Acti 9 Smartlink Ethernet Communication System
User Manual

04/2016

Schneider Electric
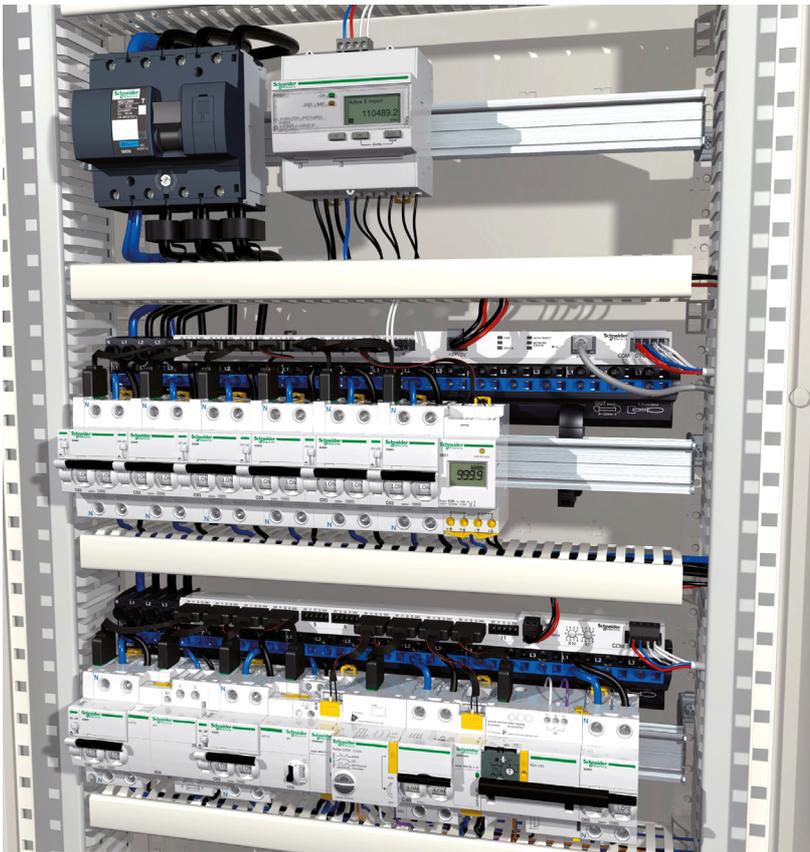
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Safety Information

ⓘ

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

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A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

The purpose of this manual is to provide users, installers, and maintenance personnel with the technical information necessary to install and use the Acti 9 Smartlink Ethernet communication system.

Validity Note

The Acti 9 Smartlink Ethernet communication system can be easily integrated into any building management architecture.

It combines command and control, metering and protection functions designed for energy efficiency solutions in any type of environment. Based on the Modbus protocol, the Acti 9 Smartlink Ethernet communication system allows switchboard data to be exchanged in real time with a supervision system or a PLC.

This system's pre-wired cables can save time and prevent wiring errors during installation.

Related Documents

Title of Documentation	Reference Number
Instruction Sheet for the iACT24 Auxiliary on the iCT Contactor (English, Dutch, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B33421
Instruction Sheet for the iATL24 Auxiliary on the iTL Remote Control Switch (English, Dutch, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B33422
Instruction Sheet for the Acti 9 Smartlink Ethernet (English, Dutch, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	EAV14819
Instruction Sheet for the RCA iC60 Remote Control (English, Dutch, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1A4079001
Instruction Sheet for the Reflex iC60 Integrated Control Circuit Breaker (English, Dutch, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B8674701
Instruction Sheet for the iEM2000T Meter (English, Dutch, French, Finnish, German, Hungarian, Italian, Norwegian, Polish, Portuguese, Spanish, Swedish, Chinese, Russian)	S1A89364
Instruction Sheet for the iEM3100, iEM3110, iEM3115 Meters (English, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B46581
Instruction Sheet for the iEM3150, iEM3155 Meters (English, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B46583
Instruction Sheet for the iEM3200, iEM3210, iEM3215 Meters (English, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B46598
Instruction Sheet for the iEM3250, iEM3255 Meters (English, French, German, Italian, Portuguese, Spanish, Chinese, Russian)	S1B46602
Reference Manual for the RCA iC60 Remote Control for iC60 Circuit Breakers (English)	A9MA01EN

Title of Documentation	Reference Number
Reference Manual for the Reflex iC60 Integrated Control Circuit Breaker (English)	A9MA03EN
User Manual for the PowerLogic EGX300 Ethernet Gateway (English, French, German, Spanish)	63230-319-216
Technical Advice on the Acti 9 Smartlink Device (English)	CA908033EN
User Manual - Acti 9 Communication System Diagnostics (English)	DOCA0042EN
User Manual - Acti 9 Smart Test Software (English)	DOCA0029EN

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Chapter 1
Acti 9 Communication System

Overview

Introduction

The Acti 9 communication system is used to connect final distribution boards to any supervision system.

Modular equipment in the Acti 9 communication system is used to monitor, measure, and control electrical distribution boards via a Modbus serial line or Modbus TCP/IP communication network.

The Acti 9 communication system concentrates the data from electrical distribution boards in real time, thus contributing to achieve energy efficiency targets.

The Acti 9 communication system collects data from any meter (including kilowatt-hour, water, air, gas or steam meters).

This system consists of:
- Acti 9 Smartlink Ethernet and the test kit
- iOF+SD24 and OF+SD24 indication auxiliaries
- iACT24 and iATL24 auxiliaries for contactors and impulse relays in the Acti 9 range
- The Acti 9 RCA iC60 remote control module with Ti24 interface
- The Reflex iC60 integrated control circuit breaker with Ti24 interface
- iEM2000T, iEM3110, iEM3155, iEM3210, iEM3255, and iEM3355 meters
- Pre-wired cables

This system offers the following advantages and services:
- Calculation functions

The Acti 9 communication system is an open system:
- Acti 9 Smartlink Ethernet can be used as a standard I/O distributed module.
- Acti 9 Smartlink Ethernet is equipped with seven digital channels. Each channel is represented by a Ti24 interface consisting of:
  - Two power supply terminals: 0 V and 24 Vdc
  - Two 24 Vdc logic inputs (I1 and I2)
  - One 24 Vdc logic output (Q)
- Each Ti24 interface is compatible with Miniconnect Phoenix standard connectors (at intervals of 3.81 mm) or equivalent.
- Acti 9 Smartlink Ethernet is equipped with one analog channel having:
  - Two power supply terminals: 0 V and 24 Vdc
  - Two analog inputs (4...20 mA or 0...10 V)
- Acti 9 Smartlink Ethernet is compatible with any type of counter (pulse output) compliant with standard IEC 62053-21 (minimum pulse width of 30 ms):
  - The pulse weight must be configured (written in a Modbus register).
  - Acti 9 Smartlink Ethernet calculates consumption and flow.
- Acti 9 Smartlink Ethernet is compatible with any type of device equipped with low level inputs and outputs (24 Vdc).

The Acti 9 communication system is simple and safe to use:
- The Acti 9 communication system pre-wired cables reduce complexity and wiring time by allowing connection on an Acti 9 Smartlink Ethernet module of all the Acti 9 communication system components and 24 Vdc compatible products.
- All Acti 9 communication system functions can be created by sending messages (Modbus protocol) to Acti 9 Smartlink Ethernet devices (Modbus slave or Ethernet server) that act on devices via Ti24 interfaces.

Acti 9 Smartlink Ethernet Communication System Block Diagram
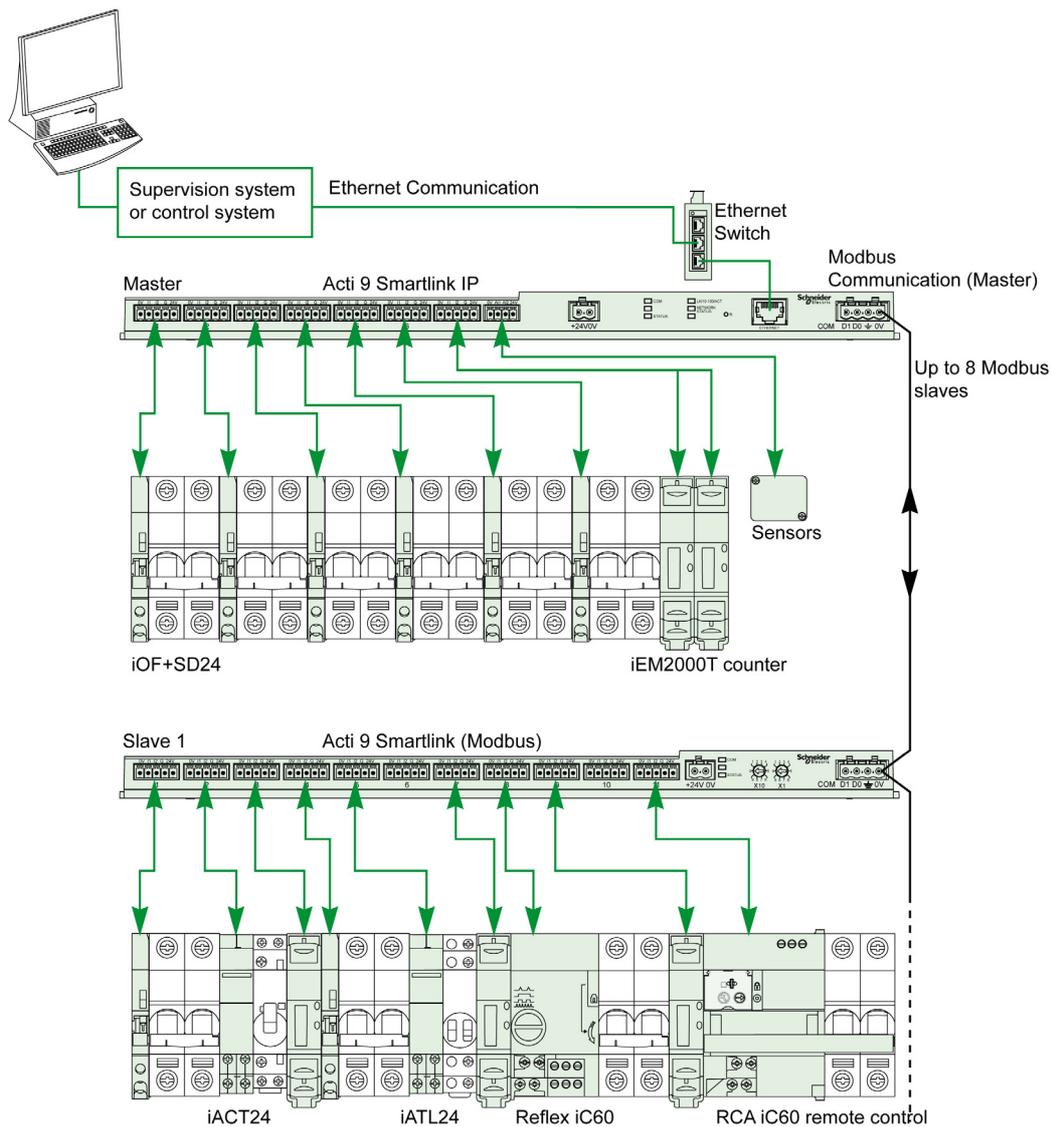
Acti 9 Smartlink Ethernet can manage a gateway function (Modbus TCP/IP to Modbus RS485). It can support up to eight Modbus RS485 slave devices (address from 1 to 247).

Acti 9 Smartlink Ethernet also manages web page in order to configure settings or to monitor and control the Acti 9 devices.

Chapter 2
Architecture of Acti 9 Communication System

What Is in This Chapter?

This chapter contains the following topics:

Acti 9 Smartlink Ethernet

Introduction

The Acti 9 Smartlink Ethernet device has seven digital channels (24 Vdc) and one analog channel (4...20 mA or 0...10 Vdc) and can be connected to the devices in the Acti 9 range equipped with a Ti24 interface. The data can be transmitted from the Acti 9 Smartlink Ethernet device to a PLC or a supervision system via a Modbus TCP/IP protocol.

The Acti 9 Smartlink Ethernet device channels can also be used to transmit standardized I/O. The Acti 9 Smartlink Ethernet device can also therefore communicate with devices (not in the Acti 9 range) with or without a Ti24 link.

Devices which can be connected to the Acti 9 Smartlink Ethernet device include:
- Acti 9 products: control switch for iACT24 contactors and iATL24 impulse relays, iC60 iOF+SD24 indication auxiliary, C60 OF+SD24 indication auxiliary, RCA iC60 remote control with Ti24 interface, Reflex iC60 integrated control circuit breaker with Ti24 interface
- Meters: iEM2000T or other meters (Schneider Electric or other manufacturers) in compliance with IEC 62053-21 (minimum pulse 30 ms).
- Any product (not in the Acti 9 range) that has command and control information: 2 discrete 24 V outputs and 1 discrete 24 V input.
- Any product using analog output (4...20 mA or 0...10 V).

The Acti 9 Smartlink Ethernet device is an intermediary between the supervisor and various electrical appliances. It can therefore be used to retrieve and process data received from devices and also control them. The functions available depend on the type of connected devices.

The Acti 9 Smartlink Ethernet functions are described in Acti 9 Smartlink Ethernet functions .

Description
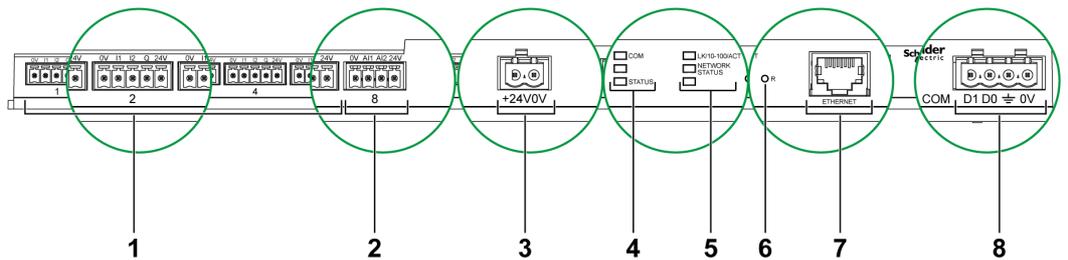
1 7 digital input/output channels
2 1 analog channel with two inputs
3 1 x 24 V power connector
4 Status LEDs
5 Ethernet LEDs
6 Reset button
7 Ethernet communication port
8 1 Modbus connector: 4-way

Acti 9 Communication System Pre-assembled Cables

Description

Acti 9 communication pre-assembled cables are a quick way to connect all the Acti 9 communication system components and compatible products (24 Vdc) to the channels of the Acti 9 Smartlink Ethernet module.

The pre-assembled cables are:

Product Reference	Description	Length (mm)
A9XCAS06	Set of six pre-assembled cables with two Ti24 connectors	100
A9XCAM06	Set of six pre-assembled cables with two Ti24 connectors	160
A9XCAL06	Set of six pre-assembled cables with two Ti24 connectors	870
A9XCAH06	Set of six pre-assembled cables with two Ti24 connectors	450
A9XCAU06	Set of six pre-assembled cables with one Ti24 connector	870
A9XCAC01	One pre-assembled cable with one Ti24 connector	4,000
A9XC2412	Set of 12 connectors with 5-pin spring	-

Each Ti24 interface (I/O channel) is compatible with Miniconnect Phoenix standard connectors (at intervals of 3.81 mm) or equivalent.
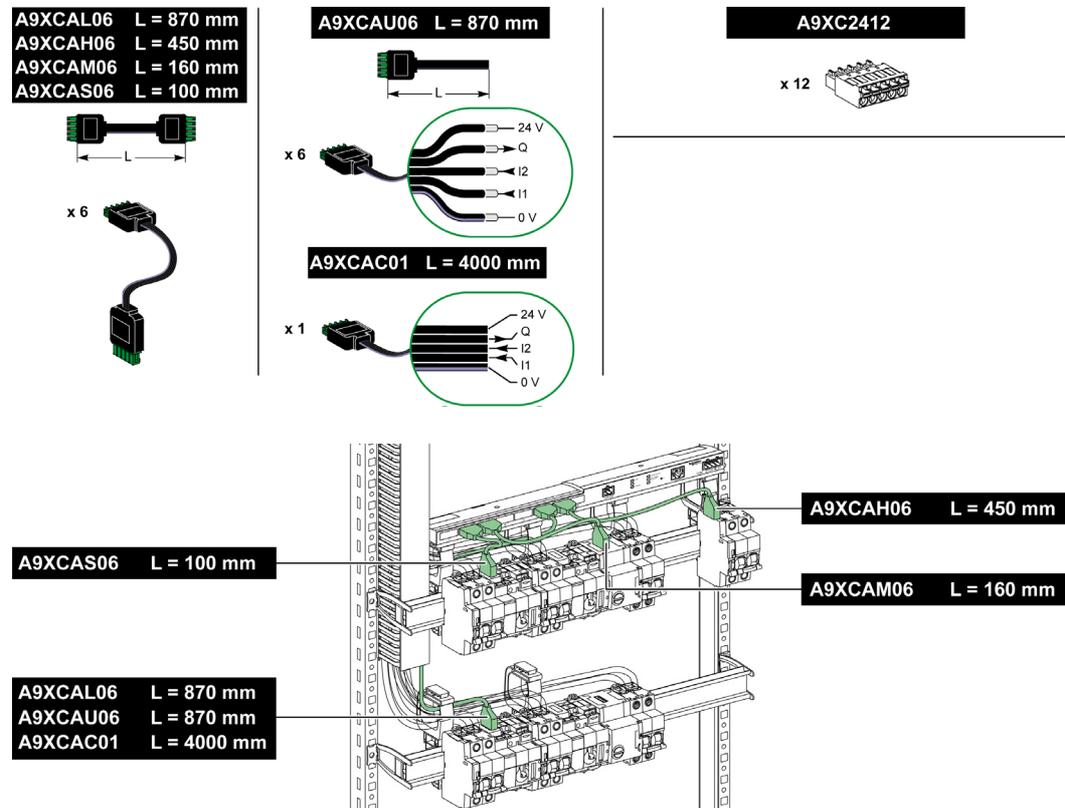
NOTE: The connectors in each pre-assembled cable have a flat surface where a self-adhesive label can be placed to identify the channel number used.
Self-adhesive labels are not supplied by Schneider Electric.

Description of the Connector at the Ti24 Interface End	
Terminal	**Description**
24 V	24 V of the 24 Vdc power supply
Q	Control output
I2	Input number 2
I1	Input number 1
0 V	0 V of the 24 Vdc power supply

NOTE:

● Do not connect two wires in each of the Ti24 connector terminals (A9XC2412).

● Do not connect a wire with cable end in each of the Ti24 connector terminals.

The table below gives the characteristics of cables that can be used with the A9XC2412 connector:

10 mm	0.5...1.5 mm²		0.4 x 2.5

Acti 9 Devices with Ti24 Interface

Description

Devices that can be connected to the Acti 9 Smartlink Ethernet are listed in the table below:

Device	Product Reference	Description
iACT24 auxiliary for iCT contactor	A9C15924	The iACT24 auxiliary: • Can be used to control a contactor (iCT) via its Y1, Y2, and Y3 inputs. The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet device channels. • Is used to find out the contactor status (O/C status).
iATL24 auxiliary for iTL contactor	A9C15424	The iATL24 auxiliary: • Can be used to control an (iTL) impulse relay via its Y1, Y2, and Y3 inputs. The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet device channels. • Is used to find out the impulse relay status (O/C status).
iOF+SD24 indication auxiliary for iC60, iC65, and iDPN circuit breakers	A9A26897	The iOF+SD24 indication auxiliary is used to find out the status of a iC60, iC65 (OF and $\overline{SD}$ states) and iDPN circuit breaker (sold in China).
OF+SD24 indication auxiliary for C60, C120, C60H-DC, and iDPN circuit breakers	A9N26899	The OF+SD24 indication auxiliary is used to find out the status of a C60, C120, C60H-DC (OF and $\overline{SD}$) and iDPN circuit breaker (sold in all the countries except China).
Acti 9 RCA iC60 remote control with Ti24 interface	A9C7012•	The Acti 9 RCA iC60 remote control: • Should have a Ti24 interface (with product references A9C70122 and A9C70124). • Can be used to control an iC60 circuit breaker via input Y3 of its Ti24 interface. Input Y3 (24 Vdc) can be controlled by one of the device channels Acti 9 Smartlink Ethernet. • Can be used to find out the OF and $\overline{SD}$ status of the circuit breaker associated with the RCA iC60 remote control.
Acti 9 Reflex iC60 integrated control circuit breaker with Ti24 interface	A9C6••••	The Acti 9 Reflex iC60 integrated control circuit breaker: • Should have a Ti24 interface (with product references A9C6••••). • Can allow the device to be controlled via input Y3 of its Ti24 interface. The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet channels. • Can be used to communicate its O/C and auto/OFF status.

NOTE: All the devices in the above table can be connected to channel N (1 ≤ N ≤ 7) of an Acti 9 Smartlink Ethernet module with A9XCAS06 pre-wired cable (or A9XCAM06 or A9XCAH06).

Acti 9 Devices without Ti24 Interface

Description

Devices that can be connected to the Acti 9 Smartlink Ethernet are listed in the table below:

Designation	Product Reference	Description
iEM2000T	A9MEM2000T	Single-phase energy meter without display
iEM3110	A9MEM3110	Three-phase energy meter with display
iEM3155	A9MEM3155	Three-phase energy meter with display
iEM3210	A9MEM3210	Three-phase energy meter with display
iEM3255	A9MEM3255	Three-phase energy meter with display
iPRD (Type 2)	A9L••••1	Withdrawable surge arresters with remote indication contact iPRD65r/iPRD40r/iPRD20r/iPRD8r
iPRD 40r PV (Type 2)	A9L40271 A9L40281	Withdrawable surge arresters with remote indication contact
iPRF1 12.5r (Type 1 + Type 2; Type B+C)	A9L16632 A9L16633 A9L16634	Monobloc surge arresters with remote indication contact
PRD1 25r (Type 1 + Type 2)	16329 16330 16331 16332	Withdrawable surge arresters with remote indication contact
PRD1 Master (Type 1)	16360 16361 16362 16363	Withdrawable surge arresters with remote indication contact
iQuick PRD (Type 2)	A9L16292 A9L16293 A9L16294 A9L16295 A9L16296 A9L16297 A9L16298 A9L16299 A9L16300	Withdrawable surge arresters with integrated backup MCB and remote indication contact

NOTE: The connection of these devices can be done with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Smartlink end), and with five wires (at device end).

The table below describes products that need a low level interface relay in order to be connected to Acti 9 Smartlink Ethernet:

Designation	Product Reference	Description
IH, IHP	see catalog	Timer switches with RBN type low level relays or equivalent
IC	see catalog	Light sensitive switches with RBN type low level relays or equivalent
TH, THP	see catalog	Thermostats with RBN type low level relays or equivalent

Devices out of the Acti 9 Range

Description

Devices that can be connected to the Acti 9 Smartlink Ethernet are:
- Meter with a pulse output and compliant with standard IEC 62053-31
- Volt-Free Low Level Indication Contact
- Volt-Free Standard Indication Contact
- Contactor and Relay
- Indication device or PLC input can be directly connected to the output (Q) of Acti 9 Smartlink Ethernet channel.
  The connected device should have the following characteristics:
  - To be powered with 24 Vdc
  - The consumption must be less than 100 mA

- Any device (for example: motor) that needs a command circuit of more than 100 mA can be controlled by the output (Q) of a channel of Acti 9 Smartlink Ethernet. The electrical diagram must be indirect between Acti 9 Smartlink Ethernet and this device: a low level relay must be installed between the command of this device and Acti 9 Smartlink Ethernet.

NOTE: The connection of these devices can be done with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Smartlink end), and with five wires (at device end).
All sensors (compliant with IEC 61000-6-2 and IEC61000-6-3 standards) using one output (compatible with 4...20 mA or 0...10 V) can be directly connected to analog inputs of Acti 9 Smartlink Ethernet (the cable for analog channel is delivered with the product).

Devices with Analog Output

Overview

All sensors (compliant with IEC 61000-6-2 and IEC61000-6-3 standards) using 24 Vdc as power supply input and 0...10 V or 4...20 mA output can be connected to Acti 9 Smartlink Ethernet analog inputs (female analog connector is delivered with the product).

Chapter 3
Technical Characteristics

Technical Characteristics of the Acti 9 Smartlink Ethernet

General Characteristics

Characteristic		Value
Product marking		CE
Temperature	Operation (horizontal)	–25...+60°C
	Operation (vertical)	–25...+50°C
	Storage	–40...+85°C
Tropicalization		Execution 2 (relative humidity of 93% at 40 °C)
Resistance to voltage dips		10 ms, class 3 according to IEC 61000-4-29
Degree of protection		IP 20
Level of pollution		3
Overvoltage category		OVC II
Conforming to SELV specifications		Yes
Altitude	Operation	0...2,000 m
	Storage	0...3,000 m
Immunity to vibration	IEC 60068-2-6	1 g/± 3.5 mm, 5...300 Hz, 10 cycles
Immunity to mechanical shock		15 g/11 ms
Immunity to electrostatic discharge	IEC 61000-4-2	Air: 8 kV
		Contact: 4 kV
Immunity to radiated electromagnetic interference	IEC 61000-4-3	10 V/m – 80 MHz to 3 GHz
Immunity to fast transients	IEC 61000-4-4	1 kV for the I/O, Modbus and Ethernet communication. 2 kV for the 24 Vdc - 5 kHz - 100 kHz power supply
Surge	IEC 61000-4-5	Power supply: 0.5 kV Modbus and Ethernet: 1 KV
Immunity to conducted magnetic fields	IEC 61000-4-6	10 V from 150 kHz to 80 MHz
Immunity to magnetic fields at line frequency	IEC 61000-4-8	30 A/m continuous 100 A/m pulse
Conducted emissions	IEC 61131-2, CISPR	Class A (0.15...30 MHz)
Radiated emissions	IEC 61131-2, CISPR	Class A (30...1000 MHz)
Resistance to corrosive atmospheres	IEC 60721-3-3	Level 3C2 on $H_2S/SO_2/NO_2/Cl_2$
Fire withstand	For live parts	30 s at 960 °C. IEC 60695-2-10 and IEC 60695-2-11
	For other parts	30 s at 650 °C. IEC 60695-2-10 and IEC 60695-2-11
Salt mist	IEC 60068-2-52	Severity 2
Environment		Conforms to RoHS directives
Installation position		Horizontal or vertical
Mean time between failures		More than 1 M hours

Integrated Functions

Characteristic		Value
Counter	Number of counters	Up to 14 (14 inputs)
	Maximum frequency	16.667 Hz, IEC 62053-31
Period stored in backup memory		10 years

Mechanical Characteristics

Characteristic		Value
Dimensions	Length	359 mm
	Height	22.5 mm
	Depth	42 mm
Weight		180 g

Communication Module

Characteristic		Value
Type of interface module		Modbus RTU, RS485 serial connection Modbus TCP/IP Ethernet
Transmission	Modbus RS485	Transfer rate: 9,600...19,200 Baud Medium: Double shielded twisted pair Impedance 120 Ω
	Ethernet	Transfer rate: 10/100 Mbps Medium: STP, Cat5e, straight cable
Structure	Type	Modbus, Ethernet
	Method	Master/Slave
Device type	Modbus	Master
	Ethernet	Server
Turnaround time	Modbus	10 ms
	Ethernet	1 ms
Maximum length of cable	Modbus	1000 m
	Ethernet	100 m
Type of bus connector	Modbus	4-pin connector
	Ethernet	RJ45 (Shielded)
Power supply	Nominal	Non-isolated 24 Vdc with protection against negative voltages up to -28.8 Vdc
	Voltage limits	19.2... 28.8 Vdc with ripple
	Current consumption, no-load	110 mA
	Maximum input intensity	1.5 A
	Maximum current inrush	3 A
Isolation	Between the Modbus serial connection and 24 Vdc Ti24 I/O interfaces	1.9 kVdc for 1 minute
	Between the Ethernet serial connection and 24 Vdc Ti24 I/O interfaces	1.9 kVdc for 1 minute
Number of digital I/O channels		7
Number of analog input channels		1
Number of Ethernet ports		1

Digital Inputs

Characteristic	Value
Number of logic inputs	14 (2 per channel)
Rated input voltage	24 Vdc
Input type	Current sink, type 1 IEC 61131-2
Weight (0 V)	1 for 2 inputs (1 per channel)
Input voltage limits	19.2...28.8 Vdc
Rated input current	2.5 mA
Maximum input current	5 mA
Filter time	2 ms
Acquisition time	10 ms
Isolation	No isolation between the Ti24 interfaces
Negative voltage protection	Yes
Maximum length of cables and cordsets	500 m (conductor c.s.a. of at least 0.5 mm^2)

Digital Outputs

Characteristic		Value
Number of logic outputs		7 (1 per channel)
Logic output		Current source, 24 Vdc 0.1 A IEC 61131-2
Weight (0 V)		1
Rated output voltage	Voltage	24 Vdc
	Maximum current	100 mA
Filter time		1 ms
Voltage drop (voltage at state 1)		1 V max.
Maximum current inrush		500 mA
Leakage current		0.1 mA
Overvoltage protection		33 Vdc
Short-circuit protection		Yes
Overload protection		Yes
Current limiting		Yes
Maximum length of cables and cordsets		500 m (conductor c.s.a. of at least 0.5 mm^2)

Analog Inputs

Characteristic		Value
Number of analog inputs		2
Type of each input		Voltage/Current: IEC 61131 - 2 compliant
Rated input voltage		0...10 V
Rated input current		4...20 mA
Input impedance	Current mode	140 Ω
	Voltage mode	50 KΩ
Resolution		12 bits
Accuracy		≤ ± 1% of the full scale
Refresh time		500 ms
Isolation		None
Type of cable		Twisted pair and screened
Cable length		< 30 m maximum[1]
Channel 8 (Analog inputs) maximum sourcing current at 24 V to power the sensors		200 mA for each analog sensor
Conversion time/Refresh time		100 ms
Connector type		Screw type (4-pin), 3.5 mm pitch

NOTE: [1] Wrong wiring or wrong configuration can cause the analog input damage.

Introduce analog isolators (with 0.5 to 1% accuracy) when the cables go outside the switchboard where Acti 9 Smartlink Ethernet is mounted.

iACT24

Characteristic		Value
Control voltage (Ue)		230 Vac, +10 %, -15 % (Y2) 24 Vdc, ± 20 % (Y3)
Control voltage frequency		50/60 Hz
Insulation voltage (Ui)		250 Vac
Rated impulse withstand voltage (Uimp)		8 kV (OVC IV)
Level of pollution		3
Degree of protection		IP20B device only IP40 device in modular enclosure
Width in 9 mm modules)		2
Auxiliary contact (O/C) Ti24		24 Vdc protected output, min. 2 mA, max. 100 mA
Contact		1 O/C operating category AC 14
Temperature	Operation	-25 … 60 °C
	Storage	-40 … +80°C
Consumption		< 1 W
Standard		IEC/EN 60947-5-1

iATL24

Characteristic		Value
Control voltage (Ue)		230 Vac, +10 %, -15 % (Y2) 24 Vdc, ± 20 % (Y3)
Control voltage frequency		50/60 Hz
Insulation voltage (Ui)		250 Vac
Rated impulse withstand voltage (Uimp)		8 kV (OVC IV)
Level of pollution		3
Degree of protection		IP20B device only IP40 device in modular enclosure
Width in 9 mm modules)		2
Auxiliary contact (O/C) Ti24		24 Vdc protected output, min. 2 mA, max. 100 mA
Contact		1 O/C operating category AC 14
Temperature	Operation	-25 … 60 °C
	Storage	-40 … +80°C
Consumption		< 1 W
Standard		IEC/EN 60947-5-1

Chapter 4
Sizing the 24 Vdc Power Supply

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Definition of the 24 Vdc Power Supply	28
Protection Against a 240 Vac Fault on the Acti 9 Smartlink Ethernet Channels	30
Electromagnetic Compatibility (EMC) Recommendations	31

Definition of the 24 Vdc Power Supply

Safety Information

> ### ⚡ ⚠ DANGER
>
> **RISK OF ELECTROCUTION**
>
> Isolate the Acti 9 Smartlink Ethernet 24 V power terminals from the power terminals connected to the Modbus network line.
>
> **Failure to follow these instructions will result in death or serious injury.**

Example: The 0 V and the 24 V of a 24 Vdc power supply connected to the TRV00210 ULP communication module must be isolated from the **0 V** or **+24 V** terminals of the 24 Vdc power supply for the Acti 9 Smartlink Ethernet device.

General Characteristics

Acti 9 Smartlink Ethernet device consumption:

Status	Consumption
Device with no load	110 mA
Device under load	1.5 A maximum

Products in the Acti 9 Range

If products connected to the channels (Ti24 interfaces) of an Acti 9 Smartlink Ethernet device are in the Acti 9 range, the consumption of a channel output is the same as the consumption of an input because the output is connected to the input. All that needs to be done is to add up the consumption of three input currents per channel.

Example: Assuming that the input current is less than 5 mA and two analog sensors connected to Acti 9 Smartlink Ethernet, the consumption of an Acti 9 Smartlink Ethernet device is as follows:

No-load consumption + (number of digital channels x 3 input currents) + (Analog sensor x 2) = 110 mA + (7 x (3 x 5 mA)) + (200 mA x 2) = 615 mA

Products that can be Controlled by a Channel

If products connected to the channels (Ti24 interfaces) of an Acti 9 Smartlink Ethernet device are in a different range, the maximum consumption of a device channel is 110 mA. The output for each channel supplies 100 mA, the digital inputs can consume up to 10 mA and the analog input can consume up to 200 mA.

Example: Assuming that the consumption of one channel is 110 mA, the consumption of one Acti 9 Smartlink Ethernet device is as follows:

No-load consumption + (number of digital channels x consumption per channel) + (Analog sensor x 2)

= 110 mA + (7 x 110 mA) + (200 mA x 2) = 1.3 A

Selection of the Acti 9 Smartlink Ethernet 24 Vdc Power Supply

The 24 Vdc power supply must correspond to the following criteria:
- It must be local to the electrical cabinet.
- It must be different from the Modbus network 24 Vdc power supply so as to maintain galvanic isolation between the Modbus network (common to several electrical cabinets) and the 24 Vdc I/O.
- It must be Safety Extra Low Voltage (SELV) type.
- Galvanic isolation between the power supply input (AC voltage) and the power supply output (DC voltage) must be at least 3 kVac at 50 Hz.
- The rated AC voltage of the power supply input must be 240 Vac +15/–20%.
- This power supply can be used to supply other products inside the electrical cabinet provided that these products are double insulated or with reinforced insulation so as to preserve the power supply's SELV quality.

