



Oncor Application for Interconnection of Distributed Generation

Operating Mode: Parallel Operation Longer than 100 milliseconds (05/10/2023)

This application is for generator systems that synchronously parallel with the Oncor distribution system for longer than 100 milliseconds.

General Process

- Oncor receives completed application and secures Impact Study Fee.
- Oncor prepares and submits to customer Impact Study.
- Oncor secures funding for any required system impacts.
- Oncor prepares, submits and secures an Interconnection Agreement with customer.
- Oncor schedules and completes any required system changes.
- Oncor reviews customer preliminary and final relay test reports.

| Application Check List | Yes | No |
|---|-----|----|
| Interconnection Application 6.3 (tariff document) | | |
| Pre-Interconnection Study Fee | | |
| One-line diagram | | |
| Relay functional diagram | | |
| Layout sketch (showing the Point of Common Coupling (PCC) in relation to your generation) | | |
| Preliminary relay settings | | |

General Information

- 1) This application contains the tariff form of the application along with an Additional Information document.
- 2) The Distributed Generation Pre-Interconnection Study Fee schedule states the terms, “network” and “pre-certified.” **Pre-certified** typically refers to UL-1741 for inverter technologies and **network** refers to downtown grids found in Dallas and Fort Worth. This application is normally classified as “**Not pre-certified.**” Use this schedule to obtain the study fee amount.

Email Application Submissions to: dg@oncor.com
(Email submittals larger than 8MB will not be delivered through Oncor servers)

**Tariff for Retail Delivery Service
Oncor Electric Delivery Company LLC**

6.3 Agreements and Forms

Applicable: Entire Certified Service Area
Effective Date: May 1, 2023

Sheet: 3
Page 2 of 3
Revision: Five

Application for Interconnection and Parallel Operation of Distributed Generation

Return Completed Application to:

Oncor Electric Delivery Company LLC
Attention: Distributed Resource Specialist
1616 Woodall Rodgers Fwy
Dallas, TX 75202-1234

Customer's Name: _____

Address: _____

Contact Person: _____

Email Address: _____

Telephone Number: _____

Service Point Address: _____

Information Prepared and Submitted By: _____

(Name and Address) _____

Signature _____

The following information shall be supplied by the Customer or Customer's designated representative. All applicable items must be accurately completed in order that the Customer's generating facilities may be effectively evaluated by Oncor (Company) for interconnection with the utility system.

GENERATOR

Number of Units: _____

Manufacturer: _____

Type (Synchronous, Induction, or Inverter): _____

Fuel Source Type (Solar, Natural Gas, Wind, etc.): _____

Kilowatt Rating (95 F at location) _____

Kilovolt-Ampere Rating (95 F at location): _____

Power Factor: _____

Voltage Rating: _____

Number of Phases: _____

Frequency: _____

Do you plan to export power: _____ Yes _____ No

If Yes, maximum amount expected: _____

Do you wish Oncor to report excess generation to your REP? _____ Yes _____ No

Pre-Certification Label or Type Number (e.g., UL-1741 Utility Interactive or IEEE 1547.1): _____

Expected Energization and Start-up Date: _____

Normal Operation of Interconnection: (examples: provide power to meet base load, demand management, standby, back-up, other (please describe)) _____

One-line diagram attached: _____ Yes

For systems not using pre-certified inverters (e.g., inverters certified to UL-1741 or IEEE 1547.1), does Oncor have the dynamic modeling values from the generator manufacturer? _____ Yes _____ No

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If not, please explain: _____
(Note: For pre-certified equipment, the answer is Yes. Otherwise, applicant must provide the dynamic modeling values if they are available.)

Layout sketch showing lockable, "visible" disconnect device is attached: _____ Yes

Authorized Release of Information List

By signing this Application in the space provided below, Customer authorizes Oncor to release Customer's proprietary information to the extent necessary to process this Application to the following persons:

| | Name | Phone Number | E-Mail Address |
|------------------------------|------|--------------|----------------|
| Project Manager | | | |
| Electrical Contractor | | | |
| Consultant | | | |
| Other | | | |

Customer represents and warrants that it does not meet any of the ownership, control, or headquarters criteria listed in Lone Star Infrastructure Protection Act, Chapter 113 of the Texas Business and Commerce Code, as added by Act of June 18, 2021, 87th Leg., R.S., Ch. 975 (S.B. 2116) (relating to China, Iran, North Korea, Russia, and any other country designated by the Texas governor as a threat to critical infrastructure).

