MiCOM P595

Interface Device

P595/EN M/A13

Hardware Suffix B

Technical Manual

Schneider Electric

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1. STANDARD SAFETY STATEMENTS

1.1 Introduction

This guide and the relevant equipment documentation provide full information on safe handling, commissioning and testing of this equipment. This Safety Guide also includes descriptions of equipment label markings.

Documentation for equipment ordered from Schneider Electric is despatched separately from manufactured goods and may not be received at the same time. Therefore this guide is provided to ensure that printed information which may be present on the equipment is fully understood by the recipient.

The technical data in this safety guide is only typical, see the technical data section of the relevant product publication(s) for data specific to a particular equipment.

Before carrying out any work on the equipment the user should be familiar with the contents of this Safety Guide and the ratings on the equipment's rating label.

Reference should be made to the external connection diagram before the equipment is installed, commissioned or serviced.

Language specific, self-adhesive User Interface labels are provided in a bag for some equipment.

1.2 Health and Safety

The information in the Safety Section of the equipment documentation is intended to ensure that equipment is properly installed and handled in order to maintain it in a safe condition.

It is assumed that everyone who will be associated with the equipment will be familiar with the contents of that Safety Section, or this Safety Guide.

When electrical equipment is in operation, dangerous voltages will be present in certain parts of the equipment. Failure to observe warning notices, incorrect use, or improper use may endanger personnel and equipment and also cause personal injury or physical damage.

Before working in the terminal strip area, the equipment must be isolated.

Proper and safe operation of the equipment depends on appropriate shipping and handling, proper storage, installation and commissioning, and on careful operation, maintenance and servicing. For this reason only qualified personnel may work on or operate the equipment.

Qualified personnel are individuals who

- are familiar with the installation, commissioning, and operation of the equipment and of the system to which it is being connected,
- are able to safely perform switching operations in accordance with accepted safety engineering practices and are authorised to energize and de-energize equipment and to isolate, ground, and label it,
- are trained in the care and use of safety apparatus in accordance with safety engineering practices,
- are trained in emergency procedures (first aid).

The equipment documentation gives instructions for its installation, commissioning, and operation. However, the manual cannot cover all conceivable circumstances or include detailed information on all topics. In the event of questions or specific problems, do not take any action without proper authorization. Contact the appropriate Schneider Electric technical sales office and request the necessary information.

1.3 Symbols and External Labels on the Equipment

For safety reasons the following symbols and external labels, which may be used on the equipment or referred to in the equipment documentation, should be understood before the equipment is installed or commissioned.

1.3.1 Symbols

 Caution: refer to equipment documentation	 Caution: risk of electric shock
 Protective Conductor (*Earth) terminal.	 Functional/Protective Conductor (*Earth) terminal Note: This symbol may also be used for a Protective Conductor (Earth) Terminal (PCT) if that terminal is part of a terminal block or sub-assembly e.g. power supply.

*NOTE: THE TERM EARTH USED THROUGHOUT THIS GUIDE IS THE DIRECT EQUIVALENT OF THE NORTH AMERICAN TERM GROUND.

1.3.2 Labels

See Safety Guide (SFTY/4L M/G11 or later version) for equipment labelling information.

1.4 Installing, Commissioning and Servicing

Equipment connections

Personnel undertaking installation, commissioning or servicing work for this equipment should be aware of the correct working procedures to ensure safety.

The equipment documentation should be consulted before installing, commissioning, or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present a hazardous voltage unless the equipment is electrically isolated.

The clamping screws of all terminal block connectors, for field wiring, using M4 screws shall be tightened to a nominal torque of 1.3 Nm.

Equipment intended for rack or panel mounting is for use on a flat surface of a Type 1 enclosure, as defined by Underwriters Laboratories (UL).

Any disassembly of the equipment may expose parts at hazardous voltage, also electronic parts may be damaged if suitable electrostatic voltage discharge (ESD) precautions are not taken.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electric shock or energy hazards.

Voltage and current connections shall be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety.

Watchdog (self-monitoring) contacts are provided in numerical relays to indicate the health of the device. Schneider Electric strongly recommends that these contacts are hardwired into the substation's automation system, for alarm purposes.

To ensure that wires are correctly terminated the correct crimp terminal and tool for the wire size should be used.

The equipment must be connected in accordance with the appropriate connection diagram.

Protection Class I Equipment

- Before energizing the equipment it must be earthed using the protective conductor terminal, if provided, or the appropriate termination of the supply plug in the case of plug connected equipment.
- The protective conductor (earth) connection must not be removed since the protection against electric shock provided by the equipment would be lost.
- When the protective (earth) conductor terminal (PCT) is also used to terminate cable screens, etc., it is essential that the integrity of the protective (earth) conductor is checked after the addition or removal of such functional earth connections. For M4 stud PCTs the integrity of the protective (earth) connections should be ensured by use of a locknut or similar.

The recommended minimum protective conductor (earth) wire size is 2.5 mm² (3.3 mm² for North America) unless otherwise stated in the technical data section of the equipment

documentation, or otherwise required by local or country wiring regulations.

The protective conductor (earth) connection must be low-inductance and as short as possible.

All connections to the equipment must have a defined potential. Connections that are pre-wired, but not used, should preferably be grounded when binary inputs and output relays are isolated. When binary inputs and output relays are connected to common potential, the pre-wired but unused connections should be connected to the common potential of the grouped connections.

Before energizing the equipment, the following should be checked:

- Voltage rating/polarity (rating label/equipment documentation),
- CT circuit rating (rating label) and integrity of connections,
- Protective fuse rating,
- Integrity of the protective conductor (earth) connection (where applicable),
- Voltage and current rating of external wiring, applicable to the application.

Accidental touching of exposed terminals

If working in an area of restricted space, such as a cubicle, where there is a risk of electric shock due to accidental touching of terminals which do not comply with IP20 rating, then a suitable protective barrier should be provided.

Equipment use

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Removal of the equipment front panel/cover

Removal of the equipment front panel/cover may expose hazardous live parts, which must not be touched until the electrical power is removed.

UL and CSA/CUL Listed or Recognized equipment

To maintain UL and CSA/CUL Listing/Recognized status for North America the equipment should be installed using UL or CSA Listed or Recognized parts for the following items: connection cables, protective fuses/fuseholders or circuit breakers, insulation crimp terminals and replacement internal battery, as specified in the equipment documentation.

For external protective fuses a UL or CSA Listed fuse shall be used. The Listed type shall be a Class J time delay fuse, with a maximum current rating of 15 A and a minimum d.c. rating of 250 Vd.c., for example type AJT15.

Where UL or CSA Listing of the equipment is not required, a high rupture capacity (HRC) fuse type with a maximum current rating of 16 Amps and a minimum d.c. rating of 250 Vd.c. may be used, for example Red Spot type NIT or TIA.

Equipment operating conditions

The equipment should be operated within the specified electrical and environmental limits.

Current transformer circuits

Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation. Generally, for safety, the secondary of the line CT must be shorted before opening any connections to it.

For most equipment with ring-terminal connections, the threaded terminal block for current transformer termination has automatic CT shorting on removal of the module. Therefore external shorting of the CTs may not be required, the equipment documentation should be checked to see if this applies.

For equipment with pin-terminal connections, the threaded terminal block for current transformer termination does NOT have automatic CT shorting on removal of the module.

External resistors, including voltage dependent resistors (VDRs)

Where external resistors, including voltage dependent resistors (VDRs), are fitted to the equipment, these may present a risk of electric shock or burns, if touched.

Battery replacement

Where internal batteries are fitted they should be replaced with the recommended type and be installed with the correct polarity to avoid possible damage to the equipment, buildings and persons.

Insulation and dielectric strength testing

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part of the test, the voltage should be gradually reduced to zero, to discharge capacitors, before the test leads are disconnected.

Insertion of modules and pcb cards

Modules and PCB cards must not be inserted into or withdrawn from the equipment whilst it is energized, since this may result in damage.

Insertion and withdrawal of extender cards

Extender cards are available for some equipment. If an extender card is used, this should not be inserted or withdrawn from the equipment whilst it is energized. This is to avoid possible shock or damage hazards. Hazardous live voltages may be accessible on the extender card.

External test blocks and test plugs

Great care should be taken when using external test blocks and test plugs such as the MMLG, MMLB and MiCOM P990 types, hazardous voltages may be accessible when using these. *CT shorting links must be in place before the insertion or removal of MMLB test plugs, to avoid potentially lethal voltages.

