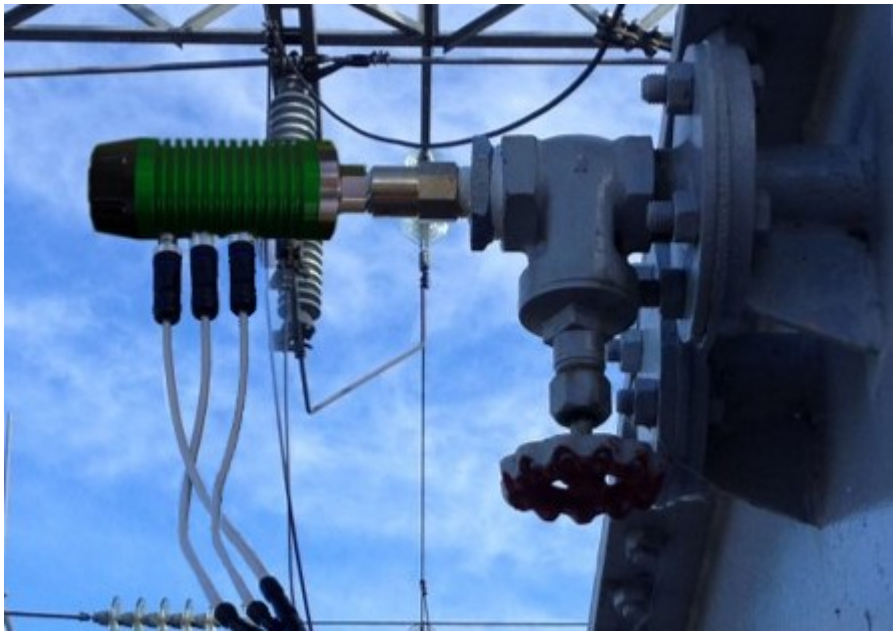
EcoStruxure Transformer Expert Probe and EcoStruxure Transformer Expert Probe Dual H2

Installation and Commissioning Guide

ETE-UM01-04
12/2024



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Foreword

Safety Information

Important Information

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.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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.

Safety Precautions

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

Before Starting Work

Before starting work, qualified personnel and the operator must have read and understood this document. Follow all instructions.

NOTE: The term **Operator** refers to personnel responsible for the installation and maintenance of the transformer.

Modifications and repairs to the product may only be carried out by Schneider Electric employees, if expressly permitted by the instructions of this document.

Instructions and symbols directly attached to the product must be observed. They must not be removed and must be kept in a fully legible condition.

People Authorized to Install the Probe

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- The installation, removal, and commissioning of the probe must be carried out only by skilled, professional and qualified electrical personnel.
- In addition to site requirements, all work is carried out in accordance with the current revision of Schneider Electric Electrical and Mechanical Safety Rules.
- The following parts related to Safety must be considered and applied by Schneider Electric employees.

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

Safety Checklist

- Is the transformer de-energized and lines grounded (**LockOut TagOut** procedure followed)?
- Is the transformer temperature less than 40 °C (104 °F)? Record the temperature by reading the transformer oil temperature indicator or by using a laser thermometer.
- The EcoStruxure™ Transformer Expert Probe (hereafter referred to as ETE Probe) may be installed in the top oil valve or the External Temperature Sensor installed around the top pipe to the radiator. Are these parts safely accessible from ground-level?
- Is appropriate personal protective equipment (PPE) available and used?

  NOTE: Appropriate PPE includes (but is not limited to):

  - Hard hat
  - Safety shoes
  - Flame retardant overalls
  - Protective glasses
  - High-visibility jacket
  - Oil resistant gloves

Transformer Operator's Responsibility

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Wear appropriate personal protective equipment (PPE) and follow safe electric work practices. See NFPA 70E or CSA Z462.
- Make sure that the equipment is only installed and serviced by qualified electrical personnel.
- Only mount or unmount the probe when the transformer is de-energized.
- Turn off all power supplies to equipment and the transformer before working on or inside it.
- Respect the LOTO (**Lock Out Tag Out**) procedure.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Before turning on the switch, check that all devices, covers, and doors are in the correct position. In addition, check that the downstream circuit is not earthed and ready to be energized.
- Before operating the switch, check that interlocks and protective barriers are not removed.
- Never go near the equipment when the transformer is energized.
- The transformer operator is responsible for checking that the following points are adhered to.

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

⚠CAUTION

HAZARD OF HOT SURFACE

- Wear appropriate personal protective equipment (PPE) to protect from hot temperature.
- Do not touch the cooling system nor the tank cover without thermal protection.

Failure to follow these instructions can result in injury or equipment damage.

- Select appropriate probe to help ensure the proper functioning of the system or machine. Schneider Electric can only make recommendations based on our experience with similar applications.
- Follow all safety instructions in this manual and additionally apply all local regulations.
- Advise the installation team of installation risks and provide suitable control measures to help ensure the safety of staff.
- Identify hazardous processes in the vicinity of the workplace and provide suitable control measures to help ensure the protection of installation staff.
- Provide site-specific training before commencement of work, including site access and egress.
- Provide emergency procedures and associated emergency telephone numbers (if applicable).
- Check the legibility of the type plate.

Cleaning Instructions

The ETE Probe is IP65-rated and requires cleaning once a year. Cleaning frequency increases in harsh environmental conditions (extreme cold or heat).

During scheduled transformer maintenance, the probe may be cleaned to remove any accumulation of dust, oil, snow, or any other pollutants.

NOTE: After cleaning, check the cable connections and tighten them if necessary.

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION Do not use a high pressure water jet or any kind of chemicals during cleaning. **Failure to follow these instructions can result in equipment damage.**

NOTE: While cleaning the probe, follow the Safety Checklist, page 6 and Safety Precautions, page 6 described in this document.

End-of-Life Disposal of Equipment

This kit (including all accessories) is not intended for household use. At the end of its service life, do not dispose of the kit with household waste.

For customers in EU countries (including the European Economic Area), Schneider Electric is subject to the EU Waste Electrical and Electronic Equipment Directive 2012/19/EU (WEEE directive). As part of our legal obligations under this legislation, contact a Schneider Electric representative to recover the kit and make sure that it is disposed of by authorized recycling agents.

For customers outside the European Economic Area, contact a Schneider Electric representative to recover the kit and make sure that it is disposed of by authorized recycling agents in accordance with the local legal requirements.

For information:

- The body of the ETE Probe is made of aluminum, and the probe is made of stainless steel. The body and probe can be recycled.
- Electronics (PCBA) are located inside the body of the sensor, which can be recycled according to local electronics rules.
- The black end cap is made of plastic (acetal 7) and can be recycled accordingly.

Improper Use

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION • Do not step on the probe. • Do not use the probe as a fastening device or holder for tools, pipelines, etc. **Failure to follow these instructions can result in equipment damage.**

The following chapters provide information on the installation requirements of the ETE Probe kit.

About the Book

Document Scope

The purpose of this document is to provide instructions for the correct installation of the EcoStruxure Transformer Expert Probe and EcoStruxure Transformer Expert Probe Dual H2.

This document describes the installation and commissioning of the probe and is intended for use by qualified personnel. It must be made available to operators.

This document describes installation of the probe hardware. To learn more about the application and software manual, refer to Ecostruxure Transformer Expert Install-Check.

Validity Note

This document applies to the following devices:

- ETE-M-EUR
- ETE-M-NA
- ETE-L-EUR
- ETE-L-NA

The characteristics of the products described in this document are intended to match the characteristics that are available on www.se.com. As part of our corporate strategy for constant improvement, we may revise the content over time to enhance clarity and accuracy. If you see a difference between the characteristics in this document and the characteristics on www.se.com, consider www.se.com to contain the latest information.

For more information about both devices, refer to EcoStruxure Transformer Expert.

Related Document

Title of documentation	Reference number
EcoStruxure Transformer Expert Probe Datasheet	998-22500700

To find documents online, visit the Schneider Electric download center.

Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

Commercial References

This document applies to the following commercial references. Each reference includes the device and the accessories (cables, adapters, etc.):

EcoStruxure Transformer Expert Probe	EcoStruxure Transformer Expert Probe Dual H2
DTS-BSPP-M-NA-B	DTS-BSPP-M-NA-H2D
DTS-BSPP-M-EUR-B	DTS-BSPP-M-EUR-H2D
DTS-BSPP-L-NA-B	DTS-BSPP-L-NA-H2D
DTS-BSPP-L-EUR-B	DTS-BSPP-L-EUR-H2D

Generalities

System Description

- The ETE Probe comes with full provision telecommunications functions requiring no configuration at installation time.
- The ETE Probe uses a local 3G/4G network.
- 3G/4G communications are fault-tolerant to cope with situations where coverage is poor or inconsistent.
- Contact Schneider Electric Support in your respective country to identify the local network used by the probe.