[COMPANY NAME]

[CUSTOMER NAME]

BY: _____

BY: _____

PRINTED NAME: _____

PRINTED NAME: _____

TITLE: _____

TITLE: _____

DATE: _____

DATE: _____

**Tariff for Retail Delivery Service
Oncor Electric Delivery Company LLC**

6.1.4 Discretionary Charges

Applicable: Entire Certified Service Area
Effective Date: May 1, 2023

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6.1.4.4 Distributed Generation

| | | |
|------|---|---------------|
| DD36 | <p>Distributed Generation Pre-Interconnection Study Fee Applicable to requests for studies that may be required and conducted by Company for the interconnection of distributed generation on the Company's delivery system.</p> <p style="text-align: center;">NON-EXPORTING</p> <p>A. 0 to 10 kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 0.00 2. Not pre-certified, not on network \$ 144.15 3. Pre-certified, on network \$ 144.15 * 4. Not pre-certified on network \$ 144.15 <p>B. 10+ to 500 kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 296.30 ** 2. Not pre-certified, not on network \$ 296.30 3. Pre-certified, on network \$ 296.30 * 4. Not pre-certified on network \$ 296.30 <p>C. 500+ to 2000 kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 3,960.30 2. Not pre-certified, not on network \$ 3,960.30 3. Pre-certified, on network \$ 6,623.45 4. Not pre-certified on network \$ 6,623.45 <p>D. 2000+ kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 6,927.85 2. Not pre-certified, not on network \$ 6,927.85 3. Pre-certified, on network \$ 9,591.00 4. Not pre-certified on network \$ 9,591.00 <p style="text-align: center;">EXPORTING</p> <p>A. 0 to 10 kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 0.00 2. Not pre-certified, not on network \$ 144.15 3. Pre-certified, on network \$ 144.15 * 4. Not pre-certified on network \$ 144.15 <p>B. 10+ to 500 kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 296.30 ** 2. Not pre-certified, not on network \$ 296.30 3. Pre-certified, on network \$ 296.30 * 4. Not pre-certified on network \$ 296.30 <p>C. 500+ to 2000 kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 3,960.30 2. Not pre-certified, not on network \$ 3,960.30 3. Pre-certified, on network \$ 6,623.45 4. Not pre-certified on network \$ 6,623.45 <p>D. 2000+ kW</p> <ol style="list-style-type: none"> 1. Pre-certified, not on network \$ 7,458.30 2. Not pre-certified, not on network \$ 7,458.30 3. Pre-certified, on network \$ 9,591.00 4. Not pre-certified on network \$ 9,591.00 <p>* No cost for inverter systems less than 20 kW. ** No cost if generator supplies less than 15% of feeder load and less than 25% of feeder fault current.</p> | |
| DD37 | <p>Distributed Renewable Generation Metering Applicable to installation, upon request pursuant to Substantive Rule § 25.213(b), by Retail Customer or Retail Customer's Competitive Retailer, of metering equipment that separately measures both the Customer's consumption from the distribution network and the out-flow that is delivered from the Customer's side of the Meter to the distribution network. Equipment shall be installed within 30 days of receipt of request.</p> | As Calculated |



Additional Information

Application for Interconnection of Distributed Generation

Operating Mode: Parallel Operation – Longer than 100 milliseconds

1. Owner of Generation Resource – Name for Interconnection Agreement

Please indicate for use in the Interconnection Agreement the name and type of entity who is the owner of the distributed resource:

| Legal Name of the Distributed Resource | |
|---|--|
| Legal Name | |
| Type of Entity | |
| DBA (doing business as – if applicable) | |