*Note: When a MiCOM P992 Test Plug is inserted into the MiCOM P991 Test Block, the secondaries of the line CTs are automatically shorted, making them safe.

Cleaning

The equipment may be cleaned using a lint free cloth dampened with clean water, when no connections are energized. Contact fingers of test plugs are normally protected by petroleum jelly, which should not be removed.

1.5 Decommissioning and Disposal

De-commissioning

The supply input (auxiliary) for the equipment may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the equipment (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to de-commissioning.

Disposal:

It is recommended that incineration and disposal to water courses is avoided.
The equipment should be disposed of in a safe manner. Any equipment containing batteries should have them removed before disposal, taking precautions to avoid short circuits. Particular regulations within the country of operation, may apply to the disposal of the equipment.

1.6 Technical Specifications For Safety

Unless otherwise stated in the equipment technical manual, the following data is applicable.

1.6.1 Protective fuse rating

The recommended maximum rating of the external protective fuse for equipments is 16A, high rupture capacity (HRC) Red Spot type NIT, or TIA, or equivalent. Unless otherwise stated in equipment technical manual, the following data is applicable. The protective fuse should be located as close to the unit as possible.

DANGER: CTS MUST NOT BE FUSED SINCE OPEN CIRCUITING THEM MAY PRODUCE LETHAL HAZARDOUS VOLTAGES.

1.6.2 Protective Class

IEC 60255-27: 2005 EN 60255-27: 2006	Class I (unless otherwise specified in the equipment documentation). This equipment requires a protective conductor (earth) connection to ensure user safety.

1.6.3 Installation Category

IEC 60255-27: 2005 EN 60255-27: 2006	Installation Category III (Overvoltage Category III): Distribution level, fixed installation. Equipment in this category is qualification tested at 5 kV peak, 1.2/50 µs, 500 Ω, 0.5 J, between all supply circuits and earth and also between independent circuits

1.6.4 Environment

The equipment is intended for indoor installation and use only. If it is required for use in an outdoor environment then it must be mounted in a specific cabinet or housing which will enable it to meet the requirements of IEC 60529 with the classification of degree of protection IP54 (dust and splashing water protected).

Pollution Degree - Pollution Degree 2 - Operation up to 2000m IEC 60255-27:2005 EN 60255-27: 2006	Compliance is demonstrated by reference Altitude to safety standards.

2. PRODUCT SCOPE

The P595 Interface Device is designed to extend EIA485 over a pilot wire protection signaling link. This link can be over distances of 1.2 km to a maximum of approximately 25 km, therefore P595 devices are always used in pairs.

The protection signaling link between the two P595 devices is in the form of two twisted-pairs of metallic wires. Section 5.1 describes suitable types of pilot wires in detail.

The connection of a P595 to the protection relay is based on an EIA485 interface.

Applications for a pair of P595 interface devices include the following:

- To provide the protection signaling link between two P521 current differential relays.
- To provide the protection signaling link between two P530C or P532 current differential relays.
- To provide the signaling link for the InterMiCOM interfaces of MiCOM P30 relays.

The P595 can be used as a direct replacement for the PZ511 Interfacing Device. However, unlike the PZ511, the P595 has internal DIP switches which allow the user to set the data rate and clock settings.

3. GETTING STARTED

Connect the auxiliary supply to terminal numbers 13 (L+) and 14 (L-) of terminal block X1.

Connect the EIA485 wires from the protection relay into P595 terminal block X12, as shown in Figure 9 in section 7.5.

Connect the pilot wires, from the P595 interface device at the remote end, to terminal block X9, as shown in the connection diagrams (Figure 10 ... Figure 13).

DIP switches in the P595 are used to set the following parameters:

- Data rate: 19200 baud (recommended) or 9600 baud
- Clock: Internal or Receive Recover
- Word length: 10 or 11 bits

Check the switch settings on the P595 at both ends:

- Ensure that the data rate is set as required, with the same baud value for both P595.
- Check that one P595 is set in **Originating** mode and the other P595 is set in **Receive** mode.

See Chapter 4 for further details of switch settings.

4. SETTINGS

There are three sets of DIP switches accessible inside the case of the P595 device. There are no other settings to be made on the P595 device. To gain access to these, remove the front plate of the P595 by unscrewing the four small retaining screws.

CAUTION: Exposed terminals. If the front plate is removed, hazardous voltages may be present. Electrically isolate the equipment beforehand.

The DIP switches are used to set the following parameters:

- Data rate: 19200 baud (recommended) or 9600 baud
- Clock: Internal or Receive Recover
- Word length: 10 or 11 bits

S1-1, S1-2, S1-3 and S1-4 control the data rate between the P595 and the relay. The recommended rate giving faster trip times is 19.2 kbit/s.

Setting	S1-1	S1-2	S1-3	S1-4
9.6 kbps	On	Off	Off	On
19.2 kbps	On	On	On	Off

S1-5 and S1-6 control the clocking configuration for the data transmission. One P595 must be set as Originating, with Internal clock mode (transmit clock generated internally). The other P595 must be set as Receive, with Receive Recover clock mode (clock recovered from the received data).

Note: The default setting of every P595 is Originating (Internal clock) mode. Therefore when a pair of P595 devices are installed or commissioned, ensure that **only one is changed to Receive** (Receive Recover) mode.

Clock Mode	Description	S1-5	S1-6
Internal	Transmit clock generated internally	On	On
External	Transmit clock derived from the P521	Off	On
Receive Recover	Transmit clock derived from the line	On	Off
Disabled	Reserved	Off	Off

Do not change S1-7, S1-8, S2 and S3 from their default settings. See Figure 1 and Figure 2.

For modem 1 (originating) set SW1-6 ON, see Figure 2. For modem 2 (receive) set SW1-6 OFF, see Figure 2.

S2-1 and S2-2 control the word length between the P595 and the relay.

