

Línea: **Mejillones-O'Higgins**  
pafio: **5212**  
TC: **800/5**  
TP: **23000/115**

| SISTEMA 2  |                      |  |                         |
|--|----------------------|--|-------------------------|
| Relé SEL-421   |                      | Relé SIEMENS 7SA87                               |                         |
| Line Configuration Settings                                  |                      | Datos generales de Línea                         |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| Z1MAG (Ohm sec)  | 1.91                 | X per length unit (ohm sec)                      | 0.0249                  |
| Z1ANG  | 75.7                 | Line angle                                       | 75.70                   |
| Z0MAG (Ohm sec)  | 5.92                 | C1 per length unit (uOhm sec)                    | 0.147                   |
| Z0ANG  | 71.5                 | C0 per length unit (uOhm sec)                    | 0.078                   |
| LL   | 74.00                | Line length                                      | 74.00                   |
| PHASE DISTANCE   |                      | PHASE DISTANCE                                   |                         |
| Mho Phase Distance Element Reach                             |                      | Quad Phase Distance Element Reach                |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| Z1P Zone 1 (Ohm sec)   | 1.53                 | Z1 P Reach (Ohm sec)                             | 1.47                    |
| Z2P Zone 2 (Ohm sec)   | 2.29                 | Z1 R (PhPh) (Ohm sec)                            | 0.79                    |
| Z3P Zone 3 (Ohm sec)   | 0.57                 | Z2 X Reach (Ohm sec)                             | 2.41                    |
| Z4P Zone 4 (Ohm sec)   | 3.65                 | Z2 R (PhPh) (Ohm sec)                            | 1.19                    |
| Z1 Level Direction   | F                    | Z3 X Reach (Ohm sec)                             | 0.35                    |
| Z2 Level Direction   | F                    | Z3 R (PhPh) (Ohm sec)                            | 0.29                    |
| Z3 Level Direction   | R                    | Z4 X Reach (Ohm sec)                             | 3.52                    |
| Z4 Level Direction   | F                    | Z4 R (PhPh) (Ohm sec)                            | 1.89                    |
| Z1 Level Direction   | F                    | Z1 Directional mode                              | Forward                 |
| Z2 Level Direction   | F                    | Z2 Directional mode                              | Forward                 |
| Z3 Level Direction   | R                    | Z3 Directional mode                              | Reverse                 |
| Z4 Level Direction   | F                    | Z4 Directional mode                              | Forward                 |
| Mho Phase Distance Element Time Delay                        |                      | Distance Element Time Delay                      |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| Z1PD Zone 1 (Cycles)   | 0                    | Operate delay Z1 (seg)                           | 0.00                    |
| Z2PD Zone 2 (Cycles)   | 20                   | Operate delay Z2 (seg)                           | 0.40                    |
| Z3PD Zone 3 (Cycles)   | 50                   | Operate delay Z3 (seg)                           | 1.00                    |
| Z4PD Zone 4 (Cycles)   | 60                   | Operate delay Z4 (seg)                           | 1.20                    |
| Ground Distance Correction Angle                             |                      | Distance Element Correction Angle                |                         |
| WANG Non-homogeneous Correction Angle                        | -3.00                | Zone-inclination angle Z1 (°)                    | 0 °                     |
| GROUND DISTANCE  |                      | GROUND DISTANCE                                  |                         |
| Quad Ground Distance Element Reach                           |                      | Quad Ground Distance Element Reach               |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| XG1 Zone 1 Resistance (Ohm sec)                              | 1.47                 | Z1 X Reach (Ohm sec)                             | 2.41                    |
| RIG Zone 1 Resistance (Ohm sec)                              | 4.39                 | Z1 R (Ph-Gnd) (Ohm sec)                          | 4.39                    |
| XG2 Zone 2 Resistance (Ohm sec)                              | 2.21                 | Z2 X Reach (Ohm sec)                             | 2.21                    |
| RIG Zone 2 Resistance (Ohm sec)                              | 5.91                 | Z2 R (Ph-Gnd) (Ohm sec)                          | 5.91                    |
| XG3 Zone 3 Resistance (Ohm sec)                              | 0.55                 | Z3 X Reach (Ohm sec)                             | 0.55                    |
| RIG Zone 3 Resistance (Ohm sec)                              | 1.65                 | Z3 R (Ph-Gnd) (Ohm sec)                          | 1.65                    |
| XG4 Zone 4 Resistance (Ohm sec)                              | 3.52                 | Z4 X Reach (Ohm sec)                             | 3.52                    |
| RIG Zone 4 Resistance (Ohm sec)                              | 10.55                | Z4 R (Ph-Gnd) (Ohm sec)                          | 10.55                   |
| Z1 Level Direction   | F                    | Z1 Directional mode                              | Forward                 |
| Z2 Level Direction   | F                    | Z2 Directional mode                              | Forward                 |
