2 RELAY CHARACTERISTICS

- Rated values:
  \[ I_n = 5A \]
  \[ U_n = 100V \text{ 50 Hz} \]

- Relay locking:
  \[ U_v = 0.4 U_n \]

- Impedance setting range
  \[ X_m : 1.6 \text{ to } 8 \mu \text{H} \]
  \[ Y_m : 0 \text{ to } 63 \mu \text{H} \]

- Time lagging range:
  \[ 0 \text{ to } 4 \text{,4 steps } 0.4 \text{ lag} \]

- Auxiliary voltage supply:
  \[ 125V \]

3 GENERAL INSPECTION

- Wiring conformity in accordance with the following specified drawing(s):
  \[ \text{CGE JTR SGTA SDOM} \]

- Check of the module earthing:
  \[ \text{Correct} \]

- Check of test sockets locate on the input and output circuit:
  \[ \text{Correct} \]

- Mechanical check:
  \[ \text{Correct} \]

- Electrical check:
  \[ \text{Correct} \]

- Availability and value of auxiliary supply voltage:
  \[ U = 125VDC \]
4 RECEPTION TESTS

4.1 Checking of the impedance operating values

Arrangement for test: see the D1067.10 documentation

\[ X_m + \phi = \frac{U}{(2.11)} \quad X_m = \frac{U}{(2.12)} \]

\[ \phi : \text{phase angle between } U \text{ and } I \]

\[ U \text{ injected } = 50 \quad K = \frac{4}{2} \]

<table>
<thead>
<tr>
<th>Setting values</th>
<th>Measured values</th>
<th>Calculated values</th>
</tr>
</thead>
<tbody>
<tr>
<td>( X_m ) (Ohm)</td>
<td>( \phi ) (°)</td>
<td>( I_1 ) (A)</td>
</tr>
<tr>
<td>2</td>
<td>12.5</td>
<td>-45°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-60°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-120°</td>
</tr>
<tr>
<td>4</td>
<td>12.5</td>
<td>-45°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-60°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-120°</td>
</tr>
</tbody>
</table>

Essayé par: F. P. Bomp
Apprové par: 
Witnessed by: 
Date: 19.05.95
4.2 - Checking of the time delay

Pre-adjust the value of current to be injected at an impedance value located within the operate circle:

\[(X_m + \sigma) < U/(2.1) < X_m\]

<table>
<thead>
<tr>
<th>Setting Value t(s)</th>
<th>0.4</th>
<th>1.2</th>
<th>2</th>
<th>2.8</th>
<th>3.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Value t(s)</td>
<td>0.408</td>
<td>1.221</td>
<td>2.033</td>
<td>2.839</td>
<td>3.648</td>
</tr>
</tbody>
</table>

4.3 Check of the directional property ............ Correct

4.4 Check of the lock-out input voltage

\[U_L = 41.5V\]

4.5 Check of the test function .................... Correct

4.6 Check of the output contacts .................. Correct

4.7 Check of the output informations ............. Correct

4.8 Check of the signalization .................... Correct

5 SELECTED VALUES

\[X_m = 2, \quad \sigma = 12.5, \quad T_1 = 1.2s\]
Grafik Karakteristik Rele Hilang Medan Offset Zona 2 Negatif Berdasar Perhitungan
sehingga $KW = KVA \cos \phi$.

$KVAR = KVA \sin \phi$.

dengan $\phi$ adalah sudut antara vektor $KW$ dan vektor $KVA$.

 Kemampuan $KVA$ ditentukan oleh kemampuan arus belitan stator.

 Kemampuan $KW$ ditentukan oleh kemampuan penggerak mula generator yaitu kemampuan turbin.

 Kemampuan $KVAR$ ditentukan oleh kemampuan arus belitan rotor, dan merupakan kemampuan untuk pengaturan tegangan generator / jaringan.

 Faktor daya memberikan gambaran tentang:

- Tingkat pemanfaatan kemampuan $KVA$ generator untuk keperluan produksi / pembangkitan daya aktif $KW$.
- Tingkat ekonomis konstruksi generator.
- Tingkat kemampuan pengatur tegangan generator / jaringan.

**GENERATOR SATUAN I s/d V**

Kemampuan nominal: 35 MVA, 6300 V ± 10%, 2840 A, 50 Hz, p.f = 0.8, 272,7 RPM.

Runaway speed = 590 RPM.

Impedansi: $X_d = 1.0$ $X_{d}' = 0.37$ $X_{d}'' = 0.20$ $X_2 = 0.215$

$X_q = 0.66$ $X_{q}' = 0.66$ $X_{q}'' = 0.23$ $X_q = 0.09$

Short circuit ratio = 1.10 $P_g^2 = 900 \ T.M^2$.

Pendiningan: Oleh udara dengan sirkulasi tertutup; 35 m$^3$/det.

udara didinginkan oleh air: 39 liter/det.

Kenaikan temperatur: 111 liter stator 65$^\circ$ C.

111 liter rotor 70$^\circ$ C, besi 55$^\circ$ C.

Kemampuan MVA sebagai fungsi temperatur air pendingin:

<table>
<thead>
<tr>
<th>Temp. air</th>
<th>20$^\circ$C</th>
<th>25$^\circ$C</th>
<th>30$^\circ$C</th>
<th>35$^\circ$C</th>
<th>40$^\circ$C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVA</td>
<td>34</td>
<td>33</td>
<td>31</td>
<td>28</td>
<td>25.5</td>
</tr>
</tbody>
</table>

Penguatan generator:

beban nol : 78 V, 340 A

beban penuh p.f 0.8 : 192 V, 630 A

p.f 0.8 : 384 V impulse (> 5 detik)

3.2.6 - 2
Rugi-rugi:

Beban
p.f = 1.0 600 kW 510 kW 440 kW 385 kW
p.f = 0.8 665 kW 555 kW 470 kW 385 kW

Catatan:
- sudah termasuk rugi-rugi angin.
- belum termasuk rugi-rugi mekanis pada bantalan.

