

PASIŪLYMAS**DĖL CA IR MATRICOS PRIEDŲ PIRKIMO**

2025-11-03

(data)

Vilnius

(vieta)

Tiekėjo pavadinimas (<i>Jeigu dalyvauja ūkio subjektų grupė, surašomi visi dalyvių pavadinimai</i>)	Hannu Pro Vilnius, UAB
Tiekėjo adresas (<i>Jeigu dalyvauja ūkio subjektų grupė, surašomi visi dalyvių adresai</i>)	A.Juozapavičiaus g. 6, 09310 Vilnius
Tiekėjo įmonės kodas (<i>Jeigu dalyvauja ūkio subjektų grupė, surašomi visi dalyvių įmonės kodai</i>)	123918132
Tiekėjo banko rekvizitai (<i>Jeigu dalyvauja ūkio subjektų grupė, surašomi visi dalyvių banko rekvizitai</i>)	AB bankas „Swedbank“, a.s. LT84 7300 0100 0002 2988
Tiekėjo PVM mokėtojo kodas (<i>Jeigu dalyvauja ūkio subjektų grupė, surašomi visi dalyvių PVM mokėtojų kodai</i>)	LT239181314
Telefono numeris (<i>Jeigu dalyvauja ūkio subjektų grupė, surašomi visi dalyvių telefono numeriai</i>)	+370 5 2482565
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Informacija apie tiekėjo (tiekėjo grupės narių (jei pasiūlymą teikia tiekėjų grupė), ūkio subjekto(-ų), kurio(-ių) pajėgumais remiasi) – juridinio asmens, kitos organizacijos ar jos padalinio asmenis (kiekvienam subjektui pildoma atskira lentelė):

Juridinio asmens pavadinimas	<i>UAB „Hannu Pro Vilnius“</i>
Vadovas (<i>nurodyti vardą ir pavardę</i>)	
Valdyba* (<i>nurodyti ar sudaryta</i>)	<i>nesudaryta</i>
Kitas valdymo organas* (<i>nurodyti ar sudaryta, jei sudaryta – tokio organo pavadinimas</i>)	<i>Nesudaryta</i>
Stebėtojų taryba* (<i>nurodyti ar sudaryta</i>)	<i>Nesudaryta</i>
Kitas priežiūros organas* (<i>nurodyti ar sudaryta, jei sudaryta – tokio organo pavadinimas</i>)	<i>Nesudaryta</i>
Kitas asmuo, turintis teisę atstovauti tiekėjui ar jį kontroliuoti, jo vardu priimti sprendimą, sudaryti sandorį (<i>šio konkretaus pirkimo atveju - asmuo(-enys), kuris(-ie) nėra vadovas ir jiems įgaliojimu ar kitu teisėtu pagrindu suteikta teisė teikti pasiūlymą, sudaryti sutartį ar atlikti kitus veiksmus susijusius su šiuo konkrečiu pirkimu, nurodyti vardą ir pavardę</i>)	
Asmuo turintis teisę surašyti ir pasirašyti tiekėjo finansinės apskaitos dokumentus (<i>nurodyti vardą ir pavardę</i>)	

***Pastaba.** Jei sudarytas nurodytas organas – laimėjusio tiekėjo bus prašoma pateikti konkrečius dokumentus (pvz., įstatus/nuostatus, išplėstinį juridinių asmenų registro išrašą ar kitus dokumentus) apie juridinio asmens nurodytą organą sudarančių narių vardus ir pavardes, bei dokumentus patvirtinančius nurodyto organo narių atitikimą Pirkimo sąlygų 4 priedo lentelės 1 eilutėje nurodytam tiekėjo pašalinimo pagrindui.

1. Šiuo pasiūlymu pažymime, kad:

Nuostatos dėl įsipareigojimo atitikti Pirkimo sąlygas

1.1. sutinkame su visomis Pirkimo sąlygomis, nustatytomis:

1.1.1. skelbime, paskelbtame Viešųjų pirkimų įstatymo nustatyta tvarka CVP IS interneto adresu: <https://viesiejipirkimai.lt/> (taikoma, kai apie pirkimą buvo paskelbta);

1.1.2. kituose Pirkimo dokumentuose (jų paaiškinimuose, papildymuose).

Nuostatos dėl asmens duomenų tvarkymo

1.2. suprantame, jog:

1.2.1. jei tiekėjas, pirkimo laimėjimo atveju vykdant pirkimo sutartį, netvarkys asmens duomenų Perkančiosios organizacijos vardu, t. y. netaps duomenų tvarkytoju, jis bus laikomas duomenų valdytoju, kuris turi teises ir pareigas, nustatytas 2016 m. balandžio 27 d. Europos Parlamento ir Tarybos reglamente (ES) 2016/679 dėl fizinių asmenų apsaugos tvarkant asmens duomenis ir dėl laisvo tokių duomenų judėjimo ir kuriuo panaikinama Direktyva 95/46/EB (Bendrasis duomenų apsaugos reglamentas) (toliau – Reglamentas 2016/679).

1.2.2. jei tiekėjas, pirkimo laimėjimo atveju vykdant pirkimo sutartį, tvarkys asmens duomenis Perkančiosios organizacijos vardu, jis vadovaujantis Reglamentu 2016/679 bus laikomas duomenų tvarkytoju. Tokiu atveju, tiekėjas, kurio pasiūlymas bus pripažintas laimėjusiu pirkimą, turės pasirašyti duomenų tvarkymo sutartį (patvirtiname, jog susipažinome su duomenų tvarkymo sutarties sąlygomis, taip pat Perkančiosios organizacijos asmens duomenų tvarkymo tvarkos aprašu, paskelbtu Perkančiosios organizacijos interneto svetainėje adresu <https://apie.lrt.lt/skaidrumas/Skaidrumas/asmens-duomeniu-apsauga> (taip pat randamu www.lrt.lt, pasirenkant skiltį „Apie LRT“, „Skaidrumas“ ir „Asmens duomenų apsauga“). Pareiškiame, jog egzistuojant šiame punkte nurodytoms aplinkybėms, sutinkame pirkimo laimėjimo atveju sudarius pirkimo sutartį taip pat sudaryti duomenų tvarkymo sutartį.

Deklaracija dėl Rusijos veiksmų destabilizuojant padėtį Ukrainoje

1.3. **(taikoma, kai pasiūlymą teikia juridinis asmuo)** be kitų Pirkimo sąlygose nustatytų reikalavimų, deklaruojame, kad mano atstovaujamas / vadovaujamas subjektas nėra įtakojamas Rusijos, kaip nurodyta **Tarybos reglamento (ES) 2022/576 2022 m. balandžio 8 d. kuriuo iš dalies keičiamas Reglamentas (ES) Nr. 833/2014 dėl ribojamųjų priemonių atsižvelgiant į Rusijos veiksmus, kuriais destabilizuojama padėtis Ukrainoje** 5k straipsnyje nustatytuose apribojimuose. Visų pirma pareiškiu, kad:

1.3.1. mano atstovaujama įmonė (ir nė viena iš bendrovių, kurios yra mūsų konsorciumo nariais) nėra įsteigta Rusijoje;

1.3.2. mano atstovaujama įmonė (ir nė viena iš įmonių, kurios yra mūsų konsorciumo nariais) nėra juridinis asmuo, subjektas ar įstaiga, kuriuose daugiau kaip 50 % nuosavybės teisių tiesiogiai ar netiesiogiai priklauso šios deklaracijos 1.3.1 punkte nurodytam subjektui;

1.3.3. nei aš, nei mano atstovaujama bendrovė nesame fiziniu ar juridiniu asmeniu, subjektu ar organizacija, veikiančia šios deklaracijos 1.3.1 arba 1.3.2 punkte nurodyto subjekto vardu ar jo nurodymu;

1.3.4. sutartis nebus paskirta vykdyti subrangovui (-ams), ar kitam (-iems) subjektui (-tams), kurių pajėgumais remiasi, kurie priskirtini šios deklaracijos 1.3.1 arba 1.3.2, arba 1.3.3 punktuose nurodytiems subjektams.

1.4. **(taikoma, kai pasiūlymą teikia fizinis asmuo)** be kitų Pirkimo sąlygose nustatytų reikalavimų, deklaruojau, kad nesu įtakojamas (-a) Rusijos, kaip nurodyta **Tarybos reglamento (ES) 2022/576 2022 m. balandžio 8 d. kuriuo iš dalies keičiamas Reglamentas (ES) Nr. 833/2014 dėl ribojamųjų priemonių atsižvelgiant į Rusijos veiksmus, kuriais destabilizuojama padėtis Ukrainoje** 5k straipsnyje nustatytuose apribojimuose. Visų pirma pareiškiu, kad:

1.4.1. nesu Rusijos pilietis (-ė) ar įsisteigęs Rusijoje;

1.4.2. neveikiu šios deklaracijos 1.4.1 punkte nurodyto subjekto vardu ar jo nurodymu;

1.4.3. sutartis nebus paskirta vykdyti subrangovui (-ams), ar kitam (-iems) subjektui (-tams), kurių pajėgumais remiamasi, kurie priskirtini šios deklaracijos 1.4.1 arba 1.4.2 punktuose nurodytiems subjektams.

Deklaracija dėl nacionalinio saugumo reikalavimų 2 Pirkimo dalyje:

1.5. atitinkame toliau nurodomus reikalavimus:

1.5.1. tiekėjo siūlomos prekės nekelia grėsmės nacionaliniam saugumui – vadovaujantis Lietuvos Respublikos viešųjų pirkimų įstatymo (toliau – VPI) 37 straipsnio 9 dalies 1 punktu, prekių gamintojas ar jį kontroliuojantis asmuo nėra registruoti (jeigu gamintojas ar jį kontroliuojantis asmuo yra fizinis asmuo – nuolat gyvenantis ar turintis pilietybę) VPI 92 straipsnio 14 dalyje numatyta sąraše nurodytose valstybėse ar teritorijose. Specialiųjų pirkimo sąlygų 5.4 punktas;

1.5.2. tiekėjas neturi interesų, galinčių kelti grėsmę nacionaliniam saugumui – vadovaujantis VPI 47 straipsnio 9 dalimi, jis pats, jo subtiekejai ar ūkio subjektai, kurių pajėgumais remiamasi ar juos kontroliuojantys asmenys nėra registruoti (jeigu tiekėjas, jo subtiekejai, ūkio subjektas, kurio pajėgumais remiamasi, ar kontroliuojantis asmuo yra fizinis asmuo – nuolat gyvenantis ar turintis pilietybę) VPI 92 straipsnio 14 dalyje numatyta sąraše nurodytose valstybėse ar teritorijose. Specialiųjų pirkimo sąlygų 5.5 punktas.

1.6. Patvirtinu, kad 1.5 punkte nurodyti duomenys yra teisingi ir aktualūs pasiūlymo pateikimo dieną.

1.7. Suprantu, kad vadovaudamasis VPI 39 straipsnio 4 dalimi, perkančioji organizacija bet kuriuo pirkimo procedūros metu gali paprašyti kandidatų ar dalyvių pateikti visus ar dalį dokumentų, patvirtinančių atitiktį VPI 37 straipsnio 9 dalies, jeigu tai būtina siekiant užtikrinti tinkamą pirkimo procedūros atlikimą.

1.8. Suprantu, kad jeigu pagal vertinimo rezultatus pasiūlymas bus pripažintas laimėjusiu, turės būti pateikti perkančiosios organizacijos nurodyti atitiktį nacionalinio saugumo reikalavimams patvirtinantys dokumentai.

Nuostatos dėl Perkančiosios organizacijos Tiekėjų etikos kodekso:

1.9. Esame susipažinę su VšĮ Lietuvos nacionalinio radijo ir televizijos tiekėjų etikos kodeksu, paskelbtu Perkančiosios organizacijos interneto svetainėje adresu <https://apie.lrt.lt/valdymas/svarbus-dokumentai/kiti-dokumentai> skiltyje „Kiti Dokumentai“ (taip pat randamu www.lrt.lt, pasirenkant skiltį „Apie LRT“, „Valdymas“, „Svarbūs dokumentai“ ir „Kiti Dokumentai“).

2. Teikdami šį pasiūlymą, mes patvirtiname, kad į mūsų siūlomą kainą įskaičiuotos visos prekių pristatymo išlaidos ir visi mokesčiai, ir kad mes prisiimame riziką už visas išlaidas, kurias, teikdami pasiūlymą ir laikydamiesi Perkančiosios organizacijos reikalavimų, privalėjome įskaičiuoti į pasiūlymo kainą.

3. Mes siūlome šias prekes už nurodytą kainą:

3.1. 1 pirkimo dalis – Trikdžiams atsparios GNSS antenos sistemos pirkimas

Eil. Nr.	Prekės pavadinimas**	Mato vnt.	Kiekis	1 mato vnt. kaina EUR (be PVM)	PVM tarifas (%)	Iš viso kaina EUR (be PVM)
1	2	3	4	5	6	7 (4x5)
1.	Trikdžiams atspari GNSS antenos sistema	Kompl.	1			
Bendra pasiūlymo kaina EUR be PVM						
PVM suma EUR						
Bendra pasiūlymo kaina EUR su PVM						

Bendra pasiūlymo kaina su PVM* _____ EUR (*įrašyti sumą žodžiais*).

*kai pagal galiojančius teisės aktus tiekėjui nereikia mokėti PVM, jis nurodo priežastis, dėl kurių nemokamas PVM (pvz. neapmokestinama, 0% tarifas ir kt.): /tiekėjas čia nurodo priežastis, dėl kurių nemokamas PVM/.

**tiekėjas atskiras siūlomas prekes ir siūlomų prekių kainas nurodo Pirkimo sąlygų 2 priedo Techninė specifikacija 1 Pirkimo daliai 1 lentelėje ir pateikia kartu su pasiūlymu.

3.2. 2 pirkimo dalis – Sinchrogeneratorių pirkimas

Eil. Nr.	Prekės pavadinimas**	Mato vnt.	Kiekis	1 mato vnt. kaina EUR (be PVM)	PVM tarifas (%)	Iš viso kaina EUR (be PVM)
1	2	3	4	5	6	7 (4x5)
1.	Sinchronizacijos signalų generatorius	vnt.	2	16160.00	21	32320.00
2.	Sinchronizacijos rezervinio signalo perjungimo įrenginys	vnt.	1	7130.00	21	7130.00
Bendra pasiūlymo kaina EUR be PVM						39450.00
PVM suma EUR						8284.5
Bendra pasiūlymo kaina EUR su PVM						47734.5

Bendra pasiūlymo kaina su PVM*: keturiasdešimt septyni tūkstančiai septyni šimtai trisdešimt ketur EUR, 50 cent.

*kai pagal galiojančius teisės aktus tiekėjui nereikia mokėti PVM, jis nurodo priežastis, dėl kurių nemokamas PVM (pvz. neapmokestinama, 0% tarifas ir kt.): /tiekėjas čia nurodo priežastis, dėl kurių nemokamas PVM/.

**tiekėjas atskiras siūlomas prekes ir siūlomų prekių kainas nurodo Pirkimo sąlygų 2 priedo Techninė specifikacija 2 Pirkimo daliai 1 lentelėje ir pateikia kartu su pasiūlymu.

4. Siūlomos prekės visiškai atitinka pirkimo dokumentuose nurodytus reikalavimus.

5. Teikiame informaciją apie subteikėjus ir kitus ūkio subjektus (**Tiekėjas pasiūlyme privalo išviešinti subteikėjus ir/ar kitus ūkio subjektus, kurių pajėgumais remiasi ir juos nurodyti**):

Lentelė. Informacija apie subteikėjus ir kitus ūkio subjektus, kurių pajėgumais remiasi tiekėjas.

Eil. Nr.	Subteikėjo ir/ar kito ūkio subjekto pavadinimas ir statusas	Nuoroda į tikslų pirkimo sąlygų kvalifikacijos reikalavimą, kuriam atitikti remiamasi subteikėjo ir/ar kito ūkio subjekto pajėgumais	Pirkimo objekto dalies, perduodamos vykdyti subteikėjui ir/ar kitam ūkio subjektui, aprašymas (pildoma, jei jie vykdytų sutartį)	Įsipareigojimų dalis procentais, kuriai ketinama pasitelkti subteikėją ir/ar kitą ūkio subjektą
1.				
2.				
...				

Lentelė. Informacija apie subteikėjus ir kitus ūkio subjektus, kurių kvalifikacija tiekėjas nesirems, bet jiems bus perduodama vykdyti pirkimo sutarties dalis.

Eil. Nr.	Subteikėjo pavadinimas*	Pirkimo objekto dalies, perduodamos vykdyti subteikėjui ir/ar kitam ūkio subjektui, aprašymas	Įsipareigojimų dalis procentais, kuriai ketinama pasitelkti subteikėją ir/ar kitą ūkio subjektą
1.			
2.			

...			
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Pastaba: *Tiekėjas privalo nurodyti, kokiai pirkimo sutarties daliai ketina pasitelkti subteikėjus, tačiau neprivalo nurodyti konkrečių subteikėjų, jeigu jie nėra žinomi.

Lentelė. *Informacija apie specialistus ir ekspertus (jeigu taikoma), kuriais bus remiamasi įrodinėjant tiekėjo kvalifikaciją ir vykdant pirkimo sutartį, tačiau jie nėra tiekėjo ar tiekėjo pasitelkiamo subteikėjo (-ų) darbuotojai pasiūlymo pateikimo metu, bet laimėjimo atveju būtų įdarbinti.*

Eil. Nr.	Vardas ir pavardė	Specialisto ir eksperto dabartinė darbovietė
1.		
2.		
...		

6. Pasiūlymas galioja iki termino, nustatyto pirkimo dokumentuose.

7. Kartu su pasiūlymu pateikiami šie dokumentai:

Eil. Nr.	Dokumento pavadinimas	Dokumentų sudarančių lapų skaičius	Ar dokumente yra konfidencialios informacijos? (Taip/Ne)	Paaiškinimas, kokia konkreči informacija dokumente yra konfidenciali*
1.	Bullet-720-Dual-Band-GNSS_datasheet	2	Ne	
2.	ECO8000-Automatic-Changeover-Unit-Datasheet-D00013331A	9	Ne	
3.	ECO8000-User-Manual-071371700C	81	Ne	
4.	Imr-240-datasheet	4	Ne	
5.	SPG9000-User-Manual-D00013571G	248	Ne	
6.	TAK_2_Techninė specifikacija II PD	12	Ne	
7.	Telestream letter confirming SPG9000 Compliance	1	Ne	
8.	Telestream_SPG9000_product_sheet_FINAL	26	Ne	
9.	EBVPD	16	Ne	

Pastaba: *pildyti tuomet, jei bus pateikta konfidenciali informacija. Atkreipiame dėmesį, kad Lietuvos Respublikos viešųjų pirkimų įstatymo 20 straipsnyje nurodyta, kokia informacija negali būti laikoma konfidencialia

(pareigų pavadinimas)

(tiekėjo ar jo įgalioto asmens parašas)

(vardas pavardė)

A.V.

SINCHRONIZACIJOS SIGNALŲ GENERATORIŲ IR SINCHRONIZACIJOS REZERVINIO SIGNALO PERJUNGIMO ĮRENGINIO TECHNINĖ SPECIFIKACIJA

I. Bendri reikalavimai

1. VŠĮ Lietuvos nacionalinis radijas ir televizija (toliau – Perkančioji organizacija; LRT) siekia įsigyti sinchronizacijos signalų generatorius ir sinchronizacijos rezervinio signalo perjungimo įrenginį (toliau – Prekės/įranga).

2. Reikalavimai Prekėms pateikiami šioje Techninėje specifikacijoje.

3. Siekiama pakeisti dabar LRT naudojamus sinchronizacijos signalų generatorius Courtyard CY460, tam kad nauji sinchronizatoriai atitiktų SMPTE ST-2110 standartus ir užtikrintų PTP stabilumą.

4. Techninėje specifikacijoje vartojamos sąvokos:

4.1. **Dokumentacija** – gamintojo dokumentai (vartotojo vadovai, techniniai pasai, kita gamintojo teikiama informacija apie prekės parametrus) arba gamintojo internetinio puslapio nuoroda (-os), kuriuose pateikiama gamintojo informacija apie siūlomos prekės atitikimą reikalaujamam parametrai / specifikacijai.

5. Bendri reikalavimai tiekėjui dėl Techninės specifikacijos pildymo:

5.1. Tiekėjas turi užpildyti visus Techninės specifikacijos lentelių laukelius, kurie pažymėti „/įrašyti/“ (tiekėjas ištrina „/įrašyti/“ ir nurodo reikalaujama informaciją). Tiekėjui minėtų laukelių neužpildžius arba užpildžius netinkamai tiekėjo pasiūlymas gali būti atmestas kaip neatitinkantis Pirkimo dokumentų reikalavimų.

5.2. Tiekėjas negali palikti tuščių laukelių, kurie pažymėti „/įrašyti/“.

5.3. Tiekėjas negali keisti Techninės specifikacijos, t.y. tiekėjas negali keisti Techninės specifikacijos teksto (papildyti, trinti ir pan.), papildyti lentelių naujais laukais ar ištrinti esamus, nebent Techninėje specifikacijoje aiškiai nurodyta, kad tokie pakeitimai galimi. Tiekėjui atliktus minėtus pakeitimus, tiekėjo pasiūlymas gali būti atmestas, kaip neatitinkantis Pirkimo dokumentų reikalavimų.

5.4. Tiekėjas turi nurodyti konkrečius siūlomų prekių modelių pavadinimus ir gamintojus. Konkrečiai pozicijai siūloma konkretaus gamintojo konkreti prekė (modelis), jei nenurodyta kitaip. Jeigu siūloma prekė neturi konkretaus gamintojo ar modelio pavadinimo:

5.4.1. pateikiamas paaiškinimas dėl kokių priežasčių neįmanoma nurodyti gamintojo / modelio arba;

5.4.2. jeigu prekė modulinė:

5.4.2.1. modelio pavadinimo sudarymo būdas, arba;

5.4.2.2. modulinę prekę sudarančių atskirų prekių gamintojai ir modeliai.

6. Reikalavimai tiekėjui dėl lentelių stulpelių „Siūlomi parametrai“ pildymo:

6.1. Tiekėjas turi nurodyti atitikimą kiekvienam stulpelio „Reikalavimai“ nurodytam reikalavimui atskirai. Tiekėjas gali nenurodyti atitikimo reikalavimui tik tuo atveju, jeigu prie atitinkamo reikalavimo punkto stulpelio „Siūlomi parametrai“ eilutėje nurodyta „/įrašyti neprivaloma/“ arba eilutė perbraukta „“.

6.2. Tiekėjas nuroydamas siūlomos prekės atitikimą turi nurodyti konkrečias siūlomos prekės specifikacijas / parametrus, pvz.: „ilgis 1,5 m“, o ne „ilgis ne mažiau kaip 1,25 m“.

6.3. Tiekėjui vietoje konkrečių specifikacijų / parametrų nurodžius „atitinka“, „taip“ ar panašiai, toks tiekėjo pasiūlymas gali būti atmestas, kaip neatitinkantis Pirkimo dokumentų reikalavimų, jeigu reikalavimo formuluotė reikalavo nurodyti konkrečias specifikacijas kaip nurodyta 6.2 punkte.

6.4. Tiekėjas, vadovaujantis Bendrųjų pirkimo sąlygų 17.4 punktu, Techninėje specifikacijoje stulpelyje „Siūlomi parametrai“ nurodytą informaciją galės paaiškinti tik tuo atveju, jeigu:

6.4.1. Tiekėjas kartu su pasiūlymu pateikė Dokumentaciją ir pateiktoje Dokumentacijoje yra nurodyta informacija patvirtinanti, kad tiekėjo siūloma prekė atitinka Techninėje specifikacijoje nurodytus reikalavimus;

6.4.2. Tiekėjas pateiks paaiškinimą iš viešai prieinamos siūlomos prekės gamintojo informacijos arba gamintojo patvirtinimą, kad tiekėjo siūloma prekė atitinka Techninėje specifikacijoje nurodytus reikalavimus.

7. Reikalavimai tiekėjui dėl lentelių stulpelių „Siūlomus parametrus patvirtinantys dokumentai“ pildymo:

7.1. Tiekėjas:

7.1.1. atsakingas už Dokumentacijos pateikimą, kuri patvirtina tiekėjo siūlomos prekės atitikimą Techninės specifikacijos reikalavimams, tose eilutėse, kuriose nurodyta „/privaloma pateikti/“ – vietoje „/privaloma pateikti/“ nurodydamas prie pasiūlymo pridedamo dokumento pavadinimą / bylos pavadinimą arba nuorodą į konkretų internetinį puslapį. Perkančioji organizacija aktyviai neieškos ir netikrins Dokumentacijos (tačiau tai neatima teisės iš Perkančiosios organizacijos, kilus įtarimui dėl Dokumentacijos pateiktos informacijos teisingumo, pasitikrinti atitikimą) ir tikrins tik Tiekėjo kartu su pasiūlymu pateiktą Dokumentaciją, jeigu Tiekėjo pateikta Dokumentacija nepatvirtins atitikimo keliamam reikalavimui, o Tiekėjas nepaaiškins Techninės specifikacijos 6.4 punkte nustatyta tvarka, kaip tiekėjo siūloma prekė atitinka keliamą reikalavimą arba Tiekėjas su pasiūlymu iš viso nepateiks Dokumentacijos – Tiekėjo pasiūlymas bus atmetas;

7.1.2. gali, tačiau neprivalo, pateikti Dokumentaciją, kuri patvirtina tiekėjo siūlomos prekės atitikimą Techninės specifikacijos reikalavimams, tose eilutėse, kuriose nurodyta „/rekomenduojama pateikti/“ – vietoje „/rekomenduojama pateikti/“ nurodydamas prie pasiūlymo pridedamo dokumento pavadinimą / bylos pavadinimą arba nuorodą į konkretų internetinį puslapį arba pažymėdamas, kad Dokumentacijos neteiks (pvz.: „X“, „neteikiame“ ar pan.) arba palikdamas eilutę neužpildytą. Jeigu Tiekėjas su pasiūlymu pasirenka neteikti Dokumentacijos Perkančioji organizacija savarankiškai ieško ir patikrina viešai prieinama Dokumentaciją, tačiau jeigu Perkančiosios organizacijos rasta viešai prieinama Dokumentacija nepatvirtins atitikimo keliamam reikalavimui, o Tiekėjas nepaaiškins Techninės specifikacijos 6.46.4 punkte nustatyta tvarka, kaip tiekėjo siūloma prekė atitinka keliamam reikalavimui – Tiekėjo pasiūlymas bus atmetas;

7.1.3. įsipareigoja atitikti keliamam reikalavimui ir neteikia Dokumentacijos, o Perkančioji organizacija tikrina atitikimą Techninės specifikacijos reikalavimui tik sutarties vykdymo metu, tose eilutėse, kurios yra perbrauktos „“, tačiau Perkančioji organizacija turi teisę paprašyti paaiškinti atitikimą Techninės specifikacijos reikalavimui pasiūlymų vertinimo metu ir paaiškinti atitikimą Techninės specifikacijos 6.4 punkte nustatyta tvarka, jeigu kils abejonių dėl Tiekėjo galimybių įgyvendinti reikalavimą sutarties vykdymo metu.

7.2. Dokumentacija turi būti parengta prekės gamintojo, o ne trečiųjų šalių. Jeigu prekė sudaryta iš kitų gamintojų įrangos ar dalių gali būti teikiama tiek galutinės prekės, tiek prekės komplektuojančios dalies gamintojo Dokumentacija.

7.3. Tiekėjas prie konkretaus reikalavimo nurodo, kuri tiekėjo su pasiūlymu teikiama Dokumentacija patvirtina atitikimą nurodytam konkrečiam reikalavimui.

7.4. Perkančioji organizacija prašo tiekėjų, kad nurodant Dokumentacijos pavadinimą, kartu būtų pateikiama nuoroda į konkretų puslapį, paragrafą ir pan., kai tai yra įmanoma, sklandesniai tiekėjų pasiūlymų vertinimui.

8. Jei Prekių gamintojas nuo pasiūlymo pateikimo momento iki Prekių pristatymo termino nustoja gaminti siūlomą Prekę (ar Prekės sudedamąsias dalis), tiekėjas, gavęs rašytinį Perkančiosios organizacijos sutikimą, gali pristatyti to paties gamintojo kitą prekę, atitinkančią Techninėje specifikacijoje nurodytus Prekės (ar jos dalies) siūlomus parametrus arba geresnius nei tiekėjo Techninėje specifikacijoje nurodyti siūlomi parametrai, kartu pateikiant Prekės gamintojo patvirtinimą ar kitą dokumentą, įrodantį, kad gamintojas nebegamina Techninėje specifikacijoje nurodytos Prekės (ar jos dalies). Nesant to paties gamintojo asortimente nurodytas sąlygas atitinkančių prekių, pateikęs tai pagrindžiantį gamintojo patvirtinimą ar kitą įrodantį dokumentą, tiekėjas, gavęs perkančiosios organizacijos raštišką sutikimą, gali pristatyti kito gamintojo prekes, atitinkančias Techninėje specifikacijoje nurodytus prekių (ar jų dalies) siūlomus parametrus arba geresnius, nei tiekėjo Techninėje specifikacijoje nurodyti siūlomi parametrai.

9. Prekės turi būti komplektuojamos:

9.1. su visais Prekės gamintojo įprastoje Prekės komplektacijoje nurodytais priedais (t. y. tais priedais, kurie nurodyti Dokumentacijoje), jeigu nėra nurodyta kitaip;

9.2. su visais tinkamam Prekių veikimui reikalingais priedais – montavimo medžiagomis, priedais, kabeliais ir pan., jeigu tokie priedai reikalingi tinkamam Prekės veikimui, net jeigu tai atskirai nėra nurodyta.

10. Prekės atitinkančios Techninės specifikacijos reikalavimus turi **būti pristatytos ir sumontuotos kaip nurodyta 11 punkte**, adresu S. Konarskio g. 49, 03123 Vilnius. Sutarties vykdymo metu pristatymo adresas gali būti patikslintas.

11. Tiekėjas yra atsakingas už antenų montavimą ir kabeliavimą ant stogo LRT nurodytu keliu iki LRT numatytos SPG diegimo vietos.

12. Prekių pristatymo terminas (įskaitant Prekių montavimą kaip nurodyta 11 punkte) **2 (du) mėnesiai** mėn. nuo Sutarties įsigaliojimo. Šis terminas gali būti pratęstas 1 (viena) kartą(-ų) 1 (viena) mėn. Sutartyje numatyta tvarka.

II. Konkretūs reikalavimai prekėms:

13. **Sinchronizacijos signalų generatoriai ir sinchronizacijos rezervinio signalo perjungimo įrenginys - 1 kompl.** Tiekėjas turi nurodyti visą Prekių komplektą sudarančią atskirą įrangą, nurodant įrangos gamintoją, modelį, kiekį bei kainą Eur be PVM. Tiekėjas užpildo tiek eilučių, kiek yra įrangos, turinčios atskirą pavadinimą. Jei tiekėjo siūlomam komplektui atitinkama įranga nereikalinga, kai įrenginio aprašyme šioje lentelėje nurodyta, kad gali būti ir neteikiama, tiekėjas šioje lentelėje nurodo, kad nereikalinga. Jeigu tiekėjo siūlomam komplektui reikalinga papildoma įranga, kuri nenurodyta šioje lentelėje, tiekėjas atitinkamai papildo šią lentelę. „Iš viso Eur be PVM“ turi sutapti su pasiūlymo formos lentelės eilutėje „Iš viso Eur be PVM“ bei „Bendra pasiūlymo kaina EUR be PVM“ nurodyta suma. Jeigu pasiūlymo formos lentelės „Iš viso Eur be PVM“ ir Techninės specifikacijos 1 lentelės „Iš viso Eur be PVM“ bei „Bendra pasiūlymo kaina EUR be PVM“ eilučių reikšmės nesutampa – pasiūlymo kaina laikoma kaina nurodyta Techninės specifikacijos 1 lentelės eilutėje „Iš viso Eur be PVM“. Reikalavimai Prekėms nurodyti 2 lentelėje.

1 lentelė. Siūlomą komplektą sudarančios atskiros įrangos detalizacija

Eil. Nr.	Įranga	Gamintojas	Modelis	Kiekis, vnt.	Vnt. kaina (Eur be PVM)	Iš viso (Eur be PVM)
1	2	3	4	5	6	7 (5×6)
1.	Sinchronizacijos signalų generatorius.	<i>Telestream</i>	<i>SPG9000 + SPG9000-GNSS + SPG9000-PTP + SPG9000-TSG + SPG9000-DPW + SPG9000-RACK</i>	2		
2.	Sinchronizacijos rezervinio signalo perjungimo įrenginys	<i>Telestream</i>	<i>ECO8000 + ECO8000 DPW + ECO8000 RACK</i>	1		
3.	Sujungimo kabelių komplektas	<i>Telestream</i>	<i>ECO8000 CBL</i>	1		
4.	GPS antena su kabeliu	<i>Novotech</i>	<i>Bullet720</i>	2		
Iš viso EUR be PVM:						

14. Reikalavimai prekėms nurodyti 2 lentelėje.

2 lentelė. Reikalavimai *Sinchronizacijos signalų generatorius*

1. Sinchronizacijos signalų generatorius (toliau – SPG) – 2 vnt.	
Gamintojas	<i>Telestream</i>
Modelis	<i>SPG9000 + SPG9000-GNSS + SPG9000-PTP + SPG9000-TSG + SPG9000-DPW + SPG9000-RACK</i>

Eil. Nr.	Reikalavimai	Siūlomi parametrai	Siūlomus parametrus patvirtinanti Dokumentacija
1.	SPG privalo būti tinkamas naudoti tiek serijinėse skaitmeninėse (SD, HD, 3G, 4K UHD), tiek IP bei mišriose (hibridinėse) vaizdo signalų infrastruktūrose. Taip pat privalo būti tinkamas studijų, postprodukcijos, KTS ir kitų transliavimo operacinių aplinkų poreikiams.	<i>SPG9000 yra hibridinis sinchronizavimo ir testinių signalų generatorius su juodo lauko (BB, Trilevel) bei PTP sinchronizavimo signalų išėjimais. Tinkamas naudoti tiek serijinėse skaitmeninėse (SD, HD, 3G, 4K UHD), tiek IP bei mišriose (hibridinėse) vaizdo signalų infrastruktūrose. Taip pat tinkamas studijų, postprodukcijos, KTS ir kitų transliavimo operacinių aplinkų poreikiams.</i>	<i>Telestream_SPG9000_product_sheet_FINAL</i>
2.	SPG privalo būti ne aukštesnis nei 1RU ir privalo montuotis į 19 colių spintą.	Generatorius yra 1RU aukščio, montuojamas į 19 colių spintą.	<i>Telestream_SPG9000_product_sheet_FINAL, p.10</i>
3.	SPG privalo būti sinchronizuojamas nuo šių šaltinių: 1. GNSS; 2. PTP v2; 3. Vidinis Osciliatorius.	<i>Generatorius sinchronizuojamas nuo šių šaltinių: GNSS; PTP v2; Vidinis generatorius</i>	<i>Telestream_SPG9000_product_sheet_FINAL, p.12, p.15-16</i>
4.	SPG privalo būti pateiktas su pagrindiniu ir rezerviniu maitinimo šaltiniu. Tiek pagrindinis, tiek rezervinis maitinimo šaltiniai privalo būti montuojami įrenginio viduje ir būti "karštai keičiami" (angl. <i>Hot-plug</i>).	<i>Generatorius pateikiamas su pagrindiniu ir rezerviniu maitinimo šaltiniu. Tiek pagrindinis, tiek rezervinis maitinimo šaltiniai yra montuojami įrenginio viduje ir yra "karštai keičiami" (angl. Hot-plug). SPG9000-DPW</i>	<i>Telestream_SPG9000_product_sheet_FINAL, p.11, p.25</i>
5.	SPG privalo turėti ne mažiau nei 4 vnt. linijinių laiko kodo (angl. Linear (or Longitudinal) Timecode) (toliau - LTC) signalų išvesčių. LTC privalo turėti skirtingų laiko zonų pasirinkimo nustatymus. PASTABA: LTC signalai gali turėti vieną bendrą fizinę išvestį.	<i>Generatorius turi 4 vnt. linijinių laiko kodo (angl. Linear (or Longitudinal) Timecode) (toliau - LTC) signalų išvesčių, išvedamų per LTC/GPI jungtį. LTC turi skirtingų laiko zonų pasirinkimo nustatymus.</i>	<i>Telestream_SPG9000_product_sheet_FINAL, p.4, p.13</i>
6.	SPG privalo turėti: 1) ne mažiau nei vieną BNC jungtį skirtą "Word Clock" signalo išvesčiai; 2) ne mažiau nei vieną BNC jungtį skirtą "DARS" signalui. Pastaba. Turi būti ne mažiau kaip dvi atskiros dedikuotos BNC jungtys (t.y. ne mažiau kaip po vieną kiekvienam	<i>Generatorius turi: 1) vieną BNC jungtį skirtą "Word Clock" signalo išvesčiai; 2) vieną BNC jungtį skirtą "DARS" signalui. Kiekvienas signalas turi jam skirtą BNC jungtį.</i>	<i>Telestream_SPG9000_product_sheet_FINAL, p.14</i>

	signalui) aukščiau nurodytiems signalams.		
7.	<p>SPG privalo generuoti ir atiduoti sinchronizacijos signalus per ne mažiau nei 6 vnt. BNC tipo jungčių, per kurias privalo pasirinktinai atiduoti:</p> <ul style="list-style-type: none"> • juodo kadro signalą (angl. <i>Black burst</i>) PAL-B 625i 25 Hz formatu; • HD trijų-lygių signalą (angl. <i>HD Tri-level</i>) 1080 60/50i, 1080 60/50/30/25p formatais <p>PASTABA: Per BNC jungtis papildomai taip pat gali būti atiduoti ir kitokie šiame punkte išvardintų sinchronizacijos signalų formatai. Į šiame punkte nurodytą BNC jungčių skaičių neįskaičiuojamos BNC jungtys nurodytos 1 lentelės 6 eilutėje, t.y. įrenginys turi turėti ne mažiau kaip 8 BNC jungtis.</p>	<p><i>Generatorius generuoja ir per 6vnt. BNC jungčių pasirinktinai atiduoda šiuos signalus:</i></p> <p><i>Black burst</i></p> <ul style="list-style-type: none"> ○ NTSC-M (7.5 IRE black) ○ NTSC-J (0 IRE black) ○ PAL-B <p><i>HD tri-level sync</i></p> <ul style="list-style-type: none"> ○ 1080 60/59.94/50i ○ 1080 60/59.94/50/48/47.95/30/29.97/25/24/23.98p ○ 1080 24/23.98sF ○ 720 60/59.94/50p <p><i>CW 10 MHz</i> <i>1 pps</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.13</i></p>
8.	<p>Sinchronizacijos signalai turi atitikti arba viršyti atitinkamas EBU, ITU-R ir SMPTE specifikacijas.</p>	<p><i>Generatorius atitinka EBU, ITU-R ir SMPTE specifikacijas.</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL</i> <i>SPG9000-User-Manual-D00013571G</i> <i>Telestream letter confirming SPG9000 Compliance</i></p>
9.	<p>SPG privalo turėti "NTP" protokolą ir jis privalo veikti dvejais režimais:</p> <ul style="list-style-type: none"> • NTP klientas. • NTP serveris. 	<p><i>Generatorius turi "NTP" protokolą ir gali veikti dviem režimais:</i></p> <p><i>NTP klientas.</i></p> <p><i>NTP serveris.</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.14</i></p>
10.	<p>SPG privalo palaikyti sinchronizaciją "PTP" protokolu. Įrenginys tam privalo turėti ne mažiau nei 2 vnt. ne prastesnių nei SFP jungčių, kuriose privalo būti įdėti moduliai skirti prijungti RJ45 jungtis. Visos įrenginio jungtys bendrai privalo turėti šias funkcijas:</p> <ul style="list-style-type: none"> • Veikti kaip atskiri PTP sinchronizacijos lyderiai (angl. <i>Leader</i>). • Veikti kaip vienas lyderis, vienam iš jų dingus antras lieka kaip atsarginis. 	<p><i>Generatorius palaiko sinchronizaciją "PTP" protokolu. Įrenginys tam turi 2 vnt. SFP jungčių, kuriose įdiegti moduliai skirti prijungti RJ45 jungtis.</i></p> <p><i>Visos įrenginio jungtys turi šias funkcijas:</i></p> <p><i>Gali veikti kaip atskiri PTP sinchronizacijos lyderiai (angl. Leader).</i></p> <p><i>Gali veikti kaip vienas lyderis, vienam iš jų dingus antras lieka kaip atsarginis.</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.2, p.3, p.6, p15</i></p>

	<ul style="list-style-type: none"> • Veikti kaip pavaldinys, vienai iš linijų dingus antra veikia kaip atsarginė. • Veikti lyderio ir pavaldinio režimu (Angl. Follower + leader) <p>PASTABA: Jei su gaminiu nėra galimybės pridėti jam tinkančius RJ45 jungčių modulius, su kuriais įrenginyje užtikrintas PTP veikimas, tuomet galima dėti dvikrypčių vienmodžių optinių LC jungčių modulius.</p>	<p><i>Gali veikti kaip pavaldinys, vienai iš linijų dingus antra veikia kaip atsarginė.</i></p> <p><i>Gali veikti lyderio ir pavaldinio režimu (Angl. Follower + leader)</i></p> <p><i>Su generatoriumi pateikiami SFP 1G RJ45.</i></p>	
11.	<p>SPG privalo turėti keičiamus PTP nustatymus pasiekiamus per internetinę naršyklę ir taip pat privalo turėti PTP sinchronizacijos signalo statuso monitoringą. PTP nustatymai privalo palaikyti tokius profilius:</p> <ul style="list-style-type: none"> • SMPTE ST 2059-2 • AES67 • IEEE 1588-2019 • Rankiniu būdu suvedamas profilis (angl. <i>Custom</i>), arba galimybė redaguoti kitų profilių parametrus. <p>Pasirenkant rankiniu būdu suvedamą profilį, arba koreguojant kitus profilius privalo būti keičiami parametrai:</p> <ul style="list-style-type: none"> • Pranešimo siuntimo intervalas (angl. <i>Announce Interval</i>) • Sinchronizacijos siuntimo intervalas (angl. <i>Sync Interval</i>) • Pranešimo laiko limitas (angl. <i>Announce Timeout</i>) 	<p>Generatorius turi keičiamus PTP nustatymus pasiekiamus per internetinę naršyklę ir taip pat turi PTP sinchronizacijos signalo būsenos stebėjimą. PTP nustatymai palaiko tokius profilius:</p> <ul style="list-style-type: none"> • SMPTE ST 2059-2 • AES67 • IEEE 1588-2019 • Rankiniu būdu suvedamas profilis (angl. <i>Custom</i>). <p>Pasirenkant rankiniu būdu suvedamą profilį, keičiami šie parametrai:</p> <ul style="list-style-type: none"> • Pranešimo siuntimo intervalas (angl. <i>Announce Interval</i>) • Sinchronizacijos siuntimo intervalas (angl. <i>Sync Interval</i>) • Pranešimo laiko limitas (angl. <i>Announce Timeout</i>) 	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.6, p.7, p.8, p.15</i></p>
12.	<p>SPG privalo generuoti testinius video signalus ir atiduoti juos per:</p> <ul style="list-style-type: none"> • ne mažiau nei 4 vnt. HD-BNC jungčių SDI signalui; • ne mažiau nei 2 vnt. dvikrypčių daugiamodžių optinių LC tipo jungčių skirtų ST2110 video signalui. <p>Kiekviena fizinė išvestis privalo perduoti ne mažiau nei vieną atskirą testinį vaizdo</p>	<p><i>Generatorius testinius video signalus generuoja ir juos atiduoda per:</i></p> <ul style="list-style-type: none"> <i>4 vnt. HD-BNC jungčių SDI signalui;</i> <i>2 vnt. dvikrypčių daugiamodžių optinių LC tipo jungčių skirtų ST2110 video signalui.</i> <p><i>Kiekviena fizinė išvestis perduoda vieną atskirą testinį vaizdo signalą. Signalai pasirinktinai gali</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.1, p.7, p.17-p.19</i></p> <p><i>SPG9000-User-Manual-D00013571G, p.186-p.187</i></p>

	<p>signalą. Signalai privalo būti šių rezoliucijų/standartų:</p> <ul style="list-style-type: none"> • 1080i50/60/; • 1080p25/30/50/60/; • 2160p25/30/50/60. <p>Testiniai vaizdo signalai privalo turėti modifikuojamus šiuos elementus:</p> <ul style="list-style-type: none"> • Spalvų juostos (angl. <i>color bars</i>) • Judantys objektai. • Laiko kodas (angl. <i>timecode</i>) atvaizdavimas vaizdo perdengime (angl. <i>Video overlay</i>). • 	<p><i>būti šių rezoliucijų/standartų: 1080i50/60/; 1080p25/30/50/60/; 2160p25/30/50/60. Testiniai vaizdo signalai turi šiuos modifikuojamus elementus: Spalvų juostos (angl. color bars) Judantys objektai. Laiko kodo (angl. timecode) atvaizdavimą vaizdo perdengime (angl. Video overlay).</i></p>	
13.	<p>SPG privalo generuoti testinius audio signalus ir juos:</p> <ul style="list-style-type: none"> • įterpti kartu su testiniais SDI signalais išeinančiais per HD-BNC jungtis; • priskirti prie ST 2110-30 protokolo audio kanalų. 	<p><i>Generatorius generuoja testinius audio signalus ir juos: įterptia kartu su testiniais SDI signalais išeinančiais per HD-BNC jungtis; atiduoda kaip ST 2110-30 protokolo audio kanalus</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.1, p.7, p.19, p.21, p.22</i></p>
14.	<p>SPG privalo palaikyti SMPTE ST 2110 protokolus:</p> <ul style="list-style-type: none"> • ST 2110-20 • ST 2110-30 • ST 2110-40 <p>Signalai šiais protokolais išvedami per 2 lentelės 11 punkte apibūdintas dvikryptes daugiamodes optines LC jungtis. Šios jungtys SPG įrenginyje montuojasi SFP moduliais, palaikančiais ne mažesnę nei 10 Gbps greitį. Privalo būti galimybė SFP modulius keisti į ne mažesnio nei 25 Gbps greičio modulius.</p>	<p><i>Generatorius palaiko SMPTE ST 2110 protokolus: ST 2110-20 ST 2110-30 ST 2110-40 Signalai šiais protokolais išvedami per 2 lentelės 12 punkte apibūdintas dvikryptes daugiamodes optines LC jungtis. Šios jungtys SPG įrenginyje montuojasi SFP moduliais, palaikančiais 10 Gbps greitį. Yra galimybė SFP modulius keisti į 25 Gbps greičio modulius</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.22</i></p>
15.	<p>SPG privalo būti integruotas Pasaulinės palydovinės navigacijos sistemos (Global Navigation Satellite Systems) (toliau - GNSS) imtuvas. Kuris privalo priimti duomenis iš ne mažiau nei 4 skirtingų, pasaulinį padengimą turinčių, palydovinės navigacijos sistemų:</p> <ul style="list-style-type: none"> • GPS (L1 ir L5 dažnių juostose), 	<p><i>Generatoriuje yra integruotas Pasaulinės palydovinės navigacijos sistemos (Global Navigation Satellite Systems) (toliau - GNSS) imtuvas. Kuris priimai duomenis iš 4 skirtingų, pasaulinį padengimą turinčių, palydovinės navigacijos sistemų: GPS (L1 ir L5 dažnių juostose),</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.1, p.6, p.16</i></p> <p><i>SPG9000-User-Manual-D00013571G, p.21-p.22</i></p> <p><i>Bullet-720-Dual-Band-GNSS_datasheet</i></p>