| Z3 Level Direction   | R                    | Z3 Directional mode                              | Reverse                 |
| Z4 Level Direction   | F                    | Z4 Directional mode                              | Forward                 |
| Ground Distance Element Time Delay                           |                      | Ground Distance Element Time Delay               |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| Z1GD Zone 1 Time Delay (Cycles)                              | 0                    | Operate delay Z1 (seg)                           | 0.00                    |
| Z2GD Zone 2 Time Delay (Cycles)                              | 20                   | Operate delay Z2 (seg)                           | 0.40                    |
| Z3GD Zone 3 Time Delay (Cycles)                              | 50                   | Operate delay Z3 (seg)                           | 1.00                    |
| Z4GD Zone 4 Time Delay (Cycles)                              | 60                   | Operate delay Z4 (seg)                           | 1.20                    |
| Ground Distance Correction Angle                             |                      | Distance Element Correction Angle                |                         |
| WANG Non-homogeneous Correction Angle                        | -3.00                | Zone-inclination angle Z1 (°)                    | 0 °                     |
| RESIDUAL COMPENSATION FACTOR                                 |                      | RESIDUAL COMPENSATION FACTOR                     |                         |
| Quad Ground Distance Element Reach                           |                      | Quad Ground Distance Element Reach               |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| MDM1 Zone 1 ZSC Factor Magnitude                             | 0.68                 | 21.9001.118_K0                                   | 0.70                    |
| MDA1 Zone 1 ZSC Factor Angle                                 | -5.30                | 21.9001.150_Angle K0                             | -4.92                   |
|  |                      | 21.9001.118_K0                                   | 0.70                    |
|  |                      | 21.9001.150_Angle K0                             | -4.92                   |
| SUPERVISIÓN DE TENSIÓN POR PERDIDA DE POTENCIAL              |                      |  |                         |
| ELOP   |                      | Mex x fail detMode                               |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| ELOP Loss of Potential                                       | Y1                   | Mode   | On                      |
|  |                      | Asym fail-500 on netw.Rt                         | no                      |
|  |                      | Asym fail - time delay                           | 10 s                    |
|  |                      | 3ph fail - phs current lags (A sec)              | 0.25                    |
|  |                      | 3ph fail - phs curr. jump (A sec)                | 0.25                    |
|  |                      | 3ph fail - WAVEC - V sec)                        | 5 V                     |
|  |                      | Switch-on 3ph. failure                           | on                      |
|  |                      | 50 3ph fail - time delay                         | 3 s                     |
| TIME OVERCURRENT (EMERGENCY MODE)                            |                      |  |                         |
| Selectable Operating Instantaneous/Definite-Time Overcurrent |                      | 60 OC-3ph-A1 No direccional                      |                         |
| SOPFL Level 1 Pickup   | 8.61                 | Threshold (Amp sec)                              | on A                    |
| 67PID Level 1 Time Delay (Cycles)                            | 0                    | Time delay (sec)                                 | 0                       |
| Selectable Operating Quantity Inverse-Time OC Elem 1         |                      | 6160 OC-3ph-A1                                   |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| 5151TC 5151 Torque Control                                   | LOP                  | 21.221.2311.101_Emergency Mode                   | Caused by main prot     |
| 5151O 5151 Operating Quantity                                | InvA6                | Inverse-TI Mode                                  | On                      |
| 5151P 5151 Overcurrent Pickup (Amp sec)                      | 4.00                 | Threshold (Amp sec)                              | 5.56                    |
| 5151C 5151 Inv-time O/C Curve                                | C1                   | Type of character. Curve                         | I/C Normal Inverse      |
| 5151TD 5151 Inv-time O/C Time Dial                           | 0.08                 | Time dial  | 0.12                    |
| Selectable Operating Quantity Inverse-Time OC Elem 2         |                      | 51N50N OC-gnd-A1                                 |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| 550G Res. Ground Inst. Def. Time O/C Elements                | LOP                  | 21.221.2311.101_Emergency Mode                   | Caused by main prot     |
| 550GP Level 2 Pickup (Amp sec)                               | 0.50                 | Threshold (Amp sec)                              | On                      |
| 67GID Level 2 Time Delay (Cycles)                            | 60.00                | Type of character. Curve                         | 0.50                    |
|  |                      | Time dial  | I/C Normal Inverse      |
|  |                      |  | 0.25                    |
| RESIDUAL GROUND INSTANTANEOUS OVERCURRENT                    |                      |  |                         |