The ETE Probe communicates with the Cloud platform via 3G/4G signals. This is done by a plug and play dongle that is configured by the Schneider Electric factory before the probe is dispatched.

Conformity

The ETE Probe has been developed in accordance to the requirements of standards and certified as follows:

Characteristic	Value
Certification	• CE • Federal Communications Commission, FCC ID: 2AHP8-DTSBSPPX • RoHS • UL
Conforming to standards	• EN 301 489-52 V1.1.2:2020 • EN 50566:2017 • EN 55032:2015 + A11:2020 • EN 61010-1:2014 • EN 62311:2008 • EN 62368-1:2014 + A11:2017 • EN / IEC 61326-1:2014 • EN / IEC 61326-2-3:2014 • EN / IEC 63000:2015 • ETSI EN 301 489-1 V2.2.3:2017

Type of Dongle

Two different types of dongle are available, depending on geographic location:

- Europe and Asia Pacific: IK41VE modem (commercial reference includes EU)
- North America: 1K41US modem (commercial reference includes NA)

Inserting the SIM Card into the Dongle

1. Remove the SIM card cover.

2. Insert the SIM card at the relevant location.

3. Close the cover.

Inserting the Dongle in the Probe

A cover helps protect the plug and play dongle and its SIM card against atmospheric phenomena.

This cover can be easily removed using a screwdriver.

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION • When opening the cover, ensure that the gasket sealing cover to the main body is not damaged. • In order to avoid damaging the PCBA, do not use excessive force when removing the dongle. **Failure to follow these instructions can result in equipment damage.**

Protective cover open

Dongle setting

Protective cover closed

EcoStruxure Transformer Expert Probe Kit

Intended Use

The ETE Probe kit enables you to monitor the health of oil-based transformers through online condition monitoring. This allows you to make appropriate decisions related to operations, maintenance, or replacement of a transformer and helps to extend the life of the transformer.

Two different probes are available:

- **EcoStruxure Transformer Expert Probe** – Measure water activity, temperature, partial discharge (PD), and vibration from the oil flow inside the tank.
- **EcoStruxure Transformer Expert Probe Dual H2** – Measure water activity, temperature, partial discharge (PD), vibration, and hydrogen levels from the oil flow inside the tank.

The External Temperature Sensor (ETS) provides complimentary oil temperature measurements, such that, in combination with the probe temperature measurements, the thermal gradient for the transformer can be determined.

Measurements transmitted by the probe are for informational purposes only. The probe itself has no safety function. The evaluation of the data and any resulting actions are the responsibility of the operator.

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION • Use the probe exclusively within the technical limits specified on the type plate and in the data sheets. • Do not install the ETE Probe in explosive environments. • Do not use the ETE Probe in hazardous or significantly corrosive environments. **Failure to follow these instructions can result in equipment damage.**

EcoStruxure Transformer Expert Probe Kit Description

The ETE Probe comprises the following:

- ETE Probe, available lengths: 315 mm (12.40 in), 400 mm (15.75 in)
- ETE adapter: 1/2 in (15/21) socket BSPP to 3/4 in (20/27) plug BSPP / NPT machined connector with bleed valve
- Oil sample valve: 3/4 in (20/27) thread BSPP
- Power supply 220 Vac / 24 Vdc
- 10 m (33 ft) low voltage power cable: diameter 4.8 mm (0.18 in) with M12 socket-type connector
- ETS with 10 m (33 ft) cable and M12 connector
- Oil sample tube

ETE Probe kit

Elements of the kit

Accessory	Description
	ETE Probe • medium = 315 mm (12.40 in) • long = 400 mm (15.75 in)
	Adapter BSPP to NPT
	ETE Adapter with oil sample valve: 3/4 in (20/27) thread BSPP

Elements of the kit (Continued)

Accessory	Description
	Power supply (optional AC/DC converter)
	LV power cable
	External Temperature Sensor (ETS)
	Oil sample tube

Storage Conditions

The ETE Probe kit is supplied in a box. Store it in a clean and dry place at an ambient temperature between -5 °C (23 °F) and 40 °C (104 °F).

Installation Instructions

Preparation for Installation

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION • Check that the components of the ETE Probe kit have not been damaged in transport or during a previous installation attempt. • If there is any indication of damage, or if the tip or shaft is loose or misshapen, do not proceed with the installation. Contact Schneider Electric at support.dts@se.com for a replacement. • The ETE Probe tip contains multiple sensors and may be susceptible to impact, being dropped, extreme heat exposure and similar factors. Conduct a visual inspection and test prior to installation, and handle the ETE Probe carefully to help to ensure its proper functionality. **Failure to follow these instructions can result in equipment damage.**

Tools and Accessories

Purpose	Tools / Accessories	Description
Bleeding air from ETE adapter		Hexagon key 2 mm (0.08 in)
		Open end or combination or ring wrench #7
Connecting the power supply		Insulated cutting plier
		Insulated wire stripper
		Insulated screwdriver (slotted head screw)
Oil spill		Basin / bucket (to be placed under the valve where the probe will be set)
		Cleaning tissue

Work Process Overview

1. Review and sign the Risk Assessment and Method statement according to local safety regulation.
2. Refer to the transformer operator who confirms where the ETE Probe is to be installed and issues the required documentation for work to begin.
3. Refer to the safety checklist, page 6.
4. Locate emergency exits.
5. Visually check the integrity of the transformer earthing. If in any doubt, vacate the substation. Immediately inform the site contact.
6. Wear the correct oil resistant gloves and other standard PPE. Refer to the safety checklist, page 6.
7. Locate the transformer valve in which the ETE Probe is to be installed.
8. Check that an emergency spill kit is prepared and ready for use.
9. Carry out a final check of the selected valve.

⚠WARNING

HAZARD OF UNDETECTED LEAK OR INOPERABLE VALVE

Carry out a final check for leaks on the selected valve. If a leak or a suspected leak is present, do not touch the valve, nor start the installation. Inform the site contact to take appropriate measures.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For full installation procedures, refer to Installing the EcoStruxure Transformer Expert Probe, page 24.

Minimum Requirements

Insertion Point

Install the ETE Probe preferably in the top oil valve. Place it 0–30 mm (0–1.18 in) inside the tank wall. Understand the types of valves that are compatible for installation.

NOTE: Compatible valves have the following minimum diameter.

- Flange valve: DN25
- Threaded valve: 3/4 in (20/27)

Valve Types

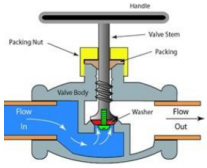
Schneider Electric provides an ETE adapter (1/2 in (15/21) socket BSPP to 3/4 in (20/27) plug BSPP / NPT machined connector with bleed valve) to interface the ETE Probe with the transformer oil valve.

NOTE: NPT threading is compatible with transformers manufactured in the USA. BSPP threading is compatible with transformers manufactured elsewhere.

The following table presents the compatibility of valves where ETE Probe can be installed:

● compatible

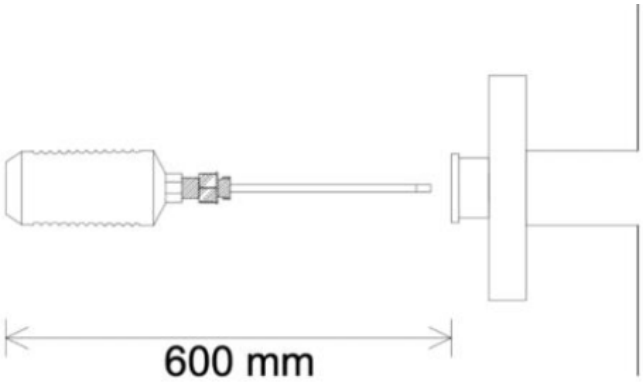
● not compatible

Valve description	Image	Compatibility
Ball valve with thread fitting or flange fitting		●
Ball valve with flange fitting		●
Knife gate valve thread fitting or flange fitting or with cathead fitting		●
Globe valves whatever the fitting type		●

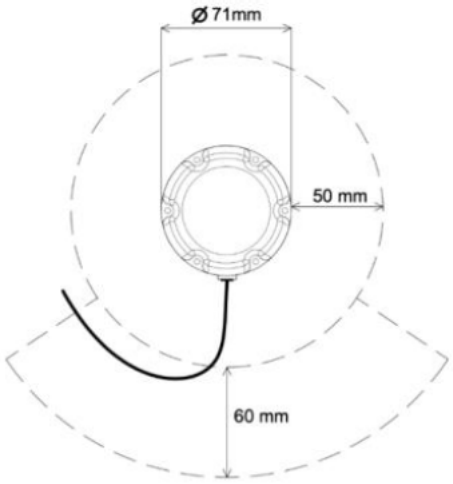
Valve description	Image	Compatibility
		●
Needle valve		●
Flap valve		●
Butterfly valve		● With difficulty

Clearance Around the Oil Valve

- A clearance of at least 600 mm (23.62 in) is required for the insertion of the ETE Probe into the transformer valve pipe.