	<ul style="list-style-type: none"> • GLONASS (L1 dažnių juostoje), • Galileo (dažnių juostose L1 ir L5), • BeiDou (dažnių juostose L1 ir L5). <p>Pastabos:</p> <p>1) priimant daugiau nei vieną dažnį papildomai užtikrinamas atsparumas galimiems trikdžiams.</p> <p>2) GNSS signalas priimamas per išorinę anteną, prijungtą prie SPG dedikuotos jungties.</p> <p>3) Kai GNSS signalas nutrūksta, ankstesnis dažnis ir fazė yra išlaikomi vidinio laikrodžio. Signalui vėl atsiradus įrenginys privalo iš lėto sulygiuoti vidinį laikrodį su etaloniniu laikrodžiu, nesukeliant sinchronizacijos šoko sistemai ir netrikdant eterio.</p>	<p><i>GLONASS (L1 dažnių juostoje), Galileo (dažnių juostose L1 ir L5), BeiDou (dažnių juostose L1 ir L5).</i></p> <p><i>Priima signalus iš 4 globalių palydovinių tinklų (GPS, GLONASS, Galileo, BeiDou)</i></p> <p><i>GPS signalas priimamas per išorinę anteną, prijungtą prie dedikuotos generatoriaus jungties.</i></p> <p><i>Kai GNSS signalas nutrūksta, ankstesnis dažnis ir fazė yra išlaikomi vidinio laikrodžio. Signalui vėl atsiradus įrenginys iš lėto sulygiuoja vidinį laikrodį su etaloniniu laikrodžiu, nesukeliant sinchronizacijos šoko sistemai ir netrikdant eterio.</i></p>	
16.	<p>Į pasiūlymą privalo būti įtraukta:</p> <ul style="list-style-type: none"> • GNSS antena, priimanti RF signalą L1 ir L5 dažnių juostose; • Antenos laikiklis skirtas anteną montuoti ir naudoti lauko sąlygomis; • Ne trumpesnis nei 30 m. Kabelis, skirtas antenos sujungimui su SPG lauko sąlygomis. <p>Antena ir visi, jos tinkamam veikimui lauko sąlygomis, reikalingi priedai patvirtinti kaip tinkami pagal parametrus siūlomos SPG įrangos gamintojo (pateikti įrodantį atitikties dokumentą), ir pilnai suderinti su SPG veikimu.</p> <p>PASTABA: Visi antenos sujungimui su kabeliu ir SPG reikalingi perėjimai, įtraukiami į pasiūlymą.</p>	<p><i>Į pasiūlymą yra įtraukta: GNSS antena (NOVOTECH, Bullet-720 Dual-Band Multi GNNS) , priimanti RF signalą L1 ir L5 dažnių juostose; Antenos laikiklis skirtas anteną montuoti ir naudoti lauko sąlygomis; 35 m. kabelis LRM-240, skirtas antenos sujungimui su SPG lauko sąlygomis.</i></p> <p><i>Visi su antenos pajungimui reikalingi kabeliai ir jungtys įtraukti į pasiūlymą.</i></p>	<p><i>Bullet-720-Dual-Band-GNSS_datasheet</i> <i>Imr-240-datasheet</i></p>
17.	<p>Valdymas ir stebėseną privalo būti:</p> <ul style="list-style-type: none"> • Fizinis - įrenginio priekyje (mygtukai, LCD 	<p><i>Generatoriaus valdymas ir stebėseną atliekami: Fizinis - įrenginio priekyje (mygtukai, LCD</i></p>	<p><i>Telestream_SPG9000_product_sheet_FINAL, p.8, p.10</i></p>

	<p>ekranėlis, indikacinės lemputės);</p> <ul style="list-style-type: none"> Nuotolinis - per RJ45 tinklo sąsają, naršyklėje ("web-based" naudotojo sąsaja). Privalo turėti ne mažiau nei dviejų tipų naudotojus (administratoriaus – monitoringui ir kontrolei; naudotojo – monitoringui) 	<p>ekranėlis, indikacinės lemputės);</p> <p>Nuotolinis - per RJ45 tinklo sąsają, naršyklėje ("web-based" naudotojo sąsaja). Turi dviejų tipų naudotojus (administratoriaus – monitoringui ir kontrolei; naudotojo – monitoringui)</p>	
18.	<p>Privalo palaikyti sistemos būsenos įvykių fiksavimą (angl. <i>Logging</i>), naudojant syslog protokolą per tinklo prieigą į nuotolinį serverį, statuso žinutes siunčiant per UDP (user datagram protocol) arba TCP (transmission control protocol). Taip pat privalo palaikyti SNMP (Simple Network Management Protocol), naudojamą įrenginio būsenų ataskaitų ir pranešimų siuntimui.</p>	<p><i>Palaiko sistemos būsenos įvykių fiksavimą (angl. Logging), naudojant syslog protokolą per tinklo prieigą į nuotolinį serverį, statuso žinutes siunčiant per UDP (user datagram protocol) arba TCP (transmission control protocol).</i></p> <p><i>Palaiko SNMP (Simple Network Management Protocol), naudojamą įrenginio būsenų ataskaitų ir pranešimų siuntimui.</i></p>	<p><i>SPG9000-User-Manual-D00013571G, p.65 - 70</i></p>
19.	<p>Privalo dirbti pagrindiniu (angl. <i>Main</i>) ir/arba atsarginiu (angl. <i>Backup</i>) režimu per sinchronizacijos rezervinio signalo perjungimo įrenginį, siūlomą 1 lentelės 2-ame punkte.</p>	<p><i>Dirba pagrindiniu (angl. Main) ir/arba atsarginiu (angl. Backup) režimu per sinchronizacijos rezervinio signalo perjungimo įrenginį, siūlomą 1 lentelės 2-ame punkte.</i></p>	<p><i>Telestream_SPG9000_p roduct_sheet_FINAL, p.4, p.9</i></p>
2. Sinchronizacijos rezervinio signalo perjungimo įrenginys (Toliau – C/O) – 1 vnt.			
Gamintojas		Telestream	
Modelis		ECO8000 + ECO8000 DPW + ECO8000 RACK	
Eil. Nr.	Reikalavimai	Siūlomi parametrai	Siūlomus parametrus patvirtinanti Dokumentacija
20.	<p>C/O privalo būti ne aukštesnis nei 1RU ir privalo montuotis į 19 colių spintą.</p>	<p><i>C/O yra 1RU ir yra montuojamas į 19 colių spintą.</i></p>	<p><i>ECO8000-Automatic-Changeover-Unit-Datasheet-D00013331A, p.7</i></p>
21.	<p>C/O privalo būti pateiktas su pagrindiniu ir rezerviniu maitinimo šaltiniu. Pagrindinis ir rezervinis maitinimo šaltiniai privalo būti montuojami įrenginio viduje ir būti "karštai keičiami" (angl. <i>Hot -plug</i>).</p>	<p><i>C/O pateikiamas su pagrindiniu ir rezerviniu maitinimo šaltiniu. Pagrindinis ir rezervinis maitinimo šaltiniai montuojami įrenginio viduje ir yra "karštai keičiami" (angl. Hot - plug).</i></p>	<p><i>ECO8000-Automatic-Changeover-Unit-Datasheet-D00013331A, p.1, p.4, p.7</i></p>
22.	<p>C/O privalo veikti su 1 lentelės 1 dalyje aprašomais</p>	<p><i>C/O veikia su 1 lentelės 1 dalyje aprašomais</i></p>	<p><i>ECO8000-Automatic-Changeover-Unit-Datasheet-</i></p>

	sinchronizacijos signalų generatoriais.	<i>sinchronizacijos signalų generatoriais.</i>	<i>D00013331A, p.1 Telestream_SPG9000_product_sheet_FINAL, p.4, p.9,</i>
23.	C/O privalo turėti galimybę priimti signalus iš pagrindinio ir atsarginio SPG. Pagrindinio SPG signalo dingimo atveju C/O privalo perjungti atiduodamus sinchronizacijos signalus į atsarginio įrenginio signalus. Įrenginys privalo atlikti perjungimą automatiškai arba rankiniu būdu.	<i>C/O priima signalus iš pagrindinio ir atsarginio SPG. Pagrindinio SPG signalo dingimo atveju C/O persijungia į atsarginį, atiduodamus sinchronizacijos signalus iš atsarginio įrenginio. Įrenginys perjungimą atlieka automatiškai arba rankiniu būdu.</i>	<i>ECO8000-Automatic-Changeover-Unit-Datasheet-D00013331A, p.1, p.2</i>
24.	C/O perjungimui priimami signalai privalo būti šių tipų: <ul style="list-style-type: none"> • ne mažiau nei po 6 vnt. juodo kadro signalo (angl. <i>Black burst</i>) arba trijų-lygių signalo (angl. <i>tri-level</i>) kiekvienam prijungtam SPG, BNC tipo jungtimis. • ne mažiau nei po 4 vnt. LTC signalų kiekvienam prijungtam SPG. Kiekvienai perjungimui skirtų jungčių porai privalo būti po vieną tokio pačio tipo jungtį skirtą signalo išvesčiai. PASTABA: Poroje vienas signalas skirtas pagrindiniam signalui, o antras atsarginiam signalui. PASTABA: LTC signalų atveju visi signalai iš vieno įrenginio gali būti perduodami per vieną jungtį.	<i>C/O perjungimui turi 9 vnt. signalo komutavimo modulių. Jais komutuojami šie signalai: juodo kadro signalo (angl. <i>Black burst</i>) arba trijų-lygių signalo (angl. <i>tri-level</i>) kiekvienam prijungtam SPG, BNC tipo jungtimis. 3 iš jų gali būti naudojami Testinių SDI signalų komutavimui. 4 vnt. LTC signalų kiekvienam prijungtam SPG. Kiekvienai perjungimui skirtų jungčių porai yra po vieną tokio pačio tipo jungtį skirtą signalo išvesčiai. Poroje vienas signalas skirtas pagrindiniam signalui, o antras atsarginiam signalui. LTC signalai iš vieno įrenginio perduodami per vieną jungtį</i>	<i>ECO8000-Automatic-Changeover-Unit-Datasheet-D00013331A, p.5, p.6</i>
25.	C/O privalo turėti valdymą per interneto naršyklę ir fiziškai priekinėje panelėje. Taip pat priekinėje panelėje privalo būti LED indikatoriai, skirti indikuoti kiekvieno prijungto BNC sinchronizacijos signalo būseną/klaidas.	<i>C/O turi valdymą per interneto naršyklę ir fiziškai priekinėje panelėje. Taip pat priekinėje panelėje yra LED indikatoriai, skirti indikuoti kiekvieno prijungto BNC sinchronizacijos signalo būseną/klaidas.</i>	<i>ECO8000-Automatic-Changeover-Unit-Datasheet-D00013331A, p.4</i>

26.	Prie C/O įrenginio privalo būti pridėti kabeliai, skirti sujungti C/O LTC pagrindinę ir atsarginę jungtis su 1 lentelės 1 punkte aprašytų SPG įrenginių jungtimis, LTC signalams perduoti.	<i>Prie C/O įrenginio yra pateikiami kabeliai, skirti sujungti C/O LTC pagrindinę ir atsarginę jungtis su 1 lentelės 1 punkte aprašytų SPG įrenginių jungtimis, LTC signalams perduoti. ECO8000 CBL</i>	<i>Lentelė 1</i>
3. Bendri reikalavimai			
27.	Visos siūlomos prekės turi būti naujos, nenaudotos, neatnaujintos, ne ekspozicinės.	<i>Visos siūlomos prekės yra naujos, nenaudotos, neatnaujintos, ne ekspozicinės.</i>	
28.	Į pasiūlymą privalo būti įtrauktas siūlomų antenų montavimas ir kabeliavimas ant stogo LRT nurodytu keliu iki LRT numatytos SPG diegimo vietos.	<i>Į pasiūlymą yra įtrauktas siūlomų antenų montavimas ir kabeliavimas ant stogo LRT nurodytu keliu iki LRT numatytos SPG diegimo vietos.</i>	
29.	Visos gamintojo standartiškai komplektuojamos dalys turi būti pateiktos kartu su pagrindinėmis prekėmis.	<i>Visos gamintojo standartiškai komplektuojamos dalys yra pateikiamos kartu su pagrindinėmis prekėmis.</i>	
30.	Siūlomų prekių garantija ir palaikymas – ne trumpiau 24 mėn.	<i>Siūlomų prekių garantija ir palaikymas - 36 mėnesiai</i>	

III. Žalieji reikalavimai

15. Perkančioji organizacija taiko aplinkos apsaugos kriterijus nurodytus 3 lentelėje šiame pirkime įsigyjamoms prekėms:

3 lentelė. Aplinkos apsaugos kriterijai prekėms

Eil. Nr.	Aplinkos apsaugos reikalavimai	Techninės specifikacijos punktai, kuriems taikomi aplinkos apsaugos reikalavimai	Atitiktį reikalavimams įrodantys dokumentai*
1.	Tai, kad perkama modulinė-sudėtinė įranga, reiškia, jog perkama prekė gali būti lengvai pataisoma esant atskirų modulių gedimams, yra ilgaamžė. Vadovaujantis Lietuvos Respublikos aplinkos ministro 2011 m. birželio 28 d. įsakymu Nr. D1-508 (Lietuvos Respublikos aplinkos ministro 2022 m. gruodžio 13 d. įsakymo Nr. D1-401 redakcija) patvirtinto Aplinkos apsaugos kriterijų taikymo, vykdant žaliuosius pirkimus, tvarkos aprašo 4.4.4.4 punkte nustatytu aplinkosauginiu principu („prekė yra tvirta, ilgaamžė, funkcionali, ji ar jos sudedamosios dalys tinka naudoti daug kartų ir (ar)	Visas pirkimo objektas	Sutarties vykdymui keliamas reikalavimas, todėl įrodymų kartu su pasiūlymu pateikti nereikia.

	lengvai pataisomos, ir (ar) pakeičiamos"), pirkimas laikomas žaliuoju.		
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Pastabos:

*Tiekėjas aplinkos apsaugos reikalavimus pagrindžiančius dokumentus turi pateikti kartu su pasiūlymu. Tiekėjas su pasiūlymu nepateikęs atitiktą reikalavimams įrodančių dokumentų tokius dokumentus galės pateikti tik tokiu atveju, jeigu atitinkami dokumentai bus parengti, arba pateiktuose dokumentuose pateikta informacija, bus parengta iki pasiūlymų pateikimo termino pabaigos ir tokia informacija prieinama viešai arba parengta prekių gamintojo, arba kito asmens turinčio teisę parengti tokius dokumentus.

IV. Nacionalinio saugumo reikalavimai

15. Šis pirkimas laikomas susijusiu su nacionaliniu saugumu, todėl šio pirkimo atžvilgiu keliami specialieji reikalavimai tiekėjo siūlomoms prekėms, nurodytoms šios Techninės specifikacijos 1 lentelėje, išskyrus tvirtinimus, antenas ir kabelius, siekiant užtikrinti šalies nacionalinio saugumo interesus. Nacionalinio saugumo reikalavimai paslaugoms nurodyti Specialiųjų pirkimo sąlygų 5 skyriuje.

Europos bendrasis viešųjų pirkimų dokumentas (EBVPD)

I dalis. Informacija apie pirkimo procedūrą ir perkančiąją organizaciją ar perkantįjį subjektą

Informacija apie paskelbimą

Skelbimo numeris OL S (tik tarptautiniams pirkimams):

-

Skelbimo numeris CVP IS (kur rasti?)

-

Perkančiosios organizacijos / Perkančiojo subjekto tapatybė

Oficialus pavadinimas:

Viešoji įstaiga Lietuvos nacionalinis radijas ir televizija

Šalis:

Lietuva

Informacija apie pirkimo procedūrą

Procedūros tipas

Atvira

Pavadinimas:

CA ir Matricos priedai. Trikdžiams atsparios GNSS antenos sistemos ir Sinchrogeneratorių pirkimas

Trumpas aprašymas:

Žr. pirkimo dokumentuose.

Perkančiosios organizacijos ar perkančiojo subjekto (jei taikoma) priskirtas dokumento numeris:

-

II dalis. Informacija apie ekonominės veiklos vykdytoją

A. Informacija apie ekonominės veiklos vykdytoją

Tiekėjo pavadinimas arba vardas ir pavardė (jei fizinis asmuo):

Hannu Pro Vilnius

Gatvė ir namo numeris:

A. Juozapavičiaus 6

Pašto kodas:

LT-09312

Miestas:

Vilnius

Šalis:

Lietuva

Interneto adresas (jei yra):

www.hannu-pro.com

E. paštas:

vilnius@hannu-pro.com

Telefonas:

85 2482565

Asmuo ar asmenys ryšiams:

PVM mokėtojo kodas, jei yra:

LT239181314

Jei PVM mokėtojo kodo nėra, nurodykite kitą nacionalinį identifikacinį numerį (Lietuvoje - įmonės kodą)

-

Ar ekonominės veiklos vykdytojas yra labai maža, mažoji ar vidutinė įmonė?

Taip

Ne

Tik tuo atveju, kai pirkimas rezervuotas: ar ekonominės veiklos vykdytojas yra globojama darbo grupė (neįgaliųjų socialinė įmonė), socialinė įmonė? Ar jis vykdys sutartį pagal globojamų darbo grupių (neįgaliųjų socialinių įmonių) užimtumo programas?

Taip

Ne

Jei taikoma, ar ekonominės veiklos vykdytojas įtrauktas į oficialų patvirtintų ekonominės veiklos vykdytojų sąrašą arba ar jis turi lygiavertį sertifikatą (pvz., pagal nacionalinę (išankstinę) kvalifikacijos vertinimo sistemą)? Lietuvos tiekėjai renkasi „ne“

Taip

Ne

- Be to, užpildykite trūkstamą informaciją IV dalies A, B, C arba D skirsniuose, atsižvelgdami į konkretų atvejį TIK jei to reikalaujama atitinkamame skelbime arba pirkimo dokumentuose:

e) Ar ekonominės veiklos vykdytojas galės pateikti sertifikatą dėl socialinio draudimo įmokų ir mokesčių mokėjimo arba pateikti informaciją, kuri leistų perkančiajai organizacijai ar perkančiajam subjektui jį gauti tiesiogiai naudojantis prieiga prie bet kurios iš valstybių narių nemokamos nacionalinės duomenų bazės?

Taip

Ne

Jei atitinkami dokumentai prieinami elektroniniu būdu, nurodykite:

-

Ar ekonominės veiklos vykdytojas pirkimo procedūroje dalyvauja kartu su kitais? Žymima TAIP, jei pasiūlymą teikia ūkio subjektų grupė (konsorciumas) pagal jungtinės veiklos sutartį

Taip

Ne

Jei pirkimas padalintas į dalis, nuoroda į pirkimo dalį (-is), dėl kurios (-ių) ekonominės veiklos vykdytojas nori dalyvauti konkurse:

-

B. Informacija apie ekonominės veiklos vykdytojo teisinius atstovus #1

- Šis skirsnis pildomas, jeigu tiekėjo vadovas įgalioja kitą asmenį pasirašyti pasiūlymą, bendrauti su pirkimo vykdytoju, įgalioja atstovauti ir pasirašyti EBVPD, bendrauti su pirkimo vykdytoju dėl EBVPD pateiktos informacijos, teikiamų kvalifikaciją ir pašalinimo pagrindų nebuvimą pagrindžiančių dokumentų, dėl pasiūlymo ir pan.

Jei taikytina, nurodykite asmens (-ų), įgalinto (-ų) atstovauti ekonominės veiklos vykdytojui šios pirkimo procedūros tikslais, vardą ir pavardę ir adresą:

Vardas

Pavardė

Gimimo data

Gimimo vieta

Gatvė ir namo numeris:

Pašto kodas:

Miestas:

Šalis:

E. paštas:

Telefonas:

Pareigos arba statusas:

Prireikus pateikite išsamią informaciją apie atstovavimą (formą, aprėptį, paskirtį ir t. t.):

-

C. Informacija apie rėmimąsi kitų subjektų pajėgumais

Ar siekdamas patenkinti IV dalyje nurodytus atrankos kriterijus ir V dalyje nurodytus kriterijus bei taisykles (jei tokių yra) ekonominės veiklos vykdytojas remiasi kitų subjektų pajėgumais?

Taip

Ne

D. Informacija apie subrangovus, kurių pajėgumais ekonominės veiklos vykdytojas nesiremia

- (Skirsnį reikia pildyti, tik jei šios informacijos aiškiai reikalauja perkančioji organizacija ar perkantysis subjektas.)

Ar ekonominės veiklos vykdytojas ketina kurias nors sutarties dalis subrangos sutartimi pavesti atlikti trečiosioms šalims?

Taip

Ne

- Jei perkančioji organizacija ar perkantysis subjektas aiškiai prašo šios informacijos, šalia informacijos pagal šį skirsnį, pateikite pagal šios dalies A ir B skirsnius ir III dalį reikalaujamą informaciją apie kiekvieną susijusį subrangovą (subrangovų kategorijas).

III dalis. Pašalinimo pagrindai

A. Su baudžiamaisiais nuosprendžiais susiję pagrindai

Direktyvos 2014/24/ES 57 straipsnio 1 dalyje nustatyti šie pašalinimo pagrindai

A1. Dalyvavimas nusikalstamos organizacijos veikloje (VPĮ 46 str. 1 d. 1 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už dalyvavimą nusikalstamos organizacijos veikloje, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2008 m. spalio 24 d. Tarybos pamatinio sprendimo 2008/841/TVR dėl kovos su organizuotu nusikalstamumu 2 straipsnyje (OL L 300, 2008 11 11, p. 42).

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

A2. Korupcija (VPĮ 46 str. 1 d. 2 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už korupciją, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo

laikotarpis tebesitęsia? Kaip apibręžta Konvencijos dėl kovos su korupcija, susijusia su Europos Bendrijų pareigūnais ar Europos Sąjungos valstybių narių pareigūnais, 3 straipsnyje (OL C 195, 1997 6 25, p. 1) ir 2003 m. liepos 22 d. Tarybos pamatinio sprendimo 2003/568/TVR dėl kovos su korupcija privačiame sektoriuje 2 straipsnio 1 dalyje (OL L 192, 2003 7 31, p. 54). Į pašalinimo pagrindus taip pat įtraukta korupcija, kaip apibręžta perkančiosios organizacijos (perkančiojo subjekto) arba ekonominės veiklos vykdytojo nacionalinėje teisėje.

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

A3. Sukčiavimas (VPĮ 46 str. 1 d. 3 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už sukčiavimą, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Pagal Europos Bendrijų finansinių interesų apsaugos konvencijos 1 straipsnį (OL C 316, 1995 11 27, p. 48).

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

A4. Teroristiniai nusikaltimai arba su teroristine veikla susiję nusikaltimai (VPĮ 46 str. 1 d. 5 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už teroristinius nusikaltimus arba

su teroristine veikla susijusius nusikaltimus, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2002 m. birželio 13 d. Tarybos pamatinio sprendimo dėl kovos su terorizmu 1 ir 3 straipsniuose (OL L 164, 2002 6 22, p. 3). Į pašalinimo pagrindus taip pat įtrauktas nusikalstamos veikos kurstymas, pagalba ar bendrininkavimas ją vykdant arba kėsintis ją įvykdyti, kaip nurodyta to pamatinio sprendimo 4 straipsnyje.

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

A5. Pinigų plovimas arba teroristų finansavimas (VPĮ 46 str. 1 d. 6 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už pinigų plovimą arba teroristų finansavimą, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2005 m. spalio 26 d. Europos Parlamento ir Tarybos direktyvos 2005/60/EB dėl finansų sistemos apsaugos nuo jos panaudojimo pinigų plovimui ir teroristų finansavimui 1 straipsnyje (OL L 309, 2005 11 25, p. 15).

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

A6. Vaikų darbas ir kitos prekybos žmonėmis formos (VPĮ 46 str. 1 d. 7 p.)

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo,

sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo nuteistas galutiniu teismo sprendimu už vaikų darbą arba kitas prekybos žmonėmis formas, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia? Kaip apibrėžta 2011 m. balandžio 5 d. Europos Parlamento ir Tarybos direktyvos 2011/36/ES dėl prekybos žmonėmis prevencijos, kovos su ja ir aukų apsaugos, pakeičiančios Tarybos pamatinį sprendimą 2002/629/TVR, 2 straipsnyje (OL L 101, 2011 4 15, p. 1).

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

B. Su mokesčių ar socialinio draudimo įmokų mokėjimu susiję pagrindai Direktyvos 2014/24/ES 57 straipsnio 2 dalyje nustatytos šios pašalinimo priežastys

B1. Mokesčių mokėjimas VPĮ 46 str. 3 d.

Ar ekonominės veiklos vykdytojas pažeidė savo pareigas, susijusias su mokesčių mokėjimu, tiek šalyje, kurioje yra įsisteigęs, tiek perkančiosios organizacijos ar perkančiojo subjekto valstybėje narėje, jei tai nėra jo įsisteigimo šalis?

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

B2. Socialinio draudimo įmokų mokėjimas VPĮ 46 str. 3 d.

Ar ekonominės veiklos vykdytojas pažeidė savo pareigas, susijusias su socialinio draudimo įmokų mokėjimu, tiek šalyje, kurioje yra įsisteigęs, tiek perkančiosios organizacijos ar perkančiojo subjekto valstybėje narėje, jei tai nėra jo įsisteigimo šalis?

Jūsų atsakymas

- Taip
 Ne
-

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

- Taip
 Ne

C. Su nemokumu, interesų konfliktu ar profesiniais nusižengimais susiję pagrindai

Direktyvos 2014/24/ES 57 straipsnio 4 dalyje nustatyti šie pašalinimo pagrindai

C4. Bankrotas ar restruktūrizavimas VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra bankrutavęs, jam iškelta restruktūrizavimo ar bankroto byla?

Jūsų atsakymas

- Taip
 Ne
-

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

- Taip
 Ne

C5. Nemokumas VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra nemokus, jam taikoma nemokumo ar likvidavimo procedūra (inicijuotos ar pradėtos likvidavimo procedūros)?

Jūsų atsakymas

- Taip
 Ne
-

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

- Taip
 Ne

C6. Susitarimas su kreditoriais VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra sudaręs susitarimą su kreditoriais?

Jūsų atsakymas

- Taip
 Ne
-

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

- Taip
 Ne

C7. Bankrotui prilygstanti situacija pagal nacionalinius įstatymus VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojas yra bet kokioje bankrotui prilygstančioje situacijoje, susiklosčiusioje dėl panašios nacionaliniuose įstatymuose ir kituose teisės aktuose nustatytos procedūros?

Jūsų atsakymas

- Taip
 Ne
-

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

- Taip
 Ne

C8. Likvidatoriaus administruojamas turtas VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojo turtą administruoja likvidatorius, nemokumo administratorius arba teismas?

Jūsų atsakymas

- Taip
 Ne
-

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

- Taip
 Ne

C9. Sustabdyta verslo veikla VPĮ 46 str. 6 d. 2 p.

Ar ekonominės veiklos vykdytojo verslo veikla yra sustabdyta arba apribota?

Jūsų atsakymas

- Taip
 Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

C10. Su kitais ekonominės veiklos vykdytojais sudaryti susitarimai, kuriais siekta iškreipti konkurenciją (VPĮ 46 str. 4 d. 1 p.)

Ar ekonominės veiklos vykdytojas su kitais ekonominės veiklos vykdytojais yra sudaręs susitarimų, kuriais siekta iškreipti konkurenciją atliekamame pirkime?

Jūsų atsakymas

Taip

Ne

C11. Rimti profesiniai pažeidimai VPĮ 46 str. 4 d. 7 p., VPĮ 46 str. 6 d. 3 p.

Pirkimams pradėtiems nuo 2022-01-01: Ar ekonominės veiklos vykdytojas yra padaręs rimtą profesinį pažeidimą, kaip nurodyta žemiau?:

a) yra padaręs finansinės atskaitomybės ir audito teisės aktų pažeidimą ir nuo jo padarymo dienos praėjo mažiau kaip vieni metai; **Nuo 2022-08-12**

pildydamas EBVPD tiekėjas yra informuotas ir supranta, kad finansinės atskaitomybės ir audito teisės aktų pažeidimu taip pat gali būti laikomi atvejai, kai tiekėjas nepateikia privalomų finansinės atskaitomybės dokumentų Registrų centrui ar juos pateikia nesilaikydamas privalomų teisės aktų reikalavimų. Išsamiau: <https://vpt.lrv.lt/lt/naujienos-3/finansiniu-ataskaitu-nepateikimas-gali-tapti-kliutimi-dalyvauti-viesuosiuose-pirkimuose>

b) neatitinka minimalių patikimo mokesčių mokėtojo kriterijų, nustatytų Lietuvos Respublikos mokesčių administravimo įstatymo 40¹ straipsnio 1 dalyje. Taikant šį tiekėjo pašalinimo iš pirkimo procedūros pagrindą, vadovaujamas Lietuvos Respublikos mokesčių administravimo įstatymo 40¹ straipsnio 1 dalyje nustatytais terminais, juos skaičiuojant nuo Mokesčių administravimo įstatymo 40¹ straipsnio 1 dalyje nurodytų pažeidimų padarymo dienos, tačiau visais atvejais šie terminai negali būti ilgesni negu 3 metai;

c) yra padaręs draudimo sudaryti draudžiamus susitarimus, įtvirtinto Lietuvos Respublikos konkurencijos įstatyme ar panašaus pobūdžio kitos valstybės teisės akte, pažeidimą ir nuo jo padarymo dienos praėjo mažiau kaip 3 metai;

d) yra padaręs bet kokią kitą rimtą profesinį pažeidimą, nenurodytą aukščiau, nuo kurio padarymo dienos praėjo mažiau kaip vieni metai?

Pirkimams pradėti iki 2022-01-01: Ar ekonominės veiklos vykdytojas yra pripažintas kaltu dėl sunkaus profesinio nusižengimo kaip nurodyta žemiau?

I. ar ekonominės veiklos vykdytojas yra padaręs profesinį pažeidimą, kai už finansinės atskaitomybės ir audito teisės aktų pažeidimus ekonominės veiklos vykdytojui ar jo vadovui paskirta administracinė nuobauda ar ekonominė sankcija, nustatytos Lietuvos Respublikos įstatymuose ar kitų valstybių teisės aktuose, ir nuo sprendimo, kuriuo buvo paskirta ši sankcija, įsiteisėjimo dienos arba nuo dienos, kai asmuo įvykdė administracinį nurodymą, praėjo mažiau kaip vieni metai?

II. Ar ekonominės veiklos vykdytojas yra padaręs kurį nors vieną iš žemiau nurodytų rimtų profesinių pažeidimų(taikoma tik tada kai, ir tik tiek, kiek apibrėžta kituose pirkimo dokumentuose):

- a) profesinės etikos pažeidimas, kai nuo ekonominės veiklos vykdytojo pripažinimo nesilaikančiu profesinės etikos normų momento praėjo mažiau kaip vieni metai;
- b) konkurencijos, darbuotojų saugos ir sveikatos, informacijos apsaugos, intelektinės nuosavybės apsaugos pažeidimas, už kurį ekonominės veiklos vykdytojui ar jo vadovui yra paskirta administracinė nuobauda ar ekonominė sankcija, nustatytos Lietuvos Respublikos ar kitų valstybių įstatymuose, kai nuo sprendimo, kuriuo buvo paskirta ši sankcija, arba nuo dienos, kai asmuo įvykdė administracinį nurodymą, įsiteisėjimo dienos praėjo mažiau kaip vieni metai;
- c) draudimo sudaryti draudžiamus susitarimus, įtvirtinto Lietuvos Respublikos konkurencijos įstatyme ar panašaus pobūdžio kitos valstybės teisės akte, pažeidimas, kai nuo sprendimo paskirti Konkurencijos įstatyme ar kitos valstybės teisės akte nustatytą ekonominę sankciją įsiteisėjimo dienos praėjo mažiau kaip 3 metai;
- d) ekonominės veiklos vykdytojas, kuris yra fizinis asmuo, arba ekonominės veiklos vykdytojo, kuris yra juridinis asmuo, kita organizacija ar jos padalinys, vadovas, kitas valdymo ar priežiūros organo narys ar kitas asmuo, turintis (turintys) teisę atstovauti ekonominės veiklos vykdytojui ar jį kontroliuoti, jo vardu priimti sprendimą, sudaryti sandorį, arba dalyvis, turintis balsų daugumą juridinio asmens dalyvių susirinkime, yra pripažintas kaltu dėl tyčinio bankroto, kaip jis apibrėžtas Lietuvos Respublikos įmonių bankroto įstatyme ar panašaus pobūdžio kitų valstybių teisės aktuose, kai nuo teismo sprendimo įsiteisėjimo dienos praėjo mažiau kaip 3 metai?

Jūsų atsakymas

Taip

Ne

C12. Interesų konfliktas dėl dalyvavimo pirkimo procedūroje (VPĮ 46 str. 4 d. 2 p.)

Ar ekonominės veiklos vykdytojas žino apie kokius nors [interesų konfliktus](#), kaip nurodyta nacionalinėje teisėje, atitinkamame skelbime ar pirkimo dokumentuose, kylančius dėl jo dalyvavimo pirkimo procedūroje?

Jūsų atsakymas

Taip

Ne

C13. Tiesioginis arba netiesioginis dalyvavimas rengiant šią pirkimo procedūrą (46 str. 4 d. 3 p.)

Ar ekonominės veiklos vykdytojas arba su juo susijusi įmonė konsultavo perkančiąją organizaciją ar perkantįjį subjektą arba kitaip dalyvavo rengiant pirkimo procedūrą?

Jūsų atsakymas

Taip

Ne

C14. Sutarties nutraukimas anksčiau laiko, žala ar kitos panašios sankcijos (VPĮ 46 str. 4 d. 6 p.)

Ar ekonominės veiklos vykdytojas turėjo tokios patirties: ankstesnė viešoji sutartis, ankstesnė sutartis su perkančiuoju subjektu arba ankstesnė koncesijos sutartis buvo nutraukta anksčiau laiko; arba buvo pareikalauta atlyginti su ankstesne sutartimi susijusią žalą ar skirtos kitos panašios sankcijos?

Lietuvoje (be kita ko) - ar ekonominės veiklos vykdytojas yra įtrauktas į nepatikimų tiekėjų sąrašą ?

Jūsų atsakymas

Taip

Ne

C15. Pripažinimas kaltu dėl faktų iškreipymo, informacijos nuslėpimo, negalėjimas pateikti reikalaujamų dokumentų ir su šia procedūra susijusios konfidencialios informacijos gavimas (46 str. 4 d. 4 p. ir 46 str. 4 d. 5 p.)

Ar ekonominės veiklos vykdytojas yra susijęs su vienu iš šių atvejų, kai jis :

a) buvo labai iškreipęs faktus pateikdamas informaciją (**pateikęs melagingą informaciją**), reikalingą patikrinti, ar nėra pagrindų pašalinti, arba patikrinti atitiktį atrankos kriterijams;

b) slėpė tokią informaciją;

c) delsė pateikti patvirtinamuosius dokumentus, kurių reikalavo perkančioji organizacija ar perkantysis subjektas,

d) siekė daryti neteisėtą įtaką perkančiosios organizacijos ar perkančiojo subjekto sprendimų priėmimo procesui, kad gautų konfidencialios informacijos, dėl kurios per pirkimo procedūrą įgytų nepagrįstą pranašumą, arba tyčia teikti klaidinančios

informacijos, kuri gali turėti esminės įtakos sprendimams dėl pašalinimo, atrankos ar sutarties skyrimo?

Jūsų atsakymas

Taip

Ne

D. Išimtinai nacionaliniai pašalinimo pagrindai

Išimtinai nacionaliniai pašalinimo pagrindai, nurodyti atitinkamame skelbime ar pirkimo dokumentuose.

D1. Išimtinai nacionalinis pašalinimo pagrindas dėl nusikalstamo bankroto (VPĮ 46 str. 1 d. 4 p.)

Pirkimams pradėtiems nuo 2022-01-01:

Ar pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo **nuteistas galutiniu teismo sprendimu už nusikalstamą bankrotą**, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia?

Pirkimams pradėtiems iki 2022-01-01:

Ar ekonominės veiklos vykdytojas yra susijęs su vienu iš šių atvejų, kai:

a) jis **neatitinka minimalių patikimo mokesčių mokėtojo kriterijų**, nustatytų Lietuvos Respublikos mokesčių administravimo įstatymo 40¹ straipsnio 1 dalyje ir dėl to laikomas padariusiu šiurkštų profesinį pažeidimą.

b) pats ekonominės veiklos vykdytojas ar bet kuris asmuo, kuris yra jo administracijos, valdymo ar priežiūros organo narys arba turi atstovavimo, sprendimo ar kontrolės įgaliojimus to ekonominės veiklos vykdytojo atžvilgiu, buvo **nuteistas galutiniu teismo sprendimu už nusikalstamą bankrotą**, o nuosprendis priimtas prieš ne daugiau kaip penkerius metus arba kai nuosprendyje aiškiai nustatytas pašalinimo laikotarpis tebesitęsia?

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

D2. Išimtinai nacionalinis pašalinimo pagrindas dėl paskirtos baudžiamojo poveikio priemonės (VPI 46 str. 2¹ d.)

Pirkimams pradėtiems nuo 2025-02-01:

Ar ekonominės veiklos vykdytojui yra taikoma sąlyga, kad jis yra neatlikęs jam paskirtos baudžiamojo poveikio priemonės – uždraudimo juridiniam asmeniui dalyvauti viešuosiuose pirkimuose?

Jūsų atsakymas

Taip

Ne

Ar ši informacija ES valstybės narės duomenų bazėje nemokamai prieinama valdžios institucijoms?

Taip

Ne

IV dalis. Atrankos kriterijai

α. Visų atrankos kriterijų bendra nuoroda

Dėl atrankos kriterijų ekonominės veiklos vykdytojas pareiškia, kad jis atitinka visus reikalaujamus atrankos kriterijus

Jūsų atsakymas

Taip

Ne

Baigti

IV dalis. Baigiamieji pareiškimai

Ekonominės veiklos vykdytojai oficialiai pareiškia, kad II–V dalyse pateikta informacija yra tiksli ir teisinga ir kad ji pateikta visiškai suvokiant didelio faktų iškreipimo padarinius.

Ekonominės veiklos vykdytojai oficialiai pareiškia, kad pareikalavus gali nedelsdami pateikti nurodytus sertifikatus ir kitų formų įrodomuosius dokumentus, išskyrus tuos atvejus, kai:

a) perkančioji organizacija ar perkantysis subjektas turi galimybę atitinkamus patvirtinamuosius dokumentus tiesiogiai gauti naudodamiesi prieiga prie bet kurios iš valstybių narių nemokamos nacionalinės duomenų bazės (su sąlyga,

kad ekonominės veiklos vykdytojas pateikė reikalingą informaciją (internetu adresu, išduodančiąją instituciją ar įstaigą, tiksliai dokumentų nuorodas), kuri perkančiajai organizacijai ar perkančiajam subjektui leidžia tai padaryti (pareikalavus dėl tokios priemonės turi būti pridėtas atitinkamas sutikimas), arba b) perkančioji organizacija ar perkantysis subjektas yra gavusi ir turi aktuales susijusius dokumentus iš ankstesnių (kitų) pirkimo procedūrų.

Ekonominės veiklos vykdytojai oficialiai sutinka perkančiajai organizacijai ar perkančiajam subjektui, nurodytam I dalyje, leisti susipažinti su dokumentais, kuriais patvirtinama informacija, pateikta šio Europos bendrojo viešųjų pirkimų dokumento III ir IV dalyse, kiek tai susiję su pirkimu, nurodytu I dalyje.

Data, vieta ir, jei reikia ar būtina, parašas (-ai):

Data

03-11-2025

Vieta

Vilnius

Parašas



ECO8000 User Manual

This document supports software version 2.0.



071371700C

May 2025

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[W2 – 15AUG04]

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Important Compliance and Safety Information

United States of America Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. 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.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause unexpected operation.

Safety

UL 61010-1: 2012 R7.19: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements.

Environmental

Perchlorate Materials: this product contains one or more type CR lithium batteries. According to the state of California, CR lithium batteries are classified as perchlorate materials and require special handling.

See www.dtsc.ca.gov/hazardouswaste/perchlorate for additional information.

Canada Compliance Notices

Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du Quadstere des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du Quadstere des Communications du Canada. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

Safety

CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements.

Sécurité

CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1: Exigences de sécurité pour l'électricité Matériel de mesure, de contrôle et d'utilisation en laboratoire - Partie 1: Généralités Exigences.

European Union, European Free Trade Association (EFTA), and United Kingdom Compliance Notices

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CROATIA, CZECHIA, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LIECHTENSTEIN, NORWAY, SWITZERLAND

Declaration of Conformity

Marking by the "CE" symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU

This equipment meets the following conformance standards:

Safety

EN 61010-1: 2010 + A1: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements Low Voltage Directive 2014/35/EU

Emissions

EN 55032: 2015 + A11: 2020, CISPR 32: 2015, EN 61000-3-2: 2014, EN 61000-3-3: 2013

Immunity

EN 55035: 2017, EN 61000-4-2: 2009,

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010, EN 61000-4-4: 2012,

EN 61000-4-5: 2014 + A1: 2017, EN 61000-4-6: 2014, EN 61000-4-8: 2010,

EN 61000-4-11: 2020

Environments: E2

Warnings



Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.



Achtung! Dieses ist ein Gerät der Funkstorgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.



Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

Notes:

1. For Compliance with the EMC standards listed here, high-quality shielded interface cables should be used.
2. Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.

Environmental Compliance

This section provides information about the environmental impact of the product.

Product end-of-life handling

Observe the following guidelines when recycling an instrument or component:



Equipment recycling

Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or

human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

This symbol on the product or its packaging indicates that this product complies with the applicable European Union requirements according to Directives 2012/19/EU and 2006/66/EC on waste electrical and electronic - equipment (WEEE) and batteries.

It also indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Battery Recycling

This product may contain a rechargeable battery, which must be recycled or disposed of properly. Please properly dispose of or recycle the battery according to local government regulations.

Transporting Batteries or products with Batteries in them

The capacity of the lithium-ion secondary battery shipped with this product is under 100 Wh. The lithium content of the installed primary battery is under 1 g. Each battery meets the applicable requirements of UN Manual of Tests and Criteria Part III Section 38.3. Battery quantity is under the limit for shipment according to Section II of the relevant Packing Instructions from the IATA Dangerous Goods Regulations. Consult your air carrier for applicability and determination of any special lithium battery transportation requirements.

Restriction of Hazardous Substances

This product is classified as an industrial monitoring and control instrument, and is required to comply with the substance restrictions of the RoHS 3 Directives 2011/65/EU and EU 2015/863.

Korea Compliance Statement

사용자 안내문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Taiwan Compliance Statement

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Japan Compliance Statement

この装置は、クラス A 機器です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the VCCI Council (VCCI 32: 2016). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Important Safety Information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition. To safely perform service on this product, see the Service Safety Summary that follows the General Safety Summary.

General Safety Summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with Local and National Safety Codes

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

Product is Designed to be Used by Trained Personnel Only

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment. Before use, always check the product with a known source to be sure it is operating correctly.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To Avoid Fire or Personal Injury

Use proper power cord: Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.

Ground the product: This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect: The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Observe all terminal ratings: To avoid fire or shock hazard, observe all rating and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not operate without covers: Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry: Do not touch exposed connections and components when power is present.

Do not operate with suspected failures: If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use Only Specified Replacement Parts

Do not operate in wet/damp conditions: Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry: Remove the input signals before you clean the product.

Provide proper ventilation: Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment: Always place the product in a location convenient for viewing the display and indicators.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use only the Telestream rackmount hardware specified for this product.

Service Safety Summary

The Service Safety Summary section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this Service Safety Summary and the General Safety Summary before performing any service procedures.

To avoid electric shock: Do not touch exposed connections.

Do not service alone: Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power: To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on: Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Verify safety after repair: Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in the Manual

These terms may appear in this manual:



WARNING: Warning statements identify conditions or practices that could result in injury or loss of life.



CAUTION: Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the Product

These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:



General Safety Product Specific Statements

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual. The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.



WARNING: Injury or death can occur as the result of electrical shock. To avoid electrical shock, do not connect power to the instrument when the top cover is off. There are dangerous potentials present on the power supply circuit boards when the power cord is connected.



WARNING: To avoid personal injury and instrument damage, do not use slides provided with other instruments from other kits (for example, General Devices, Chassis Trak C-300) with the rails from this kit. The locking feature will not function and will result in an instrument that is not secured properly and could fall out of the rack, causing personal injury or instrument damage.



WARNING: To prevent the rack-mounted instrument from tipping forward onto the operator, install the instrument so the operator is able to access all of its rear-panel connectors without pushing down on the instrument. Verify that the rack does not become unstable with the instrument fully extended. Do not leave the instrument extended when finished accessing the rear panel.



WARNING: To reduce the risk of injury and equipment damage, make sure that levers are properly installed. An improperly installed lever can prevent the slide from locking or prevent the instrument from being removed from the rack. Make sure that the lever is installed so the long handle is facing forward and the short hook is facing downward.



WARNING: To prevent injury during product installation, use care not to pinch hands or fingers in the rails and slides.



WARNING: To prevent injury when removing the product from the rack, do not forcefully and abruptly pull the product from the rack. Pull with the minimum force required to move the instrument with a consistent, even motion.



WARNING: To reduce the risk of fire and shock, ensure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.



CAUTION: The instrument does not have a power switch. When you connect the power cable to the AC line connector, the instrument powers on.



CAUTION: Be careful to select the correct screw type for your instrument (metric or SAE). If the screws do not insert easily (do not use excessive force or you might damage the threads), it is possible you are using the wrong screw.

 **CAUTION:** To prevent damage to the instrument and rackmount, do not force the instrument into the rack if it does not slide smoothly. The rails assembly might need to be adjusted to resolve the problem.

 **CAUTION:** Damage to the instrument can occur if this instrument is powered on at temperatures outside the specified temperature range.

 **CAUTION:** Do not enable the relay check function on channels that are not terminated, since the unterminated output looks similar to an open relay and will cause unfounded relay check events.

 **CAUTION:** To prevent a loss of instrument configuration and a disruption in the output signals, do not initialize hardware while the instrument is in service.

 **CAUTION:** To prevent an unexpected shutdown of the instrument, be sure to remove the correct power supply module if you are replacing a faulty module.

 **CAUTION:** The firmware upgrade process may disrupt the sync signals. We recommend that you upgrade the firmware only when the instrument is not in service.

Do not remove power from the instrument until the upgrade process has completed.

Preface

This manual contains information to help you use the ECO8000 automatic changeover unit:

- How to operate the instrument using the front panel controls
- How to configure the instrument for network access and operate the instrument using the web interface
- How to monitor the status of the instrument during normal operation

Where to Find More Information

Other information about your product is available for download at www.telestream.net/video/resources.htm. The following table lists all the documentation for the ECO8000 changeover unit.