Phaseo ABL8MEM240xx (OVC II) or ABL7RM24025 (OVC II) modular power supplies and their accessories comply with the above recommendations. These accessories provide the redundancy and backup power supply functions and can eliminate micro-cuts on the line.

The upstream and downstream protection functions of the Phaseo power supply must be installed as indicated in their respective manuals.

NOTE: OVC indicates the overvoltage category.

If overvoltage category IV or III is needed in the installation, we recommend using:
- Either power supplies (limited to 1 A) in the ULP (Universal Logic Plug) system with product references 54440 to 54445. See the User's Manual, ULP Connection System, product reference TRV99100
- Or use the Phaseo power supply recommended above, protecting it with an isolating transformer from the Phaseo Optimum (ABL6TS) range or the Universal (ABT7PDU) range.

NOTE: For each of these solutions, you should refer to the respective manuals.

Protection Against a 240 Vac Fault on the Acti 9 Smartlink Ethernet Device 24 Vdc Input

A fuse protection is provided if a 240 Vac power supply is accidentally connected to the 24 Vdc input on the Acti 9 Smartlink Ethernet power supply.

Protection Against a 240 Vac Fault on the Acti 9 Smartlink Ethernet Channels

Overview

In the event of a wiring error or electrical fault, the 240 Vac voltage may be present on the Acti 9 Smartlink Ethernet device channels: the neutral or phase (240 Vac) can be in contact with the Ti24 interfaces or the 24 Vdc power supply.

The insulation inside the Acti 9 Smartlink Ethernet device prevents propagation of this dangerous voltage (240 Vac) over the Modbus and Ethernet network.

The protection function inside the Acti 9 Smartlink Ethernet device eliminates the risk of fire inside the Acti 9 Smartlink Ethernet device.

These two protection functions (internal insulation and internal protection) cannot prevent wiring errors or electrical faults. A risk of dangerous voltage remains on the Acti 9 Smartlink Ethernet device channels.

⚡ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Implement a TT or TN-S earthing system.
- Connect the SELV (Safety Extra Low Voltage) power supply 0 Vdc to the protective earth to make it a PELV (Protective Extra Low Voltage) power supply. The upstream residual current protection must be type A.

Failure to follow these instructions will result in death or serious injury.

NOTE: In the majority of cases, the presence of a PELV means an upstream residual current protection can trip, thus protecting people and property.

⚡ ⚠ DANGER

ACCIDENTAL EQUIPMENT BEHAVIOR

- Connect the 0 Vdc of the SELV power supply to the protective earth at a single point to avoid any stray currents (50 Hz, harmonics, or transient currents) circulating across the 0 Vdc.
- Check that products supplied by this power supply are not already connecting the 0 Vdc to the protective earth.

Failure to follow these instructions will result in death or serious injury.

NOTICE

RISK OF DAMAGING THE ACTI 9 SMARTLINK DEVICE

- Connect the 0 Vdc of the SELV power supply to the protective earth at a single point to avoid any stray currents (50 Hz, harmonics, or transient currents) circulating across the 0 Vdc.
- Check that products supplied by this power supply are not already connecting the 0 Vdc to the protective earth.

Failure to follow these instructions can result in equipment damage.

Electromagnetic Compatibility (EMC) Recommendations

Overview

A star 24 Vdc distribution is preferable to a serial 24 Vdc distribution because star 24 Vdc distribution can minimize the wiring impedance.

If serial distribution is used, it is recommended to wire two serial loopback wires (see the two blue wires in the drawing below) in order to minimize impedance.
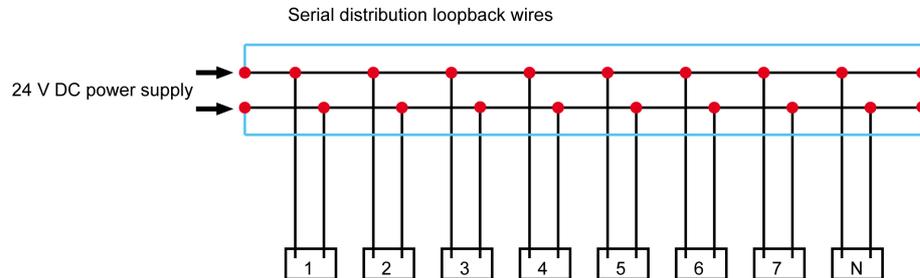
In a poor-quality electrical distribution network, it is recommended to use a Phaseo power supply from the Universal range (ABL8MEM240xx (OVC II) or ABL7RM24025 (OVC II)) which can withstand up to 500 Vac incoming and also offers galvanic insulation between the power supply AC input and the power supply DC output of 4 kVac at 50 Hz.

It is mandatory to comply with the segregation rules between low level signals (24 Vdc) and power conductors, see:
● *www.electrical-installation.org* see "ElectroMagnetic Compatibility (EMC)" part, "Wiring recommendations" section (information only available in English).
● Electrical Installation Guide in pdf format: Document No. EIGED306001EN.

Chapter 5
Installation

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Mounting	34
Connection	39

Mounting

Introduction

The Acti 9 Smartlink Ethernet device can be mounted on:
- DIN rail
- Multiclip 80
- Multiclip 200
- Mounting brackets

Acti 9 Smartlink Ethernet can be installed horizontally or vertically:
- In a horizontal mounting, Acti 9 Smartlink Ethernet is clipped onto DIN rails with fixing centers of 150 mm or more.
- Wall-mounted and floor-standing enclosures must be at least 24 modules wide (18 mm x 24 = 432 mm).
- The distance between the DIN rail and the back of the wall-mounted or floor-standing enclosure must be at least 50 mm.
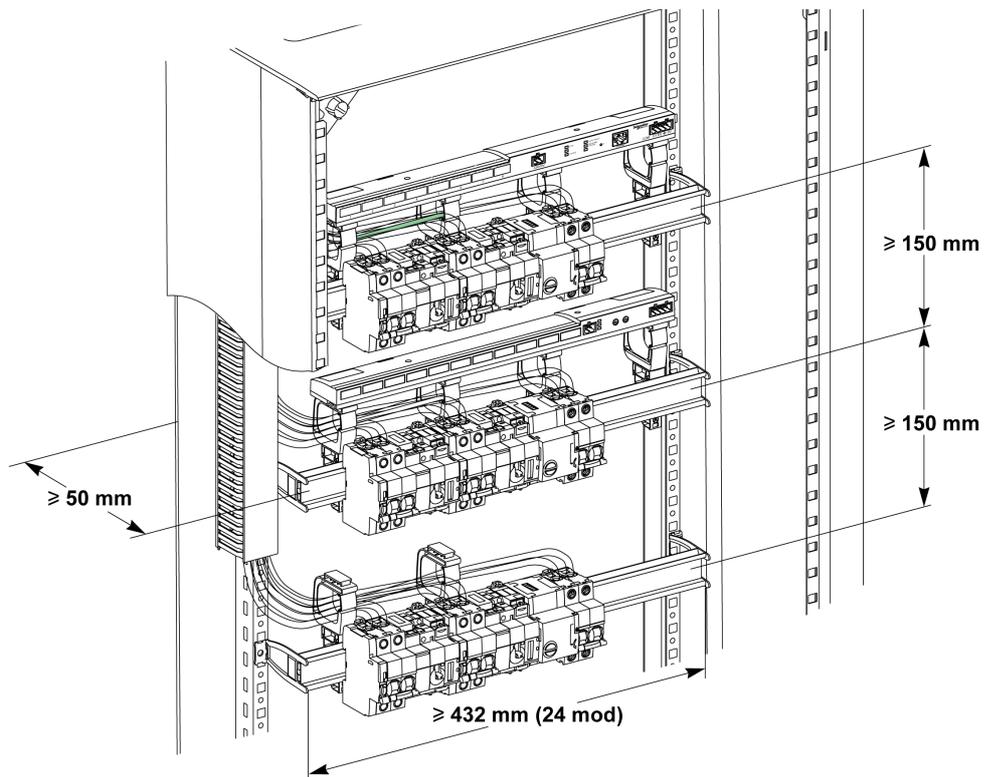
The ambient operating temperature is:
- Horizontal mounting: − 25°...+60°C
- Vertical mounting: − 25°...+50°C

Mounting Components
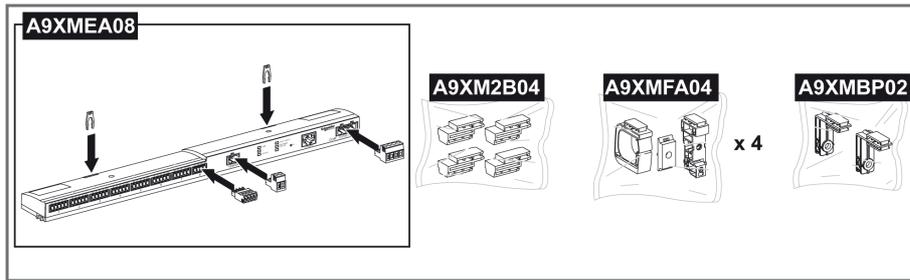
Product Reference	Description
A9XMEA08	Acti 9 Smartlink Ethernet
A9XMFA04	Set of bracelets, adaptors, and feet for DIN rail mounting
A9XM2B04	Spacers for Multiclip 200 mounting
A9XMBP02	Mounting brackets kit

DIN Rail Mounting

The side of the foot (**A** or **B** in the drawing below) used to mount the system on the DIN rail depends on the type of rail (aluminum or iron).
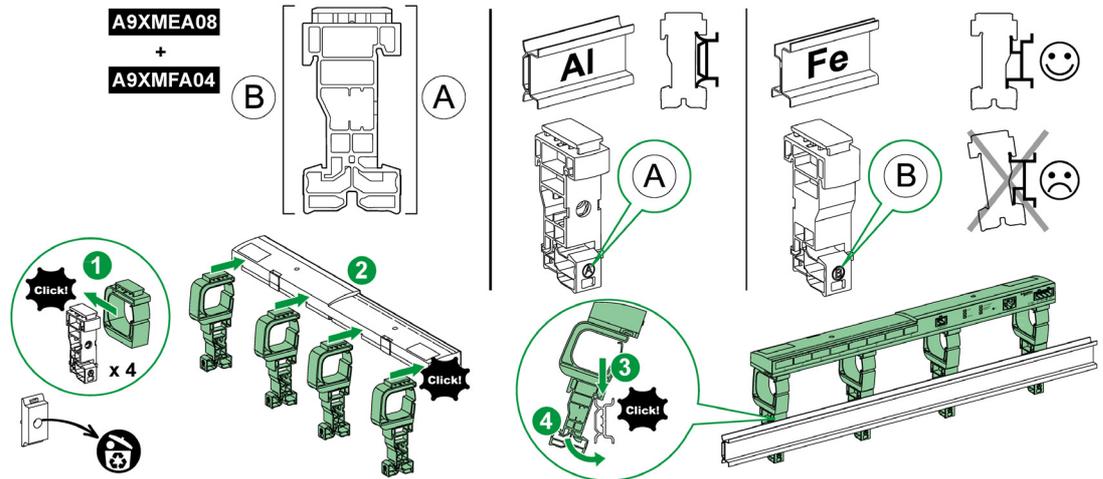
The following table describes the procedure for mounting the Acti 9 Smartlink Ethernet device on a DIN rail:

Step	Action
1	Clip one bracelet onto one foot according to the type of rail. Repeat this step three times.
2	Clip the Acti 9 Smartlink Ethernet device on top of the bracelets.
3	Place the top of the foot at an angle against the top lip of the rail.
4	Clip the bottom of the foot into place.
5	Repeat steps 3 and 4 for each of the other three feet.

Simple DIN Rail Mounting

To mount the system on a simple DIN rail (iron), use side **A** of the foot.
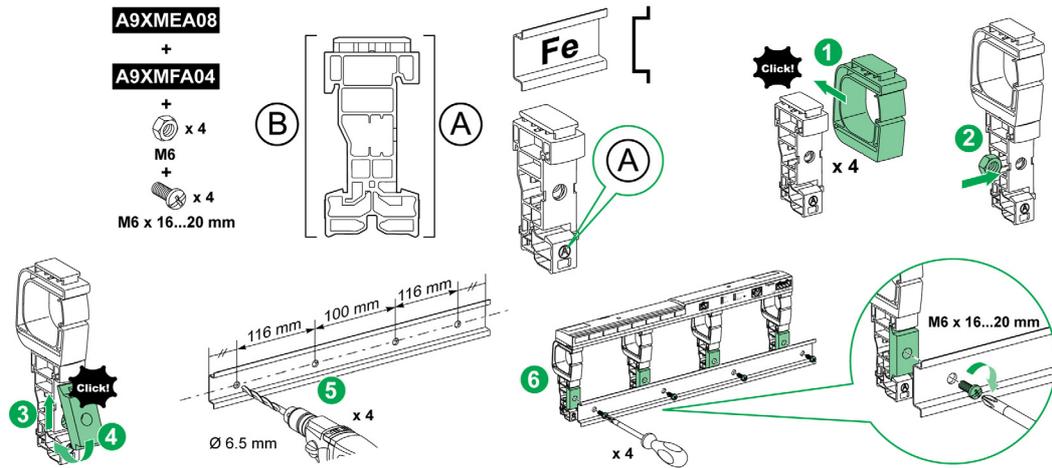
The following table describes the procedure for mounting the Acti 9 Smartlink Ethernet device on a simple DIN rail:

Step	Action
1	Clip one bracelet onto side **A** of a foot. Repeat this step three times.
2	Place one M6 nut inside a foot. Repeat this step three times.
3	Position the top of an adaptor diagonally at the front of a foot.
4	Clip the bottom of the adaptor into place. Repeat steps 3 and 4 three times.
5	Drill the rail making sure that the drill hole diameters and positioning dimensions are correct, as shown in the above graphic.
6	Screw the feet onto the rail.

Mounting on Multiclip 80
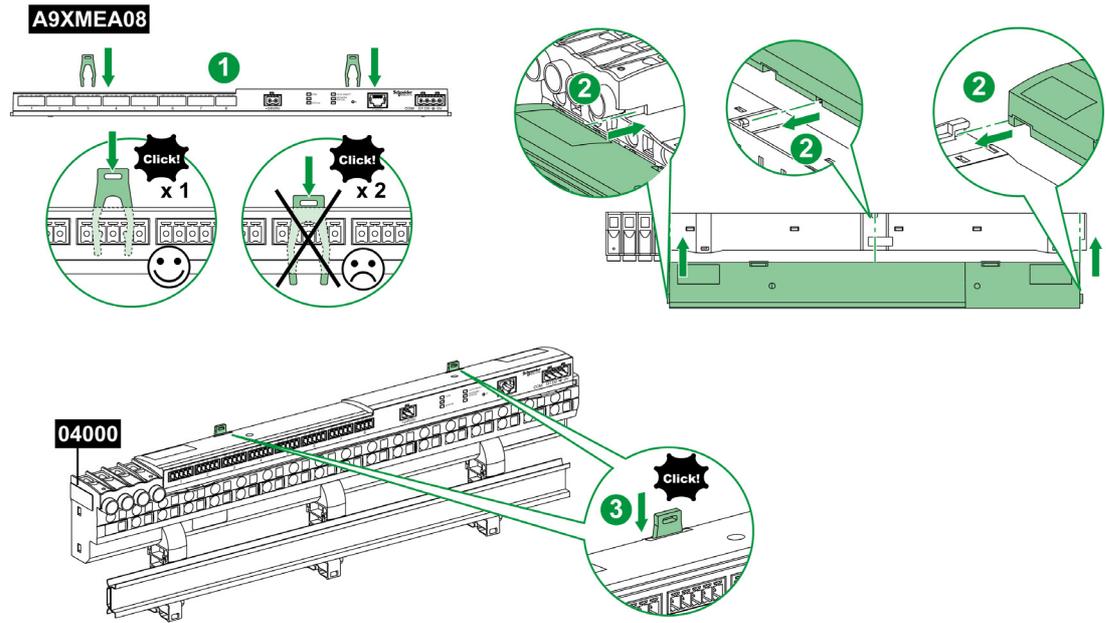
The following table describes the procedure for mounting the Acti 9 Smartlink Ethernet device on Multiclip 80.

Step	Action
1	Position the two clips in the notches on the Acti 9 Smartlink Ethernet device.
2	Slide the Acti 9 Smartlink Ethernet device front first onto the Multiclip 80 until fully inserted.
3	Push down the two clips until they click into place.

Mounting on Multiclip 200
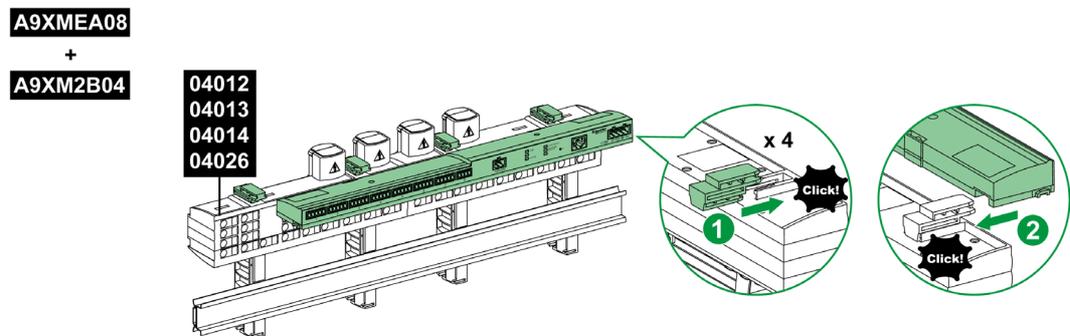
The following table describes the procedure for mounting the Acti 9 Smartlink Ethernet device on Multiclip 200.

Step	Action
1	Slide the four spacers from the back into the notches on top of the Multiclip 200.
2	Slide the Acti 9 Smartlink Ethernet device front first onto the spacers, until it clicks into place.

Mounting with Brackets
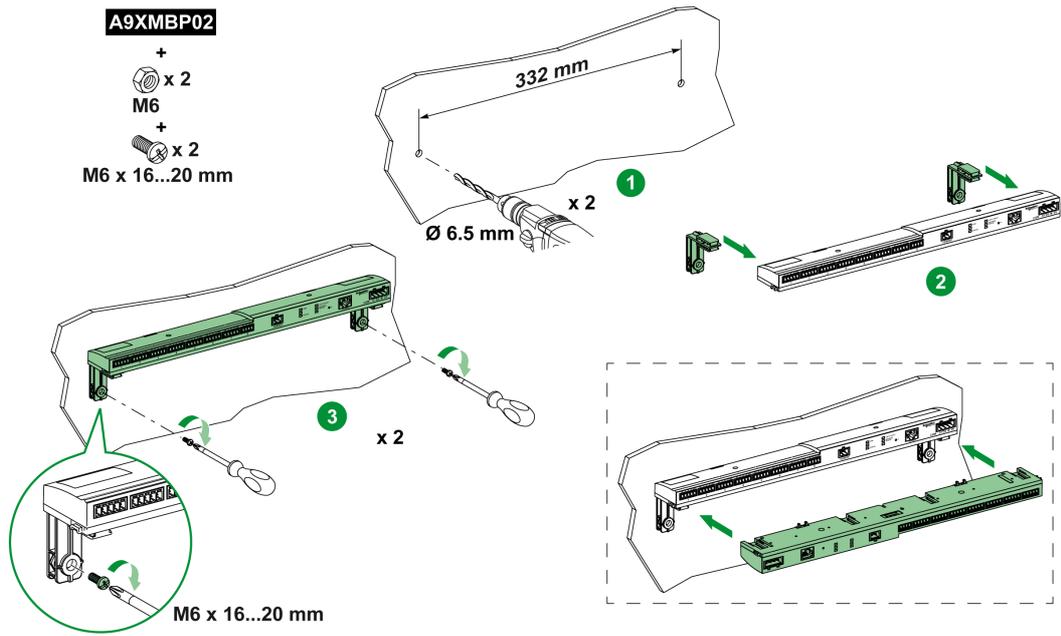
The following table describes the procedure for mounting the Acti 9 Smartlink Ethernet device with brackets.

Step	Action
1	Drill the plate of the cubicle making sure that the drill hole diameters and positioning dimensions are correct, as shown in the preceding graphic.
2	Slide the 2 brackets, from the back of the Acti 9 Smartlink Ethernet device, into the notches on the bottom of the Acti 9 Smartlink Ethernet device until they click into place.
3	Screw the brackets onto the plate.

Connection

Safety Instructions

⚡ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Wear suitable personal protective equipment and follow the currently applicable electrical safety instructions.
- This equipment may only be installed by qualified electricians who have read all the relevant information.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested and tagged. Pay particular attention to the design of the power system. Consider all power supply sources, particularly the potential for backfeed.
- Before closing protective covers and doors, carefully inspect the work area to ensure that no tools or objects have been left inside the equipment.
- Take care when removing or replacing panels. Take special care to ensure that they do not come into contact with live busbars. To minimize the risk of injuries, do not tamper with the panels.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Failure to follow basic installation procedures can lead to personal injury as well as damage to electrical equipment or other property.
- NEVER shunt an external fuse/circuit breaker.
- This equipment must be installed inside a suitable electrical cabinet.

Failure to follow these instructions will result in death or serious injury.

⚡ ⚠ DANGER

RISK OF ELECTROCUTION

Isolate the Acti 9 Smartlink Ethernet power terminals from the power terminals connected to the Modbus network line.

Failure to follow these instructions will result in death or serious injury.

Connecting the Power Supply Connector
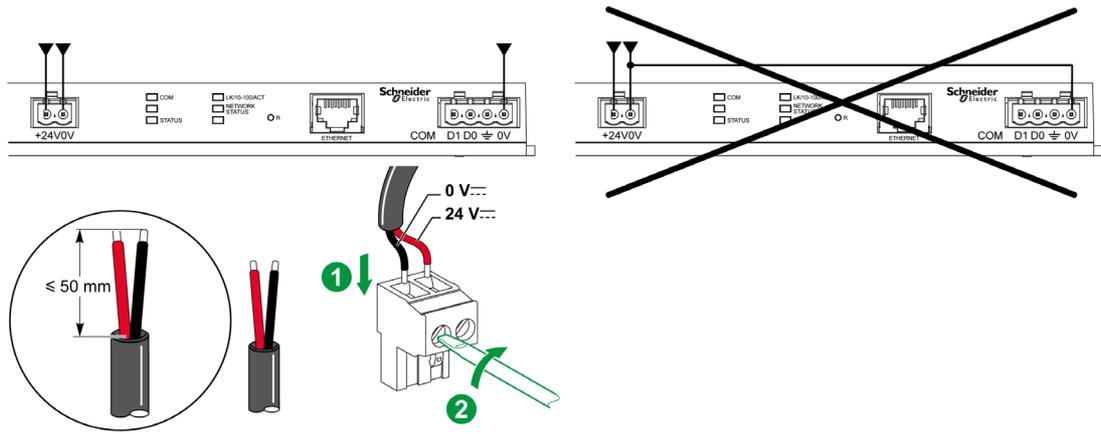
The table below describes the procedure for connecting the power supply connector:

Step	Action
1	Insert both stripped power supply wires in the connector.
2	Fix the wires in place using the connector tightening screws.

The table below gives the characteristics of cables that can be used to connect the 24 Vdc power supply:

7 mm	0.2...1.5 mm²			0.8 N.m	0.6 x 3.5

Connecting the Modbus Connector

The Schneider Electric communication cables to be used are:

Product Reference	Description	Length (m)
50965	RS 485 double shielded twisted pair cable for Modbus serial link (supplied without connector)	60
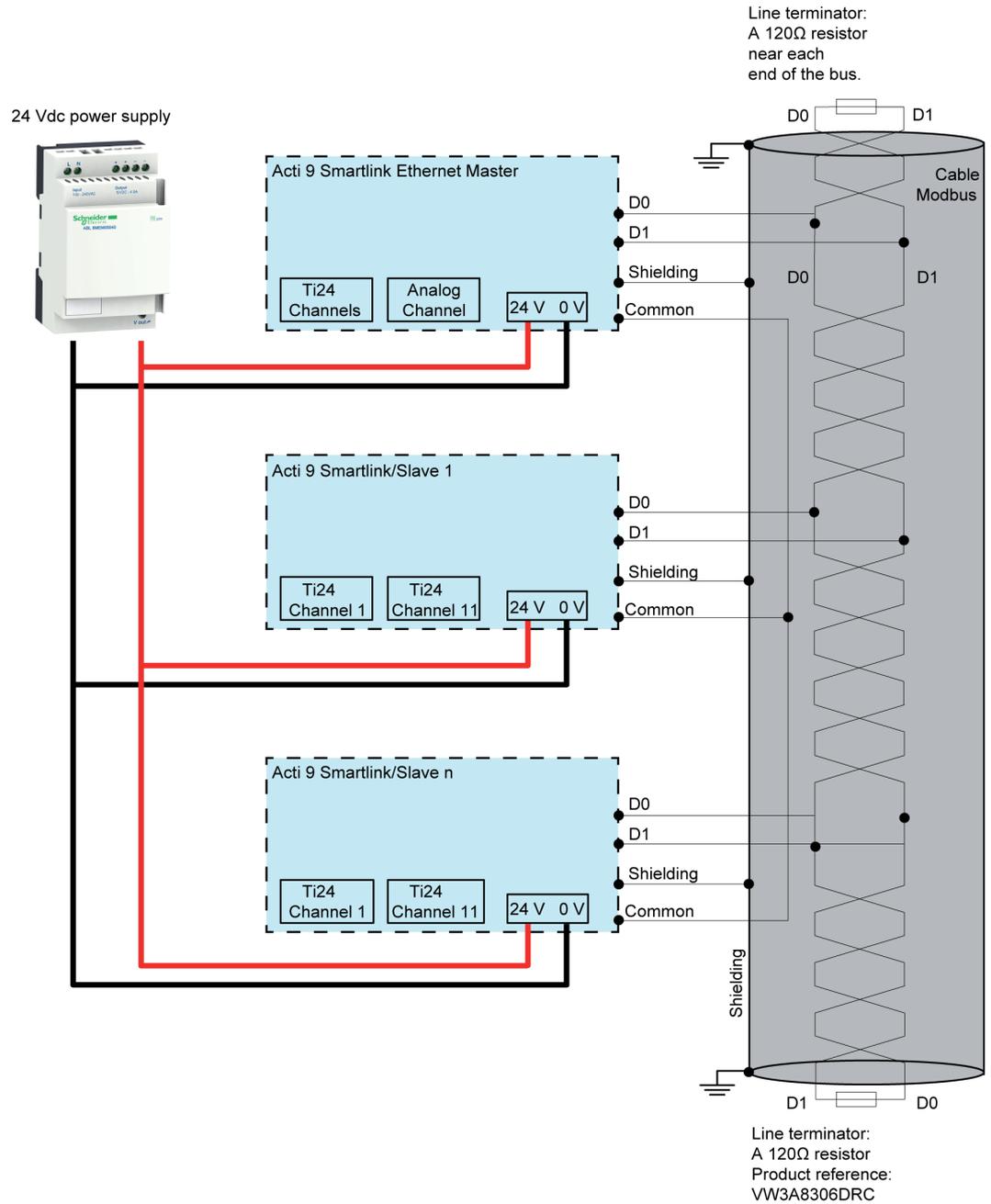
NOTE:
- It is possible to use a common 24 Vdc power-supply for several Acti 9 Smartlink devices if installed in the same switchboard.

<div style="border: 2px solid black;">

NOTICE

HAZARD OF NON-OPERATION OF MODBUS NETWORK

Comply with the wiring and connection rules described below in order to create a working Modbus network.

Failure to follow these instructions can result in equipment damage.

</div>
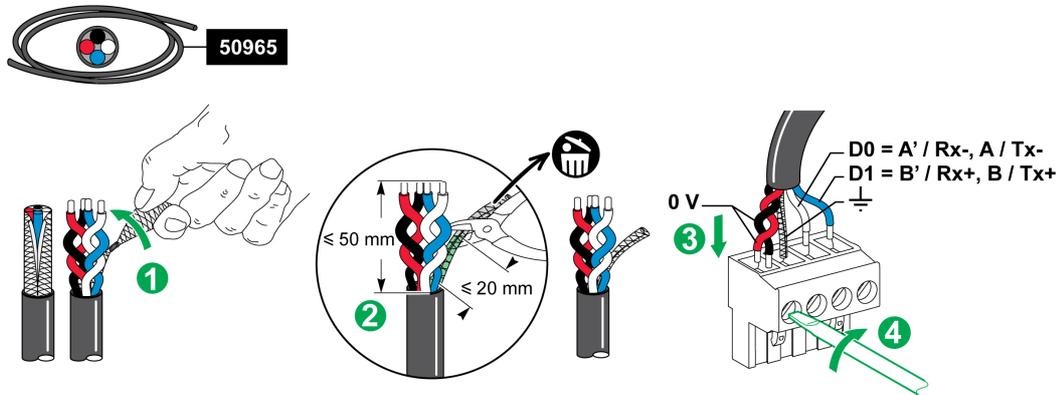
The table below describes the procedure for connecting the Modbus connector:

Step	Action
1	Coil up the Modbus communication cable shielding.
2	Cut the shielding 20 mm from the sheath.
3	Insert the stripped wires in the connector terminals as shown in the above graphic.
4	Fix the wires in place using the connector tightening screw.

The table below gives the characteristics of cables that can be used to connect the Modbus connector:

7 mm	0.2...1.5 mm²			0.8 N.m	0.6 x 3.5

Checking the Modbus Serial Link

The table below gives the characteristics of the RS 485 link that need to be checked during installation:

Designation	Description
Shielding connection	Each Modbus serial link must have shielding connected at one point to an earthed link.
Bus polarization	● Pull-up resistor connected to the 5 V: 450...650 Ohm ● Pull-down resistor connected to ground (Modbus 0 V): 450...650 Ohm **NOTE:** This polarization is recommended for the master.
Line terminator	A 150 Ohm resistor ± 5%
Ground polarity	The ground circuit (0 V of an optional power supply) must be connected directly to a protected earth, preferably at a single point on the bus. This point is usually placed on the master or its slaves.
Trunk cable	A pair of shielded twisted cables and a third conductor at minimum.
Maximum length of bus	1000 m at 19,200 Baud with the Schneider Electric 50965 cable.

Chapter 6
Connection of Input/Output Channels

What Is in This Chapter?

This chapter contains the following topics:

Acti 9 Devices with Ti24 Interface

Overview

Auxiliary devices such as iACT24, iATL24, iOF+SD24, OF+SD24, RCA iC60, and Reflex iC60 can be connected to the Acti 9 Smartlink Ethernet with Acti 9 communication system pre-asssembled cables.

Wiring

The figure below shows the connection of auxiliary devices to the Acti 9 Smartlink Ethernet using pre-assembled cables:
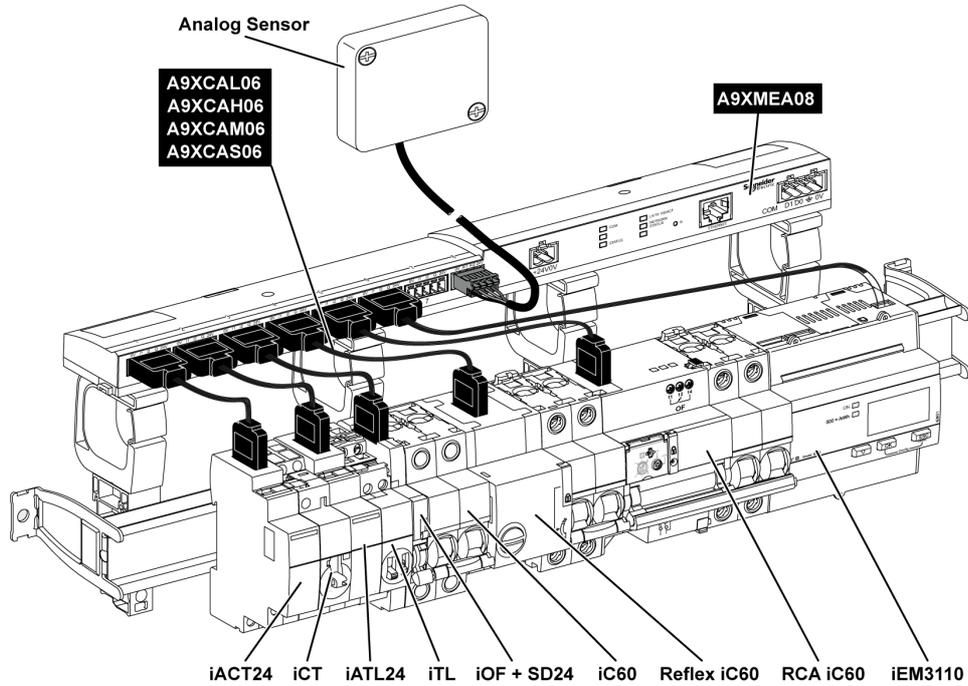
NOTE: A9XCAU06 or A9XCAC01 cable could be used to link Acti 9 devices with Ti24 interface to Acti 9 Smartlink.
In this case, for the connection of iACT24 and iATL24, input I2 must be connected on both ends of A9XCAU06 or A9XCAC01 cable.

Meters

Overview

The iEM2000T, iEM3110, iEM3155, iEM3210, iEM3255, and iEM3355 products are kilowatt-hour meters from the Schneider Electric range.