Perubahan tegangan bila beban hilang tiba-tiba sedangkan arus pengontrol dan putaran tetap:
p.f. 0.8 0.9 1.0
V(%) 37% 33% 25%

Temperatur nominal: dianggap - Temp. air pendingin = 30º C
- Temp. udara pendingin ≤ 40º C

Lilitan stator: 105º C - diukur dengan pengukur temperatur jenis tahanan
110º C - diukur dengan pengukur tahanan lilitan (cara super posisi).

Lilitan rotor: 110º C - diukur dengan cara perubahan tahanan menggunakan arus searah.

Dengan tegangan 90% nominal, generator sampa energize trans-line pada beban nol dan menyerap KVAR sebagai berikut:
- menyerap KVAR = 15.000 dengan IF = 25% x 340 A
- menyerap KVAR = 20.000 dengan IF = 10% x 340 A

Konstruksi:
- Lilitan stator: isolasi kelas B, Transposed Robel Conductor, 2 bar/stot, imbricated type.
- panjang: Ø stator = 4100 mm, Ø rotor = 4050 mm.
- celah udara = 22, jumlah alur = 270
- lilitan rotor: dilengkapi lilitan peredam.

Bila : 1 fasa putus maka selama 1 menit
2 fasa yang lain dengan arus nominal) mampu memikul tanpa rusak.

Bantalan aksial dan radial
Tipa: melumas sandiri, pendinginan oleh air bersih : 6 liter/ detik, tipa Mitchel.

Air pendingin baru boleh berhenti 1/2 jam setelah satuan berhenti.

Kemampuan bantalan tanpa air pendingin:
RPM 272.7 136 590
waktu (alamanya) 40 menit 80 menit 18 menit

Pengereman: - dengan ferrodo yang dikerjakan oleh udara bertekanan
- pengereman mulai RPM = 1/2 Nominal

Dongkrak: - akan memaksakan generator setinggi 20 - 25 mm.

3.2.6 - 3
## Specifications

### Compliance

Designed and manufactured under an ISO 9001 certified quality management system

47 CFR 15B, Class A

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

UL Listed to U.S. and Canadian safety standards (File E212775, NRGU, NRGU7)

UL Certified for Hazardous Locations to U.S. and Canadian standards (File 4700448)

CE Mark

RCM Mark

### General

#### AC Current Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase and Neutral Currents</td>
<td>$I_{NOM} = 1\ A$ or $5\ A$ secondary depending on model</td>
</tr>
</tbody>
</table>
| $I_{NOM} = 5\ A$ | Continuous Rating: $3 \cdot I_{NOM} \at 85^\circ C$, linear to $100\ A$ symmetrical  
4 $\cdot I_{NOM} \at 55^\circ C$, linear to $100\ A$ symmetrical  
1-Second Thermal: $500\ A$  
Burden (per Phase): $<0.1\ VA \at 5\ A$ |
| $I_{NOM} = 1\ A$ | Continuous Rating: $3 \cdot I_{NOM} \at 85^\circ C$, linear to $20\ A$ symmetrical  
4 $\cdot I_{NOM} \at 55^\circ C$, linear to $20\ A$ symmetrical  
1-Second Thermal: $100\ A$  
Burden (per Phase): $<0.01\ VA \at 1\ A$ |
| Measurement Category: | II |

#### AC Voltage Inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
</table>
| $V_{NOM}$ (L-L secondary) | $20–250\ V$ (if $\text{DELTA}_Y := \text{DELTA}$)  
$20–440\ V$ (if $\text{DELTA}_Y := \text{WYE}$) |
| Rated Continuous Voltage | $300\ Vac$ |
| 10-Second Thermal | $600\ Vac$ |
| Burden: | $<0.1\ VA$ |
| Input Impedance: | $4\ \Omega$ differential (phase-to-phase)  
7 $\Omega$ common mode (phase-to-chassis) |

### Power Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay Start-Up Time:</td>
<td>Approximately 5–10 seconds (after power is applied until $\text{ENABLED}\ LED$ turns on)</td>
</tr>
</tbody>
</table>
| $125/250\ Vdc$ or $120/240\ Vdc$ | Rated Supply Voltage: $110–240\ Vac, 50/60\ Hz$  
$110–250\ Vdc$ |
| Input Voltage Range: | $85–264\ Vdc$  
$85–275\ Vdc$ |
| Power Consumption: | $<40\ VA$ (ac)  
$<20\ W$ (dc) |
| Interruptions: | $50\ ms \at 125\ Vac/Vdc$  
$100\ ms \at 250\ Vac/Vdc$ |

### Fuse Ratings

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
</table>
| **LV Power Supply Fuse** | Rating: $3.15\ A$  
Maximum Rated Voltage: $300\ Vdc, 250\ Vac$  
Breaking Capacity: $1500\ A$ at $250\ Vac$  
Type: $\text{Time-lag T}$ |
| **HV Power Supply Fuse** | Rating: $3.15\ A$  
Maximum Rated Voltage: $300\ Vdc, 250\ Vac$  
Breaking Capacity: $1500\ A$ at $250\ Vac$  
Type: $\text{Time-lag T}$ |
| **Heater Fuses F2, F3:** | $5\ A$, $125\ V$ slow blow  
125 Vdc/50 A break rating |

Fuses are not serviceable.

### Output Contacts

The relay supports Form A, B, and C outputs.

#### Dielectric Test Voltages:

- 2500 Vac

#### Impulse Withstand Voltage ($U_{IMP}$):

- 4700 V

#### Mechanical Durability:

- 100,000 no-load operations

### Standard Contacts

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup/Dropout Time:</td>
<td>$58\ ms$ (coil energization to contact closure)</td>
</tr>
</tbody>
</table>

### DC Output Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Operational Voltage:</td>
<td>$250\ Vdc$</td>
</tr>
<tr>
<td>Rated Voltage Range:</td>
<td>$19.2–275\ Vdc$</td>
</tr>
<tr>
<td>Rated Insulation Voltage:</td>
<td>$300\ Vdc$</td>
</tr>
<tr>
<td>Make:</td>
<td>$30\ A \at 250\ Vdc$ per IEEE C37.90</td>
</tr>
</tbody>
</table>
| Continuous Carry: | $6\ A \at 70^\circ C$  
$4\ A \at 85^\circ C$ |
| Thermal: | $50\ A$ for $1\ s$ |
| Contact Protection: | $360\ Vdc$, $40\ J$ MOV protection across open contacts |