Document	Manual type	Part number	Description
ECO8000 User Manual	User	071371700x	Provides detailed operation information.
Release Notes	Release Notes	D00010045x	Describes the new features, improvements, and limitations of the instrument firmware.
Manual, Rackmount Slides, and Rails Kit	User	071370600x	Describes how to connect rack equipment to an ECO8000 changeover. Provides basic safety information.
ECO8000 Series Specifications and Performance Verification	Technical Reference	077087600x	Lists the product specifications and provides procedures to verify instrument performance.

Telestream Contact Information

To obtain product information, technical support, or provide comments on this guide, contact us using our website, email, or phone number listed.

Resource	Contact Information
Telestream Video Support	Website: www.telestream.net/telestream-support Email: videosupport@telestream.net US and Canada Toll-free: 1-844-219-5329 Outside of US and Canada: 1-503-967-9833
Telestream	Website: www.telestream.net Sales and Marketing Email: info@telestream.net Address: Telestream 848 Gold Flat Road, Suite 1 Nevada City, CA. USA 95959
International Distributor Support	Website: www.telestream.net See the Telestream website for your regional authorized Telestream distributor.
Telestream Technical Writers	Email: techwriter@telestream.net If you have comments or suggestions about improving this document, or other Telestream documents—or if you've discovered an error or omission, please email us.

Product Description

The ECO8000 is an automatic changeover unit for baseband synchronization and test signals. When used with the SPG9000 timing and reference system, it provides redundancy for the facility's critical synchronization and timing sources.

Two SPG9000 units, designated as Primary and Backup sources, are connected to the ECO8000 inputs. The ECO8000's outputs connect to the equipment in the facility, typically through distribution amplifiers (DAs). If one or more signals on the primary source fail, perhaps by a cable fault or by loss of power to the SPG9000, the ECO8000 will automatically switch to the signals from the backup source, thereby providing signal continuity with minimal disruption on the ECO8000's outputs. You can also manually switch from the primary SPG9000 to the backup and back again so that scheduled maintenance (such as firmware upgrades) can be performed on each SPG9000 with no discernible signal disruption for most equipment in the facility.



Capabilities

The ECO8000 includes a total of 13 channels, each with two inputs (primary and backup) and one output:

- Six channels with 50 MHz fast electronic switches that use BNC connectors. These are typically used for analog synchronization signals (NTSC/PAL black burst or HD tri-level) from the BLACK 1-6 outputs from the SPG9000. These channels are named "REF" or "ELSW" channels in the ECO8000 user interface.
- Three channels with 3 GHz relay switches that use BNC connectors. These are typically used for SDI test signals (SD-SDI, 1.5G HD-SDI or 3G-SDI) or for Word Clock (± 1 V level) or DARS audio reference signals. These channels are named "HREF" or "Relay" channels in the ECO8000 user interface.
- Four channels for LTC signals that use a shared 15-pin D-sub connector.

Note: Older ECO8000 instruments sold by Tektronix could have different hardware configurations, with different numbers of REF or HREF channel types. Tektronix also sold the ECO8020 changeover, which had up to 20 signal channels. Version 2.0 or newer of the ECO8000 firmware will correctly support all configurations of the ECO8000 and ECO8020. This manual describes the channel configuration of the Telestream ECO8000 only.

The ECO8000 has a front-panel display and buttons for a local user interface. It can also be connected to a network for remote access using a web page interface. The network interface can also be used for notifications and configuration changes via the Simple Network Management Protocol (SNMP) with a remote management system. A General Purpose Interface (GPI) is also available for alarms and for some external control of the instrument.

For increased reliability, the ECO8000 is equipped with two power supply modules. Under normal operation, the standby supply is seldom used, ensuring that it has maximum remaining life should the active supply fail. The standby supply is load-tested each day to verify that it can serve as the active supply if necessary. The usage time of each supply is logged as “temperature-weighted hours”, a metric that best estimates the calculated life of the supply. If the active supply is interrupted for any reason, the system switches to the standby supply without any disruption to system operation. Power supply modules are hot-swappable for easy replacement.

Instrument Installation

This section describes:

- the environmental limits in which the ECO8000 can operate,
- how to install the ECO8000 into a standard 19-inch equipment rack, including a list of the parts in the mounting kit and the required tools (not included),
- how to connect the ECO8000 to external power,
- the physical connectors on the rear panel of the instrument and which signals are used with each connector, and
- where to connect SPG9000 outputs to ECO8000 inputs.

Environmental Operating Requirements

Check that the location of your installation has the proper operating environment as follows:

Parameter	Description	
Temperature	Operating	0 °C to +50 °C
	Nonoperating	–20 °C to +60 °C
Relative Humidity	Operating	20% to 80% (No condensation) Maximum wet-bulb temperature 29.0 °C
	Nonoperating	5% to 90% (No condensation) Maximum wet-bulb temperature 40.0 °C
Altitude	Operating	To 3000 m (9842 feet) Maximum operating temperature decreases 1 °C for each 300 m above 1500 m
	Nonoperating	To 15,000 m (49,212 feet)



CAUTION: Damage to the instrument can occur if this instrument is powered on at temperatures outside the specified temperature range.

Rackmount Installation

The ECO8000 is typically installed in a standard 19-inch equipment rack. The rack mount kit consists of a pair of slides that are attached to the ECO8000 and a pair of rails that are attached to the rack. This section describes how to install the slides and rails.

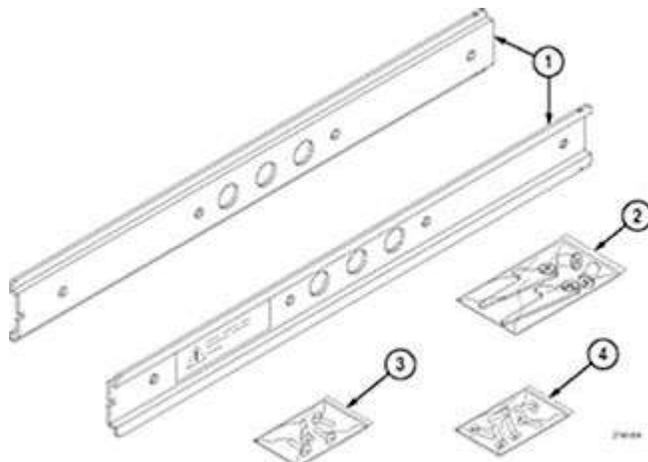
The rack mount kit can be ordered as option ECO8000 RACK at the same time as the base unit. In this case, the slides are preinstalled onto the ECO8000 before it is shipped. The kit can also be ordered as ECO800UP RACK as a standalone kit after the initial purchase.

Kit Parts List

The slides assembly parts list has the parts contained in this kit. The associated figures show what the parts look like. If your kit was shipped with your instrument, the slides are already installed.

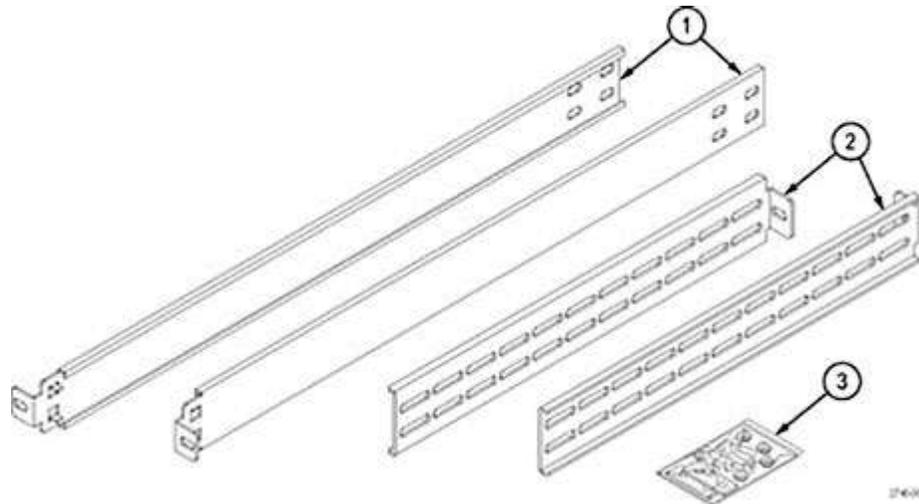
Slides assembly parts list

Number in example	Qty	Name and description
1	2	BRACKET, RACK, CHASSIS-SIDE
2	2	BRACKET, RACK, LEVER, CHASSIS-SIDE
	2	BUSHING, RACK, CHASSIS-SIDE
3	2	SCREW, MACHINE; 8-32 X 0.5, FLH, 100 DEG, STL, ZN PL, PHIL (SAE)
	6	SCREW, MACHINE; 8-32 X 0.375, PNH, STL, ZN PL, PHIL (SAE)
4	2	SCREW, MACHINE; M4X10MM L, FLH, STL, ZN PL, PHIL (metric)
	6	SCREW, MACHINE; M4 X 8MM L,PNH, STL, ZN PL, PHIL (metric)



Rails assembly parts list

Number in example	Qty	Name and description
1	2	BRACKET, RACK, STATIONARY
2	2	BRACKET, RACK, REAR CABINET
3	2	BRACKET, RACK, BAR NUT
	8	SCREW, MACHINE; 10-32 X 0.625,TRH, ZINC PLATED STEEL, PHIL
	4	NUT ASSY; 10-32 X 0.375 HEX, ZINC PLATED STEEL, LOCK WASHER



Installation Instructions

This section provides instructions:

- Installing the slides onto the ECO8000 if they are not already installed
- Installing the rails into a standard 19-inch equipment rack
- Installing the instrument into the rails in the rack



WARNING: To avoid personal injury and instrument damage, do not use slides provided with other instruments from other kits (for example, General Devices, Chassis Trak C-300) with the rails from this kit. The locking feature will not function and will result in an instrument that is not secured properly and could fall out of the rack, causing personal injury or instrument damage.

Equipment List

These tools are required to install the kit hardware:

- #2 crosshead screwdriver
- 3/8-inch wrench



WARNING: To prevent the rack-mounted instrument from tipping forward onto the operator, install the instrument so the operator is able to access all of its rear-panel connectors without pushing down on the instrument. Verify that the rack does not become unstable with the instrument fully extended. Do not leave the instrument extended when finished accessing the rear panel.

Install Slides

Screw Selection

For the slides installation, this kit provides two sets of screws (metric and SAE), but the ECO8000 only needs the 3 metric screws.

Procedure

Attach the slides to the instrument:

Note: The slides might already be installed on your instrument. If they are, skip this procedure and go to Installing the Rails.

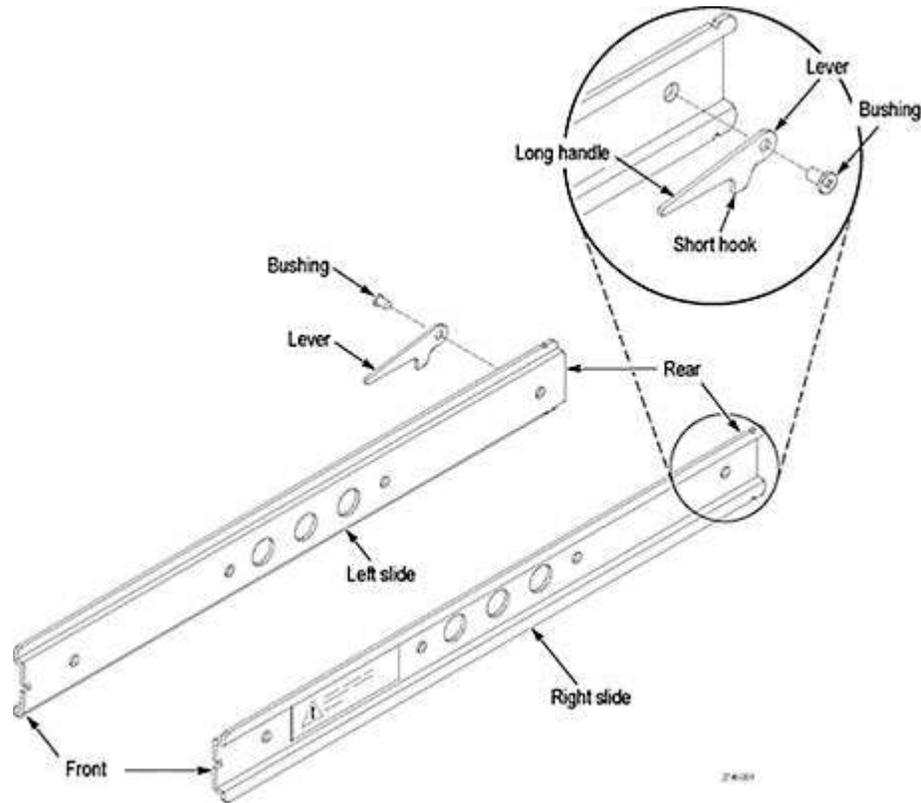
1. Identify the right rear and left rear of each slide. A warning label is on the outside side of each slide.
2. Make sure that the rear of the slide is nearest to the rear of the instrument. The front of each slide has a notch in the center edge.
3. Align the mounting holes on the right slide to the mounting holes on the right side of the instrument.
4. Use the shorter screws provided (8mm) and a screwdriver with a #2 Phillips tip; attach the right slide to the right side of the instrument:



CAUTION: Be careful to select the correct screw type for your instrument (metric or SAE). If the screws do not insert easily (do not use excessive force or you might damage the threads), it is possible you are using the wrong screw.

- A. Insert the metric screws into the first two mounting holes.
- B. Place the lever, with the long handle facing the front of the slide and the short hook facing downward, over the rear mounting hole.
- C. Insert a metric screw into the bushing for the lever.
- D. Insert the bushing and screw into the lever so the lever is attached to the slide and the slide is secured to the instrument.

The example shows how to attach the slide levers for the ECO8000 instrument.



5. Rotate the instrument to face the left side and repeat this procedure to install the left slide.



WARNING: To reduce the risk of injury and equipment damage, make sure that levers are properly installed. An improperly installed lever can prevent the slide from locking or prevent the instrument from being removed from the rack. Make sure that the lever is installed so the long handle is facing forward and the short hook is facing downward.

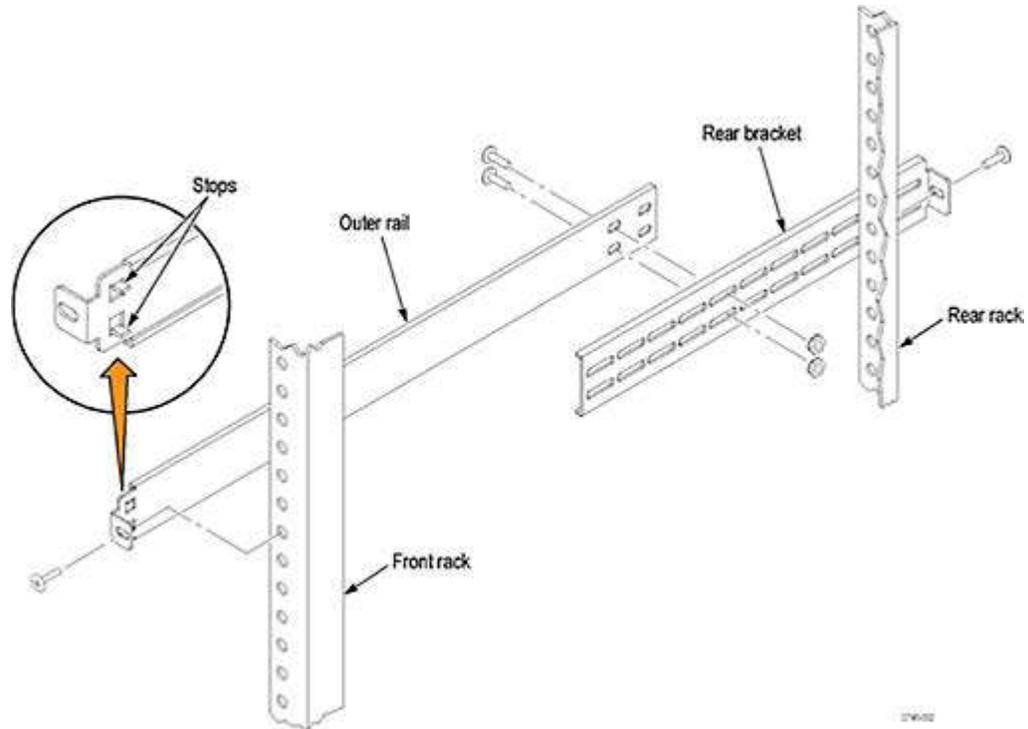
Install Rails

This two-part procedure describes how to assemble and install the rails in the equipment rack.

Assemble Rails

1. Measure the distance between the front and rear rail of the equipment rack.
2. Align the rear bracket to the right rail. Notice that the rear bracket has multiple pairs of mount-through holes. When aligning the bracket and rail, be sure to select a pair of holes that mount the rear bracket so the flange-to-flange distance matches the front rail to rear rail spacing of the rackmount rack just measured in step 2.

3. Using a screwdriver with a #2 Phillips tip, attach the rear bracket to the right rail using two 10-32 screws and 10-32 nuts or a bar nut as necessary. Leave the screws loose so you can adjust the overall length of the rail assembly in the rack.
4. Repeat this procedure to assemble the left rail assembly.



Mount Rails

1. Select a 1/2-inch-spaced hole in the front rack. This will be the middle hole of each group of three holes.
2. Select the mounting method according to your rack type:
 - Mount the rails with their front and rear flanges *outside* the front and rear racks; add a bar nut to the installation only if the rails have untapped holes.
 - Mount the rails with their front and rear flanges *inside* the front and rear racks; add a bar nut. This mounting method assumes untapped holes.
 - Some racks have square mounting holes and require cage nuts to be inserted. These are supplied from the rack vendor.
3. Using the method and hardware determined from step 2, attach the right rail assembly to the equipment rack front and rear rails. The screws should be fully, but lightly, seated so you can adjust the rack later.
4. Tighten the screws still loose when you assembled the rails, apply 28 inch-lbs of torque, to fix the front to rear flange spacing of the rail assembly.
5. Repeat this procedure to mount the left rail assembly.

Install Instrument in Rack

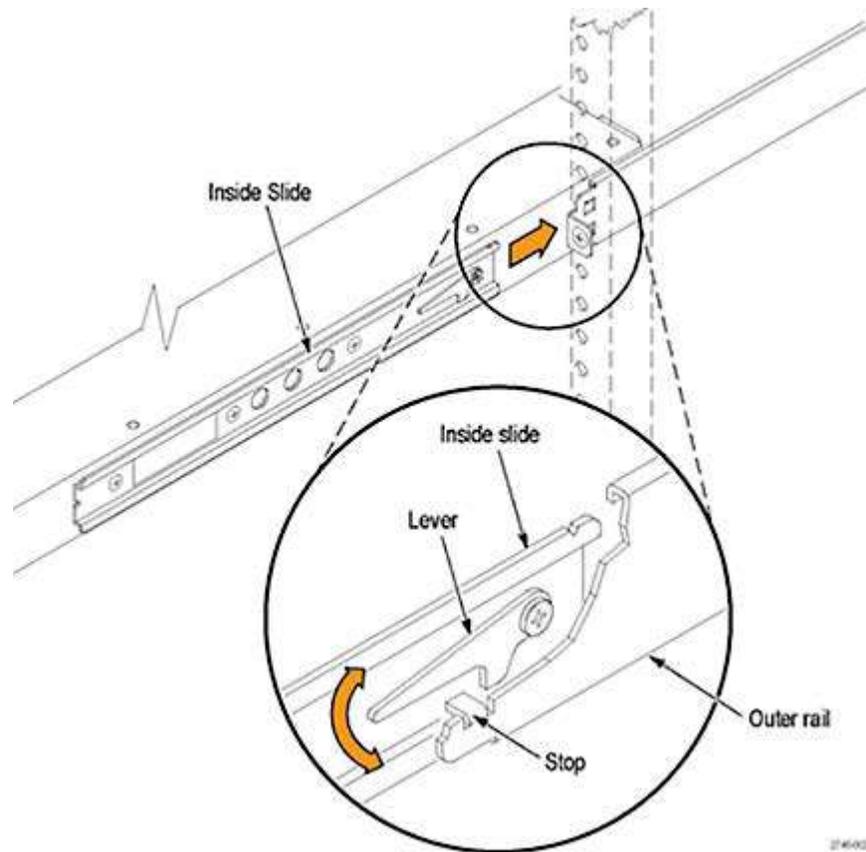
This procedure describes how to install the instrument into the equipment rack.



WARNING: To prevent injury during product installation, use care not to pinch hands or fingers in the rails and slides.

1. Insert the instrument left and right slides into the ends of the rack rails while tilting the long handle of each lever upward.

Note: Be sure to insert the instrument slides *inside* the inner rack rails. You might need to tilt rear of the instrument up or down at a slight angle to fit the slides into the rails.



2. Push the instrument into the rack until it stops.



CAUTION: To prevent damage to the instrument and rackmount, do not force the instrument into the rack if it does not slide smoothly. The rails assembly might need to be adjusted to resolve the problem.

3. Retighten any loose screws and push the instrument all the way into the rack. If the tracks do not slide smoothly, readjust the rail assemblies.
4. When adjusting is completed, tighten all rail assembly 10-32 screws.
5. If the instrument has knob screws on the front corners, tighten them so they are secured in the rack.

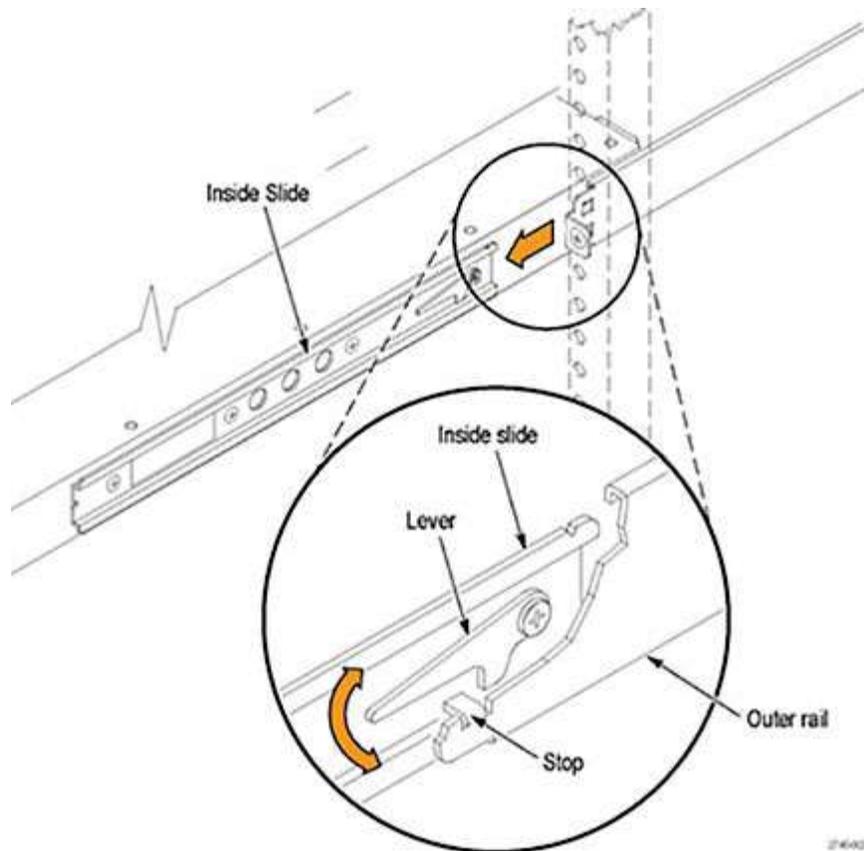
Remove Instrument from Rack

This procedure describes how to remove the instrument from the equipment rack.



WARNING: To prevent injury when removing the product from the rack, do not forcefully and abruptly pull the product from the rack. Pull with the minimum force required to move the instrument with a consistent, even motion.

1. Loosen the knob screws, if present, at the front of the instrument.
2. Gently pull the instrument out until you can reach the levers on the inside slides.
3. Tilt both lever handles upward at the same time to clear the stops.



4. Pull the instrument past the stops and out of the rack.

Power Connection

The instrument operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the locking power cord is essential for safe operation.

Two hot-swappable power supply modules are installed in the ECO8000. One is configured to be the primary supply and the other is configured to be the backup supply. In the event that the primary supply fails, the backup supply automatically provides power to maintain instrument operation. See [Power Supply Management](#) for details.



WARNING: Injury or death can occur as the result of electrical shock. To avoid electrical shock, do not connect power to the instrument when the top cover is off. There are dangerous potentials present on the power supply circuit boards when the power cord is connected.

Power Characteristics

AC power source

Rating voltage 100 V to 240 V



WARNING: To reduce the risk of fire and shock, ensure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.

Frequency 50 or 60 Hz

Maximum power 50 VA

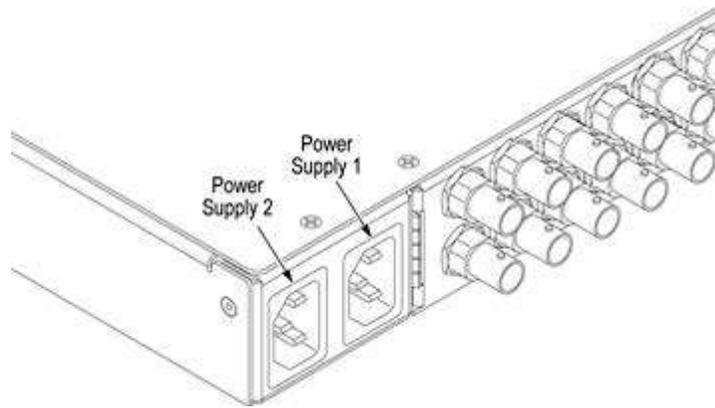


CAUTION: The instrument does not have a power switch. When you connect the power cable to the AC line connector, the instrument powers on.

Connect Power

Connect the two power cables to the instrument first and then connect them to the AC power source. Connecting at least one power cable causes the instrument to power on.

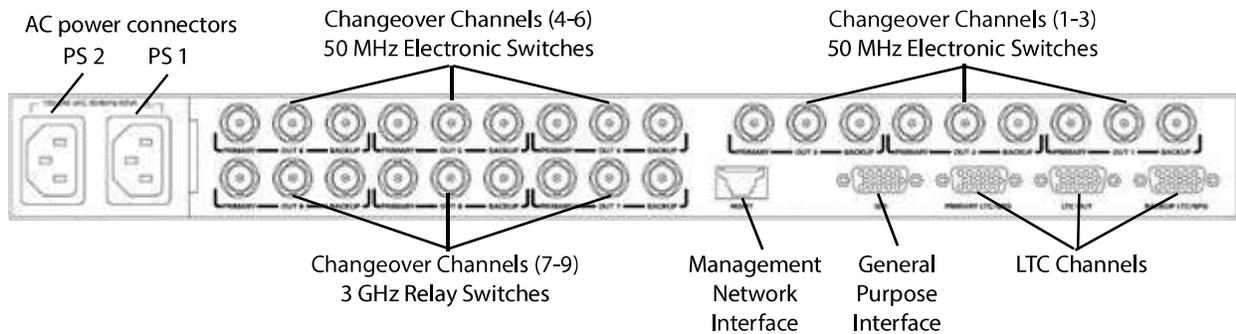
The power connectors on the rear panel are associated with the hot-swappable power supply modules that are inserted into front panel slots. From the front panel, Power Supply 1 is to the left of Power Supply 2, so from the rear panel the connector for Power Supply 2 is on the left.



The front panel has two LED indicators for each power supply. The upper LED (labeled “AC”) refers to the state of the external mains connection and the lower LED (labeled “DC”) refers to the state of the power supply module. See [Power Supply Status](#) for complete descriptions of these indicators.

Rear Panel Connectors

The rear panel of the ECO8000 has 27 BNC connectors, four D-sub connectors, one RJ45 connector and two power connectors as shown in the diagram.



Changeover Channels

The ECO8000 has 9 channels for synchronization and test signals, each with three BNC connectors. The two input connectors for each channel are labeled PRIMARY and BACKUP, and the output connector is labeled “OUT N”, where N is the channel number (1–9).

Channels 1–6 have 50 MHz electronic fast switches and are intended for use with the BLACK 1–6 outputs from the SPG9000. Channels 7–9 have 3 GHz relay switches and are intended for use with SDI test signal outputs from the SPG9000 (HD-SDI, SD-SDI or 3G-SDI formats only). The Word Clock and DARS outputs from the SPG9000 can be used with either channel type.

LTC Channels

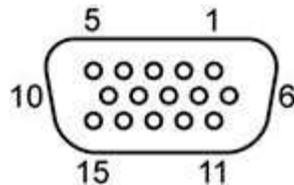
The ECO8000 has 4 channels for Linear Time Code (LTC) signals. These four channels share common 15-pin, D-sub connectors (DE-15 socket, also known as HD-15) along with a general-purpose trigger signal from the SPG9000. Standard VGA cables with DE-15 pin connectors can be used to connect each SPG9000 output to the ECO8000 inputs.

Note: Some lower-quality VGA cables do not connect all 15 pins from end-to-end. Ensure that you use high-quality cables, or use a multimeter or continuity tester to verify all 15 wires.

The PRIMARY LTC/SPG and BACKUP LTC/SPG inputs are used with the output connectors labeled LTC/GPI on the primary and backup SPG9000 units respectively.

A breakout cable is available for the LTC OUT connector, with XLR connectors for the four LTC channels and BNC connectors for the two SPG trigger outputs. It can be ordered as option ECO8000 XLR at the same time as the base ECO8000 purchase or as ECO800UP XLR, a standalone accessory purchased later.

The pin assignments for the two LTC/SPG connectors and one LTC OUT connector are shown:



Pin	LTC/SPG	LTC OUT
1	SPG trigger input	Primary SPG trigger output
2	Unused	Backup SPG trigger output
3	Unused	Unused
4	Unused	Unused
5	LTC 4 negative input	LTC 4 negative output
6	Ground	Ground
7	LTC 3 negative input	LTC 3 negative output
8	LTC 2 negative input	LTC 2 negative output
9	Ground	Ground
10	LTC 1 negative input/output	LTC 1 negative output/input

Pin	LTC/SPG	LTC OUT
11	Unused	Unused
12	LTC 3 positive input	LTC 3 positive output
13	LTC 2 positive input	LTC 2 positive output
14	LTC 1 positive input/output	LTC 1 positive output/input
15	LTC 4 positive input	LTC 4 positive output

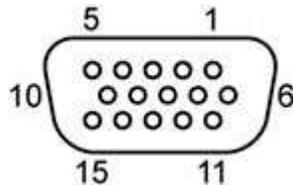
Note: The LTC 1 channel of the SPG9000 can be configured as either input or output. Therefore, the LTC 1 channel on the ECO8000 must also be configured for the matching mode. See [LTC Configuration Menu](#).

GPI Connector

The General Purpose Interface (GPI) connector is a 15-pin D-sub connector (DE-15 socket) with five inputs and six outputs. One output (pin 10) is user-configurable for event reporting. See [Event Reporting Configuration](#).

Inputs are intended to be used with a ground closure or open collector drive to activate. They have 10 kΩ pull-up resistance to 5 V. Outputs have 10 kΩ pull-up resistance to 5 V. When asserted, outputs have a pull-down that can sink 100 mA.

The pin assignments for the connector are shown:



Pin	Signal	Type	Function
1	Primary/Backup state	Output	High if Primary is selected, Low if Backup is selected
2	Primary fault	Output	Low if a Primary fault is present
3	Backup fault	Output	Low if a Backup fault is present
4	Mode state	Output	High if Manual mode is selected, Low if Auto mode is selected
5	Ground		

Pin	Signal	Type	Function
6	Power fault	Output	Low if a fault is present in the power subsystem as indicated by the AC or DC LEDs on the front panel
7	Manual mode select	Input	Assert to select Manual mode
8	Auto mode select	Input	Assert to select Auto mode
9	Fault reset	Input	Assert to reset all faults
10	Event report	Output	Low if any fault selected in the GPI EVENTS configuration is present Also low during any watchdog reboot.
11	Ground		
12	Unused		
13	Primary select	Input	Assert to select the Primary source
14	Backup select	Input	Assert to select the Backup source
15	Unused		

MGMT Connector

The management interface uses an 8P8C (RJ45) connector to connect to the local Ethernet network, with an interface speed of 100 Mbps or 10 Mbps. The instrument can be controlled remotely using the web-based user interface or using SNMP. See [Management Network Interface](#).

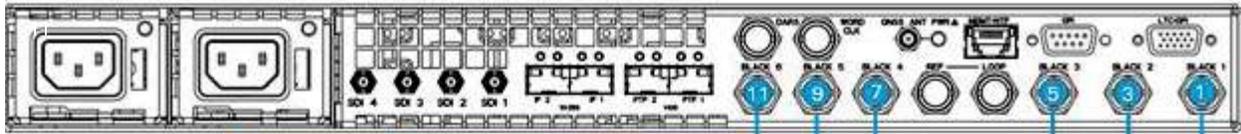
Signal Connections

Output signals from the primary and backup SPG9000 units are typically connected to the ECO8000 as shown in the diagrams below.

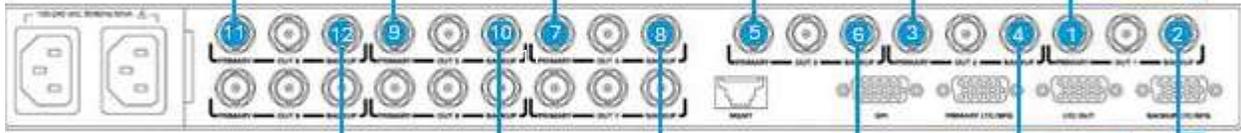
Channels 1–6 on the ECO8000 should be used for the BLACK 1–6 outputs from the SPG9000. If fewer than 6 black outputs are in use, the WORD CLK and/or DARS outputs from the SPG9000 should also use any of channels 1–6 of the ECO8000.

Use short coaxial cables (e.g. 30 cm) with standard BNC connectors for these connections.

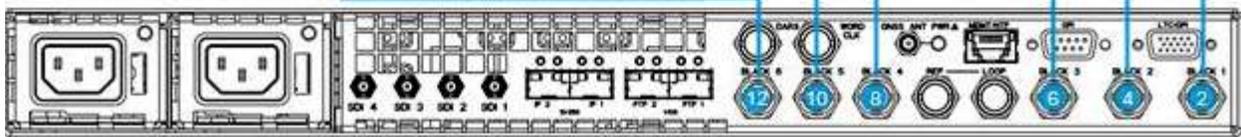
Primary SPG9000



ECO8000



Backup SPG9000



Channels 7–9 on the ECO8000 should be used for any of the SDI 1–4 outputs from the SPG9000. These three channels could also be used for WORD CLK and/or DARS outputs from the SPG9000 if 5 or 6 BLACK outputs are being used.

The SDI outputs on the SPG9000 use HD-BNC connectors, whereas the ECO8000 uses plain BNC connectors. Therefore, you will need to use a short coaxial cable with the appropriate connector at each end.

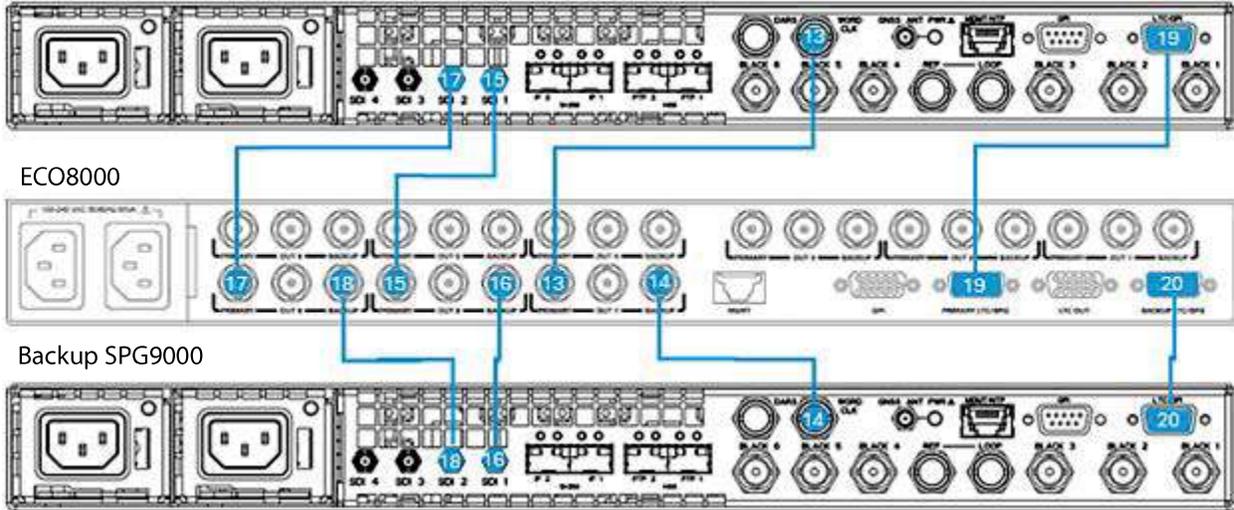
Note: The ECO8000 supports SDI signals of 270 Mbps (SD), 1.5 Gbps (HD) and 3 Gbps (HD), but does not support 12G-SDI or 6G-SDI signals. Therefore, if any of the SDI 1–4 outputs of the SPG9000 are configured for these formats, they cannot be used with the ECO8000.

The four LTC channels share a common 15-pin D-sub connector for both the connections to the primary and backup SPG9000s, and for the LTC OUT connector. Use a high-quality VGA-style video cable for the SPG9000 connections, and use the XLR breakout cable for the LTC OUT connector.

Note: The LTC 1 connection for the SPG9000 can be configured as an input time source or as an output time code signal. The ECO8000 LTC 1 channel must be configured to match the two SPG9000 units. See [LTC Configuration Menu](#).

The following diagram shows the connections for two SDI signals (SDI 1–2 from the pair of SPG9000 units), the WORD CLK signal, and the LTC signals. This set of connections is one example; other combinations are supported.

Primary SPG9000



System Operation

This section describes the basic operation of the ECO8000. This includes descriptions of the front panel of the ECO8000 and how to navigate the on-screen menus. There are also details of how to use the web interface for remote control, configuration and status reporting. Lastly, this section also explains how to control the instrument through the application programming interface (API) and the general purpose interface (GPI).

Front-Panel Interface

This section provides information about operating the instrument using the front-panel buttons and display. These menus and selections are similar to those on the web interface.



Front-Panel Layout

The ECO8000 front panel includes a small display for configuration menus and status messages, and two clusters of buttons. The control buttons on the left side of the front panel are used by the Channel Control System. The menu buttons to the right of the display are used to access and navigate the configuration menus.

PANEL ENABLE: Press and hold for four seconds to enable or disable the other control buttons. The instrument beeps to indicate the change in the enable/disable status of the front-panel control buttons. This button is illuminated when the front panel is currently enabled. The menu buttons are not affected by the enable/disable status of the control buttons.

FAULT RESET: Press to clear the individual channel fault history on the front-panel LEDs. Any yellow LEDs (indicating a previous fault that has cleared) will change color to green. Any red LEDs will remain red.

AUTO: Press to select Automatic changeover mode. This button is illuminated when the ECO8000 is in Automatic mode. See [Channel Control System](#).

MANUAL: Press to select Manual changeover mode. This button is illuminated when the ECO8000 is in Manual mode. See [Channel Control System](#).

PRIMARY: Press to select the Primary SPG signal sources. The changeover mode must be set to Manual before you can change the source. This button is illuminated when the ECO8000 is switched to the Primary SPG.

BACKUP: Press to select the Backup SPG signal sources. The changeover mode must be set to Manual before you can change the source. This button is illuminated when the ECO8000 is switched to the Backup SPG.

Arrow buttons: Use the \triangle (up) and ∇ (down) buttons to scroll through the list of available menus, use the \triangleleft (left), and \triangleright (right) buttons to view the list of available options for the current menu.

ENTER: Press to enter a submenu or to accept the selected option.

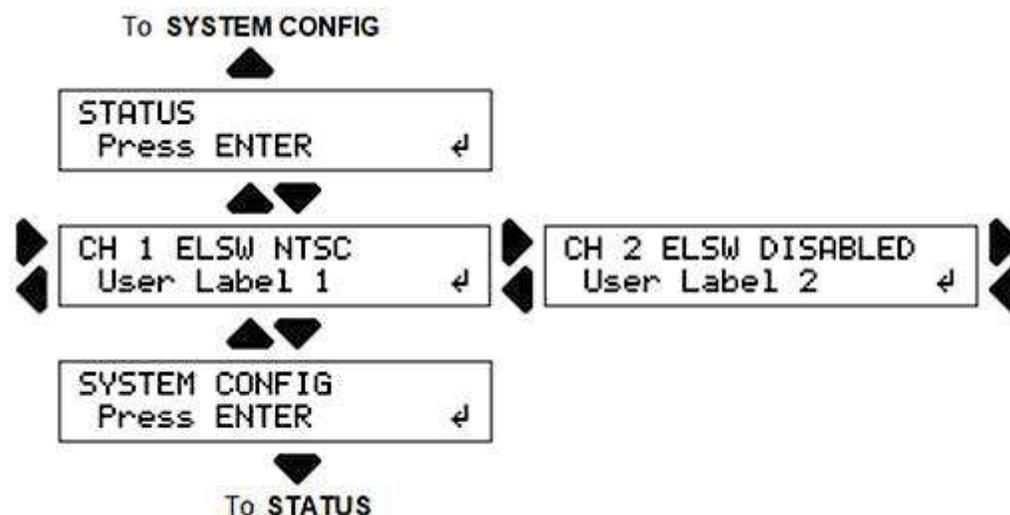
BACK: Press to return to a previous menu or to exit editing mode.

Menu System

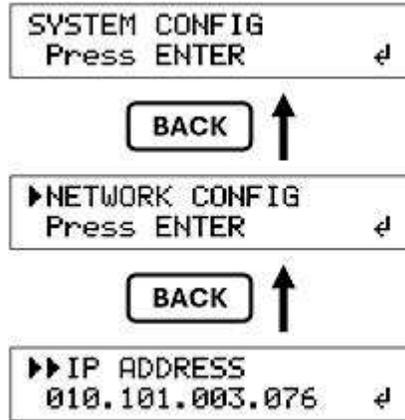
The ECO8000 front-panel interface is organized with a hierarchical list of menus. The top line of the display shows the current menu name, and the bottom line shows the value for that menu. If the backlight for the display is turned off, press any menu button to turn on the backlight.



Menus are organized into a circular list. Press the down arrow button to move to the next menu, or the up arrow button to move to the previous menu. If you press the down arrow button at the bottom of the list, you will move back to the top. Similarly, pressing the up arrow button at the top of the list will move to the menu at the bottom of the list.



Submenus in the nested hierarchy are indicated by one or more arrow indicators preceding the menu name on the top line of the display. Press the **BACK** button to return to the previous level.



The top level of the menu hierarchy has three menus:

STATUS: Select this menu item and press **ENTER** to access the submenus from which you can view any faults and view the Event Log. See [Event Log](#).

Channel menus: Use the left and right arrow buttons to cycle through the 13 channel menus (CH 1 to CH 9 and LTC 1 to LTC 4). The top line of each menu shows the channel number, the channel type (ELSW, RELAY or LTC), and the channel status or threshold level. The second line shows the user-configured label for the channel. Press **ENTER** to access the channel configuration submenu. See [Channel Configuration](#).

SYSTEM CONFIG: Select this menu and press **ENTER** to access each of the system-wide configuration submenus. See [General System Configuration](#).

Menu Operations

To navigate through the menu system, use the four arrow buttons in conjunction with the **ENTER** and **BACK** buttons. The display uses various symbols to help you navigate the menus and make selections:

- A “carriage return” symbol in the bottom right corner of the display indicates that the ENTER button can be used to access a submenu, accept the selected item, or enter editing mode for string values.



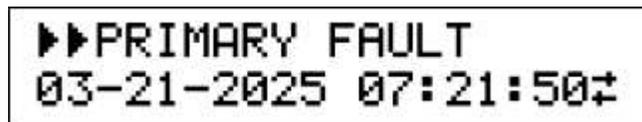
- When editing values such as a channel label or IP address, the currently editable character will be underlined. Press the left or right button to select the previous or next character. Press the up or down button to change the current character. For example, when editing a numeric value, pressing up or down will cycle through the

digits 0–9. Press **ENTER** to accept the new string value and exit editing mode or press **BACK** to exit editing mode to cancel any changes.

- A bullet symbol to the left of an option indicates the current selection for that menu. Press the left or right arrow buttons to cycle through all available options, then press **ENTER** to select a new option or **BACK** to exit the menu without making a change.



- A pair of left and right arrows in the bottom right of the display indicates more items to be viewed. This symbol is used on read-only status menus to view a long list of items from the two-line front-panel display.



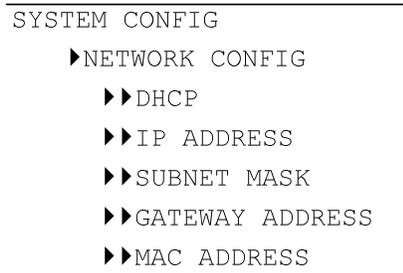
Management Network Interface

The instrument has a 10/100 BASE-T Ethernet port on the rear panel that is used for management functions. You can remotely control the instrument through the web interface or using the Simple Network Management Protocol (SNMP).

This section provides instructions for configuring the network parameters of the management network interface.

NETWORK CONFIG Menu

From the top menu, go to the **SYSTEM CONFIG** menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **NETWORK CONFIG** submenu and press **ENTER**.



DHCP

Enable to use Dynamic Host Configuration Protocol (DHCP) on the management interface. In this case, a DHCP server must be present on the network, and it assigns the IPv4 address, subnet mask, and gateway address to the DHCP client of the ECO8000. If

you enable DHCP, manual configuration of those values is disabled but the values provided by the DHCP server are displayed on read-only menus.

IP ADDRESS

Press **ENTER** to change the IPv4 address of the management interface. Enter the four octets of the IPv4 address, in dotted decimal notation. Each octet of the address uses three digits, with leading zeros if necessary. For example, an address of 10.101.3.76 would appear as 010.101.003.076 in this menu. If DHCP is enabled, the IPv4 address supplied by the DHCP server is displayed instead and cannot be edited.

SUBNET MASK

Enter the four octets of the subnet mask, in dotted decimal notation. If DHCP is enabled, the subnet mask supplied by the DHCP server is displayed instead and cannot be edited.

GATEWAY ADDRESS

Enter the four octets of the gateway address for this subnet, in dotted decimal notation. If DHCP is enabled, the gateway address supplied by the DHCP server is displayed instead and cannot be edited.

MAC ADDRESS

This is a read-only menu that displays the physical (MAC) address of the management port.

Web User Interface

After the management network interface has been configured, the SPG9000 can be accessed through a web-based user interface, using any modern browser. The default URL is:

```
http://ip_address
```

where `ip_address` is replaced with the IP address of the management network interface.

Access Control

The web interface must be enabled from the front panel. From the top menu, go to the **SYSTEM CONFIG** menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **WEB USER INTERFACE** submenu and press **ENTER**.

```
SYSTEM CONFIG
  ►WEB USER INTERFACE
```

The four access control options are:

Disable: The web server responds with a message that the web interface is disabled.