- To be able to connect the LV power supply cable and the ETS, a clearance of 50 mm (1.10 in) around the probe and an additional 60 mm (2.36 in) under the probe is required.



On-Site 3G to 4G Coverage

The ETE Probe reports collected data back to a protected server over the 3G/4G mobile data network. Good 3G/4G signal strength is required for its successful operation.

LV Power Supply

The ETE Probe operates at 24 Vdc. A standard AC/DC converter is included inside the kit, with the following characteristic: 110–220 Vac / 24 Vdc DIN rail-mount power supply. A suitable power source needs to be identified for the installation of this device. A control box with enough space to set the power supply and its protective circuit breaker (not part of the kit) is also required.

NOTE: To avoid an incorrect installation procedure, test the ETE Probe prior to installation on site:

1. Connect the ETE Probe to a power supply.
2. Check that the ETE Probe powers up and connects to the cloud.

Hardware Requirements

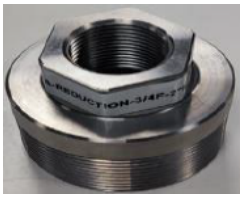
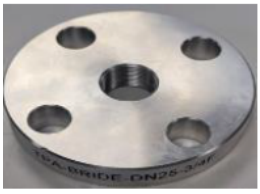
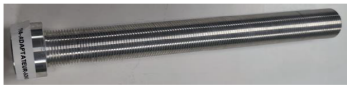
The following hardware parts are required:

- ETE Probe kit
- DIN rail to mount power supply
- DC power supply 24 V / 10 W with its protection device
- PTFE sealing tape or sealing glue to seal the thread connection
- When AC/DC converter option is present, cable with two wires 1.5 mm² to connect the circuit breaker and the AC/DC converter to the AC power supply available
- If cables cannot be installed in the existing control cabinet, an IP45 cable box 300 x 300 x 100 mm (11.81 x 11.81 x 3.93 in) is required
- Hook and loop tape to install the external temperature sensor

To interface the ETE Probe with the oil valve, a 3/4 in (20/27) thread socket-type connector is required at the insertion point of the transformer oil valve.

NOTE: For transformers manufactured in the USA, NPT threading is suitable, for transformers manufactured elsewhere, BSPP threading is suitable.

Based on the type of valve and selected length of probe, page 33, one of the following additional adapters is required:

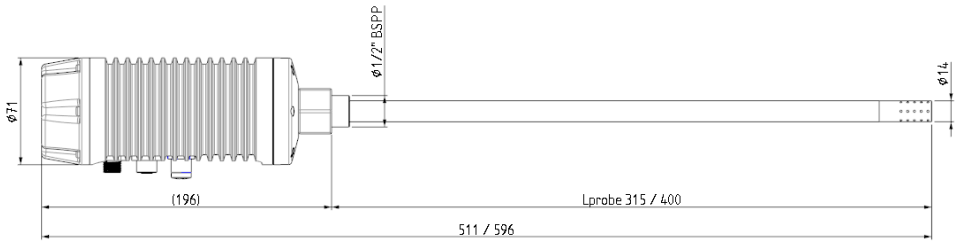
Adapter	Description		Example
Set of threaded reduction adapters	Threaded adapters are used to reduce the thread on the transformer oil valve from X to 3/4 inch thread. The length of these adapters needs to be considered when calculating probe length. Threaded adapters can be sourced at a hardware shop.		 Thread reduction plug - 2 inch type connector / 3/4 inch socket-type connector
Set of flange and gaskets with suitable bolts	Flange and gaskets are required when the transformer oil valve has a blank flange. The blank flange can be of any DN rating. The new flange plate must match the existing one. **NOTE:** New flange plates have a 3/4 in (20/27) central thread. If the flange has a different thread size in the center, use threaded reduction adapters. Not supplied.		 Flange DN 40 / 3/4 in (20/27) socket-type connector thread
Set of cathead fitting adapters	–		 Cathead fitting DN 40 / 38 mm (1.5 in) socket thread
Set of length adapters	Two types of adapters to limit the probe length inside the tank to 30 mm (1.18 in) are available.		
	Standard ETE spacers	Spacers are available in two different sizes: • DTS 45 mm (1.77 in) to reduce the probe length inside the tank by 45 mm (1.77 in) • DTS 90 mm (3.54 in) to reduce the probe length inside the tank by 90 mm (3.54 in), This can be ordered with the ETE Probe kit	–
	Threaded pipe	The threaded pipe is a tube where one end is equipped with a plug-type connector thread 19 mm (0.75 in) and the other end is equipped with a socket 19 mm (0.75 in) thread. This pipe can be cut to the required length and installed with the ETE Probe. The length of this adapter is calculated in the length of probe, page 33.	 Adjustable threaded pipe (cut to adapt the length)

Probe Length

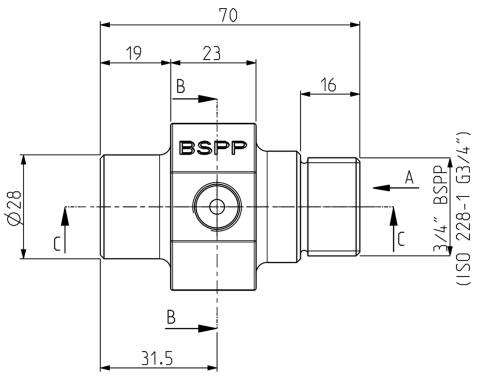
The ETE Probe is available in two lengths:

- 315 mm (12.40 in)
- 400 mm (15.75 in)

The length of the probe depends on the type of valve and the distance from the tank wall to the insertion point.



Schneider Electric provides an ETE connector of type 1/2 in (15/21) BSPP socket / 3/4 in (20/27) BSPP plug with oil bleeder valve, to interface the ETE Probe with the transformer oil valve.



For the transformers that are manufactured in the USA, a thread converter and an ETE adapter are required to change the BSPP thread to NPT. Both are provided in the kit.

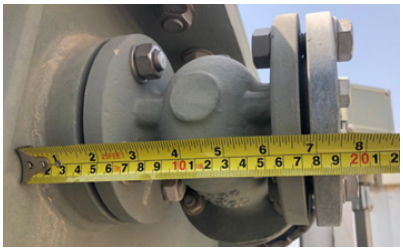
The kit can be used with the ETE adapter to change the BSPP thread to NPT.

Selecting the ETE Probe Length

1. Measure the pipe length **D** from the tank wall to the insertion point.

   NOTE: To receive accurate readings and avoid impinging on internal windings, install the probe 0–30 mm inside the internal tank wall.

   - In case of an oil valve with flange plate, there is no need for additional thread adapters or thread converter adapter. Use a flange plate with 3/4 in (20/27) BSPP thread.



   - In case of an oil valve with thread adapter, there may be a need for additional thread adapters to reduce the thread size. Take the additional adapters into consideration when determining the length **D**. In the previous case, the length **D** is 190 mm (7.5 in), as shown on the picture.

     NOTE: The use of a thread adapter to reduce the thread size to 3/4 in (20/27) can add 15 mm (0,59 in) to the length **D**.

2. Use the following table to make the correct ETE Probe choice:

D < 230 mm (9 in)	Medium ETE Probe
D > 230 mm (9 in)	Long ETE Probe

   NOTE: If **D** > 350 mm (13.78 in), no probe is suitable for this type of installation.

