Session: Three-Phase Energy Meter Installation

Learning Objectives	Evaluation Criteria
• Explain the release of new three-phase connection to an industry for a load of 60 kW • Explain the installation process of a new three-phase LTCT energy meter • Explain the process of energisation of the three-phase service line to consumer through the LTCT energy meter	Interactive Questioning

	Duration	60 Minutes
	Resources	PowerPoint Presentation, Whiteboard, Markers, Screen and Projector
	Facilitator's Notes	In this session, you will take the participants through an interactive presentation with video snippets on the release of new three-phase connection for a load of 60 KW and installation process of new three-phase LTCT energy meter. You will also help them in knowing how to prepare a safety zone before starting the work and the safety measures to be taken by a lineman and meter installer.

End of Notes

		1.	**Tell:** Welcome to the video presentation on 'Meter Installation – Three-Phase Meter'.
			Facilitator's Notes: • Display the slide • Read out the objectives and ask learners to note them • Inform them that they will be asked questions during the session **End of Notes**
		2.	**Tell:** By the end of this session, you will be able to: • Explain the release of new three-phase connection to an industry for a load of 60 kW • Explain the installation process of a new three-phase LTCT energy meter • Explain the process of energisation of the three-phase service line to consumer through the LTCT energy meter
		3.	**Tell:** Before we begin the session, let us look at the team that is going to install the three-phase meters. **Facilitator's Notes:** Click to play the video.

4.	**Facilitator's Notes:** Continue to play the video. **Tell:** Here you can see the three-phase meter that has to be installed.
5.	**Facilitator's Notes:** Continue to play the video. **Tell:** The crew have prepared six grouting holes to fix the meter box. The fasteners are placed on the hole to mount the meter box.
6.	**Tell:** The fasteners have to be tightened as shown. **Ask:** Can you see any safety equipment used by the lineman? **Responses:** • No • Yes **Ask:** What safety equipment has the lineman used? **Possible Responses:** • Safety helmet • Safety belt **Tell:** That's correct. Here, you can see that the lineman is wearing the safety belt so that he can protect himself from falling. **Facilitator's Notes:** Continue to play the video.
7.	**Tell:** Here, the lineman is drilling to fix an angle bracket. The lineman is wearing safety gloves and visor. He is wearing a face visor to protect the face from bits or particles while drilling. **Facilitator's Notes:** Continue to play the video.
8.	**Tell:** Let us now observe how the lineman pierces the fasteners of angle bracket with hammer. You can also notice that he is tightening the bolts with a box spanner. **Facilitator's Notes:** Continue to play the video.
9.	**Tell:** Let us now observe the fixation of shackle insulator. **Facilitator's Notes:**

			Continue to play the video. **Tell:** The angle bracket is fixed now. Lineman fixes the shackle insulator in the extended end of angle bracket. You can notice that the meter box is positioned properly. We now have to lay and connect the cable. Let us look at the process of cable laying.
		**10.**	**Facilitator's Notes:** Click to play the video. **Tell:** The ladder is tied to some anchor so that it will not fall. Here, you can see that the cable is covered with a PVC pipe for easy insertion through the shade and to avoid damage to the outermost PVC sheath of cable.
		**11.**	**Facilitator's Notes:** Continue to play the video. **Tell:** Here, you can see that the cable is passed through the iron shade.
		**12.**	**Facilitator's Notes:** Continue to play the video. **Tell:** The cable is measured before connecting to the meter to determine how much cable is sufficient. Then, the cable is fixed in the meter as shown.
		**13.**	**Facilitator's Notes:** Continue to play the video. **Tell:** The tape is removed from the cable and the armoured wires are separated. Here, you can observe the GI wires. The GI wires provide mechanical strength and earthing connection or path.
		**14.**	**Facilitator's Notes:** Continue to play the video. **Tell:** The lineman clamps the cable, tightens with the GI wire on the shackle insulator fitted at angle bracket. The GI wire is used as catenaries to guard the cable.
		**15.**	**Tell:** Let us now look at the process of joining phase and neutral leads to meter terminals, and the crimping of 150 sq.mm cable sockets. **Facilitator's Notes:** Click to play the video. **Tell:** Displayed here are the four terminals. We have to crimp the thimble or lugs on the terminals and then join these cable leads after crimping the thimbles.