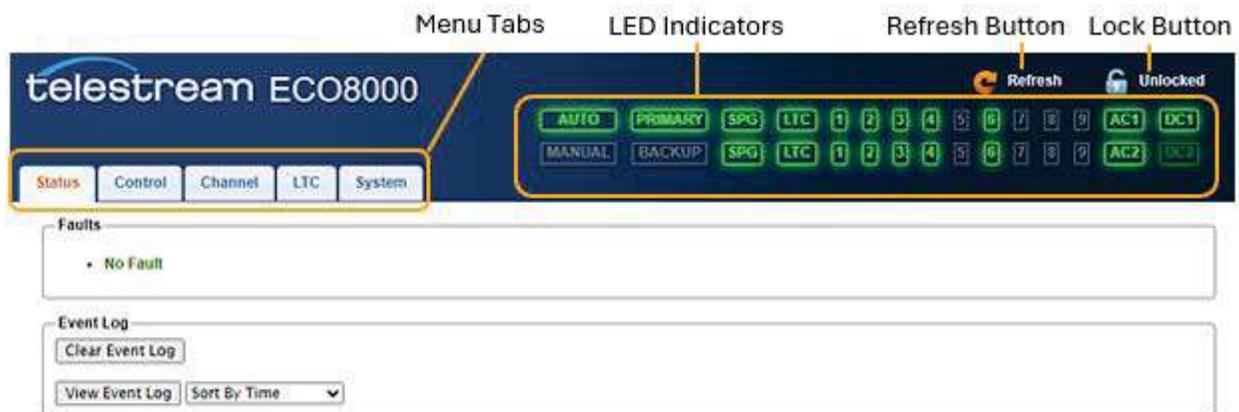
Read Only: The web interface cannot be unlocked, so you can only view the system status and configuration settings, without being able to make any changes. The Control tab is not available, so you cannot change between Auto or Manual mode.

Safe Control: The web interface can be unlocked, so you can change most configuration settings. The front panel must be set to Manual mode to make changes to any channel settings. However, the Control tab is not available on the web interface, so the front panel is required to change from Auto to Manual mode.

Extended Control: All web interface tabs are available, including the Control tab. The web interface user has full access to all configuration settings, including the ability to change between Auto or Manual mode and to select the Primary or Backup source in Manual mode.

Elements of the Web Interface

The web interface for the ECO8000 is a single-page application for viewing the current configuration and system state. The top banner (with a blue background) is always present, but the main page body (with a white background) depends on user navigation.



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Menu Tabs

There are five tabs on the web interface page. Select a tab to view the appropriate buttons or menus for that tab.

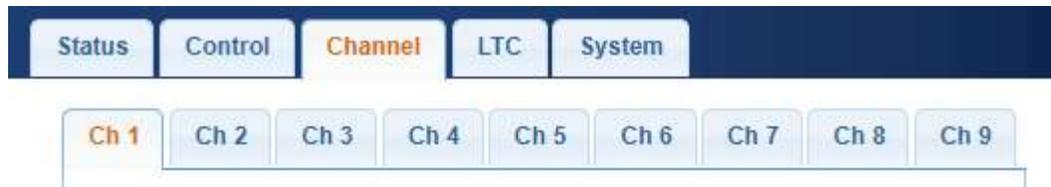
Select the **Status** tab to view any active faults and to view the fault history in the Event Log. See [Fault Status](#) and [Event Log](#).

Select the **Control** tab to access the buttons for the channel control system. The web interface mimics the behavior of the front-panel buttons. For example, the Enable button must be highlighted before any other control buttons can be pressed. One of the two Mode buttons will be highlighted and one of the two Source buttons will be highlighted, based on the current state of the system.



This tab is only visible if Extended Control is selected from the WEB USER INTERFACE front-panel menu. See [Access Control](#).

Select the **Channel** tab to configure any of the nine standard channels. Within this tab, a second set of tabs is used to select the specific channel.



Select the **LTC** tab to configure any of the four LTC channels. Within this tab, a second set of tabs is used to select the specific LTC channel.



Select the **System** tab to access system configuration settings, to change event reporting settings, or to view instrument diagnostics. See [General System Configuration](#).

LED Indicators

The indicators on the top banner of the web interface page mirror the physical LED indicators on the front panel of the instrument. See [Channel Status Indicators](#).

Refresh Button

Press this button to update the web interface. If configuration changes are made from the front-panel interface, they may not be reflected on the web interface unless the page is refreshed.

Lock Button

The web interface is locked when a new browser window is opened, to prevent accidental changes to the instrument configuration. Press the button to toggle between the Locked and Unlocked states.

If the page is unlocked, some configuration settings may still not be available to update. The instrument must also be in Manual mode to change the channel source or to change channel configuration settings.

SNMP

The ECO8000 uses the Simple Network Management Protocol (SNMP) as its Application Programming Interface (API). SNMP uses a Management Information Base (MIB) to describe the available objects that can be read by a GetRequest message or possibly updated by a SetRequest message. Some objects are read-only and can only be accessed by GetRequest messages.

The ECO8000 uses version 2c of SNMP, which uses two community strings as access passwords. The public community string is used for all read-only operations, and the private community string is used for read-write access.

SNMP includes a Trap message type for event notifications. The ECO8000 can be configured to send Trap messages to up to four SNMP Managers. See [Event Reporting Configuration](#).

SNMP CONFIG Menu

To configure SNMP from the front panel, return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down buttons to navigate to the **SNMP CONFIG** submenu and press **ENTER**.

```
SYSTEM CONFIG
  ▶SNMP CONFIG
    ▶▶TRAP EVENTS
      ▶▶▶PRIMARY FAULT
      ... other event menus
    ▶▶PUBLIC COMMUNITY
    ▶▶PRIVATE COMMUNITY
    ▶▶TRAP ADDRESS 1
```

-
- ▶▶TRAP ADDRESS 2
 - ▶▶TRAP ADDRESS 3
 - ▶▶TRAP ADDRESS 4
-

TRAP EVENTS

Press **ENTER** for the submenus for the event list. Press the up or down arrow buttons to select the event type, and press the left or right arrow buttons and then **ENTER** to enable or disable the event type for SNMP Trap reporting.

PUBLIC COMMUNITY

Press **ENTER** to edit the public community string for read-only access to objects in the MIB. The default string is "public" and should be changed to a non-default value.

PRIVATE COMMUNITY

Press **ENTER** to edit the public community string for read/write access to objects in the MIB. The default string is "private" and should be changed to a non-default value.

Note: Do not use the same string for both public and private community strings. The ECO8000 requires different strings for correct operation.

TRAP ADDRESS 1–4

Press **ENTER** to edit the IP address for the destination for Trap messages. The address is entered using dotted-decimal notation with leading zero digits if necessary. For example, an IPv4 address of 10.101.3.72 would be entered as 010.101.003.072. Use an address of 000.000.000.000 to disable any of the four Trap destinations.

Web Interface for SNMP

On the web interface, select the **System** tab and then select the **SNMP and Network Configuration** section. The public and private community strings cannot be edited from the web interface but must be set from the front panel menus.

You can download the MIB for the ECO8000 by selecting the **Download ECO MIB File** link on the web interface. This file can then be imported into the SNMP management system so that objects can be referenced by name instead of by object identifier (OID) strings.

➤ **SNMP and Network Configuration**

SNMP Configuration

Public Community: public
Private Community: private

Trap Destination1:

Trap Destination2:

Trap Destination3:

Trap Destination4:

[Download ECO MIB File](#)

Changeover Configuration and Operation

This section describes the functionality and operation of the changeover system and how to configure each channel for the appropriate signal type.

Operational Overview

The ECO8000 has three main subsystems:

- Channel control system
- Configuration and monitoring system
- Redundant power system

These three subsystems are loosely coupled to assume maximum reliability of the main ECO8000 function of sensing faults on the input signals and switching to a backup if necessary.



Channel Control System

The channel control system monitors the signal level on each input, and switches to the other source if a fault occurs. This subsystem is implemented as a simple hardware state machine to maximize reliability. This portion of the instrument is accessed by using the buttons on the left side of the front panel, and the status is displayed on the button lights and the per-channel LED indicators on the front panel.

If the instrument is in Auto mode, then the channel control system locks out any changes from the other subsystems. This prevents most issues in the other subsystems from impacting the basic operation of the ECO8000.

When the instrument is powered on, the channel control system restores all basic configuration settings that were in place when the instrument was powered off. This restoration is independent of the processor booting to run the display and the

configuration and monitoring system. If the configuration and monitoring system is rebooted, the channel control system is unaffected.

If the instrument loses power, the REF/ELSW channels will automatically switch from electronic to relay mode to maintain the signal throughput. These channels will automatically switch back to electronic mode when power is restored. When the REF/ELSW channels switch from electronic mode to relay mode and back, the sync on these channels will experience a momentary glitch.

In Auto mode, the channel control system will changeover only when necessary. If there is a signal fault on any enabled and triggered Primary channel, and the Backup channel has a good signal, the changeover will occur. If the Backup channel also has a faulty signal, the changeover will not occur. If the signal fault is cleared after a changeover event, the ECO8000 will continue to use the Backup channel and will avoid an unnecessary second changeover event. Use Manual mode to reset the Primary and Backup channel usage if desired. But if a signal fault on the Backup channel occurs and the Primary signal is good, the ECO8000 will switch back to the Primary channels.

Configuration and Monitoring System

The configuration and monitoring system is software based and includes the menu-based user interface. This system is accessed by using the buttons and display on the right side of the front panel and by using the web interface or API via the management network interface.

If the instrument is in Manual mode, then the configuration and monitoring system can program the settings in the channel control system. For example, it can set the level threshold on each channel or disable unused channels. When the instrument is in Auto mode, most configuration is disabled and this subsystem is used for monitoring only.

If the configuration and monitoring system processor stops running, a 20-minute watchdog timer in the channel control System will automatically cause a processor reboot. If the watchdog timer causes a reboot, the event is entered in the event log.

Under certain conditions, such as after several years of continued use, you may want to reboot the configuration and monitoring system. You can reboot this system by pressing and holding the **ENABLE** and **RESET** buttons for about five seconds until the instrument beeps about five times. Rebooting this system will have no effect on the other subsystems. When this system is rebooted, a power-on self test is performed. See [Power-on Self Test](#).

Redundant Power System

The redundant power system monitors each power supply module and switches to the backup if the preferred supply has a problem. This subsystem is independent of the other two systems. The Configuration and Monitoring system can set some parameters in the Redundant Power system and display its status. See [Power Supply Management](#).

Channel Configuration

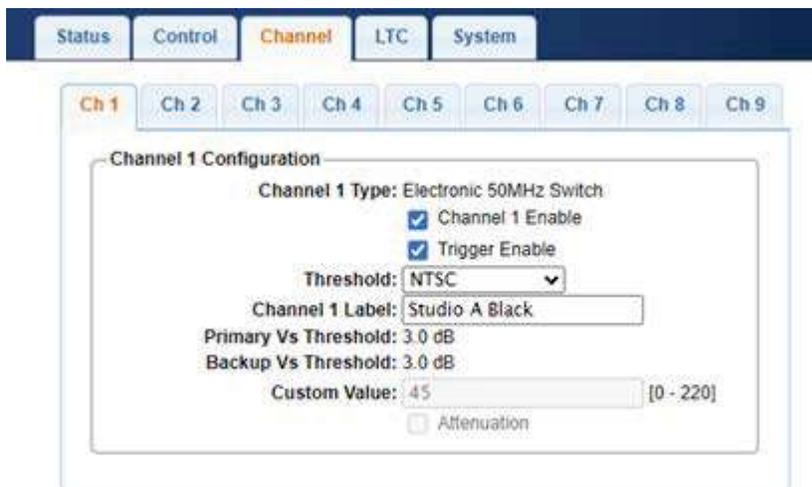
Channel configuration for the ECO8000 is done in Manual mode. When the system is fully configured, and all channels in use show green status LEDs and good signal margin, switch the instrument to Auto mode. When the instrument is in Auto mode, the channel configuration is disabled, and the system will react to input signal faults. In Auto mode, monitoring can be done locally through the front panel display or remotely through the web interface with no risk of accidental changes that would impact the basic changeover operation.

CH Configuration Menu

To configure any channel from the front panel, go to the top-level channel menu and press the left or right arrow buttons until the desired channel number is shown on the top menu row. Channels 1–6 will be identified as “ELSW” and channels 7–9 will be identified as “RELAY”. The configured threshold or “DISABLED” will also be displayed in the menu name. The second row of the display will show the user-specified text label for that channel.

CH n <type> <threshold>	
▶CH n ACTIVE	
▶CH n TRIGGER	
▶CH n THRESHOLD	
▶▶P: 0.0dB B: 0.0dB	Only available if THRESHOLD is Custom
▶▶ATTENUATION	Only available for ELSW channels and if THRESHOLD is Custom
▶CH n RELAY CHECK	Only available for RELAY channels 7–9
▶CH n LABEL	

From the web interface, select the **Channel** tab and then select the tab for the specific channel number.



ACTIVE

Enable the channel to indicate that signals are present on the primary and backup inputs for this channel. Disable the channel if it is not used. Unused channels that are enabled will appear as faults for the status indicators and other alarms. Disabled channels will have unlit status indicators. Disabled channels are still switched if another channel causes a changeover event.

TRIGGER

Select to indicate that this channel can cause a changeover between sources if the signal level drops below the configured threshold. If a channel is enabled but its trigger is disabled, the channel will still switch sources if another channel causes the changeover.

THRESHOLD

Select the desired threshold level for the channel. Several predefined threshold levels are available for each channel type, or a custom threshold level can be configured.

ELSW (CH 1–6)	RELAY (CH 7–9)
NTSC	NTSC
PAL	PAL
TRILEVEL	TRILEVEL
AES	AES
WC 1V	WC 1V
WC 5V	SD-SDI
Custom	HD-SDI
	3G-SDI
	Custom

Custom Threshold

When the threshold is set to Custom, you can tune the digital-to-analog converter (DAC) more precisely. This setting is useful when using other signal types for the channel, such as NTSC-J (which uses 0 IRE for black instead of 7.5 IRE for NTSC-M) or color bars instead of black. Increase or decrease the DAC value (between 0 and 220) until the signal is close to +3 dB relative to the threshold level. The values of Primary Vs Threshold and Backup Vs Threshold are displayed on both the web interface and the front-panel menus. Adjust the signal level or custom threshold as necessary until these margins are both close to +3 dB.

ATTENUATION

When the threshold is set to Custom for ELSW channels (1–6), you can add additional attenuation of approximately 14 dB to the input signal before the threshold detection circuit. This setting is not needed for typical signal levels.

RELAY CHECK

For HREF channels (7–9), you can enable a relay check function. The HREF channels rely exclusively on relays for signal switching. On rare occasions after long periods of inactivity, the relay contacts can build up a nonconductive coating on the relay contacts. This coating can create a condition so that when a fault occurs and the ECO8000 switches between primary and backup sources, the signal will not pass through the ECO8000 to the output.

When enabled, the relay check function measures the signal level on each HREF input before and after every changeover switch. If the signal level indicates that the channel is not connected to an output load, then it is possible that the relay is not properly closed for that channel. In that case, the instrument will cycle the relay 20 times to attempt to wear through the layer of nonconductive coating to restore the connection.



CAUTION: Do not enable the relay check function on channels that are not terminated, since the unterminated output looks similar to an open relay and will cause unfounded relay check events.

LABEL

You can edit the user-specified label for each channel, to help identify channels using their signal type, physical location, or purpose instead of just by the channel number. On the front-panel display, each label is shown at the top-level channel menu when navigating between channels with the left and right arrow buttons.

LTC Configuration Menu

To configure any channel from the front panel, go to the top-level channel menu and press the left or right arrow buttons until the desired LTC channel number is shown on the top menu row. The configured threshold or “DISABLED” will also be displayed in the menu name. The second row of the display will show the user-specified text label for that channel.

```
LTC n <threshold>
  ▶LTC 1 INPUT-OUTPUT          Only available for LTC 1
  ▶LTC n ACTIVE
  ▶LTC n TRIGGER
  ▶LTC n THRESHOLD
    ▶▶P: 0.0dB B: 0.0dB       Only available if THRESHOLD is Custom
  ▶LTC n LABEL
```

From the web interface, select the **LTC** tab and then select the tab for the specific channel number.



INPUT-OUTPUT

The LTC 1 channel (only) can be configured as Output from SPG or Input to SPG. This setting must match the configuration settings for LTC 1 Mode on both primary and backup SPG9000 systems.

When the SPG9000 LTC 1 Mode is configured as Output, the ECO8000 LTC 1 channel must be configured as Output from SPG. With these settings, the LTC 1 channel functions like the LTC 2–4 channels and the CH 1–9 channels, where the ECO8000 switches either the primary input or the backup input to its output for that channel.

If the SPG9000 LTC 1 Mode is configured as Input (so that the LTC signal can be used as a time-of-day source), the ECO8000 LTC 1 channel must be configured as Input to SPG. With these settings, the LTC 1 signal on the LTC OUT connector is instead always connected to both SPG9000 systems for their respective inputs.

ACTIVE

Enable the channel to indicate that signals are present on the primary and backup inputs for this channel. Disable the channel if it is not used. Unused channels that are enabled will appear as faults for the status indicators and other alarms. Disabled channels will have unlit status indicators. Disabled channels are still switched if another channel causes a changeover event.

TRIGGER

Select to indicate that this channel can cause a changeover between sources if the signal level drops below the configured threshold. If a channel is enabled but its trigger is disabled, the channel will still switch sources if another channel causes the changeover.

THRESHOLD

Select the desired threshold level for the LTC channel, as a voltage between 0.5 V and 5.0 V in 0.5 V steps, or as a Custom threshold.

When the threshold is set to Custom, you can tune the digital-to-analog converter (DAC) more precisely. Increase or decrease the DAC value (between 0 and 220) until the signal is close to +4 dB relative to the threshold level. The values of Primary Vs Threshold and Backup Vs Threshold are displayed on both the web interface and the front-panel menus. Adjust the signal level or custom threshold as necessary until these margins are both close to +4 dB.

LABEL

You can edit the user-specified label for each channel, to help identify channels using their signal type, physical location, or purpose instead of just by the channel number. On the front-panel display, each label is shown at the top-level channel menu when navigating between channels with the left and right arrow buttons.

Channel Status Indicators

There are two rows of colored LED indicators on the front panel of the instrument, that show the status of the changeover channels:



These indicators are mirrored on the web interface, on the right side of the banner at the top of the page. When a physical front-panel indicator changes state, the web page indicator also changes.

The web interface banner also includes indicators for the two power supply modules, and indicators that mirror the Mode and Source buttons on the front panel.



The top row of 11 LEDs show the status of the signals from the Primary SPG9000 source and the bottom row shows the status of the signals from the Backup SPG9000 source.

SPG: Shows the status of the SPG Trigger input. See [SPG Input Trigger](#).

LTC: Shows the combined status of all LTC channels that are enabled.

1 to 9: Shows the status of the respective ELSW channels (1–6) and Relay channels (7–9).

The color of each LED indicates the status:

- **Green:** Indicates normal operation with no faults for the signal.
- **Red:** Indicates an active fault condition. The front-panel LED also blinks on and off to help draw attention to the fault.
- **Yellow:** Indicates a past fault condition that has since been cleared. Pressing the FAULT RESET button will clear the fault history and all yellow indicators will change to green.
- **Off:** Indicates that the channel is disabled. There may be an active signal on the input, but if the channel is configured as disabled, the signal level is not checked.

Fault and Event Reporting

The ECO8000 monitors several operational parameters and records events when any fault occurs. The instrument provides four methods for reporting fault events: SNMP trap, e-mail message, GPI output, and an audible beeper. You can configure which events are reported using any combination of these methods.

Faults and Events

The following table describes the faults and events that may be reported by the instrument:

Fault or Event	Description
Primary Fault	One or more of the active primary input channels is being driven by a signal that is below the configured level threshold for that channel.
Backup Fault	One or more of the active backup input channels is being driven by a signal that is below the configured level threshold for that channel.
Primary/Backup Switch	The instrument has switched sources from primary to backup (or vice-versa), either manually or automatically.
Power Supply (1 or 2) Load Test Fail	The indicated power supply module failed the last manual or automatic load test. See Load Test .
Power Supply (1 or 2) AC Fault	The AC input to the indicated power supply has failed.
Power Supply (1 or 2) DC Fault	The 12 V DC output of the indicated power supply has failed.
Power Supply (1 or 2) Fan Fault	The fan in the indicated power supply has failed.
Power Supply (1 or 2) Warning	The 12 V DC output level on the indicated supply is above or below the nominal range.

Fault or Event	Description
Power Supply (1 or 2) Temperature Fault	The indicated power supply is over temperature.
Power Supply (1 or 2) TWH Warning	The TWH limit has been exceeded on the indicated power supply. See Temperature Weighted Hours .
Power Supply Switch Over	The instrument has switched from using one power supply to using the other power supply.
Main Board Supply Fault	A power supply has failed on the indicated circuit board. See System Diagnostics .
Temperature Fault	The instrument is operating at too high a temperature.
Backup Test Due	The recommended test interval for checking the backup channels has been exceeded.
Power On Start Test Failed	A failure was detected during the power-on self test. See Power-on Self Test .
HREF Relay Failed	A relay failure was detected on one of the HREF channels.
Reboot Normal	The instrument was rebooted manually.
Reboot Watchdog	The CPU of the Configuration and Monitoring system was rebooted automatically when its watchdog signal was not detected.

Fault Status

To view active faults from the front panel, go to the top-level **STATUS** menu and press **ENTER** to go to the **FAULT** submenu. Press the left or right arrow buttons to cycle through the list of active faults, if any.

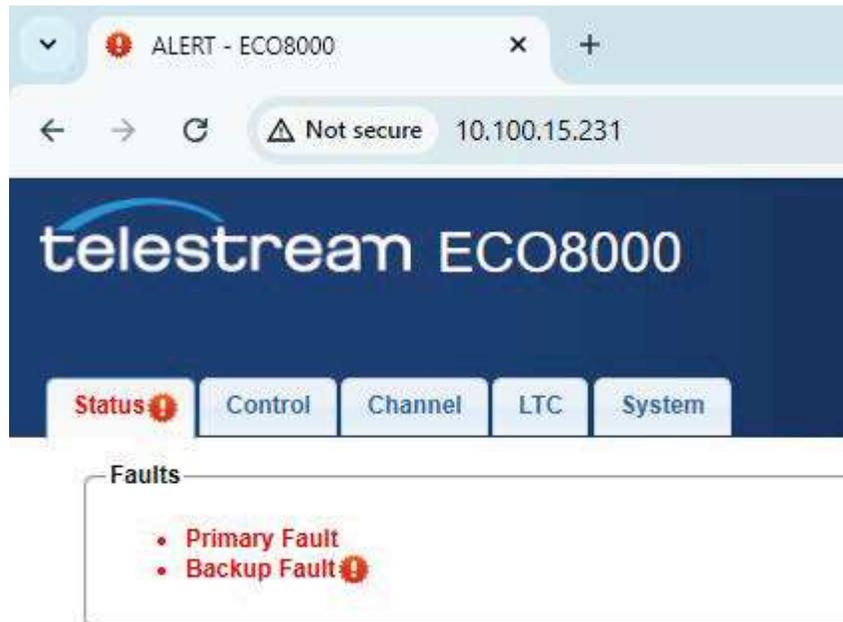
```

STATUS
  ▶FAULT
  
```

To view active faults from the web interface, select the **Status** tab. The top section will show a list of any active faults.



If there are any active faults, the Status tab name will be colored red and an error indicator will be displayed, so if any other tab is currently open, you will see the fault notification. Additionally, the browser tab will display the red indicator and “ALERT” is added to the tab name, so if any other browser tab is open, you can be alerted to the ECO8000 fault.



Event Reporting Configuration

The ECO8000 can report faults and events by four different methods:

SNMP Trap Message: The instrument can send Trap messages to up to four SNMP managers. To configure the SNMP agent of the ECO8000, see [SNMP](#).

Email Message: The instrument can send an email message to a local SMTP mail server, for delivery to a specific email address. See [Email Configuration](#).

General Purpose Interface: The instrument can assert an output (pin 10) on the general-purpose interface. See [GPI Connector](#).

Beeper: The audible beeper in the ECO8000 can emit a beep when enabled events occur. Some events, such as a primary/backup source switch, emit a single beep. Other events, such as a primary fault, emit one beep per second for as long as the event is active.

From the web interface, one menu is used to configure the desired reporting methods for each available fault or event type. Select the **System** tab and then select the **Event Reporting** section. Select the checkbox for each desired event and reporting combination:

Event Reporting				
	Trap Events	Beeper Events	E-Mail Events	GPI Events
Primary Fault	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Backup Fault	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Primary / Backup Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 Load Test Fail	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply2 Load Test Fail	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 AC Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 DC Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply2 AC Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply2 DC Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 Fan Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply2 Fan Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 Warning	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply2 Warning	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 Temperature Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply2 Temperature Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Supply1 TWH Warning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power Supply2 TWH Warning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power Supply Switch Over	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Main Board Supply Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature Fault	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Backup Test Due	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
PowerOnStart Test Failed	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HREF Relay Failed	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reboot Normal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Reboot Watchdog	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

From the front-panel menu, the four event selection menus are submenus within the **SYSTEM CONFIG** menu:

-
- SYSTEM CONFIG
 - ▶SNMP CONFIG
 - ▶▶TRAP EVENTS
 - ▶EMAIL REPORTING
 - ▶▶EMAIL EVENTS
 - ▶GPI EVENTS
 - ▶BEEPER EVENTS
-

Press **ENTER** to view the selected event submenu, then press the up and down arrows to cycle through the list of available events. Press the left or right arrow and then press **ENTER** to enable or disable the event for the selected reporting method.

Event Log

The ECO8000 maintains an Event Log in non-volatile memory. The log is a list of up to 1024 event occurrences, with the date and time and the event type stored for each incident.

To view the Event Log from the front panel, go to the top-level **STATUS** menu and press **ENTER**. Press the up or down arrow button to select how to view the list of events.

```

STATUS
  ▶EVENT LOG (BY TYPE)
    ▶▶PRIMARY FAULT
    ...other event menus
  ▶EVENT LOG (BY TIME)
  ▶LAST EVENT BY TYPE
  ▶CLEAR EVENT LOG
    
```

From the web interface, select the **Status** tab to view the Event Log section. Select how to view the list of events from the pull-down menu, then press the **View Event Log** button.



Sort By Type

In this mode, each event type is listed separately, and within those lists the events are sorted by time.

On the front-panel menu, press the up or down arrow buttons to select the event type. Press the left or right arrow buttons to cycle through all recorded occurrences of that event type. The date and time of each event is shown.

On the web interface, a new browser tab is opened with the event log list. The page shows a table of event occurrences for each event type, sorted by date and time within each table.

Sort By Time

In this mode, a single list of all events is presented, ordered by the date and time of occurrence. Each item in the list shows the event type and time.

On the front-panel menu, press the left or right arrow button to browse the list. The first line of the submenu will show the event type and the second line will show the date and time.

On the web interface, a new browser tab is opened with the event log list. The page shows a single table of all events, with the event type and the time of occurrence for each item in the table.

Last Event By Type

In this mode, a single list of all possible events is presented, ordered by event type. The most recent time of occurrence for each event is shown, or “No occurrence found” is shown if that event is not one of the most recent 1024 logged events. At most, one event per type is presented.

On the front-panel menu, press the up or down arrow button to browse through the event list.

On the web interface, a new browser tab is opened with the event log list. The page shows a single table of all possible event types, with the time of occurrence (or “No occurrence found”) shown for each event type.

Clear Event Log

Select to clear all entries from the event log.

General System Configuration

This section describes the system-wide configuration options for the ECO8000 that are not part of the channel configuration.

SPG Input Trigger

The SPG9000 can use one of its General Purpose Interface (GPI) outputs to trigger a source changeover on the ECO8000. For example, the GPI output of the SPG9000 can be configured to assert when there is a PTP grandmaster (GM) change from the active to passive state. Using this event as a changeover trigger would ensure that the black outputs are sourced from the same SPG9000 that is the current PTP GM.

The SPG input trigger uses pin 1 of the D-sub connectors labeled PRIMARY LTC/SPG and BACKUP LTC/SPG on the rear panel. See [LTC Channels](#). When 15-wire (VGA-style) cables are used to connect the ECO8000 to the two SPG9000s, these inputs are connected to the GPI output 1 from the two SPG9000s.

The SPG input trigger from the two SPG9000s can be monitored with the front-panel LED indicators labeled “SPG”, with the same color coding as the channel inputs. See [Channel Status Indicators](#).



To configure the SPG input trigger from the front panel, go to the top-level **SYSTEM CONFIG** menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **SPG INPUT TRIGGER** submenu.

```
SYSTEM CONFIG
  ▶SPG INPUT TRIGGER
```

To configure the SPG input trigger from the web interface, select the **System** tab and open the **General System Configuration** section. Select the checkbox to enable or disable the SPG input trigger. When enabled, the status indicator LEDs will be lit green or red, reflecting the state of the GPI output 1 signal from each SPG.



Startup Delay

The startup delay is the time period after the ECO8000 system powers on, during which the instrument will not make AUTO mode source switches. The Channel Control system and the basic changeover functions are fully operational a second or two after power is applied. However, when the SPG9000 powers on, its sync sources will not be ready for a longer duration. While the SPG9000s are initializing after being powered on, the ECO8000 could potentially make undesirable source switches as the various SPG9000 output signals turn on at different times.

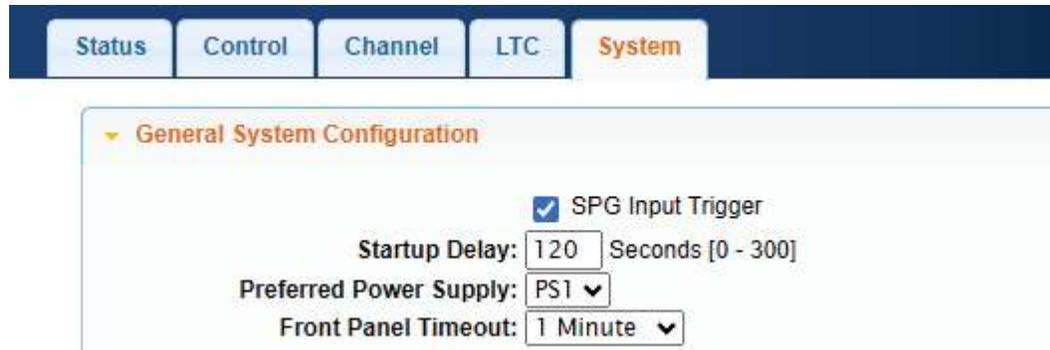
To prevent this, the ECO8000 can delay AUTO mode switching for a specified period. Additionally, at the end of the startup delay, any yellow LED states are cleared; this is effectively like asserting the FAULT RESET button at the end of the timeout period.

To configure the startup delay from the front panel, return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **STARTUP DELAY** submenu.

```
SYSTEM CONFIG
  ▶STARTUP DELAY
```

Press the left or right arrow button to set the delay in seconds, to a maximum of 300 (5 minutes). For use with the SPG9000, a startup delay of at least 150–180 seconds is recommended. Some preset settings of the SPG9000 take longer to load, so the start time for the specific configuration should be measured and some extra margin added.

To configure the startup delay from the web interface, select the **System** tab and open the **General System Configuration** section. Select the checkbox to enable or disable the SPG Input Trigger. When enabled, the status indicator LEDs will be lit green or red.



Email Configuration

The ECO8000 can send email messages as part of its fault and event reporting function. See [Event Reporting Configuration](#) to select the events for which email messages should be sent.

The ECO8000 can send messages to a Simple Mail Transfer Protocol (SMTP) server using port 25. Authentication is not supported, so no username or password for the sender need to be specified.

To configure the email sender from the front-panel, return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **EMAIL REPORTING** submenu.

```
SYSTEM CONFIG
  ▶EMAIL REPORTING
    ▶▶EMAIL SERVER ADDR
    ▶▶EMAIL ADDRESS FROM
    ▶▶EMAIL ADDRESS TO
    ▶▶SEND EMAIL
    ▶▶EMAIL EVENTS
```

To configure the email sender from the web interface, select the **System** tab and open the **E-Mail Setting** section.



EMAIL SERVER ADDR

Enter the IP address of the SMTP server, using dotted decimal notation. Each octet of the address uses three digits, with leading zeros if necessary. For example, an address of 10.101.2.50 would appear as 010.101.002.050 in this menu.

EMAIL SERVER FROM

Enter the email address that will appear as the sender of the message. This string is used with the MAIL FROM: command sent to the SMTP server.

EMAIL SERVER TO

Enter the email address for the recipient of the message. This string is used with the RCPT TO: command sent to the SMTP server. The email address will need to be a valid destination for the server for deliver the message.

SEND EMAIL

Select to send a test message using the configured server address and email from/to addresses.

EMAIL EVENTS

Press **ENTER** for the list of submenus to select individual events for email reporting. See [Event Reporting Configuration](#).

Internal Clock

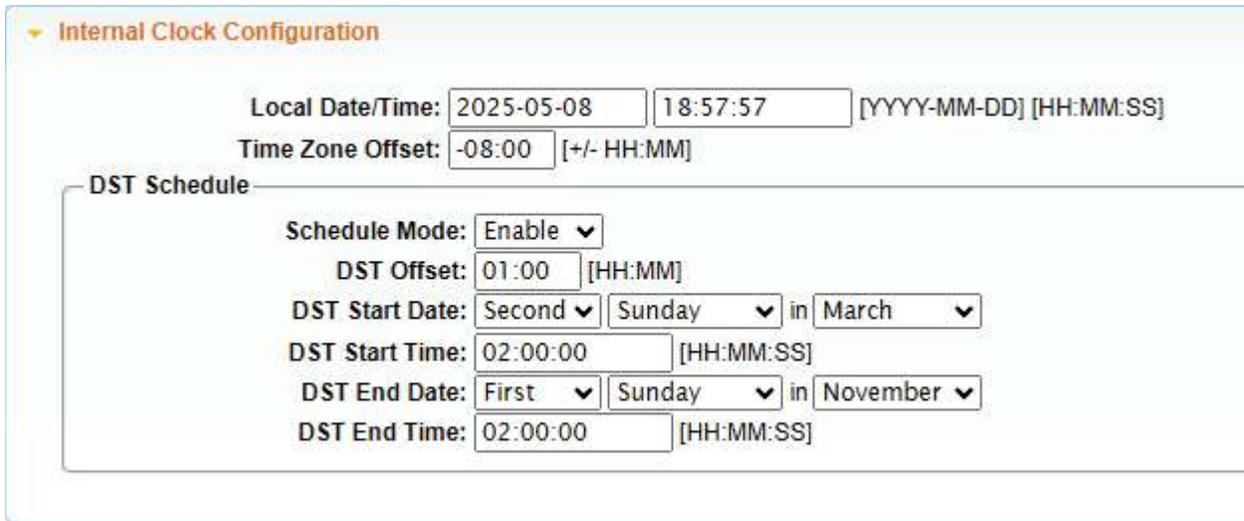
The system clock of the ECO8000 is used when events are recorded in the event log. The local time can be set by specifying the time zone offset and the start and end dates for daylight saving time.

To configure the system time from the front-panel, return to the SYSTEM CONFIG top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **INTERNAL CLOCK** submenu.

```
SYSTEM CONFIG
  ▶INTERNAL CLOCK
    ▶▶LOCAL TIME
    ▶▶SET LOCAL TIME
      ▶▶▶SET LOCAL TIME
      ▶▶▶SET LOCAL DATE
      ▶▶▶TIMEZONE OFFSET
    ▶▶DST SCHEDULE
      ▶▶▶DST ENABLE
      ▶▶▶DST OFFSET
      ▶▶▶DST START DATE
```

- ▶▶▶DST START TIME
- ▶▶▶DST END DATE
- ▶▶▶DST END TIME

To configure the system time from the web interface, select the **System** tab and then open the **Internal Clock Configuration** section.



Internal Clock Configuration

Local Date/Time: 2025-05-08 18:57:57 [YYYY-MM-DD] [HH:MM:SS]
Time Zone Offset: -08:00 [+/- HH:MM]

DST Schedule

Schedule Mode: Enable ▾
DST Offset: 01:00 [HH:MM]
DST Start Date: Second ▾ Sunday ▾ in March ▾
DST Start Time: 02:00:00 [HH:MM:SS]
DST End Date: First ▾ Sunday ▾ in November ▾
DST End Time: 02:00:00 [HH:MM:SS]

LOCAL TIME

The front panel **LOCAL TIME** submenu displays the current time (with time zone and DST offsets applied if applicable) on a read-only submenu.

SET LOCAL TIME

Press **ENTER** for the local time submenus. Enter the time as HH:MM:SS and the date as YYYY-MM-DD. Enter the time zone offset relative to UTC, without any DST offset. For example, the Pacific Time Zone is -08:00 from UTC, even though the offset is 7 hours during Daylight Saving Time.

DST SCHEDULE

A Daylight Saving Time offset can be added to or subtracted from the local time on a scheduled basis. The scheduled start and end dates and times are described in relative terms, such as "Second Sunday in March" so that you do not have to re-configure the DST start and end dates every year when those dates change naturally. You can configure the DST schedule as a permanent setting unless local legislation changes the rules.

The Daylight Saving Time rules (as of 2025) for several parts of the world are listed:

Regions	Start	End
Most of the United States and Canada	Second Sunday in March at 02:00	First Sunday in November at 02:00
European Union	Last Sunday in March at 01:00 UTC	Last Sunday in October at 01:00 UTC
Parts of Australia	First Sunday in October at 02:00	First Sunday in April at 03:00

Note: In European countries that observe daylight saving time, the local clocks change simultaneously at 01:00 UTC, which can be 01:00, 02:00, or 03:00 local time. Be sure to use local time when setting the DST start and end times on the ECO8000.

Front Panel Timeout

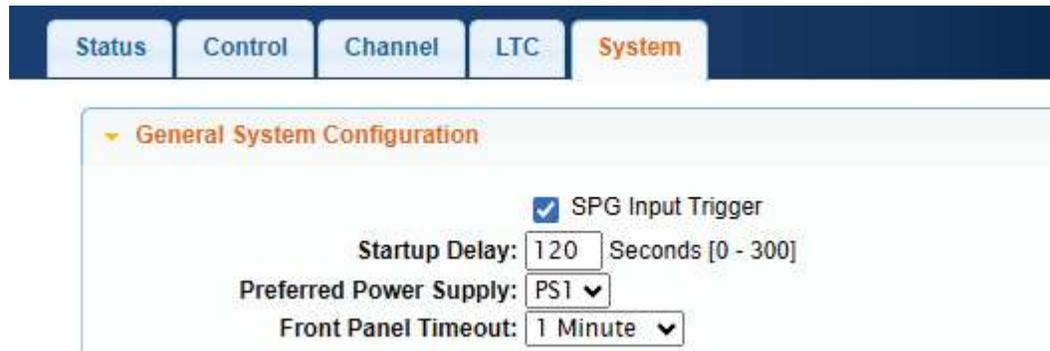
To protect against accidental changes to the Channel Control System, the front panel will automatically be disabled after a period of inactivity. You must manually press the **PANEL ENABLE** button to re-enable the buttons for the Channel Control System.

Note: The backlight of the LCD display has an independent timeout interval, to preserve the life of the backlight. The Front Panel Timeout setting does not affect the display backlight timeout. The display will be dim after 5 minutes of inactivity. Press any of the menu navigation buttons to turn on the display backlight.

To configure the timeout interval from the front-panel, return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **FRONT PANEL TIMEOUT** submenu. Press the left or right arrow button and then press **ENTER** to select 1 minute or 5 minutes for the timeout interval.

```
SYSTEM CONFIG
  ▶FRONT PANEL TIMEOUT
```

To configure the front panel timeout interval from the web interface, select the **System** tab and then open the **General System Configuration** section.



LCD Contrast

The contrast of the front panel LCD can be adjusted. This setting can only be changed from the front-panel menu system.

Return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **LCD CONTRAST** submenu. Press the left or right arrow button to adjust the contrast value, between 0 and 8.

```
SYSTEM CONFIG  
  ▶ LCD CONTRAST
```

Force Relay Path

The ELSW channels (1–6) have two signal paths: an electronic switch path that works when the power is on and a backup path through latching relays that is used when the instrument is turned off or loses power. When the Force Relay Path function is enabled, the relay path is used at all times. This function is intended for troubleshooting, but is generally not helpful or useful for normal operation. This setting can only be changed from the front-panel menu system.

Return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **FORCE RELAY PATH** submenu. Press the left or right arrow button enable or disable and press **ENTER**.

```
SYSTEM CONFIG  
  ▶ FRONT RELAY PATH
```

Initialize Hardware

The ECO8000 can be reset to a factory default state if desired. The following settings are reset:

- All channels are enabled
- All ELSW and Relay channels are set as changeover triggers
- All ELSW and Relay thresholds are set to NTSC

- All LTC thresholds are set to 2 V
- The Relay Check function is disabled
- The SPG Input Trigger is disabled
- The Startup Delay is set to 15 seconds



CAUTION: To prevent a loss of instrument configuration and a disruption in the output signals, do not initialize hardware while the instrument is in service.

This function can only be performed from the front-panel menu system.

Return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **INITIALIZE HW** submenu and press **ENTER**. A confirmation message will be shown; press **ENTER** again to proceed.

```
SYSTEM CONFIG
  ▶INITIALIZE HW
```

System Maintenance

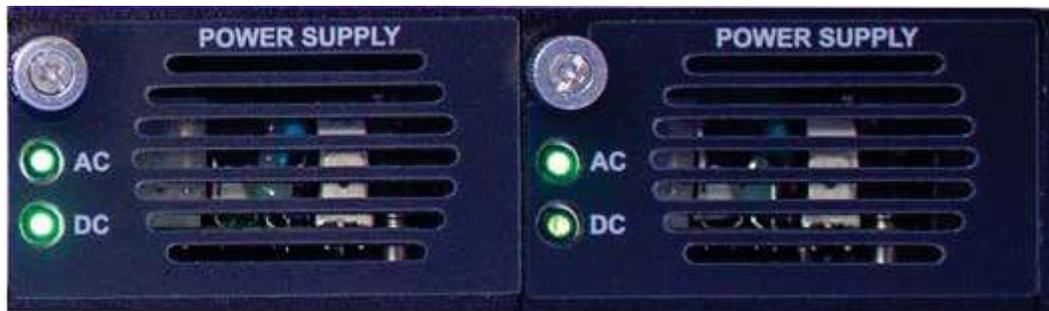
This section describes how to maintain the ECO8000 system functionality, including how to:

- manage the redundant power system,
- view the system diagnostic measurements, and
- upgrade the instrument firmware.

Power Supply Management

The ECO8000 has two hot-swappable power supply modules that can be accessed from the front panel. When both supplies are functioning normally, the system will use one supply for main power and the second supply will operate on hot standby. This ensures that the two supplies are not used with the same load for the same amount of time. When the backup supply is needed, it will have its maximum remaining life.

If both supplies are good, the system will use the supply that is configured to be the preferred (active) supply. If one power supply has a problem, the system will automatically switch to the other supply. If either supply can support the instrument load, even if it has a non-fatal problem, the system will choose the best supply and attempt to continue to operate.



This section describes how to monitor and manage the redundant power system, and how to remove and replace a power supply module if necessary.

Power Supply Status

Two LEDs on the front panel indicate the power status and module status. The LEDs are located on the instrument, not to the power supply module itself, so status is available when the module is removed.

The AC LED shows the state of the power input from the mains connector on the back panel:

Power State	AC LED
Normal voltage	Green
AC voltage is < 75 V and module is installed	Red
No module power and module is not installed	Off

The DC LED shows the module status:

Power Supply State	DC LED
Normal, active	Green
Normal, backup	Dim green
Power supply module fault	Red
Marginal low or high DC, active	Orange
Marginal low or high DC, backup	Yellow
Load test fail, backup	Red
Load test fail, active	Orange
Fan fail, backup	Red
Fan fail, active	Orange
Module is not installed	Off

If the instrument loses power from both supplies, the LEDs continue to provide status to help troubleshoot the root of the problem. In this mode, the LEDs flash to conserve the power in the storage capacitor. Typically, the LED flashing should last for 10 minutes after the loss of power.

Power Supply State	AC LED	DC LED
AC present, DC bad	Flash green	Flash red
AC present, DC present, on-board converter failure	Flash green	Flash green
AC present, supply not installed	Flash green	Off
AC missing, DC missing	Flash red	Off
AC missing, supply not installed	Off	Off

When troubleshooting any power supply issues, follow these steps:

1. If the AC LED is red, check the power source connecting to the back panel of the instrument.
2. If the DC LED is red, replace the power supply module. New modules can be ordered from Telestream with the product code ECO800UP DPW.
3. If one supply shows a red DC LED and the other supply shows an orange DC LED, both supplies need to be replaced, but the system is currently operating with the orange supply. Replace the red supply first to prevent power loss.
4. Check the Diagnostics for system voltages, fan speed and temperature measurements. See [System Diagnostics](#).

Temperature Weighted Hours

The instrument keeps track of the age of each power supply module by calculating a metric of temperature-weighted hours (TWH). When the operating temperature is 25 °C or cooler, the power supply module is expected to last 15 years. At the maximum operating temperature of 50 °C, the expected life of the supply decreases to only 5 years.

Every hour, the instrument measures the temperature and updates the TWH total for each power supply. The active supply operates at a warmer temperature than the backup supply so the TWH of the active supply increases faster than the TWH of the backup supply. When the TWH value reaches 131400 hours, an entry will be added to the Event Log and notifications will be sent to indicate that the power supply should be replaced. See [Fault and Event Reporting](#).

The current TWH values for the power supplies can be viewed on the diagnostics menus. On the web interface, go to the **System** tab and open the **Diagnostics** section.

Power Supplies		
	Power Supply 1 (Active)	Power Supply 2
Voltage:	12.03V (OK)	12.03V (OK)
Hours:	Active: 016524 Standby: 000001	Active: 010043 Standby: 047488
TWH:	0016525 (OK)	0057531 (OK)
Manufactured Date:	2019-09-18 06:16	2019-09-18 06:16
Part Number:	119809900	119809900
Load Test History:	Last Test: n/a Number of Passes: 0 Number of Failures: 0 Last Pass: ---- Last Fail: ----	Last Test: PASS Number of Passes: 836 Number of Failures: 0 Last Pass: 15:00:01 04/27/2025 Last Fail: ----
Power Supply Backup Test: PS2 Load Test		
<input type="button" value="Run Load Test"/>		

On the front-panel interface, return to the top menu, go to the **SYSTEM CONFIG** menu, and press **ENTER**. Press the up or down arrow buttons to navigate to the **DIAGNOSTICS** submenu and press **ENTER**. Press the up or down arrow buttons to navigate to the **PS1 HOURS** and **PS2 HOURS** submenus. Press the left or right arrow

buttons to view the active, standby and temperature-weighted hours for the power supply module.

```

SYSTEM CONFIG
  ▶DIAGNOSTICS
    ▶▶PS1 HOURS
    ▶▶PS2 HOURS
  
```

Preferred Power Supply

When two power supply modules are installed in the instrument, one is configured as the primary supply and the other is configured as the backup supply. If the primary supply fails, the backup supply automatically provides power to maintain instrument operation.