Determining the Adapter Length

To adjust the position of the sensor part at the end of the probe inside the tank, an additional adapter may be needed. Therefore, set an assembly of the connector (supplied in the kit) and the additional adapter (not supplied in the kit) between the connecting point (flange or thread of the valve) and the ETE Probe thread. The length of this additional adapter is calculated as follows:

1. Measure the length **D** from the tank wall to the insertion point. Refer to Selecting the ETE Probe Length, page 22.
2. Calculate the adapter length: sum of the connector length and the additional adapter length. Refer to the following picture.

   $X = L_{probe} - (D + L_{adapter})$

X: from 10 to 30 mm (0.39 to 1.18 in)

L_{probe} = 315 mm (12.40 in) (medium) or 400 mm (15.75 in) (long). Refer to Probe Length, page 20 for probe dimension.

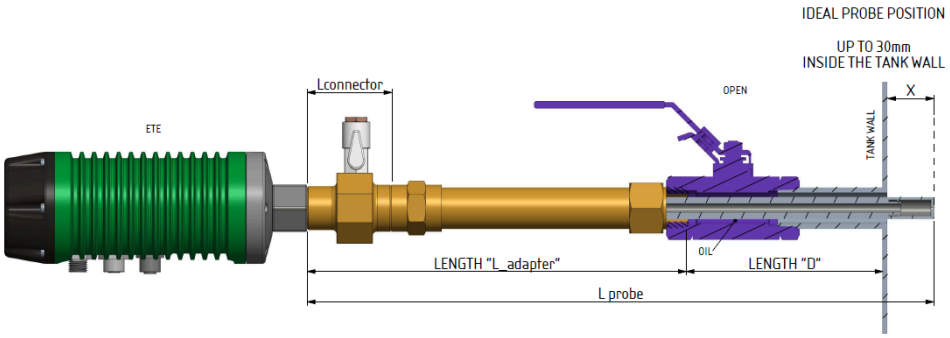
Length of the additional adapter = $L_{adapter}$ - $L_{connector}$

$L_{connector}$ = 54 mm (2.12 in). Refer to Probe Length, page 20 for probe dimension.

If the dimension **D** from the external side of the tank wall to the connecting point is 300 mm (11.81 in) and the long ETE Probe is selected:

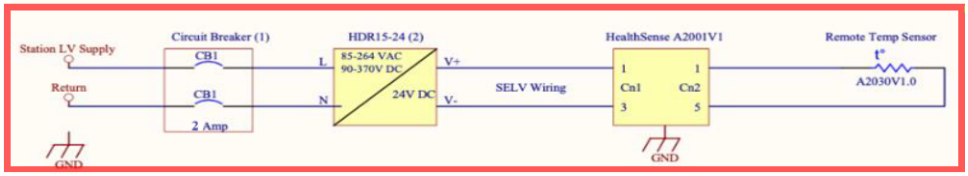
- $L_{adapter}$ = L_{probe} - X - D
- $L_{adapter}$ = 400 mm - 30 mm - 300 mm (15.75 in - 1.18 in - 11.81 in)
- $L_{adapter}$ = 370 mm - 300 mm (14.57 in - 11.81 in)
- Minimum length of the additional adapter = 70 mm - 54 mm = 16 mm (2.75 in - 2.12 in = 0.63 in)

NOTE: The position of the sensor part (tip) inside the tank (X) can vary from 10 to 30 mm (0.39 to 1.18 in). Therefore the length of the additional adapter can vary from 26 mm (1.02 in) (in case of the maximum penetration of the tip inside the tank) to 46 mm (1.81 in) (in case of the minimum penetration of the tip inside the tank).



Electrical Connections

Connecting the LV supply to the ETE Probe and ETS:



The control cabinet electrical scheme is modified with this wiring diagram, and an additional label is set on the additional MCB and AC/DC converter.

Tightening Torque Values

Part	Size	Torque
ETE Probe	1.2 in (15/21) BSPP	15–20 N.m
ETE adapter	3/4 in (20/27) BSPP or NPT	30–40 N.m
H2 sensor	3/4 in (20/27) NPT	30–40 N.m
Power supply connector	M12	Tighten the connector manually and finalize the tightening with an M12 wrench by tightening the connector one-quarter turn (equivalent to 1.2–1.5 N.m).
External sensor connector		

Installing the EcoStruxure Transformer Expert Probe

Install the ETE Probe and ETS in an oil-filled transformer.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Only mount or unmount the probe when the transformer is de-energized.

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

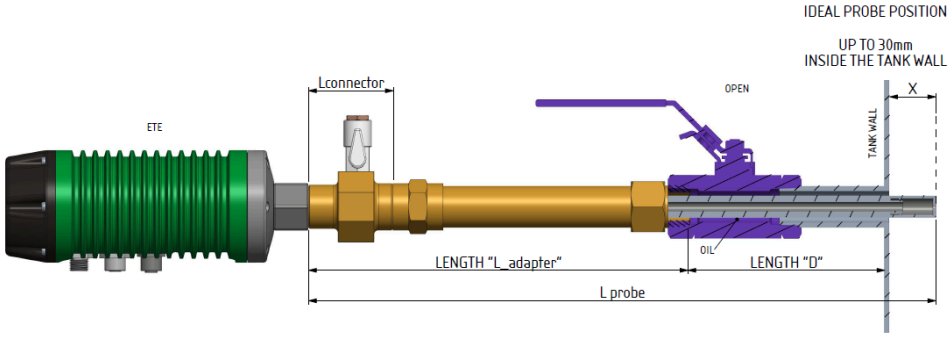
NOTICE

HAZARD OF UNINTENDED EQUIPMENT OPERATION

Do not install the sensor with more than 30 mm (1.18 in) of the sensor tip extending into the transformer tank.

Failure to follow these instructions can result in equipment damage.

Insert the probe tip up to 30 mm (1.18 in) into the transformer tank to help prevent exposure to excessively high magnetic fields. Before installation, double-check the length of the supplied probe against the length of the transformer pipe. If the sensor is likely to extend too far into the tank, consider using a plug-to-socket 3/4 in (20/27) extension adapter to extend the length of the assembly. Refer to Determining the Adapter Length, page 22.



NOTE:

- The ETE adapter with oil sample valve is referred as “the adapter valve”.
- The transformer valve is referred as “the valve”.

1. Clean the valve. Check that it is closed, and position the drip collector beneath it.
2. Place the basin or bucket under the valve connector to avoid any oil spillage on the ground when removing the cap or blank flange of the valve.
3. Firmly close the oil valve.
4. Remove the cap or blank flange, and check there is no oil leak along the threads.
5. Clean the valve orifice, valve flange, and thread.
6. Inspect the O-ring inside the ETE adapter for any signs of damage.

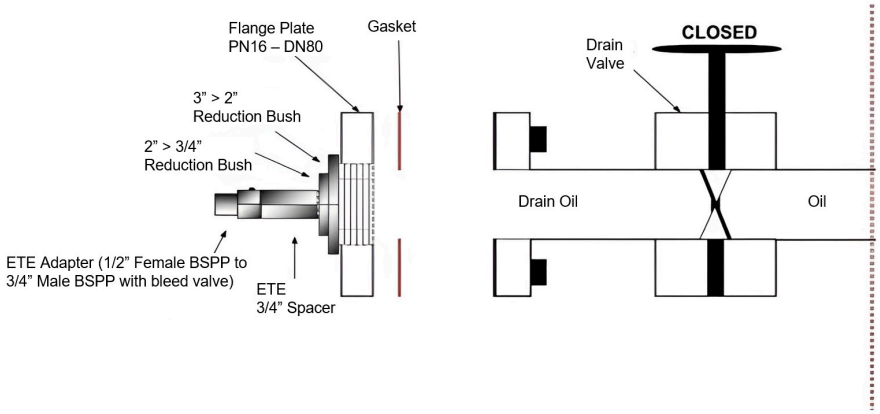
7. Lubricate the O-ring with oil and then install it as indicated below.

NOTICE
HAZARD OF INCORRECT OPERATION Use lubricant on the O-ring to avoid damage during the insertion of the sensor pipe. **Failure to follow these instructions can result in equipment damage.**

8. Using a sealing glue or PTFE tape, screw the ETE adapter (plug, 3/4 in (20/27) BSPP/NPT) into the socket thread on the oil valve.
9. After tightening, check that the bleeder valve or oil sample valve in the adapter faces upwards.