| Residual Ground Instantaneous Overcurrent Elem 1             |                      | 67N G.F.P. gnd. Sys.1                            |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| 550G Res. Ground Inst. Def. Time O/C Elements                | 2                    | Inverse-TI Mode                                  | On                      |
| 550GP Level 1 Pickup (Amp sec)                               | 0.50                 | Threshold (Amp sec)                              | 1.00                    |
| 67GID Level 1 Time Delay (Cycles)                            | 60.00                | Type of character. Curve                         | I/C Normal Inverse      |
|  |                      | Time dial  | 0.39                    |
| 85-67N Dir.com Mode (ANSI 85C)                               |                      |  |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| EPDIR  | Y                    | 21.1301.5761.1_Mode                              | On                      |
|  |                      | 21.1301.5761.101_Send prolongation [s]           | 0.08                    |
|  |                      | 21.1301.5761.102_85-67N Dir.com Send delay [s]   | 0.00                    |
|  |                      | 21.1301.5761.105_Trans. blk. pickup delay [s]    | 0.04                    |
|  |                      | 21.1301.5761.106_Trans. blk. dropout delay [s]   | 0.15                    |
| RCOMMD   | (67G) AND (NOT N103) | 21.1301.5761.140_85-67N Dir.com Send with        | 67N Inverse-T1          |
| RCOMMD   | (67G) AND (NOT N103) | 21.1301.5761.141_85-67N Dir.com Operate with     | 67N Inverse-T1          |
|  |                      | 21.1301.5761.142_85-21 Dir.com Trans. block With | False                   |
| Fault Location Settings                                      |                      | Fault Locator                                    |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| EFLOC  | Y                    | Fault Locator Mode                               | On                      |
|  |                      | Start  | With zone pick up       |
|  |                      | Load Compensation                                | no                      |
| LOAD ENCRoACHMENT  |                      |  |                         |
| Load Encroachment  |                      | Z Pickup Zc                                      |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| ELOAD Load Encroachment                                      | Y                    | Use phg load cutoff                              | yes                     |
| Z1F Forward Load Impedance (Ohm sec)                         | 7.63                 | R load cutoff (ph-ph and ph-g)                   | 9.53                    |
| Z1R Reverse Load Impedance (Ohm sec)                         | 7.63                 | Angle load cutoff (ph-ph and ph-g)               | 30.00                   |
| PLAF Forward Load Positive Angle                             | 30.00                | Angle load cutoff (ph-ph and ph-g)               | 30.00                   |
| PLAR Reverse Load Positive Angle                             | 150.00               | Angle load cutoff (ph-ph and ph-g)               | 30.00                   |
| OUT OF STEP - POWER SWING                                    |                      |  |                         |
| ID   |                      | ID   |                         |
| EOSD Out-of-Step   | Y                    | 68 Power swing trip                              | On                      |
| ODS81 Block Zone 1   | Y                    | Zones to be blocked                              | 21 Distance prot. 1.2.1 |
| ODS82 Block Zone 2   | Y                    | Zones to be blocked                              | 21 Distance prot. 1.2.2 |
| ODS81 Block Zone 1   | Y                    | Zones to be blocked                              | 21 Distance prot. 1.2.3 |
| ODS82 Block Zone 2   | Y                    | Zones to be blocked                              | 21 Distance prot. 1.2.4 |
| OSBD Out-of-Step Block Time Delay                            | 1.63                 | Max. Blocking Time (sec)                         | on                      |
| SWITCH-ONTO FAULT  |                      |  |                         |
| Switch-onto-Fault Scheme                                     |                      | Switch-onto-Fault                                |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| ESOFF Switch-onto-Fault                                      | Y                    | Stage 1 Mode Mode                                | On                      |
|  |                      | Stage 1 Operate & Block blocked                  | no                      |
|  |                      | Stage 1 Operate delay                            | 0.00 s                  |
|  |                      | Stage 1 Configuration                            | 21 Distance Z.2         |
|  |                      |  | 50 OC High-Speed 1      |
|  |                      | Mode   | On                      |
|  |                      | Activation                                       | On CB Closure           |
|  |                      | Threshold (A sec)                                | 6.00                    |
| BREAKER FAILURE  |                      |  |                         |
| Breaker 1 Failure Logic                                      |                      | 50BF Ad.CBF 1                                    |                         |
| ID   | Ajustes              | ID   | Ajustes                 |
| EBFL 1 Breaker 1 Failure Logic                               | N                    | 50BF Ad. CBF 1 Mode                              | On                      |