Meters not in the Acti 9 range can be controlled by an Acti 9 Smartlink channel. These meters must have the following characteristics:
- 1 pulse output
- Compatibility with standard CEI 62053-31

Wiring

iEM2000T, iEM3110, iEM3155, iEM3210, iEM3255, and iEM3355 kilowatt-hour meters can be connected to channel N (1 ≤ N ≤ 7) of an Acti 9 Smartlink Ethernet module with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink Ethernet end), and with 5 wires (at iEM2000T end).
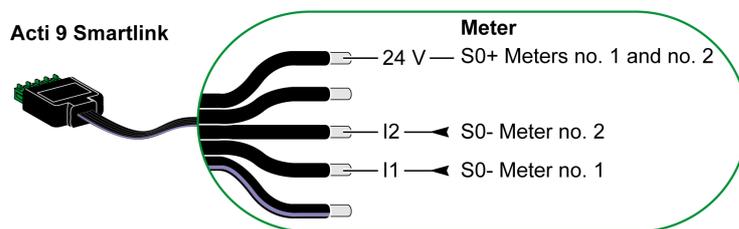
NOTE: A single Acti 9 Smartlink Ethernet channel can take account of 2 meters, 1 meter on input I1 and 1 meter on input I2.

NOTE:
- Do not connect 2 wires in each of the Ti24 connector terminals (A9XC2412).
- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Example of Connection of iEM2000T Meters

1   iEM2000T meter
2   iEM2000T meter
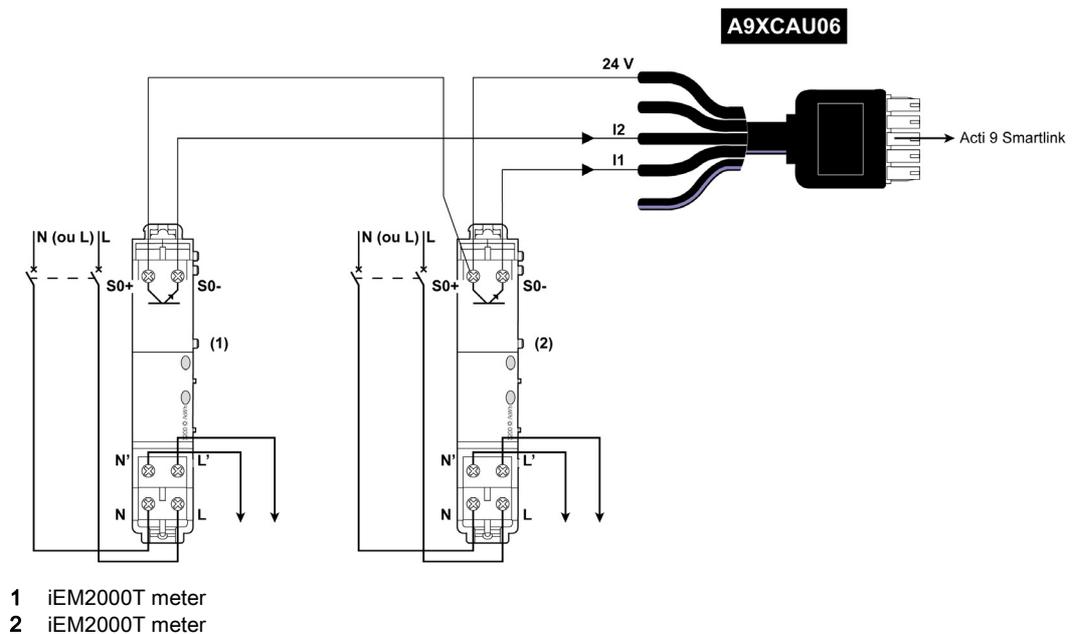
Volt-Free Low Level Indication Contact

Overview

A low level type indication contact (NO or NC) can be connected to input I1 or I2 of an Acti 9 Smartlink Ethernet channel.

NOTE: A single Acti 9 Smartlink Ethernet channel can take account of two indication contacts, one contact on input I1, and one contact on input I2.

Wiring

An indication contact can be connected with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink Ethernet end, and with the five wires (indication contact end).

NOTE:
- Do not connect 2 wires in each of the Ti24 connector terminals (A9XC2412).
- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Example of Connection

The OF and SD contacts of a NSX circuit breaker could be directly connected to Acti 9 Smartlink.
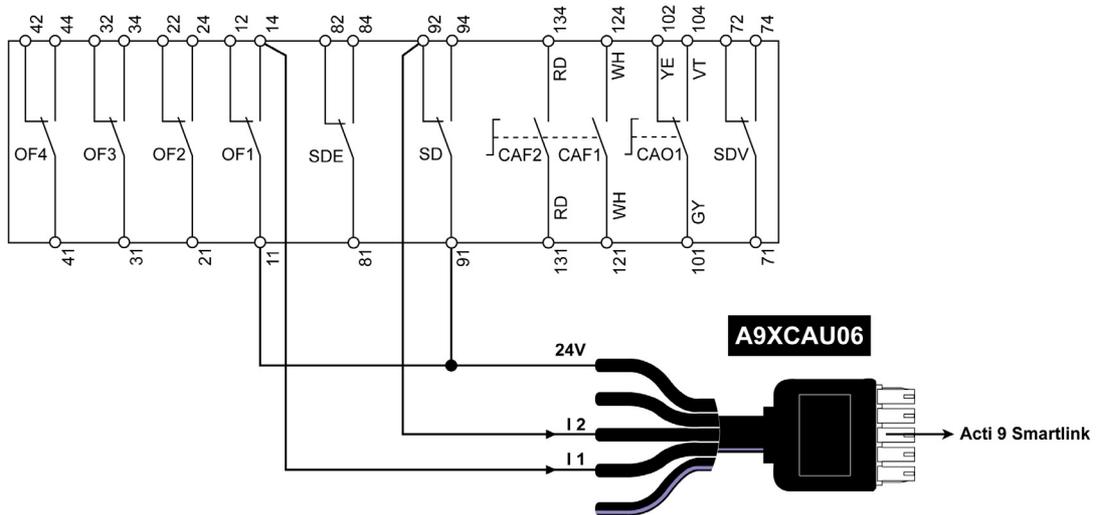
Volt-Free Standard Indication Contact

Overview

A standard indication contact (NO or NC) can be connected to input I1 or I2 of an Acti 9 Smartlink Ethernet channel.

NOTE: A single Acti 9 Smartlink Ethernetchannel can take account of two indication contacts, one contact on input I1 and one contact on input I2. The electrical diagram must be indirect between Acti 9 Smartlink Ethernet and this device: a low level relay must be installed between the contact of this device and Acti 9 Smartlink Ethernet.

Wiring

An indication contact can be connected with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink Ethernet end, and with the five wires (indication contact end).
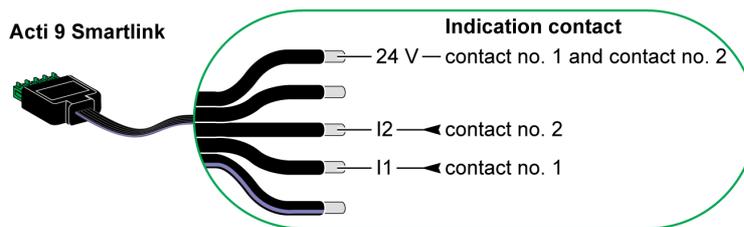
NOTE:
- Do not connect two wires in each of the Ti24 connector terminals (A9XC2412).
- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Example of Connection
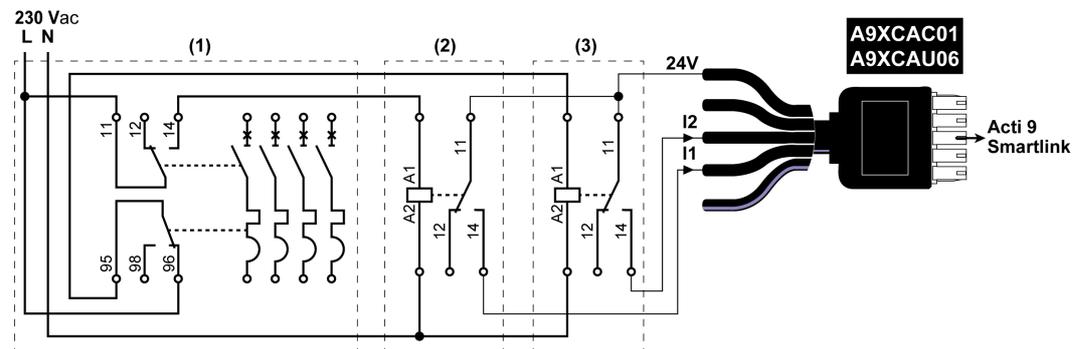
(1) NG125 circuit breaker: OF+SD auxiliary contacts with a minimum current of 100 mA
(2) iRBN relay for OF signal
(3) iRBN relay for SD signal

Surge Arresters

Overview

Acti 9 surge arresters can be connected to Acti 9 Smartlink:
- The remote transfer contact (indication contact: NO) of an Acti 9 surge arrester can be connected to input I1 or I2 of an Acti 9 Smartlink channel.
- The SD fault-trip indication contact (indication contact: NC) of the circuit breaker associated to an Acti 9 surge arrester can be connected to input I1 or I2 of an Acti 9 Smartlink channel.

NOTE: A single Acti 9 Smartlink channel can take account of two indication contacts, one contact on input I1 and one contact on input I2.

Wiring

An indication contact can be connected with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink end), and with the five wires (indication contact end).

The following wiring is dedicated to surge arresters:
- iPRD
- iPRD 40r PV
- iQuick PRD
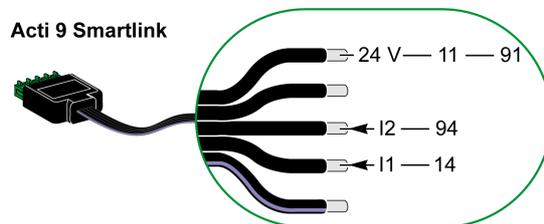
The following wiring is dedicated to surge arresters:
- iPRF1 12.5r
- PRD1 25r
- PRD1 Master
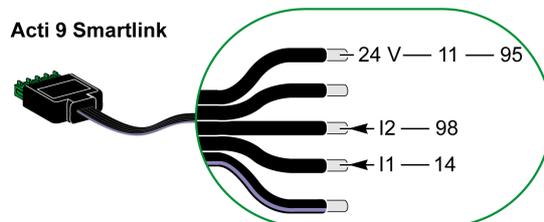
NOTE:
- Do not connect 2 wires in each of the Ti24 connector terminals (A9XC2412).
- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Examples of Connection

The following electrical diagram is dedicated to iPRD surge arrester.
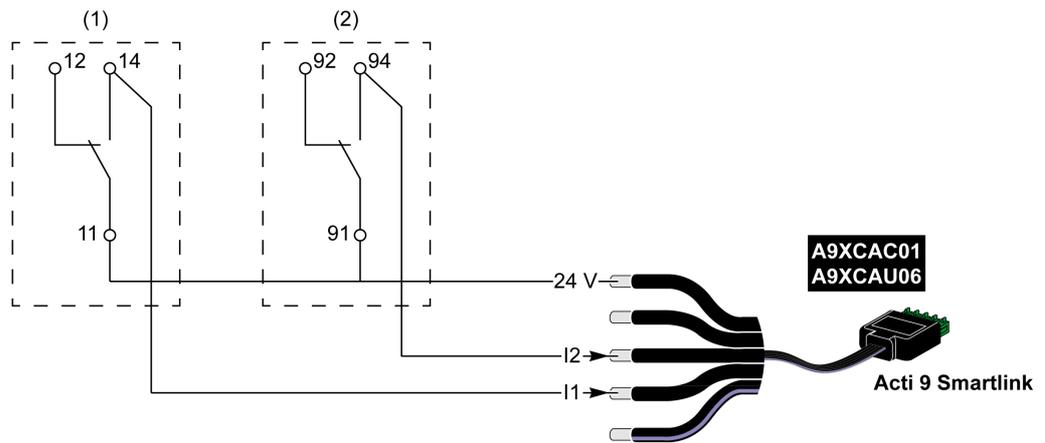
(1) Remote transfer contact of iPRD surge arrester: cartridges status
(2) iSD fault-trip indication contact of iC60 circuit breaker associated to iPRD surge arrester

The following electrical diagram is dedicated to surge arresters:
- iPRD 40r PV
- iQuick PRD
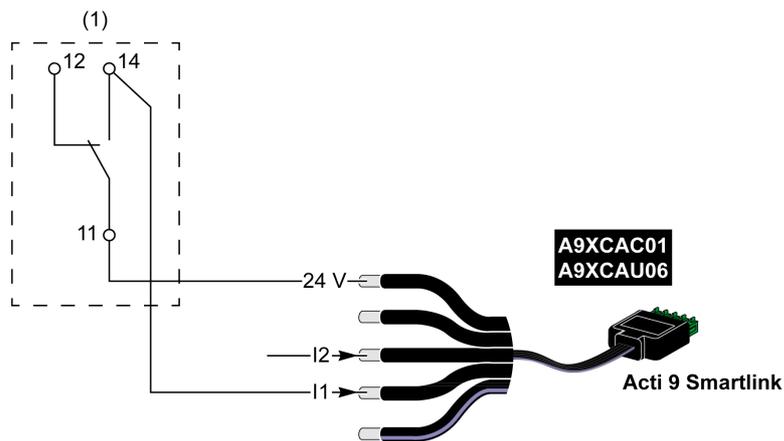
(1) Remote transfer contact of surge arrester: cartridges status

The following electrical diagram is dedicated to iPRF1 12.5r surge arresters:
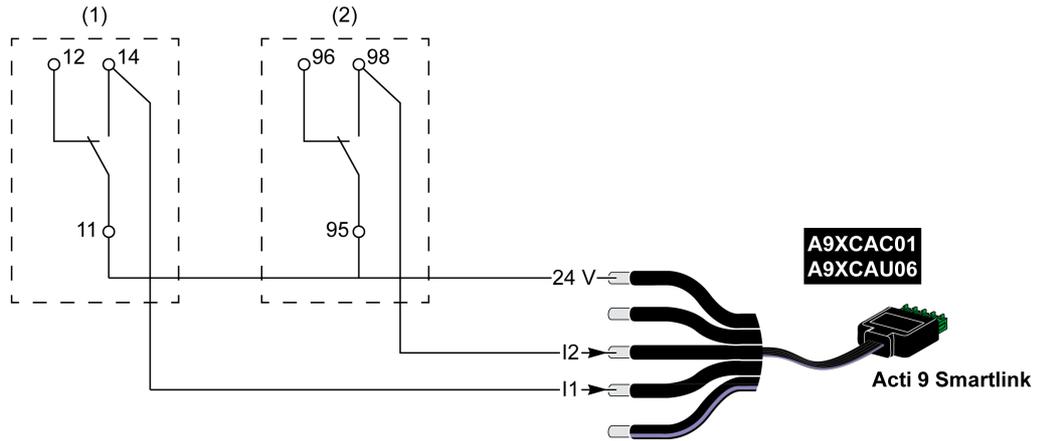
(1) Remote transfer contact of iPRF1 12.5r surge arrester: surge arrester status
(2) iSD fault-trip indication contact of NSX160F or NG125 circuit breaker associated to iPRF1 12.5r surge arrester

The following electrical diagram is dedicated to surge arresters:
● PRD1 25r
● PRD1 Master
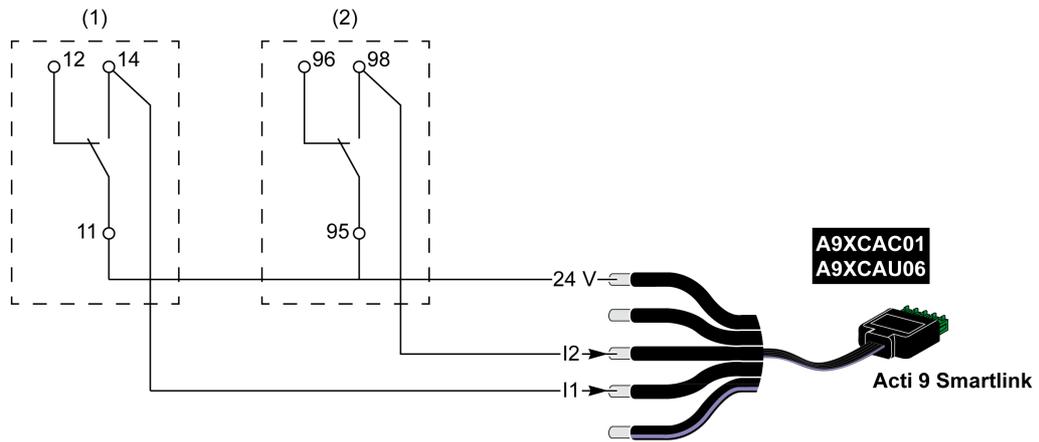
(1) Remote transfer contact of PRD1 25r or PRD1 Master surge arrester: cartridges status
(2) iSD fault-trip indication contact of NSX160 circuit breaker associated to PRD1 25r or PRD1 Master surge arrester

Contactor and Relay (Not in the Acti 9 Range)

Overview

A contactor or relay powered with 24 Vdc can be connected to Acti 9 Smartlink Ethernet. This should have the following characteristics:
- The contactor or relay coil must not draw more than 100 mA
- The indication contact must be low level type

Only contactors in the Acti 9 range can be connected to Acti 9 Smartlink Ethernet using the iACT24 auxiliary.

Wiring

A contactor can be connected with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink Ethernet end), and with five wires (at contactor end).
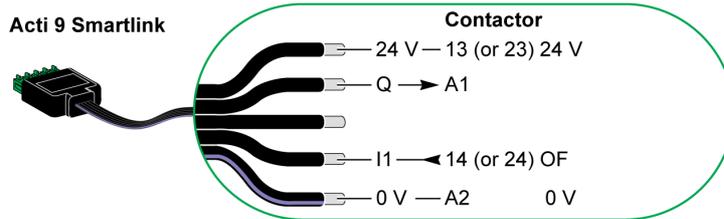

NOTE:
- Do not connect 2 wires in each of the Ti24 connector terminals (A9XC2412).
- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Example of Connection
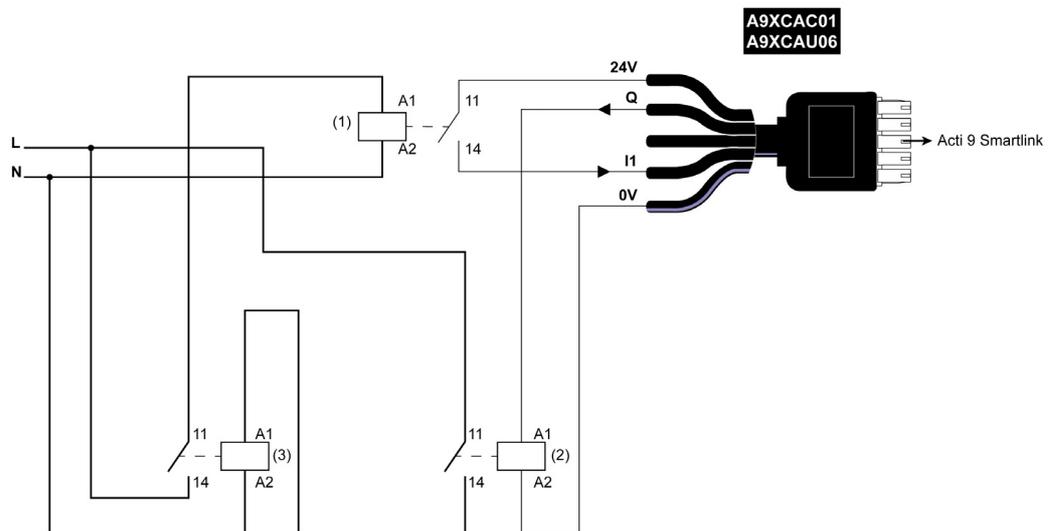
1 Low level relay (for example, iRBN)
2 24 Vdc relay
3 Power contactor (for example, TeSys D, type LC1)

Direct Output Connection

Overview

An indication device or a PLC input can be directly connected to the output (Q) of Acti 9 Smartlink Ethernet channel.

The connected device should have the following characteristics:
- To be powered with 24 Vdc
- The consumption must be less than 100 mA

Wiring

The wiring can be done with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink end), and with five wires (at contactor end).
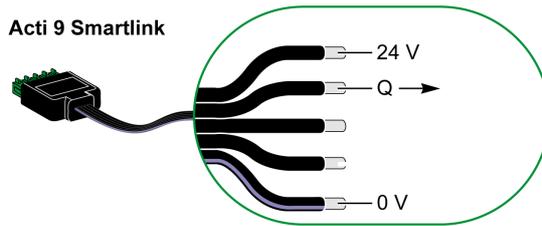
NOTE:
- Do not connect two wires in each of the Ti24 connector terminals (A9XC2412).
- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Example of Connection
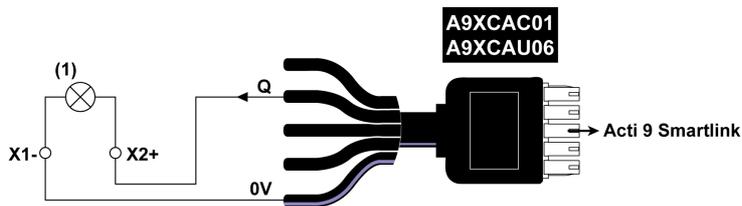
(1) Indication light 24 Vdc

Indirect Output Connection

Overview

Any device (for example: motor) that needs a command circuit of more than 100 mA can be controlled by the output (Q) of a channel of Acti 9 Smartlink Ethernet. The electrical connection between Acti 9 Smartlink Ethernet and the device must be indirect. A low level relay must be installed between the command of the connected device and Acti 9 Smartlink Ethernet.

Wiring

The wiring can be done with an A9XCAU06 or A9XCAC01 pre-wired cable: molded connector (at Acti 9 Smartlink end), and with five wires (at contactor end).
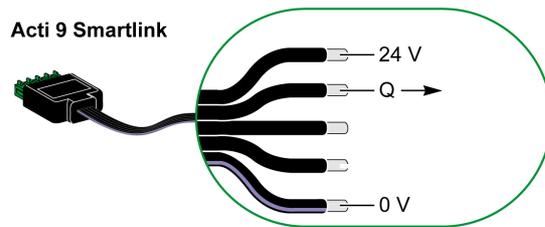
NOTE:

- Do not connect two wires in each of the Ti24 connector terminals (A9XC2412).

- Do not connect a wire with cable end in each of the Ti24 connector terminals.

Example of Connection
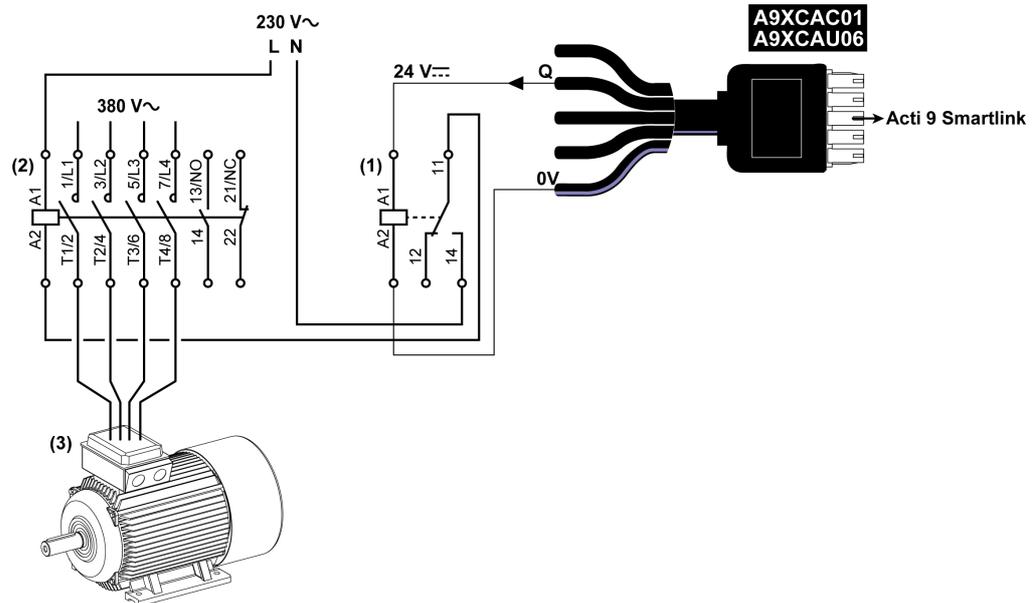
(1) Relay iRTBT
(2) Contactor Tesys D LC1D•25 with an 230 Vac coil
(3) Motor 10 kW with power supply 3-phases 380 Vac

Generating Summary Data Using iOF+SD24 or OF+SD24

Overview

The electrical summary of the SD contacts or summary of the OF contacts can be generated with iOF+SD24 and/or OF+SD24 auxiliaries.

The electrical summary of the OF signals can be done by cabling in series of all OF signals and by connecting this circuit to the I1 input of a channel of Acti 9 Smartlink Ethernet.

The electrical summary of the SD signals can be done by cabling in series of all SD signals and by connecting this circuit to the I2 input of another channel of Acti 9 Smartlink Ethernet.

The OF connections (on I1 input) and the SD connections (on I2 input) cannot be connected to the same channel of Acti 9 Smartlink Ethernet, as the summary information dedicated to the OF signals cannot be separated from the summary information dedicated to the SD signals in Acti 9 Smartlink Ethernet.

The summary of OF (or SD) signals can be wired in series using the A9XC2412 15-pin connector (spring cage). A maximum of 10 OF (or SD) signals can be wired in the same summary.

Wiring SD Contacts on iOF+SD24 or OF+SD24 in Series
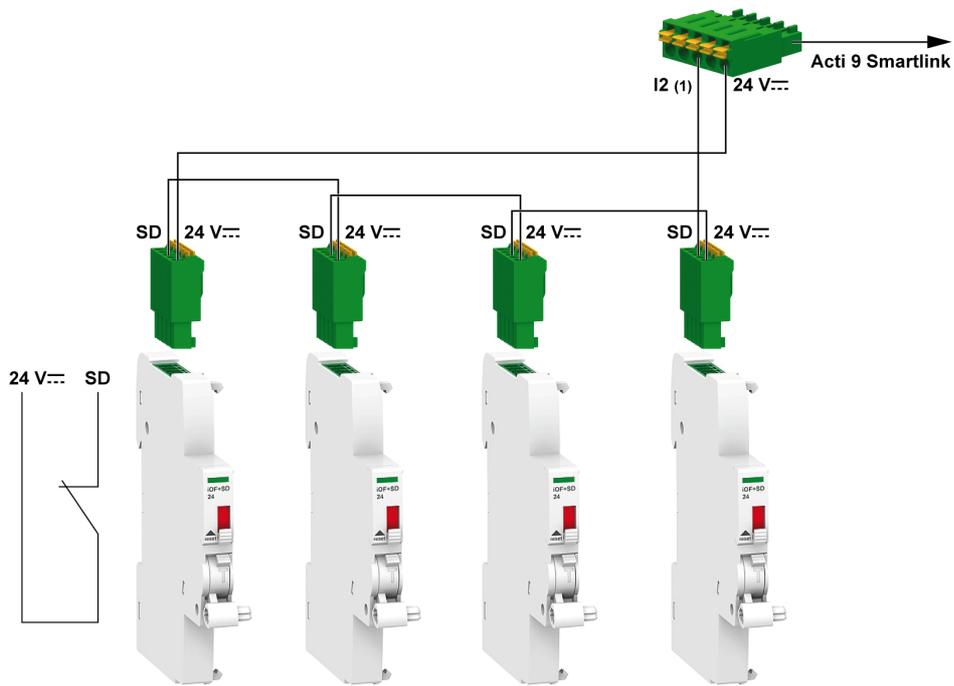
(1) Input I2 (of a channel) on Acti 9 Smartlink Ethernet or PLC input

Wiring OF Contacts on iOF+SD24 or OF+SD24 in Series
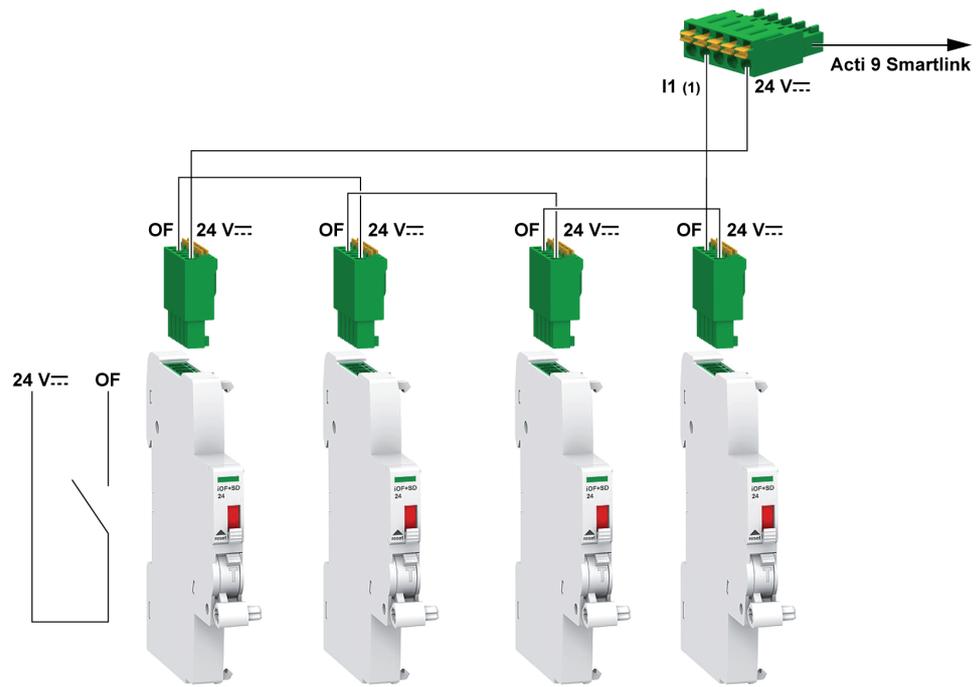
(1) Input I1 (of a channel) on Acti 9 Smartlink Ethernet or PLC input

Analog Input Characteristics and Connection (Recommendation)

Overview

Analog Input Characteristics	Value
Number of analog inputs	2
Type of input	Voltage/Current: IEC 61131 - 2
Rated input voltage	0...10 V
Rated input current	4...20 mA
Input impedance for current mode	140 Ω
Input impedance for voltage mode	50 kΩ
Resolution	12 bits
Accuracy	≤ ±1% of the full scale
Refresh time	500 ms
Isolation	None
Type of cable	Twisted pair or screened cable
Cable length	< 30 m maximum[1]
Channel 8 (analog inputs) maximum sourcing current at 24 V to power the sensors	200 mA for each analog sensor
Conversion time/Refresh time	100 ms
Connector type	Screw type (4-pin), 3.5 mm pitch

NOTE: [1] The instruction for missed wiring or wrong configuration can result in input damage.

Recommendation for Cabling

Connecting the Analog Input Connector

The table below gives the details of the cable reference and specifications of the analog input connector:

Cable Reference		Specifications	Cable Stripping Length	
Manufacturer	Alpha wire	STP Cable (shielded twisted pair	≤ 50 mm	
Part reference	3303	Cable length < 30 m		7 mm
–		AWG between 26 - 16	–	
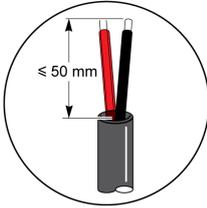
NOTICE

RISK OF DAMAGING THE EQUIPMENT

Ensure that the analog channel configuration and physical connection is accurate.

Failure to follow these instructions can result in equipment damage.

The reference of the analog input connector are:
● Manufacturer: Phoenix
● Commercial reference: 1916410
● Description: PTB PLUG 3.5 NA FMLE MCSCW 4 1x4 PA

Wiring

The following figure shows the sensor powered by Acti 9 Smartlink Ethernet:
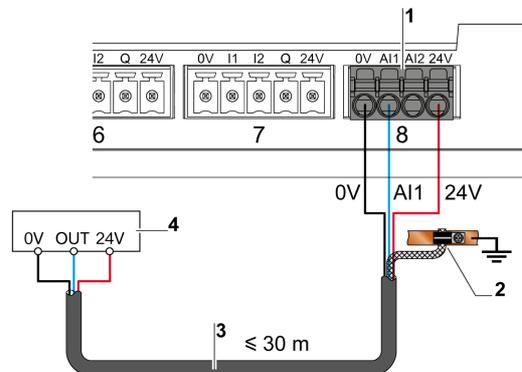
1 Consumption or each AI1 or AI2: 200 mA
2 The shield must be connected to ground near the Acti 9 Smartlink Ethernet with a clamp only
3 Twisted pair, shielded cable
4 Sensor (current/voltage) compliant with IEC 61000-6-2 and IEC61000-6-3 standards

The following figure shows the sensor powered by external power supply:
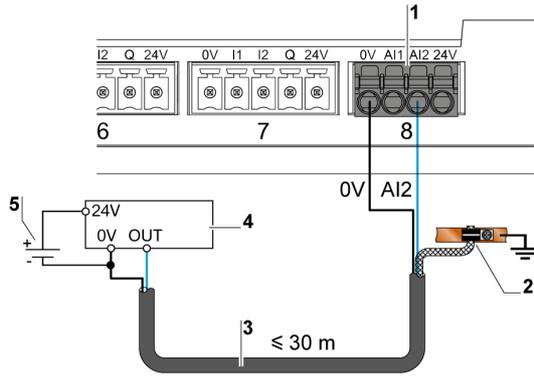
1 Consumption or each AI1 or AI2: 200 mA
2 The shield must be connected to ground near the Acti 9 Smartlink Ethernet with a clamp only
3 Twisted pair, shielded cable
4 Sensor (current/voltage) compliant with IEC 61000-6-2 and IEC61000-6-3 standards
5 External power supply

If the analog sensor is placed outside the panel, then an analog isolator is recommended as per the system specifications.
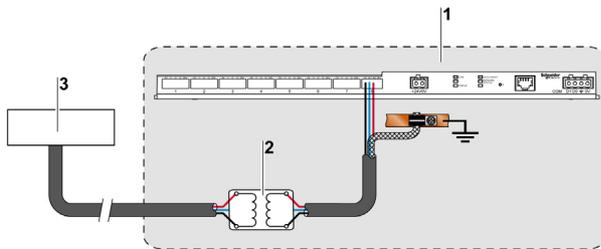
1 Acti 9 Smartlink Ethernet
2 Analog isolator
3 Sensor (current/voltage) compliant with IEC 61000-6-2 and IEC61000-6-3 standards

Connecting the Ethernet Connection

The connection between Acti 9 Smartlink Ethernet and other Ethernet devices is done using a standard straight Ethernet cable (RJ45 shield twist pair).