10. If the transformer does not have a 3/4 in (20/27) socket thread, an oil sample valve is required. If the valve is protruding more than 30 mm(1.18 in) inside the tank wall, install additional adapters with the ETE adapter.

    In the following example, two reduction bushes are used to get the 3/4 in (20/27) F thread and a 45 mm (1.17 in) ETE spacer to limit the probe tip inside the tank.



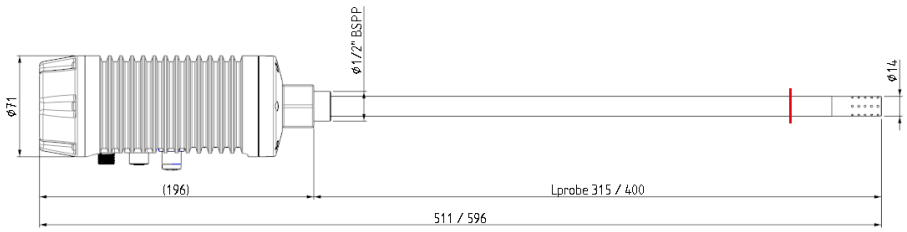
Example of installation of a valve equipped with flange

In the following example, the oil sample valve is installed with the ETE adapter.

From the left:

- Image 1: transformer oil valve
- Image 2: with flange plate cover removed
- Image 3: oil valve after cleaning

11. Before inserting the ETE Probe, make a mark with a pen on the ETE Probe tube at 60 mm (2.36 in) from the end tip of the tube, as indicated below (red mark).

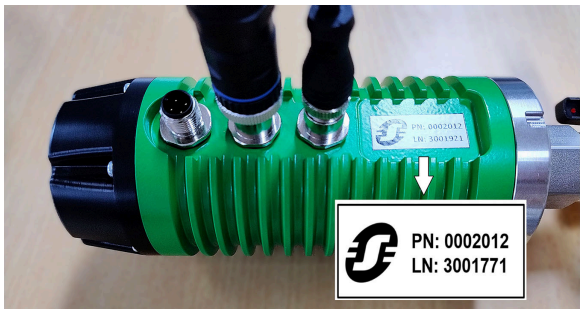


12. Lubricate the probe to facilitate insertion.

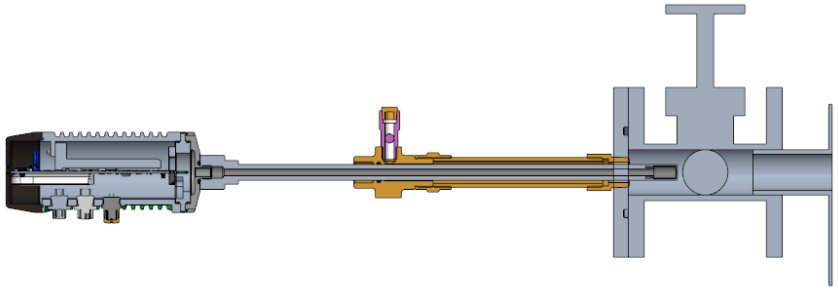
NOTICE
HAZARD OF INCORRECT OPERATION
Use lubricant on the probe to facilitate insertion.
Failure to follow these instructions can result in equipment damage.

13. Make a note of the seven-digit logger ID, to check the status of the probe through the website.

    NOTE: After mounting on the transformer, you cannot read the ID.



14. Insert the ETE Probe into the connector by pushing firmly up to the white Teflon end-tip, past the O-ring (approx. 60 mm (2.36 in)).



    NOTE: The probe is mounted such as the tip is clear of the valve-opening mechanism and it passes the O-ring (approx. 60 mm (2.36 in)).

⚠WARNING

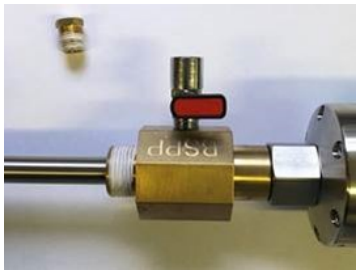
HAZARD OF INCORRECT OPERATION

- Check that the oil valve is open before pushing the probe past the O-ring.
- Do not push in the probe with the oil valve closed. This can cause damage to the probe tip.

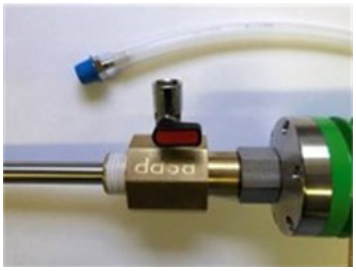
Failure to follow these instructions can result in death, serious injury, or equipment damage.

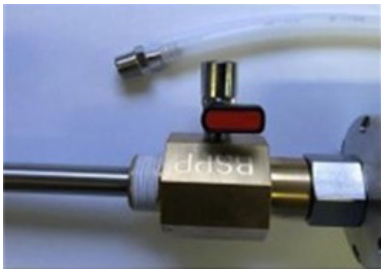
15. Bleed the air:
    a. Make sure that the valve is closed.

    b. Remove the plug and keep it aside.

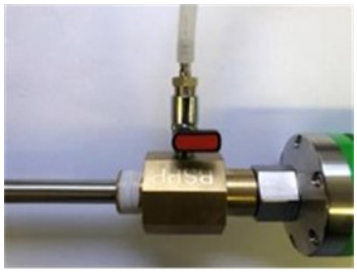


    c. Remove the cap off the barb.

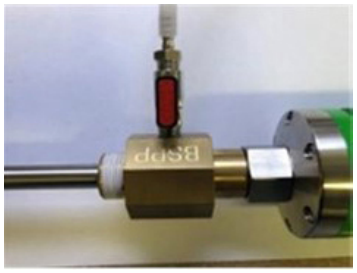




    d. Connect the barb and make sure that the sampling tube is fitted tightly on the barb.



    e. Turn the adapter valve to the open position.



    f. Open the transformer oil valve.

       IMPORTANT: For ball or butterfly valve, open the valve slowly.

NOTE: Opening the valve too fast may induce a water hammer effect creating an extra force on the ETE Probe tube.

g. When oil starts to come out, it means that air has been successfully removed. Turn the valve to the closed position.

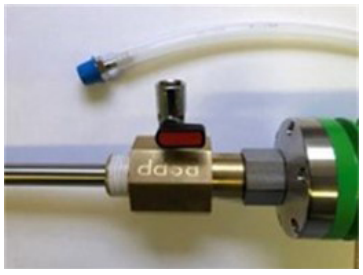
h. Remove the barb and attach the plug cap to the valve.

16. Fill the valve and adapter with oil and allow any trapped air to escape.
17. Push the probe further through the ETE Probe adapter and into the oil valve, stopping just before the thread on the probe.
18. Put the Teflon tape on the plug thread of the ETE Probe.

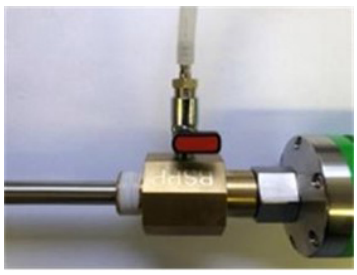
    NOTE: The ETE Probe has a right-hand clockwise thread. The tape should be wound anti-clockwise so that it presses against the thread when the ETE Probe is screwed in.
19. Screw the ETE Probe into the adapter and adjust the angle of the probe so that the M12 connectors are angled downward. This helps prevent the pooling of water around the connectors and allows the cables to enter with a sufficient drip angle.

Oil Sampling Process

1. Make sure that the valve is closed.
2. Remove the plug and keep it aside.
3. Remove the cap off the barb.



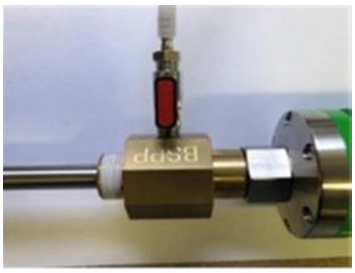
4. Connect the barb and make sure that the sampling tube is fitted tightly on the barb.



5. Install the sampling vessel below the open end of the sampling tube.

6. Turn the valve to the open position until the necessary oil sample has been collected.

   NOTE: Clean the tube before you take the sample. Let 10 cl of oil flow to remove any contaminants.



7. Turn the valve to the closed position.
8. Remove the barb and the sampling tube.
9. Wipe down the items.
10. Install the plug back to the adapter.