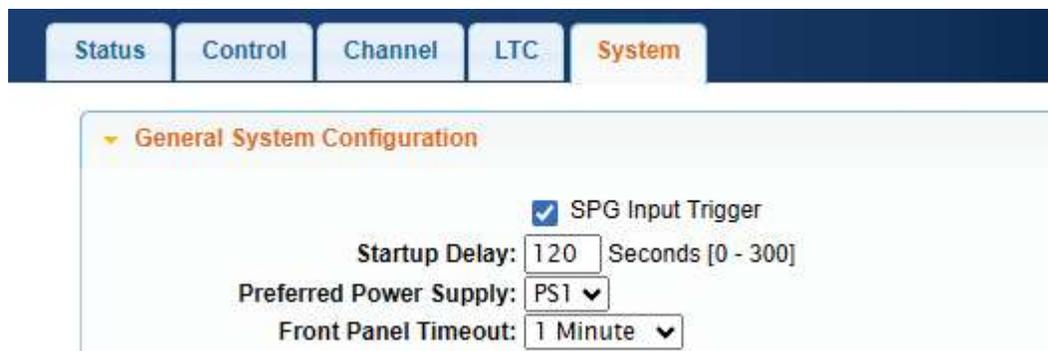
The preferred supply configuration only applies if both modules are installed and both modules are connected to a power source. If one supply has a failure, the other supply will be used to power the instrument regardless of the preferred supply configuration.

The DC LEDs on the front panel indicate which supply is active (preferred) and which one is the backup. The active supply LED is lit bright green and the backup supply is lit dim green. These LEDs are also mirrored at the top right of the web interface page.



The recommended usage strategy is to configure one supply as preferred and use the second supply only in case the first supply has a failure. This usage strategy allows the backup supply to have the maximum remaining life when it is needed.

To select the preferred power supply on the web interface, select the **System** tab and open the **General System Configuration** section. Select **PS1** or **PS2** from the **Preferred Power Supply** pull-down menu.



On the front-panel interface, return to the top menu, go to the **SYSTEM CONFIG** menu, and press **ENTER**. Press the up or down arrow buttons to navigate to the **PREFERRED SUPPLY** submenu and press **ENTER**. Select **PS1** or **PS2**.

```

SYSTEM CONFIG
└─▶ PREFERRED SUPPLY
    
```

Load Test

One time every 24 hours the backup power supply undergoes a load test. The load test is run when the instrument is first powered on and every 24 hours from that time. The backup supply, which normally runs as a powered standby, has a load applied to it, similar to that of the operating instrument, for several seconds. The voltage is measured to check if it is within tolerance for the expected 12 V value. The load test results are reported on the Diagnostics section of the web interface and the front-panel interface, and notifications can be generated if a load test failure event occurs.

If the load test passes, that power supply can be selected as the preferred supply. The system switches the preferred supply to active if possible. Depending on which power supply starts first when the system is powered up, the preferred supply may not be used as the active supply until the first successful load test (either manually or scheduled).

The load test history for the power supplies can be viewed on the Diagnostics menus. On the web interface, select the **System** tab and open the **Diagnostics** section. To manually perform a load test on the backup supply, select the **Run Load Test** button. The test status will be displayed on the web page, including the time remaining in the 30 second cooling period after the test has completed. The Load Test History will be updated with the results of the most recent test.

Power Supplies		
	Power Supply 1 (Active)	Power Supply 2
Voltage:	12.03V (OK)	12.03V (OK)
Hours:	Active: 016524 Standby: 000001	Active: 010043 Standby: 047488
TWH:	0016525 (OK)	0057531 (OK)
Manufactured Date:	2019-09-18 06:16	2019-09-18 06:16
Part Number:	119809900	119809900
Load Test History:	Last Test: n/a Number of Passes: 0 Number of Failures: 0 Last Pass: ---- Last Fail: ----	Last Test: PASS Number of Passes: 836 Number of Failures: 0 Last Pass: 15:00:01 04/27/2025 Last Fail: ----
Power Supply Backup Test: PS2 Load Test		
<input type="button" value="Run Load Test"/>		

On the front-panel interface, return to the top menu, go to the **SYSTEM CONFIG** menu, and press **ENTER**. Press the up or down arrow buttons to navigate to the **PS LOAD TEST** submenu and press **ENTER**. If the standby power supply is ready, the load test will

run and the display will report the pass or fail result. If ENTER is pressed to run the load test again too soon, a cooldown time before the test can be run again is displayed.

SYSTEM CONFIG
▶ PS LOAD TEST

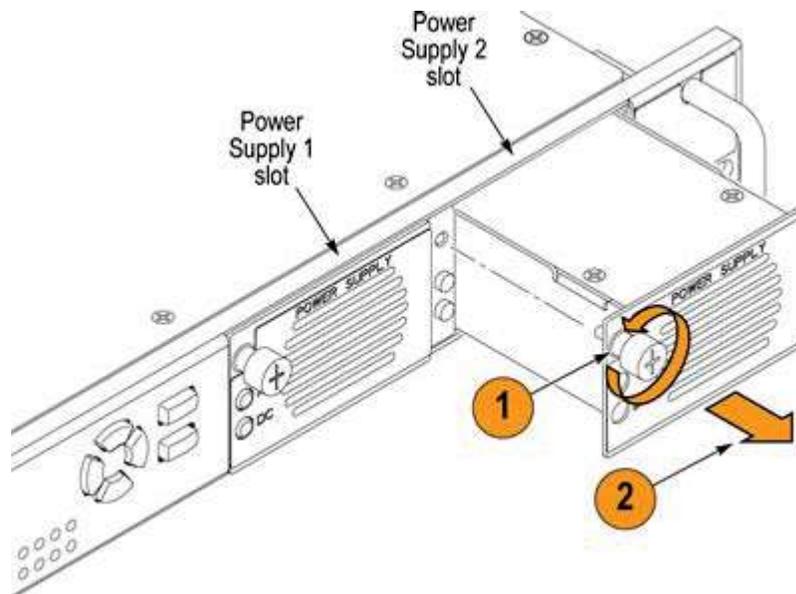
Hot-Swap Power Supply Module

Perform these steps to hot swap a power supply module (replace the power supply while the instrument is in operation).

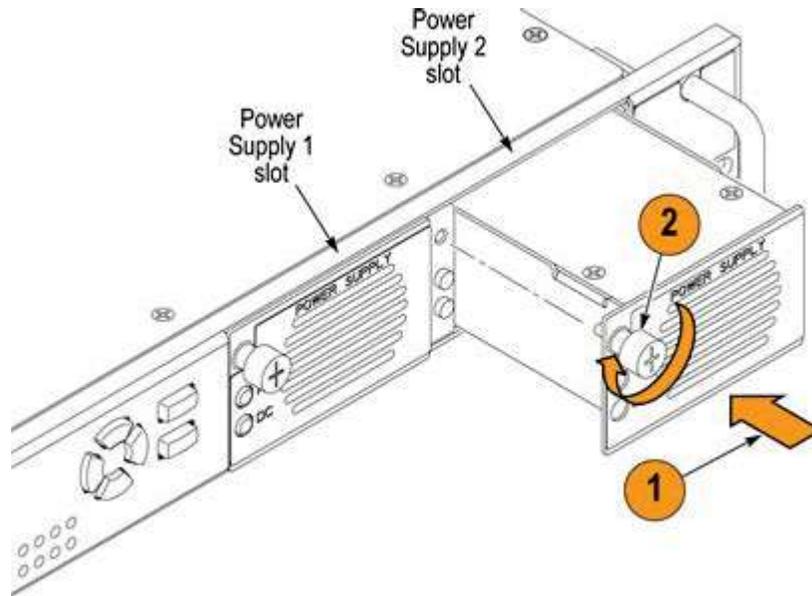
Identify the module to be replaced. When viewed from the front of the instrument, power supply 1 is the left module and power supply 2 is the right module.

CAUTION: To prevent an unexpected shutdown of the instrument, be sure to remove the correct power supply module if you are replacing a faulty module.

Unscrew the retaining screw by turning counterclockwise and then pull the module out of the instrument



Insert the replacement supply module into the instrument until it latches into place and then turn the retaining screw clockwise to secure the module in the chassis.



Check the power LEDs to ensure that the new module is operating correctly.

System Diagnostics

You can view various instrument diagnostics values, such as voltages, temperatures, and channel threshold measurements.

On the front-panel interface, return to the **SYSTEM CONFIG** top-level menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **DIAGNOSTICS** submenu and press **ENTER**. Press the up or down arrow buttons to select a diagnostics submenu. If the double-arrow indicator is displayed in the bottom right of the display, press the left or right arrow buttons within each submenu to view additional information.

```
SYSTEM CONFIG
  ▶DIAGNOSTICS
    ▶▶TEMPERATURE
    ▶▶CH1 PRI vs THRES
    ▶▶CH1 BACK vs THRES
    ▶▶MAIN BOARD
    ▶▶MODULE 1
    ▶▶MODULE 2
    ▶▶MODULE 3
    ▶▶MODULE 4
    ▶▶FAN STATUS
```

- ▶▶PS1 HOURS
- ▶▶PS2 HOURS
- ▶▶RTC BATTERY LEVEL
- ▶▶FP LED TEST
- ▶▶PS2 LOAD TEST PASS

On the web interface, select the **System** tab and open the **Diagnostics** section.

▼ **Diagnostics**

Temperature: Main: 33.0C (OK) PS1: 0.0C (OK) PS2: 26.0C (OK)
Fan Speed: PS1 Fan is running (OK), PS2 Fan is running (OK),
Battery Status: More than 40%(OK)

Power Supplies

	Power Supply 1 (Active)	Power Supply 2
Voltage:	12.03V (OK)	12.03V (OK)
Hours:	Active: 016896 Standby: 000001	Active: 010043 Standby: 047860
TWH:	0016897 (OK)	0057903 (OK)
Manufactured Date:	1970-01-01 00:00	1970-01-01 00:00
Part Number:	0	0
Load Test History:	Last Test: PASS Number of Passes: 1 Number of Failures: 0 Last Pass: 15:03:24 04/28/2025 Last Fail: ---	Last Test: PASS Number of Passes: 853 Number of Failures: 0 Last Pass: 14:59:54 05/13/2025 Last Fail: ---

Power Supply Backup Test: PS2 Load Test

Main Board Power Supply Voltages:

+5.0V: 4.98V (OK) -5.0V: -5.08V (OK) +7.0V: 6.97V (OK) LTC2 Primary Peak: 0.00V LTC4 Primary Peak: 0.00V LTC2 Backup Peak: 4.38V LTC4 Backup Peak: 4.38V LTC2 Negative: -0.88V LTC4 Negative: -0.88V	+3.3V: 3.30V (OK) +5.2R: 5.48V (OK) LTC1 Primary Peak: 4.33V LTC3 Primary Peak: 0.00V LTC1 Backup Peak: 4.30V LTC3 Backup Peak: 4.35V LTC1 Negative: -1.32V LTC3 Negative: -0.85V
--	--

Module 1 PowerSupply Voltages:

+5.2R: 5.45V (OK) +5.0V: 4.98V (OK) +4.0V: 3.97V (OK) CH1 Threshold: 0.68V CH3 Threshold: 0.69V CH1 Backup Peak: 1.08V CH2 Backup Peak: 1.03V CH3 Backup Peak: 1.03V	+3.3V: 3.30V (OK) -5.0V: -5.08V (OK) +7.0V: 6.97V (OK) CH2 Threshold: 0.57V CH1 Primary Peak: 1.06V CH2 Primary Peak: 1.03V CH3 Primary Peak: 0.99V
---	---

Temperature

Displays the temperature of several internal components. If the measured temperature is within the normal operating range, "OK" status is displayed. If the temperature is out of range, "WARN" is displayed.

Channel Primary/Backup vs Threshold

Displays the signal level for the selected primary or backup channel compared to the configured threshold level. The value should be close to +3.0 dB for changeover channels and +4.0 dB for LTC channels.

A missing signal would result in a value close to -14.0 dB. Values above +3.0 dB may be normal depending on the signal type. Black signal levels should be close to +3.0 dB but color bar signals will have a higher level. Signals with a higher threshold level will switch more slowly.

Note: The HREF/Relay outputs should be terminated for correct measurements on the channel inputs. The unselected primary or backup channel is terminated in the ECO8000, but the selected primary or backup channel drives through to the output. Be sure to connect the channel output to the actual load during setup to ensure proper configuration.

Main Board and Module Voltages

Displays several voltage measurements for each of the internal circuit boards. If the measured voltage is within the normal operating range, "OK" status is displayed. If the voltage is out of range, "WARN" is displayed.

Note: The Module 4 voltages are only available for the Tektronix ECO8020 changeover.

Fan Status

Displays the fan status for each power supply module. If the fan speed is within normal operating range, "Fan running" is displayed. If the fan speed is low, "Fan stopped" is displayed.

PS1 and PS2 Hours

Displays information about the power supply modules.

- **Active hours:** The number of hours the supply has been active.
- **Standby hours:** The number of hours the supply has been the backup.
- **TW hours:** The calculated number of temperature-weighted hours. See [Temperature Weighted Hours](#).

- **+12 V output:** The current level of the DC supply. If the voltage is within operating limits, "OK" status is shown. If the voltage is out of range, "WARN" is shown.
- **Part Number:** the Telestream part number for the power supply module.
- **MFG Date:** The date when the power supply module was manufactured.

RTC Battery Level

Displays the status of the Real-Time Clock battery power level. The status will be one of:

- **More than 40% (OK):** The battery power is good.
- **20% to 40% (WARN):** The battery power is getting low and should be replaced soon.
- **Less than 20% (LOW):** The battery should be replaced immediately.

The RTC is only used for the local time when events are recorded in the Event Log. It has no impact on the critical functions of the changeover system.

Front-Panel LED Test

Press **ENTER** to perform a test of all front-panel LED indicators. Each LED will be illuminated in all possible colors to verify they are functioning properly.

PS1/PS2 Load Test

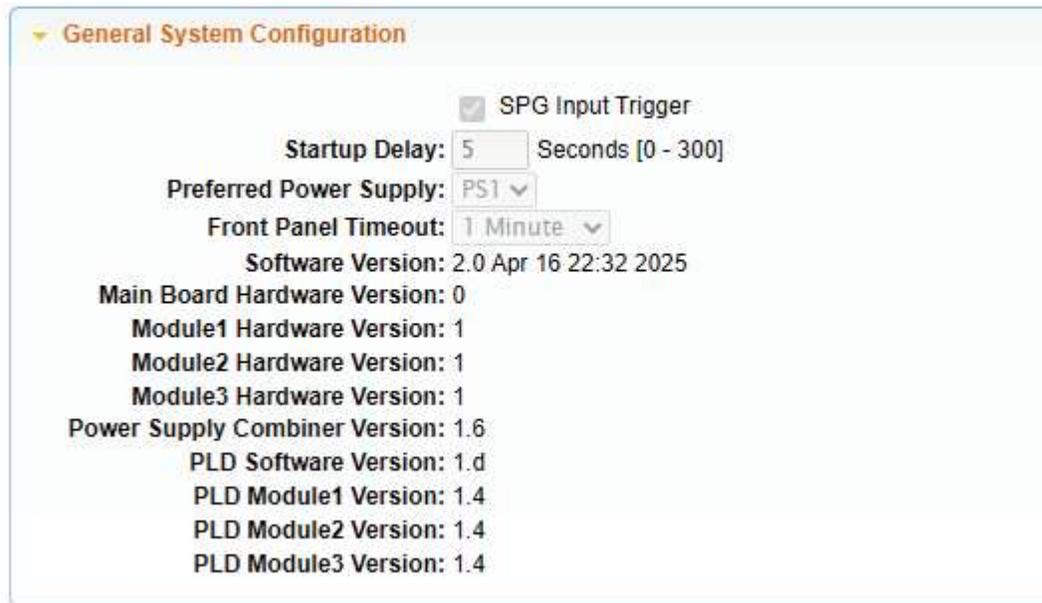
Displays the status of the most recent load test of the backup power supply. See [Load Test](#).

Upgrade Instrument Firmware

Telestream releases software and firmware updates for products to add new features and to fix product problems. You can find the latest firmware for your product at the Telestream website: www.telestream.net/video/resources.htm#Software and select **Signal and Synchronization Generators**.

Check Current Firmware Version

You can check the current version of the instrument firmware from the web interface. Select the **System** tab and open the **General System Configuration** section. The Software Version (including the build date) and hardware version numbers are displayed.



On the front-panel interface, go to the **SYSTEM CONFIG** menu and press **ENTER**. Press the up or down arrow buttons to navigate to the **FW VERSION** submenu. Press the left or right arrow button to see both the version number and date.

```

SYSTEM CONFIG
  ▶HW VERSION
  ▶PLD VERSION
  ▶PS COMBINER VERSION
  ▶FW VERSION
  
```

Upgrade Procedure

The ECO8000 firmware can be upgraded by using a Windows utility program to transfer the firmware package file to the instrument.

The ECO8000 firmware package available on the Telestream website is a ZIP archive file. Download the .zip file and then extract these three files:

Filename	Description
firmware.pkg	ECO8000 firmware package
transfer.exe	Windows utility program
ECO8000-MIB.mib	Management Information Base (MIB) for SNMP API

On your Windows PC, the firmware.pkg and transfer.exe files must be located in the same folder.



CAUTION: The firmware upgrade process may disrupt the sync signals. We recommend that you upgrade the firmware only when the instrument is not in service.

Do not remove power from the instrument until the upgrade process has completed.

The upgrade process involves both front-panel operation and a Windows PC to transfer the firmware package.

1. Press and hold the **PANEL ENABLE** button to unlock the Channel Control System.
2. Press the **MANUAL MODE** button.
3. Go to the **SYSTEM CONFIG** top-level menu and press **ENTER**.
4. Press the up or down arrow buttons to navigate to the **FIRMWARE UPGRADE** submenu and press **ENTER**. A confirmation message is shown.

```
*Begin FW upgrade?
* Yes:ENTER No:BACK
```

5. Press **ENTER** again to proceed or press **BACK** to cancel the upgrade. A second confirmation is displayed.

```
*Continue upgrading?
* Yes:ENTER No:BACK
```

6. Press **ENTER** and the display will show a message that the instrument is waiting to receive the package on the management network interface.

```
Waiting for network
IP: 10.101.3.76
```

7. On the Windows PC, open a Command Prompt window.
8. Change to the folder in which the ECO8000 firmware package has been unpacked. Verify that the firmware.pkg and transfer.exe files are both present in this folder.
9. Run the transfer program. You will be prompted to enter the IP address of the ECO8000. Type the address that is shown on the front-panel display.
10. The upgrade process will continue without interruption. Several progress messages will appear in both the Command Prompt window and on the front-panel display.
11. When complete, the instrument will reboot, and the transfer program will prompt for another ECO8000 IP address. Simply press **Enter** to exit the transfer utility.

```
Command Prompt
C:\EC08000-Firmware-V2.0-P00010163>dir
Volume in drive C is OS
Volume Serial Number is 80AB-4476

Directory of C:\EC08000-Firmware-V2.0-P00010163

05/07/2025  04:42 PM    <DIR>          .
05/07/2025  04:42 PM    <DIR>          ..
05/07/2025  04:42 PM             45,985 EC08000-MIB.mib
05/07/2025  04:36 PM          38,602,592 firmware.pkg
05/07/2025  01:36 PM             67,072 transfer.exe
               3 File(s)          38,715,649 bytes
               2 Dir(s)    61,017,366,528 bytes free

C:\EC08000-Firmware-V2.0-P00010163>transfer

Please enter DNS name or address of target instrument:
10.101.3.57
Opened TCP connection to 10.101.3.57
Reading Firmware Data... done
Programming Flash... done
done.

Please enter DNS name or address of target instrument:

C:\EC08000-Firmware-V2.0-P00010163>
```

Verify the upgrade by checking the instrument firmware version on the **FW VERSION** submenu on the front panel, or on the web interface.

Power-on Self Test

The power-on self test is performed when the Configuration and Monitoring System is powered up or restarted. To manually restart this sub-system and perform the self test, press and hold the **ENABLE** and **RESET** buttons on the front panel.

If any failure occurs, it will be reported in several ways:

- An error message is shown on the LCD display for about 2 seconds.
- The STATUS > FAULT submenu will display the event code.
- The fault is logged in the Event Log. See [Event Log](#).
- Any user-configured notifications (SNMP Trap, Beeper, E-Mail, and GPI) will be performed. See [Event Reporting Configuration](#).

The self-test event code is an 8-bit value, with each bit set as follows:

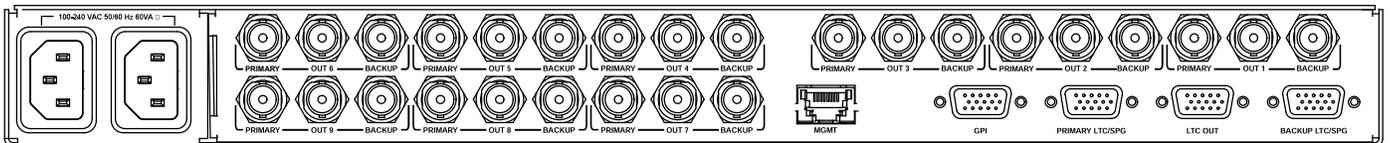
Test Type	Bit
Front panel	0 (LSB)
Main board	1
Module 1	2
Module 2	3
Module 3	4
Module 4	5
Power supply combiner	6
MRAM	7
RTC	8 (MSB)

ECO8000

Automatic Changeover Unit for the SPG9000



The ECO8000 is a highly versatile automatic sync and signal changeover unit for modern master sync applications. This changeover unit offers exceptional reliability, stability and high availability. When configured with a primary plus backup pair of SPG9000 sync generators, the ECO8000 provides protection for all the mission-critical timing and synchronization signals required in modern broadcast, production, and post-production facilities.



Key Features

- Switches NTSC and PAL black burst, HD tri-level sync, AES/DARS, word clock, LTC, and SD/HD/3G-SDI signals
- Electronic Fast Switch function for near glitch-less sync source switching, minimizing disruption in operations
- Automatic or Manual changeover mode
- Front panel LED status/fault indicators for each individual channel and both power supplies
- Dual hot-swappable power supplies ensure continuous availability of reference signals
- Easy to manage with web-based interface for configuration and SNMP for status and alert information

ECO8000



Product Configuration

The ECO8000 has nine user-configurable BNC channels and four LTC channels. Each channel consists of primary and backup inputs and an output. The ECO8000 includes six 50 MHz Electronic Fast Switch channels and three 3 GHz Relay Switch channels. The Electronic Fast Switch channels support NTSC and PAL black burst, HD tri-level sync, AES/DARS, and word clock signals. The 3 GHz Relay Switch channels support SD/HD/3G-SDI signals as well as most analog reference signals.

Robust Fault-Resistant Architecture

The ECO8000 is designed with three loosely-coupled subsystems that together provide high reliability. The Channel Control System monitors the signal level on each input and switches to the other source if a fault occurs. It is implemented with a simple hardware state machine to maximize reliability. The Configuration and Monitoring System is software-based and includes the user interface. This system can be rebooted without any disturbance to the Channel Control System. The Redundant Power System monitors the two power supply modules, automatically switching to the backup supply if necessary.

Fault Detection of Sync and Reference Signals

Each channel has a signal level threshold for fault detection for the configured signal type. Non-critical signals may be disabled for fault detection or configured not to trigger a changeover, but are still switched when a fault is detected on an enabled channel.

Changeover Switching

In automatic mode (switch-on-fault), the ECO8000 will automatically select the backup channels should any of the primary inputs fail. However, in the unlikely event both sync sources are faulty, the ECO8000 will not alternate between the two sources.

Manual source selection can be used when normal maintenance is required for the SPG9000 sources, such as firmware upgrades. Manual mode also facilitates periodic testing of the changeover function. A notification can be sent if the backup channels have not been tested for six months.

50 MHz Electronic Fast Switch Channels

The Electronic Fast Switch function for channels 1–6 significantly improves the changeover switching speed and thus minimizes disturbance of the reference sync signals when switching between primary and backup inputs. The Electronic Fast Switch channels have latching relay backups that engage on loss of power to maintain the selected signal path.



3 GHz Relay Switch Channels

The 3 GHz Relay Switch channels 7–9 are optimized for SD/HD/3G-SDI signals but are also usable for most analog reference signals. These channels utilize high bandwidth latching relays to preserve the selected signal path upon a loss of power.

The Relay Switch channels are also equipped with a patented Relay Check function. When this function is enabled, the instrument automatically checks the signal level on each 3 GHz Relay Switch channel before and after every changeover switch to determine the condition of the relay contacts. If it is determined that the relay contacts may have nonconductive coating (such as oxide buildup), the instrument will attempt to self-clean the contacts by cycling the relay rapidly for 20 times to wear through the layer of nonconductive coating and restore the relay connections.

LTC Channels

The four LTC channels connect to the SPG9000 sync generators with standard 15-wire cables with DE-15 (HD-15) connectors. An optional breakout cable can be used for the ECO8000's LTC outputs, with XLR connectors for each of the four channels.

The SPG9000 can use its LTC 1 signal as a time input instead of a time code output, so the ECO8000 can similarly be configured to route the input signal on the LTC 1 channel to the inputs of both primary and backup SPG9000s.

SPG Trigger

The same cable used for LTC channels also includes one general purpose interface (GPI) signal from the primary and backup SPG9000s to the SPG Trigger input of the ECO8000. This GPI signal can be used to force a changeover switch for SPG9000 events other than signal faults, such as a reference loss of lock or a hardware fault.

The SPG Trigger is useful for hybrid SDI/IP facilities, to force the sync outputs from the ECO8000 to follow the SPG9000 that is serving as the active PTP grandmaster. This ensures that SDI equipment that is genlocked to a black burst or HD tri-level sync source is synchronized to ST 2110 equipment that is locked to the PTP grandmaster.



Front Panel and Web-Based User Interfaces

Dedicated buttons on the front panel can be used to select automatic or manual mode, and in manual mode, to select the primary or backup source. Channel and system parameters can also be configured from the front panel, using an LCD display for the menu system. LED fault indicators show the status of each individual channel and the status of the power supplies.

The ECO8000 can also be configured and controlled from a web-based user interface via the Ethernet management port, for remote access when the ECO8000 is installed in an equipment rack away from the operator.

Redundant Hot-Swappable Power Supplies

The ECO8000 has an innovative hot-swappable dual power supply system that virtually removes the risk of sync loss due to power supply unit failure, minimizing disruption in operations.

Unlike simpler devices, the ECO8000 has a designated active power supply and an idle backup supply. This ensures that they are not used at the same rate and will not potentially fail at about the same time. The ECO8000 will monitor the temperature-weighted hours of the active supply and alert the user when it approaches the rated limit. The backup supply undergoes a brief load test automatically each day and the user can be notified if this test fails, providing extra assurance that the backup power supply will be ready when needed. Each power supply module has both AC and DC indicator LEDs that continue to operate for 10 minutes after the loss of power. This allows quick troubleshooting in the event of supply failure or AC power failure.

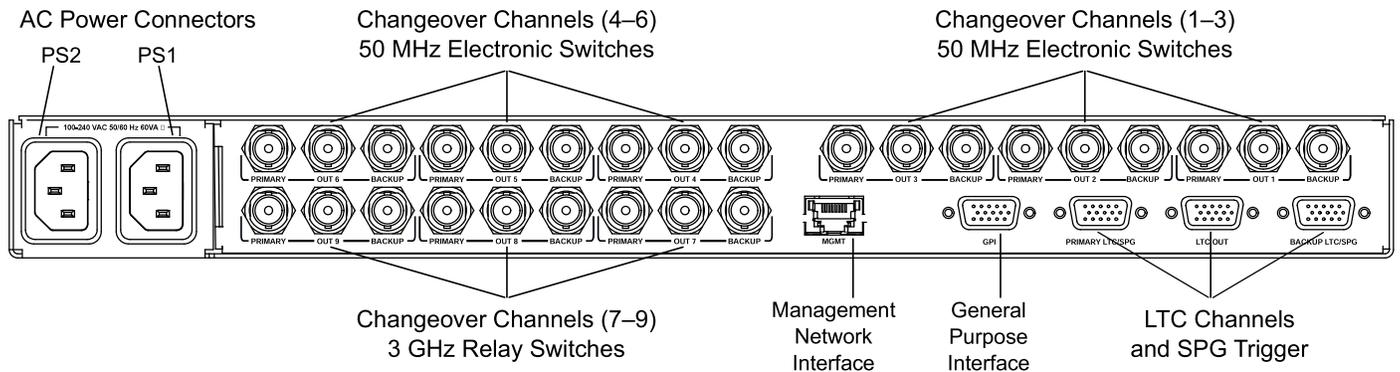
Alarm and Status Reporting

In addition to the front-panel and web interface status indicators, alarms can be reported through SNMP Trap messages, General Purpose Interface outputs, email notification to a local SMTP server, and/or an audible beeper.

An Event Log maintains the date and time of each reported event, and this log can be viewed via the front panel and web browser interfaces.

Technical Specifications

Rear-Panel Connectivity



Inputs/Outputs

Electronic Fast Switch Channels

Number of Channels	6
Signal Types	NTSC, PAL, HD Tri-Level, Word Clock (1 V and 5 V), AES/DARS, Custom
Bandwidth	50 MHz
Signal Fault Detection Threshold	-2 dB to -4 dB from the nominal level for the selected signal type
Switch Settling Time	<p>NTSC, PAL, HD Tri-Level DARS and 1 V Word Clock 5 V Word Clock</p> <p>Typically 5 ns glitch, then 125 ns to 90% of final value Typically 5 ns glitch, then 250 ns to 90% of final value Typically 25 ns glitch, then 500 ns to 90% of final value</p>
Return Loss (typical)	<p>35 dB, 300 kHz to 6 MHz 25 dB, 6 MHz to 30 MHz</p>
Insertion Loss	<p>< ±0.2 dB DC to 10 MHz Typical < -1 dB DC to 50 MHz</p>
Maximum Switched Voltage	-3 V to +5 V
Crosstalk	<p>Unselected input to output, or channel to channel < -60 dB, 300 kHz to 6 MHz < -40 dB, 6 MHz to 50 MHz</p>

Technical Specifications

Relay Switch Channels

Number of Channels	3
Signal Types	SD-SDI, HD-SDI, 3G-SDI, NTSC, PAL, HD Tri-Level, Word Clock (1 V), AES/DARS, Custom
Bandwidth	3 GHz
Signal Fault Detection Threshold	-2 dB to -4 dB from the nominal level for the selected signal type
Relay Switch Interruption Time	Typically 0.5 ms to 2 ms
Return Loss (typical)	40 dB, 300 kHz to 6 MHz 30 dB, 6 MHz to 30 MHz 15 dB, 30 MHz to 1.5 GHz 10 dB, 1.5 GHz to 3 GHz
Insertion Loss	< -0.1 dB DC to 10 MHz Typical < -3 dB DC to 3 GHz Equivalent to approx. 5 m of Belden 1694 cable
Maximum Switched Voltage	±2.5 V peak, 1.5 V RMS
Crosstalk	Unselected input to output, or channel to channel < -48 dB, DC to 1.5 GHz < -40 dB, 1.5 GHz to 3 GHz

LTC Channels

Number of Channels	4 outputs or 3 outputs and 1 input
Signal Threshold	0.5 to 5 V _{p-p} in 0.5 V steps, differential or single-ended
Switching Interruption Time	Typically 1 ms
Load Range	600 Ω to open circuit
Crosstalk	< -60 dB

Technical Specifications

Dimensions

Height	43.7 mm (1.72 in.)
Width	483 mm (19.0 in.)
Depth	557 mm (21.9 in.)
Weight	4.5 kg (10.0 lb.)

Power Source

Voltage Range	100 to 240 VAC
Frequency	50/60 Hz
Power Consumption	50 VA maximum

Environmental

Temperature	
Operating	0 °C to +50 °C (+32 °F to +122 °F)
Nonoperating	-20 °C to +60 °C (-4 °F to +140 °F)
Altitude	
Operating	To 3000 m (9842 ft.)

Ordering Information

Base Model

Product Code	Description
ECO8000	ECO8000 automatic changeover unit; includes 6 50 MHz electrical fast switch channels, 3 3 GHz relay switch channels, 4 LTC channels, general purpose interface, management LAN interface, and dual power supply modules

Accessory Options

Option Code	Description
ECO8000 RACK	Rackmount slides and rails kit for ECO8000 (1 RU height, standard full depth)
ECO8000 XLR	Adapter cable (6 feet long) from 15-pin D-sub LTC OUT connector on the ECO8000 to 4 XLR male connectors (for LTC outputs) and BNC male connectors (for General Purpose Interface outputs)
ECO8000 CBL	Set of connection cables (12 inch length) for primary & backup SPG9000s to the ECO8000. Includes 8 pairs of BNC to BNC cables for 6x Black, Word Clock and DARS outputs, 3 pairs of HD-BNC to BNC cables for SDI outputs, and one pair of D-sub 15 cables for LTC outputs.

Technical Specifications

Power Cords

Option Code	Description
ECO8000 A0	North America locking power cords (115 V, 60 Hz)
ECO8000 A1	Universal European locking power cords (220 V, 50 Hz)
ECO8000 A2	United Kingdom locking power cords (240 V, 50 Hz)
ECO8000 A3	Australia locking power cords (240 V, 50 Hz)
ECO8000 A5	Switzerland locking power cords (220 V, 50 Hz)
ECO8000 A6	Japan locking power cords (100 V, 110/120 V, 60 Hz)
ECO8000 A10	China locking power cords (220V, 50 Hz)
ECO8000 A11	India non-locking power cords (230 V, 50 Hz)
ECO8000 A12	Brazil non-locking power cords (127 V, 60 Hz)
ECO8000 A99	No power cords included

Service Options

The ECO8000 has a standard warranty period of one year, which can be extended to three or five years. Service options provide complete coverage, including all necessary repairs, software updates, parts, and labor. Coverage also includes all shipping costs, including freight and import/export fees. This guarantees faster repair times and cost-efficiency when compared to non-contract, "on-demand" repairs that are typically 5x the annual contract cost per incident, no matter how minor.

Option Code	Description
ECO8000 R3	ECO8000 Standard Warranty extended to 3 years
ECO8000 R5	ECO8000 Standard Warranty extended to 5 years

Technical Specifications

Post-Purchase Upgrades and Replacements

Option Code	Description
ECO800UP DPW	Replacement power supply module for the ECO8000. (Power cord option must also be specified)
ECO800UP RACK	Rackmount slides and rails kit for ECO8000 (1 RU height, standard full depth)
ECO800UP XLR	Adapter cable (6 feet long) from 15-pin D-sub LTC OUT connector on the ECO8000 to 4 XLR male connectors (for LTC outputs) and BNC male connectors (for General Purpose Interface outputs)
ECO800UP CBL	Set of connection cables (12 inch length) for primary & backup SPG9000s to the ECO8000. Includes 8 pairs of BNC to BNC cables for 6x Black, Word Clock and DARS outputs, 3 pairs of HD-BNC to BNC cables for SDI outputs, and one pair of D-sub 15 cables for LTC outputs.

SPG9000

Professional Synchronization,
Timing, and Reference Test
Signal Generation

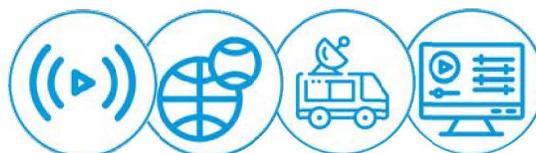


SPG9000 Timing and Reference System

- Two independent 1G/10G ports for PTP, supporting dual leader, dual follower, and follower + leader configurations
- Integrated multi-system (GPS, GLONASS, BeiDou, Galileo, QZSS) dual-band GNSS receiver for a highly accurate and reliable timing source
- Analog genlock input and multiple sync outputs for legacy and hybrid SDI/IP facilities
- Multiple video/audio/data test signal generators for formats from SD to HD/2K to UHD/4K
- 4 multi-rate (SD-SDI to 12G-SDI) SDI test signal outputs
- 2 10G/25G Ethernet ports for ST 2110 test signal streams with ST 2022-7 redundancy
- NMOS management of IP sender configuration
- Secure web interface for remote operation and REST- style HTTP API for easy integration with third-party management software

The **SPG9000** is the complete reference and timing system for IP/SDI networks

Advantages of SPG9000



- Ideal for use in broadcast, sports, mobile live production, and post-production
- Provides a variety of timing references: GNSS, PTP, black burst, and 10MHz
- Highly versatile with reference distribution options such as PTP, NTP, black burst, and DARS
- Sets up fast as a Grandmaster or Follower using PTP
- Ensures precise timing and seamless connectivity by producing known-good references for SDI and IP
- Offers a user-friendly web interface
- Supports a multitude of broadcast and post-production signal formats including SD, HD/2K and UHD/4K

Unmatched IP Synchronization and Redundancy



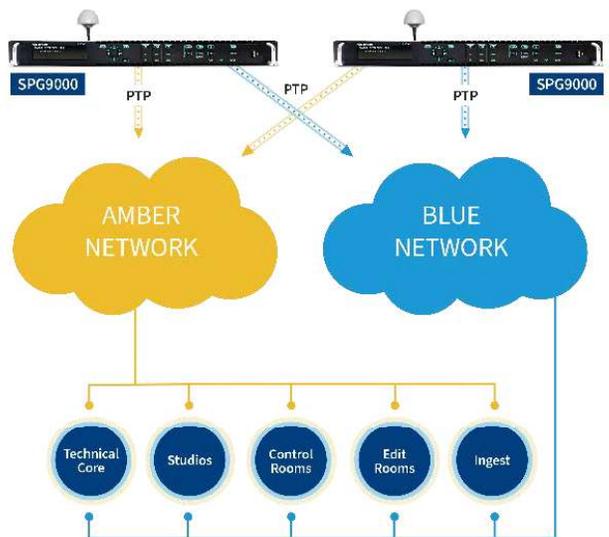
IP-Based Video Facilities

In modern IP-based facilities, PTP is distributed for timing and synchronization to a common source. The SPG9000 can use a GNSS signal as the time source and serve as a PTP grandmaster for the video network. With two independent ports and PTP engines, each SPG9000 can provide PTP for two different domains (e.g. ST 2059 and AES67) or can connect to both sides of redundant networks.

For easy connectivity to spine or backbone switches, each PTP port of the SPG9000 can connect at either 10 Gbps or 1 Gbps line rate, using SFP+ transceiver modules.

Each PTP instance of the SPG9000 can operate as a leader only, a follower only, or use “Ordinary Clock” mode which can adapt between leader and follower as required. For example, if GNSS- based time synchronization is not available (perhaps because there is no clear view of the sky for the antenna), a pair of SPG9000 systems can still function as a primary + backup pair for redundancy. The backup will use PTP to sync to the primary, and takeover with no time disturbance when it switches from follower to leader.

The SPG9000 can also function as an NMOS-controlled media sender, generating video, audio and data reference test signals over ST 2110 IP streams. The two 25 Gbps ports for IP traffic can operate independently or as redundant links per ST 2022-7.



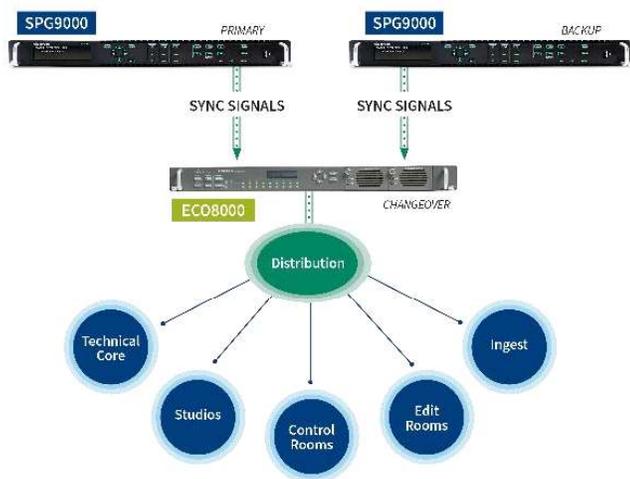
Optimal Synchronization Made Easy for SDI and Hybrid Workflows

SDI/Analog Video Facilities

The SPG9000 is a full-featured sync pulse generator, providing all the necessary reference signals for an SDI-based video facility. The SPG9000 can lock to a GNSS signal or genlock to another SPG. It has six analog outputs for NTSC/PAL black burst, HD tri-level sync, 10 MHz continuous wave, or 1 pulse-per-second signals, each with independent timing offsets. Time code can be distributed from four LTC outputs and from VITC on any NTSC/PAL black outputs. Word Clock and Digital Audio Reference Signal (DARS) outputs are available for audio reference.

The SPG9000 also includes four multi-rate SDI test signal outputs that can operate independently for SD, HD-SDI (1.5G and 3G), and UHD (6G and 12G-SDI) formats.

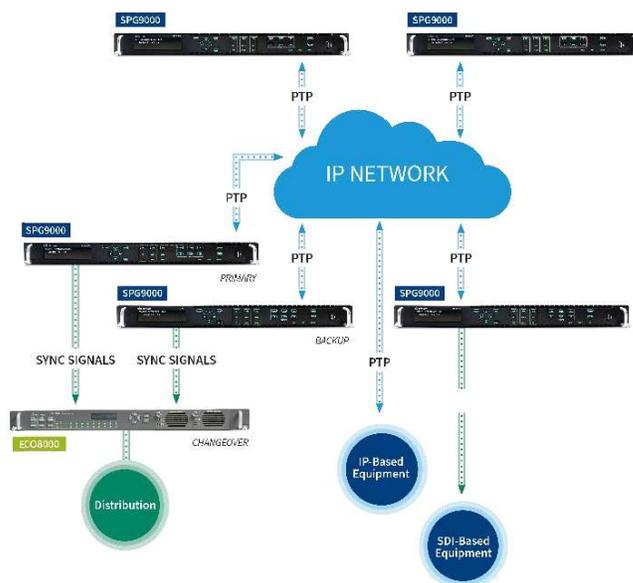
Along with the companion ECO8000 changeover unit, a pair of SPG9000 units (primary and backup) comprise a highly available synchronization solution.



Hybrid SDI/IP Video Facilities

The SPG9000 is ideal for facilities that have a hybrid mix of IP-based equipment and SDI/analog equipment. SPG9000s can serve as PTP grandmasters for the facility's time and synchronization source. PTP is distributed through the facility, and directly to IP-based devices. At the network edge, additional SPG9000 units (either standalone or paired in a primary/backup configuration with an ECO8000) can operate as PTP followers and lock to the active grandmaster. This reference is then used to generate analog sync and time code signals for SDI/analog equipment that uses a traditional genlock input. This system architecture ensures that all equipment in the facility is synchronized to the same time source.

Test signal outputs of each SPG9000 can be configured to duplicate the same video test patterns to both IP and SDI outputs, or they can be configured to use separate test patterns.



Flexible Configuration Options for Any System Architecture

The SPG9000 offers a complete set of reference inputs and outputs, supporting a wide variety of system designs. The base configuration includes all the features of a complete sync pulse generator, and all options are licensed so that they can be purchased with the base unit or any time later to upgrade the system.

The SPG9000 has multiple options for setting the internal clock reference (frequency and time-of-day). It can lock to a received GNSS signal, to another PTP grandmaster, or to another sync generator or an external atomic clock using the analog genlock input.

The loop-through genlock input can lock to many different types of analog synchronization signals, including NTSC and PAL black burst, HD tri-level sync signals for all common 1080-line and 720-line frame rates and formats, and continuous wave (CW) signals at 10 MHz.

Resilient to Interruption and Reliable for Continuous Operation

Resiliency and reliability are essential attributes for a timing reference generator since it is a mission-critical component for the video facility.

The SPG9000 has a high-quality oven-controlled micro-electromechanical system (MEMS) oscillator for its internal clock. If the received GNSS signal or genlock input signal is temporarily lost, the SPG9000 will switch to holdover mode in which this clock maintains its time and phase from the previous lock. When the reference input signal is restored, the holdover recovery process adjusts the clock slowly to eliminate any accumulated phase difference. Avoiding an abrupt “jam” when the SPG9000 is re-locked ensures that no “synchronization shock” will be observed by follower devices.

Most facilities require the timing reference to be available continuously and the SPG9000 has an innovative dual power supply system to assist high availability. Unlike simpler devices, the SPG9000 has a designated active power supply and an idle backup supply. This ensures that they are not used at the same rate and will not potentially fail at about the same time. The SPG9000 will monitor the temperature-weighted hours of the active supply and alert the user when it approaches the rated limit. The backup supply undergoes a brief load test automatically each day and the user can be notified if this test fails.

Integrated Dual-Band GNSS Receiver

In addition to their main purpose of providing position information, Global Navigation Satellite Systems also provide highly accurate time-of-day information. Video systems can use this time to compute the precise number of video and audio frames since the “epoch” date and time, thereby synchronizing signals even from disconnected systems.

The SPG9000 has an integrated multi-GNSS, dual-band receiver, supporting GPS, GLONASS, Galileo, BeiDou, and QZSS satellite constellations at L1 and L5 frequencies as applicable. Unlike “smart” antennas that include an internal receiver, the SPG9000’s antenna produces a simple RF signal that can be brought to the SPG9000 by plain coaxial cable, greatly simplifying installation and maintenance.

The SPG9000 constantly monitors the received GNSS signal, showing the ID, status, and signal strength of each satellite currently in view. This information can be viewed on the web interface and retrieved via the HTTP API, providing valuable diagnostic information when investigating signal reception issues.

Complete PTP Solution for Today’s IP Video Networks

The SPG9000 includes an advanced implementation of the Precision Time Protocol, making it the ideal choice for a facility’s timing and synchronization reference.

Both Leader and Follower modes are supported, and the SPG9000 can also operate as an “Ordinary Clock” that adapts between the two modes depending on dynamic network conditions. With two independent PTP instances, the SPG9000 can operate as a dual Leader serving two different domains and/or profiles, as a dual Follower connected to the two sides of a redundant network, or simultaneously as a Follower synchronized to an upstream grandmaster and as a Leader to a separate downstream network. The PTP ports operate over 1G/10G-capable interfaces (using SFP+ modules) for easy connection to commonly used switch ports.

The SPG9000 supports the three profile types required for media networks: SMPTE ST 2059-2, AES67 Media Profile, and IEEE 1588 Default. Both multicast and unicast communication models are supported, including mixed multicast/unicast mode.

Key Features

PTP performance monitoring per IEEE 1588-2019 Annex J is supported, with real-time display of delay and offset measurements and message rates. The data is also available via the HTTP API, for easy integration with management dashboards.

The SPG9000 has a unique Dynamic Priority algorithm that minimizes unnecessary grandmaster changes. For example, it is normal and expected behavior for the Best Master Clock Algorithm (BMCA) to cause a switch from a primary (active) leader to a backup (passive) leader when the GNSS signal degrades. But if that signal is restored, the current active leader is equally capable of serving PTP to the network, so there is no need to switch back to the original leader. Dynamic Priority ensures that the unnecessary GM change does not happen, improving stability for ST 2110 and PTP networks.

Powerful Test Signal Generator

Test signals are useful video and audio references that can be used to troubleshoot or verify performance of equipment and network links within the facility. The SPG9000 includes video, audio, and ancillary data generators for four multi-rate (up to 12G) SDI outputs and two 25 Gbps IP outputs.

A wide variety of standard video test patterns are available, such as color bars, monitor calibration patterns, ramps and staircases, and multiburst patterns. Formats and image sizes from standard definition to UHD/4K are supported simultaneously on the independent outputs. User-supplied image files can be loaded onto the instrument and output from the test signal outputs.

A set of overlays can be superimposed above the video test signal background. The text ID overlay supports multiple lines of text at a configurable text size, and uses Unicode characters for localized text in many languages. The logo overlay adds an uploaded image file for network or channel graphics, for example. The burnt-in time code overlay adds the frame-accurate time code to the test pattern, creating a dynamic test signal.

The SPG9000 has multiple independent audio tone generators that can be embedded into the SDI signals and output as ST 2110-30 IP streams. A special synchronized audio and video sequence can be used to measure AV delay on a companion PRISM monitor.