Word length	S2-1	S2-2
10 bits	Off	Off
11 bits	On	Off

4.1 DIP switch settings for P521 applications

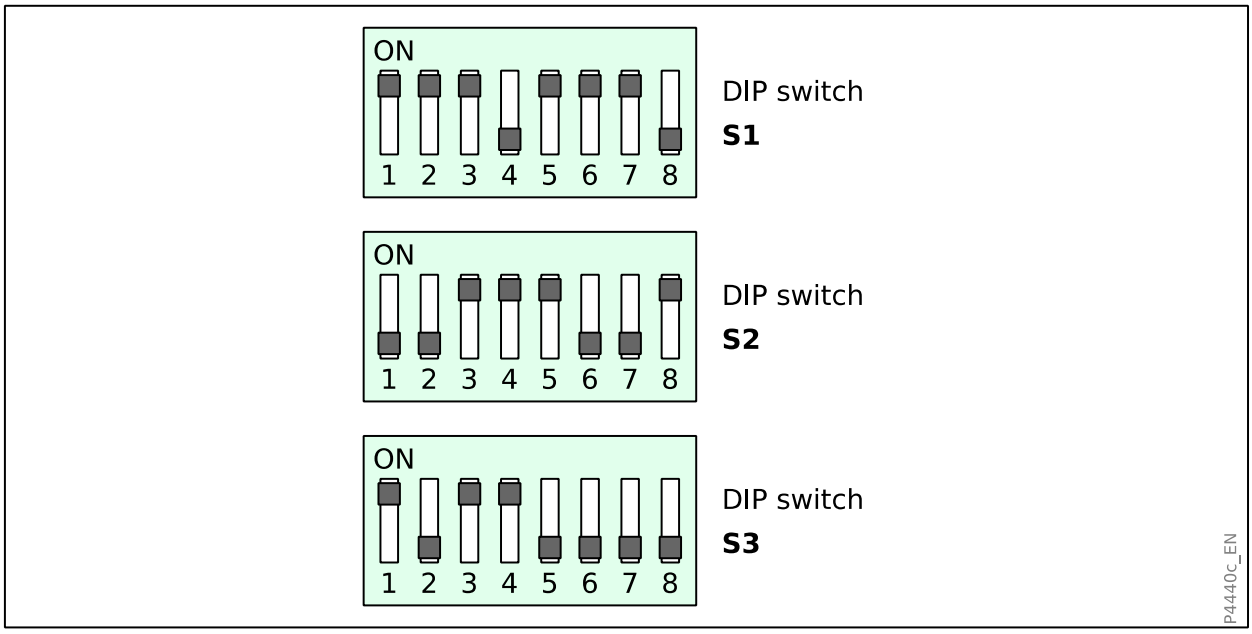

Figure 1 P595 at End A – Originating (Internal clock mode) – P521

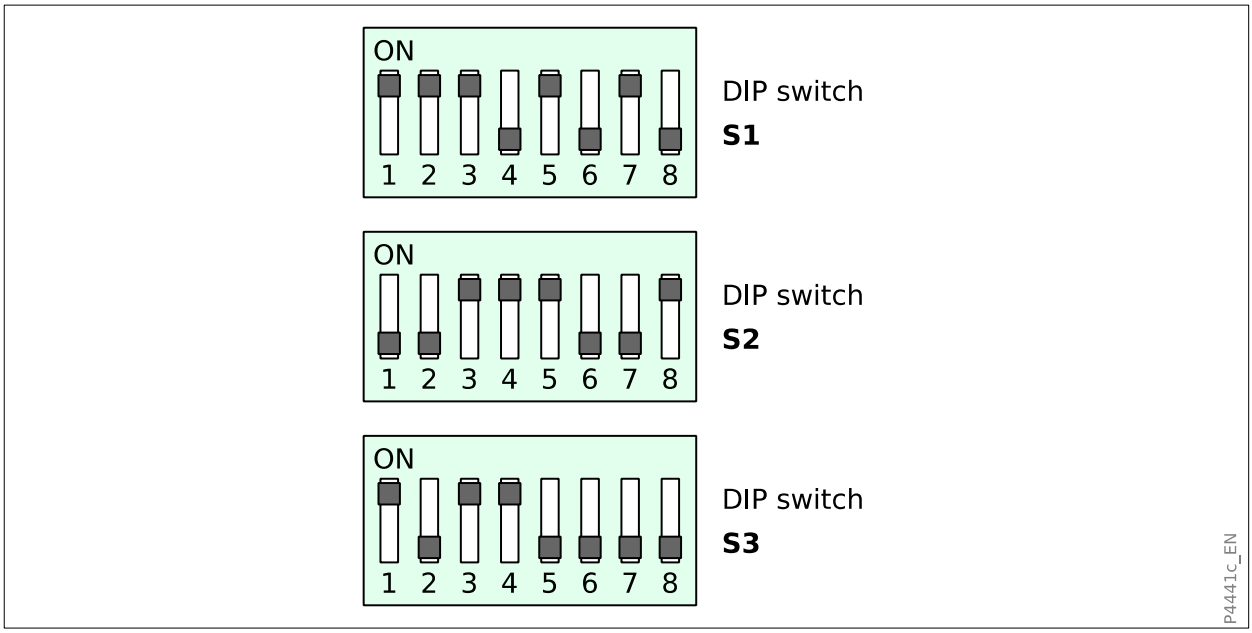

Figure 2 P595 at End B – Receive (Receive Recover clock mode) – P521

Compatible P521 relay settings (EIA485 interface):

To communicate with the P595, on the P521 relay select **COMMUNICATION > Protection** then use the following settings:

- **Protocol** = *NRZ*
- **Data rate** = *19.2K* or *9.6K*, according to the P595 switch settings
- **Clock Source Ch1** = *Internal*

4.2 DIP switch settings for P530C / P532 applications

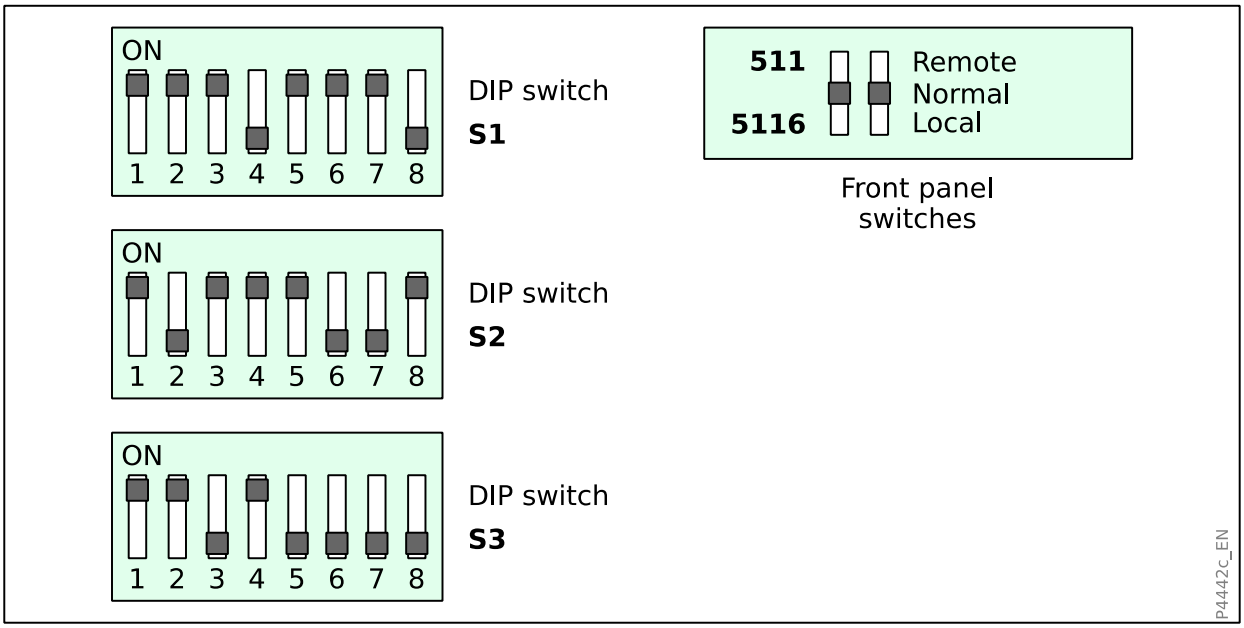

Figure 3 P595 at End A – Originating (Internal clock mode) – P530C / P532

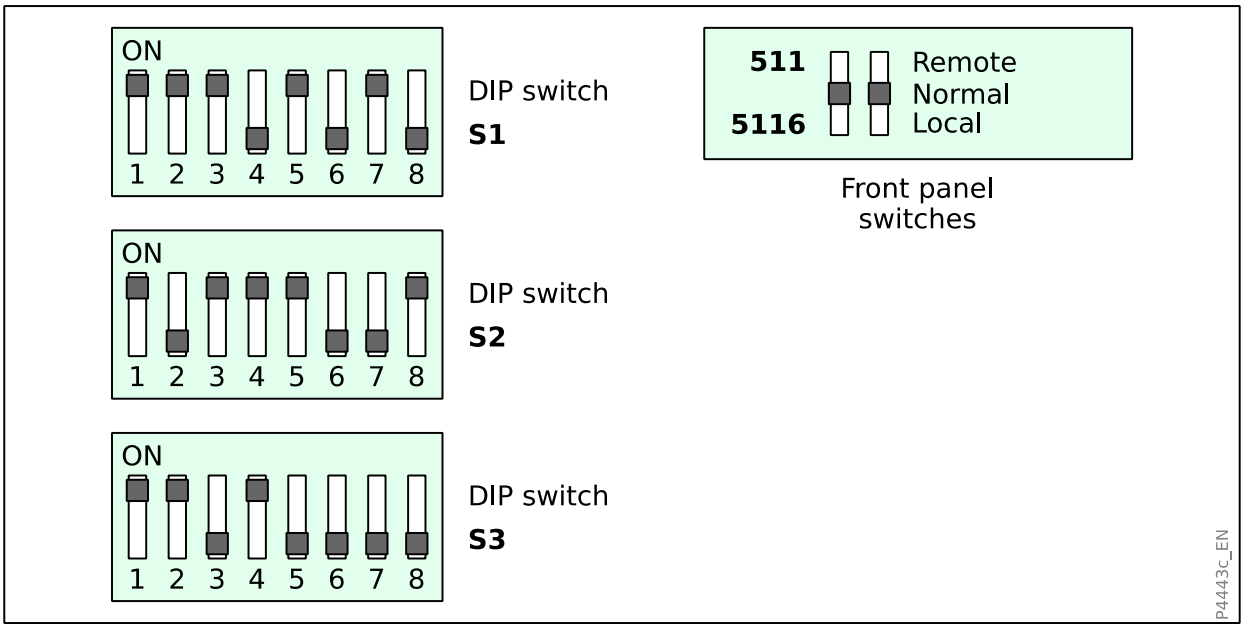

Figure 4 P595 at End B – Receive (Receive Recover clock mode) – P530C / P532

Compatible P530C / P532 relay settings:

To communicate with the P595, on the P530C / P532 relay select
Parameters > Config. Parameters > PCOMM
then use the following settings to configure the signaling channel:

- PCOMM: Transmission mode = *19.2 kBaud*
- PCOMM: Parity bit = *even*

4.3 DIP switch settings for P30 InterMiCOM application

The DIP switch settings are the same as for a connection with the P521; see Figure 1 and Figure 2 in Section 4.1.