Finishing Tasks

Complete the ETE Probe installation by following these steps:

1. Empty the contents of the drip tray into a special storage container.
2. Place all oil contaminated waste material in a bag for disposal in accordance with local regulations.
3. On completion, clear all tools and materials and cancel any work permits issued by the operator.

Fitting the ETE Probe and External Temperature Sensor

Specific recommendations:

- Install the ETE Probe in a location where the tip of the probe measures the top oil temperature.
- For transformers equipped with radiators, this is on the top of the tank, and for transformers with corrugated wall tanks, this is on the cover.
- When the transformer is designed with a gas cushion, the probe fitting is designed to improve the immersion of the probe tip in the oil flow.

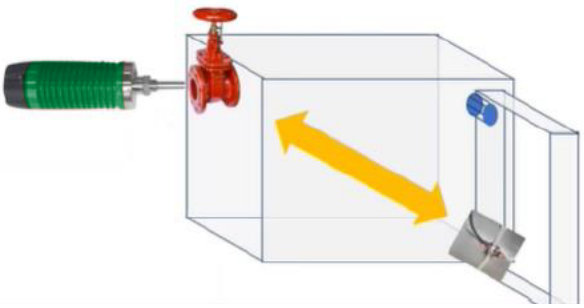
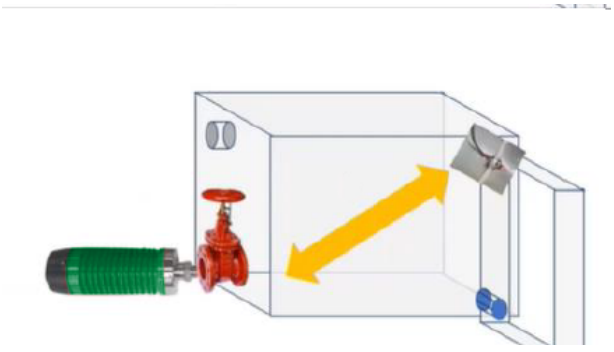
- The dedicated fitting for the ETE Probe is composed of:
  - Inside a control cabinet, an additional MCB 2A (not supplied) is installed for the AC/DC converter, and a dedicated space is provided to fix the AC/DC converter. A dedicated cable gland (power cable of the ETE Probe diameter of 4.8 mm (0.19 in) is fitted on the cable gland plate.
  - The external temperature sensor is fixed to the bottom pipe of a radiator (or other type of cooling system). In the case of a corrugated wall, fix it on a short piece of tube (DN 50) welded as near as possible to the bottom of the fins.
  - A mechanical and thermal protection of the external temperature sensor is needed.
  - Cable trays or cable supports are also needed to route the power supply cable and the cable for the external temperature sensor.

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION Cable trays or supports must respect the minimum dielectric distance to the live parts according to the voltage level of the transformer (refer to the IEC 60076 standard). **Failure to follow these instructions can result in equipment damage.**

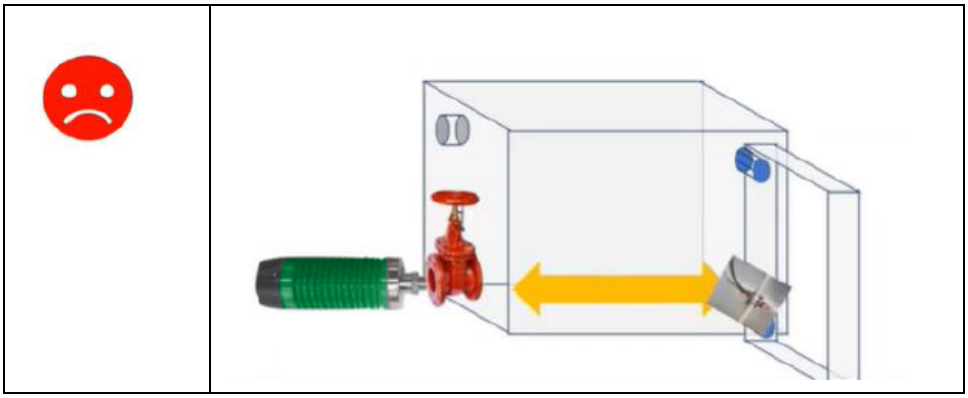
Mounting the ETE Probe and External Temperature Sensor (ETS)

The purpose of the probe is to take measurements from the oil flow. Mount the probe in active oil flow inside the transformer tank. It can be installed in either the top oil valve (preferred) or the bottom oil valve. The ETE algorithms require both top and bottom oil temperatures to determine the thermal gradient for the transformer loading and temperature model. Install the ETS opposite the ETE Probe to facilitate this. For example, if the ETE Probe is installed in the top oil valve, install the ETS at the bottom.

Ideal mounting

Incorrect mounting



Installing the EcoStruxure Transformer Expert Probe Dual H2

The ETE Probe Dual H2 model has a different packing list from the basic model. Before installation, confirm that all the necessary parts have been included.

Follow all installation instructions described in Installing the EcoStruxure Transformer Expert Probe, page 24 before completing the installation process specific to the ETE Probe Dual H2 described here.

There are three methods of installing the ETE Probe Dual H2 sensor, presented below in order of preference:

1. Split installation
2. Side-by-side installation, in large valve transformers
3. Y-Adapter installation

This applies to the ETE Probe Dual H2 references only.

Components

The ETE Probe Dual H2 kit is comprised of the following:

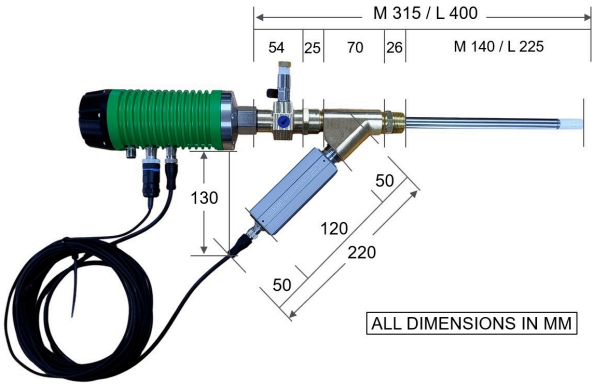
- ETE Probe, available lengths: 315 mm (12.40 in), 400 mm (15.75 in)
- H2 sensor
- ETE adapter: 1/2 in (15/21) socket BSPP to 3/4 in (20/27) plug BSPP/NPT machined connector with bleed valve
- ETE Probe Dual H2 splitter: Y-Adapter Socket 3/4 in (20/27) NPT
- Brass cap: 3/4 in (20/27) NPT-BSPP plug or 3/4 in (20/27) NPT-NPT plug
- Power supply
- 10 m (32.80 ft) low voltage power cable with M12 connector
- ETS with 10 m (32.80 ft) cable and M12 connector
- 1 m (3.28 ft) H2scan Sensor connecting cable

  NOTE: This 1-m cable is an off the shelf item. If needed, a longer cable can be sourced locally.

Probe Length

Split and Side-by-side installations use the ETE Probe Dual H2 length as described in Selecting the ETE Probe Length, page 22.

The Y-adapter installation of the ETE Probe Dual H2 requires an additional H2 sensor. The ETE Probe Dual H2 uses the H2 option Dual splitter to connect to the additional H2 sensor.



The probe length can be determined with the help of the formula below.

Length inside tank wall = X = L_{probe} – (Length d + $L_{adapters}$)

If no additional adapters are required, $L_{adapter}$ = $L_{connector}$ + $L_{Dual\ Splitter}$ = 140 mm (5.51 in)

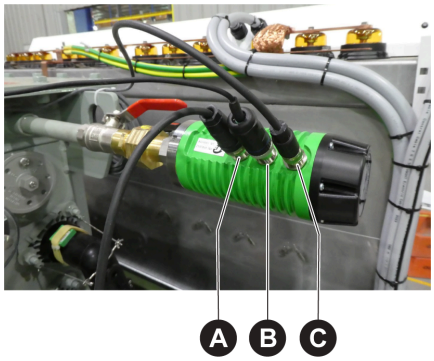
X < 0	Probe is too short to go inside tank wall.
X = 0–30 mm (1.18 in)	Right probe choice
X > 30 mm (1.18 in)	Use spacers or adapters to limit probe insertion in tank

Additional Installation Steps

The following instructions explain how to install the components of the ETE Probe Dual H2 sensor onto an oil valve.