If Acti 9 Smartlink Ethernet is mounted on Multiclip 200, the cable must be a right angle RJ45 Ethernet cable in order to install a cover in the panel.

RJ45 Connector and Signal Pin
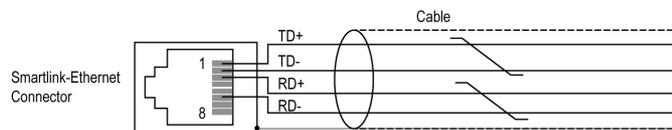
The table below gives the details of RJ45 connector and signal description:

RJ45 Female Pin Number	Signal	RJ45 Male Plug Pair	Signal Description
1	TX+	A	Transmit+
2	TX-	A	Transmit-
3	RX+	B	Receive+
4	Not connected	–	Not connected
5	Not connected	–	Not connected
6	RX-	B	Receive-
7	Not connected	–	Not connected
8	Not connected	–	Not connected

Chapter 7
Getting Started with Acti 9 Smartlink Ethernet

Getting Started with Acti 9 Smartlink Ethernet - Commissioning and Testing

Description

This section helps you to install, commission, and test your Acti 9 Smartlink Ethernet device.

Installing Acti 9 Smart Test Software

The following table describes the procedure for installing the Acti 9 Smart Test software:

Step	Description
1	Go to the Schneider Electric website: *www.schneider-electric.com* or Schneider Electric country website.
2	Enter **DOCA0047WF** in the **Search** field to get Acti 9 Smart Test package with .NET Framework.
3	Download the Acti 9 Smart Test software.
4	Unzip the .zip folder and save it on your system.
5	Click the **setup.exe** file to install the software. During installation, Acti 9 Smart Test upgrades or installs Schneider Electric Modbus Driver Suite. **NOTE:** Make sure that you are connected to Internet during the installation of the software. After the installation is successfully completed, the **Acti 9 Smart Test** icon appears in the PC program.
6	Launch the Acti 9 Smart Test software.

Connecting Acti 9 Smart Test Software to Acti 9 Smartlink Ethernet

The following table describes the procedure to connect the Acti 9 Smart Test software to the Acti 9 Smartlink Ethernet:

Step	Description
1	Connect your PC or laptop directly to the Acti 9 Smartlink Ethernet. **NOTE:** If your PC does not automatically connect to the Acti 9 Smartlink Ethernet, use the RJ45 cable.
2	Click the **Smartlink Ethernet** icon on the **Connect** tab.
3	Select **Automatic Discovery** to discover the Acti 9 Smartlink Ethernet. This also discovers Acti 9 Smartlink Modbus slave devices. The following pop-up screen appears to confirm the firmware upgrade of the Acti 9 Smartlink Ethernet. **NOTE:** To connect and discover only the Acti 9 Smartlink Modbus, click the **Smartlink Modbus** icon.
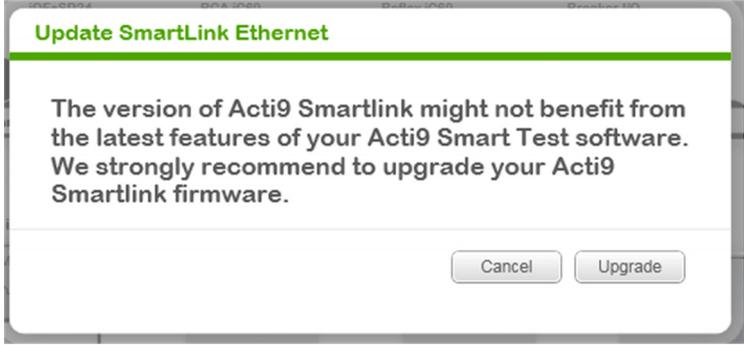
Step	Description
4	Click the **Upgrade** button to upgrade the firmware. After the firmware is upgraded successfully, the Acti 9 Smartlink Ethernet is ready for commissioning. **NOTE:** ● Schneider Electric cannot guarantee the latest feature if the Acti 9 Smartlink Ethernet does not have the latest firmware upgraded. ● The pop-up screen appears only if the firmware is not upgraded to the latest version.

NOTICE

RISK OF DAMAGE TO THE FIRMWARE

● Do not unplug the A9XCATM1 cable during the Acti 9 Smartlink Modbus firmware update.
● Do not unplug the RJ45 cable during the Acti 9 Smartlink Ethernet firmware update.
● Do not interrupt the power to the Acti 9 Smart Test software during the Acti 9 Smartlink firmware update.

Failure to follow these instructions can result in equipment damage.

Commissioning of Acti 9 Smartlink Ethernet and Acti 9 Smartlink Modbus

The following table describes the procedure to commission the Acti 9 Smartlink Ethernet:

Step	Description
1	Select the **Acti 9 Smart Test** tab in the Acti 9 Smart Test software.
2	Click the appropriate **Smartlink** tab to configure Acti 9 Smartlink Ethernet.
3	Select the device from the device toolbox . For each selected device, the 🖉 icon allows to modify the configuration and the ✖ icon allows to reject the product in the online mode. You can configure the following devices: ● iOF/SD: Input 1 informs if the circuit is open (OFF) or closed (ON), and input 2 informs if the device is tripped or not. ● iACT24, iATL24, RCA iC60, and Reflex iC60: These devices control the load from Acti 9 Smart Test. ● Breaker I/O: Collects the information of open/closed status (input 1) and tripped or not tripped status (input 2) of any breaker I/O device (for example, Compact NSX or third party communicating breaker). ● Standard I/O: Configures input1 and input 2 for the same device or different devices (input 1 for device 1 and input 2 for device 2). The meaning of input 1, input 2, and output is available to adapt each input status to your application. ● Energy meters: Configures electrical or any third-party pulse meters. You can select the unit to adapt the pulse meter to the right pulse and you can reset the consumption value to zero or preset to any number. **NOTE:** The consumption value is the multiple of the pulse weight * number of pulses. The system automatically rounds your entry to a multiple of the pulse weight. ● Analog device: Configures the physical value. You can select any physical value to match with the raw value (0...20 mA or 0...10 V).
4	Drag and drop the selected device into Acti 9 Smartlink channel that is required to be configured.
5	Download the configuration into Acti 9 Smartlink Ethernet using the upload 🔼 button.
6	Select the **Reports** tab and click the [💾 Save (.Xlsx)] button to save the generated test report in *.xlsx* format. For more details on Acti 9 Smart Test, refer the *Acti 9 Smart Test User Manual*.

NOTE: For each device, click the [TESTED ☐] button after checking for successful communication.

NOTICE
RISK OF LOSING CONFIGURATION DATA
After the successful commissioning, click upload ⬆ to save the configuration into the Acti 9 Smartlink Ethernet.
Failure to follow these instructions can result in equipment damage.

Saving Test Report

The following table describes the procedure to save the generated test report in *.pdf* or *.xls*x format:

Step	Description
1	Click the **Reports** tab to view the generated test report. You can save the report in *.pdf* or *.xlsx* format for later use.
2	Click the [💾 Save (.Pdf)] button to save the report in *.pdf* format and click the [💾 Save (.Xlsx)] . button to save in *.xlsx* format.

For more details on Acti 9 Smart Test, refer the *Acti 9 Smart Test User Manual*.

The *.xlsx* report has the complete list of Modbus registers and their details that can be configured to integrate Acti 9 Smartlink Ethernet easily into the control system.

Configuring Acti 9 Smartlink Ethernet Web Pages for Email Alarm Configuration and Modbus Metering

Logging to the web page

The following table describes the procedure to log in to the web page and to set date and time of the Acti 9 Smartlink Ethernet:

Step	Description
1	Browse to the network folder of Windows explorer and click the Acti 9 Smartlink Ethernet icon. You can also enter the IP address of the Acti 9 Smartlink Ethernet in the web browser.
2	Enter the username as admin and password as admin to log in to the web page.

Setting date and time of the Acti 9 Smartlink Ethernet

The following table describes the procedure to set the date and time of the Acti 9 Smartlink Ethernet:

Step	Description
1	Click **Settings → General → Date/time** in the web page of the Acti 9 Smartlink Ethernet.
2	Enter the date and time in the respective fields in the **Date/time** page.
3	Click **Apply Changes** to save the settings.

Configuring the email settings and email events in the web page

The following table describes the procedure to configure the email service and email events in the web page of the Acti 9 Smartlink Ethernet:

Step	Description
1	Click **Settings → Events Notification → Email Service Setup** in the web page of the Acti 9 Smartlink Ethernet. **NOTE:** The system is configured to work with a predefined email server managed by Schneider Electric.
2	Select the **Enable** check box to configure the email server. You can configure email using one of the following options: • The pre-configured **schneider-electric mail server** profile. • The **my own SMTP server** profile that you can configure the email settings according to the requirement. • The Facility Hero service in the **Settings → Communication → Facility Hero** web page of the Acti 9 Smartlink Ethernet sends an alarm to the Facility Hero notification center on occurrence of an event.
3	If you are not using Facility Hero service, then create user accounts. Click **Settings → User management → Users accounts** page to create a new user accounts.
4	Click the **Settings → Events Notification → Email Events** page to create an alarm event.

NOTE: For the default **schneider-electric mail server** profile, we use a high level of cyber security that is compatible with highest standard on the Internet.

Configuring the Modbus slave devices in the web page

The following table describes the procedure to configure the Modbus slave devices of the Acti 9 Smartlink Ethernet:

Step	Description
1	Click **Settings → Modbus Slave Devices → Device List** in the web page of the Acti 9 Smartlink Ethernet.
2	Add Modbus slave devices manually or use **Auto Discover** feature to discover the connected slave devices.
3	You can view the Modbus slave devices in the **Quick View** page and the **Monitoring and Control** page of the web page.
4	Click **Settings → Modbus Slave Devices → Incomer Selection** and enable the meter, which is the incomer.
5	Click **Diagnostics → Communication** to check the communication of all slave devices.

Configuring the IPv4/v6 service in the web page

The following table describes the procedure to configure IPv4 and IPv6 service of the
Acti 9 Smartlink Ethernet:

Step	Description
1	Click **Settings → Communication → IPv4/v6** to change the IP address to static IP address and to enable IPv6 service.
2	Change the IP address to static IP address. **NOTE:** To enable IPv6 service, it is required to restart the system. To restart the system, click **Settings → Communication → Ethernet** page and click the **Reboot** button
3	Click the **Enable** check box to enable the IPv6 service. IPv6 is enabled by default. **NOTE:** To enable IPv6 service, it is required to restart the system. Click the **Settings → Communication → Ethernet** page and then click **Reboot** to restart the system,

Chapter 8
Setting Up Ethernet Communication

What Is in This Chapter?

This chapter contains the following topics:

Ethernet Principle

Overview

Ethernet is a data link and physical layer protocol defined by IEEE 802 specification that connects computer or other Ethernet devices. Ethernet is an asynchronous Carrier Sense Multiple Access with Collision detection (referred as CSMA/CD) protocol. Carrier Sense means that the hosts can detect whether the medium (coaxial cable) is idle or busy. Multiple Access means that multiple hosts can be connected to the common medium. Collision Detection means a host detects whether its transmission has collided with the transmission of another host (or hosts).

Acti 9 Smarlink Ethernet can be connected to a PC or a laptop over Ethernet. Acti 9 Smarlink Ethernet provides a Modbus TCP/IP gateway over Ethernet to enable Modbus TCP communication from a Modbus TCP master to any Modbus slave devices connected to it.

The maximum active Modbus TCP client connection is eight.

Acti 9 Smarlink Ethernet has an embedded web server (web page).

Set Up and Ethernet Addressing Mode

Ethernet Connection

The table below provides the steps recommended to connect a PC or a laptop for the first time to Acti 9 Smartlink Ethernet device:

Step	Action
1	**Disconnect your PC from all networks.**
2	Connect an Ethernet straight cable between your PC or a laptop and the Ethernet port on the Acti 9 Smartlink Ethernet.
3	Perform the actions described in the section below for accessing web page.

The following tables provides the steps to access web page of Acti 9 Smartlink Ethernet from Windows XP and Windows 7.

Access Web Page of Acti 9 Smartlink Ethernet from Windows XP

The table below provides the steps to access web page of Acti 9 Smartlink Ethernet from Windows XP:

Use Case	Procedure
Panel not connected to building network	1. Launch the web browser (Google Chrome, Internet Explorer, Mozilla Firefox, or Safari)[1] on your PC. 2. Type the IPv4 address[2] in the address field of the web browser. 3. Press ENTER. This opens the home page of the web page.
Panel is already connected for the first time to building network with no DHCP server, using static addressing mode	1. Connect your PC or a laptop directly to Acti 9 Smartlink Ethernet (point to point) or if not connected to Acti 9 Smartlink Ethernet, connect your PC to the building Ethernet network. 2. Launch the web browser (Google Chrome, Internet Explorer, Mozilla Firefox, or Safari)[1] on your PC. 3. Type the IPv4 address[2] in the address field of the web browser. 4. Press ENTER. This opens the home page of the web page. 5. From the web page, click **Settings** menu - **IPv4/v6 page**, **Manual IP Addressing** parameter, type new IPv4 address, subnet mask, and gateway address. 6. Put a sticker on the product with the new IPv4 address.
Panel is already connected to building network with DHCP server, using dynamic addressing mode	1. Connect your PC or a laptop to the building Ethernet network. 2. Launch the web browser (Google Chrome, Internet Explorer, Mozilla Firefox, or Safari)[1] on your PC. 3. Type the name[3] of the Acti 9 Smartlink Ethernet in the address field of the web browser. 4. Press ENTER. This opens the home page of the web page.

[1] The browsers compatible with Acti 9 Smartlink Ethernet are:
- Internet Explorer (Windows) version 8, 9, 10, and 11
- Google Chrome (Windows) version 42.0.2311.90 m
- Mozilla Firefox version 27.0.1
- Safari (Windows) from 5.1.7

[2] IPv4 address is printed on Acti 9 Smartlink Ethernet with this format 169.254.xxx.yyy. The 2 last numbers (xxx, yyy) are unique per product.
[3] By default the name of the product is SmartLinkIP-1234.

NOTE: It is recommended to use Google Chrome web browser to display the Acti 9 Smartlink Ethernet web pages. If you want to use Internet Explorer web browser to display the web pages, refer to the troubleshooting section *(see page 181)*.

Access Web Page of Acti 9 Smartlink Ethernet from Windows 7

The table below provides the steps to access web page of Acti 9 Smartlink Ethernet from Windows 7:

Use Case	Procedure
Panel not connected to building network	1. Connect your PC or a laptop directly to Acti 9 Smartlink Ethernet (point to point) or connect your PC or a laptop to the Ethernet switch of the panel. 2. Launch the Windows explorer, then select Network to see the available devices. 3. Double-click on the auto-discovered[3] Acti 9 Smartlink Ethernet product. This opens the home page of the web page.
Panel is already connected for the first time to building network with no DHCP server, using static addressing mode	1. Connect your PC or a laptop directly to Acti 9 Smartlink Ethernet (point to point) or connect your PC or a laptop to the Ethernet switch of the panel or if not connected to Acti 9 Smartlink Ethernet, connect your PC to the building Ethernet network. 2. Launch the Windows explorer, then select Network to see the available devices. 3. Double-click on the auto-discovered[3] Acti 9 Smartlink Ethernet product. This opens the home page of the web page. 4. From the web page, click **Settings** menu - **IPv4/v6 page**, **Manual IP Addressing** parameter, type new IPv4 address, subnet mask, and gateway address. 5. Put a sticker on the product with the new IPv4 address.
Panel is already connected to building network with DHCP server, using dynamic addressing mode	From either different subnet or same subnet: 1. Connect your PC or a laptop to the building Ethernet network. 2. Launch the web browser (Google Chrome, Internet Explorer, Mozilla Firefox, or Safari)[1] on your PC. 3. Type the name[3] of the Acti 9 Smartlink Ethernet in the address field of the web browser. 4. Press ENTER. This opens the home page of the web page. From same subnet: 1. Connect your PC or a laptop to the building Ethernet network. 2. Launch the Windows explorer, then select Network to see the available devices. 3. Double-click on the auto-discovered[3] Acti 9 Smartlink Ethernet product. This opens the home page of the web page.
Panel is already connected to the building network with DHCP server, using fixed addressing mode	From either different subnet or same subnet: 1. Connect your PC or a laptop to the building Ethernet network. 2. Launch the web browser (Google Chrome, Internet Explorer, Mozilla Firefox, or Safari)[1] on your PC. 3. Type the IPv4 address[2] of the Acti 9 Smartlink Ethernet in the address field of the web browser. 4. Press ENTER. This opens the home page of the web page. From same subnet: 1. Connect your PC or a laptop to the building Ethernet network. 2. Launch the Windows explorer, then select Network to see the available IP devices. 3. Double-click on the auto-discovered[3] Acti 9 Smartlink Ethernet product. This opens the home page of the web page.

[1] The browsers compatible with Acti 9 Smartlink Ethernet are:
- Internet Explorer (Windows) version 8, 9, 10, and 11
- Google Chrome (Windows) version 42.0.2311.90 m
- Mozilla Firefox version 27.0.1
- Safari (Windows) from 5.1.7

[2] IPv4 address is printed on Acti 9 Smartlink Ethernet with this format 169.254.xxx.yyy. The 2 last numbers (xxx, yyy) are unique per product.

[3] By default the name of the product is SmartLinkIP-1234.

Access Web Page using Tablet

The table below describes the procedure to access web page using tablet:

Step	Action
1	Connect Acti 9 Smartlink Ethernet to the wireless router using Ethernet cable.
2	Search for the available networks in the tablet.
3	Connect the tablet to the same wireless router to which Acti 9 Smartlink Ethernet is connected.
4	Launch web browser in the tablet after a connection is established.
5	Type the IP address of the Acti 9 Smartlink Ethernet on the web browser if Acti 9 Smartlink Ethernet is in static IP address mode. Type the product name (for example, https://SmartlinkIP-1234) on the web browser if Acti 9 Smartlink Ethernet is in DHCP mode and tablet is used along with wireless router (DHCP).
6	Type the username and the password in the login page to access the device.

Access Web Page using Smartphone

The table below describes the procedure to access web page using smartphone:

Step	Action
1	Connect Acti 9 Smartlink Ethernet to the wireless router using Ethernet cable.
2	Search for the available networks in the smartphone.
3	Connect the smartphone to the same wireless router to which Acti 9 Smartlink Ethernet is connected.
4	Launch web browser in the smartphone after a connection is established.
5	Type the IP address of the Acti 9 Smartlink Ethernet on the web browser if Acti 9 Smartlink Ethernet is in static IP address mode. Type the product name (for example, https://SmartlinkIP-1234) on the web browser if Acti 9 Smartlink Ethernet is in DHCP mode and smartphone is used along with wireless router (DHCP).
6	Type the username and the password in the login page to access the device.

Web Page Setting Menu

Description

The first page displayed in the **Settings** menu is the **Identification** page as shown in the following figure:
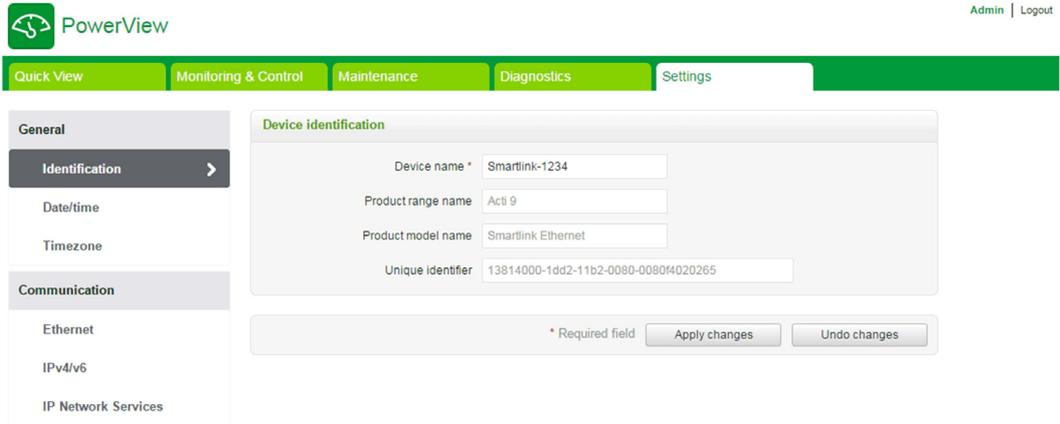
This page is used to read or modify the **Device name** that is used by the communication protocol to identify the device. For more details, refer the Identification page *(see page 106)* described in web page chapter.

Ethernet Settings

The Ethernet parameters can be set using the Acti 9 Smartlink Ethernet web page (access to web page is described in Web Page chapter *(see page 87)*).

The following figure shows the **Ethernet** page to configure Ethernet parameters:
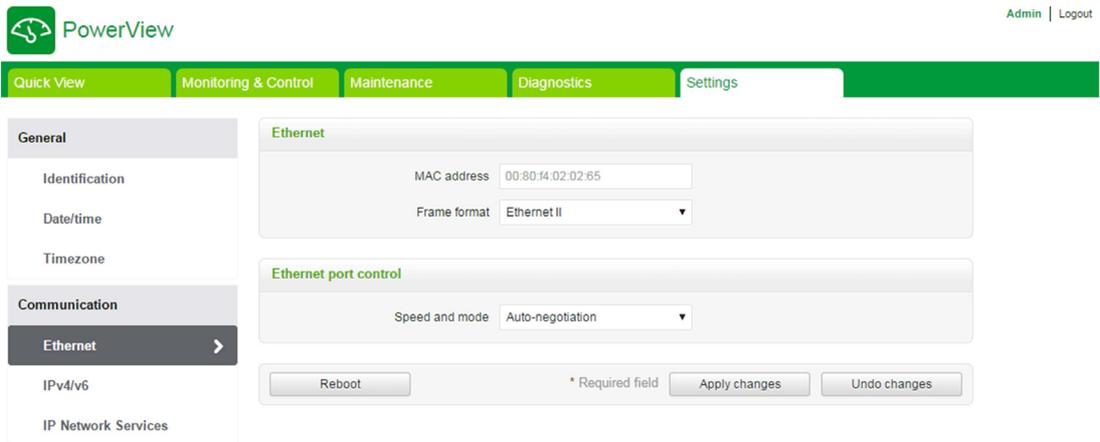
The user can modify the following parameters in **Communication** chapter, **Ethernet** page:
- **Frame format** (the default value is **Auto**)
- **Speed and mode** (the default value is **Auto-negotiation**)

This page also permits to read the **MAC address** of the product. The configuration of the Ethernet parameters is explained in detail in Ethernet page *(see page 109)*.

IPv4/IPv6 Settings

The user can configure the IPv4 parameters using the **IPv4/v6** page in the **Communication** chapter.

The following figure shows the IPv4/IPv6 page:

The user must select either **Automatic** or **Manual** (the default is **Automatic**) mode to configure IPv4 parameters. The user can select DHCP or BOOTP (the default is DHCP) from the list to configure IPv4 parameters using Automatic mode *(see page 110)*.

The user can enter the details of the following parameters to configure the IPv4 parameters in **Manual** mode:
- **IPv4 address**
- **Subnet mask**
- **Default gateway**

The user can select the **Enable** check box to enable the IPv6 service. It is recommended to reboot the device for enable or disable action to take effect.

NOTE: It takes about a minute for the IP setting changes to take effect.

NOTE: The user can access the IPv6 link local address if the PC is in same network as the Acti 9 Smartlink Ethernet. If there is a router between a PC and the Acti 9 Smartlink Ethernet, then the IPv6 link local address cannot be accessed.

IP Network Services

The user can select the IP network services using **IP Network Services** page in the **Communication** chapter.
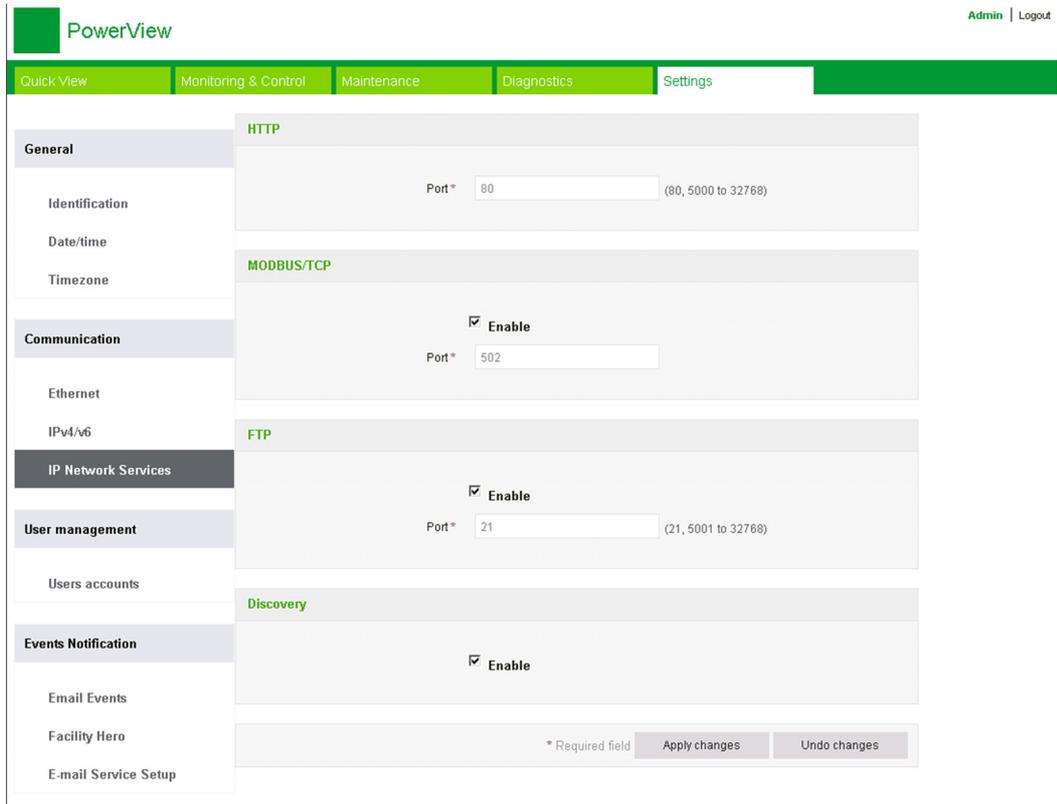
Acti 9 Smartlink Ethernet supports HTTP, FTP, Modbus TCP, and Discovery protocols and services. The user can select the **Enable** check box to enable the **Modbus/TCP** and **Discovery** services. If the discovery service is enabled, user can access Acti 9 Smartlink Ethernet from a laptop or a PC directly. The user cannot modify the HTTP and FTP parameters, as HTTP and FTP are read-only parameters The configuration of the network parameters is explained in detail in IP Network Services page *(see page 111)*.

Acti 9 Smartlink Ethernet Device Function

Modbus TCP/IP Server

Acti 9 Smartlink Ethernet provides a Modbus TCP server to give access to all its data and configuration parameters. Acti 9 Smartlink Ethernet has a fixed unit ID of 255. The Modbus data mapping and read or write accesses is identical to RS485 for same functions or data. In other words, the Modbus data mapping is a subset of RS485 data mapping (at least for digital channels related accesses).

Modbus TCP/IP Gateway

Modbus TCP/IP gateway on Acti 9 Smartlink Ethernet enables communication between a Modbus TCP/IP client connected to the TCP/IP port on Acti 9 Smartlink Ethernet and any Modbus slave devices connected to Acti 9 Smartlink Ethernet. Acti 9 Smartlink Ethernet provides a simple and transparent interface between Ethernet based networks and field devices. This includes meters, monitors, protective relays, trip units, motor controls, and other devices that communicate using Modbus RS485 slave.

Acti 9 Smartlink Ethernet can manage up to eight Modbus RS485 slaves. Address of these slaves could be from 1 to 247 (the default address ranges from 1 through 8).

Modbus communication parameters are:
● Data rate (in Baud) 9,600 and 19,200 (19,200 is the default data rate)
● Parity
  ❍ Even and one stop bit
  ❍ Odd and one stop bit
  ❍ No Parity (parity bit eliminated) two stop bits are needed

Modbus TCP/IP Functions

General Description

The Modbus messaging service provides a client/server communication between devices connected on an Ethernet TCP/IP network.

The client/server model is based on four type of messages:
- Modbus Request, the message sent on the network by the client to initiate a transaction.
- Modbus Indication, the request message received on the server side.
- Modbus Response, the response message sent by the server.
- Modbus Confirmation, the response message received on the client side.

Modbus Client	Request → Indication	Modbus Server
	Confirmation ← Response	
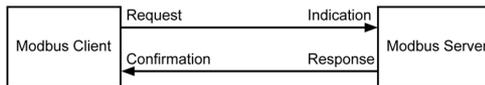
The Modbus messaging services (client/server model) are used for real time information exchange between:
- two device applications
- device application and other device
- HMI/SCADA applications and devices
- a PC and a device program providing on line services

A dedicated header is used on TCP/IP to identify the Modbus Application Data Unit. It is called the MBAP header (Modbus Application Protocol header).

Modbus TCP/IP ADU

MBAP Header	MBAP Header	MBAP Header

PDU
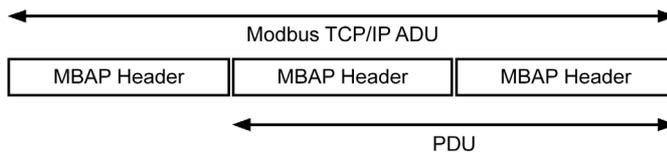
The MBAP header contains the following fields:

Fields	Length	Description	Client	Server
Transaction Identifier	2 bytes	Identification of a Modbus Request/Response transaction	Initialized by the client	Recopied by the server from the received request
Protocol Identifier	2 bytes	0 = Modbus protocol	Initialized by the client	Recopied by the server from the received request
Length	2 bytes	Number of following bytes	Initialized by the client (Request)	Initialized by the server (Response)
Unit Identifier	1 byte	Identification of a remote slave connected on a serial line or on other buses	Initialized by the client	Recopied by the server from the received request

Table of Modbus Functions

The following table describes in detail the functions supported by Acti 9 Smartlink Ethernet devices:

Function Code	Function Name
01	Read n output or internal bits
02	Read n input bits
03	Read n output or internal bits
05	Write 1 bit
06	Write 1 word
08[1]	Modbus diagnostic data
15	Write n bits
16	Write n words
43-14[2]	Read identification
43-15[3]	Read the date and time
43-16[4]	Write the date and time
100-4[5]	Read non-adjacent words where n ≤ 100

[1]For more details, see the appendix describing function 8 *(see page 172)*

[2]For more details, see the appendix describing function 43-14 *(see page 174)*

[3]For more details, see the appendix describing function 43-15 *(see page 176)*

[4]For more details, see the appendix describing function 43-16 *(see page 177)*

[5]For more details, see the appendix describing function 100-4 *(see page 178)*

Modbus TCP/IP Exception Codes

Exception Responses

Exception responses issued by the master or a slave can be the result of data processing errors. One of the following events can occur after a request from the master:

- If the slave receives the request from the master without a communication error and manages the request correctly, it sends back a normal response.
- If the slave does not receive the request from the master due to a communication error, it does not send back a response. The master program ends by applying a time delay condition to the request.
- If the slave receives the request from the master but detects a communication error, it does not send back a response. The master program ends by applying a time delay condition to the request.
- If the slave receives the request from the master without a communication error but cannot manage it (for example, the request consists of reading a register that does not exist), the slave sends back an exception response to inform the master of the nature of the error.

Exception Frame

The slave sends an exception frame to the master to indicate an exception response. An exception response consists of four fields:

Field	Definition	Size
1	Slave number	1 byte
2	Exception function code	1 byte
3	Exception code	n bytes
4	Check	2 byte

Managing Modbus Exceptions

The exception response frame consists of two fields that distinguish it from a normal response frame:

- The exception response's exception function code is the same as the original request function code plus 128 (0x80).
- The exception code depends on the communication error detected by the slave.

The table below describes the exception codes managed by the Acti 9 Smartlink Ethernet device:

Exception Code	Name	Description
01	Illegal function	The function code received in the request is not a permitted action for the slave. It is possible that the slave is in an unsuitable state to process a specific request.
02	Illegal data address	The data address received by the slave is not a permitted address for the slave.
03	Illegal data value	The value of the request data field is not a permitted value for the slave.
04	Slave device failure	The slave is unable to perform a required action due to an unrecoverable error.
06	Slave device busy	The slave is busy processing another command. The master should send the request once the slave is free.

NOTE: For more information, a detailed description of the Modbus protocol is available on *www.modbus.org*.

Access to Variables

A Modbus variable can have the following attributes:

- Read-only
- Read/write
- Write-only

NOTE: An attempt to write to a read-only variable generates an exception response.

Description of Ethernet LEDs

Ethernet LED Status
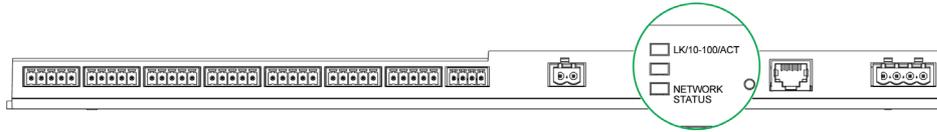
Mode	LED	Status
Ethernet communication	⬜ LK/10-100/ACT	10 Mb
	⬜ LK/10-100/ACT	100 Mb

LED Network Status

Mode	LED	Status
Network status	⬜ NETWORK STATUS	No power, invalid IP address
	🟩 NETWORK STATUS	Connected, valid IP address
	🟧 NETWORK STATUS	Factory setting IPv4 address
	🟥 NETWORK STATUS	Duplicated IP address/IP error
	🟥 NETWORK STATUS	Self-test

Other Protocol or Services

Overview

Acti 9 Smartlink Ethernet supports Simple Network Time Protocol (SNTP) and Devices Profile for Web Services (DPWS) protocols.

Simple Network Time Protocol

Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.

A less complex implementation of NTP, using the same protocol without the storage of state over extended periods of time is known as the Simple Network Time Protocol. It is used in embedded devices and in applications where high accuracy timing is not required.

When automatic time configuration is selected and NTP servers are configured, the Acti 9 Smartlink Ethernet can communicate with NTP and server to synchonizes its time.

