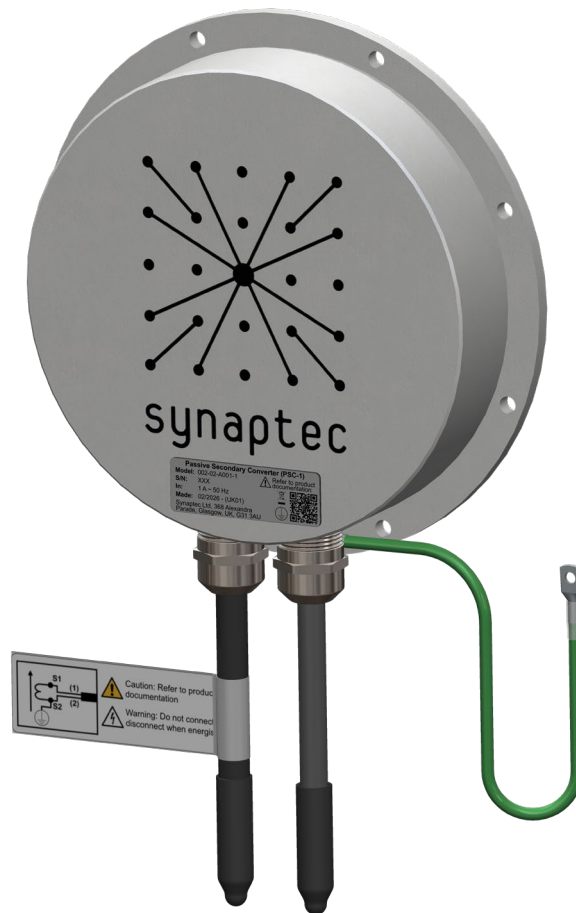




Product manual

Passive Secondary Converter for Current – Single-Phase (PSC-1-C) Gen2

(002-02-A001-1)



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1. Introduction

1.1 Scope

This document is valid for the following products:

Passive Secondary Converter for Current – Single-Phase (PSC-1-C) Gen2 (002-02-A001-1)

1.2 Content

This technical manual provides an overview of the Synaptec Passive Secondary Converter for Current – Single-Phase (PSC-1-C) and the information necessary for installation, use, and end-of-life treatment of the device.

1.3 Limitations

The technical content presented in this document aims to provide general guidance suitable for most users in typical installations. Specific use cases and applications may vary from the content of this document - please contact Synaptec to discuss your application-specific requirements.

1.4 Revision and feedback

While Synaptec has made reasonable efforts to ensure the accuracy of the information stated herein at the time of publication, it is presented without any guarantee or warranty other than as explicitly stated in a valid contract. Synaptec may change this document at any time without notice.

Please report any errors or opportunities for improvement to Synaptec. Our policy is to provide the information necessary to help you safely specify, engineer, install, commission, maintain and end-of-life treatment of this product. If you require further guidance, please contact us.

All feedback should be sent to us via info@synapt.ec.

1.5 Target audience

This manual is aimed towards all professionals involved in:

- Product installation
- Commissioning
- Use and operation
- End of life treatment

For each section, the reader is assumed to be a competent person who possesses the necessary technical knowledge.

1.6 Glossary

For the purposes of this document, the following definitions apply:

- PSC-1-C – Passive Secondary Converter for Current – Single-Phase. Sometimes referred to as “the product”
- CT – Current Transformer
- DES – Distributed Electrical Sensing
- OTDR – Optical Time-Domain Reflectometry
- Earth/earthing/earthed – according to the definition in IEC 61936-1

2. Product overview

2.1 Introduction to the PSC-1-C

The PSC-1-C applies Synaptec's passive photonic sensing technology to the secondary circuits of new or existing current transformers (CTs) to deliver reliable, centralised power system instrumentation. The PSC-1-C is a single-phase measurement device used to collect high-accuracy and high-frequency measurements of current waveforms on primary or sheath conductors of Transmission, Distribution or other electrical assets.

The PSC-1-C allows existing current transformers to be digitised and new current transformers to be installed beyond the substation fence and monitored passively via the same optical fibre network. In combination with an appropriate interrogation system, the PSC-1-C may be configured as an IEC 60044 or IEC 61869 compliant protection class device or merging unit.

Synaptec's photonic sensing technology allows the PSC-1-C to operate without ancillary power or communications networks and does not use active electronics, batteries, data communications, power supplies or time synchronisation at the measurement location.

Each PSC-1-C is installed in combination with Synaptec's Distributed Electrical Sensing (DES) Interrogator measurement device. Multiple single-phase PSC-1-C units may be installed in series on a single optical fibre, connected to the Interrogator at a single end (typically in a substation environment). The standard maximum distance from the Interrogator to the final PSC-1-C is 60 km. Longer distances can be achieved using an optical amplifier in the case of specific application requirements.

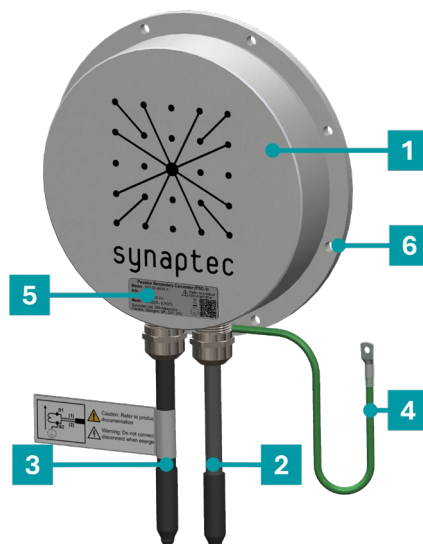
The PSC-1-C may also be interoperated with Synaptec's other electrical and mechanical sensors to provide comprehensive local and remote infrastructure monitoring and protection.