### AC Output Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
</table>
| Breaking Capacity (10,000 Operations) per IEC 60255-0-20:1974: | $24\ Vdc$ $0.75\ A$  
$L/R = 40\ ms$  
$48\ Vdc$ $0.50\ A$  
$L/R = 40\ ms$  
$125\ Vdc$ $0.30\ A$  
$L/R = 40\ ms$  
$250\ Vdc$ $0.20\ A$  
$L/R = 40\ ms$ |
| Cyclic (2.5 Cycles/Second) per IEC 60255-0-20:1974: | $24\ Vdc$ $0.75\ A$  
$L/R = 40\ ms$  
$48\ Vdc$ $0.50\ A$  
$L/R = 40\ ms$  
$125\ Vdc$ $0.30\ A$  
$L/R = 40\ ms$  
$250\ Vdc$ $0.20\ A$  
$L/R = 40\ ms$ |
| AC Output Ratings | Maximum Operational Voltage ($U_{OP}$) Rating: $240\ Vac$  
Insulation Voltage ($U_I$) Rating (excluding EN 61010-1): $300\ Vac$ |
Contact Rating Designation: B300

### B300 (5 A Thermal Current, 300 Vac Max)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Maximum Current</th>
<th>Max VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 Vac</td>
<td>240 Vac</td>
<td>—</td>
</tr>
<tr>
<td>Make</td>
<td>30 A</td>
<td>15 A</td>
</tr>
<tr>
<td>Break</td>
<td>3 A</td>
<td>1.5 A</td>
</tr>
</tbody>
</table>

PF < 0.35, 50–60 Hz

**Fast Hybrid (High-Speed, High-Current Interrupting)**

**DC Output Ratings**
- Rated Operational Voltage: 250 Vdc
- Rated Voltage Range: 19.2–275 Vdc
- Rated Insulation Voltage: 300 Vdc
  - Make: 30 A @ 250 Vdc per IEEE C37.90
  - Continuous Carry: 6 A @ 70°C 4 A @ 85°C
- 1-Second Rating: 50 A
- Open State Leakage Current: <500 µA
- MOV Protection (Maximum Voltage): 250 Vac/330 Vdc
- Pickup Time: <50 µs, resistive load
- Dropout Time: ≤8 ms, resistive load
- Break Capacity (10,000 Operations) per IEC 60255-0-20:1974:
  - 48 Vdc: 10.0 A L/R = 40 ms
  - 125 Vdc: 10.0 A L/R = 40 ms
  - 250 Vdc: 10.0 A L/R = 20 ms
- Cyclic Capacity (4 cycles in 1 second, followed by 2 minutes idle for thermal dissipation) per IEC 60255-0-20:1974:
  - 48 Vdc: 10.0 A L/R = 40 ms
  - 125 Vdc: 10.0 A L/R = 40 ms
  - 250 Vdc: 10.0 A L/R = 20 ms

**AC Output Ratings**
- See AC Output Ratings for Standard Contacts.
- Analog Output (Optional)
  - 1A0: 4–20 mA ±20 mA
  - 4A0: — ±10 V
- Load at 1 mA:
  - — 0–15 kΩ
- Load at 20 mA:
  - 0–300 Ω 0–750 Ω
- Load at 10 V:
  - — >2000 Ω
- Refresh Rate:
  - 100 ms 100 ms
- % Error, Full Scale, at 25°C:
  - ±1% ±0.55%
- Select From: Analog quantities available in the relay
- Analog Input (Optional)
  - Maximum Input Range:
    - ±20 mA
    - ±10 V
  - Operational range set by user
- Input Impedance:
  - 200 Ω (current mode)
  - >10 kΩ (voltage mode)
- Accuracy at 25°C:
  - With user calibration: 0.050% of full scale (current mode)
  - 0.025% of full scale (voltage mode)
- Without user calibration:
  - Better than 0.5% of full scale at 25°C
- Accuracy Variation With Temperature:
  - ±0.015% per °C of full scale
- Frequency and Phase Rotation
  - System Frequency: 50, 60 Hz
  - Phase Rotation: ABC, ACB
  - Frequency Tracking: 15–70 Hz
- Time-Code Input
  - Format: Demodulated IRIG-B
  - On (1) State: V_{ih} ≥ 2.2 V
  - Off (0) State: V_{il} ≤ 0.8 V
  - Input Impedance: 2 kΩ
- Synchronization Accuracy
  - Internal Clock: ±1 µs
  - Synchrophasor Reports (e.g., MET PM): ±10 µs
  - All Other Reports: ±5 ms
- Simple Network Time Protocol (SNTP) Accuracy: ±5 ms
- Unsynchronized Clock Drift
  - Relay Powered: 2 minutes per year, typically
Communications Ports

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Location</th>
<th>Data Speed</th>
<th>Serial Ports</th>
<th>Data Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard EIA-232</td>
<td>Front Panel</td>
<td>300–38400 bps</td>
<td>2 ports</td>
<td></td>
</tr>
<tr>
<td>EIA-485 Port (Optional)</td>
<td>Rear Panel</td>
<td></td>
<td></td>
<td>300–19200 bps</td>
</tr>
<tr>
<td>Ethernet Port (Optional)</td>
<td>Rear Panel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fiber-Optic Ports Characteristics

<table>
<thead>
<tr>
<th>Port 1 (or 1A, 1B) Ethernet</th>
<th>Wavelength</th>
<th>Optical Connector Type</th>
<th>Fiber Type</th>
<th>Link Budget</th>
<th>Typical TX Power</th>
<th>RX Min. Sensitivity</th>
<th>Fiber Size</th>
<th>Approximate Range</th>
<th>Data Rate</th>
<th>Typical Fiber Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1300 nm</td>
<td>LC</td>
<td>Multimode</td>
<td>16.1 dB</td>
<td>–15.7 dBm</td>
<td>–31.8 dBm</td>
<td>62.5/125 µm</td>
<td>~6.4 km</td>
<td>100 Mbps</td>
<td>–2 dB/km</td>
</tr>
<tr>
<td>Port 2 Serial</td>
<td>820 nm</td>
<td>ST</td>
<td>Multimode</td>
<td>8 dB</td>
<td>–16 dBm</td>
<td>–24 dBm</td>
<td>62.5/125 µm</td>
<td>~1 km</td>
<td>5 Mbps</td>
<td>–4 dB/km</td>
</tr>
</tbody>
</table>