16.	**Facilitator's Notes:** Continue to play the video. **Tell:** The length of the excess cable lead is cut and the insulation for thimble punch is removed. The cable lead is punched with the crimping tool.
17.	**Facilitator's Notes:** Continue to play the video. **Tell:** After fixing the thimbles, cover them with the insulation tape. Then, are fixed on the terminals.
18.	**Facilitator's Notes:** Continue to play the video. **Tell:** In this way, fix all the four cable leads with thimbles and connect them to the meter terminals. Let us now look at the outgoing terminals connection from meter box to consumer mains.
19.	**Facilitator's Notes:** Click to play the video. **Tell:** Here, you can see the outgoing terminals connection from meter box to consumer mains. The thimbles are tightened with the box spanner.
20.	**Facilitator's Notes:** Continue to play the video. **Tell:** As shown here, all the consumer leads are connected. Then, the consumer's sockets are covered with insulation tape.
21.	**Facilitator's Notes:** Continue to play the video. **Tell:** This way, the 3 phase meter connections of LTCT energy meter are done.
22.	**Facilitator's Notes:** Continue to play the video. **Tell:** The sequence of the phases are red, Y, blue and neutral. Here, you can notice all the phases.
23.	**Facilitator's Notes:** Continue to play the video. **Tell:**

			We have connected the output terminals for consumer above the meter box. These terminals are exposed to avoid short circuit due to insects entering the terminal. Let us now look at the details of an LTCT energy meter.
		24.	**Facilitator's Notes:** Click to play the video. **Tell:** Here, you can notice the resin cast CT of the meter.
		25.	**Facilitator's Notes:** Continue to play the video. **Tell:** The modem is used to send and receive meter reading data. The armour of cable is earthed in the base of LTCT meter. We have connected the consumer earthing with this earthing.
		26.	**Tell:** Let us now look at the outdoor process for cable connection on pole. **Facilitator's Notes:** Click to play the video. **Tell:** Here, you can see the lineman pulling the service cable to the DP structure at source end.
		27.	**Facilitator's Notes:** Continue to play the video. **Tell:** The cable is drawn from consumer's premises and laid over the DP structure.
		28.	**Facilitator's Notes:** Continue to play the video. **Tell:** The meter is drawn till the source end. This is the source end of the main, where we give connection to the cable.
		29.	**Facilitator's Notes:** Continue to play the video. **Tell:** Here, the cable ends are inserted in bus chamber of MCCB through cable entry hole.
		30.	**Facilitator's Notes:** Continue to play the video. **Tell:** Check the length of the cable lead and cut the excess cable lead in bus bar chamber of MCCB (LT main). The thimbles are crimped with the help of a crimping tool.

31.	**Facilitator's Notes:** Continue to play the video. **Tell:** The thimbles are then covered with the insulation tape up to the tips. Now, the cable is connected to the source end at the MCCB box. Once the cable is connected, we need to energise the meter. Let us look at the energising process.
32.	**Facilitator's Notes:** Continue to play the video. **Tell:** To energise the meter, we need to follow certain steps. They are: • Cancel the PTW (Permit to Work) first • Send the PTW to ZSO (Zonal Shift Officer) • Check for the power supply energised to the newly installed meter
33.	**Tell:** Let us now look at the checks to be done to ensure that the meter is functioning properly. **Facilitator's Notes:** Click to play the video. **Tell:** Here, the meter is energised as it has the power supply now. You can notice that all the three phases are glowing. The phases need to be checked physically whether the line is energised or not with the help of a test lamp.
34.	**Facilitator's Notes:** Continue to play the video. **Tell:** The test lamp is connected to the respective phases, 1 and 2, and the phases are glowing. This shows that the phases are energised.
35.	**Facilitator's Notes:** Continue to play the video. **Tell:** The test lamp is connected to phase 3 and it is glowing. This shows that the phase is energised. We will also check the phase-to-phase connections.
36.	**Facilitator's Notes:** Continue to play the video. **Tell:** When the test lamp wires are connected phase-to-phase, the series test lamp glows brighter as seen in the video.
37.	**Facilitator's Notes:** Continue to play the video.

			Tell: We will also check for the earthing phase and you can notice that the test lamp is glowing. Let us now look at the sealing of the meter.
		38.	**Facilitator's Notes:** Click to play the video. **Tell:** Displayed here are the meter terminal cover and meter box cover.
		39.	**Facilitator's Notes:** Continue to play the video. **Tell:** The meter box cover has the details of the following: • Date of installation • Sanctioned load of consumer • CA number • Meter number • Initial reading • Modem number and • SIM number
		40.	**Facilitator's Notes:** Continue to play the video. **Tell:** Here you can see the Permit To Work (PTW) clearance certificate.
			Tell: In this video presentation, we have seen the release of a new three-phase connection to an industry for a sanctioned load of 60 kW. We have also seen the installation process of a new three-phase LTCT energy meter, apart from energisation of the three phase service line to the consumer through the LTCT energy meter.
Key Learning Outcomes			
		41-42.	**Tell:** Let us quickly recollect the key points of this session. • The support on which the angle rests is known as angle bracket • The shackle insulator is fixed in the extended end of angle bracket • The GI wires of armouring of cable provides mechanical protection as well as earthing connection or path • The phase and neutral terminal leads of four cables are fixed with thimbles and connected to meter terminals • The phase sequences of LTCT energy meter are red, Y, blue and neutral • The cable drawn from consumer's premises is connected to the LT main, the

			three-phase MCCB of transformer • To ensure proper functioning of the meter, a few checks need to be done • Test lamp is connected to the three phases, earthing phases and phase to phase to check if the lines are energised • The meter is sealed with meter terminal cover after the meter is energised • Meter box cover has the details of installation date, load, CV number and so on