2.2 Features and functions

Table 2.1: Key components of the PSC-1-C.

Item	Designation	Description
1	Sensor enclosure	Weatherproof (IP68) aluminium enclosure for PSC-1-C sensor
2	Fibre optic cable	Multicore cable to connect sensor into the optical network (full length not shown)
3	Current transformer secondary connection	Electrical connection to current transformer secondary circuit (full length not shown)
4	Earth bonding strap	For earthing the enclosure (M4)
5	Rating plate	Information including sensor unique identifier / serial number
6	Mounting points	Radial mounting points for 8x M6 bolts

Figure 2.1: PSC-1-C design. Numbered items are identified in Table 2.1.



2.3 Overview of optical fibre routing

The PSC-1-C is spliced in series into an optical network of sensors. The sensor network is monitored at a single end, at a substation installation, by Synaptec's DES Interrogator.

Optical fibre may be existing or new single-mode fibre.

Each PSC-1-C is connected into the optical fibre network via a local fibre splice box, not provided by Synaptec.

A general approach to fibre routing and connection is shown below. Refer to Section 3 for detailed installation instructions. Note that the fibre colours shown in the diagrams are for illustration purposes only.

Figure 2.2: Example fibre routing between PSC-1-C units and DES Interrogator (Single phase).

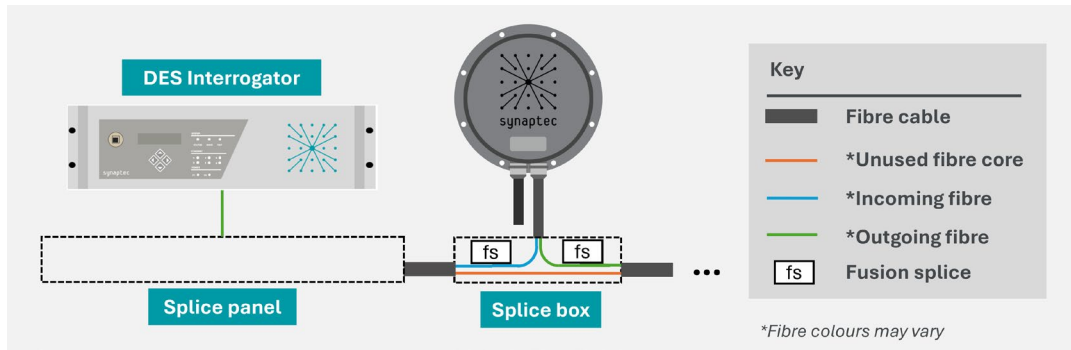
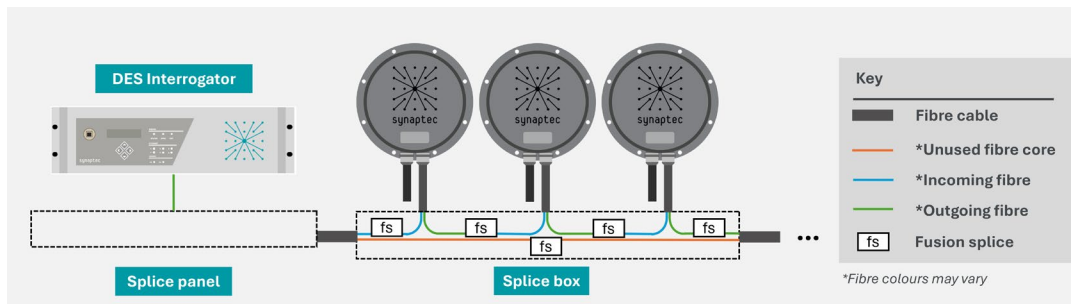


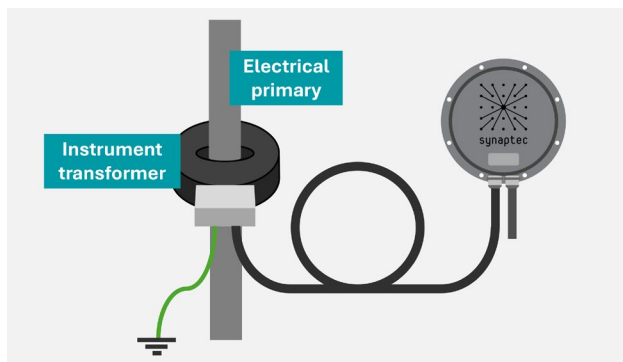
Figure 2.3: Example fibre routing between PSC-1-C units and DES Interrogator (Three phase).



2.4 Overview of secondary electrical connection

The PSC-1-C electrical cable is connected to a new or existing current transformer. Each PSC-1-C is connected to a separate CT. Refer to Section 3 for detailed installation instructions.