Optional Communications Cards

<table>
<thead>
<tr>
<th>Option 1: EIA-232 or EIA-485 communications card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 2: DeviceNet communications card</td>
</tr>
</tbody>
</table>

Communications Protocols

- SEL, Modbus, DNP, FTP, TCP/IP, Telnet, SNTP, IEC 61850, MIRRORED BITS, EVMSG, C37.118 (synchrophasors), and DeviceNet

Operating Environment

<table>
<thead>
<tr>
<th>Environmental Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution Degree</td>
<td>2</td>
</tr>
<tr>
<td>Overvoltage Category</td>
<td>II</td>
</tr>
<tr>
<td>Atmospheric Pressure</td>
<td>80–110 kPa</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5–95%, noncondensing</td>
</tr>
<tr>
<td>Maximum Altitude</td>
<td>2000 m</td>
</tr>
</tbody>
</table>

Dimensions

- 144.0 mm (5.67 in) x 192.0 mm (7.56 in) x 147.4 mm (5.80 in)
- Weight: 2.0 kg (4.4 lb)

Terminal Connections

<table>
<thead>
<tr>
<th>Terminal Block</th>
<th>Screw Size</th>
<th>Ring Terminal Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal Block Tightening Torque</td>
<td>Minimum: 0.9 Nm (8 in-lb)</td>
<td>Maximum: 1.4 Nm (12 in-lb)</td>
</tr>
<tr>
<td>Compression Plug Tightening Torque</td>
<td>Minimum: 0.5 Nm (4.4 in-lb)</td>
<td>Maximum: 1.0 Nm (8.8 in-lb)</td>
</tr>
<tr>
<td>Compression Plug Mounting Ear Screw Tightening Torque</td>
<td>Minimum: 0.18 Nm (1.6 in-lb)</td>
<td>Maximum: 0.25 Nm (2.2 in-lb)</td>
</tr>
</tbody>
</table>

Type Tests

Environmental Tests

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Conditions</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure Protection</td>
<td>IEC 60529:2001</td>
<td>IP65</td>
</tr>
<tr>
<td></td>
<td>IP65 enclosed in panel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP20 for terminals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP54 rated terminal dust protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>assembly (SEL Part #915900170).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10°C temperature derating applies to the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>temperature specifications of the relay.</td>
<td></td>
</tr>
<tr>
<td>Vibration Resistance</td>
<td>IEC 60255-21-1:1988, Class 2 Endurance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 60255-21-2:1988, Class 2 Response</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 60255-21-3:1993, Class 2 Shock Response</td>
<td></td>
</tr>
<tr>
<td>Cold</td>
<td>IEC 60068-2-1:2007 –40°C, 16 hours</td>
<td></td>
</tr>
<tr>
<td>Damp Heat, Steady State</td>
<td>IEC 60068-2-7:2001 40°C, 93% relative humidity, 4 days</td>
<td></td>
</tr>
<tr>
<td>Damp Heat, Cyclic</td>
<td>IEC 60068-2-30:2005 25–55°C, 6 cycles, 95% relative humidity</td>
<td></td>
</tr>
<tr>
<td>Dry Heat</td>
<td>IEC 60068-2-2:2007 85°C, 16 hours</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
- Not applicable to UL applications
- LCD contrast is impaired for temperatures below –20°C and above +70°C
- DeviceNet Communications Card Rating: +60°C (140°F) maximum
Dielectric Strength and Impulse Tests

Dielectric (HiPot):

IEC 60255-5:2000
IEEE C37.90-2005
2.5 kVac on current inputs, voltage inputs, contact I/O
2.0 kVac on analog inputs
1.0 kVac on analog output
2.83 kVdc on power supply

Impulse:

IEC 60255-5:2000
0.5 J, 4.7 kV on power supply, contact I/O, ac current and voltage inputs
0.5 J, 530 V on analog outputs

RFI and Interference Tests

EMC Immunity

Electrostatic Discharge Immunity:

IEC 60255-22-2:2008
IEEE 61000-4-2:2008
Severity Level 4
8 kV contact discharge
15 kV air discharge

Radiated RF Immunity:

IEC 60255-22-3:2007
IEC 61000-4-3:2002, 10 V/m
IEEE C37.90.2-1995, 35 V/m

Fast Transient, Burst Immunity:

IEC 60255-22-4:2008
IEC 61000-4-4:2004
4 kV @ 2.5 kHz
2 kV @ 5.0 kHz for comm. ports

Surge Immunity:

IEC 60255-22-5:2008
IEC 61000-4-5:2005
2 kV line-to-line
4 kV line-to-earth

Surge Withstand Capability Immunity:

IEC 60255-22-1:1988
2.5 kV common mode
1.0 kV differential mode
1 kV common mode on comm. ports
IEEE C37.90.1-2002
2.5 kV oscillatory
4 kV fast transient

Conducted RF Immunity:

IEC 60255-22-6:2001
IEC 61000-4-6:2006, 10 Vrms

Magnetic Field Immunity:

IEC 60255-22-7:2001
IEC 61000-4-8:2001
1000 A/m for 3 seconds
100 A/m for 1 minute

EMC Emissions

Conducted Emissions: EN 55011:1998, Class A
Radiated Emissions: EN 55011:1998, Class A

Electromagnetic Compatibility

Product Specific: EN 50263:1999

Oscillography

Length: 15, 64, 180 cycles
Sampling Rate: 32 samples per cycle unfiltered
4 samples per cycle filtered

Trigger: Programmable with Boolean expression

Format: ASCII and Compressed ASCII

Time-Stamp Resolution: 1 ms

Time-Stamp Accuracy: ±5 ms

Sequential Events Recorder

Time-Stamp Resolution: 1 ms

Time-Stamp Accuracy (with respect to time source): ±5 ms

Relay Elements

Instantaneous/Definite Time-Overcurrent (50P, 50G, 50N, 50Q)

Pickup Setting Range, A secondary:

5 A models: 0.50–96.00 A, 0.01 A steps
1 A models: 0.10–19.20 A, 0.01 A steps

Accuracy: ±5% of setting plus ±0.02 • I NOM A (steady-state pickup)

