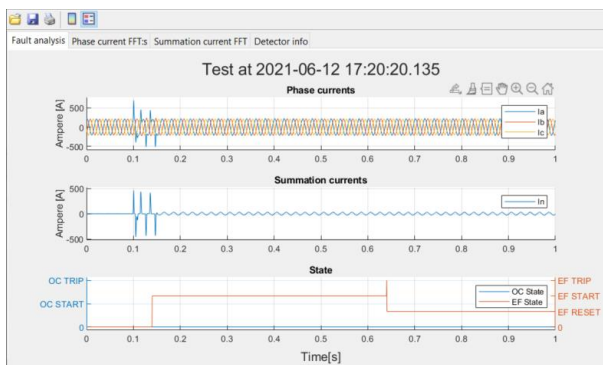
Settings high impedance earth fault 0.1 A – 100.0 A, 0 – 10 000 ms.

An arcing fault is concluded after two earth fault starts within a settable time, range 0 – 25 000 ms.

A non-directional earth fault stage is integrated.

Transient Fault Recorder

The built-in transient fault recording function registers currents and events from the last detected faults. It is possible to connect to the service port to analyse signals and events in detail. The transient fault recordings can be downloaded using the web interface and be analysed offline. The registered data can also be converted to COMTRADE format.



Remote Terminal Unit

Binary objects: 8 inputs (Single Point / Double Point). Also, objects for Start and Trip I_>, I_{>>}, I₀>, phase break and non-directional I₀> (Single Point)

3 outputs (Single Cmd / Double Cmd), and object for remote acknowledge (Single Cmd)

Analog objects (spontaneous reporting with settable deadband 0.1 – 100%, or cyclic):

- Phase currents, rms
- Maximum current
- Average current 15 min
- Max fault current, I_{>/I_{>>} ¹}
- Residual current, 3I₀
- Faulty phase(s), I_{>/I_{>>} or I₀> ¹}
- Temperature

¹ Dead band does not apply, transmitted upon event.

Expansion

IPC4022 can be ordered for fault detection of one line and in larger versions for two or three lines. This means that an expanded IPC4022 can handle larger secondary substations.

Expanded IPC4022 are specified by unique product codes. The extra current inputs for the additional lines are located to the left of the standard terminals of IPC4022. Also refer to the sections 'Ordering Information' and 'Overview Diagrams'.



Other Functions

Physical Interface

Detected overcurrent or earth fault is indicated by LEDs and can be acknowledged by a push button, remote control and automatically after a pre-defined time.

Separate LEDs indicate binary inputs and outputs, status for power supply, internal supervision, and activity of the communication ports.

Web Interface

The IPC4022 device has a built-in web interface for local and remote access using TCP/IP. This interface enables the user to access status information and to configure the device. It is also possible to upgrade firmware and download transient fault recordings.

IPC4020exp3 - Kvarnen

Start	Config	Status	System				
Detector status:							
	Detector 1		Detector 2		Detector 3		
	Trip	Status	Trip	Status	Trip	Status	
Earth fault							
Overcurrent							
Phase break							
Function status:				Expansion status:		Software version:	
IRF			Expansion		Module		
Expansion			Status		Software version		
IEC 60870-5-101 slave			Connection		IPC4020		
IEC 60870-5-104 slave					Loader		
IEC 60870-5-101 master					(AB)1-0.5.0		
Ethernet interface					PDC SW ver		
IPC4020 temperature							
	23 °C						

Technical Data

General

Dimensions: IPC4022: 200 x 109(115)² x 65(74) mm (l x w x h)
 IPC4022exp2/3: 290 x 92(114) x 65(74) mm (l x w x h)

Weight: 420/950 g

Assembly: DIN bracket

Ambient temp: -40 – +70 °C

Supply voltage: 19.5 – 48 VDC

Supply current: appr. 100 mA at 24 VDC

Standards: EN 61000-6-2 – Immunity
 EN 61000-6-4 – Emission Class B
 EN 61000-6-5 – For installation in medium voltage substations
 EN 60068-2 – Environmental

Tests according to: EN 61000-4-2
 EN 61000-4-3
 EN 61000-4-4
 EN 61000-4-6
 EN 60068-2-1
 EN 60068-2-2
 EN 60068-2-30

EU directives: ROHS, EMC

² The dimensions 115, 114 and 74 mm includes the female contacts.

Inputs and Outputs:

Binary inputs: 8 BI, 24 – 110 VDC

Binary outputs: 3 BO, max 115 VAC / 150 VDC
 One group with 2 relays, 8 A breaking current at 30 VDC (kontakt X10).
 One group with 1 relay, 5 A breaking current at 30 VDC (kontakt X9).