Figure 2.4: Example electrical secondary connection



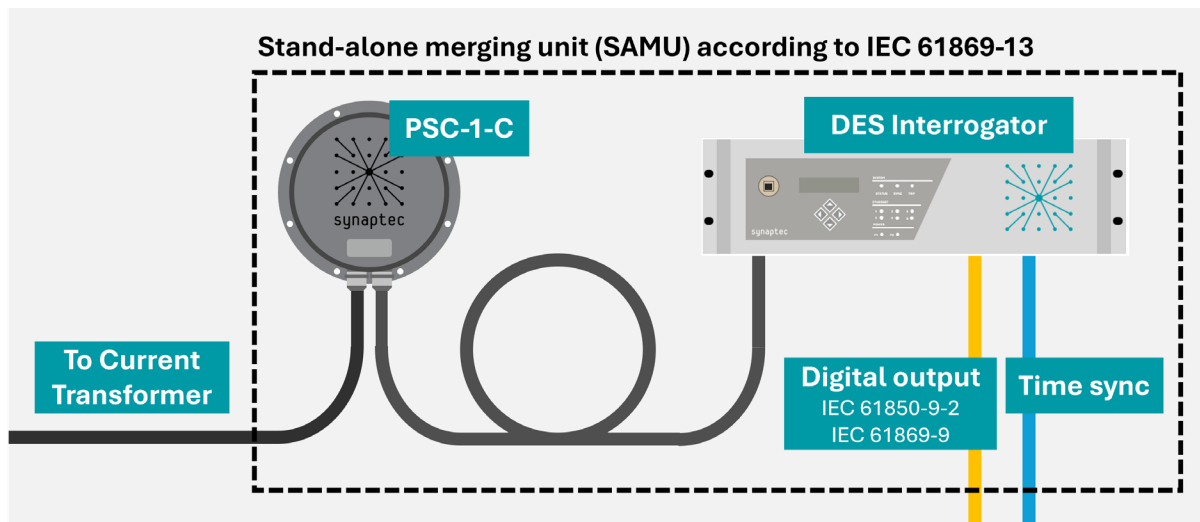
2.5 Stand-alone merging unit (SAMU) classification according to IEC 61869-13

For application of the IEC 61869-13 definition for a stand-alone merging unit (SAMU), the following scope applies.

A system of one or more PSC-1-C products connected by optical fibre to a DES Interrogator product may act as a SAMU under the IEC 61869-13 definition. Each PSC-1-C (which may be installed at a remote location) instruments the secondary of a CT as defined per IEC 61869. The DES Interrogator (typically installed in a substation) receives a local auxiliary power supply and time synchronisation signal and outputs digital measurements of the instrumented CTs per IEC 61850-9-2 and IEC 61869-9. The SAMU digital output may be accessed by other devices to enable various protection, control and condition monitoring applications.

The PSC-1-C is therefore a component of a SAMU when used in conjunction with the DES Interrogator.

Figure 2.5: Classification of PSC-1-C and DES Interrogator according to IEC 61869-13



3. Product Installation

3.1 Prerequisites

3.1.1 Further references

- DES System Manual (TD-014)
- PSC-1-C Gen2 Installation checklist (TD-037)

Figure 3.1: Installation Checklist Indicator

When this icon appears, it means the section includes information that is required for completing the installation checklist or contains steps directly linked to it.

3.1.2 Associated documents

Documentation related to the PSC-1-C and supplied to the installer prior to installation shall include:

- PSC-1-C Product Manual (this document)
- Detailed system design pack for the full delivered system, signed by Synaptec and the end-user/client

The detailed system design pack includes:

- System specifications
- Topology and fibre routing diagrams
- Bill of materials
- Any exceptions to the standard product installation guides
- Laser hazard guidance

This information will indicate the installation location of each PSC-1-C sensor, indexed by serial number, and other relevant information related to its installation and operation. Particular attention should be given to the location of each PSC-1-C by serial number, as any deviations from this design during installation will impact system performance. Where no exceptions are listed to the installation information provided in this manual, that information should be followed.

3.1.3 Competencies

Installation of the PSC-1-C requires no specialist competencies that are unfamiliar to the installation of measurement or telecoms hardware in the power sector.

All mechanical and electrical installation works should be carried out by qualified installers. Typical skills required for mechanical and electrical installation works will include:

- Mechanical mounting of components to a suitable structure identified during project design
- Mechanical mounting of split- or solid-core CTs
- Wiring of CT secondary terminals, or divider secondary terminals

All fibre optic work should be carried out by qualified fibre optic engineers. Synaptec systems use only single-mode fibre. Typical skills required for fibre optic works during PSC-1-C installation will include:

- Fibre end cleaving, cleaning and inspection
- Single-mode fibre splicing
- Fibre optic routing and the use of splice boxes and patch panels
- Optical time-domain reflectometry (OTDR) and splice loss measurement

For additional competencies related to the wider DES system installation, refer to TD-014 DES System Manual.

3.1.4 Tools

Tools for mechanical installation, for example:

- M6 bolts and associated tools for mounting the PSC-1-C (See Section 3.4)

Tools for electrical installation, for example:

- Stripping, crimping, and connecting wires of up to 4 mm² cross-section, for connection between the PSC-1-C and the current transformer (see Section 3.6)

Tools for fibre optic inspection, splicing and protection, for example:

- Fibre optic inspection equipment
- Fibre optic stripping, cleaving, cleaning and fusion splicing tools and accessories (See Section 3.7)

3.2 Receipt of products and documentation

This section discusses requirements for receiving and unpacking the goods, as well as associated considerations regarding product care and user safety.

3.2.1 Handling and product care

Handle the product carefully at all times during installation to avoid damage. Special care should be taken with the connected optical fibre. The fibre should not be subject to tight bends, crushing, or significant tensile force.

After initial unboxing to confirm receipt, products should be carefully re-packed in the original packaging for storage and onward transport to final installation locations. Products should not be removed again from packaging until the time of installation.

Ensure that loose components are retained with the product, in the packaging. These should accompany the product to its installation destination and afterwards be stored in a dedicated safe location. Digital copies of all documentation are available from the Synaptec website.

It is recommended that during installation of the PSC-1-C, the site environment is appropriate for the product installation to be carried out properly. This includes consideration of lighting, cleanliness, vibration and weather conditions. This particularly applies where installation is being carried out at the same time as construction work.