| SYNCHRONISM CHECK                      |         |                                      |         |  |
|--|---------|--------------------------------------|---------|--|
| Synchronism Check for Breaker 1        |         | 25 Synchronization                   |         |  |
| ID                                     | Ajustes | ID                                   | Ajustes | Observaciones  |
| E25BK1 Synchronism Check for Breaker 1 | N       | Syncheck 1 General Mode              | On      | Se recomienda habilitar y ajustar a los siguientes valores                             |
|  |         | Max. voltage diff. V2-V1 (Volt/sec)  | 11.5    | Diferencia de tensión menor al 10% de la tensión nominal (VL-L x 0.1 = 115 Vsec x 0.1) |
|  |         | Max. voltage diff. V2-V1 (Volt/sec)  | 11.5    |  |
|  |         | Max. frequency diff. f2-f1           | 0.10 Hz | En este caso se recomienda ajustar en 0.10 Hz  |
|  |         | Max. frequency diff. f2-f1           | 0.10 Hz |  |
|  |         | Max. angle diff.                     | 10°     | En este caso se recomienda ajustar en 10°  |
|  |         | Max. angle diff.                     | 10°     |  |
|  |         | V1, V2 without voltage (Volt/sec)    | 34.50   | (VL-L x 0.30 = 115 Vsec x 0.3)   |
|  |         | V1, V2 with voltage (Volt/sec)       | 92.00   | (VL-L x 0.80 = 115 Vsec x 0.8)   |
|  |         | Max. operating limit Vmin (Volt/sec) | 103.50  | (VL-L x 0.90 = 115 Vsec x 0.9)   |
|  |         | Max. operat. limit Vmax (Volt/sec)   | 126.50  | (VL-L x 1.10 = 115 Vsec x 1.1)   |