Time Delay: 0.00–400.00 seconds, 0.01 seconds steps, ±0.5% plus ±0.25 cycle
0.10–400.00 seconds, 0.01 seconds steps, ±0.5% plus ±0.25 cycle for 50Q

Pickup/Dropout Time: <1.5 cycles

Inverse Time-Overcurrent (51P, 51G, 51N, 51Q)

Pickup Setting Range, A secondary:

5 A models: 0.50–16.00 A, 0.01 A steps
1 A models: 0.10–3.20 A, 0.01 A steps

Accuracy: ±5% of setting plus ±0.02 • I NOM A (steady-state pickup)

Time Dial:

US: 0.50–15.00, 0.01 steps
IEC: 0.05–1.00, 0.01 steps

Accuracy: ±1.5 cycles plus ±4% between 2 and 30 multiples of pickup (within rated range of current)

Differential (87)

Unrestrained Pickup Range: 1.0–20.0 in per unit of TAP
Restained Pickup Range: 0.10–1.00 in per unit of TAP

Pickup Accuracy (A secondary):

5 A Model: ±5% plus ±0.10 A
1 A Model: ±5% plus ±0.02 A

TAP Range (A secondary):

5 A Model: 0.5–31.0 A
1 A Model: 0.1–6.2 A

Unrestrained Element

Pickup Time: 0.8/1.0/1.9 cycles (Min/Typ/Max)

Restained Element (With Harmonic Blocking)

Pickup Time: 1.5/1.62/2.2 cycles (Min/Typ/Max)

Restained Element (With Harmonic Restraint)

Pickup Time: 2.62/2.72/2.86 cycles (Min/Typ/Max)
Harmonics
Pickup Range (% of fundamental): 5–100%
Pickup Accuracy (A secondary):
  5 A Model: ±5% plus ±0.10 A of harmonic current
  1 A Model: ±5% plus ±0.02 A of harmonic current
Time Delay Accuracy: ±0.5% plus ±0.25 cycle

Restricted Earth Fault (REF)
Pickup Range (per unit of INOM of neutral current input, IN):
  0.05–3.00 per unit, 0.01 per-unit steps
Pickup Accuracy (A secondary):
  5 A Model: ±5% plus ±0.10 A
  1 A Model: ±5% plus ±0.02 A
Timing Accuracy:
  Directional Output: 1.5 ±0.25 cycle
  ANSI Extremely Inverse TOC Curve (U4 With 0.5 range of current):
  ±6 cycles plus ±5% between 2 and 30 multiples of pickup (within rated range of current)

Undervoltage (2TP, 27PP, 27VI, 27S)
Pickup Range: Off, 2.0–300.0 V (2.0–520.0 V for phase-to-phase wye connected; 2.0–170.0 V positive-sequence, delta connected)
Accuracy: ±5% of setting plus ±2 V
Pickup/Dropout Time: <1.5 cycle
Time Delay: 0.00–120.00 seconds, 0.01 second steps
Accuracy: ±0.5% plus ±0.25 cycle

Pickup Range (59G, 59Q): Off, 2.0–200.0 V
Accuracy: ±5% of setting plus ±2 V
Pickup/Dropout Time: <1.5 cycle
Time Delay: 0.00–120.00 seconds, 0.01 second steps
Accuracy: ±0.5% plus ±0.25 cycle

Volts/Hertz (24)
Definite-Time Element
Pickup Range: 100–200%
Steady-State Pickup Accuracy: ±1% of setpoint
Pickup Time: 25 ms @ 60 Hz (Max)
Time-Delay Range: 0.04–400.00 s
Time-Delay Accuracy: ±0.1% plus ±4.2 ms @ 60 Hz
Reset Time Range: 0.00–400.00 s

Inverse-Time Element
Pickup Range: 100–200%
Steady-State Pickup Accuracy: ±1% of setpoint
Pickup Time: 25 ms @ 60 Hz (Max)
Curve: 0.5, 1.0, or 2.0
Factor: 0.1–10.0 s
Timing Accuracy: ±4% plus ±25 ms @ 60 Hz, for V/Hz above 1.2 multiple of pickup setting, and for operating times >4 s
Reset Time Range: 0.00–400.00 s

Composite-Time Element
Combination of Definite-Time and Inverse-Time specifications

User-Definable Curve Element
Pickup Range: 100–200%
Steady-State Pickup Accuracy: ±1% of setpoint
Pickup Time: 25 ms @ 60 Hz (Max)
Reset Time Range: 0.00–400.00 s

Directional Power (32)
Instantaneous/Definite Time, 3 Phase Elements
Type: +W, –W, +VAR, –VAR
Pickup Settings Range, VA secondary:
  5 A Model: 1.0–6500.0 VA, 0.1 VA steps
  1 A Model: 0.2–1300.0 VA, 0.1 VA steps
Accuracy: ±0.10 A • (L-L voltage secondary) and ±5% of setting at unity power factor for power elements and zero power factor for reactive power element (5 A nominal)
  ±0.02 A • (L-L voltage secondary) and ±5% of setting at unity power factor for power elements and zero power factor for reactive power element (1 A nominal)
Pickup/Dropout Time: <10 cycles
Time Delay: 0.00–240.00 seconds, 0.01 second steps
Accuracy: ±0.5% plus ±0.25 cycle

Frequency (81)
Setting Range: Off, 15.0–70.0 Hz
Accuracy: ±0.01 Hz (V1 > 60 V)
Pickup/Dropout Time: <4 cycles
Time Delay: 0.00–240.00 seconds, 0.01 second steps
Accuracy: ±0.5% plus ±0.25 cycle

RTD Protection
Setting Range: Off, 1–250°C
Accuracy: ±2°C
RTD Open-Circuit Detection: >250°C
RTD Short-Circuit Detection: <–50°C
RTD Types: PT100, NI100, NI120, CU10
RTD Lead Resistance: 25 ohm max. per lead
Update Rate: <3 s
Noise Immunity on RTD Inputs: To 1.4 Vac (peak) at 50 Hz or greater frequency
RTD Trip/Alarm Time Delay: Approx. 6 s