The following are examples of names and types of entities:

| | |
|---------------------------------------|---|
| <i>XYZ Business Inc.</i> | <i>a Texas corporation</i> |
| <i>XYZ Company LLC</i> | <i>a Delaware limited liability company</i> |
| <i>City of XYZ</i> | <i>a Texas governmental agency</i> |
| <i>XYZ Business LP</i> | <i>a Texas limited partnership</i> |
| <i>XYZ Business LTD</i> | <i>a Texas limited partnership</i> |
| <i>XYZ Organization</i> | <i>a Texas non-profit organization</i> |
| <i>XYZ financial institution N.A.</i> | <i>member FDIC</i> |

| Ownership & Possession | | | |
|--|--|-----|----|
| Is the owner of the distributed resource also the owner of the property where the distributed resource is located? | | Yes | No |
| If NO , then please list the name of the entity that owns the property: | | | |
| Legal Name | | | |
| Type of Entity | | | |
| DBA (if applicable) | | | |
| Is the Legal Name of the Owner of the system (listed above) the same name as listed on the electric bill for this account? (Usually the name shown on your electric bill is the entity Oncor would prefer to use on the Interconnection Agreement) | | Yes | No |
| If NO , then what is the relationship between the Customer Name (on the electric bill) and the owner of the generating system? | | | |

2. Account ID & Address Information

| Electric Service | | |
|---|---|--------------------------------|
| Is this application for a new service account? | Yes | No |
| If YES , please provide the proposed service address: | | |
| Service Address: City, State, Zip | | |
| If NO , please provide existing account information: | | |
| Existing Service Accounts | | |
| Please provide the 17 digit Electric Service Identifier (ESI ID) (This can be found on your electric bill) | Oncor Company Code (First 10 digits) | Premise ID# (Last 7 digits) |
| Oncor | 1044372000 | |
| (formerly SESCO) | 1017699000 | |
| Oncor Meter Number (optional if ESI ID is not provided) | | |
| Is this ESI ID for a temporary service? | Yes | No |
| Service Address: City, State, Zip | | |
| Correspondence: (If different) City, State, Zip | | |

3. Oncor Delivery Voltage Information

| Please indicate the Oncor distribution delivery voltage at the PCC: | | | |
|---|-------------------------------|--|-------------------------------------|
| | 240/120 V – 1 ϕ , 3 wire | | 480/277 V – 3 ϕ , 4 wire |
| | 240/120 V – 1 ϕ , 3 wire | | 4,160/2,400 V – 3 ϕ , 4 wire |
| | 208/120 V – 3 ϕ , 4 wire | | 12,470/7,200 V – 3 ϕ , 4 wire |
| | | | 13,200/7,620 V – 3 ϕ , 4 wire |
| | | | 24,900/14,400 V – 3 ϕ , 4 wire |
| | | | Other: |

4. Normal Operation of Interconnection

| System Paralleling Times | Yes | No |
|---|-----|----|
| Is the application for continuous paralleling? (Where generation is operating for <i>extended periods of time</i> such as peak shaving) | | |
| If NO , what is the estimated maximum paralleling transition time per event? | sec | |
| Does the system contain multiple breaker pairs for “soft transition”? (Paralleling transitions from <i>utility to customer</i> or <i>customer to utility</i>) | | |
| If YES , how many breaker pairs are designed? | | |

Describe your proposed method of operation & schemes that trigger paralleling events:

(I.e. non-exporting, peak shaving, non-exporting with paralleling due to loss of utility, paralleling during monthly testing of generation, etc.)

Briefly summarize the sequence or mode of operations for this project in paragraph form:

i.e. "The generators will operate in parallel at all times. If there is an abnormality picked up by the sensing at the PCC (SEL Relay), breaker 52-1 will trip. Should this breaker fail to open (and after a 200ms delay), the breaker failure feature from the SEL 351 will trip breaker 52G1 (show control circuit on your one-line). When Oncor restores power, the system will be synchronized and reconnected to the grid and exporting will resume. The mode of operation will be to first satisfy local on-site load and then export any excess capacity."

(Please reference any relevant equipment on the one-line diagram, you may attach a separate document if necessary)

Please describe your breaker failure scheme in paragraph form:

(In the event that a breaker fails to open, please provide information on what logic or sequence of operation is included in your system. Please reference all breaker and equipment labels on the one-line diagram)

If multiple Oncor feeders are planned then please describe (in paragraph form) the protection scheme to prevent tying the feeders together.