Nota: La función Fall Interruptor correspondiente a la línea Mejillones - O'Higgins (extremo Mejillones) se encuentra ajustada en una protección externa de referencia 7VX

| BREAKER FAILURE                            |         |                                    |         |  |
|--|---------|------------------------------------|---------|--|
| SOBF Ad.CBF 1                              |         | SOBF Ad.CBF 1                      |         |  |
| ID   | Ajustes | ID                                 | Ajustes | Observaciones  |
| Breaker Failure Protection                 | On      | SOBF Ad. CBF 1 Mode                | On      |  |
| Pick-up threshold I <sub>0</sub> (Amp pri) | 960 A   | Threshold ground current (Amp pri) | 889 A   | Ajustes recomendados para la función ANSI SOBF en transformadores como se indica en el numeral 5.2.1 |
| T1 delay after 1/3 pole start (local trip) | 0.08    | Delay T1 for 3-pole retrip (s)     | 0.01    |  |
| T2 delay after 2nd stage (busbar trip)     | 0.20    | Delay T2 for 3-pole trip (s)       | 0.20    |  |

| SISTEMA 1   |         |   |         |  |
|---|---------|---|---------|--|
| PHASE DISTANCE  |         | PHASE DISTANCE                            |         |  |
| ID  | Ajustes | ID  | Ajustes | Observaciones  |
| X per length unit (ohm/sec)                                   | 0.025   | X per length unit (ohm/sec)               | 0.025   | Ajuste sin cambios   |
| Line angle  | 75.00   | Line angle                                | 75.00   | Ajuste sin cambios   |
| Line length   | 74.00   | Line length                               | 74.00   | Ajuste sin cambios   |
| Distance zones (quadrilateral)                                |         |   |         |  |
| ID  | Ajustes | ID  | Ajustes | Observaciones  |
| XZ(1), Resistance   | 1.47    | XZ(1), Resistance                         | 1.47    | Ajuste sin cambios   |
| RZ(1), Resistance for ph-ph faults                            | 1.47    | RZ(1), Resistance for ph-ph faults        | 0.79    | Ajuste recomendado con el fin de que el sistema 1 y 2 sean iguales |
| RZ(1), Resistance for ph-gnd faults                           | 4.39    | RZ(1), Resistance for ph-gnd faults       | 4.39    | Ajuste sin cambios   |
| XZ(2), Resistance   | 2.21    | XZ(2), Resistance                         | 2.21    | Ajuste sin cambios   |
| RZ(2), Resistance for ph-ph faults                            | 2.21    | RZ(2), Resistance for ph-ph faults        | 1.18    | Ajuste recomendado con el fin de que el sistema 1 y 2 sean iguales |
| RZ(2), Resistance for ph-gnd faults                           | 5.91    | RZ(2), Resistance for ph-gnd faults       | 5.91    | Ajuste sin cambios   |
| XZ(4), Resistance   | 3.52    | XZ(4), Resistance                         | 3.52    | Ajuste sin cambios   |
| RZ(4), Resistance for ph-ph faults                            | 3.52    | RZ(4), Resistance for ph-ph faults        | 1.78    | Ajuste recomendado con el fin de que el sistema 1 y 2 sean iguales |
| RZ(4), Resistance for ph-gnd faults                           | 10.55   | RZ(4), Resistance for ph-gnd faults       | 10.55   | Ajuste sin cambios   |
| XZ(3), Resistance   | 0.55    | XZ(3), Resistance                         | 0.55    | Ajuste sin cambios   |
| RZ(3), Resistance for ph-ph faults                            | 0.55    | RZ(3), Resistance for ph-ph faults        | 0.29    | Ajuste recomendado con el fin de que el sistema 1 y 2 sean iguales |
| RZ(3), Resistance for ph-gnd faults                           | 1.65    | RZ(3), Resistance for ph-gnd faults       | 1.65    | Ajuste sin cambios   |
| XZ(4), Resistance   | Forward | Operating mode Z1                         | Forward | Ajuste sin cambios   |
| Operating mode Z2   | Forward | Operating mode Z2                         | Forward | Ajuste sin cambios   |
| Operating mode Z3   | Reverse | Operating mode Z3                         | Reverse | Ajuste sin cambios   |
| Operating mode Z4   | Forward | Operating mode Z4                         | Forward | Ajuste sin cambios   |
| Group Distance protection, general settings, Group Time Delay |         |   |         |  |
| ID  | Ajustes | ID  | Ajustes | Observaciones  |
| T1 1-phase, delay for single phase faults                     | 0.00    | T1 1-phase, delay for single phase faults | 0.00    | Ajuste sin cambios   |
| T2 1-phase, delay for single phase faults                     | 0.40    | T2 1-phase, delay for single phase faults | 0.40    | Ajuste sin cambios   |
| T3 delay  | 1.00    | T3 delay                                  | 1.00    | Ajuste sin cambios   |
| T4 delay  | 1.20    | T4 delay                                  | 1.20    | Ajuste sin cambios   |
| Zone Reduction Angle (load compensation)                      | 0°      | Zone Reduction Angle (load compensation)  | 0°      | Ajuste sin cambios   |

| RESIDUAL COMPENSATION FACTOR               |         |  |         |  |
|--|---------|--|---------|--|
| Quad Ground Distance Element Reach         |         | Quad Ground Distance Element Reach         |         |  |
| ID   | Ajustes | ID   | Ajustes | Observaciones  |
| Zero seq. comp. factor K0 for zone Z1      | 0.68    | Zero seq. comp. factor K0 for zone Z1      | 0.68    | Ajuste Calculado con base a los parámetros de la línea |
| Zero seq. comp. angle for zone Z1          | -3.30   | Zero seq. comp. angle for zone Z1          | -3.30   | Ajuste Calculado con base a los parámetros de la línea |
| Zero seq. comp. factor K0 higher zones >Z1 | 0.68    | Zero seq. comp. factor K0 higher zones >Z1 | 0.70    | Ajuste Calculado con base a los parámetros de la línea |
| Zero seq. comp. angle higher zones >Z1     | -3.30   | Zero seq. comp. angle higher zones >Z1     | -3.30   | Ajuste Calculado con base a los parámetros de la línea |