3.2.2 Receipt

Open the product packaging on receipt to confirm the products and accessories are correct and there has been no external damage in transit. Do not remove the product from packaging unless required.

Re-seal the product in its original delivery packaging for storage and onward transport.

Refer to TD-14 DES System Manual for further information related to receipt of DES system hardware.

3.2.3 Storage

If the product is not intended for immediate installation, store in a place free from dust, moisture and high humidity, between -40 to 50 °C in the original packaging. Products should be stored in a way that avoids crushing the packaging.

On subsequent unpacking, make sure that any dust on the carton does not fall inside.

3.3 Preparing for installation

3.3.1 Installation method

In advance of installation, a plan for the installation should be developed. This should establish a safe and practical method for the work and consider factors such as access, lighting, environmental factors, cleaning or preparation of the site for the work. Safety is always a priority when conducting installations or maintenance and the method of work should be consistent with the asset owner's policies, as well as regional best practices and regulatory requirements.

3.3.2 Sensor location

The PSC-1-C requires an electrical cable to interface with a current transformer placed around the primary conductor being instrumented, and a fibre optic cable to be spliced into the system optical network. The location of the sensor should be appropriate to support these two interfaces with acceptable arrangements for cable lengths, restraints, and paths.

A mounting structure may be required to mount the PSC-1-C. Mounting structures should be appropriate for the purpose, for example, providing adequate windage and weight-carrying ratings, earthing requirements, supporting appropriate routing of fibre and electrical cable and avoiding abnormal vibration which could impede safety or proper operation of the product.

Many factors should be considered when selecting the sensor location and depend on the specific requirements of the installation and its location. For example, consideration should be given to operator safety, environmental conditions, drainage provision, restriction of access to public or operatives, and restricted space.

In the case of extreme UV intensity, presence of rodents or requirement for supplementary mechanical protection of the electrical and/or fibre cables, a cable conduit or other adaptation may be required.

3.4 Mechanical mounting

The PSC-1-C should be robustly attached to the mounting structure according to the following:

- The sensor body should be vertical, with the fibre and electrical cables facing down
- M6 bolts of appropriate length for interface with any adaptor elements should be inserted through the enclosure mounting holes and secured to the mounting surface
- The PSC-1-C is not subjected to movement, mechanical loads or excessive vibrations
- The mounting surface is clean, free from obstructions and of a suitable construction to support the mechanical mounting of the PSC-1-C
- The PSC-1-C should be mounted in a way which mitigates the risk of submersion during precipitation or flooding, and which supports drainage of precipitation away from the sensor and cables

Figure 3.2: Overall dimensions of the PSC-1-C

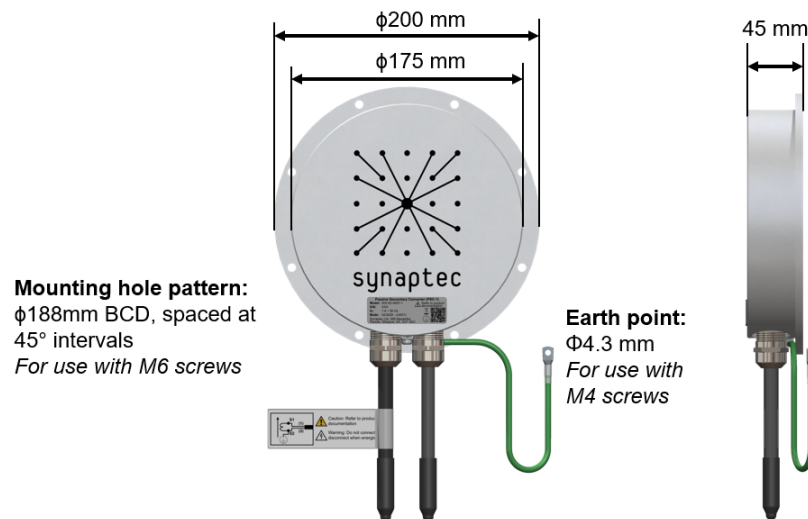
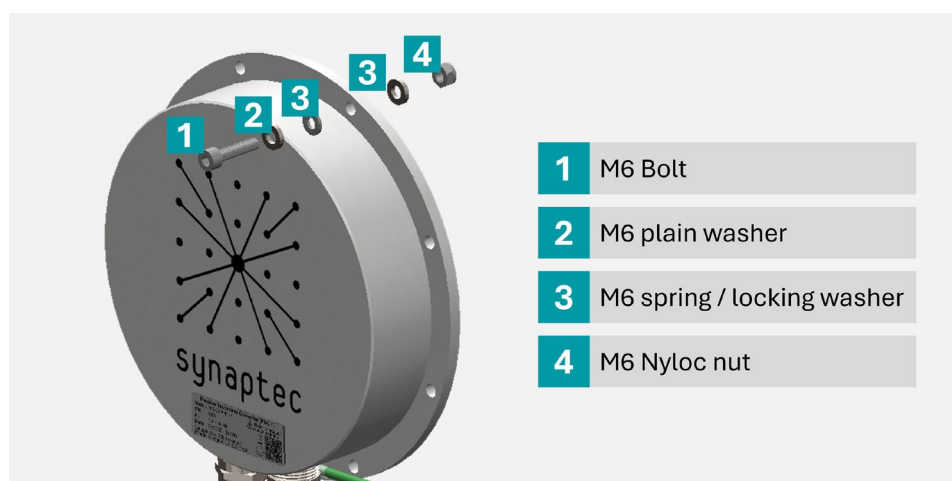


Figure 3.3: Suggested mounting arrangement of the PSC-1-C



INSTALLATION
CHECKLIST

After completing the PSC-1-C mechanical mounting, take a clear photo of each PSC-1-C, showing the mechanical mounting.