Compatible P30 relay InterMiCOM port settings:

To communicate with the P595, on the MiCOM P30 protection relay select **Parameters > Config. Parameters > COMM3** then use the following settings to configure the InterMiCOM port (COMM3):

- COMM3: Baud rate = *19200 baud* or *9600 baud*, according to the P595 switch settings

5. APPLICATION NOTES

The P595 Interface Device is designed to transmit over suitable 4-wire pilot wire links. Section 5.1 describes suitable types of pilot wires in detail.

The P595 Interface Device converts the EIA485 serial interface signals and outputs them to the integral modem. External isolating transformers with either a 10 kV or 20 kV voltage withstand can then be connected in series with the P595 modem outputs on terminal block X9, to isolate any high longitudinal voltages present on the protection signaling link. Schneider Electric can supply suitable external isolating transformers, model reference PCM-FLÜ. 10 kV and 20 kV versions are available.

If the specifications for isolation are less stringent, the protection signaling interface can be connected directly to the modem outputs on terminal block X9. The maximum voltage withstand in the absence of the transformers is 1.5 kV.

The longitudinal voltage present on the copper wires must not exceed 60 % of the test voltage.

A DC or AC auxiliary supply voltage is needed for the power supply of the P595 Interface Device. The supply voltage and power rating are specified in section 6.7. The internal supply voltage is monitored by a watchdog relay having a change-over contact and being connected in a normally-energized arrangement

5.1 Suitable pilot wires

The pilot wires to be used for the signaling link must conform to the following requirements to be suitable:

1. **4 wire:** A total of four cores between the two P595 devices is required.
2. **Twisted pair:** The four cores must be two twisted pairs.
3. **Shielded:** There should be a shield (screen) around the wires – preferably a separate shield around each twisted pair – which should be earthed (grounded) at one end or at both ends if local practices dictate this.
4. **Unconditioned:** This means they are not subject to signal equalisation equipment, such as implemented on a leased line rented from a telephone company, also known as a “voice frequency” line.
5. **Suitable core gauge (diameter):** Distances up to approximately 25 km between the pair of P595 interface devices can be achieved, depending on the gauge (diameter) of the pilot wire cores. The following table shows the recommended range of suitable wires. Larger core wires may also be used as they have lower resistance, but the distance is limited due to possible inductance effects.

Wire Gauge	Wire Diameter	Max. Distance
19 AWG	0.9 mm	25 km
22 AWG	0.6 mm	13 km
24 AWG	0.5 mm	11 km
26 AWG	0.4 mm	8 km

The typical propagation delay between two P595 devices is 1.08 ms at 19.2 kbit/s.

5.2 Applications

The connection diagrams for the relays and P595 devices are in section 7.5. The external isolation transformers are optional, all connections (between relay and P595) use copper connections.

5.2.1 Application with P521 current differential relays

Two P595 devices can provide the protection signaling link between two P521 current differential relays where suitable pilot wires are available, as defined in section 5.1.

5.2.2 Application with P530C / P532 current differential relays

Two P595 devices can provide the protection signaling link between two P530C or P532 relays where suitable pilot wires are available, as defined in section 5.1.

5.2.3 Application with P30 relay InterMiCOM interface

Two P595 devices can provide the InterMiCOM link between the COM interfaces of P30 relays where suitable pilot wires are available, as defined in section 5.1.

6. PERFORMANCE SPECIFICATION

6.1 Conformity Statements

EMC Compliance 89/336/EEC

Compliance to the European Community Directive 89/336/EEC amended by 93/68/EEC is claimed. The following Product Specific Standard was used to establish conformity:

EN 50263: 2000

LVD Compliance 72/23/EEC

Compliance with European Community Directive on Low Voltage 73/23/EEC is demonstrated by reference to generic safety standards:

EN 61010-1: 2001

EN 60950-1: 2001

6.2 General Data

Case

Suitable for surface mounting

Installation position

Vertical ± 30°

Enclosure protection

IP 51 according to EN 60529

Weight

Approx. 2.6kg

X1 terminal block (voltage supply/watchdog contact)

Threaded terminal block M4, self-centering with wire protection for conductor cross-sections from 0.5 mm² to 6 mm² or 2 × 2.5 mm²

X12 terminal block (EIA485 to relay)

Mini Combicon, MC 1.5/5-STF-3.81, for wire cross-sections up to 1.5 mm², flexible

X9 terminal block (pilot wire connection)

Mini-Combicon, MC 1.5/6-STF-3.81, for wire cross-sections up to 1.5 mm², flexible

Creepage distances and clearances

Per EN 61010-1 or IEC 664-1

Pollution degree 3, working voltage 250 V

Overvoltage category III

6.3 Tests

6.3.1 Type Tests

All tests according to EN 60255-6

6.4 Electrical Environment

Interference suppression

According to EN 55022: 1995, class B

1 MHz burst disturbance

According to EN 60255-22-1, class III

Common mode test voltage:	2.5 kV
Differential test voltage:	1.0 kV
Test duration:	> 2 s
Source impedance:	200 Ω

100 kHz high frequency interference

According to EN 60255-4-12: 1996, class III

Common mode test voltage:	2.5 kV
Differential test voltage:	1.0 kV
Test duration:	> 2 s
Source impedance:	200 Ω

Immunity to electrostatic discharge

According to EN 61000-4-2, severity level 4

Contact discharge:	8 kV
Air discharge:	15 kV
Single discharges:	10 at each polarity

Immunity to radiated electromagnetic energy

According to EN 61000-4-3, level 3

Antenna distance to tested device: > 1 m on all sides

Test field strength, frequency band 80 MHz to 1000 MHz: 10 V/m, using AM: 1 kHz / 80 %

Test field strength, frequency band 800 MHz to 960 MHz: 30 V/m, using AM: 1 kHz / 80 %

Test field strength, frequency band 1400 MHz to 2000 MHz: 30 V/m, using AM: 1 kHz / 80 %

Test field strength, single test at 900 MHz and 1890 MHz: 10V/m, using PM: 200 Hz / 50 % duty cycle

Electrical fast transient / burst requirements

According to EN 61000-4-4, severity level 3 and 4

Rise time of one pulse: 5 ns

Impulse duration (50% value): 50 ns

Amplitude: 2 kV 5 kHz (level 3) / 4 kV 2.5 kHz (level 4)

Burst duration: 15 ms

Burst period: 300 ms

Source impedance: 50 Ω

Surge immunity test

According to EN 61000-4-5, level 3

Testing of asymmetrically / symmetrically operated lines

Common mode test voltage: 0.5/1/2 kV

AC/DC auxiliary supply port

Common mode test voltage: 0.5/1/2kV

Differential test voltage: 0.5/1kV

Immunity to conducted disturbances induced by radio frequency fields

According to EN 61000-4-6: 1996, level 3

Disturbing test voltage: 10 V

Power frequency magnetic field immunity

According to EN 61000-4-8, level 4

Frequency: 50 Hz

Test field strength: 30 A/m

Alternating component (ripple) in DC auxiliary energizing quantity of measuring relays

According to EN 60255-11

Ripple: 12%

Insulation

Voltage test

According to EN 60255-5

X12 interface: 2 kV AC, 60 s

X9 interface: 1.5 kV AC, 60 s Power supply:

For the voltage test of the power supply inputs, 2.8 kV DC must be used

Impulse voltage withstand test

According to EN 60255-5

Front time:	1.2 µs
Time to half-value:	50 µs
Peak value:	5 kV
Source impedance:	500 Ω

Mechanical Environment

Vibration test

According to EN 60255-21-1, severity class 1

Frequency range, in operation:

10 to 60 Hz, 0.035 mm

60 to 150 Hz, 0.5 g

Frequency range, during transport:

10 to 150 Hz, 1 g

Shock response and withstand test, bump test

According to EN 60255-21-2, severity class 1

Acceleration:	5 g/15 g
Pulse duration:	11 ms

Seismic test

According to EN 60255-21-3, test procedure A, class 1

Frequency range during operation:

5 to 8 Hz, 3.5/1.5 mm,

8 to 35 Hz, 10/5 m/s2

3 × 1 cycle

6.4.1 Routine Tests

All tests according to EN 60255-6

Additional thermal test

100 % controlled thermal endurance test, inputs loaded

6.5 Atmospheric Environment

Temperature

Operating temperature: -25 °C to + 55 °C [-13 °F to +131 °F]

Storage temperature: -25 °C to + 70 °C [-13 °F to +158 °F]

Ambient humidity range

Relative humidity to preclude any condensation; 45 % to 75 % (annual mean)

6.6 Inputs and Outputs

X12 terminal block

Per EIA485, 2kV-isolation

Maximum distance: 10 m

X9 terminal block

15kV-isolation

Maximum distance: 25 km

6.7 Power Supply

Nominal auxiliary voltage V

60 to 250 V DC, 100 to 230 V AC (50 Hz / 60 Hz)

Operating range for DC voltage: 0.8 to 1.1 V

Residual ripple of up to 12% V

Operating range for AC voltage: 0.9 to 1.1 V

Nominal consumption at V = 220 V DC: 7.8 W (VA)

Start-up peak current for a duration of 0.25 ms: < 13 A

7. INSTALLATION AND CONNECTION

7.1 Unpacking and Packing

All P595 Interface Devices are packaged individually and shipped inside outer packaging. Use special care when opening the cartons and unpacking the equipment, and do not use force. Remove the Operating Manual from the carton; one manual is supplied with each device.

After unpacking the equipment, inspect it visually for sound mechanical condition after transportation.

7.2 Case Dimensions and Mounting Details

The P595 Interface Device is mounted in an aluminium case. Connection is via threaded terminal blocks.

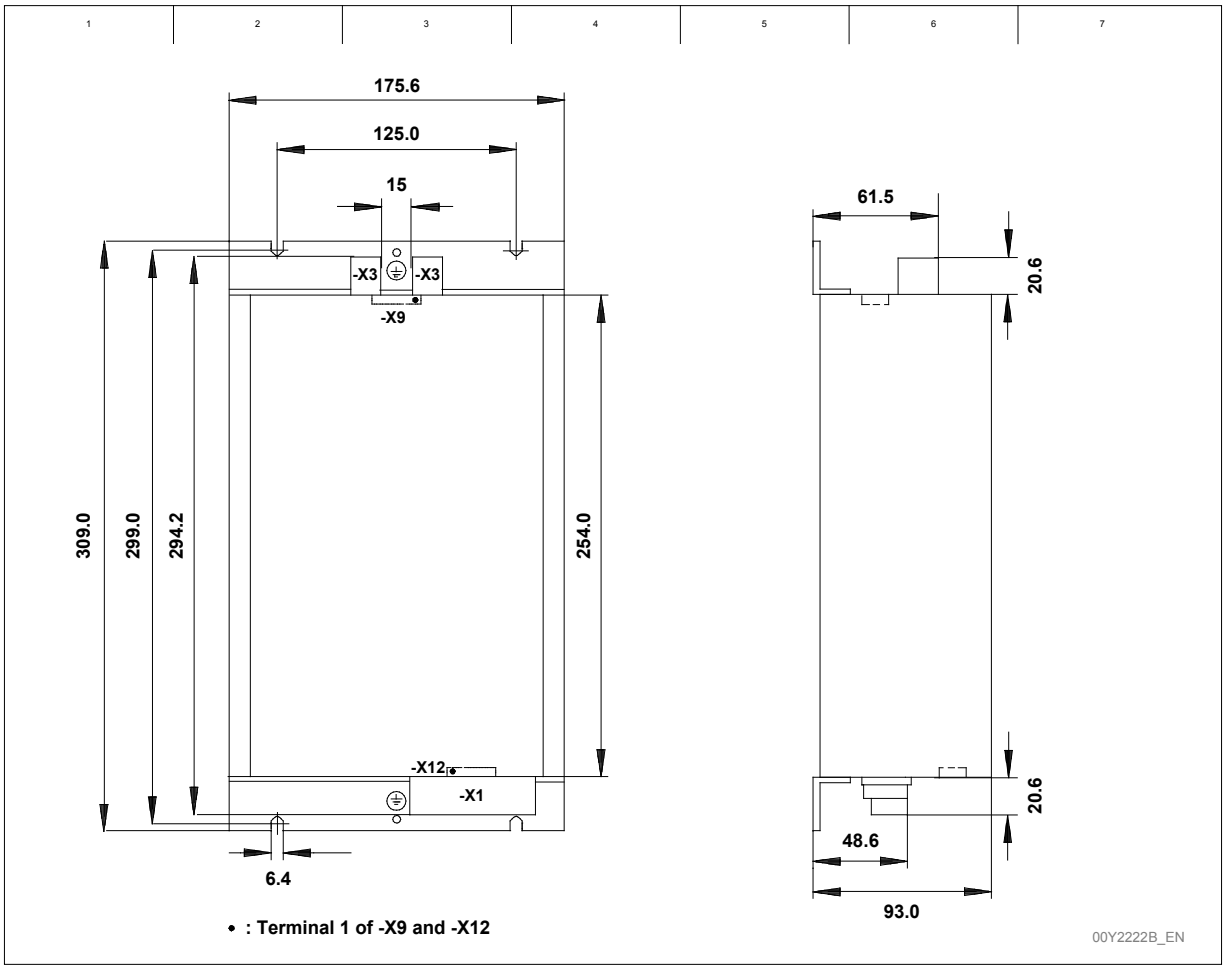

Figure 5 Case dimensions and mounting details (dimensions in mm)

7.3 Installation

For wall surface mounting, the cables to the P595 Interface Device are usually run in front of the connector blocks. Otherwise, a cut-out for cable entry can be provided below or above each connector block. This is shown in Figure 6 for the lower connector block.

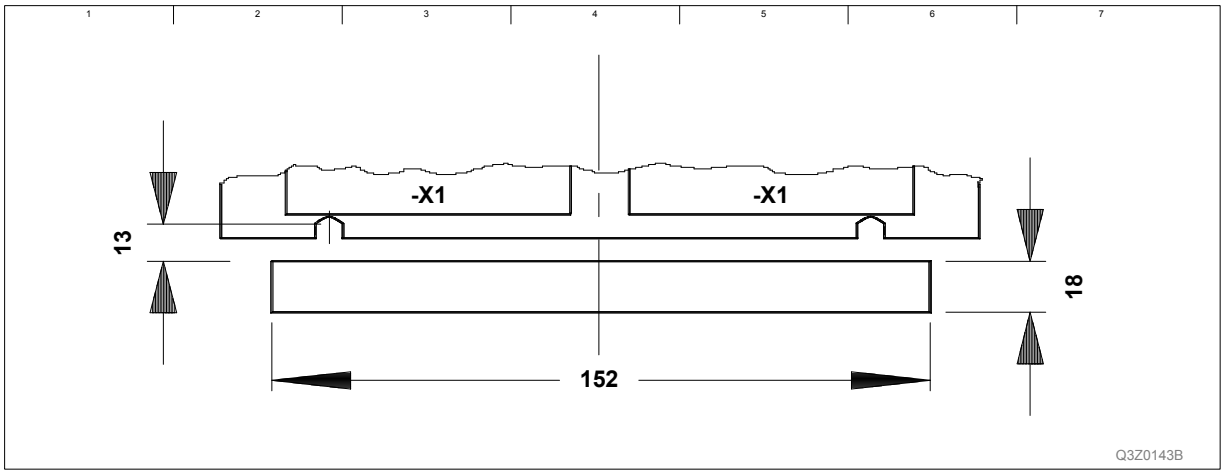

Figure 6 Cut-out for cable entry

7.4 Protective and System Earthing (Grounding)

Make sure the device case is reliably earthed (grounded) for reasons of protective equipment safety. This is also essential for proper operation of the device and is therefore equivalent to system earthing (grounding). Potentials that need to be earthed (grounded) from an operational standpoint are already properly connected to the equipment earth (ground) inside the device.

The P595 Interface Device has holes for the earth (ground) connection in the two mounting brackets, which are labeled accordingly.

In the standard configuration the earth (ground) connection is made on the lower mounting bracket, otherwise the upper mounting bracket can be used. The earth (ground) must be low inductance.

7.5 Connections

Connect the P595 Interface Device in accordance with the connection diagrams shown later in this section (Figure 9 … Figure 13).

As a general principle, all connections run into the system must have a defined potential.

Open wire ends and unused wires must be grounded.

7.5.1 Connection of the Auxiliary Voltage

Copper leads with a cross-section of 1.5 mm^2 are generally adequate for the power supply input.