| SUPERVISIÓN DE TENSIÓN POR PERDIDA DE POTENCIAL    |  |  |  |                    |
|--|--|--|--|--------------------|
| Fuse Fail monitor                                  |  |  |  |                    |
| ID   | Ajustes                                  | ID   | Ajustes                                  | Observaciones      |
| Fuse Fail monitor Mode                             | On                                       | Fuse Fail monitor Mode                             | On                                       | Ajuste sin cambios |
| Minimum Voltage Threshold V <sub>0</sub>           | 10 V                                     | Minimum Voltage Threshold V <sub>0</sub>           | 10 V                                     | Ajuste sin cambios |
| Maximum Current Threshold I <sub>0</sub>           | 0.50                                     | Maximum Current Threshold I <sub>0</sub>           | 0.50                                     | Ajuste sin cambios |
| Maximum Voltage Threshold V <sub>0</sub> (3-phase) | 5V                                       | Maximum Voltage Threshold V <sub>0</sub> (3-phase) | 5V                                       | Ajuste sin cambios |
| Delta Current Threshold (phase)                    | 0.50 A                                   | Delta Current Threshold (phase)                    | 0.50 A                                   | Ajuste sin cambios |
| Voltage Failure Supervision                        | with current supervision and Cbpos (53a) | Voltage Failure Supervision                        | with current supervision and Cbpos (53a) | Ajuste sin cambios |
| Delay Voltage Failure Supervision                  | 3 s                                      | Delay Voltage Failure Supervision                  | 3 s                                      | Ajuste propuesto   |

| TIME OVERCURRENT NO DIRECTIONAL - EMERGENCY |   |                  |   |  |
|---|---|------------------|---|--|
| I1/50 OC-3ph-A1                             |   |                  |   |  |
| ID  | Ajustes                                 | ID               | Ajustes                                 | Observaciones  |
| Operating mode                              | ON: Only active with Loss of VT sec. cr | Operating mode   | ON: Only active with Loss of VT sec. cr | Modo de Emergencia por pérdida de potencial                                |
| 50 B2 Pickup                                | 6.00 A                                  | 50 B2 Pickup     | oo A                                    | Se recomienda deshabilitar la función ANSI 50 y ajustar la función ANSI 51 |
| 50 B2 Time delay                            | 0.50 sec                                | 50 B2 Time delay | 0.50 sec                                | Se recomienda deshabilitar la función ANSI 50 y ajustar la función ANSI 51 |
| 50 B1 Pickup                                | oo A                                    | 50 B1 Pickup     | oo A                                    | Se recomienda deshabilitar la función ANSI 50 y ajustar la función ANSI 51 |
| 50 B1 Time delay                            | 0.30 sec                                | 50 B1 Time delay | 0.30 sec                                | Se recomienda deshabilitar la función ANSI 50 y ajustar la función ANSI 51 |
| 80 Pickup                                   | 6.00 A                                  | 80 Pickup        | 3.55                                    | Ajuste recomendado como se indica en numeral 5.3 del informe               |
| T10 Time Dial                               | 0.08 sec                                | T10 Time Dial    | 0.12                                    | Ajuste recomendado como se indica en numeral 5.3 del informe               |
| IE Curve                                    | IEC Normal Inverse                      | IE Curve         | IEC Normal Inverse                      | Ajuste recomendado como se indica en numeral 5.3 del informe               |

| I1/50 OC-3ph-A1   |   |                   |   |  |
|-------------------|---|-------------------|---|--|
| ID                | Ajustes                                 | ID                | Ajustes                                 | Observaciones  |
| Operating mode    | ON: Only active with Loss of VT sec. cr | Operating mode    | ON: Only active with Loss of VT sec. cr | Modo de Emergencia por pérdida de potencial                                  |
| 50N B2 Pickup     | 0.50 A                                  | 50N B2 Pickup     | oo A                                    | Se recomienda deshabilitar la función ANSI 50N y ajustar la función ANSI 51N |
| 50N B2 Time delay | 1.20 sec                                | 50N B2 Time delay | oo sec                                  | Se recomienda deshabilitar la función ANSI 50N y ajustar la función ANSI 51N |
| 50N B1 Pickup     | oo A                                    | 50N B1 Pickup     | oo A                                    | Se recomienda deshabilitar la función ANSI 50N y ajustar la función ANSI 51N |
| 50N B1 Time delay | 2.00 sec                                | 50N B1 Time delay | oo sec                                  | Se recomienda deshabilitar la función ANSI 50N y ajustar la función ANSI 51N |
| 80N Pickup        | oo A                                    | 80N Pickup        | 0.50                                    | Ajuste recomendado como se indica en numeral 5.3 del informe                 |
| T10N Time Dial    | 0.50 sec                                | T10N Time Dial    | 0.25 sec                                | Ajuste recomendado como se indica en numeral 5.3 del informe                 |
| IE Curve          | IEC Normal Inverse                      | IE Curve          | IEC Normal Inverse                      | Ajuste recomendado como se indica en numeral 5.3 del informe                 |