Distance Element (21)
Two zones of Compensator Distance elements with Load Encroachment block
Reach Pickup Range: 5 A model: 0.1–100.0 ohms
  1 A model: 0.5–500.0 ohms
Offset Range: 5 A model: 0.0–10.0 ohms
  1 A model: 0.0–50.0 ohms
Steady-State Impedance
  5 A model: ±5% plus ±0.1 ohm
  1 A model: ±5% plus ±0.5 ohm
Pickup Time: 33 ms at 60 Hz (Max)
Definite-Time Delay: 0.00–400.00 s
Accuracy: ±0.1% plus ±0.25 cycle
Minimum Phase Current:
5 A model: 0.5 A
1 A model: 0.1 A
Maximum Torque Angle Range: 90–45°, 1° step

Loss-of-Field Element (40)
Two Mho Zones
Zone 1 Offset:
5 A model: –50.0 to 0.0 ohms
1 A model: –250.0 to 0.0 ohms
Zone 2 Offset:
5 A model: –50.0 to 50.0 ohms
1 A model: –250.0 to 250.0 ohms
Zone 1 and Zone 2 Diameter:
5 A model: 0.1–100.0 ohms
1 A model: 0.5–500.0 ohms
Steady-State Impedance Accuracy:
5 A model: ±0.1 ohm plus ±5% of (offset + diameter)
1 A model: ±0.5 ohm plus ±5% of (offset + diameter)
Minimum Pos.-Seq. Signals:
5 A model: 0.25 V (V1), 0.25 A (I1)
1 A model: 0.25 V (V1), 0.05 A (I1)
Directional Element Angle: –20.0° to 0.0°
Pickup Time: 3 cycles (Max)
Zone 1 and Zone 2 Definite-Time Delays: 0.00–400.00 s
Accuracy: ±0.1% plus ±1/2 cycle

Voltage-Restrained Phase Time-Overcurrent Element (5IV)
Phase Pickup (A secondary):
5 A Model: 2.0–16.0 A
1 A Model: 0.4–3.2 A
Steady-State Pickup Accuracy:
5 A Model: ±5% plus ±0.10 A
1 A Model: ±5% plus ±0.02 A
Time Dials:
US: 0.50–15.00, 0.01 steps
IEC: 0.05–1.00, 0.01 steps
Accuracy: ±4% plus ±1.5 cycles for current between 2 and 20 multiples of pickup (within rated range of current)
Linear Voltage Restraint Range: 0.125–1.000 per unit of VNOM

Voltage-Controlled Phase Time-Overcurrent Element (5IC)
Phase Pickup (A secondary):
5 A Model: 0.5–16.0 A
1 A Model: 0.1–3.2 A
Steady State Pickup Accuracy:
5 A Model: ±5% plus ±0.10 A
1 A Model: ±5% plus ±0.02 A
Time Dials:
US: 0.50–15.00, 0.01 steps
IEC: 0.05–1.00, 0.01 steps
Accuracy: ±4% plus ±1.5 cycles for current between 2 and 20 multiples of pickup (within rated range of current)

100 Percent Stator Ground Protection (64G)
Neutral Fundamental Overvoltage (64G1):
OFF, 0.1–150.0 V
Steady-State Pickup Accuracy:
±5% plus ±0.1 V
Pickup Time: 1.5 cycles (Max)
Definite-Time Delay: 0.00–400.00 s
Accuracy: ±0.1% plus ±0.25 cycle
Third-Harmonic Voltage Differential or Third-Harmonic Neutral Undervoltage Pickup 64G2: 0.1–20.0 V
Steady-State Pickup Accuracy:
±5% plus ±0.1 V
Third-Harmonic Voltage Differential Ratio Setting Range: 0.0 to 5.0
Pickup Time: 3 cycles (Max)

Field Ground Protection (64F)
(Requires SEL-2664 Field Ground Module)
Field Ground Protection Element:
Pickup Accuracy: ±5% plus ±500 ohms for
48 ± VF ± 825 Vdc
±5% plus ±20 kilohms for
825 < VF ± 1500 Vdc
(VF is the generator field winding excitation dc voltage)
Pickup Time:
2 s if the injection frequency in the SEL-2664 is selected at 1 Hz
8 s if the injection frequency in the SEL-2664 is selected at 0.25 Hz
Definite-Time Delay: 0.0–99.0 s
Maximum Definite-Time Delay Accuracy: ±0.5% plus ±5 ms

Out-of-Step Element (78)
Forward Reach:
5 A model: 0.1–100.0 ohms
1 A model: 0.5–500.0 ohms
Reverse Reach:
5 A model: 0.1–100.0 ohms
1 A model: 0.5–500.0 ohms

Single Blinder
Right Blinder:
5 A model: 0.1–50.0 ohms
1 A model: 0.5–250.0 ohms
Left Blinder:
5 A model: 0.1–50.0 ohms
1 A model: 0.5–250.0 ohms
Double Blinder
Outer Resistance Blinder:
5 A model: 0.2–100.0 ohms
1 A model: 1.0–500.0 ohms
Inner Resistance Blinder:
5 A model: 0.1–50.0 ohms
1 A model: 0.5–250.0 ohms
Steady-State Impedance Accuracy:
5 A model: ±0.1 ohm plus ±5% of diameter
1 A model: ±0.5 ohm plus ±5% of diameter
Pos.-Seq. Current:
5 A model: 0.25–30.00 A
1 A model: 0.05–6.00 A
Supervision:
5 A model: 0.05–6.00 A
Definite Time Delay:
3 cycles (Max)
Definite Time Delay:
0.00–1.00 s, 0.01 s step
Trip Delay Range:
0.00–1.00 s, 0.01 s step
Trip Duration Range:
0.00–5.00 s, 0.01 s step
Definite-Time Timers:
±0.1% plus ±1/2 cycle

Ground Differential Elements (87N)
Ground Differential Pickup:
5 A Model:
0.10*CTR/CTRN – 15.00 A
1 A Model:
0.02*CTR/CTRN – 3.00 A
(Ratio CTR/CTRN must be within
1.0–40.0)
Steady-State Pickup Accuracy:
5 A Model: ±5% plus ±0.10 A
1 A Model: ±5% plus ±0.02 A
Pickup Time:
1.5 cycles (Max)
Time Delay Range:
0.00–5.00 s
Definite-Time Delay:
±0.5% plus ±1/4 cycle
Negative-Sequence Overcurrent Elements (46)