3.5 Earthing the metal enclosure

After the product is mechanically mounted, and before the equipment is energised, the enclosure earth bonding point (M4x0.7, 8 mm max) should be reliably connected to earth. The PSC-1-C is provided with an earthing strap which may be used or replaced as required.

Specifications of the provided earthing strap:

- Conductor cross-sectional area: 4 mm²
- Material: stranded copper, stainless steel ring terminal
- Fastening: suitable for use with M4 fasteners
- CENELEC harmonised designation: H07Z-K
- Length: 250 mm

The earthing arrangement should be in accordance with the asset operator's policies and appropriate standards for the specific application and region of use.

The earthing surface should be secure and free from excessive vibration, contamination and corrosion.

Synaptec recommends that if replaced, the earthing conductor should have a cross-sectional area no smaller than 3.3 mm² and be constructed from stranded copper. The earthing strap should be restrained to the PSC-1-C earthing point using a stainless steel (A2) fastener (M4x0.7, 8 mm max) with an appropriate locking washer or thread locking compound. A tightening torque of 2 Nm should be used as a reference, but may differ depending on the specific approach used.

Note: The PSC-1-C enclosure is constructed from hard anodised aluminium and the product surface is therefore non-conductive. The PSC-1-C is not suitable for earthing by direct contact with the mounting structure, or by connecting an earthing strap to a mounting hole.



After completing the PSC-1-C earthing, take a clear photo of each PSC-1-C, showing the earthing conductor and bonding point.

3.6 Secondary electrical connection

Caution: Connection to the current transformer and cable routing should be performed according to an approved method of work which meets the asset operator's requirements, regional best practices and safety protocols.

Connection to the current transformer is made via a two-core cable pre-installed on the PSC-1-C. Standard wiring gauge is 2.5 mm². As standard, 2 m of cable is provided between the current transformer and PSC-1-C, however customers are welcome to specify a different length according to their requirements.

3.6.1 Suggested tools

The following tools are suggested by Synaptec for preparing the electrical cable:

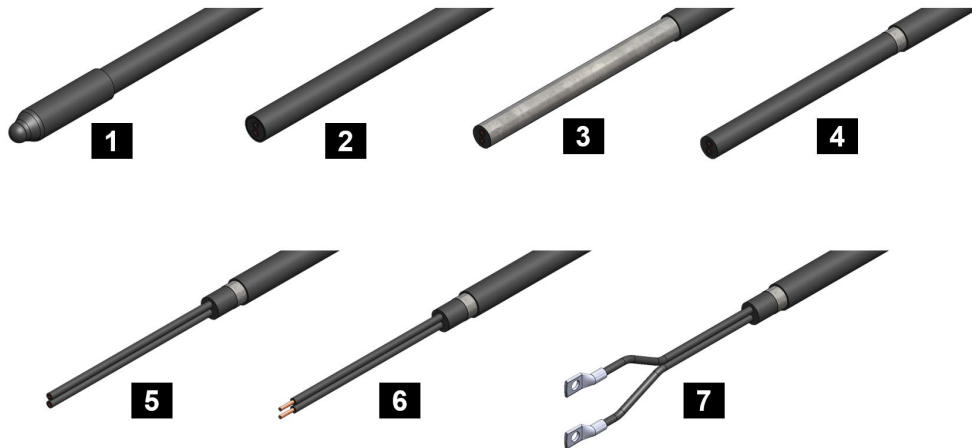
- Knipex 16 30 135 – Stripping the outer jacket
- Knipex 95 05 10 – Trimming the EMC braid
- Knipex 16 30 135, Jokari 10270 – Stripping the bedding (if applicable)
- Knipex 12 62 180 – Stripping the primary insulation

3.6.2 Preparing the electrical cable

The electrical cable should be prepared as shown in diagrams 1-7 below.

1. Inspect the electrical cable for damage. Measure the required lengths within the electrical enclosure and from the enclosure to the PSC-1-C sensor location
2. Cut the electrical cable to the correct length, removing the end boot
3. Strip the outer jacket, exposing the tinned-copper wire braid (EMC screen)
4. Trim the EMC screen back as far as possible. Wrap securely in electrical tape to insulate loose strands from the CT electrical terminals. Do not connect the EMC screen to earth, it is already earthed at the sensor
5. Strip the cable bedding back to expose the two cable cores
6. Strip the primary insulation from the two cores
7. Apply ring terminals to the two cores. No loose copper strands should be permitted. Terminals should be appropriate for use with stranded 2.5mm² conductors, and in accordance with the CT manufacturer's recommendations. The stripping length should be in accordance with the terminal manufacturer's recommendations