Ancillary data can be included in the SDI signals and output as ST 2110-40 IP streams. Ancillary time code and video payload identifier (SDI only) are supported.



NMOS-Enabled Media Sender

Using the Networked Media Open Specifications (NMOS) developed by the Advanced Media Workflow Association (AMWA), the SPG9000 can function as a media device in an IP network.

Using the Discovery & Registration API (IS-04), the SPG9000 can register as a node with sender capabilities. Using the Device Connection Management API (IS-05), receivers can automatically configure IP connections to receive IP streams for test signal content (video, audio, and data).

Remote System Management and Monitoring

The SPG9000 includes several tools to facilitate easy integration with modern management systems and monitoring dashboards.

In addition to the front panel display and keypad for local operation, the SPG9000 has a full-featured easy-to-use web-based interface for remote operation. Access is controlled via user login and password authentication, with both administrator and operator access levels. HTTPS can be used for secure network access per EBU R 143 cybersecurity requirements.

A complete HTTP-based Application Programming Interface (API) is available for client-side software to query the instrument status and to configure its run-time options. Integrated web-based API documentation makes it easy for developers to understand message structures, and to interactively send requests to the instrument and view the responses.

The SPG9000 also utilizes syslog for sending log messages to a remote server. The minimum reported severity level is configurable, to only report error and warning messages or to also report informational system messages, for example.

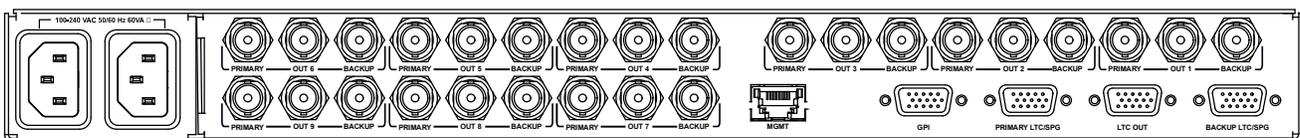
PTP status and performance monitoring and GNSS receiver status are well-supported by both the HTTP API and syslog. The API conforms with the proposed SMPTE RP 2059-15 data model, providing a vendor-neutral interface for client-side developers.

The SPG9000 has an SNMP agent for system monitoring with traditional management systems. SNMP version 3 is used for security, and the agent supports objects for system and reference status and Trap messages for event notifications.

Companion Changeover Unit

The ECO8000 electronic changeover unit works with a primary + backup pair of SPC9000 units to serve as a highly-reliable redundant system. It utilizes electronic fast switches for near glitch-less sync source switching, minimizing disruption in operation. Dual hot-swappable power supplies ensure continuous availability of reference signals, and signals are passed even when the unit is powered off.

The ECO8000 provides nine user-configurable BNC channels and four LTC channels. Each channel consists of primary and backup inputs, and an output. The system includes six 50 MHz electronic fast switch channels, three 3 GHz relay switch channels, and four LTC channels. The 50 MHz electronic fast switch channels support black burst, HD tri-level sync, AES/DARS, and word clock signals. The 3 GHz relay switch channels support SD/HD/3G-SDI signals as well as most analog reference signals.



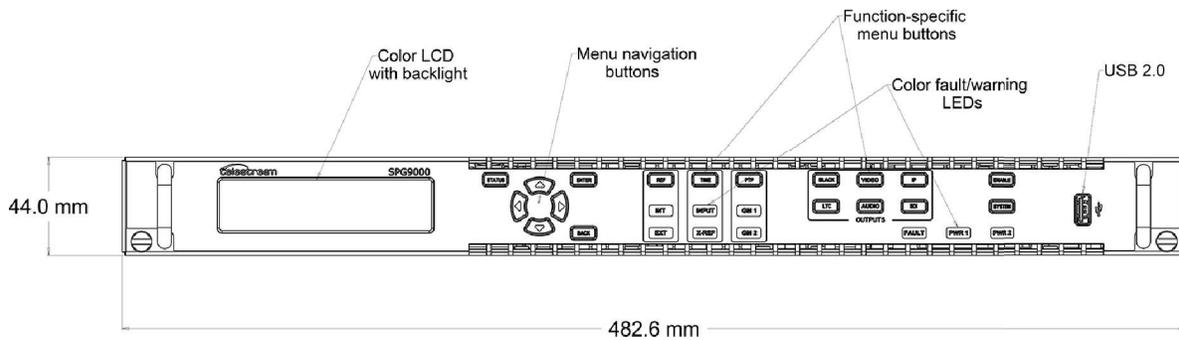
SPG9000

Tech Specs

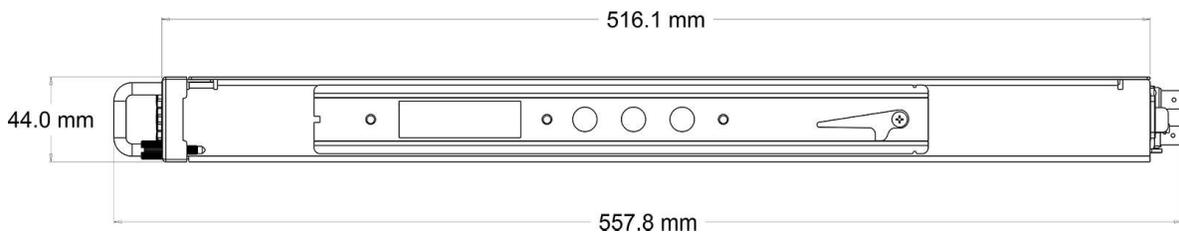


Form Factor and Dimensions

Front View



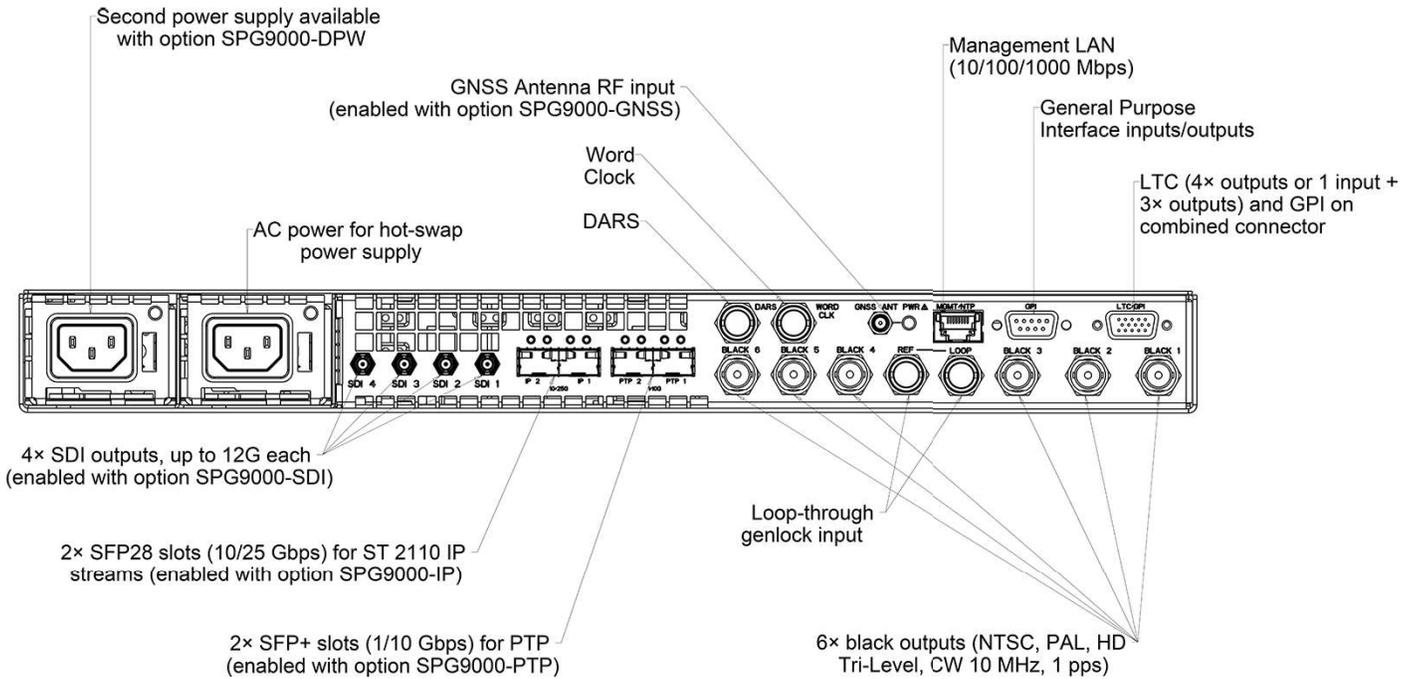
Side View



Dimensions

Height	44.0 mm (1.73 in.)
Width	482.6 mm (19 in.)
Depth	516.1 mm (20.32 in.)
Weight	4.85 kg (10.7 lbs)

Connectivity



Baseband Synchronization

Internal Oscillator

Frequency accuracy in internal/holdover modes	$\pm 155 \times 10^{-9}$ over 1-year calibration interval; typically $\pm 10 \times 10^{-9}$ just after adjustment
Frequency drift	$< \pm 100 \times 10^{-9}$ per year for internal and holdover modes at constant temperature

Genlock Input

Connector	BNC ×2, passive loop-through
Formats	<ul style="list-style-type: none">• NTSC/PAL black burst• HD tri-level sync<ul style="list-style-type: none">◦ 1080 60/59.94/50i◦ 1080 30/29.97/25/24/23.98p◦ 1080 24/23.98sF◦ 720 60/59.94/50p• CW 10 MHz
Amplitude Range	-8 dB to +6 dB
Lock Stability	
±3 dB amplitude change	<1 ns
Jitter with burst lock	<0.5°
Jitter with tri-level sync lock	<1 ns
Jitter with CW lock	<1 ns (typ. 1°)
Timing Adjustment	
Range	$\pm \frac{1}{2}$ color frame
Resolution	<0.5° of NTSC/PAL subcarrier, 1 ns for tri-level sync

Baseband Synchronization

Black Outputs

Number of Outputs	6
Formats	<ul style="list-style-type: none">• Black burst<ul style="list-style-type: none">◦ NTSC-M (7.5 IRE black)◦ NTSC-J (0 IRE black)◦ PAL-B• HD tri-level sync<ul style="list-style-type: none">◦ 1080 60/59.94/50i◦ 1080 60/59.94/50/48/47.95/30/29.97/25/24/23.98p◦ 1080 24/23.98sF◦ 720 60/59.94/50p• CW 10 MHz• 1 PPS
Amplitude Accuracy	± 2%
Timing Adjustment Range Resolution	± ½ color frame Clock resolution: 18.5 ns for black burst, 13.5 ns for HD tri-level Fine resolution: 0.1 ns for black burst, 0.2 ns for HD tri-level
Time Code (VITC) Line Numbers Date and Time Zone Source	User-selectable 1 or 2 lines, default 14/16 for NTSC, 19/21 for PAL SMPTE ST 309, YYYYMMDD format Time-of-day with adjustable offset, or program (elapsed) time counter
Ten-Field Sequence	For NTSC formats per SMPTE ST 318 (Black 4-6 outputs only)

LTC Input/Outputs

Number of Outputs	4 outputs or 3 outputs and 1 input
Connector	Available through D-sub 15-pin connector; Optional break-out cable to XLR connectors
Formats	24 fps (24 Hz or 23.98 Hz), 25 fps, 30 fps, 30 fps drop-frame (29.97 Hz) per SMPTE ST 12-1
Source	Time-of-day with adjustable offset, or program (elapsed) time counter
Output Amplitude	5V ±10%, adjustable from 0.5 V to 5 V in 0.5 V steps

Baseband Synchronization

Word Clock

Connector	BNC ×1
Frequency	48 kHz
Output Level	0-5 V DC (CMOS compatible) or ±1 V into 75 Ω (AES level)

DARS

Outputs	Outputs 2 channels (1 AES/EBU pair)
Connector	BNC ×1
Amplitude	1 V ± 0.2 V
Sampling Frequency	48 kHz (lock on video signal)
Quantization	Linear PCM, 20 or 24 bits

Network Time Protocol (NTP)

Network Interface	Combined MGMT/NTP interface for management functions and NTP server/client RJ45 connector, 10/100/1000 Mbps line speed
Server	
Stratum Level	Stratum 1 when the reference time source is GNSS or PTP Follower Optional Stratum 12 operation for internal time or LTC/VITC time source
Client Query Rate	Maximum 1 query per 8 seconds for each individual client Rate limiting is enabled to prevent DoS attacks
Number of Clients	5000 or more at maximum query rate
Client	
Operation	Available when using internal time source Update internal time from NTP manually, upon system startup, from API, or from GPI
Remote Time Servers	One or two remote servers from local network or Internet

Precision Time Protocol (PTP)

Port Connectors	2× SFP+ sockets. Available transceiver modules for 1G or 10G line speeds.
Operating Modes	Leader only, Follower only, Ordinary Clock (adaptive).
PTP Instances	2 independent, as dual Leader, dual Follower or Follower + Leader
Profiles	SMPTE ST 2059-2, AES67 Media Profile, IEEE 1588-2019 Default
Communication Model	Multicast, Unicast, Mixed Multicast/Unicast
Follower Lock Time	Typically 30 seconds for initial lock
Follower Lock Range	± 7.5 ppm
Measurements	For follower, shown on user interface or available via API <ul style="list-style-type: none">• Offset from Master• Path Delay• Leader-Follower Delay• Follower-Leader Delay
Status Reporting	Current GM Clock Identity, Clock Class, Clock Accuracy, Time Source Message rates for Announce, Sync, Delay_Req, and Delay_Resp messages
SMPTE Synchronization Metadata	For ST 2059-2 profile, automatically inserted in TLV data of Management messages for leader instances, and automatically decoded for follower instances

Global Navigation Satellite System (GNSS)

GNSS Receiver

Constellations	GPS, GLONASS, Galileo, BeiDou, QZSS
Frequency Bands	L1 1575.42 MHz and 1602 MHz (GPS, GLONASS, Galileo) L1 1561.098 MHz (BeiDou) L5 1176.45 MHz (GPS, QZSS, Galileo, BeiDou)
Time Accuracy	Within 150 ns to UTC
Acquisition Time	2 minutes on boot up with warm oven, good satellite signal, and known position
Status Reporting	Available via user interface and API <ul style="list-style-type: none">• Satellites in view and in fix• Per-satellite signal information• Position

GNSS Antenna Input

Connector	SMA female
Input Impedance	50 Ω , internally terminated
DC antenna power output voltage	3.3 V or 5 V at 55 mA
Fault Protection	Short-circuit/open detection and protection
Return loss	15 dB for L1 band at 1575 MHz 7 dB for L5 band at 1176 MHz
Signal Strength	Recommended 18 dB above ambient level after cable loss and signal amplifiers

Test Signal Generation

Video Formats

All listed formats are available for SDI outputs. ST 2110-20 video streams support 10-bit 4:2:2 progressive and interlaced formats for all listed image sizes and frame rates.

Image Size	Scan Type	Frame Rate	Sampling	Color Space	Bit Depth
720×486	Interlaced	29.97	4:2:2	YCbCr	10
720×576	Interlaced	25	4:2:2	YCbCr	10
1280×720	Progressive	60/59.94/50 30/29.97/25/24/23.98	4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
1920×1080	Progressive	60/59.94/50 30/29.97/25/24/23.98	4:2:2	YCbCr	10
			4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
			4:4:4	YCbCr	12
			4:4:4	RGB	12
	Interlaced	30/29.97/25	4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
			4:4:4	YCbCr	12
			4:4:4	RGB	12
			4:2:2	YCbCr	12
	Segmented	30/29.97/25/24/23.98	4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
2048×1080	Progressive	60/59.94/50/48/47.95 30/29.97/25/24/23.98	4:2:2	YCbCr	10
			4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
			4:4:4	YCbCr	12
			4:4:4	RGB	12
			4:2:2	YCbCr	12
			4:4:4	XYZ	12
			Segmented	30/29.97/25/24/23.98	4:2:2
	4:4:4	YCbCr			10
	4:4:4	RGB			10
	4:4:4	YCbCr			12
	4:4:4	RGB			12
	4:2:2	YCbCr			12
			4:4:4	XYZ	12

Test Signal Generation

3840×2160	Progressive	60/59/94/50	4:2:2	YCbCr	10
		30/29.97/25/24/23.98	4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
			4:4:4	YCbCr	12
			4:4:4	RGB	12
			4:2:2	YCbCr	12
4096×2160	Progressive	60/59/94/50/48/47.95	4:2:2	YCbCr	10
		30/29.97/25/24/23.98	4:2:2	YCbCr	10
			4:4:4	YCbCr	10
			4:4:4	RGB	10
			4:4:4	YCbCr	12
			4:4:4	RGB	12
			4:2:2	YCbCr	12

Video Encoding

Colorimetry	BT.601, BT.709, or BT.2020 per source format
Transfer Characteristics	SDR, HDR HLG, HDR PQ
Range	Narrow or Full, as permitted by source format

Video Test Patterns

Color Bars	100%, 75%, Bars Over Red, SMPTE EG1, SMPTE RP219-1 and RP219-2, BT.2111 (HLG Narrow, PQ Narrow, PQ Full), EBU 3373, NBCU HLG, Sony S-Log3, ARIB B28, ARIB B66
Monitor	BT.814 SD/SDR/HDR Pluge, Pluge and Luma Reference, Convergence, Production Aperture, Clean Aperture, Checkerboard, Window, EBU 3374 EOTF Validation, Black-White Step Scale, Black-Dark Gray Step Scale, SMPTE 303M Color Reference, SMPTE EG432-1 Color Accuracy, ChromaDuMonde
Linearity	Valid Ramps (Y, B-Y, R-Y), Limit Ramp, 3 Channel Ramp, Shallow Ramp Matrix, Color Ramp Matrix, 5/10 Step Staircases
Flat Field	0% Black, 50% Gray, 100% White, 100% Red/Green/Blue/Cyan/Magenta/Yellow, Interlaced Field Test
SDI Pathological	Equalizer Test, PLL Test, Checkfield per SMPTE RP198, Full-Length and Half-Length variants, Bandwidth Test, Matrix, Matrix with Color Bars
Frequency Response	Multiburst, various packet frequencies
Pulses	2T Pulse and Bar, Color Pulses, Co-siting Pulse
Image File	Any user-supplied image file, TIFF 16-bit or 8-bit RGB format. Automatic colorimetry conversion if necessary for YCbCr output.

Test Signal Generation

Video Overlays

ID Text

Text Length	Multiple lines, up to 1000 characters total
Available Scripts	Latin, Cyrillic, Chinese (both Simplified and Traditional), Japanese, Korean, Devanagari, Arabic
Appearance	Near-white (90%) with or without near-black (10%) border rectangle
Text Size	Adjustable from 1% to 25% of active picture height
Position	Adjustable anywhere within the active picture

Burnt-In Time Code

Value	Same format and source as ancillary time code, updated every frame
Displayed Digits	HH:MM:SS:FF (hours, minutes, seconds, frames) “.0” or “.1” suffix for frame-pair when the video frame rate is greater than 30 fps Optional YYYY-MM-DD (year, month, day) on second line of text
Text Size	10% or 20% of active picture height, including black border rectangle
Position	Adjustable anywhere within the active picture

Logo

File Format	PNG, 8-bit RGBA, full color with transparency
Maximum size	1920×1080 pixels
Position	Adjustable anywhere within the active picture

Audio Tones

Number of Tones	32 independent tone generators. Each tone generator can be used for any individual SDI embedded audio channel and any individual ST 2110-30 audio channel.
Sampling	48 kHz
Resolution	24 bits (HD and UHD), 20 bits (SD)
Frequency	10.0 Hz to 20000.0 Hz, 0.5 Hz resolution
Amplitude	-60 to 0 dBFS, 1dB steps or mute
Channel Identification	Audible click, AES channel origin

Serial Digital Interface (SDI)

SDI Outputs

Number of Outputs	4
Connector	HD-BNC
Output Impedance	75 Ω
Output Amplitude	800 mV _{p-p} \pm 3%
Rise/Fall Time	
SD	\leq 700 ps (20-80%), 550 ps typ.
1.5G/3G	\leq 100 ps (20-80%), 60 ps typ.
6G/12G	\leq 42 ps (20-80%), 30 ps typ.
Jitter	
SD	210 ps typ. (alignment), 300 ps typ. (timing)
1.5G	40 ps typ. (alignment), 70 ps typ. (timing)
3G	30 ps typ. (alignment), 60 ps typ. (timing)
6G/12G	15 ps typ. (alignment), 45 ps typ. (timing)
Return Loss	\geq 25 dB typ. from 5 MHz to 2 GHz \geq 15 dB typ. from 2 GHz to 3 GHz \geq 10 dB typ. from 3 GHz to 6 GHz \geq 10 dB typ. from 6 GHz to 12 GHz

SDI Formats

Standard Definition (SD-SDI)	
Interface Bit Rate	270 Mbps
Standards	SMPTE ST 259 Level C, ST 272
Formats	720 \times 486 (525-line) and 720 \times 576 (625-line)
High Definition (HD-SDI)	
Interface Bit Rate	1.485 Gbps and 1.485/1.001 Gbps
Standards	SMPTE ST 274, ST 292-1, ST 296
Formats	1920 \times 1080, 2048 \times 1080, 1280 \times 720 4:2:2 10-bit
3G-SDI	
Interface Bit Rate	2.97 Gbps and 2.97/1.001 Gbps
Standards	SMPTE ST 424, ST 425-1
Formats	1920 \times 1080, 2048 \times 1080, 1280 \times 720 Level A, Mapping Structures 1, 2, 3, and 4 Level B, per ST 372 Mapping Structures I, II, III, and IV

Serial Digital Interface (SDI)

6G-SDI

Interface Bit Rate	5.94 Gbps and 5.94/1.001 Gbps
Standards	SMPTE ST 2081-10, ST 425-3
Formats	3840×2160, 4096×2160 ST 2081-10 Mode 1

12G-SDI

Interface Bit Rate	11.88 Gbps and 11.88/1.001 Gbps
Standards	SMPTE ST 2082-10, ST 425-5
Formats	3840×2160, 4096×2160 ST 2082-10 Mode 1

Embedded Audio

Number of Channels	16 (4 groups of 4 channels each)
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Channel Control	Enable/Disable per group Active/Inactive per channel
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Standard	SMPTE ST 299-1
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Ancillary Data

Ancillary Time Code Source Format	ATC_LTC and/or ATC_VITC per SMPTE ST 12-2 Local time-of-day with adjustable offset, UTC, or program (elapsed) time counter 24 fps, 25 fps, 30 fps drop-frame, 30 fps non-drop per video format
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Payload Identifier	Per SMPTE ST 352, automatic or manual override
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Error Detection and Handling	EDH packet inserted in SD-SDI per SMPTE RP 165
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Internet Protocol (IP)

IP Ports

Port Connectors	2 SFP28 sockets
Line Speed	10 Gbps or 25 Gbps per installed SFP type
Error Correction	RS-FEC per Clause 108 of IEEE 802.3by-2016 Enable/disable for 25G SFPs, not applicable for 10G SFPs

ST 2110 Generation

Operating Modes	Stream generation on both ports per SMPTE ST 2022-7 or on either individual port
Number of Streams	6× ST 2110-20 video streams 6× ST 2110-30 audio streams 6× ST 2110-40 data streams
Sender Type	Type N – Gapped PRS
RTP Payload Type	Independent value (96–127) per stream
UDP Size Limit (MAXUDP)	1460 octets
UDP Port Numbers	Independent source and destination port numbers for both paths of each stream
Destination Address	Multicast, 224.0.2.0 to 239.255.255.255 Independently configured for both paths of each stream
Session Description Protocol (SDP)	Available via web interface and API for each enabled stream
ST 2110-20 Video Packing Mode TR_{OFFSET}	General Packing Mode (GPM) or Block Packing Mode (BPM) Automatically calculated or Manual override
ST 2110-30 Audio Number of Channels Channel Order Packet Time	Each stream is independently configured for 1, 2, 4, 6, 8, or 16 channels Manual configuration, signaled via SDP 1 ms or 125 μ s
ST 2110-40 Data Payload Formats	Ancillary Time Code (ATC_LTC or ATC_VITC) per SMPTE ST 12-2 Time code format of 24 fps, 25 fps, 30 fps, or 30 fps drop-frame Associated video format of 525, 625, 750, 1125 or 2250 lines

Internet Protocol (IP)

Networked Media Open Specifications (NMOS)

Specifications	IS-04 NMOS Discovery and Registration IS-05 NMOS Device Connection Management
Registry Discovery	Automatic using DNS-SD (unicast or multicast) or Manual
API Versions	
Node	v1.0, v1.1, v1.2, v1.3
Connection	v1.0, v1.1
Registration	v1.0, v1.1, v1.2, v1.3
Data Model	The SPG9000 is represented as one Node, consisting of one Device, consisting of 18 Senders (6 video, 6 audio, 6 data)

Power Consumption

Typical	130 VA
Maximum	180 VA
Voltage Range	100 to 240 VAC ±10%, 50/60 Hz

Packaging Dimensions

Height	29.2 cm (11.5 in.)
Width	64.1 cm (25.2 in.)
Depth	73.7 cm (29.0 in.)
Weight	9.6 kg (21.2 lbs.) with no options 12.0 kg (28.7 lbs.) with all options

Ordering Information

Base Model

Product Code	Description
SPG9000	SPG9000 timing and reference generator; includes loop-through genlock input, 6 analog black/tri-level outputs, 4 LTC outputs, word clock output, DARS output, general-purpose interface, and management LAN interface

Licensed Feature Options

Option Code	Description
SPG9000-GNSS	License; SPG9000, Enable internal GNSS receiver and time synchronization features
SPG9000-PTP	License; SPG9000, Enable PTP (IEEE 1588) support on two ports
SPG9000-SDI	License; SPG9000, Enable SD/HD/UHD test signal generation on four SDI outputs
SPG9000-IP	License; SPG9000, Enable ST 2110 test signal generation on two IP ports
SPG9000-TSG	License; SPG9000, Includes both SDI and IP licenses for test signal generation

Accessory Options

Option Code	Description
SPG9000-RACK	Rackmount slides and rails kit for SPG9000 (1 RU height, standard full depth)
SPG9000-XLR	Adapter cable (6 feet long) from 15-pin D-sub GPI/LTC connector on the SPG9000 to 4 XLR male connectors (for LTC input/outputs) and 3 BNC male connectors (for General Purpose Interface input/outputs)

SFP Modules

Option Code	Description
SPG9000-SFP-1GESR	Gigabit Ethernet short reach 850 nm SFP transceiver module
SPG9000-SFP-10GESR	10G Ethernet short reach 850 nm SFP+ transceiver module
SPG9000-SFP-10GELR	10G Ethernet long reach 1310 nm SFP+ transceiver module
SPG9000-SFP-25GESR	25G Ethernet short reach 850 nm SFP28 transceiver module
SPG9000-SFP-25GELR	25G Ethernet long reach 1310 nm SFP28 transceiver module

Ordering Information

Power Options

Option Code	Description
SPG9000-SPW	Includes a single hot-swappable power supply
SPG9000-DPW	Includes two hot-swappable power supply modules for a redundant (primary + backup) pair

Power Cords

Option Code	Description
PWR-CORD-NA-S15	North America Power Cord, Straight 15A
PWR-CORD-EURO	Universal EURO Power Cord
PWR-CORD-CHN	China Power Cord
PWR-CORD-IND	India Power Cord
PWR-CORD-AUS	Australia Power Cord
PWR-CORD-UK	United Kingdom Power Cord
PWR-CORD-BRZ	Brazil Power Cord
PWR-CORD-CHE	Switzerland Power Cord
PWR-CORD-JPN	Japan Power Cord
PWR-CORD-NONE	No Power Cord or AC Adapter

Service Options

Option Code	Description
SPG9000 R3	Standard Warranty Extended to 3 Years. Covers parts, labor and 2-day shipping within country. Guarantees faster repair time than without coverage. All repairs include performance verification and updates. Hassle free - a single call starts the process
SPG9000 R5	Standard Warranty Extended to 5 Years. Covers parts, labor and 2-day shipping within country. Guarantees faster repair time than without coverage. All repairs include performance verification and updates. Hassle free - a single call starts the process

Ordering Information

Standalone Accessories

The DPW, RACK and XLR accessories can be ordered at the same time as the base SPG9000 product (see “Accessory Options” above) and shipped together in the same packaging, or they can be ordered separately and shipped in individual packaging. The ANT accessory is only shipped in separate packaging.

Product Code	Description
SPG9000-ACC-ANT	Multi-GNSS (GPS, GLONASS, Galileo, BeiDou) dual-band (L1 & L5) rooftop antenna that works with the integrated GNSS receiver of the SPG9000 with option SPG9000-GNSS. Includes mounting bracket. Coaxial cable with type-N connector required.
SPG9000-ACC-DPW	Hot-swappable, redundant (backup) power supply for the SPG9000
SPG9000-ACC-RACK	Rackmount slides and rails kit for SPG9000 (1 RU height, standard full depth)
SPG9000-ACC-XLR	Adapter cable (6 feet long) from 15-pin D-sub GPI/LTC connector on the SPG9000 to 4 XLR male connectors (for LTC input/outputs) and 3 BNC male connectors (for General Purpose Interface input/outputs)

Post-Purchase License Upgrades

The licensed feature options for the SPG9000 can be ordered at any time after the initial base unit purchase. No hardware upgrades are necessary to enable these features.

Product Code	Description
SPG9000-LICENSE	Upgrade license(s) to enable features for the SPG9000

Option Code	Description
SPG9000-LIC-GNSS	License; SPG9000, Enable internal GNSS receiver and time synchronization features
SPG9000-LIC-PTP	License; SPG9000, Enable PTP (IEEE 1588) support on two ports
SPG9000-LIC-SDI	License; SPG9000, Enable SD/HD/UHD test signal generation on four SDI outputs
SPG9000-LIC-IP	License; SPG9000, Enable ST 2110 test signal generation on two IP ports
SPG9000-LIC-TSG	License; SPG9000, Includes both SDI and IP licenses for test signal generation



**SPG9000
User Manual**

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Warranty

Telestream on behalf of itself and its Affiliates (“Telestream”) warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Telestream, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Telestream for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Telestream.

In order to obtain service under this warranty, Customer must notify Telestream of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Telestream, with shipping charges prepaid. Telestream shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Telestream service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Telestream shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Telestream representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non- Telestream supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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DAMAGES IRRESPECTIVE OF WHETHER TELESTREAM OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

[W2 – 15AUG04]

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THIRD-PARTY SOFTWARE LICENSE

The SPG9000 PTP option uses open source software from the Linux PTP Project (ptp4l), which is licensed under GPL v2.0. The ptp4l source code has been modified for use on the SPG9000, so a copy of the modified source code will be made available upon request in accordance with the GPL v2.0 license. Visit www.telestream.net/telestream-support/video/support.htm to find contacts in your area.

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Important Compliance and Safety Information

United States of America Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. 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.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause unexpected operation.

Safety

UL 61010-1: 2012 R7.19: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements.

Environmental

Perchlorate Materials: this product contains one or more type CR lithium batteries. According to the state of California, CR lithium batteries are classified as perchlorate materials and require special handling.

See www.dtsc.ca.gov/hazardouswaste/perchlorate for additional information.

Canada Compliance Notices

Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du Quadstere des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du Quadstere des Communications du Canada. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

Safety

CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements.

Sécurité

CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1: Exigences de sécurité pour l'électricité Matériel de mesure, de contrôle et d'utilisation en laboratoire - Partie 1: Généralités Exigences.

European Union, European Free Trade Association (EFTA), and United Kingdom Compliance Notices

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CROATIA, CZECHIA, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LIECHTENSTEIN, NORWAY, SWITZERLAND

Declaration of Conformity

Marking by the "CE" symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU

This equipment meets the following conformance standards:

Safety

EN 61010-1: 2010 + A1: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements Low Voltage Directive 2014/35/EU

Emissions

EN 55032: 2015 + A11: 2020, CISPR 32: 2015, EN 61000-3-2: 2014, EN 61000-3-3: 2013

Immunity

EN 55035: 2017, EN 61000-4-2: 2009,

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010, EN 61000-4-4: 2012,

EN 61000-4-5: 2014 + A1: 2017, EN 61000-4-6: 2014, EN 61000-4-8: 2010,

EN 61000-4-11: 2020

Environments: E2

Warnings



Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.



Achtung! Dieses ist ein Gerat der Funkstorgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerates Rundfunkstörungen auftreten, in welchen Fallen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.



Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

Notes:

1. For Compliance with the EMC standards listed here, high-quality shielded interface cables should be used.
2. Emissions which exceed the levels required by this standard may occur when this equipment is connected to a test object.

Environmental Compliance

This section provides information about the environmental impact of the product.

Product end-of-life handling

Observe the following guidelines when recycling an instrument or component:

Equipment recycling



Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we

encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

This symbol on the product or its packaging indicates that this product complies with the applicable European Union requirements according to Directives 2012/19/EU and 2006/66/EC on waste electrical and electronic - equipment (WEEE) and batteries.

It also indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Battery Recycling

This product may contain a rechargeable battery, which must be recycled or disposed of properly. Please properly dispose of or recycle the battery according to local government regulations.

Transporting Batteries or products with Batteries in them

The capacity of the lithium-ion secondary battery shipped with this product is under 100 Wh. The lithium content of the installed primary battery is under 1 g. Each battery meets the applicable requirements of UN Manual of Tests and Criteria Part III Section 38.3. Battery quantity is under the limit for shipment according to Section II of the relevant Packing Instructions from the IATA Dangerous Goods Regulations. Consult your air carrier for applicability and determination of any special lithium battery transportation requirements.

Restriction of Hazardous Substances

This product is classified as an industrial monitoring and control instrument, and is required to comply with the substance restrictions of the RoHS 3 Directives 2011/65/EU and EU 2015/863.

Korea Compliance Statement

사용자 안내문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Taiwan Compliance Statement

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Japan Compliance Statement

この装置は、クラス A 機器です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the VCCI Council (VCCI 32: 2016). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Important Safety Information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition. To safely perform service on this product, see the Service Safety Summary that follows the General Safety Summary.

General Safety Summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with Local and National Safety Codes

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

Product is Designed to be Used by Trained Personnel Only

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment. Before use, always check the product with a known source to be sure it is operating correctly.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To Avoid Fire or Personal Injury

Use proper power cord: Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.

Ground the product: This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect: The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Observe all terminal ratings: To avoid fire or shock hazard, observe all rating and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not operate without covers: Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

Avoid exposed circuitry: Do not touch exposed connections and components when power is present.

Do not operate with suspected failures: If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Before use, inspect voltage probes, test leads, and accessories for mechanical damage and replace when damaged. Do not use probes or test leads if they are damaged, if there is exposed metal, or if a wear indicator shows.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use Only Specified Replacement Parts

Do not operate in wet/damp conditions: Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry: Remove the input signals before you clean the product.

Provide proper ventilation: Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment: Always place the product in a location convenient for viewing the display and indicators.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use only the Telestream rackmount hardware specified for this product.

Service Safety Summary

The Service Safety Summary section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this Service Safety Summary and the General Safety Summary before performing any service procedures.

To avoid electric shock: Do not touch exposed connections.

Do not service alone: Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power: To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on: Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Verify safety after repair: Always recheck ground continuity and mains dielectric strength after performing a repair.

Terms in the Manual

These terms may appear in this manual:



WARNING: Warning statements identify conditions or practices that could result in injury or loss of life.



CAUTION: Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the Product

These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:



General Safety Product Specific Statements

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual. The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.



WARNING: Injury or death can occur as the result of electrical shock. To avoid electrical shock, do not connect power to the instrument when the top cover is off. There are dangerous potentials present on the power supply circuit boards when the power cord is connected.

Disconnect the power cord from a power supply module before you remove the module from the instrument. Also, do not connect a power cord to a power supply module while the module is not installed in the instrument. There are dangerous high voltages on the module when the power cord is connected.



WARNING: Prevent risk of shock or fire by ensuring that the GNSS antenna is protected from lightning strikes when it is mounted outside a building or facility. The instrument does not have isolation protection from lightning, so the facility installation must provide suitable protection for the GNSS antenna external to the instrument and surge suppression for the cable. Failure to use appropriate precautions can result in injury or death. It is important the antenna and cable installation complies with all regulations for the location in which it is installed.



WARNING: To avoid personal injury and instrument damage, do not use slides provided with other instruments from other kits (for example, General Devices, Chassis Trak C-300) with the rails from this kit. The locking feature will not function and will result in an instrument that is not secured properly and could fall out of the rack, causing personal injury or instrument damage.



WARNING: To prevent the rack-mounted instrument from tipping forward onto the operator, install the instrument so the operator is able to access all of its rear-panel connectors without pushing down on the instrument. Verify that the rack does not become unstable with the instrument fully extended. Do not leave the instrument extended when finished accessing the rear panel.



WARNING: To reduce the risk of injury and equipment damage, make sure that levers are properly installed. An improperly installed lever can prevent the slide from locking or prevent the instrument from being removed from the rack. Make sure that the lever is installed so the long handle is facing forward and the short hook is facing downward.



WARNING: To prevent injury during product installation, use care not to pinch hands or fingers in the rails and slides.



WARNING: To prevent injury when removing the product from the rack, do not forcefully and abruptly pull the product from the rack. Pull with the minimum force required to move the instrument with a consistent, even motion.



CAUTION: The instrument does not have a power switch. When you connect the power cable to the AC line connector, the instrument powers on.

Do not install or remove a power supply module when a power cord is attached to that module.



CAUTION: To avoid antenna damage, do not turn on the DC antenna power until you know that the antenna is designed to handle the selected voltage. Antenna damage can occur if the antenna is not designed to handle the voltage you select.



CAUTION: Be careful to select the correct screw type for your instrument (metric or SAE). If the screws do not insert easily (do not use excessive force or you might damage the threads), it is possible you are using the wrong screw.



CAUTION: To prevent damage to the instrument and rackmount, do not force the instrument into the rack if it does not slide smoothly. The rails assembly might need to be adjusted to resolve the problem.



CAUTION: To prevent an unexpected shutdown of the instrument, be sure to disconnect the correct power cord if you are replacing a faulty power supply module.



CAUTION: The instrument might automatically reboot at the end of the upgrade process. Do not perform the upgrade while the instrument is in use as a sync reference. When the instrument has started to erase the internal flash, do not remove power from the instrument.



CAUTION: To prevent static damage to the SFP modules, if you remove the SFP modules from the instrument, always transport the SFP modules in an anti-static bag or container.



CAUTION: To prevent damage to the SFP modules, remove the SFP modules before transporting the SPG instrument.



CAUTION: To prevent dust from contaminating the SFP module, use its cover when the SFP is not in use. If SFP modules or fiber optic cable have been left exposed, we recommend it is cleaned before use. This is especially important on the long-reach, single-mode SFP modules and fiber.



CAUTION: We strongly recommend using the timeout function to keep the display backlight at a low level when the front-panel interface is not actively being used, to maximize the life of the display backlight.

Preface

This manual contains information to help you use the SPG9000 timing and reference system:

- How to operate the instrument using the front-panel controls
- How to configure the instrument for network access and operate the instrument using the web interface
- How to monitor the status of the instrument during normal operation

Where to Find More Information

Other information about your product are available for download at www.telestream.net/video/resources.htm. The Product Documentation table lists all the documentation for the SPG9000 timing and reference system.

Document	Manual type	Part number	Description
SPG9000 User Manual	User	D00013571x	Provides detailed operating information.
Release Notes	Release Notes	D00013575x	Describes the new features, improvements, and limitations of the instrument firmware.
Read-this-first	User	P00010592x	Lists all relevant documents.
SPG9000 Installation and Safety Instructions	User	P00010606x	Describes how to install and set up a SPG9000 generator, and provides basic safety and operating information.
Manual, Rackmount Slides and Rails Kit	User	071370600x	Describes how to connect rack equipment to an SPG9000 generator. Provides basic safety information.

Telestream Contact Information

To obtain product information, technical support, or provide comments on this guide, contact us using our website, email, or phone number listed.

Resource	Contact Information
Telestream Video Support	Website: www.telestream.net/telestream-support Email: videosupport@telestream.net US and Canada Toll-free: 1-844-219-5329 Outside of US and Canada: 1-503-967-9833
Telestream	Website: www.telestream.net Sales and Marketing Email: info@telestream.net Address: Telestream 848 Gold Flat Road, Suite 1 Nevada City, CA. USA 95959
International Distributor Support	Website: www.telestream.net See the Telestream website for your regional authorized Telestream distributor.
Telestream Technical Writers	Email: techwriter@telestream.net If you have comments or suggestions about improving this document, or other Telestream documents—or if you've discovered an error or omission, please email us.

Product Description

The SPG9000 is a precision multiformat video signal generator and timing system, suitable for primary synchronization and reference applications. It provides multiple video, audio, and time reference signals, and it can synchronize to different reference sources. The instrument uses optional licenses to enable additional functionality, such as GNSS-based synchronization, PTP (Precision Time Protocol) support, and test signal generation for SDI and ST 2110 IP interfaces. The images show the front and back of the SPG9000.



Base Capabilities

These capabilities and hardware are available on all SPG9000 instruments.

The SPG9000 has six sync outputs that can be configured with independent output formats (NTSC/PAL black burst and/or HD tri-level sync) and independently adjustable timing offsets. It includes two dedicated audio reference signal outputs: a 48 kHz word clock output and an AES DARS (Digital Audio Reference Signal) output.

A high-accuracy, oven-controlled micro-electromechanical system (MEMS) oscillator provides a stable frequency reference for the system, or the loop-through genlock input can be used to lock to an external video reference or 10 MHz continuous wave signal. The Stay GenLock® feature avoids synchronization shock, which can result in many possible video and audio errors because of a sudden change in timing. If the external reference suffers a temporary disturbance, Stay GenLock® maintains the frequency and phase of each output signal. When the external reference is restored, Stay GenLock® ensures that any accumulated clock drift is removed by slowly adjusting

the system clock instead of suddenly forcing the system clock back to the correct phase.

Time reference outputs are available in multiple formats. One LTC (linear time code) connection can be used as input or output, and three additional independent LTC outputs are available. Each LTC output has independent frame rate selection, time source (time of day or program time) and time zone offset. VITC (vertical interval time code) is available on each NTSC or PAL black output, also with independent time sources and offsets. The SPG9000 can function as a Network Time Protocol (NTP) server, and it can function as an NTP client to set the current time.

For remote access to the instrument, a 10/100/1000BASE-T Ethernet interface is included. A web-based user interface can be used for all configuration settings and for monitoring system status. A web-services application programming interface can be used for all configuration settings and to get status and performance monitoring information; this enables easy integration with management and dashboard systems. System events can be logged to a remote server using Syslog. The Simple Network Management Protocol (SNMP) is available for querying system status and for event notifications. An electrical General Purpose Interface (GPI) is available for events and alarms.

Optional Capabilities

These capabilities are available as separately licensed features and can be added to any SPG9000 at the initial time of purchase or as a later upgrade.

Optional GNSS-based Synchronization

Option SPG9000-GNSS enables an integrated receiver inside the SPG9000 that can receive GNSS (Global Navigation Satellite System) signals from multiple satellite constellations (GPS, GLONASS, BeiDou, Galileo, and QZSS) and frequency bands (L1 and L5). When connected to an external antenna that supplies the standard GNSS RF signal (for example, SPG9000-ACC-ANT), the SPG9000 can use the GNSS system's stable frequency reference.

The GNSS signal also includes a precise time-of-day reference that can be used for all time code outputs. Similar to the Stay GenLock® feature, the SPG9000 can maintain the video frequency and phase when the GNSS signal is interrupted, and the Holdover Recovery mode ensures a shock-free realignment of frequency and phase when the GNSS signal is restored.

Optional PTP Support

Option SPG9000-PTP enables two PTP (Precision Time Protocol) engines for IP network-based synchronization. Two SFP+ ports provide two network interfaces that can operate at 1 Gbps or 10 Gbps depending on the SFP module type. Each port has an independent PTP instance that can operate as a leader (grandmaster), follower, or as an Ordinary Clock that can adaptively change between leader and follower states. With

two instances, the SPG9000 can operate as a dual leader, providing PTP to two separate networks (such as a primary + backup network pair as used by ST 2022-7); as a dual follower, synchronized to the GM on either the primary or backup network; or as a follower on one network and a leader on another, bridging the two separate PTP domains. A follower instance can be used to monitor PTP operation on the network without having to function as the reference source of the instrument.

The SPG9000 supports IEEE 1588, ST 2059-2 and AES67 profiles, and each instance can operate with multicast, unicast, or mixed communication models.

The status of each instance, including performance monitoring measurements such as offsets, delays and message rates can be viewed on the web interface or retrieved by the web services API for integration into management dashboard systems.

The black outputs support a 1 PPS output signal. This is useful for measuring timing between systems.

Optional Test Signal Outputs

The SPG9000 includes video, audio, and data test signal generation for a variety of formats on multiple outputs. Option SPG9000-SDI enables four SDI (Serial Digital Interface) outputs capable of SD (Standard Definition), HD (High Definition), or UHD (Ultra High Definition) signals at interface rates up to 12G-SDI. Option SPG9000-IP enables two SFP28 ports for ST 2110 IP stream generation over 25 Gbps or 10 Gbps interfaces, depending on the SFP type. IP streams can be configured manually from the SPG9000 user interface or from an NMOS-enabled connection manager.

The SPG9000 includes a wide variety of predefined test patterns, such as different types of color bars, ramps, or SDI pathological signals. Additionally, user-supplied image files of custom test patterns or photographic content can be uploaded to the instrument and used for the video outputs. Overlays such as ID text, time code, or a color logo can be added to the image. Embedded audio in SDI signals or ST 2110-30 IP audio streams can be configured as tones with a specific amplitude and frequency. Ancillary data in the form of time code can also be generated.

Optional Backup Power Supply

For critical applications, the instrument can be configured with a second power supply module. Under normal operation, the designated backup supply is seldom used, ensuring that it has maximum remaining life should the primary supply fail. The backup supply is load-tested each day to verify that it can serve as the primary supply if necessary. The usage time of each supply is logged as “temperature-weighted hours”, a metric that best estimates the calculated life of the supply. A front-panel LED indicates when the supply is nearing its end-of-life. If the primary supply is interrupted for any reason, the system switches to the backup without any disruption to system operation. Power supply modules are hot-swappable for easy replacement and feature a locking mechanism to prevent the power cable from accidental disconnection.

Instrument Installation

This section describes:

- how to install the SPG9000 into a standard 19-inch equipment rack, it includes a list of the parts in the mounting kit and the required tools (not included),
- how to connect the SPG9000 to external power,
- the physical connectors on the rear panel of the instrument and which signals are used with each connector,
- how to install and remove SFP modules, and
- how to connect an external GNSS antenna and its associated cables.

Rackmount Installation

The SPG9000 is typically installed in a standard 19-inch equipment rack. The rack mount kit consists of a pair of slides that are attached to the SPG9000 and a pair of rails that are attached to the rack. This section describes how to install the slides and rails.