Acti 9 Smartlink Ethernet supports time synchronization with remote server using SNTP. When SNTP is activated, time synchronization from one of the selected time servers can be achieved at every configured interval and also supports Modbus time services Get Date-Time (function code 43-15) and Set Date-Time (function code 43-16). The time is configured in 24-hour format.
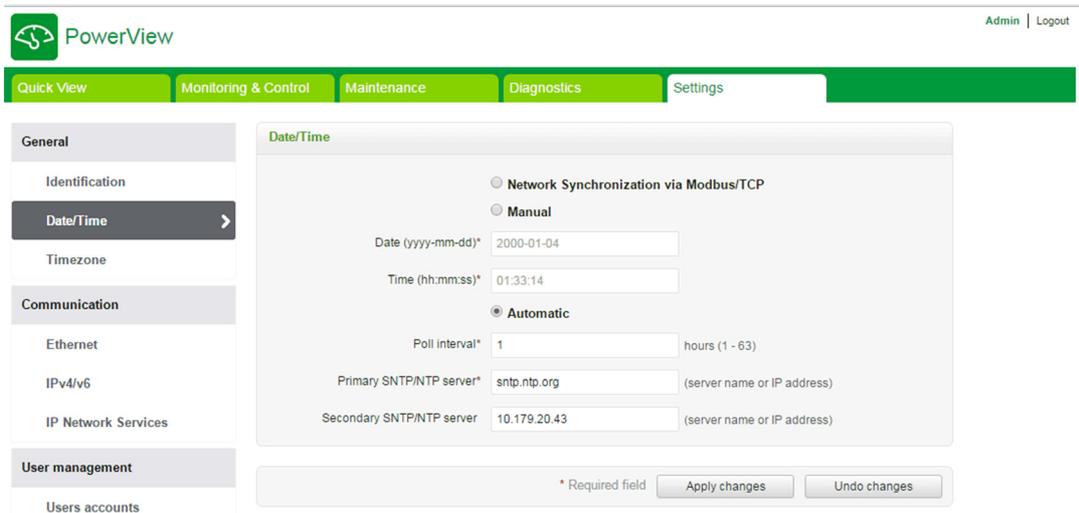
NOTE: SNTP feature works only when the device is integrated with the remote server network.

Devices Profile for Web Services

DPWS defines a minimal set of implementation constraints to enable secure Web Service messaging, discovery, description, and eventing on resource-constrained devices.

DPWS is supported on Acti 9 Smartlink Ethernet.

Chapter 9
Setting Up Modbus Communication (Gateway Function)

What Is in This Chapter?

This chapter contains the following topics:

Modbus Master Principle

Overview

The Modbus protocol exchanges data using a request/response mechanism between a master and a slave. The master/slave principle is a type of communication protocol in which a device (the master) controls one or more devices (the slaves). A standard Modbus network consists of one master and up to 31 slaves.

NOTE: For more information, a detailed description of the Modbus protocol is available on *www.modbus.org*.

Characteristics of the Master/Slave Principle

The master/slave principle has the following characteristics:
- Only one master at a time is connected to the network.
- Only the master can launch communication and send requests to slaves.
- The master can address each slave individually using its dedicated address or all slaves simultaneously using address 0.
- The slaves can only send responses to the master.
- Slaves cannot launch communication with either the master, or the other slaves.

Master/Slave Communication Modes

The Modbus protocol can exchange data using 2 communication modes:
- Request/response mode
- Broadcast mode

Acti 9 Smartlink Ethernet support Modbus protocol as master and can support up to eight Modbus slave devices as Acti 9 Smartlink RS485. Each Acti 9 Smartlink RS485 has a Modbus address (1 to 99), and concentrates data from connected devices on its 11 channels (Ti24 interface).

The states and orders for each device connected to Acti 9 Smartlink Ethernet are accessible in registers whose address depends on the digital channels (1 to 7) on which the device is connected.

Request/Response Mode

In request/response mode, the master addresses one slave using the slave's dedicated address. The slave processes the request, then responds to the master.

Broadcast Mode

In broadcast mode, the master addresses all the slaves using address 0. Slaves do not respond to broadcast messages.

Turnaround Time

The turnaround time T_r is the time between the end of receipt of a request and sending the response.
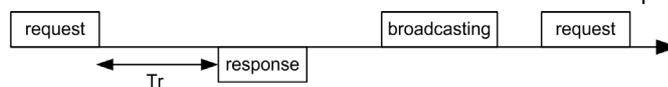
The typical value of the turnaround time T_r is less than 10 ms with the Modbus protocol.

Data Exchange

The Modbus protocol uses two data types:
- Bits
- 16-bit words called registers

Each register has a register number. Each data type (bit or register) has a 16-bit address.

Messages exchanged with the Modbus protocol contain the address of the data to be processed.

Frames

All frames exchanged with the Modbus protocol are 256 bytes maximum and consist of 4 fields:

Field	Definition	Size	Description
1	Slave number	1 byte	Destination of the request ● 0: broadcast (all slaves are affected) ● 1...247: unique destination
2	Function code	1 byte	Modbus TCP/IP Function *(see page 75)*
3	● Data ● Sub-function code	n bytes	● Request or response data ● Sub-function code
4	Check	2 bytes	CRC16 (to check transmission errors)

Data Format

The data format is configured as shown below according to Modbus RTU protocol:

Start	Data	Parity	Stop
1 bit	8 bits	1 bit	1 bit

NOTE: The Modbus RTU data format is composed of 11 bits.
Even parity is required, other modes (odd parity, no parity) may be also used.
If no parity is implemented in the Modbus Master, an additional stop bit must be transmitted by the Modbus Master to fill out the character frame to a full 11 bit asynchronous character.

NOTE: For more information, a detailed description of the Modbus protocol is available on *www.modbus.org*.

Possible Architecture

Description

Acti 9 Smartlink Ethernet acts as a Modbus master that can be connected to 8 slave devices. The default Modbus address of Acti 9 Smartlink Ethernet is 255.

Address 0 is used to broadcast and address from 248 to 254 is used as reserved address. Slave devices can be assigned from any address between 1 to 247 (the default slave addresses ranges from 1 through 8).
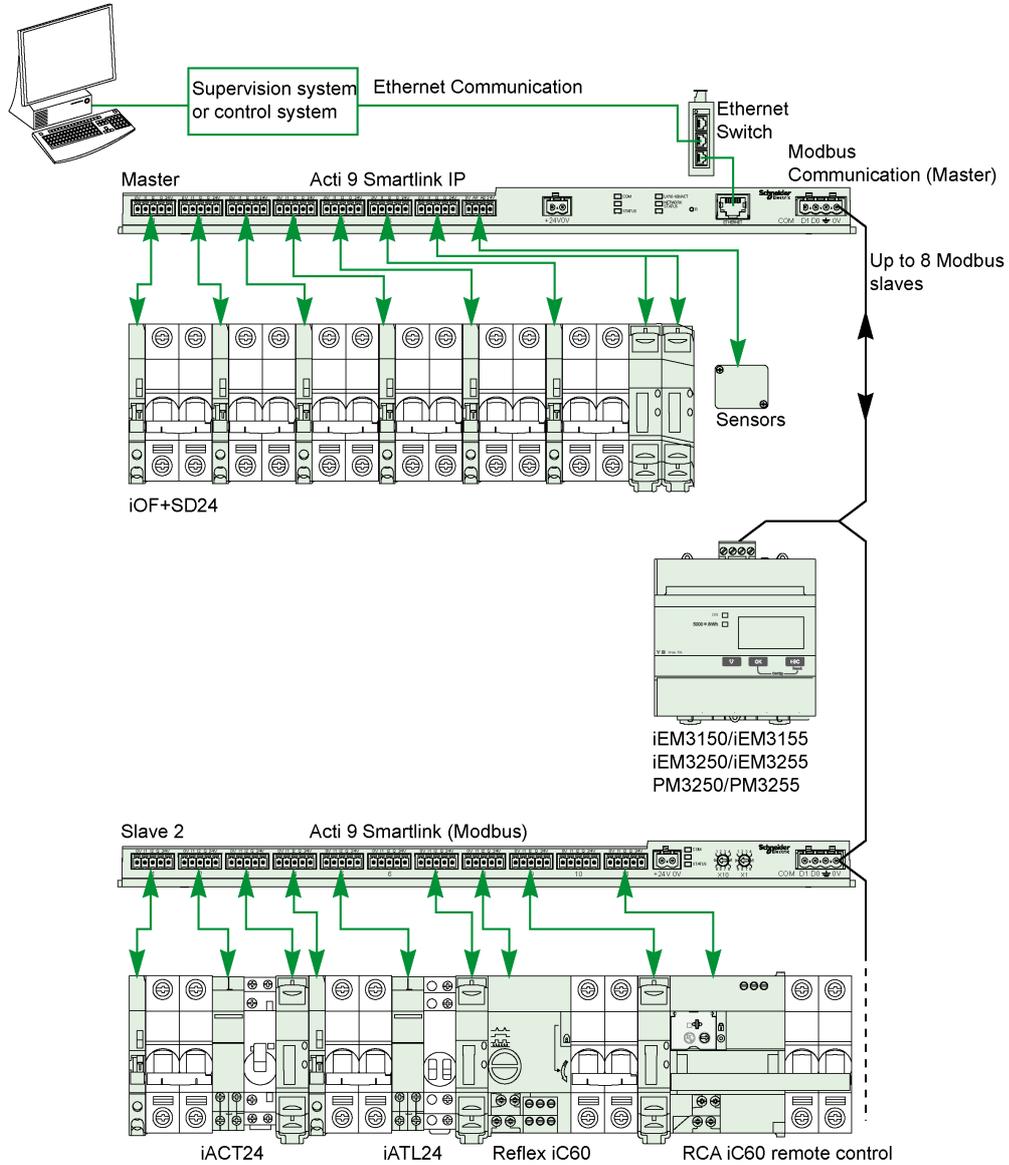
Setup

Overview

The default gateway ID of Smartlink Ethernet is 255.

The table below provides the communication parameter values:

Settings	Authorized Values	Default Valued
Data rate (in Bauds)	9600 and 19,200	19,200
Parity	• Even and one stop bit • Odd and one stop bit • No parity (parity bit eliminated), 2 stop bits are needed.	Even (with 1 stop bit)

NOTE: The Modbus network communication speed is same for all serial connections. It is imposed by the lowest communication speed of a slave device. If slave implements auto go, then it obtains Modbus parameters from the master (Acti 9 Smartlink Ethernet) automatically. If slave does not support auto go, then user has to manually configure Modbus parameters as that of the master.

Gateway Features

Overview

Acti 9 Smartlink Ethernet supports Modbus TCP/IP gateway. The gateway features enable Modbus TCP communication from a Modbus TCP master to any Modbus RS485 slave devices connected to it.
Acti 9 Smartlink Ethernet provides a simple and transparent interface between Ethernet based networks and field devices. These devices are meters, monitors, protective relays, trip units, motor controls, and other devices that communicate using Modbus TCP/IP.

Web Page Setting Menu

Modbus Settings

The Modbus parameters can be configured using **Settings** menu. The user can configure Modbus RS485 master settings as shown in the figure below:

The user can configure the following parameters to set the RS485 master settings:
- **Baud Rate**
- **Parity**
- **Enable Termination**

The **Enable Termination** is selected by default and is embedded in Acti 9 Smartlink Ethernet.

Description of Modbus LEDs

Modbus LED Status
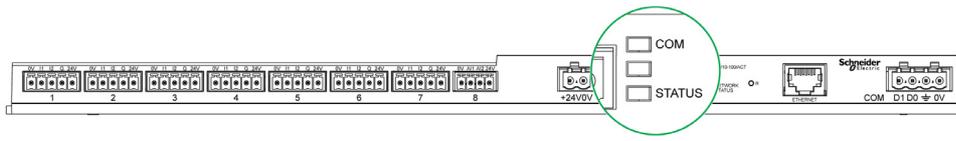
The table below lists the LED status according to the operating mode:

Mode	LEDs	Status
Initialization	COM / STATUS	**COM**: Yellow light **STATUS**: Green light
Start-up	COM / STATUS	**COM**: Yellow light during communication with the Modbus serial port; off if there is no Modbus communication **STATUS**: Alternate green and red light every second
Operation	COM / STATUS	**COM**: Yellow light during communication with the Modbus serial port; off if there is no Modbus communication **STATUS**: Green light
Degraded	COM / STATUS	**COM**: Yellow light during communication with the Modbus serial port **STATUS**: Flashing orange light. Peripheral device problem: ● Short-circuit or overload on the 24 Vdc I/O ● The power supply level is less than 19.2 Vdc
Failure	COM / STATUS	**COM**: Yellow light during communication with the Modbus serial port **STATUS**: Red light (internal problem)

Chapter 10
Web Page

What Is in This Chapter?

This chapter contains the following sections:

Section 10.1
Overview

Introduction

Description

Acti 9 Smartlink Ethernet has an embedded web server and user can access to web pages with PC or mobile tool like laptop *(see page 67)*.

The web pages can be used for multiple operations:
- Setting of Ethernet parameters to connect Acti 9 Smartlink Ethernet on the network.
- Diagnosis of exchanges on Ethernet network.
- Monitoring or control of the devices connected to Acti 9 Smartlink, Acti 9 Smartlink Modbus or energy meter IEM3000 and power meter PM3000.
- Configuration of the devices connected.
- Adding or removing Acti 9 Smartlink and devices connected to Acti 9 Smartlink.

The last features can be useful during installation or maintenance of the electrical panel and also during operation.

The monitoring and control operation are accessible only if Acti 9 Smartlink Ethernet and Acti 9 Smartlink Modbus have been configured by Smart Test tool or by **Configuration** menu in the web page.

Web pages are accessible to the following three categories of user:
- Administrator, can access all information, control the connected devices, and modify the parameters in the **Settings** menu
- User, can access only monitoring and control of connected devices
- Guest, can access only monitoring of connected devices

The scope of products supported in web page are:
- Smartlink Ethernet
- Smartlink Modbus slave connected to Smartlink Ethernet
- Energy meter IEM3000, power meter PM3000, Modbus slaves connected to Smartlink Ethernet

The web page can support one Acti 9 Smartlink Ethernet and up to eight Modbus slaves.

Web Page Organization
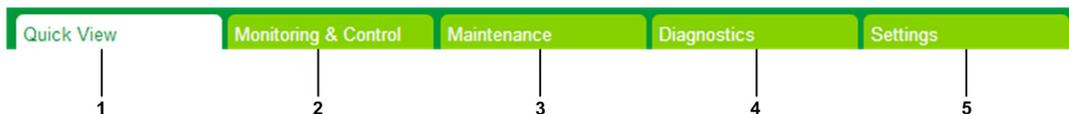
1 The alarm for trip on circuit breaker or the alarm for default on communication device is the default value. The complementary information can be selected from the **Settings** menu to display in the **Quick View** menu.
2 Information is classified based on function and product; digital channels, analog channels, and energy meter
3 Smartlink upgrade
4 Information is classified based on product and channel; Ethernet diagnosis
5 Configuration of Ethernet parameter, Modbus parameter, quick view page, communication product, and auxiliary devices

Login Page

The **Login** page is used to enter the user credentials and select the preferred language to access Acti 9 Smartlink Ethernet web pages. When the user connects to the Acti 9 Smartlink Ethernet through a web browser, the **Login** page is displayed as shown in the figure below.

Enter the following details in the **Login** page:
- **Language**
- **User name**
- **Password**

Enter the user name and password to access the web pages related to Acti 9 Smartlink Ethernet, connected slaves, and auxiliaries. The default user name and password is **admin** to access the web page for the first time. The user can modify the user name and passowrd in the **Settings** menu, **User Management** chapter. The user can select the language in the **Login** page, so that all the pages are displayed in the selected language.

The top right corner of all the web pages displays the following information:
- User name
- Logout

The **Logout** link is used to logout of the Acti 9 Smartlink Ethernet web page.

Section 10.2
Quick View Page

Quick View Page

Description

The user is redirected to **Quick View** page after logging to the Acti 9 Smartlink Ethernet. This page gives an overview of the entire system.

The **Quick View** page displays the status of the alarms and the missing communication devices.

In addition, the **Quick View** page displays the following information if you select each of the parameter in the **Settings** menu:
- Value of the incomer meter
- Status of the digital channels
- Value of the analog channel
- Value of the connected pulse meter

The following figure shows the **Quick View** page:
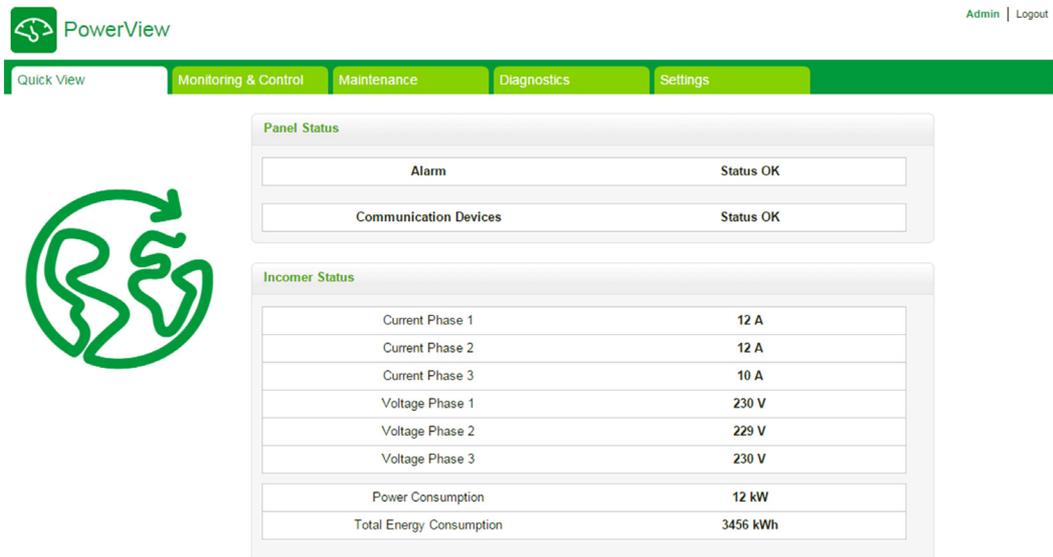
NOTE: The **Quick View** page can display a maximum of 190 status information.

The following table gives the functional description of the main elements of **Quick View** page:

Function	Description
Alarm Status	Displays name and number of the tripped breakers and the circuit breaker in default.
Communication Devices	Displays the missing IEM3000 or PM3000 connected to communication devices.
Incomer Status	Displays the value for the incoming meter (connected to Acti 9 Smartlink Ethernet through Modbus) if selected in the **Incomer Selection** page of the **Settings** menu. This provides the values of power, energy, voltage, and current on each phase. If there is no data from the device, then incomer status displays the null (0) value for that device. NOTE: The **Incomer Status** is displayed in the **Quick View** page for 1P2W and 3P4W settings on the meter.
Analog Channels	Displays the value of the analog channels if selected from **Analog Channels** page of the **Settings** menu.
Digital Channels	Displays the status of the digital channels if selected from **Digital Channels** page of the **Settings** menu. The status of a digital channel can be open, closed, tripped, disconnected, or error.
Pulse Meter	Displays the value of the pulse meter if selected in the **Settings** menu.

Section 10.3
Monitoring and Control Page

Description

The **Monitoring & Control** menu is used to monitor and control Acti 9 Smartlink Ethernet, Acti 9 Smartlink RS485, and auxiliary devices.
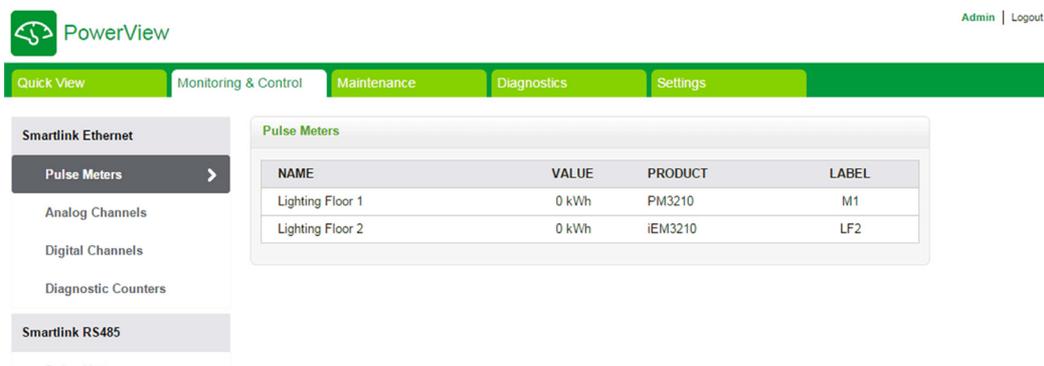
The **Monitoring & Control** menu, **Maintenance** menu, **Diagnostics** menu, and the **Settings** menu consists of two main areas:
- Function list or device list
- Dashboard

Area	Description
Function list or device list	List of functions or lists the devices connected to Acti 9 Smartlink Ethernet, Acti 9 Smartlink RS485, energy meter IEM3000 or power meter PM3000 (Modbus slaves), and auxiliary devices.
Dashboard	Displays the general characteristics of the function depending on the selected device from the function list or device list area.

What Is in This Section?

This section contains the following topics:

Topic	Page
Smartlink Ethernet	92
Smartlink RS485	95
Energy Meters	97

Smartlink Ethernet

Pulse Meters

The **Pulse Meters** provides information about the energy measurements from the meters connected to Acti 9 Smartlink Ethernet (pulse output).

Analog Channels

The **Analog Channels** displays the values of the current sensors and the voltage sensors connected to Acti 9 Smartlink Ethernet.

The following information is displayed for each analog device:
- Name
- Value
- Product
- Label

Digital Channels

The **Digital Channels** monitors and displays the following information of the devices like breakers, relays, contactors, and standard I/O input and output channels connected to Acti 9 Smartlink Ethernet.

- Name
- Status
- Control
- Product
- Label

The status of the channels can be one of the following:
- **Open**: Applicable to all the devices
- **Closed**: Applicable to all the devices
- **Tripped**: Applicable to only OF/SD, iOF/SD, and RCA iC60 devices
- **Disconnected**: Applicable to only iACT24 and iATL24 devices
- **OFF**: Applicable to only Reflex iC60 device

The Standard IO Input and Standard IO Output channels displays the following status:
- **Low position** or **High position**
- **0** or **1**
- **0 V** or **24 V**
- **Open** or **Closed**
- **Tripped**

The device can be opened or closed using the control buttons (accessible only for Administrator and User accounts). Click **Open** to open the corresponding device and click **Close** to close the device.

Diagnostic Counters

The **Diagnostic Counters** dsplays the number of open/close, tripped, OFF status, and running hours of Acti 9 Smartlink Ethernet digital channels. Trip status is applicable to OF/SD, iOF/SD, and RCA iC60 devices and OFF is applicable to only Reflex iC60 devices.

Smartlink RS485

Pulse Meters

The **Pulse Meters** provides information about the energy measurements from the meters connected to Acti 9 Smartlink RS485 (from 1 to 8 devices). The maximum number of Modbus slave devices that can be connected is 8, which includes energy meters, power meters, and Acti 9 Smartlink Modbus RS485.

Digital Channels

The **Digital Channels** displays the following information of the devices like breakers, relays, and contactors connected to Acti 9 Smartlink RS485.

- Name
- Status
- Control
- Product
- Label

The status of the device can be one of the following:
- **Open**: Applicable to all the devices
- **Closed**: Applicable to all the devices
- **Tripped**: Applicable to only OF/SD, iOF/SD, and RCA iC60 devices
- **Disconnected**: Applicable to only iACT24 and iATL24 devices
- **OFF**: Applicable to only Reflex iC60 device

The Standard IO Input and Standard IO Output channels displays the following status:
- **Low position** or **High position**
- **0** or **1**
- **0 V** or **24 V**
- **Open** or **Closed**
- **Tripped**

The device can be opened or closed using the control buttons (accessible only for Administrator and User accounts). Click **Open** to open the contacts of the corresponding device and click **Close** to close the contacts of the corresponding device.

Diagnostic Counters

The **Diagnostic Counters** dsplays the number of open/close, tripped, OFF status, and running hours of Acti 9 Smartlink RS485 digital channels. Trip status is applicable to OF/SD, iOF/SD, and RCA iC60 devices and OFF is applicable to only Reflex iC60 devices.

Energy Meters

Description

The **Energy Meters** displays the energy meters (IEM3000 or PM3000 Modbus slaves) connected to Acti 9 Smartlink Ethernet through Modbus.

The following information is displayed for each device:
- Name
- Value
- Product
- Label

Section 10.4
Maintenance Page

Maintenance Page

Description

The **Maintenance** page displays the firmware version and web page version of the device.

Device Information

The **Device Information** page displays the following firmware details:

Device Information	Description
Serial Number	Displays the serial number of Acti 9 Smartlink Ethernet.
Firmware Version	Displays the currently installed firmware version of Acti 9 Smartlink Ethernet.
Webpage Version	Displays the currently installed web page version of Acti 9 Smartlink Ethernet.

Section 10.5
Diagnostics Page

What Is in This Section?

This section contains the following topics:

General

Description

The **Diagnostics** menu is used to perform self diagnostics of the system.

Date/Time

The **Date/Time** page displays the following information:

Parameters	Description
Date	Displays the current date in the format YYYY-MM-DD.
Time	Displays the current in the local time zone.
Uptime	Displays the elapsed time since the last start of the device.

Communication

Ethernet

The **Ethernet** page displays the statistics information of Ethernet network.

	Function Name	Description
Ethernet global statistics	Frames received	Displays the number of frames received from all the Ethernet ports.
	Frames transmitted	Displays the number of frames transmitted from all the Ethernet ports.
Ethernet port statistics	Link speed	Displays link speed on Ethernet port.
	Duplex mode	Displays the communication mode of the Ethernet port. It can be half duplex or full duplex.
	Frames received	Displays the number of frames received from the specific Ethernet port.
	Frames transmitted	Displays the number of frames transmitted from the specific Ethernet port.

Click **Reset** button to clear the Ethernet frames counter.

IP Network Services

The **IP network services** page displays Modbus/TCP port information, number of active connections, and number of recevied and transmitted frames.

	Function Name	Description
Modbus/TCP port	Port status	Displays the current status of the Modbus/TCP port.
	Opened TCP connections	Displays the number of established Modbus/TCP connections.
	Received messages	Displays the counter of received Modbus/TCP messages.
	Transmitted messages	Displays the counter of transmitted Modbus/TCP messages.
Modbus/TCP port connections		Displays the statistics of open Modbus/TCP connections.

Click **Reset** button to clear the Modbus/TCP counter.

Switchboard Architecture

Communication Products

The **Communication Products** page displays the communication device status (Acti 9 Smartlink Ethernet and Acti 9 Smartlink RS485 connected through Modbus).

The communication device status displays the following information:
- **Name**
- **Status**
- **Product**
- **Protocol**

If the device is communicating properly, the status is displayed as **Ok**. If the device is not communicating properly, the status is displayed as **Communication Error**. If input/output channel do not have 24 V, then the status is displayed as **24 V Channel Error** and this status is displayed only for Acti 9 Smartlink Ethernet.

Auxiliary Devices

The **Auxiliary Devices** page displays the list of communication device.

Click the **Diagnose** button to display the auxiliary devices connected on the selected communication device.

The auxiliary device status displays the following information for each connected device:
- **Name**
- **Device Type**
- **Label**
- **Diagnose**

The figure below shows the auxiliary devices connected to the communication device:
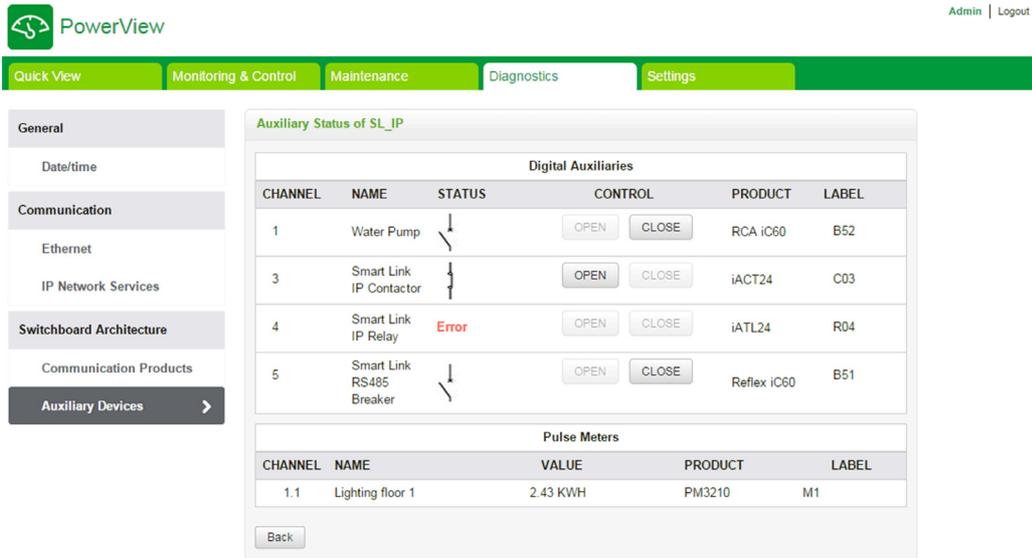
The diagnose page displays the following information for **Digital Auxiliaries**:

Parameter	Description
Channel	Displays the channel number.
Name	Displays the name of the auxiliary device.
Status	Displays one of the following status for an auxiliary device: ● Open ● Close ● Tripped ● Disconnected ● Error
Control	Click the **Open** or **Close** button of an auxiliary device. A pop-up dialog with a message, success or failure, appears to confirm the control operation. Only Administrator account or user account can perform the **Open** or **Close** action. .
Product	Displays the product of the auxiliary device.
Label	Displays the label of the auxiliary device.

The diagnose page also displays the value of the pulse meters. Click **Back** button to go back to the auxiliary device page.

Section 10.6
Settings Page

Description

The **Settings** menu is used to configure or edit the following parameters:

Parameters to be Set	Page
Identification	*(see page 106)*
Date/time	*(see page 106)*
Timezone	*(see page 108)*
Ethernet	*(see page 109)*
IPv4/v6	*(see page 110)*
IP Network Services	*(see page 111)*
Users accounts	*(see page 112)*
Email Events	*(see page 114)*
Facility Hero	*(see page 116)*
E-mail Service Setup	*(see page 117)*
Digital Channels	*(see page 119)*
Analog Channels	*(see page 121)*
Modbus Parameters	*(see page 123)*
IP Filter	*(see page 124)*
Device List	*(see page 126)*
Incomer Selection	*(see page 132)*
Restore	*(see page 133)*

The configuration of the parameters is accessible to only Administrator accounts.

What Is in This Section?

This section contains the following topics:

Topic	Page
General	106
Communication	109
User Management	112
Events Notification	114
Setting Up Devices on Smartlink Ethernet	119
Modbus Slave Devices	126
Restore	133

General

Identification Page

The **Identification** page is used to edit the device name and it displays the following parameters:

Parameters	Description
Device name	Displays the name of the particular device used by communication services to identify the device.
Product range name	Displays the product range name of the device.
Product model name	Displays the product model name of the device.
Unique identifier	Displays the identifier used by communication protocols.

The user can edit only the **Device name**. The **Device name** is same as the name displayed in Windows 7 explorer. The other parameters in this page cannot be edited, as these are read-only parameters.

NOTE: The **Device name** should contain only alphanumeric characters and a hyphen (-) character. However, the '-' character cannot be last character.

Click **Apply Changes** to save the changes. Click **Undo Changes** to revert the settings.

NOTE: Once you click apply changes, you cannot undo the changes. You can click undo changes only before saving the changes.
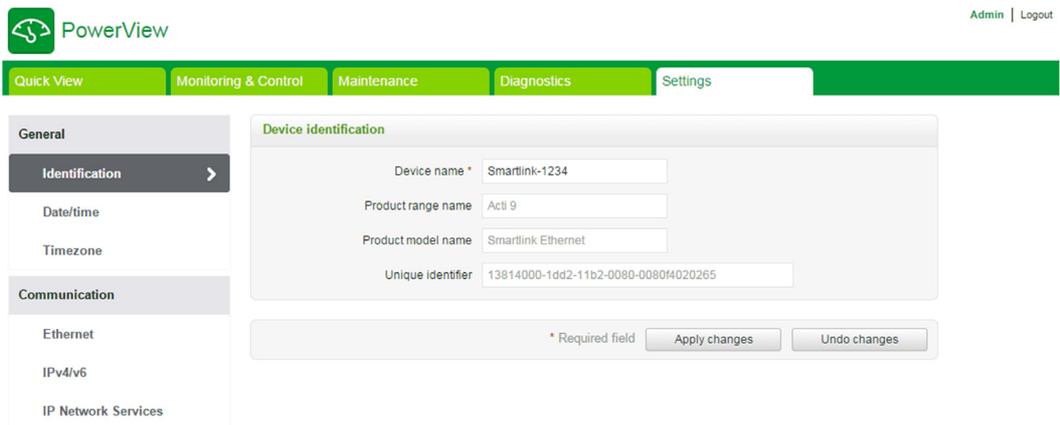
Date/Time Page

The **Date/time** page is used to set date and time either in manual mode or in automatic mode. Select **Network Synchronization via Modbus/TCP** to configure date and time via Mod bus/TCP.
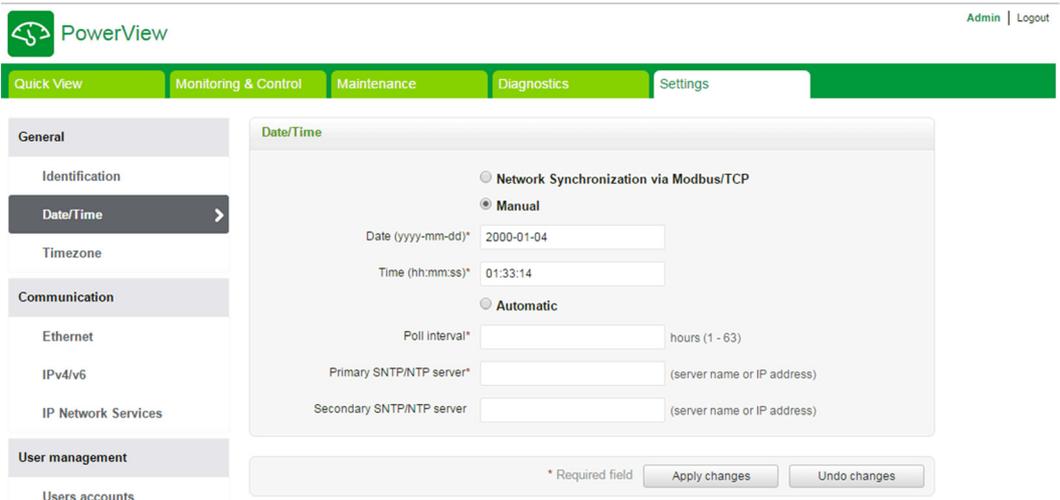
NOTE: After every power cycle, the device will reset to a default value of date and time. The default date and time value is 2000-1-1, 00:00:00.