Figure 3.4: Stages of preparation for the electrical cable

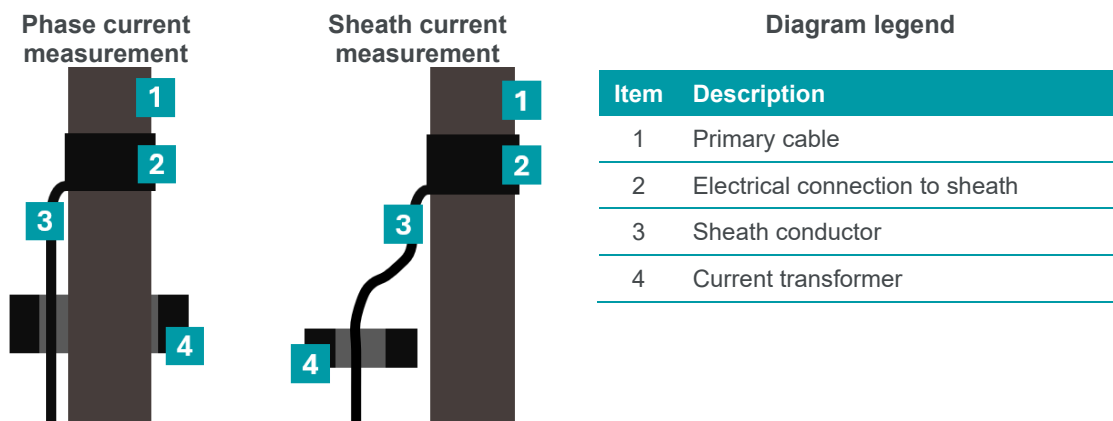


3.6.3 Preparing the measurement conductors

Phase current CTs should be installed with the sheath conductor routed back through the CT in the opposite direction (for example, see below, left). This is to subtract the screen current from the total currents flowing through all conductors in the cable, providing a measure of the load current.

Sheath current CTs should be installed on the screen conductor directly (for example, see below, right).

Figure 3.5: CT installation



3.6.4 Selection and use of cable glands

- Cable glands are selected by the customer and should be suitable for the requirements of the application and be used in accordance with the manufacturer's instructions. Cable glands must be suitable for the cable diameter(s). The PSC-1-C electrical cable has a nominal outer diameter of $\Phi 11.3\text{mm}$
- Depending on the current transformer, it may be necessary to drill one or more holes in the electrical enclosure for the cable glands. Cable glands should face down to facilitate ingress protection

3.6.5 Using Open Circuit Protection

The Synaptec PSC-1-C features integrated Open Circuit Protection (OCP). For the best protection across a wide range of scenarios, it is recommended to also install an OCP device directly at the CT electrical terminals, at the discretion of the end user and installer, and taking into account the asset operator's requirements, regional best practices and safety protocols.

3.6.6 Earthing the current transformer secondary

Note: Current transformer earthing is the responsibility of the asset operator and installer and the following provides general guidance only.

Current transformer secondary circuits are not connected to ground within or at the PSC-1-C. Current transformer secondary circuits should be reliably connected to earth in one location only, for example, at one of the secondary terminals in the electrical enclosure, as illustrated in section 3.6.8 below. It is recommended that the earthing conductor has a cross-sectional area of at least 3.3 mm^2 .

3.6.7 Sensor polarity

PSC-1-C electrical cables should be connected according to the following polarity:

Current transformer terminal	Conductor identification
S1	Marked with "1" on insulation
S2	Marked with "2" on insulation

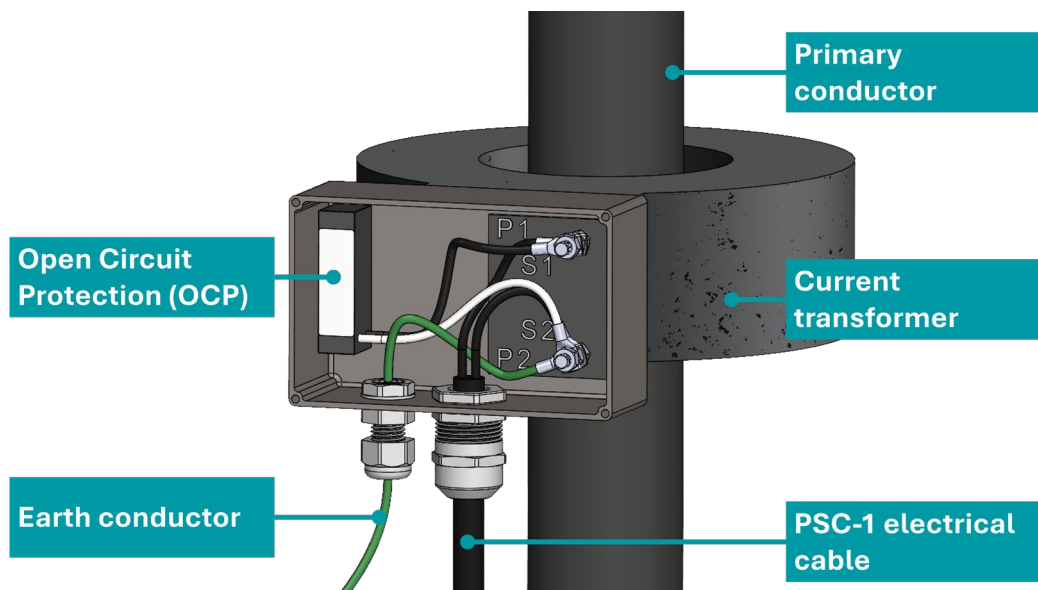


3.6.8 Connecting to the CT electrical terminals

Note: The following information provides a general example, which cannot be applicable to all applications. Please contact Synaptec to discuss your specific application.

Synaptec PSC-1-C is typically connected to the current transformer secondary terminals within an electrical enclosure on the current transformer (see figure below).

Figure 3.6: Example electrical connection to the current transformer



After completing the secondary electrical connection inside the CT junction box, take a clear photo showing the wiring inside each junction box

3.6.9 Routing the electrical cable

The electrical cable should be secured at regular intervals between the CT and the PSC-1-C. The method of securing should be selected to relieve stress from the connections at the CT and PSC-1-C. Once secured, the electrical cable should not be able to move, for example due to wind.