7.5.2 Terminals

- Interface X9
  Threaded terminal ends for wire cross-sections up to 1.5 mm².

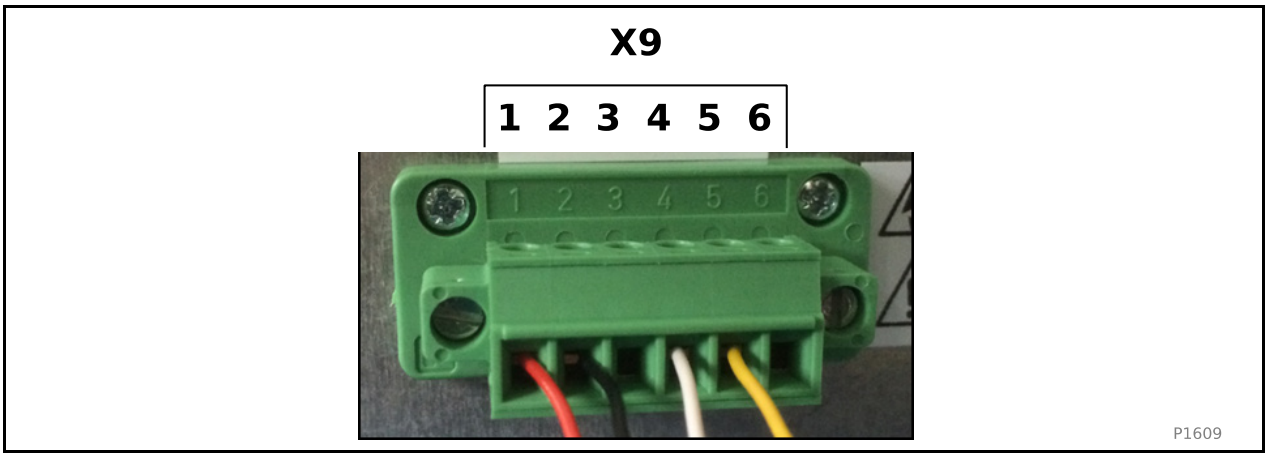

Figure 7 Interface X9

- Interface X12
  Threaded terminal ends for wire cross-sections up to 1.5 mm².

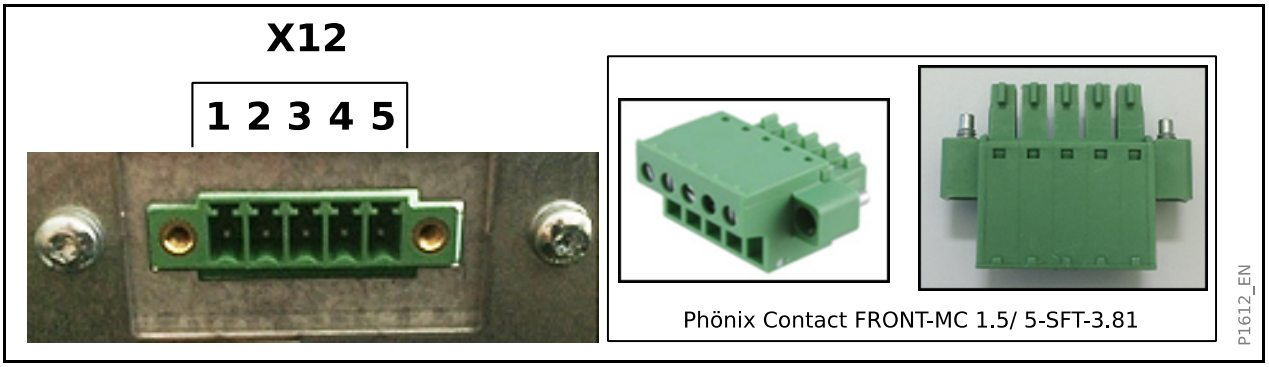

Figure 8 Interface X12

7.5.3 Connection of the protection signaling interfaces of the relays to P595 devices

When connecting the P595 Interface Device to the protection signaling interface of the P521 using copper wires, the following guidelines must be followed.

- Use screened cables throughout.
- Twist each core pair.
- Do not use trifurcated cables from differential protection cables.
- Trip the cable cores and cable shield as close to the connection point as possible. Connect them in accordance with the relevant code of practice
- The cable shields of cables run outside must be connected at the cable inlet of the relevant cabinet or rack to the earth (ground) bar or shield bus, taking care to provide an adequate contact surface area. To do this, remove the outer cover then clamp and bolt the bared braided screen to the earth (ground) bar or shield bus.
- Connect all shields at both ends. Ground any free cores at one end.

If the longitudinal voltages exceed 900 V on the protection signaling link between the P595 Interface Devices, the protection signaling link must use external isolating transformers. There should then be a direct link between the P595 Interface Devices without any transition or routing points.

If the isolation specifications are less stringent for the protection signaling link, the modems of the P595 Interface Devices can be connected directly without the isolating transformers. In this case, the link between the P595 Interface Device can be implemented using twisted pairs (telephone cord) having a limited number of transition and routing points.