Follow the procedure to configure the date and time in **Manual** mode:

Step	Action
1	Select **Manual**.
2	Enter the **Date** to be set in the format **yyyy-mm-dd**.
3	Enter the **Time** in the format **hh:mm:sec**. Ensure to enter the time in a proper format. The following error message pops up if you enter the time in an incorrect format:
4	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
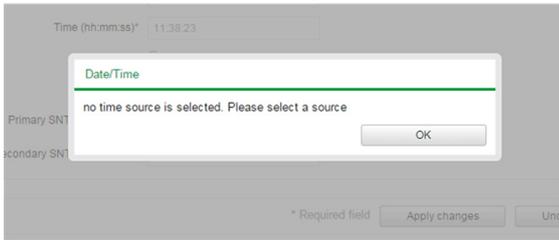
In automatic mode, the Acti 9 Smartlink Ethernet receives date and time from SNTP server after every poll interval time. Follow the procedure to configure date and time in **Automatic** mode:

Step	Action
1	Select **Automatic**.
2	Enter the value for **Poll interval** in hours that ranges from 1 through 63. The default value of poll interval is 1.
3	Enter the primary server name or IP address for **Primary SNTP/NTP server** parameter. The primary server can be: ● IPv4 address ● IPv6 address ● Domain name
4	Enter the secondary server name or IP address for **Secondary SNTP/NTP server** parameter. This is an optional parameter.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Timezone Page

The **Timezone** page is used to configure the offset and daylight saving time for the selected timezone.

Follow the procedure to configure timezone settings:

Step	Action
1	Click the offset value used by the local time zone from the **Timezone offset** list.
2	Select the **Enable** check box to configure the daylight time saving settings. The **Enable** check box is not selected by default.
3	Select the day, month, and time to configure the start time of daylight saving time from the respective **Daylight saving time begins** list.
4	Select the day, month, and time to configure the end time of daylight saving time from the **Daylight saving time ends** list.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Communication

Ethernet Page

The Ethernet page is used to configure the frame format and speed and mode of the Ethernet port. This page also displays the MAC address of the Ethernet network.

The following procedure describes to configure Ethernet parameters:

Step	Action
1	Select the type of Ethernet frame format from the **Frame format** list. It can be **Ethernet II**, **802.3**, or **Auto**. The default value of the frame format is **Auto**.
2	Select the value for speed and mode of the Ethernet port from the **Speed and mode** list. The value of speed an dmode can be one of the following: ● **10 Mbps - Half duplex** ● **10 Mbps - Full duplex** ● **100 Mbps - Half duplex** ● **100 Mbps - Full duplex** ● **Auto-negotiation** The default value is **Auto-negotiation**.
3	Click **Apply Changes** and then click **Reboot** to automatically restart the device to save the settings. Click **Undo Changes** to revert the settings.

IPv4/v6 Page

The **IPv4/v6** page is used to configure IPv4 and IPv6 parameters.

IPv4 parameters can be set either in manual mode or in automatic mode. To configure IPv4 parameter in automatic mode, click **Automatic** and select the type of protocol (DHCP or BOOTP) from the list. The default type is **DHCP** protocol.

DHCP mode is used to acquire the IPv4 address from the DHCP server in the network to which Acti 9 Smartlink Ethernet is connected. BOOTP mode is used to acquire the IPv4 address if DHCP server is not present in the network. and a BOOTP server is configured in the network to assign the IPv4 address.

Follow the procedure to configure IPv4 parameters in the manual mode:

Step	Action
1	Select **Manual**.
2	Enter the **IPv4 Address** of the device.
3	Enter the **Subnet Mask** of the device.
4	Enter the **Default Gateway** of the device.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Follow the procedure below to configure IPv6 parameters:

Step	Action
1	Select the **Enable** check box to enable the IPv6 service. The **Enable** check box is selected by default.
2	Displays the value of the **IPv6 link local address**. The user cannot modify this parameter.
3	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Acti 9 Smartlink Ethernet can acquire the domain name automatically or user can set the DNS server address manually. Click **Automatic** to acquire the DNS server automatically from the network.

Follow the procedure below to configure DNS parameters in manual mode:

Step	Action
1	Click **Manual**.
2	Enter the **Primary DNS Server** of the device.
3	Enter the **Secondary DNS Server** of the device.
4	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

IP Network Services Page

The **IP Network Services** page is used to configure the network protocols and discovery services.
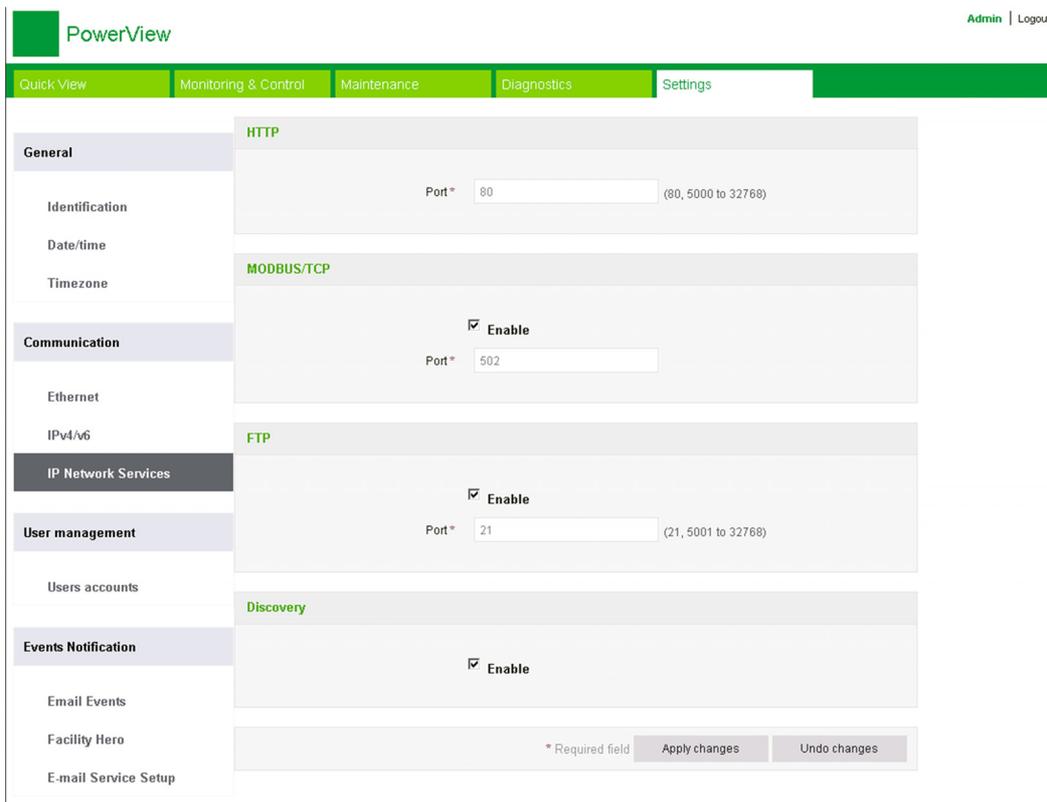
Acti 9 Smartlink Ethernet supports HTTP, Modbus/TCP, FTP protocols and discovery services.

Displays the value of the HTTP **Port**. The default value of the port number is 80.

Follow the procedure to configure Modbus/TCP parameters:

Step	Action
1	Select the **Enable** check box to enable the Modbus/TCP service. The **Enable** check box is selected by default.
2	Displays the port number of the Modbus/TCP network. The default value is 502.
3	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Follow the procedure to configure discovery services:

Step	Action
1	Select the **Enable** check box to enable the discovery service. The **Enable** check box is selected by default.
2	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

User Management

Users Accounts Page

The **User Management** chapter is used to manage the user profiles. The **Users accounts** page displays the existing user accounts. This page is used to add a new user account and edit the password of the existing user account.

The following table lists the three types of user account supported by Acti 9 Smartlink Ethernet and their access rights:

User Accounts	Access	Username	Password
Administrator	● Edit parameters in **Settings** menu ● Monitor and control of the devices ● View all menus	admin	admin
User	● Monitor and control of the devices ● View all menus	user	user
Guest	● View all menus	guest	guest

Administrator account is the first level of access to the web page by default. The number of user accounts at Administrator level is up to 1. The number of user accounts at User level is up to 10.

Follow the procedure to add a new user profile:

Step	Action
1	Click **Add user**.
2	Select the user group from the **Group** list.
3	Enter the authentication information in the **Username** and **Password** area for a user.
4	Enter the email of the user in the **Email** area.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

By default, only one Administrator account and one user account is available.

The **Username** and **Password** must meet the following criterias:
- The **Username** must have minimum of 4 characters.
- The **Username** must not exceed 16 characters.
- The **Password** must contain minimum of 8 characters with 1 special character, 1 number, and 1 alphabet in upper case.
- The **Password** must not exceed 16 characters.

Follow the procedure to edit the details of an existing user profile:

Step	Action
1	Select the user account from the **Users** list and click **Edit**.
2	Select the user group from the **Group** list.
3	Modify the **Password** for the selected user account, if required.
4	Enter the email of the user in the **Email** area.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Click **Delete** to delete the user profile from web page. The user profile with Admin account cannot be deleted.

Events Notification

Email Events Page

The **Email Events** page is used to configure email recipients and events. This page displays the information about the email events, products, channels and devices, and email recipients.

The user can add a new event and edit the selected event from the list of events.

Follow the steps given in the table to add a new event:

Step	Action
1	Click the **Add Event** button to add a new event.
2	Click the required **Products**, **Channels and Devices**, and **Events**.
3	Select the email recipients from the **Email** list.
4	Enter the **Subject** and **Message** of an email event.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

The following screen shows an example of an email sent upon an event:

1 Subject of an email
2 Channels and connected devices
3 Event
4 Message of an email sent upon an event

NOTE: The email with custom text that uses characters such as à, è, ù, é, â, ê, î, ô, û , ë, ï, ü, ÿ, and ç are not shown correctly in the email but the generic text message is shown correctly.

Follow the steps given in the table to edit the parameters of an event:

Step	Action
1	Select an event and click the **Edit** button to edit the parameters of an event.
2	Modify the required **Products**, **Channels and Devices**, and **Events** to edit an event.
3	Select the email recipients from the **Email** list.
4	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
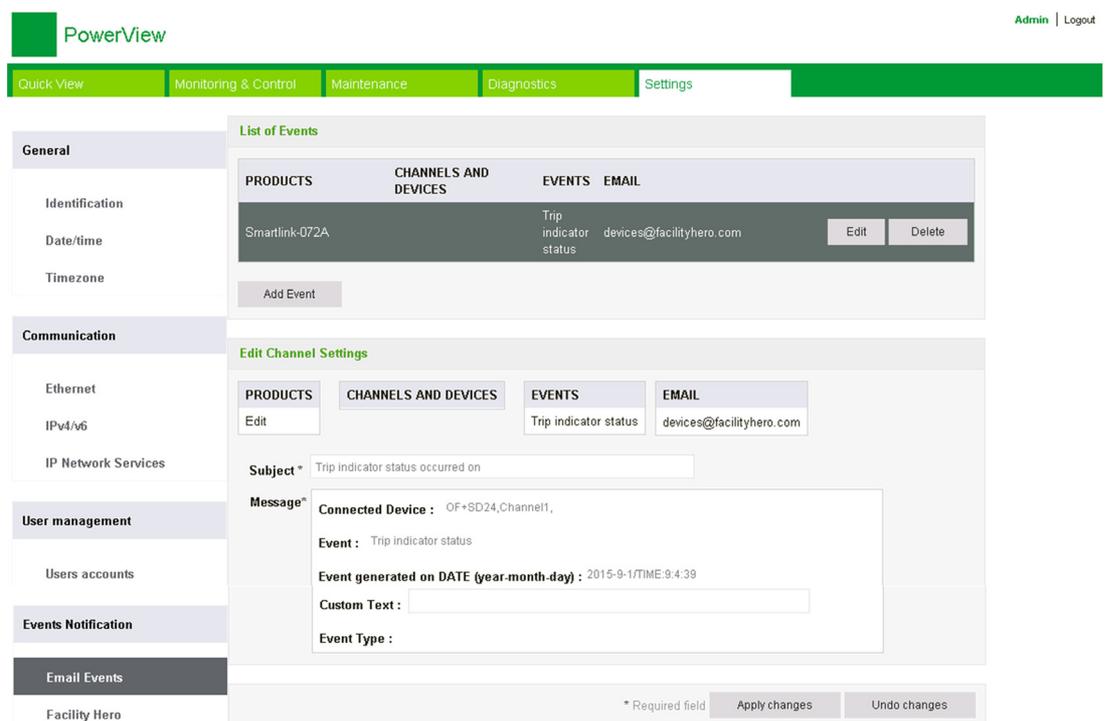
Facility Hero

The **Facility Hero** service enables the electricians and the facility manager to stay connected with their customer assets. The manager in charge of maintaining the electrical installation can receive the alarms from all the installed Acti 9 Smartlink devices logged in a notebook, and the complete history of the maintenance is shared within the maintenance staff. You can receive alarms directly in the notification center of **Facility Hero** as it is easy to monitor all the connected panels in the same space.

For more details on facility hero, see www.facility-hero.com.

The following figure allows you to connect the Acti 9 Smartlink Ethernet to the facility hero service:
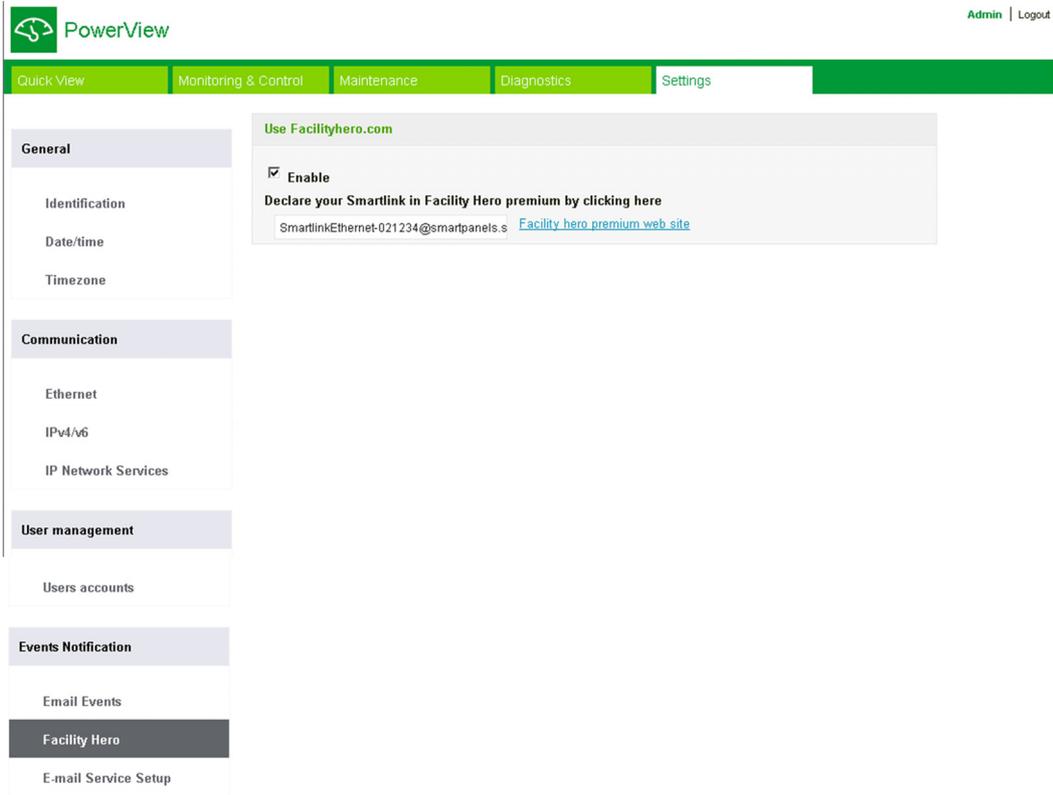
Enabling Facility Hero

Follow the steps given in the table to configure the facility hero service:

Step	Action
1	Select the **Enable** check box to enable the facility hero service in Acti 9 Smartlink Ethernet. **Result**: The **FacilityHero Notification** screen opens:
2	Click **OK** to confirm. When you enable the facility hero service, you can receive all the alarm emails in the Facility Hero notification center. **NOTE:** If the SMTP server is already configured, then the facility hero service over writes the SMTP configuration and saves the earlier configuration so that the user can select the SMTP configuration whenever required.
3	Click the link **Facility hero premium web site** to log into the facility hero account. Facility hero manages a special page to declare the Acti 9 Smartlink Ethernet.
4	An alarm notification is sent to the facility hero premium website on occurrence of an alarm.

Disabling Facility Hero

Follow the steps given in the table to disable the facility hero service:

Step	Action
1	Click to clear the **Enable** check box to disable the facility hero service in Acti 9 Smartlink Ethernet. **Result**: The **FacilityHero Notification** screen opens: FacilityHero Notification If you disable this service SMTP server settings, e-mails used in e-mail events and user account settings will go back to previously configured settings. Click OK to continue or Cancel to keep the service Enabled OK Cancel
2	Click **OK** to confirm the disable of the facility hero service.
3	No alarm is sent to the facility hero on occurrence of an alarm.
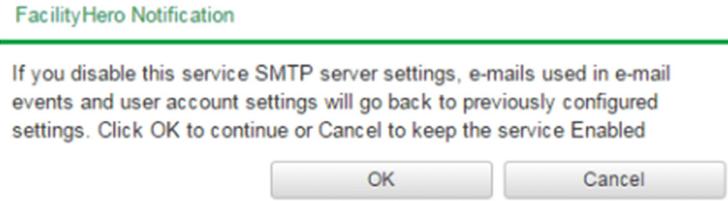
E-mail Service Setup Page

The event notification is used to send emails when the connected devices trigger an alarm. The alarms are configured by the administrator and can be sent to many users. The event notifications require unfiltered Internet access. This level of service is well suited for small or mid-sized non-critical buildings. The device sends the emails when Internet access is available through a dedicated connection or through a local area network (LAN) with Internet access.

NOTE: The event notifications should not be used if email services are managed internally by a customer IT domain administrator.

The **E-mail Service Setup** page is used to configure the email server settings.
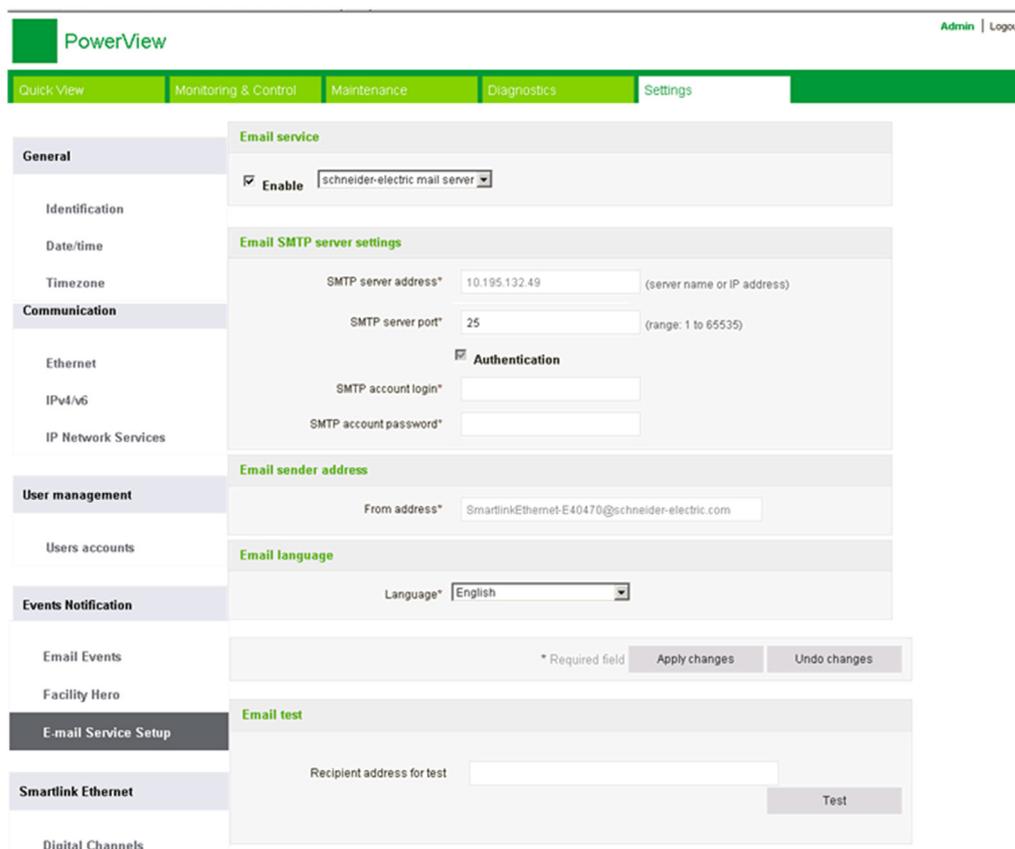
Click the **Enable** check box to configure the email server settings. Acti 9 Smartlink Ethernet allows you to select the **schneider-electric mail server** or **my own SMTP server** profiles from the drop-down list.

Follow the steps given in the table to configure the email server settings if you select **my own SMTP server** profile:

Step	Action
1	Enter the email server name or IP address in the **SMTP server address** area.
2	Enter the server port value in the **SMTP server port** area. The value ranges from 1 to 65535.
3	Select **Authentication** if the server requires login information. This option is disabled by default.
4	Enter the user name in the **SMTP account login** area.
5	Enter the password to authenticate the SMTP login in the **SMTP account password** area.
6	Enter the email address of the administrator who is administering the device in the **From address** area. The **From address** can be used in different ways: ● Use the **From address** as context provider: If you want to be only notified without a reply, use a **From address** as a contextual information. The **From address** syntax includes "no-reply", "device name", "site name", @a validated domain .com, .net, and so on. ● Create an alias in the **From address** to allow replies to be sent to the person in charge of an alarm: An email can be sent to multiple people who are responsible for a specific appliance. This feature allows the receivers to reply to follow up with the responsible person. For example, the Facility Manager would receive an email from an alarm. He can send a reply email to the Maintenance Contractor to follow up on the action.
7	Select the language of the email body from the **Language** list.
8	Click **Apply Changes** to save the settings. If you do not want to save the changes, click **Undo Changes**.
9	Enter the email address of the recipient to test the delivery of the email in the **Recipient address for test** area. The test email feature enables connection from the device to the service. If the test emails are not received, the Internet connection needs to enable the email ports (port 25 or 587). The port settings are configured in accordance between the device that sends the email and the site router settings.
10	Click **Test** to deliver the email to the added recipient.

If you select **schneider-electric mail server** profile, then you can configure only **SMTP server port** and **Language** parameters.

Schneider Electric provides an email service, free of charge, which allows you to receive the alarm notifications. When you choose to activate this service, you accept that Schneider Electric collects the data of your smart panel and your email address for the purpose to improve the product and the associated services and in accordance with our *Data Privacy policy.*

The email notification service can be used with the following settings:

Parameter	Settings
SMTP server address	smartpanels.schneider-electric.com
Connection security mode	None, TLS-SSL, or STARTTLS
SMTP server port	25 or 587
Authentication	Enabled
SMTP account login	Schneider1234
SMTP account password	Schneider1234

Setting Up Devices on Smartlink Ethernet

Digital Channels Page

The **Digital Channels** page displays the list of connected I/O devices. This page is used to configure an I/O device and to edit or delete an existing I/O device on Acti 9 Smartlink Ethernet.

Acti 9 Smartlink Ethernet web page allows the configuration of the following digital channels:

- OF+SD24
- iOF+SD24
- iACT24
- iATL24
- Reflex iC60
- RCA iC60
- Breaker IO
- Pulse Counter
- iEM3110
- iEM3155
- iEM3210
- iEM2000T
- iEM3255
- iEM3355
- PM3210
- PM3255
- StandardIO Input
- StandardIO Output

Follow the procedure to configure the digital channels:

Step	Action
1	Click **Add** to add a new digital channel.
2	Enter the **Name** of a digital channel.
3	Enter the **Label** of a digital channel. This is an optional parameter.
4	Select the type of the product from the **Product** list.
5	Enter the **Channel** number of a digital channel.
6	Select the **Quick View** check box to display the digital channel in the **Quick View** page.
7	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
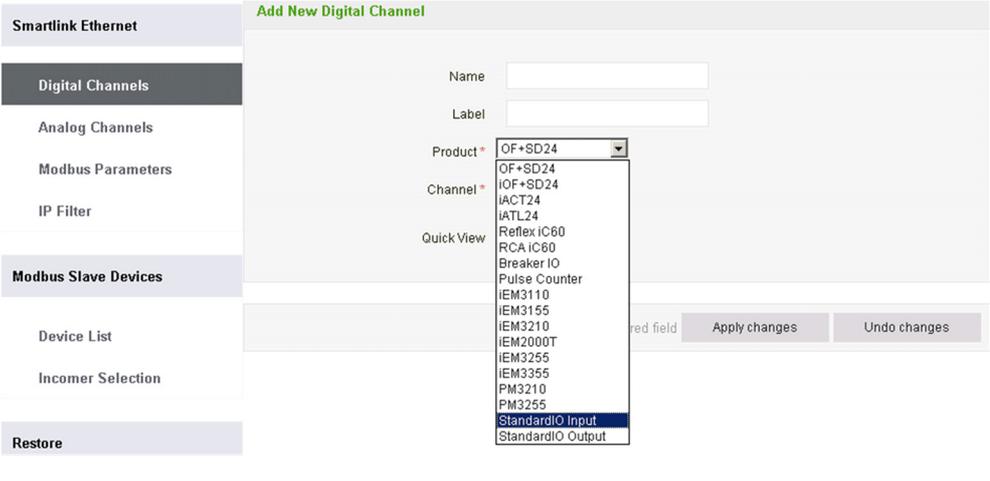
Follow the procedure to configure the pulse meters:

Step	Action
1	Click **Add** to add a new digital channel.
2	Enter the **Name** of a digital channel.
3	Enter the **Label** of a digital channel. This is an optional parameter.
4	Select the pulse meter from the **Product** list.
5	Enter the **Channel** number of a digital channel.
6	Click the required **Input** value.
7	Enter the value for the **Consumption value** and select the unit from the list. **NOTE:** You can reset the energy counter or change it any value. However, the value you set has to be a multiple of pulse weight.
8	Enter **Pulse Weight** for the pulse meter. **NOTE:** The pulse weight is measured with respect to watt-hour (Wh).
9	Select the **Quick View** check box to display the digital channel in the **Quick View** page.
10	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

NOTE: The user can configure the value of the pulse weight as Act 9 Smartlink Ethernet does not read the default pulse weight values (on web page, the value is always displayed as 10) from Smartlink devices.

Click **Edit** to modify the device details. Click **Delete** to remove the digital channel from a web page.

Analog Channels Page

The **Analog Channels** page displays the list of connected analog devices. This page is used to add new analog device and to edit or delete an existing analog device.

Follow the procedure to configure the analog channels:

Step	Action
1	Click **Add** to add a new analog channel.
2	Enter the **Name** of a analog channel.
3	Enter the **Label** of a analog channel. This is an optional parameter.
4	Click either **Voltage Sensor** or **Current Sensor** from the **Input Type** list.
5	Select either input 1 or 2 from the **Input** list.
6	Specify the **Sensor Range Min** and **Sensor Range Max** values.
7	Select the type of unit from the **Unit** list.
8	Select the **Quick View** check box to display the analog channel in the **QuickView** page.
9	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
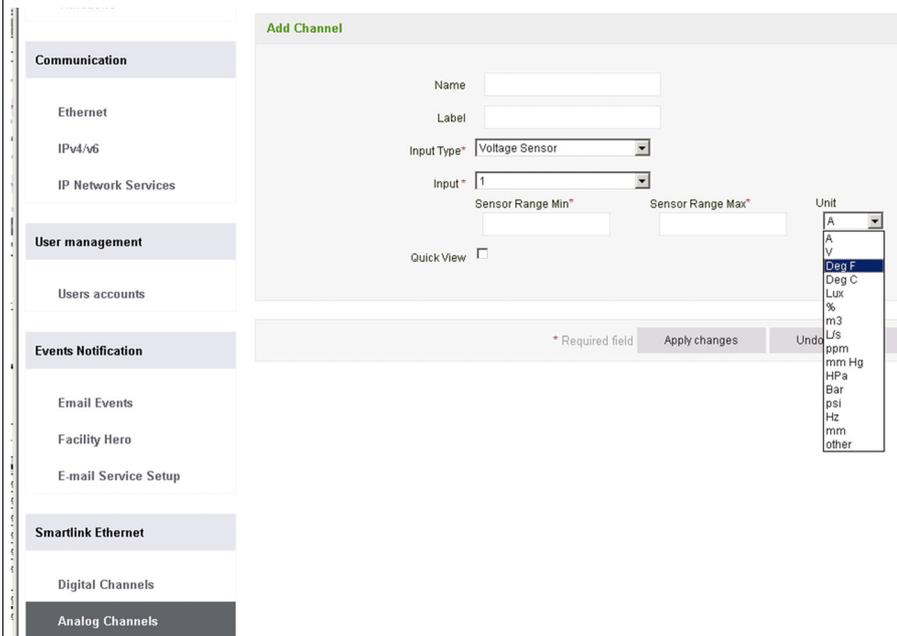
Click **Edit** to modify the device details. Click **Delete** to remove the digital channel from the web page.

NOTE: The device flags a conflict status in case the sensor type is wrongly configured.

Modbus Parameters Page

The **Modbus Parameters** page is used to configure Modbus serial line settings.

Follow the procedure to configure the Modbus parameters:

Step	Action
1	Select the baud rate from the **Baud Rate** list. The default value is 19,200.
2	Select the type of parity from the **Parity** list. The default value is **Even**.
3	Select the **Enable Termination** check box, if Acti 9 Smartlink Ethernet is at the beginning or end of RS485 network. The **Enable Termination** check box is enabled by default.
4	Click **Apply Changes** and then click **Reboot** to save the settings. Click **Undo Changes** to revert the settings.

IP Filter Page

IP filtering is a security feature that lists the IP addresses from which the communication can be accepted (Ethernet client). This function is used only with Ethernet static addressing mode. This page is used to configure the IP address in order to enable write access.

Follow the procedure to configure the IP address to enable write access:

Step	Action
1	Select the **Enable Modbus TCP/IP Filtering** check box to enable write access for the global IP address range and for the listed IP address range. **NOTE:** If you do not select the **Enable Modbus TCP/IP Filtering** check box, you cannot edit global IP address range and add or edit applicable exceptions.
2	Click **Add exception** to add the IP address and access level. A maximum of 10 IP address can be added. The IP address added will have a write access.
3	Enter the IP address in the **IP address/range** area and select the **Access level** for the entered IP address.
4	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

NOTE: You can only edit the global IP address range, but you cannot delete the global IP address range. You can edit and delete the added exceptions.

Modbus Slave Devices

Device List Page

The Modbus slave **Device List** page is used to view and configure the **Modbus** slave devices connected to Acti 9 Smartlink Ethernet. The devices can be discovered automatically with this page.

The web page supports the following devices:
- Acti 9 Smartlink RS485
- PM3250
- PM3255
- IEM3150
- IEM3155
- IEM3250
- IEM3350
- IEM3255
- IEM3355

The user can add devices to Acti 9 Smartlink Ethernet either in manual mode or by using auto discover feature.