The electrical cable securing method, or any other fastening or associated part, should not crush, pinch or mark the electrical cable.

The electrical cable bend radius must be at least 175mm at all points.



After completing the electrical cable routing, take a clear photo showing the cable routing between CT and PSC-1-C

3.7 Fibre optic connection

Caution: Working with optical fibres should be performed according to an approved method of work which meets the asset operator's safety protocols.

Warning: The optical splice box must not be opened when the DES Interrogator is turned on. The Synaptec DES Interrogator must only be operated when the optical system is fully installed and tested.

Caution: Use of controls or adjustments or performance of procedures other than those specified herein might result in exposure to hazardous invisible laser radiation in the range 1525-1600 nm.

3.7.1 Installing the fibre optic cable

The PSC-1-C is typically supplied with 25 m of fibre optic cable pre-installed on the PSC-1-C, but this may vary based on project requirements. The available end of the fibre cable is provided unterminated for connection to the sensor network. The fibre cable specifications vary depending on the application requirements; two of the fibres are used to connect the PSC-1-C into the sensor network at the local splice box according to the following:

Table 3.1: PSC-1-C fibre optic polarity

Fibre colour	Connection polarity
*Blue	Connected into the fibre network in the direction of the previous sensor in the chain, in the direction of the Interrogator
*Green	Connected into the fibre network in the direction of the next sensor in the chain, away from the Interrogator
*Other	Other fibre optic cores are not connected in the PSC-1-C and should be left unterminated or cut back

Figure 3.7: Example fibre optic cable



*Fibre colour may vary according to application requirements and is confirmed in the supplementary technical details provided with the product

The fibre cable should be secured at regular intervals between the splice box and the PSC-1-C. The method of securing should be selected to relieve stress from the connections at the splice box and PSC-1-C. Once secured, the fibre cable should not be able to move, for example due to wind.

The fibre cable securing method, or any other fastening or associated part, should not crush, pinch or mark the fibre cable.

The fibre cable bend radius depends on the specific cable used. This information is provided with the product.

3.7.2 Fusion splicing and dB loss measurement

Warning: Fusion splicing must not be attempted while the DES Interrogator is powered on. This could cause exposure to potentially harmful invisible laser radiation, and damage the system.

Fibre optic splices should be performed by trained individuals using a suitable fusion splicer. To avoid optical loss, the optical fibre should not be bent at less than 50mm bend radius.

The dB loss of each splice should be below -0.1dB, confirmed using calibrated equipment and reported in the TD-038 PSC-1-C Gen2 Installation Checklist. Loss measurement is generally made using a handheld light source and power meter.

For typical optical loss guidelines, and instructions on verification of the complete sensor fibre network following installation of a DES system, refer to TD-014 DES System Manual.

3.7.3 Laser safety risk assessment and mitigation

The Synaptec PSC-1-C is a passive optical device intended only for use as part of an Optical Fibre Communication System (OFCS) per ISC 60825-2 in conjunction with the Synaptec DES Interrogator, which contains an invisible laser light source emitting in the invisible wavelength region between 1525-1600 nm. It is important that, according to IEC 60825-2, appropriate measures are taken to prevent users of the system from being exposed to potentially harmful laser radiation.

Synaptec provides details of the optical safety features incorporated into the DES Interrogator, and of the intensity of laser radiation at each connector or splice location to support the asset operator and installer in conducting a risk assessment and developing safe methods of installation and use for the system.

The asset operator and installer (“the user”) takes responsibility for the safe installation and maintenance of the optical system.




The user should identify whether each splice box in the optical system is a **restricted** or **controlled** location. It is not recommended to locate splice boxes in *unrestricted* locations, i.e. those where members of the public have free access.


- **Restricted:** locations are inaccessible, except to authorised personnel who might not have appropriate laser safety training
- **Controlled:** locations are inaccessible, except to authorised personnel who do have appropriate laser safety training.

Synaptec will provide laser safety warning labels for both restricted and controlled locations. The user should confirm their labelling requirements and ensure the appropriate labels are affixed.

Synaptec recommends to cable-tie the provided label onto the fibre cable where it enters the splice box:

Figure 3.8: Example laser safety warning labels according to hazard level and location category

	Restricted locations	Controlled locations
Hazard level 1M	 <p>Label mandatory</p>	 <p>Label optional</p>
Hazard level 3B	<p><i>Not permitted</i></p>	 <p>Label mandatory</p>



INSTALLATION CHECKLIST

After completing the fusion splicing and splice box installation, take a photo inside each splice box showing the splices. Also take clear photos which show the fibre cable routing. For each fusion splice, record the optical loss (dB) and loss measurement method in the installation checklist.

3.8 Completing the installation checklist

After the product installation is completed, ensure that:

- The provided installation checklist has been completed and signed off by the installer(s) and approver(s)
- All the required evidence and photos have been taken and provided to Synaptec

4. Use of the product

4.1 Condition inspection

Note: In ordinary use, the Synaptec PSC-1-C requires no maintenance. Correct functionality can be verified by analysis of the optical spectrum and electrical measurements at the DES Interrogator.

To maximise the product lifespan, it is recommended to conduct condition inspections of the system when access is available:

Item	Suggested inspection
Sensor enclosure	Visual inspection to identify corrosion or contamination. Confirm that the sensor mechanical mounting is acceptable.
Current transformer electrical enclosure	Visual inspection to identify ageing or damage. Confirm that the cable glands are in an acceptable condition.
Fibre optic cable	Visual inspection to identify ageing or damage (for example, brittleness or discolouration of the cable), confirm correct cable restraint and that there has been no movement.
Electrical cable	Visual inspection to identify ageing or damage (for example, brittleness or discolouration of the cable), confirm correct cable restraint and that there has been no movement.
Earth bonding point	Visual inspection to identify corrosion or contamination.
Fibre optic splice box	Visual inspection to identify ageing or damage.