| TIME OVERCURRENT (DIRECTIONAL FORWARD MODE) |              |  |                    |   |
|---|--------------|--|--------------------|---|
| 67N GPF and Syn. 1                          |              |  |                    |   |
| ID  | Ajustes      | ID                                     | Ajustes            | Observaciones   |
| Operating mode                              | Forward      | Operating mode                         | Forward            | Función de sobrecorriente direccional de tierra habilitada hacia adelante |
| 30A Pickup                                  | 0.50 A       | 30A Pickup                             | Inactive           | Ajuste propuesto  |
| Operating Mode                              | Forward - ID | Operating Mode                         | Forward            | Ajuste propuesto  |
| T30A Time delay                             | 1.20 sec     | Time Dial                              | oo                 | Ajuste propuesto  |
| 51N Directional Inverse Time                | Inactive     | 51N Directional Inverse Time           | Forward            | Ajuste propuesto  |
| Threshold (Amp sec)                         | 1.00         | Threshold (Amp sec)                    | 1.00               |   |
| Type of character Curve                     | Time dial    | Type of character Curve                | IEC Normal Inverse |   |
| Instantaneous trip via Pilot Prot. (B)      | YES          | Instantaneous trip via Pilot Prot. (B) | YES                | Aceleración por esquema de comparación direccional                        |

| 85-67N PILOT PROT. GND. OVERCURRENT               |               |   |               |   |
|---|---------------|---|---------------|---|
| 85-67N Pilot Prot. for Gnd. O/C                   |               |   |               |   |
| ID  | Ajustes       | ID  | Ajustes       | Observaciones   |
| Line Configuration                                | Two Terminals | Line Configuration                                | Two Terminals | Se habilita un esquema de comparación direccional con el objetivo de despejar fallas residuales de alta resistencia |
| Time for send signal prolongation                 | 0.05 sec      | Time for send signal prolongation                 | 0.08 sec      |   |
| Transient Block, Duration external R <sub>0</sub> | 0.04 sec      | Transient Block, Duration external R <sub>0</sub> | 0.04 sec      | Tiempos recomendados en numeral 4.13 del documento de criterios y 5.9 del Documento                                 |
| Transient Block, BKR 1 after ext. R <sub>0</sub>  | 0.05 sec      | Transient Block, BKR 1 after ext. R <sub>0</sub>  | 0.05 sec      |   |

| FAULT LOCATOR            |         |                          |         |   |
|--------------------------|---------|--------------------------|---------|---|
| Fault Location Settings  |         |                          |         |   |
| ID                       | Ajustes | ID                       | Ajustes | Observaciones   |
| Start fault locator with | BP      | Start fault locator with | BP      |   |
| Load Compensation        | NO      | Load Compensation        | NO      | Cálculo para la Función Fault Locator depende de Power System Data 2 o parámetros de la línea |

| LOAD ENCRACHMENT (Omnibus secondary)   |         |  |         |   |
|--|---------|--|---------|---|
| Load Encroachment                      |         |  |         |   |
| ID                                     | Ajustes | ID                                     | Ajustes | Observaciones   |
| R load, minimum Load Impedance (ph-e)  | 7.63    | R load, minimum Load Impedance (ph-e)  | 9.53    | Ajuste propuesto, ya que actualmente no se tiene ajustada la función Load Encroachment en el sistema 2 - Cálculo de ajuste en numeral 5.5 |
| R load, minimum Load Impedance (ph-ph) | 30.00   | R load, minimum Load Impedance (ph-ph) | 30.00   | Ajuste propuesto  |
| PH load, maximum Load Angle (ph-ph)    | 30.00   | PH load, maximum Load Angle (ph-ph)    | 30.00   | Ajuste propuesto  |
| PH load, maximum Load Angle (ph-ph)    | 30.00   | PH load, maximum Load Angle (ph-ph)    | 30.00   | Ajuste propuesto  |