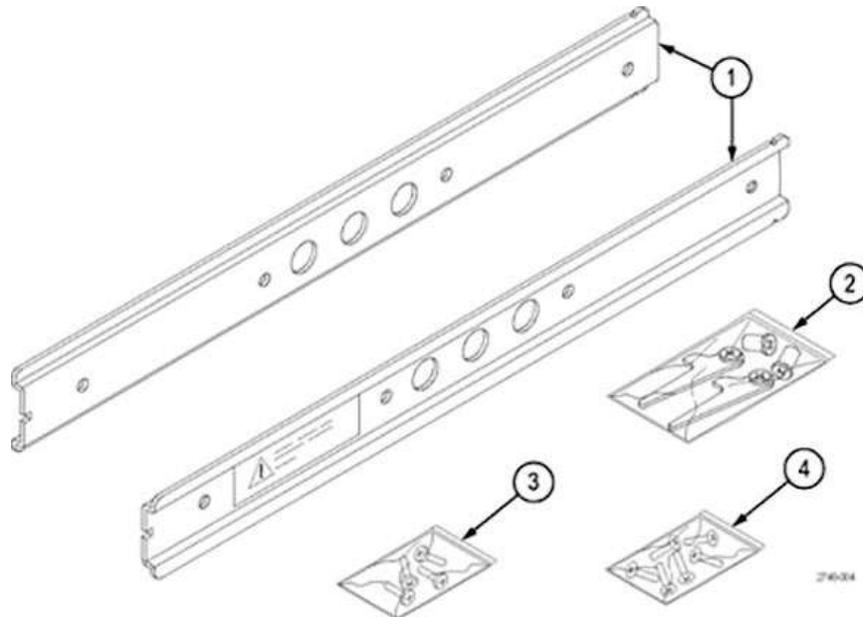
The rack mount kit can be ordered as option SPG9000-RACK at the same time as the base unit. In this case, the slides are pre-installed onto the SPG9000 before it is shipped. The kit can also be ordered as SPG9000-ACC-RACK as a standalone kit after the initial purchase.

Kit Parts List

The slides assembly parts list has the parts contained in this kit. The associated figures show what the parts look like. If your kit was shipped with your instrument, the slides are already installed.

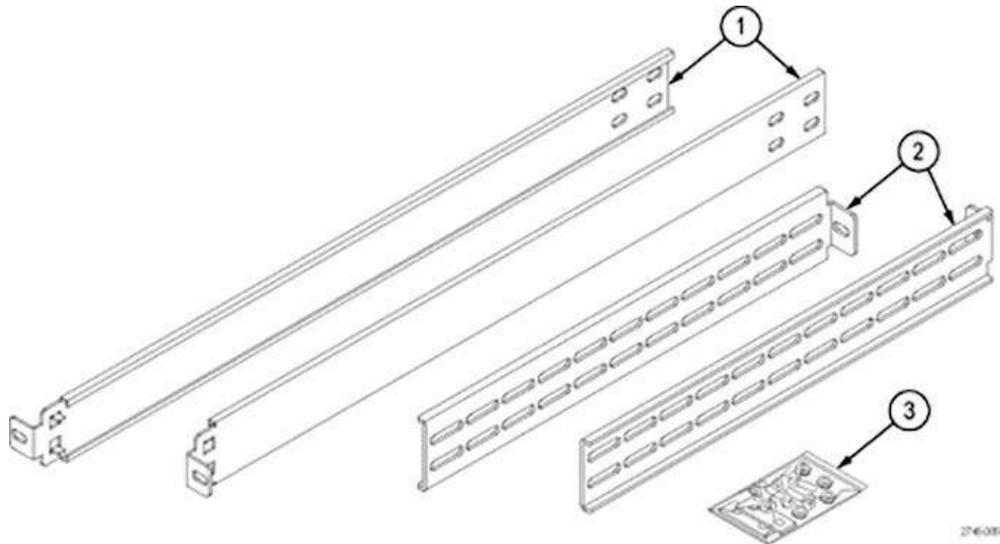
Slides assembly parts list

Number in example	Qty	Name and description
1	2	BRACKET, RACK, CHASSIS-SIDE
2	2	BRACKET, RACK, LEVER, CHASSIS-SIDE
	2	BUSHING, RACK, CHASSIS-SIDE
3	2	SCREW, MACHINE; 8-32 X 0.5, FLH, 100 DEG, STL, ZN PL, PHIL (SAE)
	6	SCREW, MACHINE; 8-32 X 0.375, PNH, STL, ZN PL, PHIL (SAE)
4	2	SCREW, MACHINE; M4X10MM L, FLH, STL, ZN PL, PHIL (metric)
	6	SCREW, MACHINE; M4 X 8MM L,PNH, STL, ZN PL, PHIL (metric)



Rails assembly parts list

Number in example	Qty	Name and description
1	2	BRACKET, RACK, STATIONARY
2	2	BRACKET, RACK, REAR CABINET
3	2	BRACKET, RACK, BAR NUT
	8	SCREW, MACHINE; 10-32 X 0.625,TRH, ZINC PLATED STEEL, PHIL
	4	NUT ASSY; 10-32 X 0.375 HEX, ZINC PLATED STEEL, LOCK WASHER



Installation Instructions

This section provides instructions:

- Installing the slides onto the SPG9000 if they are not already installed
- Installing the rails into a standard 19-inch equipment rack
- Installing the instrument into the rails in the rack



WARNING: To avoid personal injury and instrument damage, do not use slides provided with other instruments from other kits (for example, General Devices, Chassis Trak C-300) with the rails from this kit. The locking feature will not function and will result in an instrument that is not secured properly and could fall out of the rack, causing personal injury or instrument damage.

Equipment List

These tools are required to install the kit hardware:

- #2 crosshead screwdriver
- 3/8-inch wrench



WARNING: To prevent the rack-mounted instrument from tipping forward onto the operator, install the instrument so the operator is able to access all of its rear-panel connectors without pushing down on the instrument. Verify that the rack does not become unstable with the instrument fully extended. Do not leave the instrument extended when finished accessing the rear panel.

Install Slides

Screw Selection

For the slides installation, this kit provides two sets of screws (metric and SAE), but the SPG9000 only needs the 3 metric screws.

Procedure

Attach the slides to the instrument:

Note: The slides might already be installed on your instrument. If they are, skip this procedure and go to Installing the Rails.

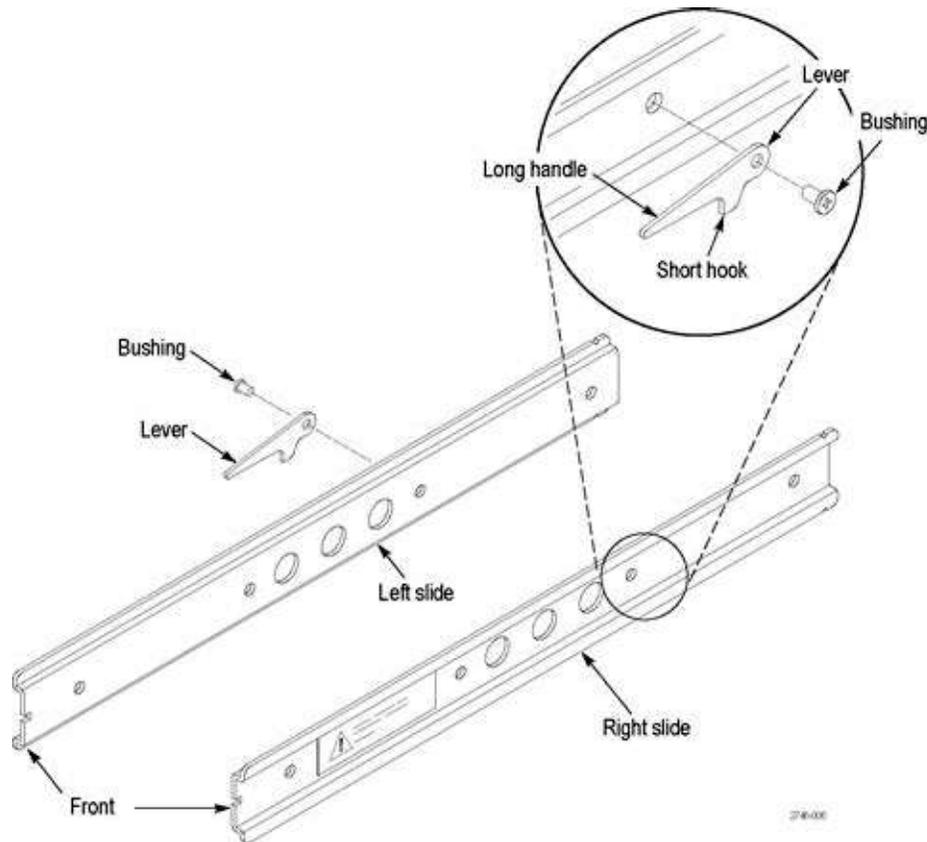
1. Identify the right rear and left rear of each slide. A warning label is on the outside side of each slide.
2. Make sure that the rear of the slide is nearest to the rear of the instrument. The front of each slide has a notch in the center edge.
3. Align the mounting holes on the right slide to the mounting holes on the right side of the instrument.
4. Use the shorter screws provided (8mm) and a screwdriver with a #2 Phillips tip; attach the right slide to the right side of the instrument:



CAUTION: Be careful to select the correct screw type for your instrument (metric or SAE). If the screws do not insert easily (do not use excessive force or you might damage the threads), it is possible you are using the wrong screw.

- A. Insert the metric screws into the first two mounting holes.
- B. Place the lever, with the long handle facing the front of the slide and the short hook facing downward, over the remaining mounting hole.
- C. Insert a metric screw into the bushing for the lever.
- D. Insert the bushing and screw into the lever so the lever is attached to the slide and the slide is secured to the instrument.

The example shows how to attach the slide levers for the SPG9000 instrument.



5. Rotate the instrument to face the left side and repeat this procedure to install the left slide.



WARNING: To reduce the risk of injury and equipment damage, make sure that levers are properly installed. An improperly installed lever can prevent the slide from locking or prevent the instrument from being removed from the rack. Make sure that the lever is installed so the long handle is facing forward and the short hook is facing downward.

Install Rails

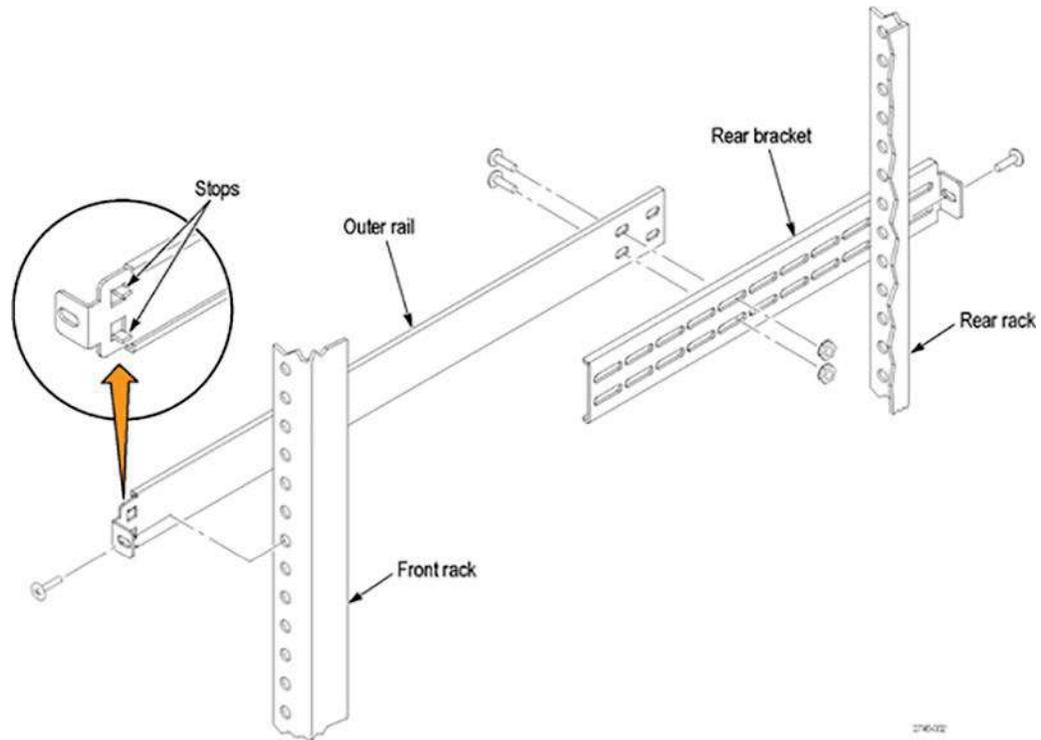
This two-part procedure describes how to assemble and install the rails in the equipment rack.

Assemble Rails

1. Measure the distance between the front and rear rail of the equipment rack.
2. Align the rear bracket to the right rail. Notice that the rear bracket has multiple pairs of mount-through holes. When aligning the bracket and rail, be sure to select a pair

of holes that mount the rear bracket so the flange-to-flange distance matches the front rail to rear rail spacing of the rackmount rack just measured in step 2.

3. Using a screwdriver with a #2 Phillips tip, attach the rear bracket to the right rail using two 10-32 screws and 10-32 nuts or a bar nut as necessary. Leave the screws loose so you can adjust the overall length of the rail assembly in the rack.
4. Repeat this procedure to assemble the left rail assembly.



Mount Rails

1. Select a ½-inch-spaced hole in the front rack.
2. Select the mounting method according to your rack type:
 - Mount the rails with their front and rear flanges *outside* the front and rear racks; add a bar nut to the installation only if the rails have untapped holes.
 - Mount the rails with their front and rear flanges *inside* the front and rear racks; add a bar nut. This mounting method assumes untapped holes.
 - Some racks have square mounting holes and require cage nuts to be inserted. These are supplied from the rack vendor.
3. Using the method and hardware determined from step 2, attach the right rail assembly to the equipment rack front and rear rails. The screws should be fully, but lightly, seated so you can adjust the rack later.
4. Tighten the screws still loose when you assembled the rails, apply 28 inch-lbs of torque, to fix the front to rear flange spacing of the rail assembly.
5. Repeat this procedure to mount the left rail assembly.

Install Instrument in Rack

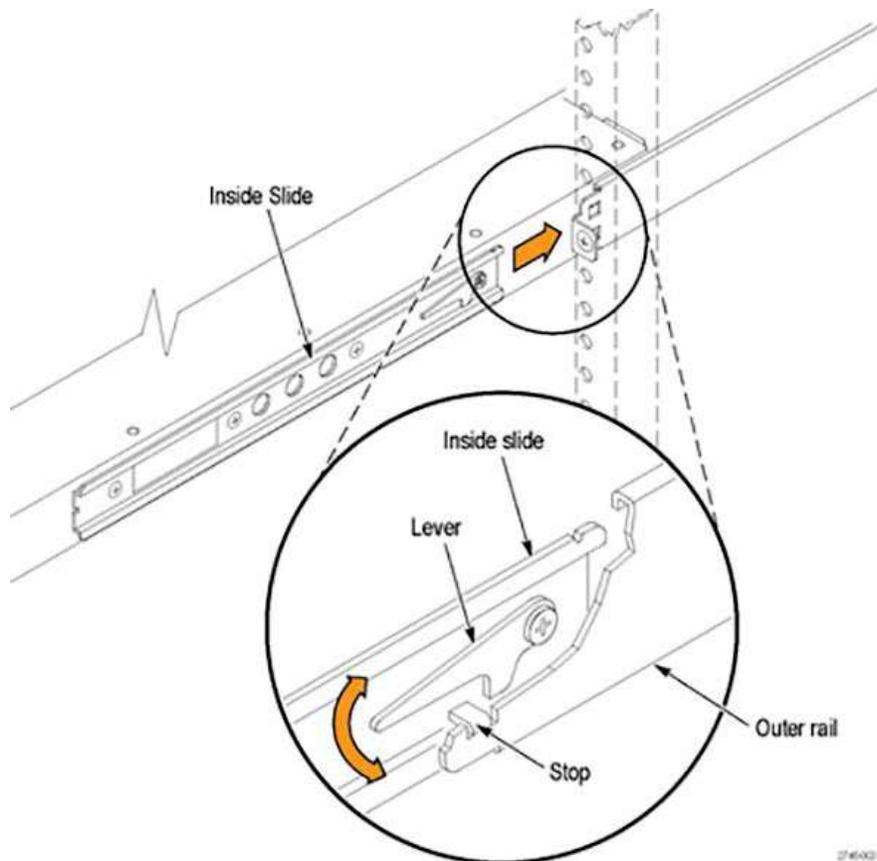
This procedure describes how to install the instrument into the equipment rack.



WARNING: To prevent injury during product installation, use care not to pinch hands or fingers in the rails and slides.

1. Insert the instrument left and right slides into the ends of the rack rails while tilting the long handle of each lever upward.

Note: Be sure to insert the instrument slides *inside* the inner rack rails. You might need to tilt rear of the instrument up or down at a slight angle to fit the slides into the rails.



2. Push the instrument into the rack until it stops.



CAUTION: To prevent damage to the instrument and rackmount, do not force the instrument into the rack if it does not slide smoothly. The rails assembly might need to be adjusted to resolve the problem.

3. Retighten any loose screws and push the instrument all the way into the rack. If the tracks do not slide smoothly, readjust the rail assemblies.
4. When adjusting is completed, tighten all rail assembly 10-32 screws.
5. If the instrument has knob screws on the front corners, tighten them so they are secured in the rack.

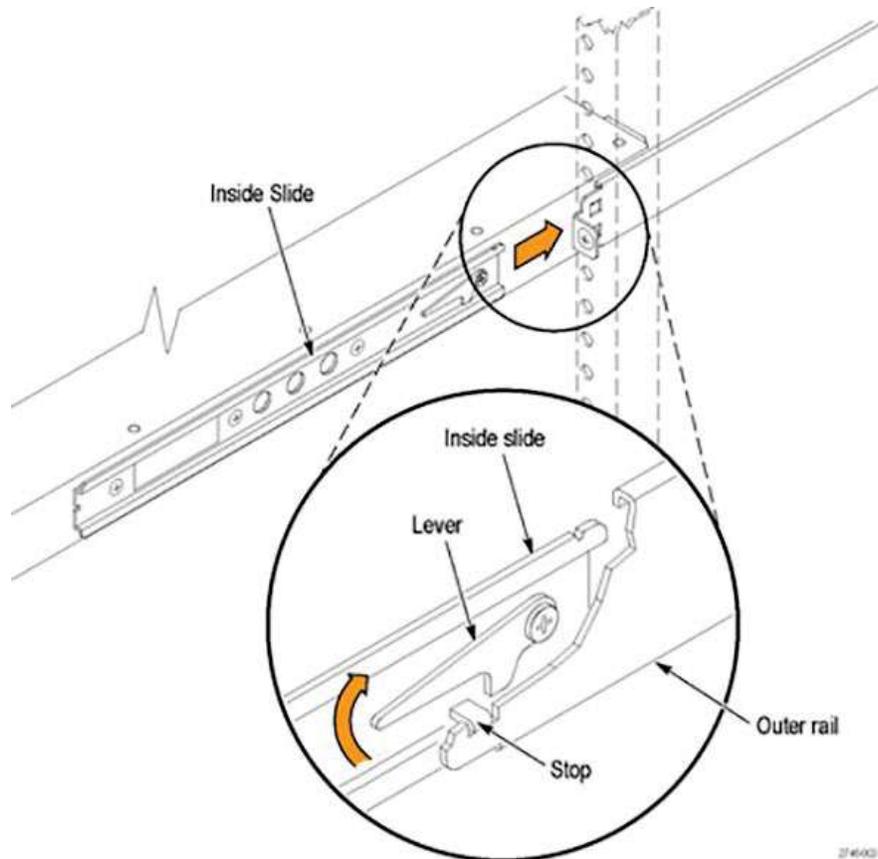
Remove Instrument from Rack

This procedure describes how to remove the instrument from the equipment rack.



WARNING: To prevent injury when removing the product from the rack, do not forcefully and abruptly pull the product from the rack. Pull with the minimum force required to move the instrument with a consistent, even motion.

1. Loosen the knob screws, if present, at the front of the instrument.
2. Gently pull the instrument out until you can reach the levers on the inside slides.
3. Tilt both lever handles upward at the same time to clear the stops.



4. Pull the instrument past the stops and out of the rack.

Power Connection

The instrument operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the locking power cord is essential for safe operation.

With option SPG9000-SPW, a single power supply module is installed. With option SPG9000-DPW, a second, hot-swappable, redundant (backup) power supply module is also installed. When two power supply modules are installed in the instrument, one is configured to be the primary supply and the other is configured to be the backup supply. In the event that the primary supply fails, the backup supply automatically provides power to maintain instrument operation. See [Power Supply Monitoring and Replacement](#) about how to operate the instrument with two power supplies.



WARNING: Injury or death can occur as the result of electrical shock. To avoid electrical shock, do not connect power to the instrument when the top cover is off. There are dangerous potentials present on the power supply circuit boards when the power cord is connected.

Disconnect the power cord from a power supply module before you remove the module from the instrument. Also, do not connect a power cord to a power supply module while the module is not installed in the instrument. There are dangerous high voltages on the module when the power cord is connected.

Power Characteristics

AC power source	
Rating voltage	100 V to 240 V
	WARNING: To reduce the risk of fire and shock, ensure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.
Frequency	50 or 60 Hz
Typical power	130 VA
Maximum power	180 VA
Surge current, typical	20 a peak (25 °C) for ≤ 5 lines cycles, after the instrument has been turned off for at least 30 seconds.
Inrush current, typical	10 A RMS half cycle at initial turn on according to EN55103-1:2009 Annex B.

CAUTION: The instrument does not have a power switch. When you connect the power cable to the AC line connector, the instrument powers on.

Do not install or remove a power supply module when a power cord is attached to that module.

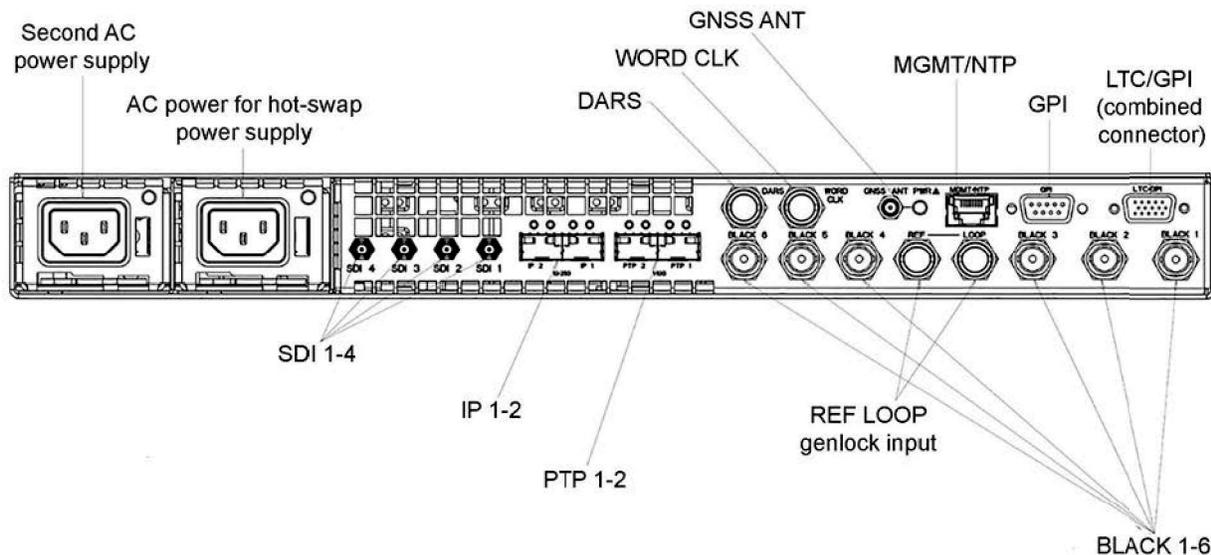
Connect Power

Connect the power cable to the instrument first and then connect it to the AC power source. Connecting the power cable causes the instrument to power on. If there is a backup power supply (option SPG9000-DPW), connect the second power cable to the instrument and then connect it to the AC power source.

After the instrument boots up and initializes, check that the FAULT indicator on the front panel is not illuminated and no faults are reported on the instrument display. If the FAULT indicator is illuminated, take the appropriate action.

Each power supply module has an LED (labeled STATUS) visible on the rear panel that mirrors the corresponding PWR indicator on the front panel. Under normal conditions, the LED for the active power supply is bright green and the LED for the backup power supply is dim green. See [FAULT](#) and [PWR 1 and PWR 2](#) for descriptions of the FAULT and PWR indicators.

Rear Panel Connectors



The descriptions of the connectors start with the base outputs on the right and move to the optional outputs on the left.

LTC/GPI Connector

The LTC/GPI connector is a 15-pin, D-sub connector (DE-15 socket) that includes both Linear Time Code (LTC) input and outputs, and a subset (3 inputs and 2 outputs) of the General Purpose Interface. See [Linear Time Code Input and Outputs](#) and [General Purpose Interface](#).

A breakout cable is available for this connector with XLR connectors for the four LTC outputs and BNC connectors for the GPI input (1 only) and outputs (1-2 only). It can be ordered as option SPG9000-XLR at the same time as the base SPG9000 purchase or as SPG9000-ACC-XLR, a standalone accessory purchased later.

In addition, the pin assignments were selected so a standard RGBHV cable can be used for a subset of signals. These cables have been used to connect VGA computer output to the component video inputs of a CRT monitor, with a DE-15-pin connector at one end and five BNC connectors at the other end.

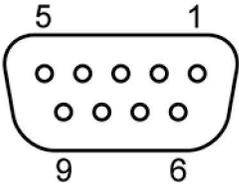
The pin assignments for the connector are shown, with the RGBHV BNC connector shown if available:

Pin	Function	RGBHV Cable	Diagram
1	GPI output 1	Red BNC	
2	GPI output 2	Green BNC	
3	GPI input 1	Blue BNC	
4	GPI input 2		
5	LTC 4 negative		
6	Ground	Ground	
7	LTC 3 negative	Ground	
8	LTC 2 negative	Ground	
9	Ground		
10	LTC 1 negative	Ground	
11	GPI input 3		
12	LTC 3 positive		
13	LTC 2 positive	H BNC	
14	LTC 1 positive	V BNC	
15	LTC 4 positive		

GPI Connector

The General Purpose Interface (GPI) connector is a 9-pin, D-sub connector (DE-09 socket) that includes four ground closure inputs and three ground closure outputs. See [General Purpose Interface](#).

The pin assignments for the connector are:

Pin	Function	Diagram
1	Ground	
2	GPI output 1	
3	GPI output 2	
4	GPI input 1	
5	+5 V (1 kΩ source resistance, limited current)	
6	GPI output 3	
7	GPI input 4	
8	GPI input 3	
9	GPI input 2	

MGMT/NTP Port

The Management/NTP port uses an 8P8C (RJ45) connector to connect to your local Ethernet network, with an interface speed of 1 Gbps, 100 Mbps, or 10 Mbps. You can control the instrument remotely through the port to connect to the web-based user interface or the web services API. See [Management Network Interface](#).

This network interface is also used for NTP (Network Time Protocol) messages. See [Network Time Protocol](#).

GNSS ANT Connector

With option SPG9000-GNSS, the GNSS antenna connector (SMA female) allows you to synchronize the instrument timing to one or more GNSS (Global Navigation Satellite Systems). The integrated receiver supports the global GPS (United States), GLONASS (Russia), BeiDou (China), and Galileo (European Union) systems, and the regional QZSS (Japan) system. You must connect a GNSS antenna to the instrument to use this functionality. The GNSS antenna input must meet specific requirements. See [Antenna Requirements](#).

You can enable this connector to provide 3.3 V or 5 V DC power to the antenna, or disable power if the antenna is externally powered. When the connector is configured to provide power to the antenna, the rear-panel GNSS ANT indicator is illuminated:

- Blinks green to indicate an open circuit. This occurs if no antenna is connected or if the current load is less than expected because a splitter or DC block is being used.
- Displays solid red if the connected antenna is shorted.
- Displays solid green if the current load of the antenna is within the nominal range.

See [GNSS Receiver Settings](#).

WORD CLK Output Connector

The Word Clock connector (BNC) outputs a 48 kHz word clock signal. See [Audio Reference Outputs](#).

DARS Output Connector

The DARS connector (BNC) outputs an AES11 DARS (Digital Audio Reference Signal) signal. See [Audio Reference Outputs](#).

BLACK 1–6 Output Connectors

The six BNC connectors labeled BLACK 1 to BLACK 6 are used to each output a black burst (NTSC or PAL), HD tri-level sync, 1 PPS (pulse-per-second) or 10 MHz CW (continuous wave) signal.

Note: The 10 MHz CW signal is only available on the BLACK 3-6 outputs.

You can set the format and timing of the six black outputs independently and enable VITC to be applied to the output signal. For HD tri-level sync signals, the BLACK 1-3 and BLACK 4-6 outputs are independent groups. Within each group, any of the three outputs configured to a tri-level format must have all integer (25, 24, 30, etc.) or non-integer (29.97, 23.98, etc.) frame rates. See [Black Outputs](#).

REF LOOP Input Connectors

Use the Reference Loop input loop-through connectors (BNC) for an external reference signal (genlock input), which can be an NTSC/PAL black burst or HDTV tri-level sync signal. The reference input requires proper external termination. The signal can connect to other devices through the loop connection; however, the signal must be terminated eventually, either on the instrument or at the other device. See [Genlock Reference](#).

PTP 1-2 Ports

With option SPG9000-PTP, the PTP 1 and PTP 2 ports are enabled. Each port corresponds to an independent PTP instance. Two SFP+ slots are provided for use with SFP modules that can operate at 10 Gbps or 1 Gbps line speed depending on the SFP type.

These SFP modules are available as accessory options:

SPG9000-SFP-1GESR	1 G (gigabit) Ethernet, short reach, 850 nm SFP transceiver module
SPG9000-SFP-10GESR	10 G Ethernet, short reach, 850 nm SFP+ transceiver module
SPG9000-SFP-10GELR	10 G Ethernet, long reach, 1310 nm SFP+ transceiver module

See [PTP Configuration](#).

These two Ethernet ports have LEDs that show the current link status. The left LED is green when the link is up and flickers when there is network activity. The right LED is green when the interface operates at the 10 Gbps line rate, but it is not on when the interface operates at the 1 Gbps line rate.

IP 1-2 Ports

With option SPG9000-IP, the IP 1 and IP 2 ports are enabled for generation of ST 2110 IP streams of video, audio, and data test signals. Two SFP28 slots are provided for use with SFP modules that can operate at 25 Gbps or 10 Gbps line speed depending on the SFP type.

These SFP modules are available as accessory options:

SPG9000-SFP-10GESR	10 G (gigabit) Ethernet, short reach, 850 nm SFP+ transceiver module
SPG9000-SFP-10GELR	10 G Ethernet long reach, 1310 nm SFP+ transceiver module
SPG9000-SFP-25GESR	25 G Ethernet short reach, 850 nm SFP28 transceiver module
SPG9000-SFP-25GELR	25 G Ethernet, long reach, 1310 nm SFP28 transceiver module

See [Video Sources](#) and [Audio Sources](#) for how to configure the test signal content and [IP Streams](#) for how to configure the transmitted IP streams.

SDI 1-4 Output Connectors

With option SPG9000-SDI, the SDI 1 to SDI 4 outputs are enabled for test signal generation through HD-BNC connectors. Each output has an independent line rate of SD-SDI (270 Mbps), HD-SDI (1.5 Gbps and 3 Gbps), or UHD (6G-SDI and 12G-SDI).

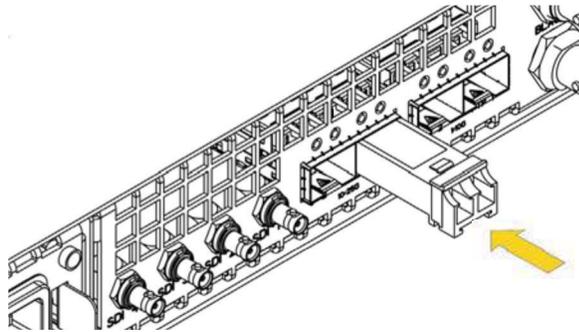
See [Video Sources](#) and [Audio Sources](#) for how to configure the test signal content, and [SDI Outputs](#) for how to configure the SDI signals.

SFP Module Installation

This section explains how to install and remove an SFP module from an SPG9000.

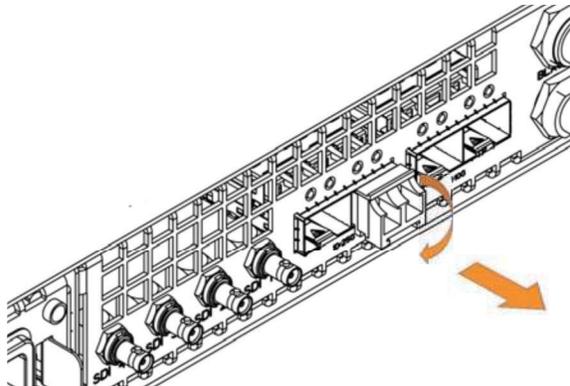
Install SFP Module

1. Remove the protective plug from the SFP connector.
2. Insert the SFP module into the PTP connector on the rear-panel of the instrument as shown. The module latches into place when fully inserted.



Remove SFP Module

Pull down on the latch and pull the module out of the PTP connector as shown.



The SFP module should be removed from the generator while the instrument is being transported.



CAUTION: To prevent damage to the SFP modules, remove the SFP modules before transporting the SPG instrument.



CAUTION: To prevent static damage to the SFP modules, if you remove the SFP modules from the instrument, always transport the SFP modules in an anti-static bag or container.



CAUTION: To prevent dust from contaminating the SFP module, use its cover when the SFP is not in use. If SFP modules or fiber optic cable have been left exposed, we recommend cleaning it before use. This is especially important on the long-reach, single-mode SFP modules and fiber.

GNSS Antenna Installation

If your instrument has option SPG9000-GNSS enabled, you need to connect a GNSS antenna and check the main oscillator calibration before you put the instrument into service.

If you ordered SPG9000-ACC-ANT, you received a GNSS rooftop antenna (5.0 VDC, dual-band (L1 and L5), type-N connector) that is matched with the internal GNSS receiver.

Note: The SPG9000-ACC-ANT antenna uses a type-N connector and the SPG9000 has an SMA female connector for the antenna input. You might have to build a custom cable with the appropriate connectors at each end, or use adapters with existing cables.

After installation, see [GNSS Receiver Settings](#).

Antenna Requirements

The instrument requires an external antenna to receive GNSS signals from satellites. You must set up an antenna system to provide the GNSS signal as an input to the instrument. You can configure the instrument to provide 3.3 V or 5 V DC power for the antenna.



WARNING: Prevent risk of shock or fire by ensuring that the GNSS antenna is protected from lightning strikes when it is mounted outside a building or facility. The instrument does not have isolation protection from lightning, so the facility installation must provide suitable protection for the GNSS antenna external to the instrument and surge suppression for the cable. Failure to use appropriate precautions can result in injury or death. It is important the antenna and cable installation complies with all regulations for the location in which it is installed.



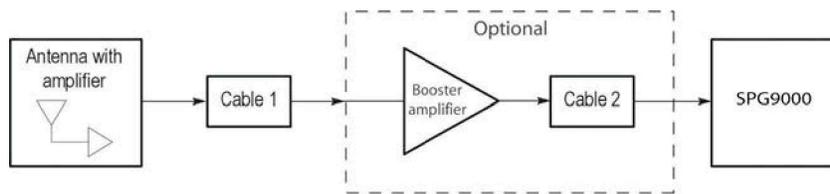
CAUTION: To avoid antenna damage, do not turn on the DC antenna power until you know that the antenna is designed to handle the selected voltage. Antenna damage can occur if the antenna is not designed to handle the voltage you select.

Note: The frequencies for the different GNSS systems are slightly different from each other. Be sure to choose an antenna that supports all of the satellite constellations you intend to use. We recommend you use an antenna, amplifiers, and splitters that can receive signals from multiple GNSS systems and frequency bands. This allows the instrument timing to be more stable because a GNSS antenna can communicate with more satellites.

When a GNSS signal is first connected to the antenna input on the instrument, it can take several minutes for the signal quality to reach its nominal potential. How long that takes depends on such things as antenna site, cable plant design, and available satellites. Excluding those variables, the typical time to acquire satellites and achieve specified stability with a good satellite signal, known position, and a warmed up instrument, is two minutes.

Antenna Systems

Antenna systems vary depending on the operating environment and on safety and regulatory requirements. A simplified GNSS antenna and cable block diagram is shown to help you with planning and understanding the trade-offs of one setup versus another.



A GNSS-specific antenna with amplifier provides sufficient gain to drive a reasonable length of cable, and provides filtering to reject signals at other frequencies. A typical example for GNSS signals is the Protempis Bullet™ 720, 35±3 dB, 5 V antenna.

In a simple system without the optional booster, Cable 1 connects the antenna to the instrument. The length of this cable is limited by its attenuation at the carrier frequency (L1: 1559~1610 MHz, L5: 1164~1214 MHz). The instrument should have a signal that is 18 dB or greater above the ambient level. For example, for a 35 dB antenna, the allowed loss is 17 dB.

Antenna Location

It is important that the GNSS antenna location has a clear view of a large part of the sky. Because GNSS satellites are constantly orbiting the earth, they can be in any direction at a given time. If part of the sky is blocked by buildings, trees, mountains, etc., then fewer satellites are visible. It is also possible to get reflected signals that come by a longer path than expected, which can degrade timing accuracy and stability. When evaluating a site, it is important to monitor it over several days and with a variety of weather conditions present.

This antenna information is not intended to cover all aspects of the antenna system design. Important topics that were not covered include items like lightning protection and drip loops. For information about the cable plant design in your system, contact the appropriate person or group in your organization, or contract with a qualified installer.

Cables

Attenuation varies significantly depending on cable type. Cable loss is about 13 dB/100 ft for a miniature coaxial cable like the Belden 1855, while for a RG 1 style like the Belden 7731, the loss is only 5.5 dB/100 ft. This correlates to an allowable length of 130 ft for the small cable, to over 300 ft for the larger cable.

A booster amplifier can be added if more length is needed, as shown in the optional block in the signal path system. The booster amplifier should be closer to the antenna than to the SPG9000.

If a 20 dB amplifier is added, then 20 dB more cable loss can be accommodated. This equates to another 150 ft of small coaxial cable, or 360 ft of large coaxial.

Although the GNSS input and most of the other components are 50 Ω , either 50 Ω or 75 Ω cables can be used in most installations. The reflections from the impedance mismatch will not cause significant changes in the system because the signal is narrow band and the cable loss is usually many decibels. However, you should not mix short cable lengths of different impedances, as this might create reflections with the potential to cause signal degradation.

Amplification

The instrument provides either 3.3 V or 5 V DC power to drive the amplified antenna and booster amplifier. The power is carried on the same coaxial cable as the GNSS signal and can be turned off if the antenna is powered by a separate supply. When you are designing the antenna system, check the voltage and current requirements of the components to insure compatibility.

The location of the booster amplifier is important. It needs to be before the second length of cable, shown in the simplified GNSS antenna and cable block diagram.

If the booster amplifier is placed just *before* the instrument, then the signal has been attenuated too far and the output might be noisy. If you cannot put the optional booster amplifier in the middle of a long run of cable, then put it near the antenna rather than near the instrument end.

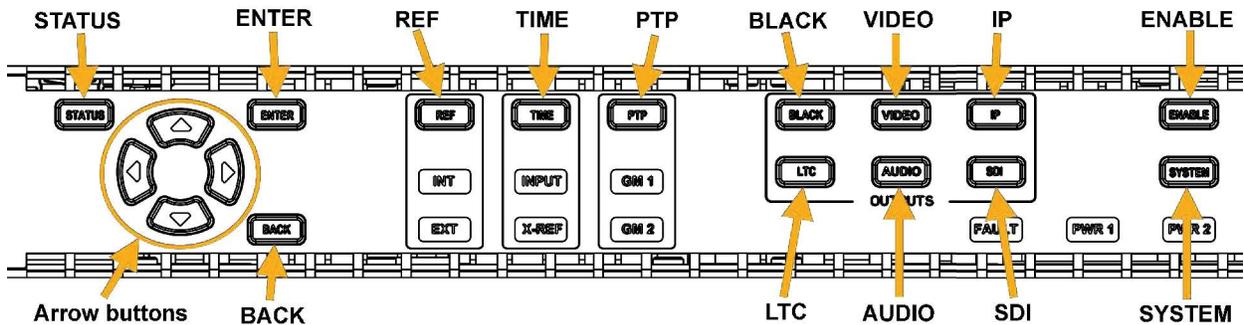
For more complex systems, a variety of booster amplifiers, powered and passive splitters, DC blocks, and filters are available from a number of vendors.

System Operation

This section describes the basic operation of the SPG9000. This includes descriptions of the front panel of the SPG9000 and how to move through the on-screen menus. There are also details of how to use the web interface: how to log in, information in the tabs, and how to understand the available information. This section also explains how to control the instrument through the application programming interfaces (APIs) and the general purpose interface (GPI). Finally this section explains how to create, save, and recall presets.

Front-Panel Interface

This section provides information about operating the instrument using the front-panel buttons and display. These menus and selections are similar to those on the web interface.



Front-Panel Layout

The SPG9000 front panel includes a color display for configuration menus and status messages, and a set of buttons for accessing and navigating these menus.

STATUS: Press to view the current status of the instrument, such as the state of the reference source, time-of-day, GNSS signal, and PTP instances. See [System Status and Monitoring](#).

ENTER: Press to accept the selected option.

Arrow buttons: Use the \triangle (up) and ∇ (down) buttons to scroll through the list of available menus, use the \triangleleft (left), and \triangleright (right) buttons to view the list of available options for the current menu.

BACK: Press to return to a previous menu or exit Edit Mode.

REF: Press to configure the reference source and GNSS receiver parameters. See [Reference and Time Sources](#).

TIME: Press to configure the time-of-day source and options for daylight saving time, leap second, and daily jam sync management. See [Reference and Time Sources](#).

PTP: Press to configure the two PTP instances. See [PTP Operation](#).

BLACK: Press to configure the six black outputs. See [Black Outputs](#).

LTC: Press to configure the four LTC outputs (or one input and three outputs). See [Linear Time Code Input and Outputs](#).

VIDEO: Press to configure the four video sources. See [Video Sources](#).

AUDIO: Press to configure the audio sources (tone generators) or the audio reference outputs (Word Clock and DARS). See [Audio Sources](#) and [Audio Reference Outputs](#).

IP: Press to configure the IP (ST 2110) video, audio, and data streams for test signal generation. See [IP Streams](#).

SDI: Press to configure the four SDI outputs for test signal generation. See [SDI Outputs](#).

ENABLE: Press and hold to enable and disable the front-panel interface. See [Front Panel Disable and Enable](#).

SYSTEM: Press to configure systemwide parameters such as presets, network interfaces, passwords, and power supplies. See [Presets](#), [Management Network Interface](#), and [System Maintenance](#).

Front Panel Disable and Enable

Access to the front-panel interface can be configured to end after a period of idle time. See [Front-Panel Settings](#).

Disable Front-panel Interface

Press-and-hold **ENABLE** for 2 seconds. The display backlight is dimmer when the interface is disabled. When the front-panel interface is disabled, pressing any front-panel button does not have an effect, except the **ENABLE** button is illuminated as a reminder that the front panel is currently disabled.

Enable Front-panel Interface

Press-and-hold **ENABLE** for 4-5 seconds. The display backlight is brighter when the interface is enabled.

Menu System

The SPG9000 front-panel interface is organized as a set of menus. Each of the front-panel menu buttons is associated with one of the menu lists. For example, press the **REF** button to open the **REFERENCE** menu list. The top line of the display shows the name of

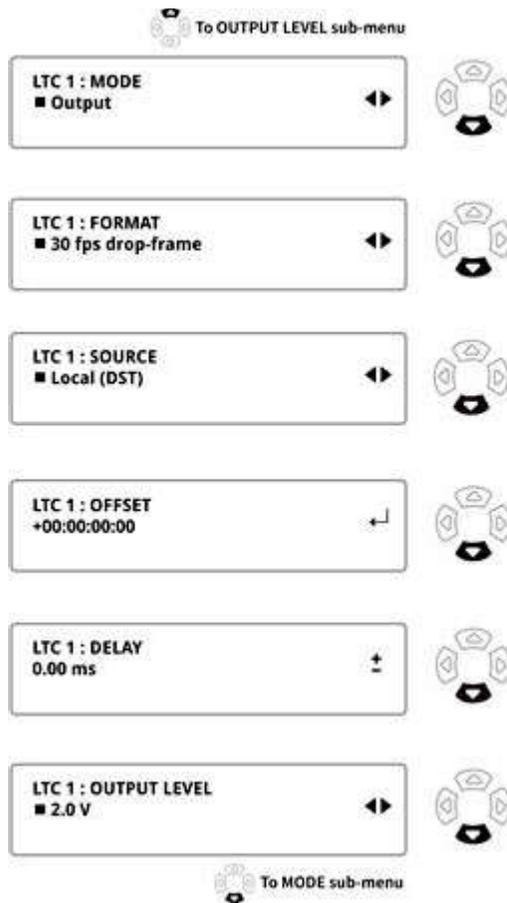
the current menu in its hierarchical structure. For example, the REFERENCE : GENLOCK : TIMING menu is a third-level menu under the REFERENCE menu list.

1. Press **REF** to open the REFERENCE menu.
2. Press the \triangle or ∇ button to move between menus.

Note: Menus are organized in a circular structure; if you press the same arrow repeatedly, you will view all available menus and return to your original starting menu.

3. When the REFERENCE : GENLOCK menu is displayed, press ENTER.
4. Repeat the process to find the TIMING submenu, and press ENTER.

Some buttons are associated with multiple outputs or ports. Press a menu button repeatedly to cycle through the menus for each of the outputs. For example, press the LTC button to cycle through the four menus for LTC 1 through LTC 4. Within any of these menus, press the \triangle or ∇ button to cycle through the complete set of menus for that output. The LTC 1 menu has six submenus: MODE, FORMAT, SOURCE, OFFSET, DELAY, and OUTPUT LEVEL. The list of submenus is circular, meaning you can go directly from the first submenu (in this example MODE) to the last submenu (in this example OUTPUT LEVEL) by pressing the \triangle button, or from the last submenu to the first by pressing the ∇ button.



Note: Menus might be hidden if they are not applicable or available in the current configuration settings. In this example, the MODE submenu is only available for LTC 1 because only LTC 1 can be configured as an input or as an output. When it is configured as an input, the other five submenus (FORMAT through OUTPUT LEVEL) are hidden because they are only applicable for LTC outputs.

Menu Operations

There are four kinds of menus used for making configuration changes and for viewing the instrument status. Each menu type is indicated by a symbol displayed on the right side of the second menu line.

Note: In all menus, except in edit mode, the up and down arrows change the selected menu.

Selection Menus

Selection menus are marked by the pair of left- and right-facing triangles on the right, as shown in the example.



Use selection menus to choose one option from an available list. When the menu first opens, the current setting is indicated by a square bullet symbol to the left of the item.

1. Press the ◀ or ▶ button to cycle through the available options.
2. When the required option is displayed, press **ENTER**. The menu text blinks to confirm the selection and the bullet indicates the new selection.

Adjustment Menus

Adjustment menus are marked by a plus-minus sign on the right, as shown in the example.



Use these menus to make immediate adjustments to the configuration parameters.

- Press ▶ to *increase* the parameter by the smallest increment available (for example, 0.0185μs).

- Press ◀ to *decrease* the parameter by the smallest increment available.
- Press-and-hold ◀ or ▶ to increase or decrease the parameter until the button is released.
- Press both ◀ and ▶ at the same time to return the parameter to the default value.

Edit Menu

Edit menus are marked by the carriage-return symbol, as shown in the example.