- **Definite-Time and Inverse-Time Neg.-Seq. I² Pickup:**
  - 2%–100% of generator rated secondary current

- **Generator Rated Secondary Current:**
  - 5 A Model: 1.0–10.0 A secondary
  - 1 A Model: 0.2–2.0 A secondary

- **Steady-State Pickup Accuracy:**
  - 5 A Model: ±0.005 A plus ±3%
  - 1 A Model: ±0.005 A plus ±3%

- **Pickup Time:**
  - 50 ms at 60 Hz (Max)

- **Definite-Time Delay Setting Range:**
  - 0.02–999.90 s

- **Maximum Definite-Time Delay Accuracy:**
  - ±0.1% plus ±4.2 ms at 60 Hz

- **Inverse-Time Element Time Dial:**
  - K = 1 to 100 s

- **Linear Reset Time:**
  - 240 s fixed

- **Inverse-Time Timing Accuracy:**
  - ±4% plus ±50 ms at 60 Hz for | I² | above 1.05 multiples of pickup

- **Rate-of-Change of Frequency (81R)**

  - **Pickup Setting Range:**
    - Off, 0.10–15.00 Hz/s

  - **Accuracy:**
    - ±100 mHz/s plus ±3.33% of pickup

- **Synchronism Check (25Y) for Tie Breaker**

  - **Synchronism-Check Voltage Source:**
    - VAY, VBY, VCY, VABY, VBCY, VCAY or angle from VAY or VABY

  - **Voltage Window High Setting Range:**
    - 0.00–300.00 V

  - **Voltage Window Low Setting Range:**
    - 0.00–300.00 V

  - **Steady-State Voltage Accuracy:**
    - ±5% plus ±2.0 V (over the range of 12.5–300 V)

  - **Maximum Percentage Voltage Difference:**
    - 1.0–15.0%

  - **Maximum Slip Frequency:**
    - –0.05 Hz to 0.50 Hz

  - **Steady-State Slip Accuracy:**
    - ±0.02 Hz

  - **Close Acceptance Angle 1, 2:**
    - 0–80°

  - **Breaker Close Delay:**
    - 0.001–1.000 s

  - **Steady-State Angle Accuracy:**
    - ±2°

Synchronism Check (25X) for Generator Breaker

- **Synchronism-Check Voltage Source:**
  - VAX, VBX, VCX, VABX, VBCX, VCAX or angle from VAX or VABX

- **Voltage Window High Setting Range:**
  - 0.00–300.00 V

- **Voltage Window Low Setting Range:**
  - 0.00–300.00 V

- **Steady-State Voltage Accuracy:**
  - ±5% plus ±2.0 V (over the range of 12.5–300 V)

- **Maximum Percentage Voltage Difference:**
  - 1.0–15.0%

- **Minimum Slip Frequency:**
  - –1.00 Hz to 0.99 Hz

- **Maximum Slip Frequency:**
  - –0.99 Hz to 1.00 Hz

- **Steady-State Slip Accuracy:**
  - ±0.02 Hz

- **Close Acceptance Angle 1, 2:**
  - 0–80°

- **Target Close Angle:**
  - –15 to 15°

- **Breaker Close Delay:**
  - 0.001–1.000 s

- **Close Failure Angle:**
  - 3–120°

- **Steady-State Angle Accuracy:**
  - ±2°

Generator Thermal Model (49T)

- **Thermal Overload Trip Pickup Level:**
  - 30–250% of full load current

- **TCU Alarm Pickup Level:**
  - 50–99% Thermal Capacity Used

- **Time-Constant Range (2):**
  - 0.02–999.90 s

- **Time Accuracy Pickup/Dropout Time:**
  - ±(5% + 25 ms) at multiple-of-pickup

- **Autosynchronizing Frequency Matching**

  - **Speed (Frequency) Control Outputs:**
    - Raise: Digital output, adjustable pulse duration and interval
    - Lower: Digital output, adjustable pulse duration and interval

  - **Frequency Synchronism Timer:**
    - 5–3600 s, 1 s increments

  - **Frequency Adjustment Rate:**
    - 0.01–10.00 Hz/s, 0.01 Hz/s increment

  - **Frequency Pulse Interval:**
    - 0.10–60.00 s, 0.01 s increment

  - **Frequency Pulse Maximum:**
    - 0.10–60.00 s, 0.01 s increment

  - **Kick Pulse Interval:**
    - 1–120 s, 1 s increments

  - **Kick Pulse Minimum:**
    - 0.02–2.00 s, 0.01 s increments

  - **Kick Pulse Maximum:**
    - 0.02–2.00 s, 0.01 s increments

  - **Voltage Matching**

    - **Voltage Control Outputs:**
      - Raise: Digital Output, adjustable pulse duration and interval
      - Lower: Digital Output, adjustable pulse duration and interval

    - **Voltage Synchronized Timer:**
      - 5–3600 s, 1 s increments

    - **Voltage Adjustment Rate**
      - (Control System): 0.01–30.00 V/s, 0.01 V/s increment

    - **Voltage Pulse Interval:**
      - 1–120 s, 1 s increment

    - **Voltage Control Pulse Minimum:**
      - 0.10–60.00 s, 0.01 s increment

    - **Voltage Control Pulse Maximum:**
      - 0.10–60.00 s, 0.01 s increment

    - **Timing Accuracy:**
      - ±0.5% plus ±1/4 cycle

Metering Accuracy

Accuracies are specified at 20°C, nominal frequency, ac currents within (0.2–20.0) * I_{NOM} secondary, and ac voltages within 50–250 V secondary unless otherwise noted.