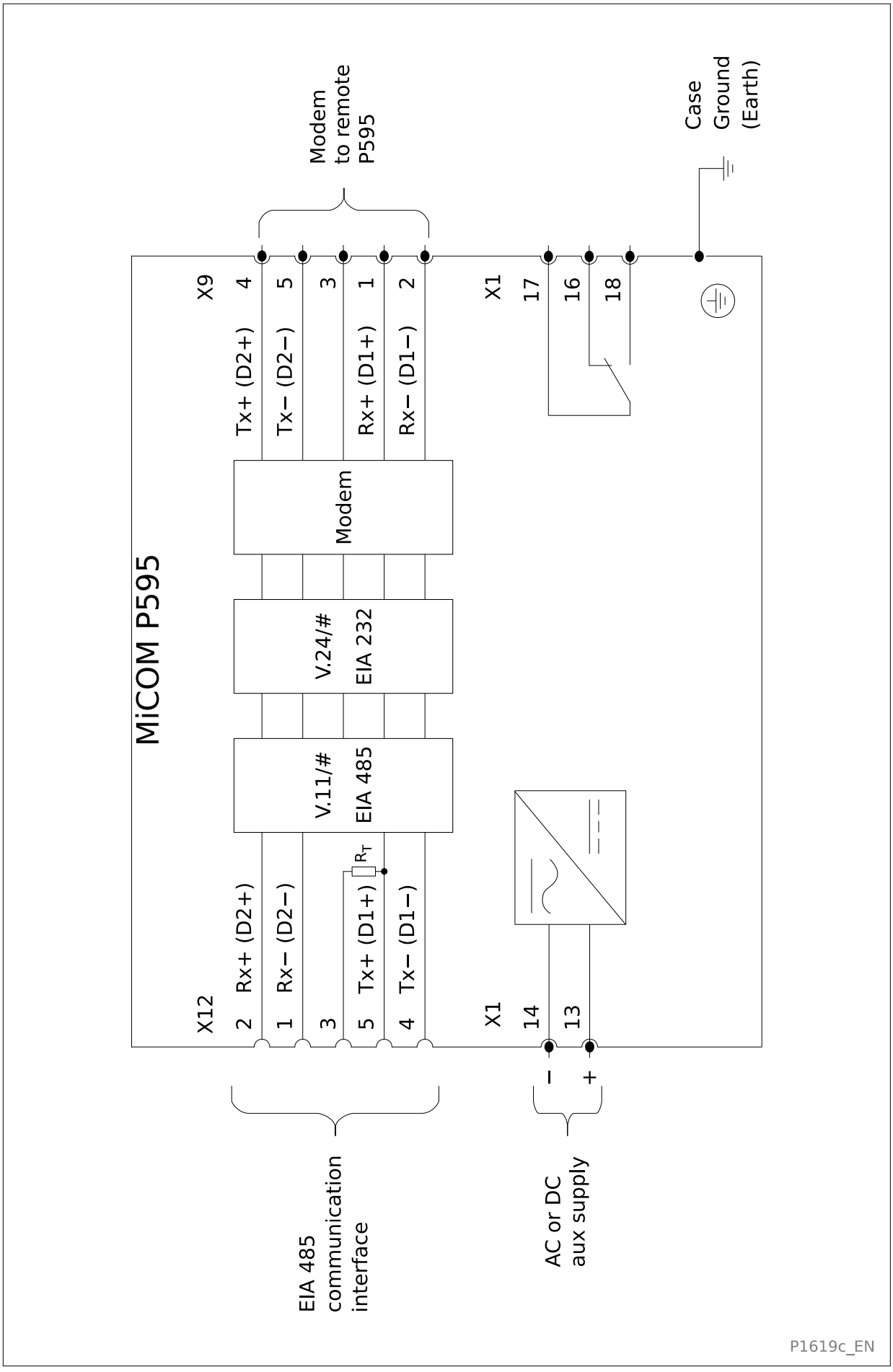

Figure 9 External connection diagram P595 Interface Device

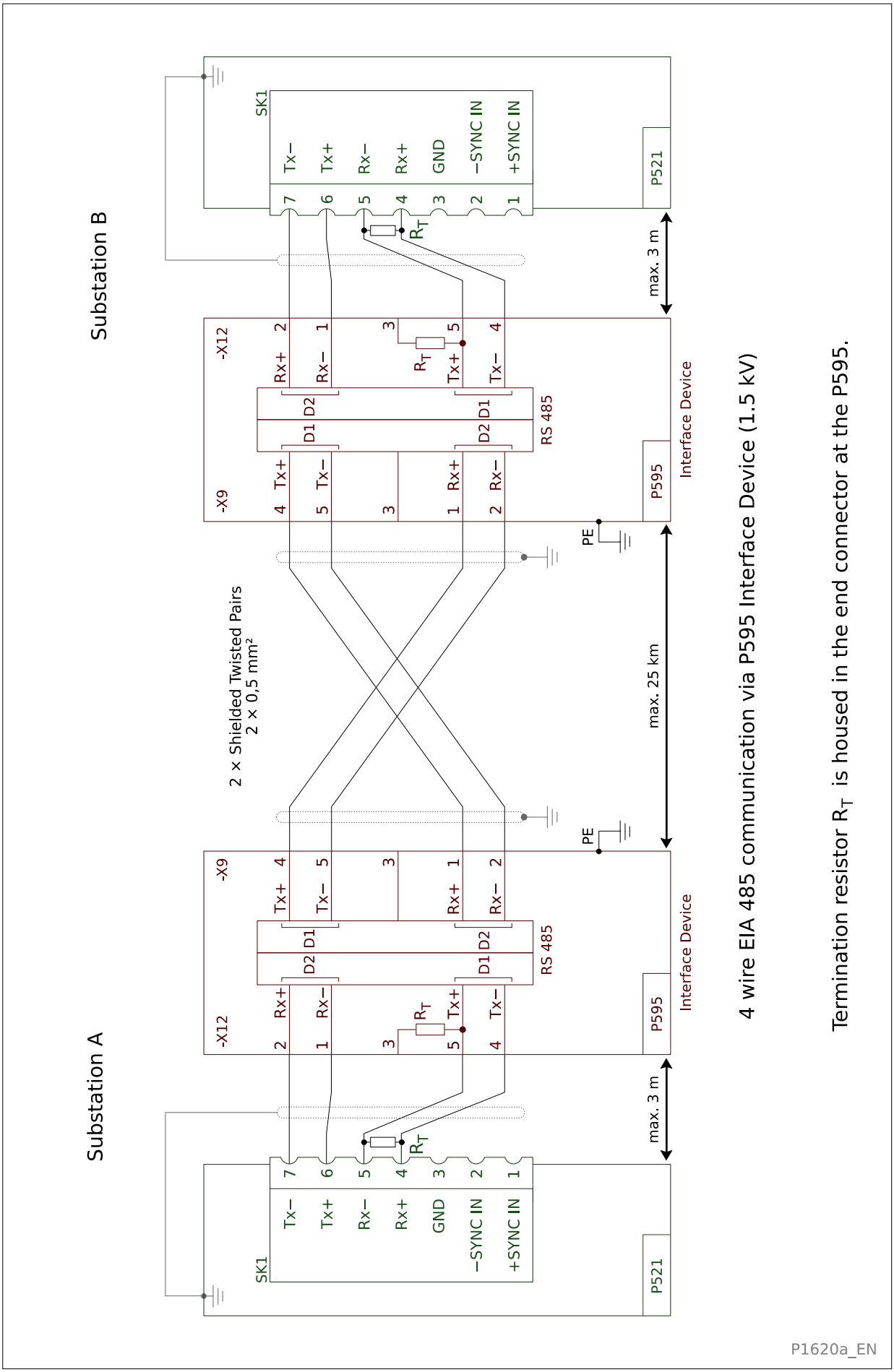

Figure 10 Protection signalling connections for 2-ended P521 system via P595 Interface Devices (EIA RS485 interface)

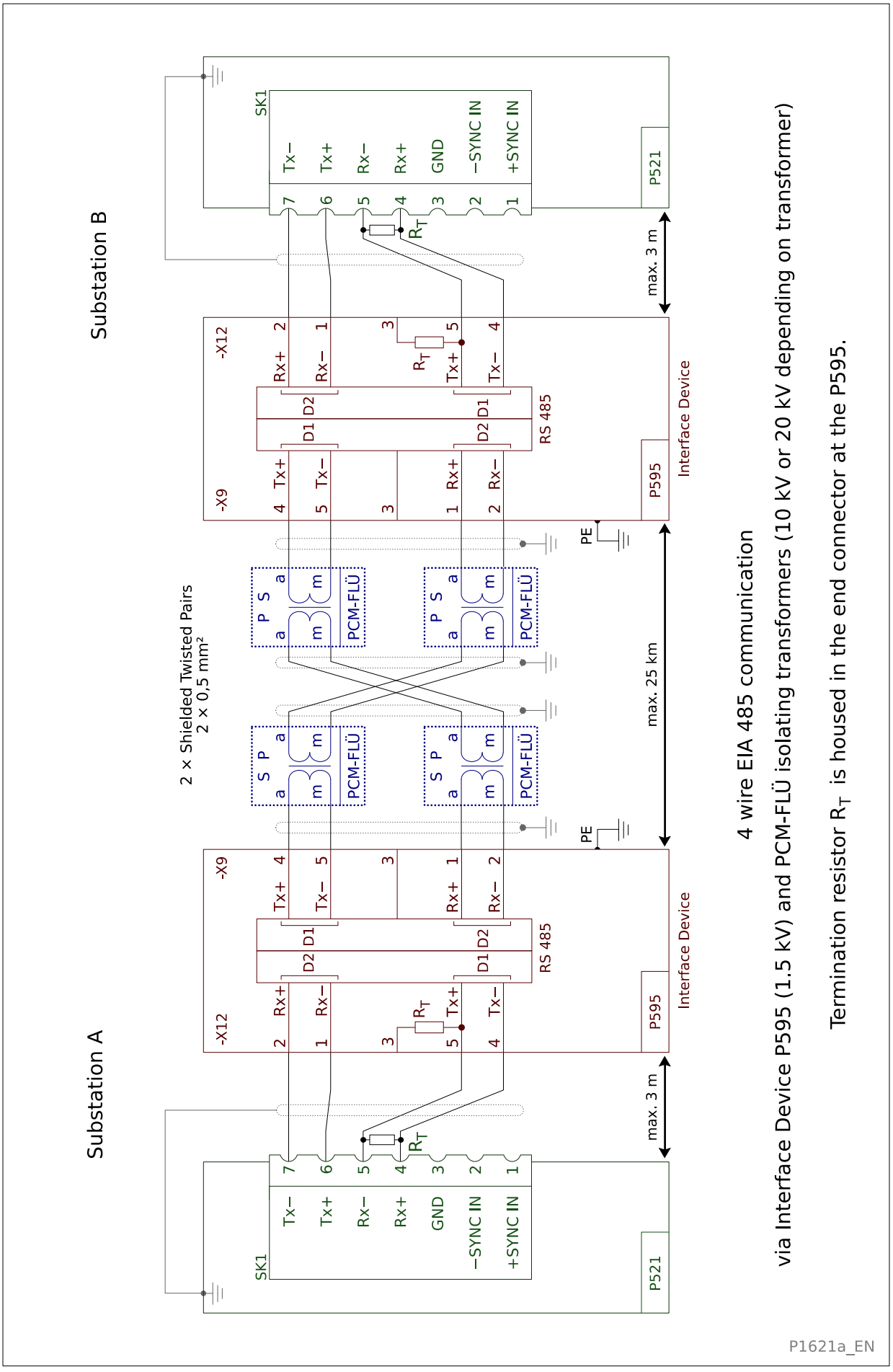

Figure 11 Protection signalling connections for 2-ended P521 system via P595 Interface Devices (EIA RS485 interface) and isolating transformers