(If only a single feeder is planned, then leave this section blank)

5. Generator Data

| Proposed Customer Generation | | | | |
|------------------------------|--------------|--|----------|----------------|
| Qty | Manufacturer | Model Number | Capacity | Total Capacity |
| | | | | |
| Generator Voltage | | | | |
| Generator kVA Base | | | | |
| Power Factor | | <i>All proposed generators will be evaluated at unity power factor</i> | | |

| Generator Data | | |
|---|-----|----|
| Did you provide manufacturer generator data sheets on a separate attachment? (If no, please provide below) | Yes | No |
| T'_{do}(sec. 0) – D-axis transient open circuit time constant | | |
| T''_{do}(sec. 0) – D-axis subtransient open circuit time constant | | |
| X_d – Unsaturated d-axis synchronous reactance | | |
| X_q – Unsaturated q-axis synchronous reactance | | |
| X'_d – Unsaturated d-axis transient reactance | | |
| X''_d – Unsaturated d-axis subtransient reactance | | |
| X₂ – Negative sequence reactance | | |
| X₀ – Zero sequence reactance | | |
| NR – Generator neutral resistor (<i>Ohm</i>) | | |

6. Relay Information

Part A – Sensing Points & Equipment Selection

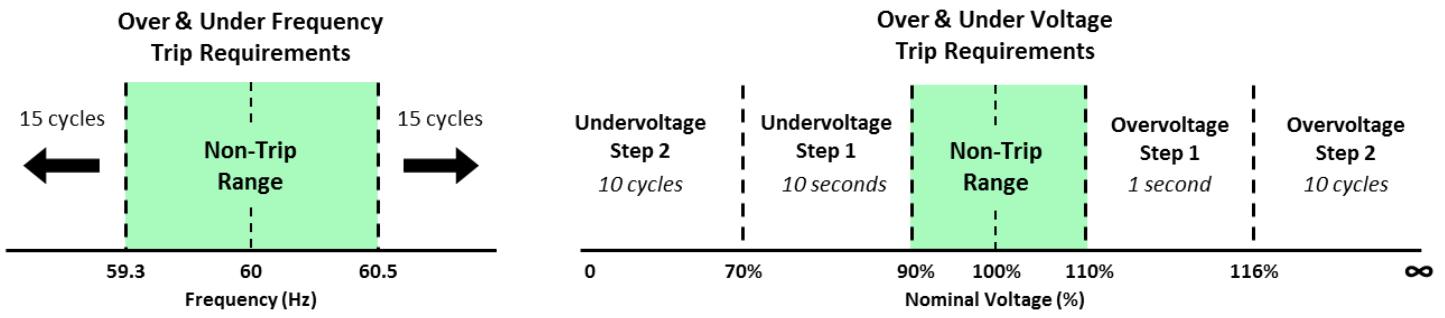
Requirements for relaying are strictly functional and Oncor does not specify equipment manufacturers.

| Sensing at the PCC | |
|--|--|
| What is the approximate distance from the PCC to the Customer's sensing equipment? (Provide a rough general estimate in feet) | |

| Sensing Point and Clearing Time for Generator Paralleling |
|---|
| <p>The requirements for sensing (PTs & CTs) shall be met at the Point of Common Coupling (PCC). While tripping of the Customer's main breaker is desired, other tripping alternatives to ensure generation ceases to energize the Oncor system can be requested (if designed and found unobjectionable to Oncor). Please indicate the tripping circuits on the relay functional diagram. Clearing time is the time between the start of the abnormal condition and the generation ceasing to energize the utility system. If you know your breaker operation times, then please shift the relay settings to allow for total clearing time.</p> <p>For example: If your total clearing time is 10 cycles and breaker operation time is 4 cycles, then your relay setting would be 6 cycles.</p> |

Part B – Required Relaying Elements & Setting Guidelines

| Voltage Clearing Time – Minimum required | | | | |
|--|---------|----------------|----------------|----------------|
| | Step 1 | | Step 2 | |
| | Pick-Up | Total Clearing | Pick-Up | Total Clearing |
| Under-voltage (27) | 90% | 10 seconds | 70% | 10 cycles |
| Over-voltage (59) | 110 % | 1 second | 116% | 10 cycles |
| <i>* Per-phase sensing is required</i> | | | | |
| Frequency Clearing Time – Minimum required | | | | |
| | Pick-Up | | Total Clearing | |
| Under-frequency (81U) | 59.3 Hz | | 15 cycles | |
| Over-frequency (81O) | 60.5 Hz | | 15 cycles | |