Follow the procedure to add the devices in manual mode to Acti 9 Smartlink Ethernet:

Step	Action
1	Click **Add** to add Modbus slaves to Acti 9 Smartlink Ethernet.
2	Enter the **Name** of the device to be added.
3	Enter the **Label** of the device, if required.
4	Choose the required product type from the **Device Type** list.
5	Enter the **Modbus Address** of the device to be added.
6	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
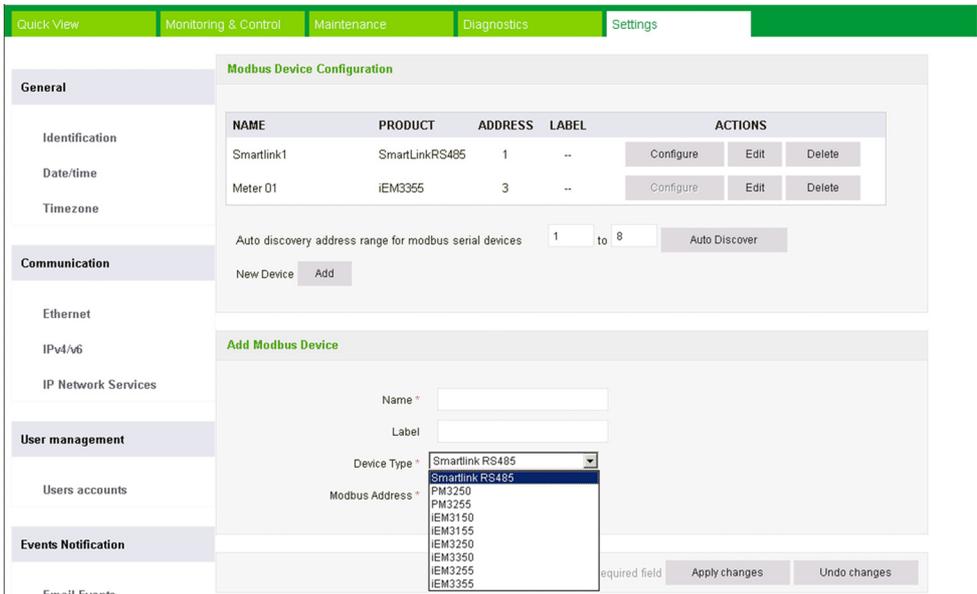
Auto Discovery Feature

Follow the procedure below to add any supported devices using auto discover feature:

Step	Action
1	Specify the start and end address for Modbus serial device. The default Modbus address for discovery ranges from 1 through 8, but you can choose to discover any device in the address range of 1 through 247. **NOTE:** It is recommended to use a closer address range for rapid detection of the devices.
2	Click **Auto Discover** to start auto discovery of the devices. **NOTE:** It is recommended to stay on the **Device List** page when auto discovery is in progress. The communication with upper supervisory systems, if any, could be disrupted while auto discovery is in progress.
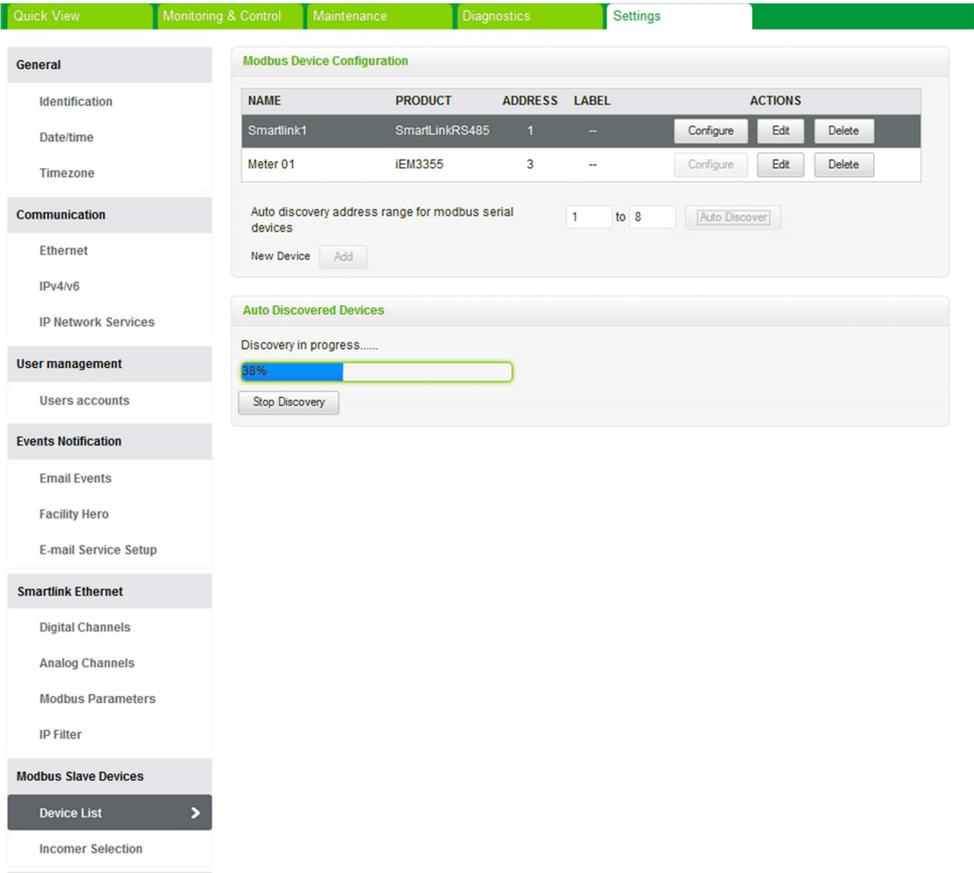
Step	Action
3	After the auto discovery of the devices, the list of auto discovered devices are displayed.
4	Click the **Add** button to add **Name**, **Label**, **Modbus Address**, and **Device Type** of the auto discovered device.
5	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
6	Click **Stop Discovery** to stop the auto discovery of the devices.

NOTE: For Acti 9 Smartlink Ethernet web page to display the latest configuration of Acti 9 Smartlink Modbus, It is essential to restart Acti 9 Smartlink Ethernet when the configuration of downstream Acti 9 Smartlink Modbus is updated from remote master (like Acti 9 Smart Test, IFE, FDM 128, etc).

Click **Edit** to modify the device parameters. Click **Delete** to delete the selected device from the device list.

The users can configure the digital channels of Acti 9 Smartlink Modbus from the **Device List** page. Follow the procedure to configure the digital channels:

Step	Action
1	Click the **Configure** button to configure the channels of Acti 9 Smartlink Modbus.
2	Click **Add** or **Edit** or to add a digital channel or to modify the parameters of a digital channel *(see page 119)*.
3	Enter the required parameters.
4	Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.
5	Click **Back** to navigate to the **Device List** page.
6	Click **Delete** to delete a digital channel..

Incomer Selection Page

The **Incomer Selection** page displays the list of energy meters or power meters and is used to select any one device as incomer. This incomer meter is displayed in the **Quick View** page with voltage, current and energy readings.

Click **Apply Changes** to save the settings. Click **Undo Changes** to revert the settings.

Restore

Restore Page

The **Restore** configuration page is used to restore the configuration of the connected Acti 9 Smartlink devices. The restore allows the configuration done in the previous version of the firmware to be retained and applied to the selected Acti 9 Smartlink Ethernet and Acti 9 Smartlink Modbus devices.

It is recommended to restore all the Acti 9 Smartlink devices which are not restored before writing any new configuration.

This page displays the information about the name, label, address, device type, and status of the connected devices.

The **Restore** page displays the following parameters:

Parameter	Description
Check box	Allows you to select the desired device to restore the configuration of the device. **NOTE:** The check box is unavailable if the device is not connected or the device has incompatible firmware version
Name	Displays the name of the device entered in the device list.
Label	Displays the label of the device.
Address	Displays the address of the device.
Device Type	Displays the device type selected for the device in the device list.
Status	Displays the status of the device to restore the configuration. The status can be one of the following: ● **Restored**: Indicates that the device is successfully restored. ● **Not Restored**: Indicates that the device has supporting firmware, but not restored. ● **Unsupported Firmware**: Indicates that the firmware is not supported. ● **Unknown**: Indicates the unsupported device or status of the device that could not be retrieved.
Restore Devices	Allows you to restore the configuration of the connected devices

Follow the steps given in the table to restore the configuration of the connected device:

Step	Action
1	Select the check box of the desired device to be restored.
2	Click **Restore Devices** to restore the configuration of the selected device. **Restoration Confirmation** dialog box appears.
5	Click **OK** to confirm the restore configuration of the selected device. The status of the selected device changes to **Restored**.

NOTE: To retrieve the old configuration from the restore link, it is essential not to have any special character as part of the previous configuration.

Chapter 11
Acti 9 Smartlink Ethernet Firmware Upgrade

Firmware Upgrade

Overview

The firmware upgrade of Acti 9 Smartlink Ethernet can be done from Acti 9 Smart Test software.

For more information, see *Acti 9 Smart Test Software User Manual*.
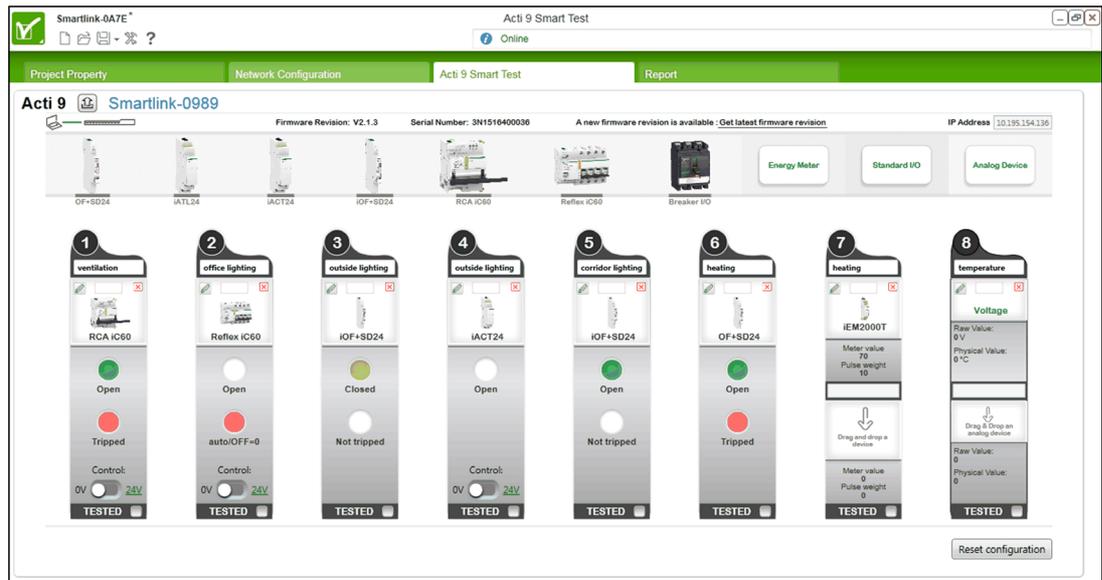
NOTICE
RISK OF DAMAGING THE EQUIPMENT
Ensure to operate the Acti 9 Smartlink Ethernet firmware upgrade only by a maintenance person.
Failure to follow these instructions can result in equipment damage.

Firmware Compatibility

If you add or update a device, the firmware has the potential to create inconsistencies. Hence, it is important to review your firmware upgrade plan with respect to other devices in the system. If the firmware creates inconsistencies, the system may have some limitations or unexpected behavior.

The primary reason for updating the system is to obtain the latest system features. The following system compatibility table shows the firmware versions of the products that are compatible with each other:

Range	Product	Reference Number	SmartPanel 1.0 Firmware Versions	SmartPanel 1.1 Firmware Versions	SmartPanel 1.2 Firmware Versions
Enerlin'X	IO Input/Output Interface for LV Circuit Breaker	LV434063	V2.1.4	V2.1.4	V2.1.4
	IFE Ethernet Interface for LV Circuit Breaker	LV434010 LV434011	Firmware V1.8.4 Web page V1.8.9	Firmware V1.9.8 Web page V1.9.9	Firmware V1.10.14 Web page V1.10.14
	IFM Modbus-SL Interface for LV Circuit Breaker	TRV00210	V2.2.7	V2.2.7	V2.2.9
	FDM121 Display for LV Circuit Breaker	TRV00211	V2.3.5	V2.3.5	V2.3.5
	FDM128 Display for 8 LV Devices	LV434128	V5.5.6	V6.1.1	V6.2.0
	ULP Accessories	LV4•••••	-	-	-
	Com'X 200	EBX200	V1.1.20	V1.3.5	V3.0.4
	BCM ULP Breaker Communication Module	33702 33703 33708 33713 33714 33842 33848 S64205	V4.0.9 Product data code greater than or equal to 14251	V4.0.9 Product data code greater than or equal to 14251	V4.1.4 Product data code greater than or equal to 14251
	BSCM Breaker Status and Control Module	Product data code greater than or equal to 3 N141810186	V2.2.7	V2.2.7	V2.2.7
	Micrologic Control Unit for Masterpact NT/NW and Compact NS Circuit Breakers	-	V8282	V8282	V8282
	Acti 9 Smartlink Modbus	A9XMSB11	V1.1.4	V1.2.0	V1.3.5
	Acti 9 Smartlink Ethernet	A9XMEA08	V2.1.3	V2.2.6	V2.5.5

For example, the following device updates require a mandatory update of device firmware between SmartPanel V1.0 and SmartPanel V1.1:
● FDM128 V6.1.1 can work with Acti 9 Smartlink Ethernet version V2.5.5 and Acti 9 Smart Test version 3.4.7.
● FDM128 V6.1.1 requires Acti 9 Smartlink Modbus to be updated to V1.2.0
● IFE V1.9.8 requires Acti 9 Smartlink Ethernet to be updated to V2.2.6
● IFE V1.9.8 requires Acti 9 Smartlink Modbus to be updated to V1.2.0
● Acti 9 Smartlink Ethernet V2.2.6 requires Acti 9 Smartlink Modbus to be updated to V1.2.0

To manage the device firmware, refer to the device documentation and Ecoreach that assures the feature set is complete and compatible.

NOTE: The Ecoreach compatibility check is used for Compact NSX, PowerPact H-, J-, and L-frame circuit breakers and Masterpact devices. As a result, the Enerlin'X devices that are not part of these product lines (for example, FDM128, Acti 9 Smartlink Ethernet, Acti 9 Smartlink Modbus, Com'X, iEM, and power meters) need to be manually verified with system compatibility table.

Chapter 12
Tables of Modbus Registers

What Is in This Chapter?

This chapter contains the following sections:

Section 12.1
General Description of Modbus Tables

What Is in This Section?

This section contains the following topics:

Topic	Page
Overview	139
Modbus Table Format and Data Types	140
Global Modbus Address Table	143

Overview

Overview

All the Modbus tables in the Acti 9 Smartlink Ethernet device have been designed to minimize the number of Modbus requests that the master system needs to send in order to collect the data prepared by Acti 9 Smartlink Ethernet.

The Modbus tables in the Acti 9 Smartlink Ethernet device are compact and summaries of all the data are collected on the seven digital channels and one analog channel of the Acti 9 Smartlink Ethernet device.

The Modbus tables in the Acti 9 Smartlink Ethernet device are described in:
● The section presenting:
  ❍ The overall list of Acti 9 Smartlink Ethernet device address zones
  ❍ The summary of channel 1 to 7 address zones
  ❍ The details of channel 1 to 7 address zones
  ❍ Analog inputs

● The section presenting the address zones for each type of device that can be connected to Acti 9 Smartlink Ethernet: iOF+SD24, OF+SD24, iACT24, iATL24, RCA iC60, Reflex iC60, iEM2000T, analog sensor, meter, contactor, and impulse relay
● The section presenting the address zones for each type of data (status, orders, measurements, and parameter settings) with a description of the summary zones and a description of the detailed data zones for each channel .

General Organization of Modbus Tables in Acti 9 Smartlink Ethernet Devices
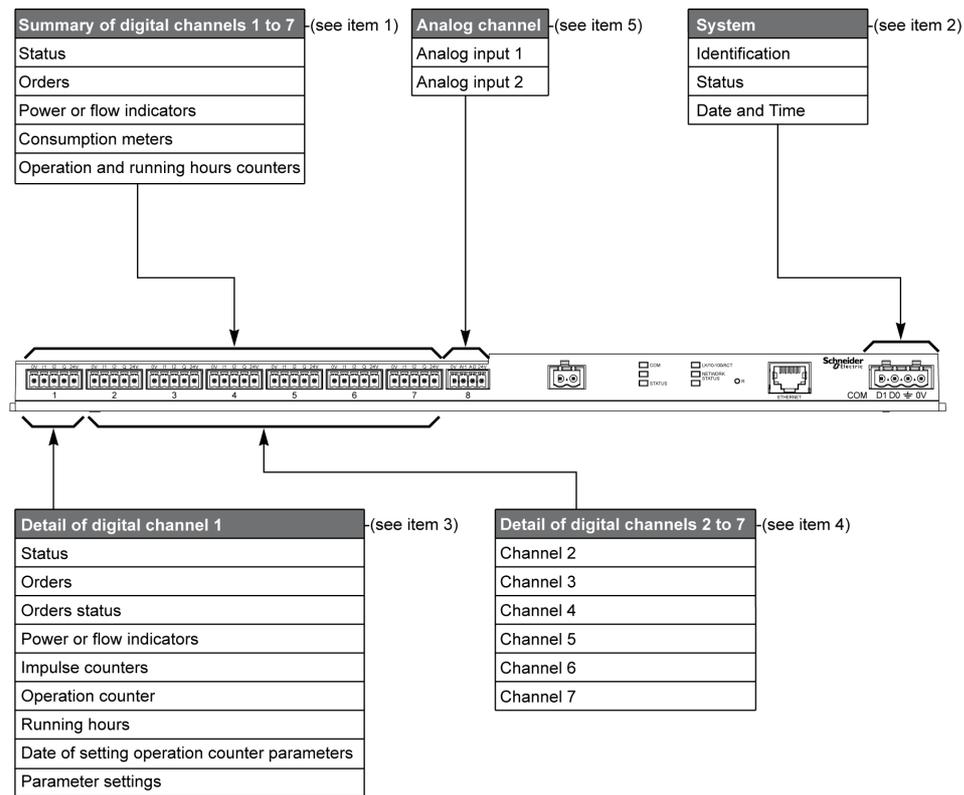
Item	Description	Link
1	Channel summary data	
2	System data independent of the channel	
3	Data for channel 1 Devices that can be connected to channel 1	
4	Data for channel 2 to 7 Devices that can be connected to channel 2 to 7	
5	Analog inputs 1 to 2	

Modbus Table Format and Data Types

Table Formats

Register tables have the following columns:

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description

Designation	Description
Address	16-bit register address that allows the user to access the variable. The address is expressed in decimal notation. Modbus Address: The list of Modbus addresses, defined by the Modbus protocol, starts at 0. The detailed tables in subsequent chapters of this manual give the Modbus addresses. If the programmable controller (master) refers to the data model addresses, the addresses to be supplied to this controller must meet the following rule: Data model address = Modbus address + 1. If the programmable controller (Modbus master) refers to the procotol addresses, the addresses to be supplied to this controller must be the Modbus addresses.
No.	Number of 16-bit registers that need to be read/written to access the complete information.
RW	Whether the register is read only (R) or read-write (RW).
X	Scale factor: • Scale "X1" means that the value of the register is the right one with the unit indicated. • A scale of 10 means that the register contains the value multiplied by 10. The actual value is therefore the value of the register divided by 10. • A scale of 0.1 means that the register contains the value multiplied by 0.1. The actual value is therefore the value of the register multiplied by 10.
Unit	Information unit of measurement: • "–": no unit corresponding to the value expressed. • "h": hours • "D": the unit depends on the connected device.
Type	Coding data type (see "Data type" table below).
Range	Range of permitted values for the variable, usually a subset of what the format allows. For BITMAP type data, the content of this domain is "–".
Default Value	Default value for the variable
Svd	Saving the value in the event of a power failure: • "Y": the value of the register is saved in the event of a power failure. • "N": the value is lost in the event of a power failure. **NOTE:** On start-up or reset, the available values are retrieved.
Function code	Code of functions that can be used in the register.
Description	Information about the register and the restrictions that apply.

Data Types

The following data types appear in the tables of Modbus registers:

Name	Description	Range
UINT	16-bit unsigned integer (1 word)	0...65535
INT	16-bit signed integer (1 word)	-32768...+32767
UINT32	32-bit unsigned integer (2 words)	0...4 294 967 295
INT32	32-bit signed integer (2 words)	-2 147 483 648...+2 147 483 647
Float32	32-bit value (2 words)	-3.4028E+38... +3.4028E+38
ASCII	8-bit alphanumeric character	Table of ASCII Characters
BITMAP	16-bit field (1 word)	–
DATE	See below	–

NOTE:
Float32 type data: Single precision float with sign bit, 8 bits exponent, 23 bits mantissa (positive and negative normalized real)

For ASCII type data, the order of transmission of characters in words (16-bit registers) is as follows:
● Character n as least significant
● Character n + 1 as most significant

All registers (16-bit or 2 bytes) are transmitted with Big Endian coding:
● The most significant byte is transmitted first
● The least significant byte is transmitted second

32-bit variables saved on two 16-bit words (e.g. consumption meters) are in Big Endian format:
● The most significant word is transmitted first, then the least significant.

64-bit variables saved on four 16-bit words (e.g. dates) are in Big Endian format:
● The most significant word is transmitted first, and so on.

DATE

DATE format in accordance with TI081 standard:

Word	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Reserved (0)								R4 (0)	Year (0...127)						
2	0					Month (1...12)			WD (0)			Day (1...31)				
3	SU (0)	0		Hour (0...23)					iV	0		Minute (0...59)				
4	Millisecond (0...59,999)															

R4:	Bit reserved
Year:	7 bits (year starting at 2000)
Month:	4 bits
Day:	5 bits
Hour:	5 bits
Minute:	6 bits
Millisecond:	16 bits
WD (day of the week) :	Bit at 0 if this parameter is not used.
SU (summertime):	Bit at 1 for summertime, bit at 0 if this parameter is not used.
iV (validity of the information received):	Bit at 1 if the information is not valid, bit at 0 if this parameter is not used.

Direct Bit Addressing

Addressing is permitted for BITMAP type zones with functions 1, 2, 5, and 15.

The address of the first bit is constructed as follows: (register address x 16) + bit number.

This addressing mode is specific to Schneider Electric.

Example: For functions 1, 2, 5, and 15, bit 3 of register 0x0078 should be addressed; the bit address is therefore 0x0783.

NOTE: The register whose bit needs to be addressed should have an address ≤ 0x0FFF.

Example of Modbus Frames

Request

Definition	Number of Bytes	Value	Comment
Slave number	1 byte	0x05	Acti 9 Smartlink Ethernet Modbus Address
Function code	1 byte	0x03	Reads n output or internal words
Address	2 bytes	0x36E2	Address of a consumption meter whose address is 14050 in decimal notation.
Number of words	2 bytes	0x002C	Reads 44 16-bit registers.
CRC	2 bytes	xxxx	Value of CRC16.

Response

Definition	Number of Bytes	Value	Comment
Slave number	1 byte	0x05	Acti 9 Smartlink Ethernet Modbus Address
Function code	1 byte	0x03	Reads n output or internal words
Number of Bytes	2 bytes	0x0058	Number of bytes read
Value of words read	88 bytes	–	Reads 44 16-bit registers
CRC	2 bytes	xxxx	Value of CRC16.

Modbus Address

The list of Modbus addresses, defined by the protocol, starts at 0. The detailed tables in subsequent chapters of this manual give the addresses.

If the programmable controller (Modbus master) refers to the data model addresses, the addresses to be supplied to this controller must meet the following rule: Data model address = address + 1.

If the programmable controller (Modbus master) refers to the procotol addresses, the addresses to be supplied to this controller must be the Modbus addresses.

Global Modbus Address Table

Overview

Description	Address	No. of Words	Type	RW
System				
Identification	100	11	ASCII	R
Status	112	1	BITMAP	R
Date and Time	115	4	DATE	RW
Summary of digital channels 1 to 7				
Status	120	2	BITMAP	R
Orders	130	4	BITMAP	RW
Power or flow indicators	14000	28	Float32	R
Consumption meters	14050	28	UINT32	R
Operation counters	14100	28	UINT32	RW
Running hour counters	14144	14	UINT32	RW
Detail of digital channel 1				
Status	14200	1	BITMAP	R
Orders	14201	2	BITMAP	RW
Output status	14203	1	BITMAP	R
Power or flow indicators	14204	4	Float32	R
Consumption meters	14208	4	UINT32	R
Operation counters	14212	4	UINT32	RW
Running hour counters	14216	2	UINT32	RW
Setting date of operation counters	14218	12	DATE	R
Pulse weight settings (meters)	14230	2	UNIT	RW
Detail of digital channels 2 to 7				
Channel 2[1]	14240	40	–	–
Channel 3[1]	14280	40	–	–
Channel 4[1]	14320	40	–	–
Channel 5[1]	14360	40	–	–
Channel 6[1]	14400	40	–	–
Channel 7[1]	14440	40	–	–
Analog inputs 1 to 2				
Raw value of analog input 1	200	2	Float32	R
Raw value of analog input 2	202	2	Float32	R

[1]The detailed information for the digital channels 2 to 7 has the same structure as the detailed information for a digital channel 1. To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N - 1) to the digital channel 1 registers.

Modbus Address

The list of Modbus addresses, defined by the Modbus protocol, starts at 0. The detailed tables in subsequent chapters of this manual give the Modbus addresses.

If the programmable controller (Modbus master) refers to the data model addresses, the addresses to be supplied to this controller must meet the following rule: Data model address = Modbus address + 1.

If the programmable controller (Modbus master) refers to the procotol addresses, the addresses to be supplied to this controller must be the Modbus addresses.

Section 12.2
Summary and Detailed Modbus Tables

What Is in This Section?

This section contains the following topics:

Topic	Page
System	145
Summary of Digital Channels 1 to 7	147
Details of Digital Channels 1 to 7	150
Analog Input	156
Embedded Configuration Registers	158

System

Identification

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
100	6	R	–	–	ASCII	–	N/A	Y	03, 100–4	Serial number on 12 ASCII characters; 11 alphanumeric digits maximum [SN] or [S/N]: PP YY WW [D[nnnn]] • PP: SAP Bridge plant number • YY: Year in decimal notation [05...99] • WW: Week in decimal notation [1...53] • D: Day of the week in decimal notation [1...7] • nnnn: Sequence of numbers [0001...10.000–1]
106	3	R	–	–	ASCII	–	N/A	Y	03, 100–4	Hardware version on 6 ASCII characters
109	3	R	–	–	ASCII	–	N/A	Y	03, 100–4	Software version on 6 ASCII characters. **Example:** "V0.0.1"

Status

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
112	1	R	–	–	BITMAP	–	0x0000	N	01, 02, 03, 100–4	Acti 9 Smartlink Ethernet device status and diagnostic register Bit 0 = 1: start-up phase Bit 1 = 1: operating phase Bit 2 = 1: downgraded mode[(1)] Bit 3 = 1: failure mode Bit 4: not used Bit 5: not used Bit 6 = 1: invalid data Bit 7 = 1: 24 V channel error Bit 8: not used Bit 9: not used Bit 10: not used Bit 11: not used Bit 12: not used Bit 13: E2PROM error Bit 14: RAM error Bit 15: FLASH error **NOTE:** Bits 0 to 3 are exclusive: only one mode is used at any given time.

[(1)]Downgraded mode comes into effect:
• When the power supply is cut or less than 16 Vdc.
• In the event of overcurrent (overload or short-circuit) on the Ti24 I/O.

If a short-circuit on an output has caused a change to downgraded mode, at the end of the short-circuit, the output is reset to 0 by the electronics: the Modbus master system sends a Modbus message to reset the output to 1 if it was at 1, before the short-circuit.

Failure mode intervenes if there is an FLASH and/or RAM and/or E2PROM error.

The data is invalid in the start-up phase, downgraded, and failure modes. Invalid data include inputs 1 and 2, the power or flow indicator, the operation and running hours counter.

- The E2PROM error bit is activated during the operating phase when a checksum error is detected in an E2PROM page.
- The RAM error bit is activated during the product initialization phase when an error is detected during a test of the RAM.
- The FLASH error bit is activated during the start-up phase when a checksum error is detected on the FLASH memory.

Date and Time

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
115	4	RW	–	–	DATE	(1)	N/A	N	03, 16 100–4	Indicates the year, month, day, hour, minute and millisecond on the Acti 9 Smartlink Ethernet device.

(1) See description of the DATE type *(see page 141)*.

Summary of Digital Channels 1 to 7

Status

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
120	1	R	–	–	BITMAP	–	0x0000	N	01, 02, 03, 100–4	Electrical status on input 1 of all channels[1].
121	1	R	–	–	BITMAP	–	0x0000	N	01, 02, 03, 100–4	Electrical status on input 2 of all channels[1].

[1]
- Bit 0 to 6: channel 1 to 7
- Bits 7 to 15: reserved

Each bit gives the electrical level of input 1 and 2:
- 0 = no current
- 1 = input current

Reserved bits do not mean anything.

Orders

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
130	1	RW	–	–	BITMAP	–	0x0000	N	01, 02, 03, 05, 06, 15, 16, 100–4	Open order for Acti 9 product[1].
131	1	RW	–	–	BITMAP	–	0x0000	N	01, 02, 03, 05, 06, 15, 16, 100–4	Close order for Acti 9 product[1].
132	1	RW	–	–	BITMAP	–	0x0000	N	01, 02, 03, 05, 06, 15, 16, 100–4	Deactivation order for product not in the Acti 9 range[1].
133	1	RW	–	–	BITMAP	–	0x0000	N	01, 02, 03, 05, 06, 15, 16, 100–4	Activation order for product not in the Acti 9 range[1].

[1]
- Bit 0 to 6: channel 1 to 7
- Bits 7 to 15: reserved

NOTE:
- Each bit corresponds to an open order (activated when the bit is at 1).
- The open order on several channels is possible.
- The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel).
- If a reserved bit is at 1, the Acti 9 Smartlink Ethernet device resets it to 0.
- "No meaning" indicates that the bits are fixed at 0 or 1 and do not affect the system.
- If bits 0 and 1 are at 1, there is no effect on the system.

Power or Flow Indicators

	Channels						
	1	2	3	4	5	6	7
Input I1	14000	14002	14004	14006	14008	14010	14012
Input I2	14022	14024	14026	14028	14030	14032	14034

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14000	2	R	X1	D	Float32	–	0	N	03, 100–4	Power or flow indicator for channel 1/input 1[1].

[1]
- When the impulse counter (the unit depends on the connected device: energy, gas, water, etc.) is connected to input 1 or 2 of channel 1, the register contains the flow value. This is calculated as follows:
  - (3600 x pulse weight)/t, t representing the time in seconds between 2 pulses. The result is expressed for one hour.
- The default value of pulse weight is 10 and it can be configured by the Modbus command.
  Example: This register indicates the active power between the last 2 pulses if an iEM2000T device is connected to the channel 1/input 1 (Pulse weight = 10 Wh).
  NOTE:

This register is reset to 0:
- After a duration d = 3 x t (t being the time in seconds between the last 2 pulses), if 3 x t is less than 5 seconds, the duration d equals 5 seconds
- After 24 hours without a pulse
- After loss of the 24 Vdc input/output voltage

The accuracy of the power or flow indication is:
- 5% if the pulse frequency is 5 Hertz or less
- 17% if the pulse frequency equals the maximum frequency of 17 Hertz

Consumption Meters

The consumption meters in this Modbus table indicate the consumption from meters connected to each Acti 9 Smartlink Ethernet channel (1 to 7).

The consumption value (associated with a channel) is obtained by multiplying the number of pulses (received by inputs I1 and I2 of this channel) by the pulse weight.

	Channels						
	1	2	3	4	5	6	7
Input I1	14050	14052	14054	14056	14058	14060	14062
Input I2	14072	14074	14076	14078	14080	14082	14084

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14050	2	R	X1	–	UINT32	–	0	Y	03, 100–4	Consumption meter on channel 1/input I1.

NOTE:
- The number of pulses from inputs I1 and I2 of each channel (1 to 7) are available in registers 14212 (channel 1) to 14454 (channel 7). The number of pulses can be preset by writing to the impulse counter register. See the Operation Counters *(see page 149)* chapter.
- The pulse weights of inputs I1 and I2 of each channel (1 to 7) are available and can be set in registers 14230 (channel 1) to 14471 (channel 7). The pulse weight is 10 by default. See the Pulse Weight Settings *(see page 155)* chapter.

Operation Counters

	Channels						
	1	2	3	4	5	6	7
Input I1	14100	14102	14104	14106	14108	14110	14112
Input I2	14122	14124	14126	14128	14130	14132	14134

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14100	2	RW	X1	–	UINT32	–	0	Y	03, 16, 100–4	Operation counter for channel 1/input 1: changes from state 1 to state 0.

Running Hour Counters

	Channels						
	1	2	3	4	5	6	7
Input I1	14144	14146	14148	14150	14152	14154	14156

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14144	2	RW	X1	h	UINT32	–	0	Y	03, 16, 100–4	Running hours counter for channel 1/input 1. Counting starts when the input is activated.

Details of Digital Channels 1 to 7

Channels 1 to 7 Overview

	Channels						
	1	2	3	4	5	6	7
Status							
Input I1 (bit 0)	14200	14240	14280	14320	14360	14400	14440
Input I2 (bit 1)	14200	14240	14280	14320	14360	14400	14440
Orders							
Commands output Q (bit 0 and bit 1): Acti 9 product	14201	14241	14281	14321	14361	14401	14441
Commands output Q (bit 0 and bit 1): non-Acti 9 product	14202	14242	14282	14322	14362	14402	14442
State of output Q (bit 0)	14203	14243	14283	14323	14363	14403	14443
Counters							
Input I1 power or flow indicator[2]	14204	14244	14284	14324	14364	14404	14444
Input I2 power or flow indicator[2]	14206	14246	14286	14326	14366	14406	14446
Input I1 consumption meter[1][2]	14208	14248	14288	14328	14368	14408	14448
Input I2 consumption meter [1][2]	14210	14250	14290	14330	14370	14410	14450
Operation and Running Hours Counters							
I1 operation counter[1]	14212	14252	14292	14332	14372	14412	14452
I2 operation counter[1]	14214	14254	14294	14334	14374	14414	14454
I1 input running hours[1]	14216	14256	14296	14336	14376	14416	14456
Setting Date of Operation Counters							
Input I1 date	14218	14258	14298	14338	14378	14418	14458
Input I2 date	14222	14262	14302	14342	14382	14422	14462
Running hours parameter setting date on input I1	14226	14266	14306	14346	14386	14426	14466
Pulse Weight Settings (Meters)							
Pulse weight for input I1[2]	14230	14270	14310	14350	14390	14430	14470
Pulse weight for input I2[2]	14231	14271	14311	14351	14391	14431	14471

[1] Data type: UINT32

[2] Information specific to meter type devices

Modbus Address

The list of Modbus addresses, defined by the Modbus protocol, starts at 0. The detailed tables in subsequent chapters of this manual give the Modbus addresses.

If the programmable controller (Modbus master) refers to the data model addresses, the addresses to be supplied to this controller must meet the following rule: Data model address = Modbus address + 1.

If the programmable controller (Modbus master) refers to the procotol addresses, the addresses to be supplied to this controller must be the Modbus addresses.

The figure below shows the terminals for each channel.
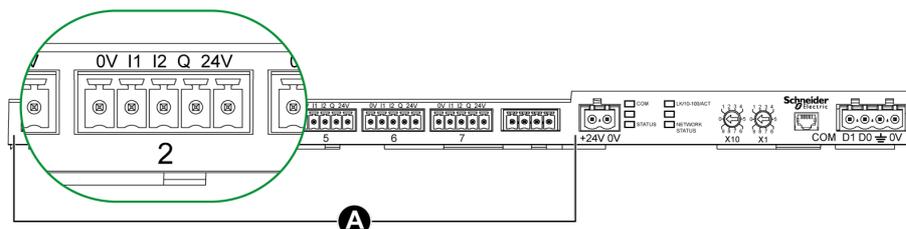
A Channels from 1 to 7

Description of terminals for each channel (Ti24 interface):

Terminal	Description
24 V	24 V of the 24 Vdc power supply
Q	Control output
I2	Input number 2
I1	Input number 1
0 V	0 V of the 24 Vdc power supply

Status

	Channels						
	1	2	3	4	5	6	7
Input I1 (bit 0)	14200	14240	14280	14320	14360	14400	14440
Input I2 (bit 1)	14200	14240	14280	14320	14360	14400	14440

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14200	1	R	–	–	BITMAP	–	0x0000	N	03, 100–4	Electrical status of inputs 1 and 2 of all connected devices[1].