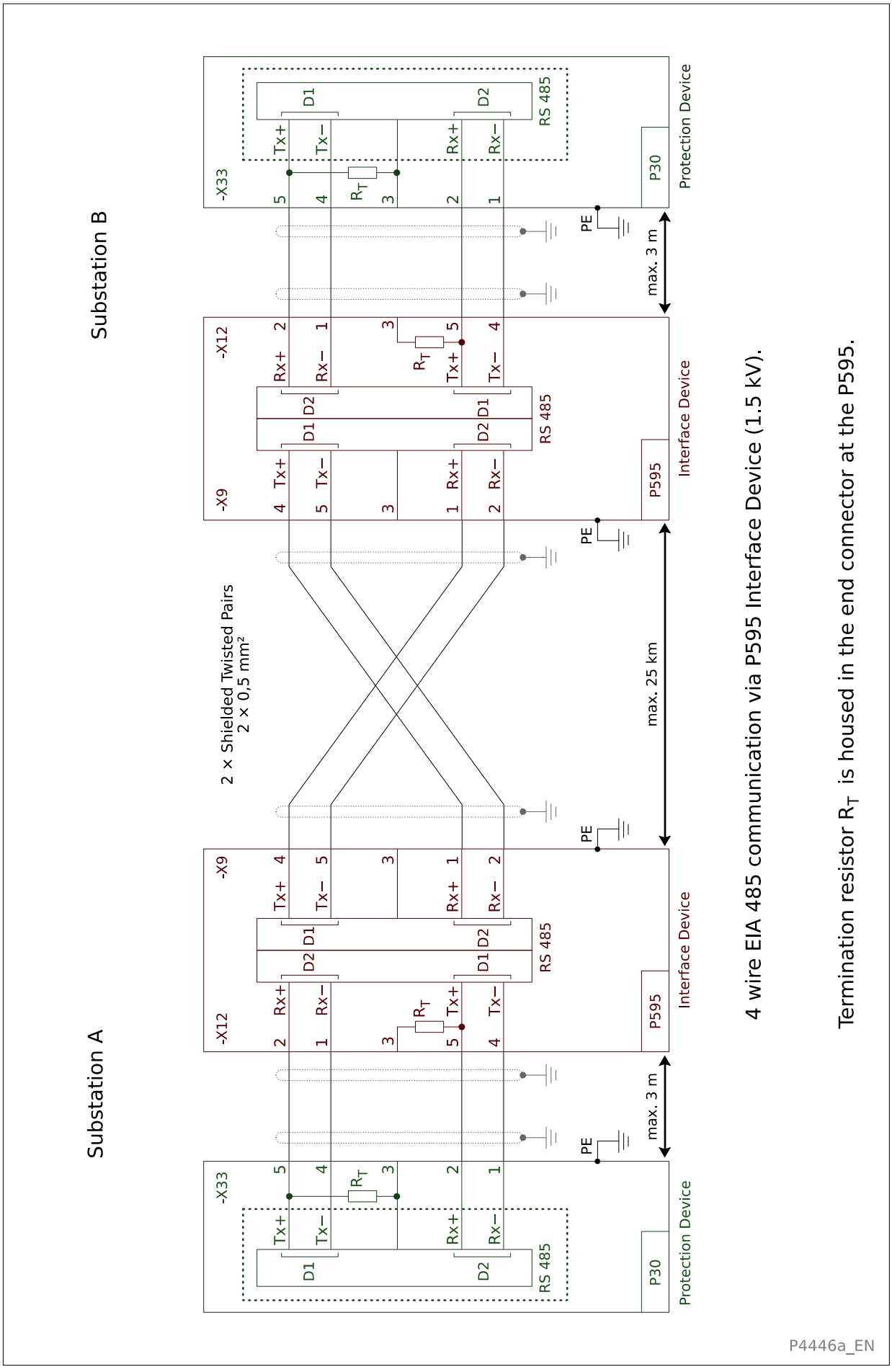

Figure 12 Connection with P530C / P532 relays, or via InterMiCOM interface with P30 relays (EIA RS485 interface)

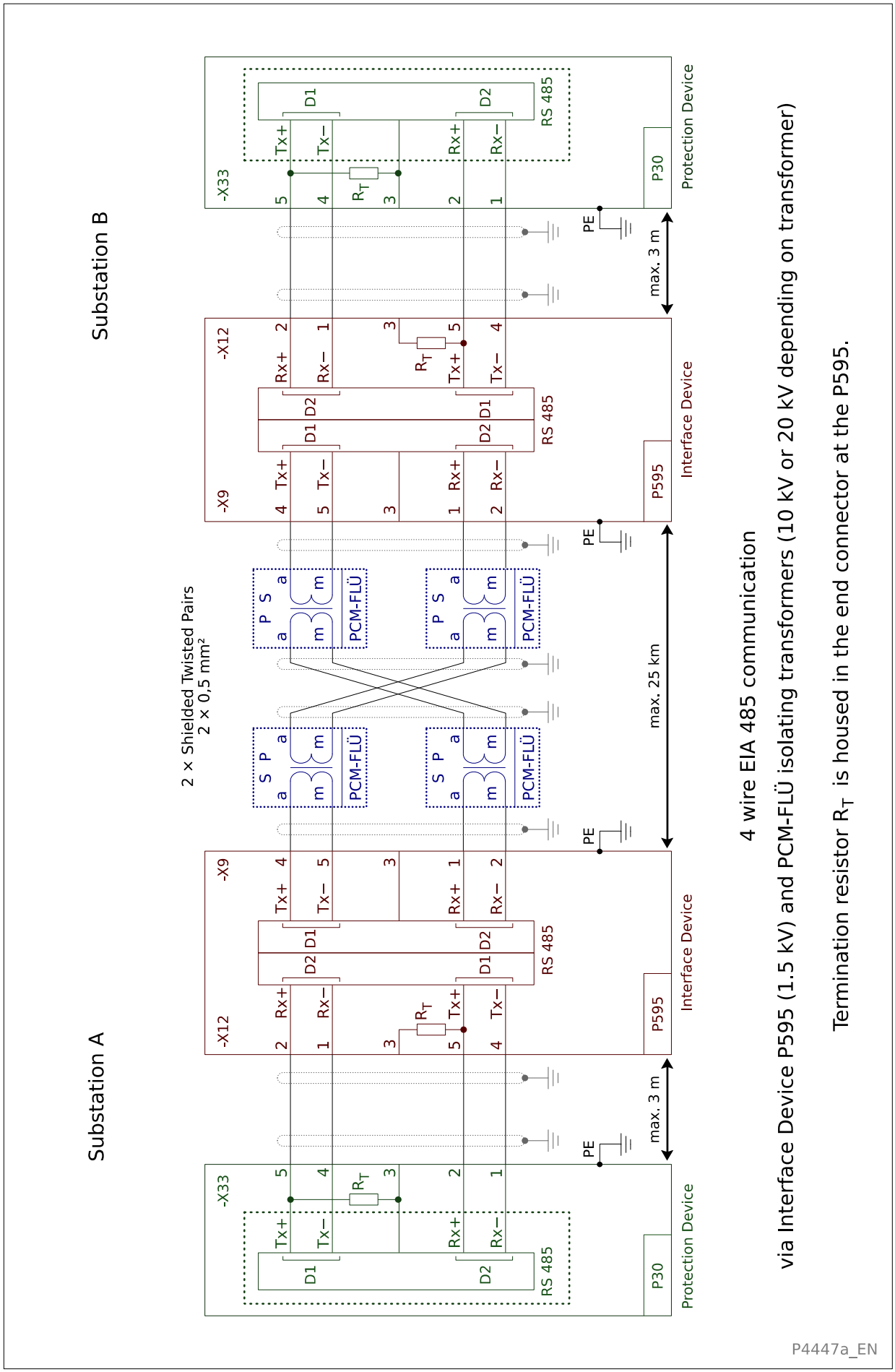

Figure 13 Connection with P530C / P532 relays, or via InterMiCOM interface with P30 relays (EIA RS485 interface) and isolating transformers

8. GLOSSARY

EIA	Electronics Industry Association.
EIA485	EIA Recommended Standard 485, for asynchronous serial communication. Formerly known as RS485.
DIP switch	Dual Inline Pin. A circuit component providing a set of miniature on/off switches.
AWG	American Wire Gauge.
Protective Conductor	Earth (Ground) terminal.
ESD	Electrostatic voltage discharge.

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