Part C – Proposed Relay Settings

| Proposed Relay Settings | | | | |
|---|---|--|-----|----|
| <p>Oncor requests preliminary relay settings for review. This process is to help ensure the relay you purchase (with associated sensing equipment) will be able to be set to accommodate the required protective relay settings. In some cases, the required setting might be based on the assumption that only one generator will run when multiple generators are planned for operation (<i>worst case scenario</i>). This requirement can lead to settings lower than the capability of the relay and sensing equipment selected. Please feel free to contact Oncor to discuss the design criteria for relay settings.</p> | | | | |
| | | | Yes | No |
| Are you planning on submitting relay settings with this application? | | | | |
| If No: | Are you aware that settings developed after the short circuit study by Oncor could result in settings below the capability of your relay and sensing equipment? | | | |

| | | |
|---------------|--|--|
| If No: | Please provide an estimated date when you plan on submitting preliminary settings to Oncor. (Contact Oncor for feeder impedance information if necessary) | |
|---------------|--|--|

Please be aware that final relay test report results will be expected to be within certain accuracy. If test report results are outside 5% deviation (over the agreed upon settings – timing and pick-up), they will not be accepted.

| Preliminary Relay Settings | | | | |
|--|---------------------|-----------------------|--------------------------|-----------|
| Relay Settings | | | Per Phase Sensing | |
| Element | Pick-Up | Total Clearing | Yes | No |
| 27 – Step 1 | | | | |
| 27 – Step 2 | | | | |
| 59 – Step 1 | | | | |
| 59 – Step 2 | | | | |
| 81O | | | | |
| 81U | | | | |
| | Pick-Up (kW) | Total Clearing | | |
| 32 – Phase A | | | | |
| 32 – Phase B | | | | |
| 32 – Phase C | | | | |
| Directional Ground Over-Current or Ground Overvoltage | | | | |
| 67N | | | | |
| 59N | | | | |

Part D – Relay Functional Diagrams

Oncor requests relay functional diagrams to accompany this application. Example diagrams are included at the end of this application.

| Relay Functional Diagram Checklist – Does the diagram show... | Yes | No |
|--|------------|-----------|
| The Point of Common Coupling (PCC) | | |
| The delivery voltage at the PCC | | |
| The metering point | | |
| The incoming utility feeders (Feeder 1, Feeder 2, etc.) | | |
| High and low side voltages (Transformers, VT's, etc.) | | |
| A coordinating isolation device at the PCC | | |
| VT configuration symbols (Wye, delta, corner delta, etc.) | | |
| Sensing equipment ratios and quantity | | |
| Required relaying elements (27/59, 81O/U, 67N or 59N, 32) | | |
| Relay manufacturer and model number | | |
| Tripping circuit scheme (Dotted lines to breaker, etc.) | | |
| Generator neutral resistor/reactor, if applicable (Ω) | | |
| Generator kW and voltage | | |
| Transformer high and low side voltages, impedance (%), and kVA | | |

| | | |
|--|--|--|
| Transformer neutral resistor/reactor, if applicable (Ω) | | |
| Normal breaker position (N/O or N/C) | | |
| Kirk Key interlocks (If applicable) | | |
| Breaker labels (i.e. UM-1 or GM-2 utility, etc.) | | |

Part E – Relay Operation

| Relay Tripping Logic | | | |
|--|--|--------|--|
| | Yes | No | |
| Will the Oncor interconnection relay <u>tripping logic</u> be enabled at all times? (relay needs to be in steady state operation during paralleling) | | | |
| If No: | Please explain reasoning for why the <u>trip logic</u> relaying is not enabled at all times: | | |
| | | | |
| If No: | What causes the <u>tripping logic</u> to become enabled? Oncor requires that the <u>trip logic</u> activate the tripping elements at least two seconds before the paralleling event begins to ensure relay steady state operation. Please include the <u>scheme, sequence of events, and/or include logic variables in your description.</u> | | |
| | | | |
| If No: | If the Oncor interconnection protective relay is not enabled at all times, then Oncor requests information on the contact state to enable the relay. Oncor requests that the N/O (normally open) state activate the relaying elements and the N/C (normally closed) state disable the relaying elements. | | |
| | | Yes No | |
| | Does the N/O state activate the relay? | | |
| | Do you plan on changing setting groups to enable the Oncor protective relaying functions? | | |