4.2 In-use notices

Synaptec draws the user's attention to the following notices:

- Do not open any optical splice box or cut any optical fibre or cable when the DES Interrogator is powered on. This could cause exposure to potentially harmful invisible laser radiation
- Do not open the PSC-1-C enclosure at any time. Opening the PSC-1-C enclosure voids the product warranty and may damage the product and poses a risk of electric shock and/or exposure to potentially harmful invisible laser radiation
- If any splice box in the optical system is opened or moved, the optical splices can be disturbed and dB attenuation can change. If this is the case, check at the Synaptec Interrogator that the sensor system is valid
- In the case of a fault on the primary conductor, or an elevated current below fault classification, the PSC-1-C enclosure can become hot to touch, even when de-energised
- If any changes may alter the environmental conditions, such as the exposure of the PSC-1-C to direct sunlight, windage, vibrations, precipitation or mechanical load, it is recommended to re-assess the installation and if necessary, discuss the changes with Synaptec
- If any changes may alter access restrictions to any of the splice boxes, it is important to re-assess the classification of the location and take appropriate actions

5. End of life treatment

Note: If PSC-1-C sensors are no longer required please **contact Synaptec to discuss end-of-life options**, such as collection of sensors. When possible, returning equipment to Synaptec provides the best opportunity for equipment to be recycled or reused in a safe and environmentally sustainable way.

5.1 Why recycle?

Synaptec PSC-1-C contains valuable materials which place a burden on the environment to extract and process. Recycling these materials returns these materials to the manufacturing value chain and avoids the need for virgin materials to be extracted. This reduces the use of energy and resources such as water, in turn reducing the emission of greenhouse gases like Carbon Dioxide (CO₂).

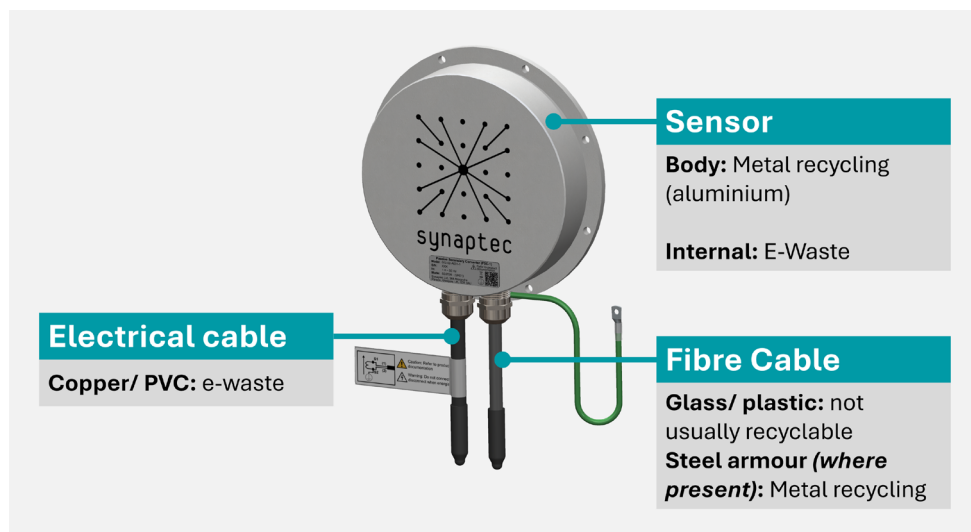
5.2 Follow local guidance

Recycling services differ between regions and countries. Always seek up-to-date guidance for your region. Treatment should only be conducted by an appropriately registered and qualified recycling operator in accordance with regional best practice. In the EU and UK, Synaptec PSC-1-C is considered "Electronic and Electrical Equipment" according to the Waste Electronic and Electrical Equipment Directive ("WEEE Directive").

5.3 Summary product breakdown

The PSC-1-C is a complex product for long-term outdoor use. Synaptec strives to make our products suitable for disassembly to assist recycling, however the PSC-1-C is a complex and highly integrated product with a (non-toxic) internal silicone encapsulation. It is therefore recommended to treat the product in three parts:

Figure 6.1: PSC-1-C Recommended breakdown for recycling



5.4 Material breakdown

Synaptec's PSC-1-C is built using valuable and high-quality materials - with your help, they can be recycled to reduce environmental impact.

Excluding the external electrical cable and fibre cable, which depend on the specific project, the PSC-1-C material breakdown is given by the table below.

Table 6.1: PSC-1-C Material Breakdown by material category (excluding fibre cable and electrical cable)

Material category	% Content
Aluminium	74%
Mixed electrical	12%
Stainless steel	6%
Silicone	5%
Plastics (general)	1%
Plastics (PA)	1%
Copper	<1%
PVC	<1%
Brass	<1%
Steel (general or galvanised)	<1%

5.5 Hazards and waste classification

Synaptec is committed to minimising harm to people and the environment as far as reasonably possible. The following aims to support operators in identifying and addressing risks associated with treatment:

- Product contains optical fibres and other parts which can be sharp and irritant to the skin
- Product contains max 0.2%wt (<3.5g) lead compounds. If the gold-coloured sensor is removed from the product, it should be classified as hazardous waste with the waste code 06 04 05 (“wastes containing other heavy metals”)
- Product contains small quantities (<1g) of epoxies, which can be harmful to humans and the environment if inhaled

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