- **Phase Currents:**
  - ±1% of reading, ±1°

- **3-Phase Average Current:**
  - ±1% of reading

- **Differential Quantities:**
  - ±5% of reading plus ±0.1 A (5 A nominal), ±0.02 A (1 A nominal)

- **Current Harmonics:**
  - ±5% of reading plus ±0.1 A (5 A nominal), ±0.02 A (1 A nominal)

- **IG (Residual Current):**
  - ±2% of reading, ±2° (±5.0° at 0.2–0.5 A for relays with I_{NOM} = 1 A)

- **IN (Neutral Current):**
  - ±1% of reading, ±1° (±2.5° at 0.2–0.5 A for relays with I_{NOM} = 1 A)

- **3I₂ Negative-Sequence Current:**
  - ±2% of reading
System Frequency: ±0.01 Hz of reading for frequencies within 20–70 Hz (V1 > 60 V)

Line-to-Line Voltages: ±1% of reading, ±1° for voltages within 24–264 V

3-Phase Average Line-to-Line Voltage: ±1% of reading for voltages within 24–264 V

Line-to-Ground Voltages: ±1% of reading, ±1° for voltages within 24–264 V

3-Phase Average Line-to-Ground Voltages: ±1% of reading for voltages within 24–264 V

Voltage Harmonics: ±5% of reading plus ±0.5 V

3V2 Negative-Sequence Voltage: ±2% of reading for voltages within 24–264 V

Real 3-Phase Power (kW): ±3% of reading for 0.10 < pf < 1.00

Reactive 3-Phase Power (kVAR): ±3% of reading for 0.00 < pf < 0.90

Apparent 3-Phase Power (kVA): ±3% of reading

Power Factor: ±2% of reading

RTD Temperatures: ±2°C

**Synchrophasor Accuracy**

**Maximum Message Rate**
- Nominal 60 Hz System: 60 messages per second
- Nominal 50 Hz System: 50 messages per second

**Accuracy for Voltages**
Level 1 compliant as specified in IEEE C37.118 under the following conditions for the specified range.

Conditions:
- At maximum message rate
- When phasor has the same frequency as the positive-sequence tracking quantity (see Table H.10)
- Frequency-based phasor compensation is enabled (PHCOMP := Y)
- The narrow bandwidth filter is selected (PMAPP := N)

Range:
- Frequency: ±5.0 Hz of nominal (50 or 60 Hz)
- Magnitude: 30 V–250 V
- Phase Angle: −179.99° to 180°
- Out-of-Band Interfering Frequency (Fs): 10 Hz ≤ Fs ≤ (2 • FNOM)

**Accuracy for Currents**
Level 1 compliant as specified in IEEE C37.118 under the following conditions for the specified range.

Conditions:
- At maximum message rate
- When phasor has the same frequency as the positive-sequence tracking quantity (see Table H.10)
- Frequency-based phasor compensation is enabled (PHCOMP := Y)
- The narrow bandwidth filter is selected (PMAPP := N)

Range:
- Frequency: ±5.0 Hz of nominal (50 or 60 Hz)
- Magnitude: (0.4–2) • INOM (INOM = 1 A or 5 A)
- Phase Angle: −179.99° to 180°
- Out-of-Band Interfering Frequency (Fs): 10 Hz ≤ Fs ≤ (2 • FNOM)
Single Line Diagram Proteksi PLTA Ir. H. Djuanda Jatiluhur
Lampiran : 3  
No. Formulir : F-Pro. 19.03

Kepada Yth,
General Manager Unit PLTA
Perum Jasa Tirta II
di
Jatiluhur

LAPORAN GANGGUAN

I. Gangguan : Hari/Tanggal : Kamis /05 Oktober 2017
Pukul : 09.39
Jenis Gangguan : TBB1, Penguatan

II. Indikasi Gangguan :

☐ Di PLC

☑ Di Panel Komando
  : TBB1, Penguatan

III. Pemeriksaan dan Perbaikan :
  - Pemeriksaan : Pemeriksaan pada P. PLC & P.AVR
  - Perbaikan : Percepatan pengujian di Panel AVR

IV. Sebab Gangguan :
  - Eksitasi fault.

IV. Akibat Gangguan :
  - Unit 3 tidak beroperasi

IV. Verifikasi Keefektifan Tindakan Perbaikan :
  - Unit 3 Kembali Beroperasi pada pukul 11.15

Unit PLTA
Manager Operasional Pembangkitan

H. Ade Suhaedini, ST
NIK. 040708 9270
Kepada Yth,
General Manajer Unit PLTA
Perum Jasa tirta II
di
Jatiluhur

LAPORAN GANGGUAN

I. Gangguan : Hari/Tanggal : Kamis / 05 Oktober 2017
   Pukul : 14.47
   Jenis Gangguan : LT1, Penguatan, Trafo35MVA

II. Indikasi Gangguan :
   [ ] Di PLC
   [ V ] Di Panel Komando
       : LT1, Penguatan, Trafo35MVA

III. Pemeriksaan dan Perbaikan :
   - Pemeriksaan : Pemeriksaan pada P. PLC & P.AVR
   - Perbaikan : Pengecekan Tegangan Eksitasi

IV. Sebab Gangguan :
   - Eksitasi fault

IV. Akibat Gangguan :
   - Unit 3 tidak beroperasi

IV. Verifikasi Keefektifan Tindakan Perbaikan
   - Unit 3 Kembali Beroperasi pada pukul 20.41

Unit PLTA
Manajer Operasional Pembangkitan

H. Ade Suhedin, ST
NIK: 040782970
LAMPIRAN GANGGUAN

I. Gangguan

<table>
<thead>
<tr>
<th>Hari/Tanggal</th>
<th>06 Oktober 2017</th>
</tr>
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<tbody>
<tr>
<td>Pukul</td>
<td>03.10</td>
</tr>
<tr>
<td>Jenis Gangguan</td>
<td>TBB1, Trafo35MVA, Penguatan</td>
</tr>
</tbody>
</table>

II. Indikasi Gangguan

| Indikasi |  
|----------|---|
| PLC      |  
| Panel Komando | TBB1, Trafo35MVA, Penguatan |

III. Pemeriksaan dan Perbaikan

- Pemeriksaan: Pemeriksaan pada panel PLC dan AVR
- Perbaikan: Pengecekan tegangan Eksitas

IV. Sebab Gangguan

- Eksitas fault

IV. Akibat Gangguan

- Unit 3 tidak beroperasi

IV. Verifikasi Keefektifan Tindakan Perbaikan

- Unit 3 Kembali Beroperasi pada pukul 09.06

Unit PLTA
Manajer Operasional Pembangkitan

H. Adi Suhardin, ST
NIK: 040789270