Part F – Relay Testing

| Relay Testing Agent Commissioning Logic |
|--|
| If the Oncor interconnection relay tripping logic is not enabled at all times then please explain the proposed scheme (or isolated test) to allow the relay testing agent the ability to verify the relay was in steady state operation. |

Part G – Event Capture

| Relay Data Loggers – Event Capture | Yes | No |
|--|-----|----|
| Does your relay have a pre-event and post-event data logger (event capture)? | | |
| If yes, do you plan on enabling this function? | | |

Relay Testing, Relay Test Reports and Relay Tester Comments

Part of the interconnection process required for approval of your system is submitting relay test reports to Oncor. Oncor requires that a certified testing agent test your system. Testing of protection systems shall include procedures to functionally test all protective elements of the system (including relay/breaker trip timing) up to and including tripping of the generator(s) and/or interconnection device. Your breaker failure scheme should also be tested. An example form of a Relay Test Report is included at the end of this application.

- **Reverse Power (32)** – Oncor requests these elements be tested per phase at 1/3 of the agreed three phase kW amount.
- **Under-Voltage (27) and Over-Voltage (59)** – Relay test reports should indicate results for per phase testing.

Test Report – Agreed Upon Settings versus Actual Results – Expected Accuracy

To minimize having to test customer owned protective relaying several times, you should instruct your testing agent to adjust settings if your results vary by more than 5%. *(For example, if you expect your total clearing time is expected to be 10 cycles and the test report shows 10.9 cycles, then this exceeds 5%. Testing agent could adjust the setting to a lower value to hit the target 5% expected result or contact Oncor.)*

Oncor requests testing agent proposed comments be submitted with preliminary settings. Following are some generic comments. Comments should be customized for each project.

| Relay Testing Agent Requested Comments - <i>These comments should be customized to your project</i> | |
|---|---|
| | Oncor asks the testing agent state in the comments section of the test report that the generator tripping device ___ ~ 52-UM (breaker or contactor) was operated and that the agent witnessed the devices operated as intended. |
| | For installations utilizing <u>tripping logic</u> which is enabled and disabled, Oncor requests that the testing agent state the relay was in full active service when paralleling occurred or occurs. The testing agent should be able to confirm the relay was active before and during paralleling and state this in the test report comments and that the N/O state activated the relay. |
| | Breaker Failure – Testing agent should comment and indicate breaker failure scheme was tested and operated as designed. |

| | |
|--|----------------------------|
| | Others as required. |
|--|----------------------------|

Exporting Information *(skip for non-exporting applications)*

The purpose of this section is to provide general information for facilities such as landfill gas exporting generation systems or other similar type larger based exporting systems. Certified systems (inverter based) should use the application for certified systems. Please feel free to contact Oncor for a preliminary screening study or to determine other requirements for exporting systems.

| Metering | |
|--|--------------------------|
| Reference Source ---ERCOT (Electric Reliability Council of Texas) <i>http://www.ercot.com/services/rq/re/dgresource.html</i> | Check One: |
| Do you request TDSP Oncor read meter data? <i>Settlement Metering Option 1: TDSP Read Generation Meter</i> | <input type="checkbox"/> |
| Do you request EPS (ERCOT Polled Settlement) type metering? <i>Settlement Metering Option 2: ERCOT Polled Settlement Meter</i> | <input type="checkbox"/> |

Metering Communications

Generally for customers with expected demands or generation larger than 700 kW, a two wire land line will be required for metering. Monthly expenses and procurement will be the customer's responsibility.

Reverse Power Relaying

In most cases, a 32 element with per-phase sensing is required for exporting.

Transfer Trip

Depending on facility and Oncor parameters, transfer trip between the Oncor substation and customer generation facilities may be required. Please feel free to contact Oncor for additional information. If transfer trip is required then:

