

Remote Meter Point INSTALLATION PLANNING GUIDE

# Installation Planning Guide

# EZDP-2042 Rev F

## **Remote Meter Point**





## **Table of Contents**

1.0 Safety Precautions 2.0 Introduction	2 3
2.1 Definitions	3
3.0 Strategies	4
3.1 Installation Best Practices	5
4.0 Diagrams	6
4.1 Cable Routing Layout	6
4.2 Cutsforth Equipment Layout 4.3 Conduit Layout	7 8
4.4 NEMA 4X Enclosure Specifications	9
5.0 Responsibilities	10
6.0 Welding Instructions	12
7.0 Additional Information	13

## **1.0 Safety Precautions**



High voltage and rotating parts can cause serious or fatal injury. Installation, operation, and maintenance of this product must only be performed by qualified personnel, in accordance with all applicable safety regulations and guidelines. Before working on the generator, de-energize and lock-out all power sources to the generator, shaft, and accessory devices.

Electrical shock and death may occur.

Warning:

When working with Cutsforth shaft grounding products, it is important to observe safety precautions. Among the many considerations:



- Avoid contact with energized circuits
- Avoid contact with rotating parts
- Never install any component that appears to not be functioning in a normal manner
- Always ensure proper installation of the holder assembly

## 2.0 Introduction

This manual covers the installation of the Cutsforth Shaft Grounding Assembly and Remote Meter Point. If this system is replacing OEM systems, please see the documentation that came with the OEM systems for how to remove them.

**Note:** This manual does not claim to cover all details or variations in equipment or to provide for every possible contingency that could be faced during installation, operation, or maintenance. Should additional information be required, please contact Cutsforth, Inc.

#### 2.1 Definitions

**Shaft Grounding Assembly (SGA):** A Cutsforth product designed to provide a best-in-class ground connection, as well as a shaft contact point at which shaft voltage can be measured.

**Remote Meter Point (RMP):** A Cutsforth product which connects to Cutsforth's Shaft Grounding Assembly to provide remote test points at which voltage and current readings can be taken at a safe distance from the generator.

**Junction Box:** An enclosure which contains the current sensing equipment and is placed in between the SGA and the grounding location. The junction box can be placed a maximum of 6ft away from the SGA.

**Ground Conductor:** 8AWG ground conductor that runs from the SGA, to the Junction Box, then to unit case ground

**Signal Cable:** Shielded, twisted-pair cable that carries the voltage signals from the SGA to the Junction Box and the RMP

**Unit Case Ground:** The lower half of either the turbine case, generator case, or coupler case near the SGA to which the shaft can be grounded

**High Frequency Drain (HFD):** 12 AWG conductor that splits off of the main ground conductor, runs through a low inductance resistor, and then to unit case ground in less than 4ft 6in. This ensures that high frequency voltage spikes will be grounded properly.



## **3.0 Strategies**

Determine the component installation locations by following this step-by-step guide.

3.0.1 Identify the existing grounding equipment to be replaced by the Cutsforth Shaft Grounding Assembly

The Cutsforth Shaft Grounding Assembly will be installed on the same portion of exposed shaft as the previous grounding equipment. The SGA must be installed on the "uphill" side of the shaft rotation. Installing on this side of the shaft ensures that the rope will not bunch up or bind up inside the rope guide. See below image for example.



3.0.2 Determine ground conductor termination location

The goal when choosing a grounding location is to electrically bond the shaft to the unit case. Cutsforth suggests drilling and tapping into the lower half of the unit case to create a grounding location close to the SGA. The location at which the ground wire will terminated should have all paint removed and should be free of all contaminants in order to create a smooth, conductive surface. Structural steel and station ground are examples of unacceptable grounding locations. It is important to note that it is not necessary for the ground conductor to be grounded to an existing generator grounding pad.



3.0.3 Identify an accessible and safe Remote Meter Point mounting location

The Remote Meter Point has a temperature rating of 70°C (158°F). Avoid mounting the enclosure in areas that exceed this temperature. If possible, avoid mounting the Remote Meter Point in a location that experiences direct sunlight for extended periods of time throughout the day.

The ground conductor must be routed through the Junction Box prior to terminating to the unit case. Therefore, it is a good idea to mount the Junction Box somewhere between the SGA and the unit case termination location. This helps eliminate extensive lengths in the ground conductor run. routing to ground, the Junction Box should be installed between the SGA and the ground location to accommodate a short ground run.

The RMP contains voltage and current test points and should be placed in a location that is safe and accessible for plant personnel. The RMP should be placed at an ergonomic height such that plant personnel can safely and comfortably utilize the test points.

#### 3.1 Installation Best Practices

Please review the list of best practices for installation below to help ensure maximum effectiveness of your Cutsforth Shaft Grounding System

- 3.1.1 All Series 1 and Series 2 Shaft Grounding Assemblies shall be installed with a High Frequency Drain (HFD)
- 3.1.2 Avoid sharp turns and bends in the grounding wire whenever possible. Bending the conductor can create induction back on the bent wire. While the HFD will aid in dissipating this inductance, it is best to make turns as gradual as possible.
- 3.1.3 The grounding conductor shall be routed according to the shortest possible path.When the HFD is installed, it is allowable for the ground conductor to extend up to 47 feet in total length when measured from the SGA grounding rope all the way to the finished grounding terminal on the unit case.
- 3.1.4 The Remote Meter Point shall be mounted such that the segment of conductor between the SGA and the Remote Meter Point is no greater than 30 feet. If the signal lines between the SGA and the Remote Meter Point are longer than 30 feet, the metering function begins to be diminished.



