

IPC4020

Fault Detector and Remote Terminal Unit



IPC4020 is a fault detector for overcurrent and earth faults with integrated remote terminal unit functionality.

It has I/O for indications and orders and is therefore suitable for a typical secondary substation with up to four objects.

The standard IPC4020 detects faults on one feeder. It can be ordered with an expansion module that allows fault detection of 2 additional feeders.

The communication protocol is IEC 60870-5-101 or -104.

Since the algorithm for earth fault detection does not require any voltage measurement, IPC4020 provides very cost-efficient fault detection and grid automation with a high sensitivity for pass-through faults, also in networks where the earth fault currents are low.

IPC4020

Fault Detection

Overcurrent, I_> och I_{>>}

Settings overcurrent: 0.1 – 3.5 × rated CT current, 0.04 – 10.00 s.

Earth Fault, I₀>

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 conventional wattmetrical directional earth fault protective relays.

Settings high impedance earth fault: From 0.8 A¹, 0.02 – 2.00 s.

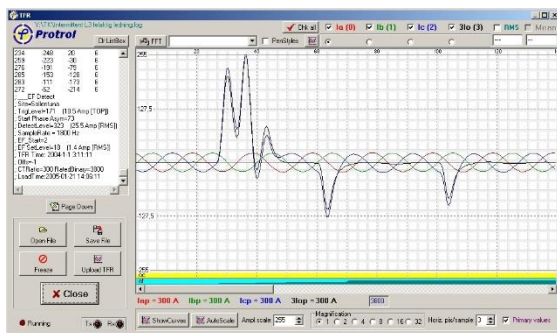
An intermittent fault is concluded after two earth fault starts within a settable time, range 0.00 – 10.00 s.

A non-directional earth fault stage is included.

¹ The level reflects primary fault current and corresponds to the base ratio 300/1. If current transformers with ratio 150/1 are used, the setting range starts at 0.4 A.

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 using Protrol Tool. The registered data can also be converted to COMTRADE format.



Remote Terminal Unit

Binary objects: 16 inputs (Single Point / Double Point). Objects for Start and Trip I_> / I_{>>} / I₀> (Single Point), phase break, non-directional I₀>.

8 outputs (Single Cmd / Double Cmd). Various objects for custom functions and remote acknowledge.

Analog objects (spontaneous reporting with settable dead band 0.5 – 100%):

- Phase currents, rms
- Phase currents, max load
- Phase currents, aver. load 15 min
- Max overcurrent at I_> or I_{>>}
- Neutral current, I_N
- Faulty phase(s), I_> or I₀>
- Temperature

Expansion

IPC4020 can be equipped with an expansion module for fault detection of two additional objects. This means that an IPC4020 with expansion module can handle fault detection for three lines/cables and indications/orders for four objects.

IPC4020 with expansion module are delivered in a larger casing and is specified as an option at order. The expansion is located on the left side of the detector, see the picture beneath for explanation. Also refer to the sections 'Schematic Overview' and 'Ordering Information'.



Other Functions

HMI – User Interface

Detected overcurrent or earth fault is indicated by LEDs and can be reset by a push button, remote control and/or after a pre-defined time up to 48 h.

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

Configuration is done in the built-in web interface.

Web Interface

The IPC4020 has a built-in web interface that facilitates remote access using TCP/IP. In this interface it is possible to access status information and to configure the device. It is also possible to upgrade firmware and download transient fault recordings.

Master for Slave RTUs

IPC4020 can act master (IEC-101) for slave RTUs in a local bus. Independent on how many slave RTU nodes the IPC4020 polls, the remote master will only address one device. The interface is two-wire RS485 (terminal X13).

The slave RTU function is specified as an option at order, refer to section 'Ordering Information'.

Customer Adaption

The IPC4020 software can optionally be adapted to special customer needs (PLC function).

Technical Data

Allmänt

Dimensions ² :	195(310) x 105(115) x 75(80) mm. (l x w x h)
Assembly:	DIN bracket
Ambient temp:	-20 – +60 °C
Supply voltage:	24 – 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
Tests according to:	EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-6

EU directives: ROHS, EMC, LVD

² Height 115 mm / 80 mm includes the female contacts. 310 mm is the width of the expanded model.

Service Port:

USB: Type B

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

Inputs and Outputs:

Binary inputs: 16 BI, 24 – 110 VDC

Binary outputs: Two groups with 2 relays, 8 A
breaking current at 250 VAC / 30
VDC.

Two groups with 2 relays³, 5 A
breaking current at 250 VAC / 30
VDC.

Analogue inputs: 3 AI, 1 A (+ 6 AI, 1 A)⁴

All binary in- and outputs are equipped with LED indications

³ These can in one group be replaced with one latching relay when required.

⁴ In total, 9 analogue inputs with expansion module connected.

Time Synchronisation:

Standard: IEC60870-5-101/104, or (S)NTP

System Port, slave:

RS485: Plugin contact.
Both two- and four-wire
communication are supported
using RS485. Bus termination can
be done by connecting X11:4 and
X11:5, see section 'Overview
Diagram'.

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

Communication Protocol, slave:

Standard: IEC60870-5-101/104

System Port, master:

RS485: Plugin contact.
Two-wire communication. Bus
termination can be done by
connecting X13:2 och X13:3, see
section 'Overview Diagram'.

Ordering Information

Article Number

The article number is specified as 101140(-W-XYZ).

Basic version: 101140

Options

IPC4020 can be ordered with additional functionality which is specified by the following postfix to the article number of the basic version.

Option W = Expansion module 0-1

- 0: – Basic version (no expansion)
- 1: – With expansion module

Option X = Hardware options 0-9⁵

- Option 0: – Basic version, no options
- Option 1: – RS232 interface
- Option 2: – Latching relay at output X7

Option Y = Software options 0-9⁵

- Option 0: – Basic version, no options
- Option 1: – Auto-reclosing function
- Option 2: – IEC -101 master

Option Z = Other adjustments 0-9

- Option 0: – Standard
- Options 1-9: – Software version 1-9

⁵ Calculation of article number for options according to table:

Article Number	Option 3	Option 2	Option 1
0 - No options	-	-	-
1 - Option 1	-	-	X
2 - Option 2	-	X	-
3 - Option 1 & 2	-	X	X
4 - Option 3	X	-	-
5 - Option 1 & 3	X	-	X
6 - Option 2 & 3	X	X	-
7 - Option 1 & 2 & 3	X	X	X

Example article number

IPC4020 with Expansion and Auto-reclosing function:
101140-1-010

Overview Diagram