[1]
- Bit 0 = electrical level of input 1
- Bit 1 = electrical level of input 2
- Bits 2 to 15 = reserved
  NOTE: "Reserved" means that the bits are fixed at 0 and do not mean anything.

  Meaning of bits for inputs I1 and I2:
  - 0 = no current
  - 1 = input current

Orders

	Channels						
	1	2	3	4	5	6	7
Output Q (bit 0 and bit 1): Acti 9 product	14201	14241	14281	14321	14361	14401	14441

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14201	1	RW	–	–	BITMAP	–	0x0000	N	03, 06, 16, 100–4	Close and open order for products in the Acti 9 range[1].

	Channels						
	1	2	3	4	5	6	7
Output Q (bit 0 and bit 1): non-Acti 9 product	14202	14242	14282	14322	14362	14402	14442

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14202	1	RW	–	–	BITMAP	–	0x0000	N	03, 06, 16, 100–4	Deactivation and activation order for product not in the Acti 9 range[2].

(1)
- Bit 0 = open order
- Bit 1 = close order
- Bits 2 to 15 = no meaning

(2)
- Bit 0 = deactivation order
- Bit 1 = activation order
- Bits 2 to 15 = no meaning

NOTE:
- The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel).
- If a reserved bit is at 1, the Acti 9 Smartlink Ethernet device resets it to 0.

- "No meaning" indicates that the bits are fixed at 0 or 1 and do not affect the system.
- If bits 0 and 1 are at 1, there is no effect on the system.

Power or Flow Indicators

	Channels						
	1	2	3	4	5	6	7
Input I1 power or flow indicator[6]	14204	14244	14284	14324	14364	14404	14444
Input I2 power or flow indicator[6]	14206	14246	14286	14326	14366	14406	14446

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14204	2	R	X1	D	Float32	–	0	N	03, 100–4	Power or flow indicator for input 1[1].
14206	2	R	X1	D	Float32	–	0	N	03, 100–4	Power or flow indicator for input 2[1].

[1] The same channel (Ti24 interface) on the Acti 9 Smartlink Ethernet can take account of 2 counters:
- One counter connected to input I1
- One counter connected to input I2

Consumption Meters

	Channels						
	1	2	3	4	5	6	7
Input I1 consumption meter[1]	14208	14248	14288	14328	14368	14408	14448
Input I2 consumption meter[1]	14210	14250	14290	14330	14370	14410	14450

[1] The same channel (Ti24 interface) on the Acti 9 Smartlink Ethernet can take account of 2 meters:
- One meter connected to input I1
- One meter connected to input I2

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14208	2	R	X1	–	UINT32	–	0	Y	03, 100–4	Consumption meter on input 1.
14210	2	R	X1	–	UINT32	–	0	Y	03, 100–4	Consumption meter on input 2.

Operation Counters

	Channels						
	1	2	3	4	5	6	7
I1 operation counter	14212	14252	14292	14332	14372	14412	14452
I2 operation counter	14214	14254	14294	14334	14374	14414	14454

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14212	2	RW	X1	–	UINT32	–	0	Y	03, 16 100–4	Operation counter for channel 1/input 1. This register indicates the number of changes of state of input 1 from state 1 to state 0.

Running Hour Counters

	Channels						
	1	2	3	4	5	6	7
I1 input running time	14216	14256	14296	14336	14376	14416	14456

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14216	2	RW	X1	h	UINT32	–	0	Y	03, 16 100–4	Running hours counter for a digital channel 1/input 1. Counting starts when the input is activated.

Setting Date of Operation Counters

	Channels						
	1	2	3	4	5	6	7
Input I1 date	14218	14258	14298	14338	14378	14418	14458
Input I2 date	14222	14262	14302	14342	14382	14422	14462
Running hours parameter setting date on input I1	14226	14266	14306	14346	14386	14426	14466

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14218	4	R	–	–	DATE	(1)	(1)	Y	03, 100–4	Date when the operation counter parameter was last set. This register indicates the date and time when the operation counter parameter was last set on input 1.
14222	4	R	–	–	DATE	(1)	(1)	Y	03, 100–4	Date when the operation counter parameter was last set. This register indicates the date and time when the operation counter parameter was last set on input 2.
14226	4	R	–	–	DATE	(1)	(1)	Y	03, 100–4	Date when the running hours counter parameter was last set. This register indicates the date and time when the running hours counter parameter was last set on input 1.

(1) See description of the DATE type *(see page 141)*.

Pulse Weight Settings (Meters)

	Channels						
	1	2	3	4	5	6	7
Pulse weight I1	14230	14270	14310	14350	14390	14430	14470
Pulse weight I2[1]	14231	14271	14311	14351	14391	14431	14471

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
14230	1	RW	X1	D	UINT	0...65,535	10	Y	03, 06, 16 100–4	Pulse weight: this register can be used to set the value of the pulse weight for the meter connected to input 1 of a digital channel 1.
14231	1	RW	X1	D	UINT	0...65,535	10	Y	03, 06, 16 100–4	Pulse weight: this register can be used to set the value of the pulse weight for the meter connected to input 2 of a digital channel 1.

[1] The same channel (Ti24 interface) on the Acti 9 Smartlink Ethernet can take account of 2 meters:
● One meter connected to input I1
● One meter connected to input I2

Analog Input

Analog Channel Synthesis Data Access

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
200	2	R	–	V/mA	Float32	4...20 mA or 0...10 V	0	N	03, 06, 16, 100–4	Analog input 1 raw value[1] in Volt (0...10 V) or Ampere (4...20 mA).
202	2	R	–	V/mA	Float32	4...20 mA or 0...10 V	0	N	03, 06, 16, 100–4	Analog input 2 raw value[1] in Volt (0...10 V) or Ampere (4...20 mA).

Analog Channel Detail Information Access

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
Analog input 1 data										
15000	2	R	–	V/mA	Float32	4...20 mA or 0...10 V	0	N	03, 06, 16, 100–4	Analog input 1 raw value[1] in Volt (0...10 V) or Ampere (4...20 mA)
15002	2	R	–	User-defined	Float32	–	0	N	03, 06, 16, 100–4	Scaled value for analog input 1
Analog input 1 setting										
15010	1	R/W	–	–	BITMAP	–	0x0000	Y	03, 06, 16, 100–4	Details about input 1 Bit 0 0 : 0...10 V 1 : 4...20 mA Bit 1 0 : Input 1 is not scaled 1 : Input 1 is scaled
15011	2	R/W	N/A	User defined	Float16	–	0	Y	03, 06, 16, 100–4	Minimum of scale for the transfer function of analog input 1
15013	2	R/W	N/A	User defined	Float16	–	0	Y	03, 06, 16, 100–4	Maximum of scale for transfer function of analog input 1
Analog input 2 data										
15020	2	R	–	V/mA	Float320.897969	4...20 mA or 0...10 V	0	N	03, 06, 16, 100–4	Analog input 2 raw value[1] in Volt (0...10 V) or Ampere (4...20 mA)
15022	2	R	–	User defined	Float320.897969	–	0	N	03, 06, 16, 100–4	Scaled value for analog input 2
Analog input 2 setting										
15030	1	R/W	–	–	BITMAP	–	0x0000	Y	03, 06, 16, 100–4	Details about input 2 Bit 0 0 : 0...10 V 1 : 4...20 mA Bit 1 0 : Input 2 is not scaled 1 : Input 2 is scaled
15031	2	R/W	N/A	User defined	Float16	–	0	Y	03, 06, 16, 100–4	Minimum of scale for the transfer function of analog input 2
15033	2	R/W	N/A	User defined	Float16	–	0	Y	03, 06, 16, 100–4	Maximum of scale for transfer function of analog input 2

NOTE:

[1] The calculation of the scaled value is based on the following items:

● Analog measurement: Analog input raw value in Volt (0...10 V) or Ampere (4...20 mA).
● Minimum measurement: 0 V or 4 mA.
● Maximum measurement: 10 V or 20 mA.
● Minimum of scale: Minimum of scale for the transfer function of the analog channel (0 V or 4 mA).
● Maximum of scale: Maximum of scale for the transfer function of the analog channel (10 V or 20 mA).

The scaled value is:

Scaled value = [Maximum scale - Minimum scale] / [Maximum measurement - Minimum measurement] x Analog measurement + Minimum scale

Embedded Configuration Registers

Details of Digital Channels 1 to 7

	Channels						
	1	2	3	4	5	6	7
Input I1	20009	20137	20265	20393	20521	20649	20777
Input I2	20073	20201	20329	20457	20585	20713	20841
Output	21417	21481	21545	21609	21673	21737	21801

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
20009	13	R	–	–	ASCII	–	–	Y	03, 100–4	Name of the device. Maximum is 20 characters and minimum is 1 character.
20022	13	R	–	–	ASCII	–	–	Y	–	Label of the device. Maximum is 5 characters and minimum is zero character.
20035	1	R	–	–	UINT16	–	–	Y	–	Indicates the product type. 0 = Null 1 = Standard IO 2 = Standard counter (any pulse meter) 3 = OF+SD24 (breaker with status) 4 = iOF+SD24 (breaker with status) 5 = Reflex iC60 (breaker with control) 6 = RCAiC60 (breaker with control) 7 = iACT24 (contactor) 8 = iATL24 (relay) 10 = PM3210 12 = PM3255 13 = iEM3110 15 = iEM3155 16 = iEM3210 18 = iEM3255 18 = iEM3255 19 = iEM2000T 25 = Breaker IO 27 = iEM3355
20036	1	R	–	–	UINT16	–	10	Y	–	Indicates the pulse weight from 0...65535.
20037	1	R	–	–	UINT16	–	–	Y	–	Indicates the unit of the device. 0 = Wh 2 = M3 3 = L 4 = J 5 = Cal 8 = Gallon

NOTE: The above table provides the description of embedded registers of the digital channels and these are read-only registers.

Details of Analog Channel

	Analog Channel
Input I1	20905
Input I2	20969

Address	No.	RW	X	Unit	Type	Range	Default Value	Svd	Function Code	Description
20905	13	R	–	–	ASCII	–	–	Y	03, 100–4	Name of the analog device. Maximum is 20 characters and minimum is 1 character.
20918	13	R	–	–	ASCII	–	–	Y	–	Label of the analog device. Maximum is 5 characters and minimum is zero character.
20931	1	R	–	–	UINT16	–	–	Y	–	Indicates the product type. 20 = Voltage sensor 21 = Current sensor
20932	1	R	–	–	UINT16	–	10	Y	–	Indicates the pulse weight from 0...65535.
20933	1	R	–	–	UINT16	–	–	Y	–	Indicates the unit of the analog device.
20943	2	R	–	–	Float32	–	10	Y	–	Logical minimum value.
20945	2	R	–	–	Float32	–	–	Y	–	Logical maximum value.

Section 12.3
Modbus Tables for Connected Products

What Is in This Section?

This section contains the following topics:

iOF+SD24 Indication Auxiliary

Overview

The iOF+SD24 indication auxiliary is used to find out the status of the following devices:

- iC60 and iC65 circuit breaker (OF and $\overline{SD}$ states)
- iID residual current circuit breaker (OF and $\overline{SD}$ states)
- iSW-NA switch (OF status)
- iDPN circuit breaker (sold in China)

The Modbus information in the table below is given for an iOF+SD24 auxiliary connected to channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
OF status	14200	1	BITMAP	R	bit 0 = 0: circuit breaker open bit 0 = 1: circuit breaker closed
status $\overline{SD}$	14200	1	BITMAP	R	bit 1 = 0: device tripped (fault present) bit 1 = 1: device not tripped
Counters					
Number of circuit breaker opening/closing cycles	14212	2	UINT32	RW	–
Number of trippings	14214	2	UINT32	RW	–
Load running time	14216	2	UINT32	RW	in hours

[1] To address the digital channel N ($1 \leq N \leq 7$) registers, add $40 \times (N - 1)$ to the digital channel 1 registers.

OF+SD24 Indication Auxiliary

Overview

The OF+SD24 indication auxiliary is used to find out the status of the following devices:

- C60 or C120 circuit breaker (OF and $\overline{SD}$ states)
- DPN residual current circuit breaker (OF and $\overline{SD}$ states)
- DPN switch (OF status)
- C60H-DC circuit breaker (OF and $\overline{SD}$ states)
- iDPN circuit breaker (sold in every country except China)

The Modbus information in the table below is given for an OF+SD24 auxiliary connected to channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
OF status	14200	1	BITMAP	R	bit 0 = 0: circuit breaker open bit 0 = 1: circuit breaker closed
Status $\overline{SD}$	14200	1	BITMAP	R	bit 1 = 0: device tripped (fault present) bit 1 = 1: device not tripped
Counters					
Number of circuit breaker opening/closing cycles	14212	2	UINT32	RW	–
Number of trippings	14214	2	UINT32	RW	–
Load running time	14216	2	UINT32	RW	in hours

[1] To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N – 1) to the digital channel 1 registers.

iEM2000T, iEM3110, iEM3155, iEM3210, iEM3255, iEM3355 Meters, or Meter with Pulse Output (Standard CEI 62053-31)

Overview

The meter delivers a pulse output.

The Modbus information in the table below is given for a meter connected to a digital channel 1.

The same channel (Ti24 interface) on the Acti 9 Smartlink Ethernet can take account of 2 meters:
● One meter connected to input I1
● One meter connected to input I2

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
Pulse output (meter 1)	14200	1	BITMAP	R	bit 0
Pulse output (meter 2)	14200	1	BITMAP	R	bit 1
Counters					
Power or flow indicator (meter 1)	14204	2	Float32	R	[2]
Power or flow indicator (meter 2)	14206	2	Float32	R	[2]
Consumption meter (meter 1)	14208	2	UINT32	R	[3]
Consumption meter (meter 2)	14210	2	UINT32	R	[3]
Settings					
Pulse weight (meter 1)	14230	1	UINT	RW	[2]
Pulse weight (meter 2)	14231	1	UINT	RW	[2]

[1] To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N – 1) to the digital channel 1 registers.

[2] The register contains the flow value.
● The flow is: (3600 x pulse weight)/t, with t representing the time in seconds between 2 pulses. The result is expressed for one hour.
● The pulse weight is 10 by default. The unit depends on the connected device: energy, gas, water, etc.

[3] The consumption value (associated with a channel) is obtained by multiplying the number of pulses (received by inputs I1 and I2 of this channel) by the pulse weight.

iACT24 Auxiliary for iCT Contactor

Overview

The iACT24 auxiliary:
- Can be used to control an iCT contactor rated 25 A or higher via its Y1, Y2 and Y3 inputs.
  The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet device channels.
- Is used to find out the contactor status (O/C status: open/closed status)

The Modbus information in the table below is given for an iACT24 auxiliary connected to a digital channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
O/C status: open/closed status	14200	1	BITMAP	R	bit 0 = 0: contactor open bit 0 = 1: contactor closed
Device present	14200	1	BITMAP	R	bit 1 = 0: connection fault or no connected device bit 1 = 1: connected device
Orders					
Deactivate contactor coil	14201	1	BITMAP	RW	bit 0 = 1: deactivate coil[2]
Activate contactor coil	14201	1	BITMAP	RW	bit 1 = 1: activate coil[2]
Counters					
Number of contactor open/close cycles	14212	2	UINT32	RW	–
Load running time for an NO contactor	14216	2	UINT32	RW	in hours

[1] To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N – 1) to the digital channel 1 registers.

[2] The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel). If bits 0 and 1 of address 14201 are activated simultaneously, the Acti 9 Smartlink Ethernet device does nothing.

iATL24 Auxiliary for iTL Impulse Relay

Overview

The iATL24 auxiliary:
- Can be used to control an iTL impulse relay via its Y1, Y2, and Y3 inputs
  The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet device channels.
- Can be used to find out the impulse relay status (O/C status open/closed status).

The Modbus information in the table below is given for an iATL24 auxiliary connected to a digital channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
O/C status: open/closed status	14200	1	BITMAP	R	bit 0 = 0: impulse relay open bit 0 = 1: impulse relay closed
Device present	14200	1	BITMAP	R	bit 1 = 0: connection fault or no connected device bit 1 = 1: connected device
Orders					
Impulse relay contact opening	14201	1	BITMAP	RW	bit 0 = 1: Impulse relay contact opening[2]
Impulse relay contact closing	14201	1	BITMAP	RW	bit 1 = 1: Impulse relay contact closing[2]
Counters					
Number of impulse relay opening/closing cycles	14212	2	UINT32	RW	–
Load running time	14216	2	UINT32	RW	in hours

[1] To address the digital channel N ($1 \leq N \leq 7$) registers, add $40 \times (N - 1)$ to the digital channel 1 registers.

[2] The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel). If bits 0 and 1 of address 14201 are activated simultaneously, the Acti 9 Smartlink Ethernet device does nothing.

Contactor and Relay (Not in the Acti 9 Range)

Overview

A contactor or relay powered with 24 Vdc can be connected to Acti 9 Smartlink Ethernet. This should have the following characteristics:
- The contactor or relay coil must not draw more than 100 mA
- The indication contact must be low level type

Only contactors in the Acti 9 range can be connected to Acti 9 Smartlink Ethernet using the iATL24 auxiliary.

The contactor can be controlled by one of the Acti 9 Smartlink Ethernet device channels.

The Modbus information in the table below is given for a contactor connected to a digital channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
OF status	14200	1	BITMAP	R	bit 0 = 0: contactor open bit 0 = 1: contactor closed
Orders					
Deactivate contactor coil	14202	1	BITMAP	RW	bit 0 = 1: deactivate coil[2]
Activate contactor coil	14202	1	BITMAP	RW	bit 1 = 1: activate coil[2]
Counters					
Number of contactor open/close cycles	14212	2	UINT32	RW	–
Load running time for an NO contactor	14216	2	UINT32	RW	in hours

[1] To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N – 1) to the digital channel 1 registers.

[2] The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel). If bits 0 and 1 of address 14202 are activated simultaneously, the Acti 9 Smartlink Ethernet device does nothing.

Acti 9 RCA iC60 Remote Control with Ti24 Interface

Overview

The Acti 9 RCA iC60 remote control:
- Should have a Ti24 interface (with product references A9C70122 and A9C70124)
- Can be used to control a iC60 circuit breaker via input Y3 of its Ti24 interface.
  The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet device channels
- Can be used to find out the OF and $\overline{SD}$ states of the circuit breaker associated with the Acti 9 RCA iC60 remote control

The Modbus information in the table below is given for an Acti 9 RCA iC60 remote control connected to a digital channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
OF status	14200	1	BITMAP	R	bit 0 = 0: circuit breaker open bit 0 = 1: circuit breaker closed
Status $\overline{SD}$	14200	1	BITMAP	R	bit 1 = 0: device tripped (fault present) bit 1 = 1: device not tripped
Orders					
Activation of the open order	14201	1	BITMAP	RW	bit 0 = 1: activation of the open order[2]
Activation of the close order	14201	1	BITMAP	RW	bit 1 = 1: activation of the close order[2]
Counters					
Number of circuit breaker open/close cycles	14212	2	UINT32	RW	–
Number of trippings	14214	2	UINT32	RW	–
Load running time	14216	2	UINT32	RW	in hours

[1] To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N – 1) to the digital channel 1 registers.

[2] The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel). If bits 0 and 1 of address 14201 are activated simultaneously, the Acti 9 Smartlink Ethernet device does nothing.

Acti 9 Reflex iC60 Integrated Control Circuit Breaker With Ti24 Interface

Overview

The Acti 9 Reflex iC60 integrated control circuit breaker:
- Should have a Ti24 interface (with product references A9C6••••).
- Can allow the device to be controlled via input Y3 of its Ti24 interface
  The Y3 (24 Vdc) input can be controlled by one of the Acti 9 Smartlink Ethernet device channels.
- Can be used to communicate its O/C and auto/OFF status

The Modbus information in the table below is given for an Acti 9 Reflex iC60 integrated control circuit breaker connected to a digital channel 1.

Description	Address[1]	No. of Register(s)	Type	Action	Values and Meanings
Status					
O/C status: open/closed status	14200	1	BITMAP	R	bit 0 = 0: circuit breaker open bit 0 = 1: circuit breaker closed
auto/OFF status: handle position	14200	1	BITMAP	R	bit 1 = 0: handle in OFF position (device open) bit 1 = 1: handle in upper position: auto
Orders					
Activation of the open order	14201	1	BITMAP	RW	bit 0 = 1: activation of the open order[2]
Activation of the close order	14201	1	BITMAP	RW	bit 1 = 1: activation of the close order[2]
Counters					
Number of circuit breaker open/close cycles	14212	2	UINT32	RW	–
Number of trippings	14214	2	UINT32	RW	–
Load running time	14216	2	UINT32	RW	in hours

[1] To address the digital channel N (1 ≤ N ≤ 7) registers, add 40 × (N – 1) to the digital channel 1 registers.

[2] The Acti 9 Smartlink Ethernet device resets the bit to state 0 when the order is taken into account (unless no product is connected to the channel). If bits 0 and 1 of address 14201 are activated simultaneously, the Acti 9 Smartlink Ethernet device does nothing.

Appendices

What Is in This Appendix?

The appendix contains the following chapters:

Chapter	Chapter Name	Page
A	Details of Modbus Functions	171
B	Reset of Smartlink Ethernet	179
C	Troubleshooting	181

Appendix A
Details of Modbus Functions

What Is in This Chapter?

This chapter contains the following topics:

Function 8: Modbus Diagnostics

Structure of Modbus Messages Concerning Acti 9 Smartlink Ethernet Diagnostic Counter Management

Request

Definition	Number of Bytes	Value
Slave number	1 byte	0xFF
Function code	2 bytes	08 (0x08)
Sub-function code	2 bytes	22 (0x0016)
Operation code	2 bytes	1 ((0x0001) see below list for operation code)
Diagnostic control	2 bytes	0x0100 (see below list for diagnostic control)
Starting entry index	1 byte	0x00 (0 to 255)

The operation code field is used to select the diagnostic and the statistic data to be read from the device.

Most Significant Byte								Least Significant Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reserved				Protocol Version				Operation Code							

Bit assignments are included in the table below:

Bit	Field	Description
15...12	Reserved	Must be zero
11...8	Protocol Version (PV)	Indicates version of the protocol of the client (requestor) Values are: 0x00 (initial version)
7...0	Operation Code	Indicates function to be performed by the command Values are: ● 0x01 = Read diagnostic data ● 0x02 = Clear diagnostic data ● 0x03 = Clear all diagnostic data ● 0x04 = List ports

The diagnostic control field provides the data selection information for this protocol as well as specifies the logical port from which, the data is to be retrieved (if applicable). The diagnostic control field is defined as shown in the table below:

Most Significant Byte								Least Significant Byte							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Data Selection Code								Port Select							

Bit assignments are included in the table below:

Bit	Field	Description
15...8	Data Selection Code (DS)	Indicates the diagnostic data to retrieve or to clear from the logical port. See the table below for valid values.
7...0	Port Select (PS)	Indicates the logical port number to retrieve the selected data from ● 0x00 = the internal port of a device that supports an embedded switch or any single port not accessible externally ● 0x01 to 0xFE = logical number of the desired port ● 0xFF = the port the current request came in This value should be 0xFF if the requested data is not port specific. See the **Port Select Needed** column in the table below for which **Data Selection Code** requires a valid port select value.

Data selection code

Data Selection Code	Diagnostic Data Retrieved	Port Select Needed	Type
0x00	Reserved		Public
0x01	Basic network diagnostics		Public
0x02	Ethernet port diagnostics	Yes	Public
0x03	Modbus TCP port 502 diagnostics		Public
0x04	Modbus TCP port 502 connection table		Public
0x05 to 0x7E	Reserved for other public codes		Public
0x7F	Data structure offsets		Public
0x80 to 0xFF	Reserved		Reserved

Response

Definition	Number of Bytes	Value
Slave number	1 byte	0xFF
Function code	2 bytes	08 (0x08)
Sub-function code	2 bytes	22 (0x0016)
Operation code	2 bytes	1 ((0x0001) see the above list for operation code)
Diagnostic control	2 bytes	0x0100 (see the above list for diagnostic control)
Starting entry index	1 byte	0x00 (0 to 255)

Resetting Counters

The counters are reset to 0:
● When they reach the maximum value 65535.
● When they are reset by a Modbus command (function code 8, sub-function code 10).
● When the power is cut off, or
● When the communication parameters are modified.

Function 43-14: Read Acti 9 Smartlink ID

Structure of Modbus Read Acti 9 Smartlink ID Messages

The ID consists of ASCII characters called objects.

Request for basic information

Definition	Number of Bytes	Value
Slave number	1 byte	0xFF
Function code	1 byte	0x2B
Sub-function code	1 byte	0x0E
Product ID	1 byte	0x01
Object identifier	1 byte	0x00

Response with basic information

Definition		Number of Bytes	Value
Slave number		1 byte	0xFF
Function code		1 byte	0x2B
Sub-function code		1 byte	0x0E
Product ID		1 byte	0x01
Conformity level		1 byte	0x01
Reserved		1 byte	0x00
Reserved		1 byte	0x00
Number of objects		1 byte	0x03
Object 0: manufacturer name	Object number	1 byte	0x00
	Object length	1 byte	0x12
	Object content	18 bytes	Schneider Electric
Object 1: product code	Object number	1 byte	0x01
	Object length	1 byte	0x08
	Object content	8 bytes	A9XMEA08
Object 2: version number	Object number	1 byte	0x02
	Object length	1 byte	0x06 (minimum)
	Object content	6 bytes minimum	Vx.y.z

Request for complete information

Definition	Number of Bytes	Value
Slave number	1 byte	0xFF
Function code	1 byte	0x2B
Sub-function code	1 byte	0x0E
Product ID	1 byte	0x02
Object identifier	1 byte	0x00

Response with complete information

Definition		Number of Bytes	Value
Slave number		1 byte	0xFF
Function code		1 byte	0x2B
Sub-function code		1 byte	0x0E
Product ID		1 byte	0x02
Conformity level		1 byte	0x02
Reserved		1 byte	0x00
Reserved		1 byte	0x00
Number of objects		1 byte	0x05
Object 0: manufacturer name	Object number	1 byte	0x00
	Object length	1 byte	0x12
	Object content	18 bytes	Schneider Electric
Object 1: product code	Object number	1 byte	0x01
	Object length	1 byte	0x08
	Object content	8 bytes	A9XMEA08
Object 2: version number	Object number	1 byte	0x02
	Object length	1 byte	0x06 (minimum)
	Object content	6 bytes minimum	Vx.y.z
Object 3: manufacturer URL	Object number	1 byte	0x03
	Object length	1 byte	0x1A
	Object content	26 bytes	www.schneider-electric.com
Object 4: product name	Object number	1 byte	0x04
	Object length	1 byte	0x12
	Object content	18 byte	Acti 9 Smartlink Ethernet

NOTE: The above table describes how to read the ID of a Acti 9 Smartlink Ethernet.

Function 43–15: Read Date and Time

Structure of Modbus Read Date and Time Messages

Request

Definition	Number of Bytes	Value	Example
Slave number	1 byte	0x2F	47
Function code	1 byte	0x2B	43
Sub-function code	1 byte	0x0F	15
Reserved	1 byte	0x00	Reserved

Response

Definition			Number of Bytes	Value	Example
Slave number			1 byte	0x2F	47
Function code			1 byte	0x2B	43
Sub-function code			1 byte	0x0F	15
Reserved			1 byte	0x00	Reserved
Date and time[1]	byte 1	Not used	1 byte	0x00	Not used
	byte 2	Year	1 byte	0x0A	Year 2010
	byte 3	Month	1 byte	0x0B	Month of November
	byte 4	Day of the month	1 byte	0x02	Second day of the month
	byte 5	Hour	1 byte	0x0E	14 hours
	byte 6	Minute	1 byte	0x20	32 minutes
	byte 7 and byte 8	Millisecond	2 bytes	0x0DAC	3.5 seconds
(1) See description of the DATE type *(see page 141)*.					

Function 43-16: Write Date and Time

Structure of Modbus Write Date and Time Messages

Request

Definition			Number of Bytes	Value	Example
Slave number			1 byte	0x2F	47
Function code			1 byte	0x2B	43
Sub-function code			1 byte	0x10	16
Reserved			1 byte	0x00	Reserved
Date and time[1]	byte 1	not used	1 byte	0x00	Not used
	byte 2	Year	1 byte	0x0A	Year 2010
	byte 3	Month	1 byte	0x0B	Month of November
	byte 4	Day of the month	1 byte	0x02	Second day of the month
	byte 5	Hour	1 byte	0x0E	14 hours
	byte 6	Minute	1 byte	0x20	32 minutes
	byte 7 and byte 8	Millisecond	2 bytes	0x0DAC	3.5 seconds
[1] See description of the DATE type *(see page 141)*.					

Response

Definition			Number of Bytes	Value	Example
Slave number			1 byte	0x2F	47
Function code			1 byte	0x2B	43
Sub-function code			1 byte	0x10	15
Reserved			1 byte	0x00	Reserved
Date and time[1]	byte 1	Not used	1 byte	0x00	Not used
	byte 2	Year	1 byte	0x0A	Year 2010
	byte 3	Month	1 byte	0x0B	Month of November
	byte 4	Day of the month	1 byte	0x02	Second day of the month
	byte 5	Hour	1 byte	0x0E	14 hours
	byte 6	Minute	1 byte	0x20	32 minutes
	byte 7 and byte 8	Millisecond	2 bytes	0x0DAE	3.502 seconds
[1] See description of the DATE type *(see page 141)*.					

Function 100–4: Read n Non-Adjacent Words

Structure of Modbus Read n Non-Adjacent Words Messages Where n ≤ 100

Request

Definition	Number of Bytes	Value
Modbus slave number	1 byte	0x2F
Function code	1 byte	0x64
Length of data in bytes	1 byte	0x06
Sub-function code	1 byte	0x04
Transmission number[1]	1 byte	0xXX
Address of the first word to be read (MSB)	1 byte	0x00
Address of the first word to be read (LSB)	1 byte	0x65
Address of the second word to be read (MSB)	1 byte	0x00
Address of the second word to be read (LSB)	1 byte	0x67
(1) The master gives the transmission number in the request.		

NOTE: The above table describes how to read addresses 101 = 0x65 and 103 = 0x67 of a Modbus slave. The Modbus slave number is 47 = 0x2F.

Response

| Definition	Number of Bytes	Value
Modbus slave number	1 byte	0x2F
Function code	1 byte	0x64
Length of data in bytes	1 byte	0x06
Sub-function code	1 byte	0x04
Transmission number[1]	1 byte	0xXX
First word read (MSB)	1 byte	0x12
First word read (LSB)	1 byte	0x0A
Second word read (MSB)	1 byte	0x74
Second word read (LSB)	1 byte	0x0C
(1) The slave sends back the same number in the response.		

NOTE: The above table describes how to read addresses 101 = 0x65 and 103 = 0x67 of a Modbus slave. The Modbus slave number is 47 = 0x2F.

Appendix B
Reset of Smartlink Ethernet

Description
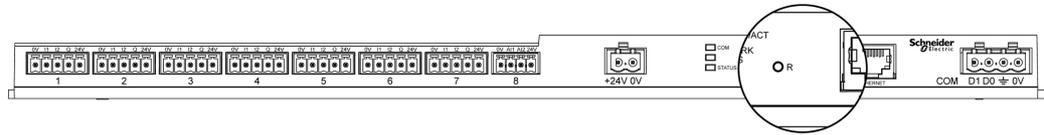
Press and hold the **Reset** button for 5 seconds of Acti 9 Smartlink Ethernet to reset to the factory parameter settings.

The reset data is as follows:
- The mode of IP acquisition is set to DHCP.
- The password is set to the default value.
- Modbus serial setting is set to 19,200, 8 bits, 1 stop bit, and even parity.
- The panel information saved in Actii 9 Smartlink Ethernet is erased.
- The user accounts is erased (only default user accounts will be retained).
- The operation counters are set to 0.
- The running hours counters are set to 0.
- The counter modification values are set to the value "1 January 2000".
- The counter pulse weights are set to 10.

Appendix C
Troubleshooting

Common Problems

Description

The following table describe the abnormal behavior and diagnostics, and provide some corrective actions:

Problem	Diagnostics	Action
Web page is displayed only with texts without graphics.	The text and graphics in the web page is loaded based on the traffic and disruptions on the IT network.	Refresh the browser.
Web pages are not displayed in Internet Explorer 11 due to specific company configurations of Internet Explorer settings.	Compatibility settings not applied.	Click **Tools → Compatibility View Settings** and select the **Display Intranet Sites in Compatibility View** in Internet Explorer browser and restart the browser. If the problem still persists, press F12 from keyboard to open the Developer Tools window, click **Emulation**, and make sure that the **Edge (by default)** is selected under **Mode Document** area.
Analog sensor values on the web page does not appear appropriate.	Incorrect sensor settings	Check the settings in the **Settings** menu and ensure proper values are applied.
	Wrong wiring between the sensor and Acti 9 Smartlink Ethernet	Check that the wiring between the sensor and Acti 9 Smartlink Ethernet is accurate.
	Sensor is disconnected from Acti 9 Smartlink Ethernet	Check the wiring for loose connections or open terminals.
IP setting changes are not effected.	IP settings not applied	Reboot the device if the changes do not take effect within two minutes.
Firmware upgrade is not succeeded.	Smartlink is disconnected from the network	Follow the below steps to recover the Smartlink: **1.** Disconnect Smartlink from the network. **2.** Power cycle the Smartlink. **3.** Connect your PC or laptop directly to the Smartlink. **4.** Use **Automatic Discovery** from the Start page of Acti 9 Smart Test to connect to the Smartlink. **5.** Launch firmware upgrade.

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