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# 4.0 Diagrams

## 4.1 Cable Routing Layout



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#### 4.2 Cutsforth Equipment Layout

\*The below diagrams represent a typical layout. Individual installations may vary.



## 4.3 Conduit Layout

Color on Diagram	Conduit Run Description	Conduit Trade Size	Max Run Length	Wire Description	Purpose	Wire Supplied By	Conduit Supplied By
Red	SGA to Junction Box	1/2"	27ft	3 conductors, shielded, 18 AWG, high temp	2 rope wear status, 1 shaft voltage	Cutsforth	Plant Electrical Contractor
Purple	Junction Box to RMP	3/4"	30ft including 'Red' run	4 twisted pair, individually shielded, 18 AWG	Signal wires from Junction Box to RMP	Cutsforth	Plant Electrical Contractor
Green	Junction Box to unit case ground	N⁄ A	47ft including 'Red' run	Single conductor, 8 AWG	Ground from Junction Box to unit case ground	Cutsforth	Plant Electrical Contractor
Black	Assurance to unit case ground	N⁄ A	9ft	20 AWG Coaxial RG58	Signal ground from Junction Box to unit case ground	Cutsforth	Plant Electrical Contractor
Yellow	High Frequency Drain	N⁄ A	4ft 6in	12 AWG Chemical Resistant wire	Drain ground wire for high frequency voltage spikes	Cutsforth	Plant Electrical Contractor



## 4.4 NEMA 4X Enclosure Specifications

#### Junction Box:



**Remote Meter Point:** 



Catalog Number	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)
SNB-3739	7.87	7.87	3.98	3.40	9.15	6.42



## 5.0 Responsibilities

The following tables summarize the responsibilities of Cutsforth and the Plant during the three project phases.

#### 5.1 Planning Phase

Responsibilities	Cutsforth	Plant
Review this planning guide and share it with key plant personnel		1
involved in the project		•
Determine enclosure mounting position and conduit routes		
customized to the generator and ensure that they are within system		$\checkmark$
guidelines		

#### 5.2 Preparation for Service Phase

NOTE: The responsibilities listed in the following table are critical to technician safety and proper installation of the Cutsforth equipment. Failure to comply may result in significant delays and additional charges.

Responsibilities	Cutsforth	Plant
Mount RMP enclosure(s) with supporting Unistrut® and install		
required conduit		•
LOTO the following components: Main excitation system, ground		
detection system, and turning gear		v
Provide 120 V GFI protected power for general use during		
installation		•
Provide adequate working access to installation site including		
scaffolding		•
Ensure the shaft is off turning gear and stationary		$\checkmark$
Ensure the shaft is fully coupled for installation		$\checkmark$
Ensure the bearing caps immediately adjacent to the shaft grounding		1
area are in place		v

#### 5.3 Cutsforth Service Phase – Cutsforth Technicians Onsite

Responsibilities	Cutsforth	Plant
Provide shaft growth value at grounding location to Cutsforth		
Technician		•
Indicate shaft rotation direction to Cutsforth Technician		$\checkmark$
Install Cutsforth shaft assembly	✓	
Provide welding for support arm		$\checkmark$
Install junction box	✓	
Run wiring in plant-completed conduit raceways	✓	
Make system wiring terminations, not including grounding		
termination to unit case	v	
Identify main grounding termination point on the unit case	✓	
Provide electrical support to assist in making ground terminations	✓	$\checkmark$
Perform system testing and commissioning	<ul> <li>✓</li> </ul>	

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## 6.0 Welding Instructions

This procedure describes the work steps required for welding the support arms on Cutsforth's Shaft Grounding system on a generator.

The attachment arm is comprised of 300 series stainless steel. TIG welding is the preferred welding method. If weld filler is needed, AWS E/ER 308, 308L or 347 are acceptable.

#### 6.0.1 Prerequisites

- 6.0.1.1 A qualified welder shall be provided b the customer to perform support arm welding.
- 6.0.2 Welder should begin by tack or stick welding at the marks. The goal is a "stich" or "fuse" weld. No additional welding material needs to be added at this time. The arm joints simply need to be locked in place by the tacks.
  - 6.0.2.1 Note: If the tacking step is overlooked and the welder commences to weld the seam, the attachment arm positioning will be compromised as this will result in a distorted arm. If this occurs, the arm is unusable and must be replaced.
- 6.0.3 Welder should weld all of the seams as indicated with the red lines shown in the illustration below. Weld both ends and follow accepted welding practices to minimize distortions that would compromise proper alignments



- 6.0.4 Use of a wire wheel to clean up the surface is good practice and acceptable
- 6.0.5 Return the fully welded arm to the Cutsforth Technician for final assembly on the generator

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## 7.0 Additional Information

#### Frequently Asked Questions:

- Q: What is the maximum run length for the ground conductor?
- A: When it comes to the ground run, shorter is always better. Cutsforth requires that the total run length of the ground conductor is kept to 15ft or less.
- Q: What is the best way to mount the RMP?
- A: The RMP is typically mounted using a Unistrut<sup>®</sup> frame as shown below.



- Q: What shaft voltage and ground current values should we expect to see on our generator?
- A: This is a question that would be best answered by the generator manufacturer. We would suggest focusing on the trending of data more than the specific voltage and current values (e.g. Are the values changing over time? Are the changes significant? How are they changing?).

For more information on the Cutsforth Remote Meter Point, please refer to the Remote Meter Point System Operations Manual - *EZDP-2046.* 

For more information on the Cutsforth Shaft Grounding System, please refer to the Shaft Grounding Manual - *EZDP-2035.*