Analog inputs: 3/6/9)³ AI, 1 A rated current.
 I_{th} 2 A cont. / 20 A, 1 s

All binary in- and outputs are equipped with LED indications. Binary outputs are galvanically isolated. One output can be used as a watchdog relay.

³ Each fault detector requires three phase currents.

Service Port:

USB: Type B
Ethernet: RJ45 10/100Base – TX Full Dupl.

Time Synchronization:

Protocol: IEC60870-5-101/104 or NTP
Drift: Max 3 ppm

System Interface:

RS485(-422)/RS232: Plugin contact/DSUB9
Both 2- and 4-wire communication are supported using RS485. Bus termination can be done by connecting X11:4 and X11:5, also see section 'Overview Diagrams'.

Ethernet: RJ45 10/100Base – TX Full Dupl.

Communication Protocol:

Protocol: IEC60870-5-101/104

Ordering Information

Product Code

Basic version IPC4022:	101142
Basic version IPC4022exp2:	101144
Basic version IPC4022exp3:	101145

Options

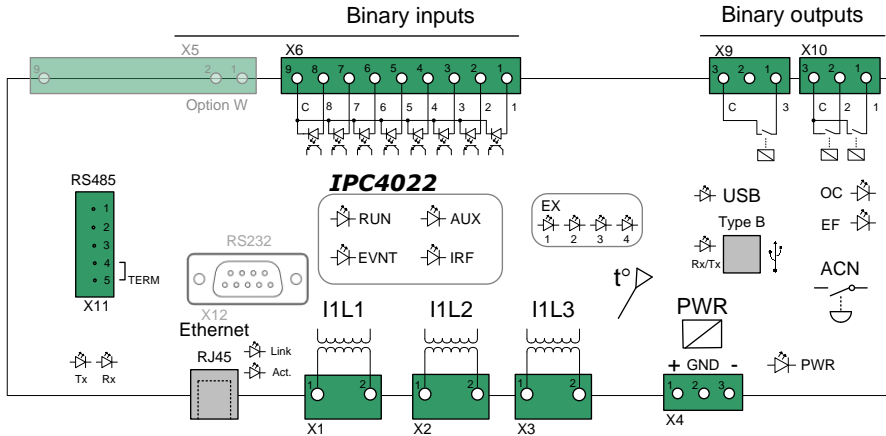
IPC4022 can also be ordered with additional functionality with the following product codes.

Hardware Options:

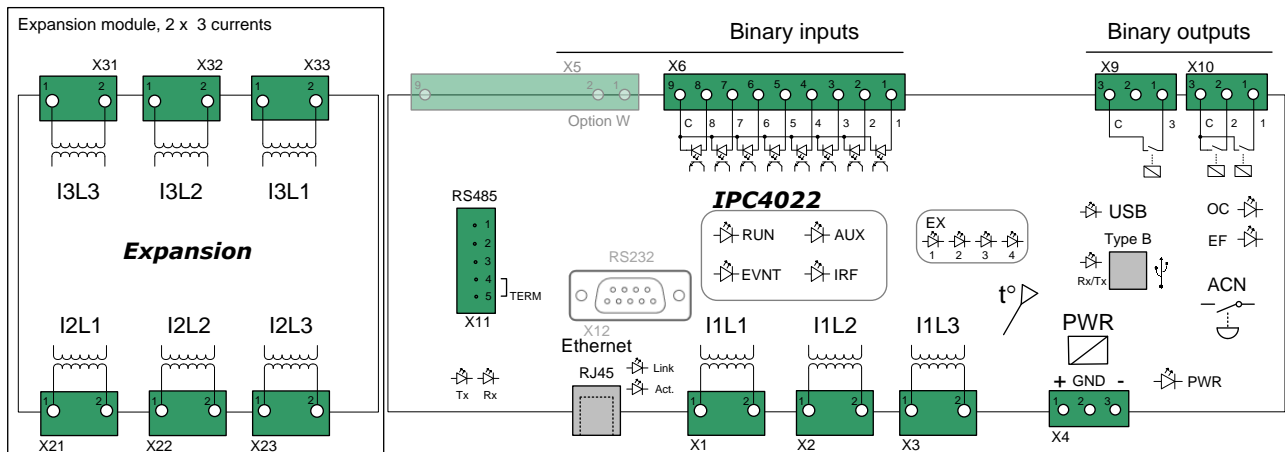
RS422-interface (4-wire):	850005
RS232 interface:	850001
2 additional inputs, contact X5:	850003

Overview Diagrams

IPC4022 – one fault detector



IPC4022exp2 and IPC4022exp3 – two or three fault detectors



Typical Application

An IPC4022exp3 can monitor a typical 3+1 secondary substation; fault detection of three lines/cables and indications from primary equipment or other devices. Communication equipment is determined by the technical conditions of the secondary station in question.