| OUT OF STEP - POWER SWING  |                   |                            |                   |  |
|----------------------------|-------------------|----------------------------|-------------------|--|
| OUT OF STEP - POWER SWING  |                   |                            |                   |  |
| ID                         | Ajustes           | ID                         | Ajustes           | Observaciones  |
| 68 Power swing trip        | On                | 68 Power swing trip        | On                | Ajuste actualmente habilitado como se indica en el numeral 5.5 del informe |
| Power Swing Operation mode | all zones blocked | Power Swing Operation mode | all zones blocked |  |
| Power swing trip           | NO                | Power swing trip           | NO                |  |

| SWITCH ONTO FAULT           |         |                             |         |   |
|-----------------------------|---------|-----------------------------|---------|---|
| Switch-onto-Fault           |         |                             |         |   |
| ID                          | Ajustes | ID                          | Ajustes | Observaciones   |
| Inst. High Speed SOF-O/C is | On      | Inst. High Speed SOF-O/C is | On      | Se recomienda habilitar, ya que actualmente la función no se encuentra habilitada |
| Inst. Pickup                | 10.77   | Inst. Pickup                | 6.00    | Se recomienda ajustar con base a cálculo obtenido en el numeral 5.1               |

| BREAKER FAILURE     |         |                     |         |   |
|---------------------|---------|---------------------|---------|---|
| SOBF Ad.CBF 1       |         |                     |         |   |
| ID                  | Ajustes | ID                  | Ajustes | Observaciones   |
| SOBF Ad. CBF 1 Mode | Off     | SOBF Ad. CBF 1 Mode | Off     | La función ANSI 50.BF se encuentra habilitada y ajustada en un relé 7VX |

| Synchronization and Voltage Check |          |                                   |  |  |
|-----------------------------------|----------|-----------------------------------|--|--|
| ID                                | Ajustes  | ID                                | Ajustes                                  | Observaciones  |
| 25 Synchronism and Voltage check  | Disabled | Operating mode with AR            | without consideration of CB closing time | Se recomienda habilitar y ajustar igual al sistema 1                                   |
|                                   |          | Maximum voltage difference        |  | Diferencia de tensión menor al 10% de la tensión nominal (VL-L x 0.1 = 115 Vsec x 0.1) |
|                                   |          | Maximum frequency difference      |  | Ajuste sin cambios   |
|                                   |          | Maximum angle difference          |  | Ajuste sin cambios   |
|                                   |          | AR at Usy1, Usy2 and Synch        | YES                                      | Ajuste sin cambios   |
|                                   |          | AR at Usy1 and Usy2               | YES                                      | Ajuste sin cambios   |
|                                   |          | Voltage threshold dead line / bus | 34.50                                    | (VL-L x 0.30 = 115 Vsec x 0.3)   |
|                                   |          | Voltage threshold live line / bus | 92.00                                    | (VL-L x 0.80 = 115 Vsec x 0.8)   |
|                                   |          | Maximum permissible voltage       | 126.50                                   | (VL-L x 1.10 = 115 Vsec x 1.1)   |

| GROUP 85-21 Pilot Prot. for Distance prot.        |               |   |               |                    |
|---|---------------|---|---------------|--------------------|
| Group 85-21 Pilot Prot. for Distance prot.        |               |   |               |                    |
| ID  | Ajustes       | ID  | Ajustes       | Observaciones      |
| 85-21 Pilot Prot. for Distance prot.              | POTT          | 85-21 Pilot Prot. for Distance prot.              | POTT          | Ajuste sin cambios |
| Type of Line                                      | Two Terminals | Type of Line                                      | Two Terminals | Ajuste sin cambios |
| Time for send signal prolongation                 | 0.05 sec      | Time for send signal prolongation                 | 0.05 sec      | Ajuste sin cambios |
| Transient Block, Duration external R <sub>0</sub> | 0.04 sec      | Transient Block, Duration external R <sub>0</sub> | 0.04 sec      | Ajuste sin cambios |
| Transient Block, BKR 1 after ext. R <sub>0</sub>  | 0.05 sec      | Transient Block, BKR 1 after ext. R <sub>0</sub>  | 0.05 sec      | Ajuste sin cambios |