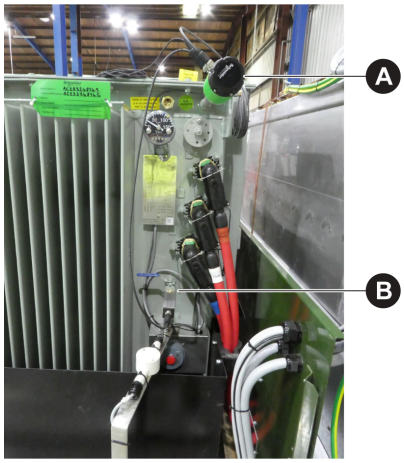
NOTE: Service representatives may find it easier to assemble all the parts prior to installing them in the oil valve.

The M12 connectors for power supply, external temperature sensor and H2scan GRIDSCAN™ 5000 Hydrogen Sensor (hereafter referred to as H2scan Sensor) are displayed below:



A. H2scan Sensor
B. External Temperature Sensor (ETS)
C. LV power supply

Split Installation



A. ETE Probe Dual H2
B. H2scan Sensor

1. Install the ETE Probe Dual H2 as described in Installing the EcoStruxure Transformer Expert Probe, page 24

2. Install the H2scan Sensor as described in *GRIDSCAN 5000 Hydrogen Sensor Operating Manual*.

   NOTE: Make sure that there are no air pockets in front of H2scan Sensor. In case of air pocket presence, see *GRIDSCAN 5000 Hydrogen Sensor Operating Manual*.

3. Connect the H2 cable between the ETE Probe Dual H2 and the H2scan Sensor.

Side-by-Side Installation

1. Where a large valve is able to fit a H2scan Sensor and an ETE Probe Dual H2 side by side (minimum 4”), create a flange with holes drilled to allow for an individual installation.
2. This approach requires a careful design and development of a custom flange to support both sensors. Please confirm any design with support.dts@se.com.
3. Install the ETE Probe Dual H2 as described in Installing the EcoStruxure Transformer Expert Probe, page 24
4. Install the H2scan Sensor as described in *GRIDSCAN 5000 Hydrogen Sensor Operating Manual*.

   NOTE: Make sure there are no air pockets in front of the H2scan Sensor. In case of air pockets presence, see *GRIDSCAN 5000 Hydrogen Sensor Operating Manual*.

5. Connect the H2 cable between the ETE Probe Dual H2 and the H2scan Sensor.

Y-Adapter Installation

1. Use the brass nipple (plug 3/4 in (20/27) BSPP/NPT) provided to attach the H2 dual splitter to all the adapters to be installed on the oil valve.
2. Attach the ETE adapter to the H2 dual splitter.

3. Connect the ETE Probe Dual H2 to the H2 dual splitter.
4. Connect the ETE Probe Dual H2 to the ETE adapter.
5. The ETS is provided with a separate H2 cable, which powers the hydrogen sensor and connects it to the data port.

   NOTE: Connect the ETS to the hydrogen sensor.
6. Apply suitable thread tape where needed.
7. Check that H2scan Sensor end is pointing upwards, to reduce the creation of air pockets which could impede oil contact.

   NOTE: Make sure there are no air pockets in front of the H2scan Sensor. In case of air pockets presence, see *GRIDSCAN 5000 Hydrogen Sensor Operating Manual*.
8. For best measurement of H2 sensing, we strongly recommend only installing valves placed at the top.

Installing the External Temperature Sensor

The External Temperature Sensor (ETS) is attached opposite the ETE Probe. If the probe is inserted in the bottom oil valve, the external sensor is attached at the top, around a pipe or on the tank, to obtain oil temperature readings. In the following example, the ETS is connected to a radiator pipe.

NOTICE
HAZARD OF UNINTENDED EQUIPMENT OPERATION The ETS does not attach to the tank surface magnetically and needs to be wrapped around a pipe to reach the radiator. **Failure to follow these instructions can result in equipment damage.**

1. Attach the ETS to a suitable radiator pipe on the opposite side from the ETE Probe by using cable ties. Refer to the ideal mounting scheme, page 31.

   NOTE: Check that the exposed metal pad of the sensor is in direct contact with the pipe to optimize thermal connection.

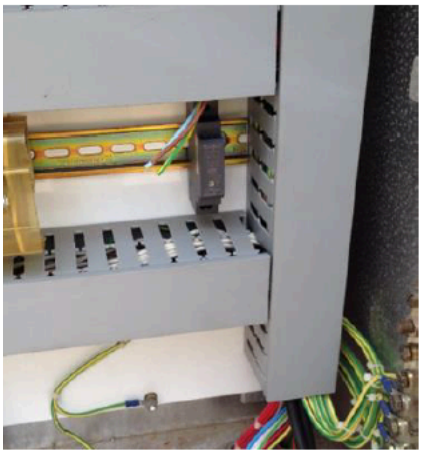
2. Cover the sensor by using additional adhesive tape.

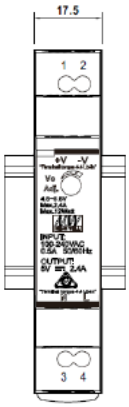
3. Route the ETS cable to the main ETE Probe.

4. Secure with split conduit or cable ties in accordance with internal company procedures.
5. Screw the plug 5-pin M12 connector of the ETS to the ETE Probe.

Installing the Power Supply (AC/DC Converter)

1. Install the DIN rail mount power supply in the transformer control cabinet or any other weatherproof cabinet close to the transformer. Check that the AC/DC converter fits with the input voltage of the LV network available in the control cabinet. Output voltage is 24 Vdc 10 W minimum.





2. To help protect and isolate the system, add a 2A circuit breaker to the supply line (not shown).
3. Run the power cable from the ETE connection to the installed power supply using flexible conduit.
4. Screw the 5-pin M12 socket-type connector of the power cable to the ETE Probe.

NOTE: The red core on the cable provided is connected to the +ve terminal, and the black core is connected to the -ve terminal.

Uninstalling the EcoStruxure Transformer Expert Probe

The removal procedure is available for ETE Probe, connected or not to the H2 Dual extension.

⚠WARNING

HAZARD OF INADEQUATE OPERATION

- Follow all steps of the removal process.
- Close the oil valve correctly when indicated.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

IMPORTANT: Oil spillage can also result in environmental pollution.

⚠WARNING

HAZARD OF INCOMPLETE CHECKING

Carry out a final check for leaks on the valve. If a leak or a suspected leak is present, do not touch the valve nor start the installation. Inform the site contact to take the appropriate measures.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To remove the ETE Probe:

1. Follow the procedure about de-energizing the transformer, as when installing it.
2. Turn off the circuit breaker for the ETE Probe.
3. Remove the ETS cable.
4. Remove the power cable.
5. If installed, remove the H2 cable from the sensor.

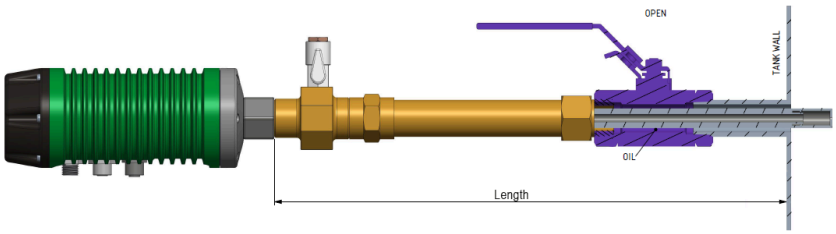
6. Remove the ETE Probe:

   If the ETE Probe is set at the bottom, the internal pressure from the insulation liquid can rise up to 0.5 bar, creating a force up to 10 N on the sensor. Then, when unscrewed, the ETE Probe can move alone and go out suddenly.

NOTICE
HAZARD OF INADEQUATE OPERATION When unscrewed, maintain the ETE Probe in position during removal, up to the closing of the valve. **Failure to follow these instructions can result in equipment damage and environmental pollution.**

   NOTE: After this step, you will have to immediately close the oil valve.

   a. Measure the length from the tank wall to the end of the BSPP adapter.

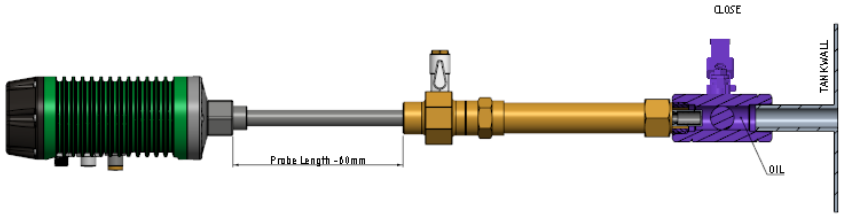


   If the length is < 315 mm (12.40 in), the probe length is Medium = 315 mm (12.40 in).