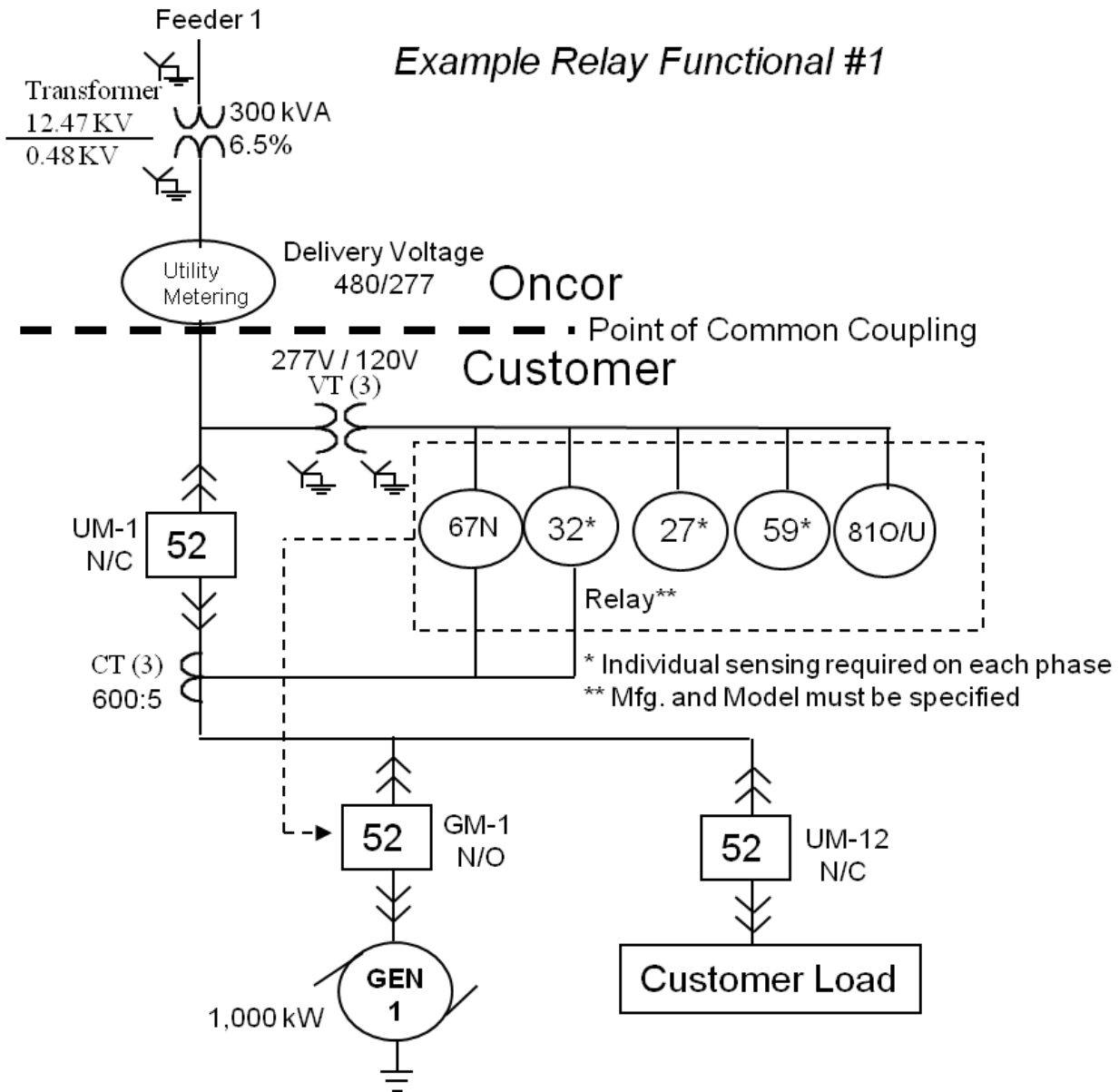
- 1) Your one-line diagram should include the circuitry for the transfer trip scheme,
- 2) Should include type of communication circuit proposed,

Please be aware should you utilize phone data circuits, wire-line isolation devices could be required to protect from high voltage surges at the Oncor substation. In this case it is the customer's responsibility to request ground potential rise measurements at the Oncor substation if required by your communication provider. If you are utilizing fiber communications, then you will need to contact local providers for leased circuit information or secure an Oncor Pole License Agreement to utilize Oncor facilities for pole contacts. Oncor specialists are available to discuss this process. Contact Oncor for further information.

Phone Company Data Circuits

Oncor is currently utilizing what is called a point to point VG6 four wire analogue data circuit which is used in conjunction with tonal receiving equipment at the Oncor substation. Oncor has been made aware by AT&T that this circuit is planned to be obsolete in 2020. Contact Oncor for further information.

Example Relay Functional Diagrams



Example Relay Functional Diagrams *(Continued)*