   If the length is ≥ 315 mm (12.40 in), the probe length is Large = 400 mm (15.75 in).

   b. Deduct 60 mm (2.36 in) from this probe length: the result is the distance to escape the valve, but keeping the sealing from the O-ring gasket set inside the adapter.

   c. Unscrew the ETE Probe and partially withdraw it out of the adapter, of the calculated length.



7. Close the valve.
8. Fully remove the ETE Probe.
9. Keep a bucket in handy to collect and remove oil.

Uninstalling the H2scan Sensor

In case of a split installation, you can remove the ETE Probe before or after removing the H2scan Sensor.

In case of a side-by-side or Y-adapter installation, you must remove the ETE Probe **before** you can remove the H2scan Sensor.

Powering the EcoStruxure Transformer Expert Probe

1. After the sensor is fully installed, power on the device. The black end cap on the probe body has an LED indicator.

   NOTE: After turning on, wait for 2 minutes before turning off. After turning off, wait for 20 seconds before turning on.

2. Wait for 5 to 10 minutes for the probe to complete its first upload.

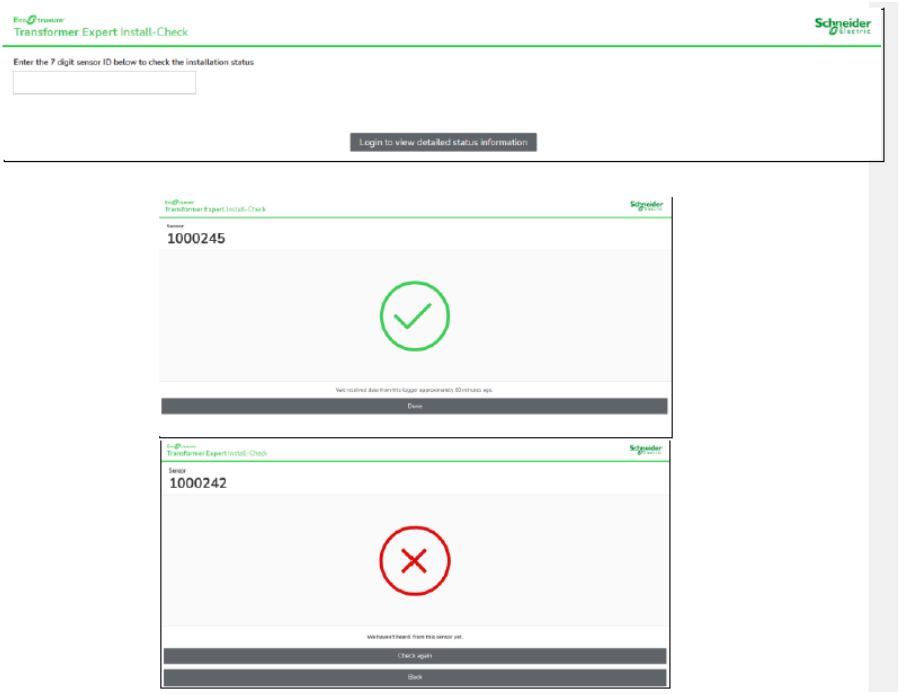
Connecting to the Website

1. On a phone, laptop, or tablet, go to Ecostruxure Transformer Expert Install-Check and enter the seven-digit log-on ID, to check the status of the probe through the website.

   NOTE: After mounting the probe on the transformer, you cannot read the ID.

2. The Ecostruxure Transformer Expert Install-Check website confirms if the unit has successfully uploaded and displays the initial temperature and moisture readings from the probe.

   NOTE: The record lasts for an hour after the upload has occurred.



3. If the installation is successful, data is available on the Schneider Electric website Ecostruxure Transformer Expert Install-Check within 30 hours of powering the ETE Probe.
4. Authorized users receive an email containing their account information, which can be used to login and view data pertaining to the transformer.

Troubleshooting

The LED on the cap shows the status according to the following tables:

● / ●	solid or flashing red or green
●	off

Expected behavior

Process	LED	Description
Startup	●	If power is ON, the LED default mode is red. When logger code is working, the LED changes to solid green.
Startup success	●	If check, test, upload and update passed successfully: solid green for 5 seconds.
Checking internet	●	While checking network: flashing green for 1 second, on and off. It can take up to 10 minutes, depending on signal strength.
Uploading	●	Flashing green at 4 Hz, then off for 4 seconds repeatedly. At start up, the upload happens after 1 hour, 3 hours, 6 hours, 12 hours, then 24 hours.
Data logging - Normal operation	●	Flashing green once every 10 seconds, otherwise off.
Updating firmware	● ●	While performing updates: flashing green and red for 1 second each.

Anomaly detected

Anomaly	LED	Description
No internet	● ●	Flashing red, then green, then OFF for 10 seconds. If no internet: • Tries to connect every hour. • Continues to collect data. If the issue persists, try different locations to test network or replace the equipment.
Anomaly on STM chip	●	Flashing red 2 Hz for 1 second, then OFF for 2 seconds. It cannot perform normal operation. STM chip is not functioning as required. • A reboot is required. • If the issue persists, replace the equipment.
Unsuccessful logger code	●	Solid red. No code is running on logger but Sitara chip is powered. • A reboot is required. • If the issue persists, replace the equipment.
Data logging - Failed upload detected	●	Flashing red once every 10 seconds, otherwise off.
Failed updating firmware detected	● ●	Flashing red every second during 10 seconds, then it reverts back to previous firmware and normal operation.
No power	●	The LED is off. • Check if the power is connected correctly. • If the power is available, replace the equipment.

Transformer Ready Specification

General

The ETE Probe is an asset monitoring device for liquid-filled transformers. Having the transformer includes provisions to accommodate this device per the installation and commissioning guide will help ensure that the transformer is ready to install the probe and will provide the ideal setup for the transformer monitoring.

Probe Port

The ETE Probe shall include a probe insertion port utilizing a 3/4 in ball valve with threaded fittings (3/4 in BSPP) on the front of the tank (the same wall as the other transformer monitoring gauges). The ball valve must allow the probe to pass through the valve completely when fully opened.

- Vertically: the port is located at a height of 100–560 mm (4–22 in) below the minimum oil level.
- Horizontally: the port's position is not critical and can be determined by the supplier. However, it must be identified on the outline drawing as "Future Provision for EcoStruxure monitoring".
- Protrude: the ETE Probe is designed to protrude into the tank 25 mm (1 in) with an overall probe length of 315 mm (12.40 in). The length of the valve and flange must be provided to accommodate this 289 mm (11.38 in) insertion length to limit the probe insertion to 25 mm (1 in).
- Mounting clearance: the area selected for the probe port must allow clearance for the probe to be installed externally with adequate mounting clearance. Once installed, the probe extends externally from the ball valve approximately 254 mm (10 in) with a 73 mm (2.88 in) diameter.

  NOTE: This diameter dimension does not include the probe power and thermal sensor connection cable protrusions, which will extend out of one side of the probe approximately 152 mm (6 in). The total clearance in extending from the front of the port to allow for installation shall be a minimum of 610 mm (24 in).

The valve is to remain closed for shipment and will allow for future probe installation on site.

Markings

The probe provision shall be labeled "Valve to be used for transformer monitoring only". No other labeling is required to identify the transformer is ETE Probe ready.

Control Power

- The control cabinet is to have provisions for the din rail mounted 1SU-width power supply.

  NOTE: This power supply will not be installed as it is ordered with the monitoring probe for future installation.
- The control power rating will allow for 15 watts of 120 Vac or 240 Vac control power to be wired in the future from the existing control power supply in the control cabinet to the din rail mount probe power supply.

There should be a control cabinet to mount the 1SU-width power supply and a protection circuit breaker to power the sensor. The power supply is provided with the ETE Probe.

The control cabinet allows for wiring of power supply from the existing power source in the field. The power supply needs 120 Vac or 240 Vac voltage.

Control Wiring

Provisions shall be made to allow for the addition of wiring:

- For the power connection cable, to be run from the control cabinet to the probe port.
- For the external temperature sensor, to be run from the ETE Probe to the temperature monitoring location. This should be opposite to the probe installation.

Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison
France

+ 33 (0) 1 41 29 70 00

www.se.com

As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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