Use these menus to change editable strings like passwords, IP addresses, and parameters with multiple fields. Edit menus are modal, which means the arrow buttons have different behaviors when the menu is in edit mode from when the menu is in navigation mode.

1. Press ENTER to switch the menu to edit mode, confirmed by an underline under the first editable character, digit, or field.

Note: When in edit mode, you must press ENTER or BACK to leave.

2. Press the ◀ or ▶ button to change to the next or previous editable character, digit, or field.
3. Press the △ or ▽ button to move through the available values for the character, digit, or field. For example, when editing an IP address, press the △ or ▽ button to cycle through the numeric digits 0-9.
4. When you have set the value for a character, digit, or field, press the ▶ button to move to the next item and repeat.
5. When all changes have been made, exit edit mode:
 - To exit edit mode and *accept* the currently displayed values, press ENTER.
 - To exit edit mode and *cancel* the editing changes, press BACK.

Multiple-Page Menus

Multiple-page menus are used to display read-only status information, not for making configuration changes. These menus are marked by a pair of arrows, facing opposite directions, as shown in the example.



The arrows mark indicate that there is more information to be viewed by pressing the left or right arrow buttons.

Press ◀ or ▶ repeatedly to move though all available pages of information.

Front-Panel Settings

There are several settings to change the appearance and behavior of the front-panel interface. These settings may only be changed from the front panel itself; you cannot change these settings remotely from the web interface or the web services API. They are not saved in preset files, but some settings are saved in the non-volatile memory of the instrument so they are preserved when the system cycles power.

The table summarizes the menu structure that is accessed when you press the SYSTEM button. Indentation indicates the menu hierarchy; for example, you need to access the SYSTEM : FRONT PANEL submenus to configure the front-panel settings. Other SYSTEM menus are shown collapsed and with dim highlighting to show their position in the menu list. For example, when you press the SYSTEM button, the first menu to be displayed is SYSTEM : PRESET. Press the down arrow button three times to go to the SYSTEM : FRONT PANEL menu. Press ENTER to go to the SYSTEM : FRONT PANEL : TIMEOUT menu. Press the up or down arrow buttons to cycle between the three submenus (TIMEOUT, DISP BACKLIGHT, and BEEPER).

Menu lists like this are used in other sections of this document to help you move through the front-panel menu system. See [Menu Operations](#).

The sample table shows the submenus for the SYSTEM menu and the submenu FRONT PANEL.

SYSTEM :

PRESET :

INFO :

NETWORK :

FRONT PANEL :

TIMEOUT**DISP BACKLIGHT****BEEPER**

WEB :

GENERAL PURPOSE INTERFACE :

POWER SUPPLY :

FIRMWARE UPGRADE

CALIBRATE OVEN

DIAGNOSTICS

TIMEOUT

Select the idle time period before the front-panel buttons are disabled. This feature can be used to prevent accidental configuration changes. An operator must explicitly re-enable the front-panel interface to access any menus.

Select **Disable** if you never want the front-panel interface to time out. See [Front Panel Disable and Enable](#).



CAUTION: We strongly recommend using the timeout function to keep the display backlight at a low level when the front-panel interface is not actively being used, to maximize the life of the display backlight.

DISP BACKLIGHT

Select the brightness of the backlight for the front-panel LCD. The display brightness can be adjusted from a value of 1 (dim) to 8 (bright). When the front-panel interface is disabled, the display backlight brightness changes to the dimmest value (1) until it is re-enabled and the selected brightness is restored.

BEEPER

Select **ENABLE** to permit the internal beeper to sound. The beeper emits a short chirping sound every second when there is a hardware fault. See [FAULT](#).

This setting is not saved in non-volatile memory. If the beeper is disabled, it re-enables when power is cycled. This ensures that the hardware fault alarm is not unintentionally ignored.

Management Network Interface

The instrument has a 10/100/1000 BASE-T Ethernet port on the rear panel that is used for management functions. You can remotely control the instrument through the web interface or through the application programming interfaces (APIs), and system events can be logged to a remote server from the management interface.

This section provides instructions for configuring the network parameters of the management network interface.

Note: The management port can only be configured using the front-panel user interface.

Front-Panel Menu for NETWORK

To use the front panel of the SPG9000 for this process, press **SYSTEM** and then select the **NETWORK** option. See [Menu Operations](#) for details of using the front-panel menus.

The table shows the submenus for the NETWORK menu.

SYSTEM :	
PRESET :	
INFO :	
NETWORK :	
MGMT :	
DHCP	
IP ADDRESS	
SUBNET MASK	
GATEWAY	
MAC ADDRESS	
DNS SERVER	
HOSTNAME	
DOMAIN NAME	
SYSTEM NAME	
LOCATION	
PTP 1 :	Requires SPG9000-PTP license to be enabled
PTP 2 :	Requires SPG9000-PTP license to be enabled
IP 1 :	Requires SPG9000-IP license to be enabled
IP 2 :	Requires SPG9000-IP license to be enabled
FRONT PANEL :	
WEB :	
GENERAL PURPOSE INTERFACE :	
POWER SUPPLY :	
FIRMWARE UPGRADE	
CALIBRATE OVEN	
DIAGNOSTICS	

Configuration Settings for NETWORK

The NETWORK settings are used to configure all the Ethernet ports for the SPG9000, including the management interface, the PTP ports, and the IP ports.

MGMT

The MGMT submenu includes all the configuration settings for the management network interface.

DHCP

Select **ENABLE** to use Dynamic Host Configuration Protocol (DHCP) on the management interface. In this case, a DHCP server must be present on the network, and it assigns the IPv4 address, subnet mask, and gateway address. If you enable DHCP,

manual configuration of those values is disabled but the values provided by the DHCP server are displayed.

IP ADDRESS

Enter the four octets of the IPv4 address, in dotted decimal notation. An edit menu (see [Edit Menus](#)) is used to enter the address, with three digits for each octet with leading zeros if necessary. For example, an address of 192.168.1.50 would appear as 192.168.001.050 in this menu. If DHCP is enabled, the IPv4 address supplied by the DHCP server is displayed instead and cannot be edited.

SUBNET MASK

Enter the four octets of the subnet mask, in dotted decimal notation. If DHCP is enabled, the subnet mask supplied by the DHCP server is displayed instead and cannot be edited.

GATEWAY

Enter the four octets of the gateway address for this subnet, in dotted decimal notation. If DHCP is enabled, the gateway address supplied by the DHCP server is displayed instead and cannot be edited.

MAC ADDRESS

This is a read-only menu that displays the physical (MAC) address of the management port. The first three octets of a MAC address indicate an Organizationally Unique Identifier (OUI), to help identify equipment on the network. The OUI for Telestream is 00-90-56, so the MAC addresses always begin with these three octets.

DNS SERVER

Enter the four octets of the Domain Name System (DNS) server address, in dotted decimal notation. The DNS server is used to resolve hostnames into IPv4 addresses so a hostname can be specified for SPG9000 configuration parameters such as a remote NTP server (see [Network Time Protocol](#)), a syslog server (see [Syslog](#)), or an SNMP trap destination (see [SNMP](#)). You can specify a DNS server in your local network, or a public server such as Google Public DNS (8.8.8.8) or Cloudflare (1.1.1.1). If DHCP is enabled, the DNS server address supplied by the DHCP server is displayed instead and cannot be edited.

Note: In the front-panel interface, use 3 digits for each number in the octet, such as 008.008.008.008 or 001.001.001.001.

HOSTNAME

Enter the hostname portion of the fully qualified domain name (FQDN) for the instrument. This name can be used to access the instrument instead of using its IP address. Valid characters for the hostname include alphanumeric characters (A-Z, a-z, and 0-9) and the hyphen character. The first character must be a letter or numeral.

The factory default hostname is “spg9000-s000000” where the last six digits represent the numeric portion of the device's serial number. The serial number is on a sticker on the left side of the SPG9000 and appears on a label on the packaging box.

DOMAIN NAME

Enter the domain name portion of the FQDN. Valid characters for the domain name include alphanumeric characters (A-Z, a-z, and 0-9), the hyphen character, and the “dot” character (to separate levels in the domain hierarchy). The first character must be a letter or numeral. If DHCP is enabled, the domain name supplied by the DHCP server is displayed instead and cannot be edited.

Note: The factory default domain name is “telestream.net”, so this must be changed to your local domain name.

Note: If you wish to use multicast DNS (mDNS) for NMOS Discovery, use a domain name of “local”. See [NMOS API](#).

SYSTEM NAME

Enter a name to identify this system for management protocol purposes. The system name that you choose will be used in several places:

- As the “label” for the /self and /devices objects in the IS-04 Node API. This label is commonly visible in NMOS controller applications, so you can uniquely identify each SPG9000 that is registered and using NMOS. See [NMOS API](#).
- As part of the sysDescr object in the SNMP Management Information Base (MIB). See [SNMP](#).
- As the first part of the userDescription parameter in the PTP descriptionDS data set. This value can be read via PTP management messages and by the /ptp/{instance}/description-ds endpoint in the HTTP API. See [HTTP API](#).
- As part of the System Description advertised via Link Layer Discovery Protocol (LLDP) for the two PTP ports and the two IP ports.

LOCATION

Enter a string to describe the physical location of this system for management protocol purposes. The location you choose will be used in two places:

- As the sysLocation object in the SNMP MIB. See [SNMP](#).
- As the second part of the userDescription parameter in the PTP descriptionDS data set. This value can be read via PTP management messages and by the /ptp/{instance}/description-ds endpoint in the HTTP API. See [HTTP API](#).

Web Interface for Management Network Interface

After the management network interface has been configured, its status can be viewed from the web interface. Click on the **System** tab and select **System Information**. The values are displayed in a section at the top right of the section.

The Host Name, System Name, and Location values can be edited from the web interface. If a static IP address is used, the Domain and DNS Server values can also be edited. If DHCP is used, the Domain and DNS Server values are read-only, as they are provided from the DHCP server. The MAC Address, IP Address, Subnet Mask, and Gateway values are always read-only status values from the web interface. The IP Address, Subnet Mask and Gateway values can only be changed from the front-panel interface.

Management Interface	
Host Name	<input type="text" value="spg9000-s010110"/>
Domain	<input type="text" value="telestream.net"/>
MAC Address	20-d7-78-13-1f-f2
IP Address	10.101.3.224
Subnet Mask	255.255.255.0
Gateway	10.101.3.1
DNS Server	<input type="text" value="10.101.2.5"/>
System Name	<input type="text" value="B50 Primary"/>
Location	<input type="text" value="B50 R02 S23"/>

Web User Interface

After the management network interface has been configured, the SPG9000 can be accessed through a web-based user interface, using any modern browser. The default URL is:

`http://hostname`

where *hostname* is replaced with a fully qualified domain name of the SPG9000, or:

`http://ip_address`

where *ip_address* is replaced with the IP address of the management network interface.

Operational Considerations

We recommend a maximum of four simultaneous users be connected to the instrument that is using the web interface. If more users are connected, it can result in lower performance and inconsistent behavior.

Note: The web interface requires that JavaScript be enabled.

Web Interface for User Login and Access Control

When the web interface URL first opens, there is a login page. The SPG9000 has two built-in user accounts for web interface access: “admin” and “operator.” These accounts are case sensitive and cannot be renamed.

- admin: has full read-write control for all system settings.
- operator: has a read-only view of the instrument; the web interface shows status information but configuration settings cannot be changed.



The default password for the admin account is “admin” and the default password for the operator account is “operator”. We recommend you change these passwords to a unique value for each instrument. You can change both passwords from the SYSTEM : WEB : ADMIN PASSWORD and SYSTEM : WEB : OPERATOR PASSWORD menus on the front-panel interface. You can also change the currently logged-in user’s password through the web interface, on the System tab, in the Management Settings section.

Front-Panel Menu for WEB

To use the front panel of the SPG9000 for this process, press **SYSTEM** and then select the **WEB** option. See [Menu Operations](#) for details of using the front-panel menus.

The table shows the submenus for the WEB menu.

SYSTEM :
PRESET :
INFO :
NETWORK :
FRONT PANEL :
WEB :
ADMIN PASSWORD

SYSTEM :

OPERATOR PASSWORD

API KEY

GENERAL PURPOSE INTERFACE :

POWER SUPPLY :

FIRMWARE UPGRADE

CALIBRATE OVEN

DIAGNOSTICS

ADMIN PASSWORD

View or update the password for the “admin” account. It has full read-and-write access to instrument settings.

OPERATOR PASSWORD

View or update the password for the “operator” account. It has read-only access to instrument settings.

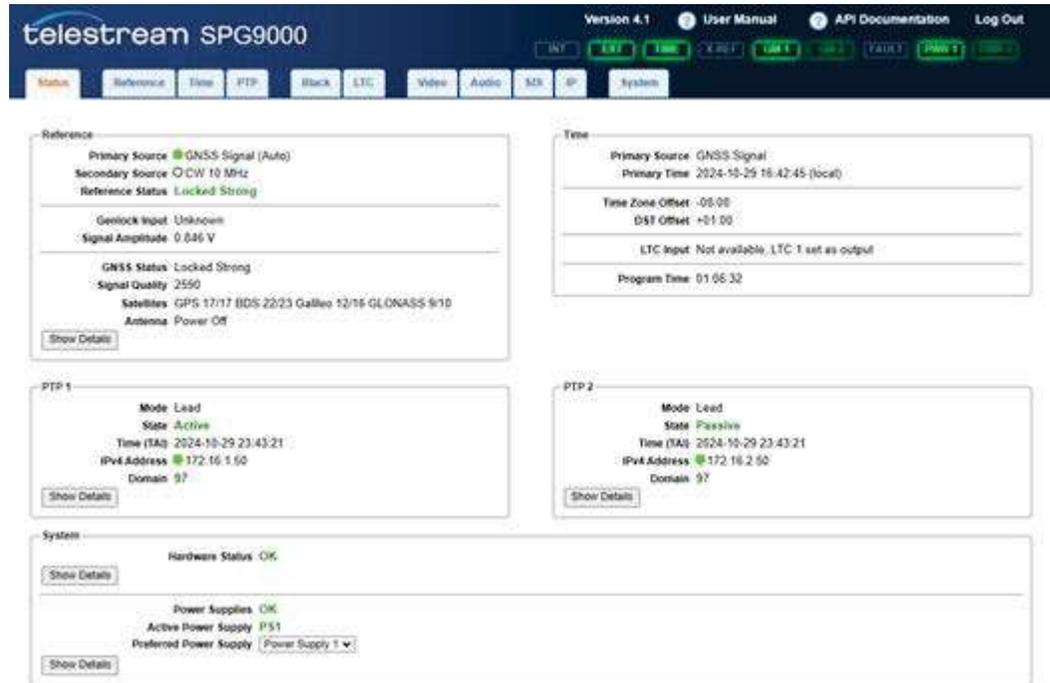
API KEY

View or update the API key for authentication of HTTP API messages. See [HTTP API](#).

Elements of Web User Interface

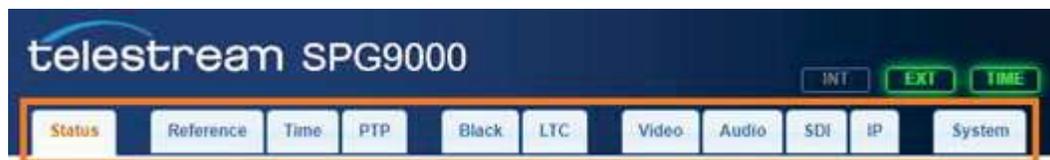
The web interface for the SPG9000 is a single-page application that dynamically updates based on current configuration and system state. The top banner (with a blue

background) is always present, but the main page body (with a white background) depends on user navigation.



Menu tabs

The name of each tab corresponds to a specific button on the front panel, and items on the tab are similar to the front-panel menu system; see [Front-Panel Interface](#). On the web page, select the tab to go to that item and see its menus.



Status

Select to observe the current operational status of the instrument and manage the power supply modules. See [System Status and Monitoring](#) and [Power Supply Monitoring and Replacement](#).

Reference

Select to configure the current reference source (genlock input, GNSS signal, PTP follower, or internal) and to configure the GNSS receiver (option SPG9000-GNSS required). See [Reference and Time Sources](#).

Time

Select to configure the time of day source (including any time zone offset), daylight saving time parameters, leap second adjustments, daily jam sync schedule, and program time. See [Reference and Time Sources](#).

PTP

Select to configure the two PTP instances associated with the two SFP ports, labeled PTP 1 and PTP 2. This tab is not present unless the SPG9000-PTP option is licensed. See [PTP Operation](#).

Black

Select to review and configure the six analog sync signal outputs. These are labeled BLACK 1 through BLACK 6. See [Black Outputs](#).

LTC

Select to configure the four linear time code (LTC) outputs, or three outputs and one input. See [Linear Time Code Input and Outputs](#).

Video

Select to review and configure the video sources (test patterns or images) that are used for SDI and IP test signal outputs. See [Video Sources](#).

Audio

Select to review and configure the audio sources (32 tone generators) or the audio reference outputs (Word Clock and DARS). See [Audio Sources](#) and [Audio Reference Outputs](#).

SDI

Select to review and configure the four SDI outputs. These are labeled SDI 1 through SDI 4. See [SDI Outputs](#).

IP

Select to review and configure the ST 2110 video, audio, and data streams for the two IP ports. See [IP Streams](#).

System

Select to manage several systemwide settings:

- Save and recall presets: see [Presets](#).
- Upload, download, rename, or delete user-created files: See [File Management](#).
- View the hardware and software versions: see [Check Current Firmware Version](#).
- View and configure the management interface: See [Management Network Interface](#).
- Update option licenses: see [Licensed Features](#).

- Configure the web server, including security and authentication: see [Secure Web Interface](#).
- Configure system logging: see [Syslog](#).
- Configure the Simple Network Management Protocol agent: see [SNMP](#).
- Configure the Networked Media Open Specifications (NMOS) interface. See [NMOS API](#).
- Configure the network interfaces for the SFP ports: see [Configuration Settings for PTP Network Interfaces](#) and [Configuration Settings for IP Network Interfaces](#).
- Configure the general purpose interface inputs and outputs: see [General Purpose Interface](#).

LED Indicators

The indicators are the same as those on the front of the instrument. See [Indicators](#).

User Manual

Select to open the PDF file of this User Manual document. The file is stored on the instrument, so it can be viewed even when the SPG9000 is not connected to the public Internet via the management network.

API Documentation

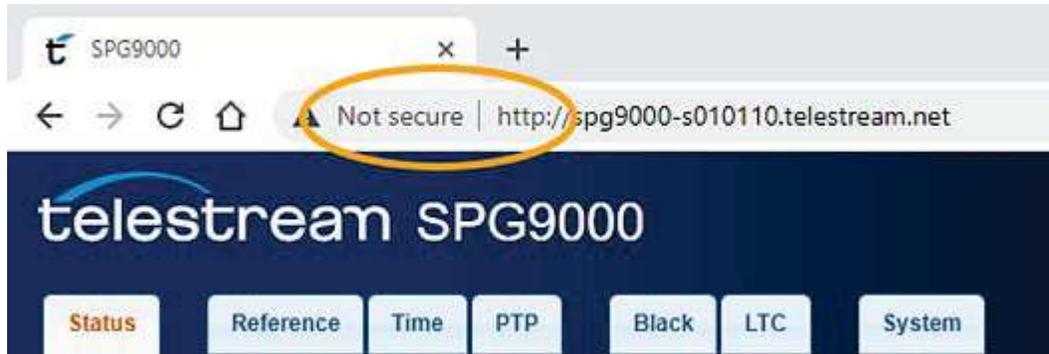
Select to open the SPG9000 HTTP API web page. See [HTTP API](#).

Secure Web Interface

The SPG9000 integrated web server can use HTTPS instead of HTTP to provide a secure web interface. This might be required by your organization cybersecurity requirements, such as EBU R 143.

The factory configuration for the web interface is to use HTTP but you can install your organization certificate files and use HTTPS.

Most browsers show the site status and protocols. For example, with plain HTTP, the Chrome browser indicates the SPG9000 web interface is “Not secure”:



Configure Web Server

To install new SSL certificate files and switch to HTTPS,

1. Select the **System** tab and then select **Management Settings**.
2. Go to the Web Server subsection.

Web Server

Web Page Password	View	Change
API Key	View	Change

Web Server Protocol	HTTP (Port 80)	▼
SSL Certificate	Choose File	No file chosen
SSL Certificate Key	Choose File	No file chosen
SSL Password File	Choose File	No file chosen

Two or three files are needed to complete the installation. Your IT organization should provide the files for your domain. Use the web interface to select these files from a location on a local computer.

SSL Certificate: Choose the certificates file. This file should contain the PEM format certificate chain for the server, any intermediate certificates, and the CA certificate. The certificate chain can be of any length, although most will contain two or three certificates. The first certificate in the file should be the server certificate that corresponds to the SSL Certificate Key file. The SSL Certificate file should have a filename extension of .crt.

SSL Certificate Key: Choose the private key file. The private key should correspond to the first certificate in the SSL Certificate file. This file should use the PEM format and have a filename extension of .key.

SSL Password File: Choose the password file. This file is optional and only needed if the key file uses passphrases. The password file should have a filename extension of .txt.

3. When the certificate, key, and optional password files have been selected, click **Install Certificate** to upload the files to the SPG9000.
4. If the certificate files are installed successfully, select **HTTPS (Port 443)** from the Web Server Protocol menu and click **Restart Web Server**. After the web server restarts, the web page shows as secure.



Note: If you change the configuration from HTTPS back to HTTP, you may need to force a hard refresh of your browser.

Application Programming Interfaces

The SPG9000 has multiple application programming interfaces (APIs) for remote access to the instrument. Client-side applications, such as data visualization dashboards, can use the APIs for system management and monitoring.

HTTP API

The primary API for the SPG9000 is based on Hypertext Transfer Protocol (HTTP) messages with JavaScript Object Notation (JSON) text. This API style is commonly referred to as a REST (Representational State Transfer) API. Strictly speaking, the SPG9000 API is not RESTful, but the message formats are familiar to developers with REST API experience.

Messages and Endpoints

The SPG9000 HTTP API uses three HTTP message types:

GET: Used to read status and/or configuration information from the SPG9000. The GET message sent to the SPG9000 does not have a message body, but the normal response from the SPG9000 (200 OK) includes a JSON object (content-type: application/json) including the requested values.

PUT: Used to set configuration parameters. The message body for the PUT message must be a JSON object with the parameter to be updated. The SPG9000 accepts a partial JSON object for PUT messages, so a subset of configuration parameters can be changed while keeping other parameters unchanged.

POST: Used to command the SPG9000 to perform an internal operation.

Endpoints are described in the documentation with a path such as `"/system/status"` that corresponds to a complete URL:

`http://spg9000/api/v1.0/system/status`

where `spg9000` is the hostname or the IP address of the system. The prefix `/api/v1.0` is required for every endpoint.

Note: If the SPG9000 web server has been configured to use HTTPS with an SSL certificate (see [Secure Web Interface](#)), the API URL uses the protocol `https://`.

Authentication

The SPG9000 HTTP API requires all messages to be authenticated, similar to requiring a user to log in with a password for the web interface. The header field `X-API-Key` must be included in every HTTP request sent to the SPG9000. If this header field is missing or does not match the user-configurable key value, the SPG9000 returns a response message: 401 Unauthorized.

The factory default value for the API key is `"apikey"`. This value can be changed from the web interface, on the System tab, in the Management Settings section. The API value can also be changed through the front panel in the SYSTEM : WEB : API KEY menu.

Note: You must be logged in as the admin user to view or change the API key.



The screenshot shows a configuration window titled "Web Server". It contains two rows of settings. The first row is "Web Page Password" with a text input field containing six asterisks, and two buttons labeled "View" and "Change". The second row is "API Key" with a text input field containing six asterisks, and two buttons labeled "View" and "Change".

Note: We recommend you change this value to a strong password, and do not share the key outside your organization.

API Documentation

Documentation for the HTTP API is available in the SPG9000 web interface. In the top banner, select **API Documentation**.

A new browser window appears for the documentation page.



The complete set of available messages is organized into categories on the documentation page:

Presets: Messages with an endpoint starting with /configuration are used to manage the configuration settings for any part of the entire instrument. See [Presets](#).

System-Wide Configuration and Status: Messages with an endpoint starting with /system correspond to configuration settings on the web interface, on the System tab, or in the front-panel SYSTEM menu. The messages also correspond to status information found on the Status tab or STATUS menu.

Reference and Time: Messages with an endpoint starting with /reference are used to manage the configuration settings of the frequency and time reference sources of the instrument, and to get the current status of all available reference sources.

PTP: Messages with an endpoint starting with /ptp are used to manage the two PTP instances corresponding to the PTP 1 and PTP 2 ports. The option SPG9000-PTP is required for this feature. The /ptp messages in the API are directly based on the SMPTE RP 2059-15 YANG data model for PTP.

GNSS: Messages with an endpoint starting with /gnss are used to configure the GNSS receiver and to get current status information about the received signals. The option SPG9000-GNSS is required for this optional feature. Some of these messages are based on the RP 2059-15 YANG data model.

SMPTE RP 2059-15: Endpoints starting with /ptp-smpte, /grandmaster, or /rfc-8173 are based on the RP 2059-15 YANG data model. They are used to access additional information not present in any of the /ptp endpoints, such as values specific to the ST 2059-2 PTP profile.

Black Outputs: Endpoints starting with /blacks are used to manage the configuration settings of the 6 analog sync (BLACK) outputs. See [Black Outputs](#).

LTC Outputs: Messages with an endpoint starting with /ltc are used to manage the configuration settings of the 4 Linear Time Code (LTC) outputs (or 3 outputs plus 1 input). See [Linear Time Code Input and Outputs](#).

Video Sources: Endpoints starting with /video are used to manage the configuration settings of the 6 video sources used for test signal generation over the SDI and IP interfaces. See [Video Sources](#).

Audio Sources: Endpoints starting with /audio are used to manage the configuration settings of the audio tones used for test signal generation over the SDI and IP interfaces. They also manage the configuration settings of the audio reference outputs (Word Clock and DARS). See [Audio Sources](#) and [Audio Reference Outputs](#).

SDI Outputs: Endpoints starting with /sdi are used to manage the configuration settings of the 4 SDI outputs. See [SDI Outputs](#).

IP Streams: Endpoints starting with /ip are used to manage the configuration settings of the ST 2110 video, audio, and data streams. See [IP Streams](#).

To view the details for a particular message, select the message name to open a panel with example values and schema descriptions for the response body (GET messages) and request body (PUT messages).

You can use the documentation to interactively send HTTP API messages to the SPG9000 without requiring the use of external software:

1. Select **Authorize** at the top of the page and enter the API key.
2. Select **Try it out**.
3. You might have to enter a parameter for the URL; for example, for the GET /blacks/{output} message enter an output number to create the complete endpoint (that is, /blacks/1 for the BLACK 1 output).
4. For PUT messages, you also need to edit the JSON message body, starting with the example provided.
5. Select **Execute** to send the message to the SPG9000. The Responses section shows the request and the server response.

NMOS API

The SPG9000 supports some of the NMOS (Networked Media Open Specifications) APIs, developed by the Advanced Media Workflow Association (AMWA). Specifically, the SPG9000 supports:

- IS-04 Discovery and Registration
- IS-05 Device Connection Management

Per the NMOS model, the SPG9000 registers as a node with a single device. This device contains 18 senders, each corresponding to an IP stream configured for one or both IP ports.

- 6 video senders
- 6 audio senders

- 6 data senders

When the SPG9000 node is registered, it can be used as the source for ST 2110 IP streams. Typically you use an external NMOS connection manager application to make the connections from senders to receivers. If the connection manager is used to specify the desired multicast destination address and UDP port numbers, it will “patch” those values to the SPG9000 using IS-05 API methods. Any previously configured addresses and port numbers will be updated.

Note: See [IP Streams](#) for more information about configuring ST 2110 video, audio and data streams.

Note: The SPG9000-IP license must be enabled to configure and use the NMOS API.

Web Interface for NMOS

1. In the SPG9000 web interface, select the **System** tab.
2. Select the **Management Settings** and find the **NMOS** section.
3. Make the necessary changes to the parameters.
4. Select **Apply Changes** for the settings to take effect.

Configuration Settings for NMOS

The NMOS settings are used to control the registration of the SPG9000 node.

NMOS Services

Select this box to enable NMOS. If disabled, the SPG9000 will not register its services and will not respond to connection requests,

Browse APIs

Click this link to view the responses from GET requests to NMOS API endpoints, starting with `http://<hostname>/x-nmos`. When NMOS is enabled, you can query the node and connection resources. If NMOS is disabled, the web server will respond with a 502 Bad Gateway error message.

Note: If the web server of the SPG9000 is configured to use HTTPS with port 443, the NMOS API will continue to use HTTP with port 80. See [Secure Web Interface](#).

Discovery

Select the method for the SPG9000 node to discover the registry server.

Automatic discovery will use the DNS-SD and mDNS protocols, as described in IS-04. If the system domain name is "local", mDNS will be used. If the system domain name is anything else, DNS-SD will be used, using the DNS server address that is configured manually or set via DHCP. See [Configuration Settings for NETWORK](#).

If the local DNS server has not been configured with the necessary records for NMOS, you can use Manual discovery mode. Enter the IP address or hostname of the NMOS registry server. If the NMOS registry server uses a different port number than the standard HTTP port 80, you can append a colon and port number after the IP address or hostname, such as "10.1.2.3:5000".

Registry Server

Displays the IP address and port number of the current registry server, or "Not Registered" if the SPG9000 has not yet successfully completed the discovery and registration process.

Syslog

The SPG9000 uses the standard syslog function to record log messages about system status and events. Syslog messages can be directed to a remote server using the management network interface, or they can be stored to volatile storage on the SPG9000 and later downloaded to your computer. The SPG9000 uses volatile storage for local syslog files to extend the life of the non-volatile memory storage.

The SPG9000 can store up to 50 MB of syslog messages in local storage. These are saved in files of up to 10 MB each. The most recent syslog file is named "syslog.txt" and when it reaches 10 MB in size, it is moved to "syslog1.txt" and a new "syslog.txt" file is created for subsequent messages. Any existing "syslog1.txt" file is moved to "syslog2.txt", and so on. Therefore, there will be a maximum of five syslog files saved in volatile memory: "syslog.txt" (newest) to "syslog4.txt" (oldest).

It is strongly recommended to periodically download older syslog files to your computer before they are removed, or use the remote syslog server function to continuously save log messages. When the SPG9000 is powered down, all syslog files in volatile storage will be lost. To download log files from the SPG9000 to your computer, use the File Manager from the web interface. See [File Management](#).

Syslog uses a set of predefined facility codes to identify the event source. For example, events related to security or authentication use the "auth" facility and events related to the Linux kernel use the "kern" facility. Messages related to SPG9000 software (including the PTP processes) use the "user" facility.

Syslog has eight defined severity levels. You can configure the threshold for reporting events. For example, setting a threshold of Warning means that any Notice, Informational, and Debug messages are not logged.

Severity Level	Description
Emergency	The system is unusable
Alert	Action must be taken immediately
Critical	Critical conditions
Error	Error conditions
Warning	Warning conditions
Notice	Normal but significant conditions
Informational	Informational messages
Debug	Debug-level messages

Most messages logged by the SPG9000 use the Informational, Notice, Warning, or Error severity levels.

Web Interface for System Logging

1. In the SPG9000 web interface, select the **System** tab.
2. Select the **Management Settings** and find the **System Logging** section.
3. Make the necessary changes to the parameters.
4. Select **Apply Changes** for the settings to take effect.

The screenshot shows the 'System Logging' configuration page. It is divided into two main sections: 'Remote Server' and 'Local Volatile Storage'. In the 'Remote Server' section, there is a checkbox for 'Log to Remote Server' which is checked and labeled 'Enable'. Below it is a text input for 'Syslog Server' containing 'test.telestream.net' and a placeholder 'IP Address or Hostname'. There is also a dropdown for 'Transport Protocol' set to 'UDP (Port 514)' and another dropdown for 'Minimum Severity' set to 'Informational'. The 'Local Volatile Storage' section has a dropdown for 'Minimum Severity' set to 'Notice'. At the bottom left, there is an 'Apply Changes' button.

Configuration Settings for System Logging

The System Logging settings are used to configure the connection to the remote syslog server if enabled and set the conditions for what messages to store.

Log to Remote Server

Select this box to enable remote logging. By default, remote logging is disabled, but logging to local storage is always enabled.

Syslog Server

Enter the IP address or host name of the remote server(s). If you configure a second (backup) server, the same syslog messages will be sent to both destinations. If you only use one syslog server, leave the second text box empty; do not use an IP address of 0.0.0.0. Be sure that any firewall on the remote computer is configured to permit syslog traffic to be received.

Transport Protocol

You can select UDP (port 514) or TCP (port 6514) for sending messages to the remote server. The default is UDP, because it is a lightweight connectionless protocol with little overhead. Select TCP for connection-oriented message transmission to the server.

Minimum Severity

You can select the minimum threshold for saved syslog messages. Messages with a lower severity level will be discarded. You can select independent thresholds for the remote syslog server and for local storage. The default value is Warning, which means that only Error and Warning level messages would typically be logged. Severity levels of Emergency, Alert, and Critical are unlikely to be observed, but they would be logged.

Message Format

Syslog messages are plain text but follow a specific format. In this example:

```
<13>Mar 16 12:34:56 spg9000-s012345 SPG9000[820]: Primary reference source is now locked
```

the string is made up of five elements:

- The first field is the facility and severity level, "<13>" in this example. The decimal number between the < and > brackets can be converted to binary digits (such as 00001101), and the 5 most significant bits (00001) indicate the facility (in this case "user") and the 3 least significant bits (101) represent the severity level (in this case "notice"). Many syslog servers automatically decode <13> as "user.notice" to make logs easier to read.
- The second field is the date, "Mar 16 12:34:56" in this example. This time is always UTC, even if a time zone and daylight saving time offset have been configured.
- The third field is the hostname of the SPG9000, "spg9000-s012345" in this example. The syslog messages originating from the PTP processes use a modified hostname with an ending of "-2" (such as spg9000-s012345-2).
- The fourth field is the process name, "SPG9000[820]" in this example. Syslog messages from the PTP processes use a process name of "ptp4l" and messages from the main application use a process name of "SPG9000."

- The fifth and final field is the message body text, “Primary reference source is now locked” in this example.

SNMP

The SPG9000 supports the Simple Network Management Protocol (SNMP) for basic status reporting and notifications. You can query the instrument with Get, GetNext, or GetBulk request messages and you can change some system identification parameters with Set messages. You can also configure Trap messages to be sent to a network management system when the instrument has alert or fault conditions.

The SPG9000 supports its own Management Information Base (MIB) and the System group of objects from SNMPv2 MIB defined in RFC 3418. The objects in SPG9000-MIB are read-only objects that mirror the state of the indicators on the front-panel and web interface banner. See [Indicators](#).

MIB	Object Name	Description
SNMPv2 MIB	sysDescr	Identifies the SPG9000, including the firmware version, hostname, and system name. To change the system name, see Management Network Interface .
	sysObjectID	Object identifier (OID) of the Telestream SPG9000 (1.3.6.1.4.1.47445.1.1.2)
	sysUpTime	Time duration since the SNMP service was last started
	sysContact	Read/write object that indicates the contact person for this system. To change this value, send an SNMP Set message from a network management system.
	sysName	Hostname for this SPG9000. To change the hostname, see Management Network Interface .
	sysLocation	Read/write object that indicates the physical location of this system. To change the location, see Management Network Interface .

MIB	Object Name	Description
SPG9000-MIB	referenceStatus	Primary or secondary reference source status, corresponding to the EXT and INT indicators
	timeStatus	Time-of-day source status, corresponding to the TIME INPUT indicator.
	ptp1GMStatus ptp2GMStatus	PTP grandmaster status, corresponding to the GM 1 and GM 2 indicators
	hardwareStatus	Hardware status, corresponding to the FAULT indicator
	ps1Status ps2Status	Power supply status, corresponding to the PWR 1 and PWR 2 indicators
	referenceSource	Current reference source, primary or secondary

The SPG9000 uses SNMP version 3 (SNMPv3) because it includes higher security than previous versions, with stronger authentication and data encryption for privacy. The user-based security model (USM) is used for authentication and privacy. It has a single pre-defined username of "snmpv3user" that cannot be changed. The authentication credentials can be changed for this username to match the configuration on the network management system.

Web Interface for SNMP

1. In the SPG9000 web interface, select the **System** tab.
2. Select **Management Settings** and find the **SNMP** section.
3. Make the necessary changes to the parameters.
4. Select **Apply Changes** for the settings to take effect.

The screenshot shows the SNMP configuration page in the web interface. It includes the following fields and controls:

- SNMP Service:** Enable [Download SPG9000 MIB File](#)
- Trap Messages:** Enable
- Trap Destinations:**
- Username:**
- Authentication Type:**
- Authentication Key:**
- Privacy Type:**
- Privacy Key:**
- Apply Changes:**

Configuration Settings for SNMP

The SNMP settings are used to configure the trap messages. This includes the type of trap messages and the authentication and privacy settings.

SNMP Service

Check this box to enable the SNMP service. If disabled, the instrument will not respond to received request messages and will not send Trap notification messages.

Download SPG9000 MIB File

Click on the link to download a copy of the “SPG9000.mib” file from your browser. This file can be imported into SNMP management applications so that they can use the names of SPG9000-specific objects instead of using their numeric Object Identifier (OID) values.

Trap Messages

Select this checkbox to enable Trap message notifications for certain system events. Fault, Error, or Warning Trap messages are repeated every 10 seconds while the condition persists, followed by a single Clear message when the condition is no longer present.

Trap messages correspond to the indicators on the front-panel and web interface banner. See [Indicators](#). Trap messages include a trapInfo object that contains additional text about the notification, and a timeOfDay object with the local time of day when the event occurred.

Trap Name	Description
hardwareFault	Any condition that causes the FAULT indicator to be on
hardwareFaultClear	The hardware fault condition has cleared and the FAULT indicator is off.
powerSupplyFault	Any condition that causes the PWR 1 or PWR 2 indicator to be red.
powerSupplyWarning	Any condition that causes the PWR 1 or PWR 2 indicator to be yellow
powerSupplyFaultClear	The power supply fault or warning condition has cleared and the PWR 1 and PWR 2 indicators are both off.
lockError	Any condition that causes the EXT indicator to be red
lockWarning	Any condition that causes the EXT indicator to be yellow
lockErrorClear	The lock error or warning condition has cleared and the EXT indicator is green, or the EXT indicator is off and the INT indicator is green.
timeError	Any condition that causes the (TIME) INPUT indicator to be red

Trap Name	Description
timeWarning	Any condition that causes the (TIME) INPUT indicator to be yellow
timeErrorClear	The time-of-day error or warning condition has cleared and the (TIME) INPUT indicator is green or off.
gnssSignalWarning	The GNSS signal level has dropped below the user-selected warning threshold. See Signal Warning Threshold .

Trap Destinations

Enter the IP address or hostname for one or two destination computers that will receive and log Trap messages sent from the SPG9000. Typically a network management system with SNMP support is configured with the IP address or hostname of the SPG9000.

Username

Displays the pre-defined username, "snmpv3user". The credentials for this user are saved on the SPG9000 and can be updated by changing the authentication values. The same username and credentials are configured on the external network management system, and the SPG9000 will only respond to requests when snmpv3user is authenticated successfully.

Authentication Type

Select the authentication protocol, either MD5 or SHA. Authentication ensures the identity of snmpv3user.

Authentication Key

Enter the key phrase for authentication. The string must be alphanumeric characters including spaces, with a minimum length of 8 characters and a maximum length of 32 characters.

Privacy Type

Select the privacy protocol, either AES (128-bit) or DES. The privacy protocol determines the method of encryption of SNMPv3 messages.

Privacy Key

Enter the key phrase for privacy (encryption). The string must be alphanumeric characters including spaces, with a minimum length of 8 characters and a maximum of 32 characters.

General Purpose Interface

The SPG9000 has a general purpose interface (GPI) with four inputs for commands to the instrument, and three outputs for alarm indications from the instrument.

There are two connectors on the back panel for the GPI. The 9-pin D-sub connector labeled "GPI" includes all four input pins and the three output pins. See [GPI Connector](#). The 15-pin, D-sub connector labeled "LTC/GPI" includes a subset of the GPI: one input and two outputs. See [LTC/GPI Connector](#). This connector can be used to connect the SPG9000 to the ECO9000 changeover unit so the two outputs can be used to signal the changeover.

Input and output signals are active low, with these characteristics:

Input	
High	Signal > 2.4 V or open (connected to internal 10 kΩ pull-up resistor)
Low	Signal < 0.8 V or ground (input impedance: 10 kΩ)
Pulse Duration	Ignores pulses < 40 ms and always detects pulses > 60 ms
Output	
Low	Signal < 0.4V or ground (when sinking 250 mA; maximum on-resistance 2 Ω)

Web Interface for General Purpose Interface

On the SPG9000 web interface, select the **System** tab and then select the **General Purpose Interface** section.



Front-Panel Menu for General Purpose Interface

To use the front-panel menu of the SPG9000 for this process, press **SYSTEM** and then select the **GENERAL PURPOSE INTERFACE** option. See [Menu Operations](#) for details of using the front-panel menus.

The table shows the submenus for the GENERAL PURPOSE INTERFACE menu.

SYSTEM :

PRESET :

INFO :

NETWORK :

FRONT PANEL :

WEB :

GENERAL PURPOSE INTERFACE :

INPUT 1 :

ACTION

PRESET

Only available if Action is Recall Preset

INPUT 2 :

Same menu and submenu as INPUT 1

INPUT 3 :

Same menu and submenu as INPUT 1

INPUT 4 :

Same menu and submenu as INPUT 1

OUTPUT 1 :

Hardware Fault

Power Supply Fault

Lock Error

Lock Warning

Time Error

Time Warning

Secondary Active

Alarm Time

PTP 1 GM Active to Inactive

PTP 2 GM Active to Inactive

OUTPUT 2 :

Same menu and submenu as OUTPUT 1

OUTPUT 3 :

Same menu and submenu as OUTPUT 1

OUTPUT ALARM DELAY :

Hardware Fault

Lock Error

Lock Warning

Time Error

Time Warning

POWER SUPPLY :

FIRMWARE UPGRADE

CALIBRATE OVEN
DIAGNOSTICS

Configuration Settings for General Purpose Interface

Each of the four GPI inputs can be configured to perform independent actions, and the three GPI outputs can be configured to assert for a set of selected events.

Input Actions

Each of the four inputs can cause an action when the input pin is asserted.

None: the GPI input is not in use.

Reset Program Time: the program time counter is reset to its initial value. See [Program Time Counter](#).

Reacquire Position (GNSS): the GNSS receiver is reset to reacquire its position. This is useful if the SPG9000 has just moved to a new location, such as on a mobile broadcast or production vehicle. See [Position](#).

Jam Sync: a jam sync is immediately performed for drop-frame time code outputs. See [Daily Jam Sync](#).

Update Internal Time from NTP: the internal time is updated from a remote NTP server. The time of day source must be set to Internal for NTP client operation. See [Network Time Protocol](#).

Recall Preset: the selected preset is recalled. Either of the built-in presets (power-on default or factory default) or any user-defined preset file can be recalled. See [Presets](#).

Output Alarms

Each of the three outputs can be asserted when any combination of events occur. If multiple events are selected for one output, they are logically ordered together. See [Indicators](#) for the conditions for which event types are reported.

Most alarms cause the GPI output to be asserted (active low) for the entire duration that the alarm condition persists. The Alarm Time event causes the GPI output to be asserted for exactly one second. The PTP 1 and PTP 2 GM Active to Inactive events cause the GPI output to be asserted for a 20 ms pulse.

Hardware Fault: any condition that causes the FAULT indicator to be lit

PS Fault: any condition that causes the PWR 1 or PWR 2 indicators to be red

Lock Error: any condition that causes the REF indicator to be red

Lock Warning: any condition that causes the REF indicator to be yellow

Time Error: any condition that causes the TIME (INPUT) indicator to be red

Time Warning: any condition that causes the TIME (INPUT) indicator to be yellow

Secondary Active: Asserted when the secondary reference is active. See [Secondary Reference](#).

Alarm Time: the program time counter matches the HH:MM:SS digits of the selected alarm time. See [Program Time Counter](#).

PTP 1 GM Active to Inactive and PTP 2 GM Active to Inactive: the PTP instance for the PTP 1 or PTP 2 port has changed state from active leader to passive. This event can be used to signal the changeover unit that the SPG9000 is no longer the grandmaster, so the backup SPG9000 is the source for both the synchronization outputs and PTP. See [PTP Operation](#).

Note: The PTP 1 and PTP 2 GM Active to Inactive events are only asserted for 20 ms instead of asserted persistently. This triggers the changeover unit to change from the primary inputs to the backup inputs when the PTP instance is no longer the grandmaster, but it allows the changeover unit to override this input if one of the monitored signals generates a fault.

Output Alarm Delays

To delay temporary alarm conditions from asserting a GPI output, a delay time can be specified. If the alarm conditions persist after the set delay duration, the output is asserted. Several of the alarms can be set with delays:

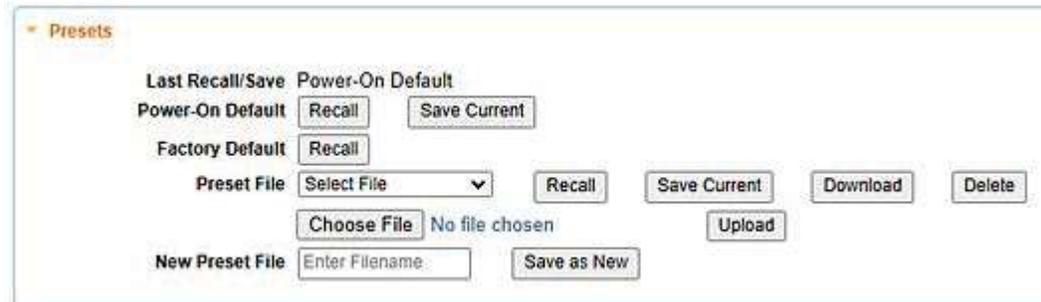
- Hardware Fault
- Lock Error
- Lock Warning
- Time Error
- Time Warning

Presets

A preset is a set of configuration parameters for the instrument. Save and recall presets to quickly change configuration settings, instead of changing each parameter individually. The system maintains two special presets (power-on default and factory default) and any number of user-defined presets: [Presets](#)

Web Interface for Presets

In the SPG9000 web interface, select the **System** tab and then select **Preset**.



Front-Panel Menu for PRESET

To use the front panel of the SPG9000 for this process, press **SYSTEM** and then select the **PRESET** option. See [Menu Operations](#) for details of using the front-panel menus.

The table shows the submenus for the PRESET menu.

SYSTEM :

PRESET :

POWER-ON DEFAULT (to Save)

POWER-ON DEFAULT (to Recall)

FACTORY DEFAULT

FILE :

RECALL

SAVE

SAVE AS

DELETE

INFO :

NETWORK :

FRONT PANEL :

WEB :

GENERAL PURPOSE INTERFACE :

POWER SUPPLY :

FIRMWARE UPGRADE

CALIBRATE OVEN

DIAGNOSTICS

Configuration Settings for Presets

This section explains the presets, from the preset applied when the instrument turns on to creating new presets. It also explains changes that can be made to presets such as recalling, downloading, and deleting them.

Last Recall/Save

The most recent preset that was recalled or saved is displayed on the web interface to help identify the current state of the system.

Note: If you make additional configuration changes and do not save them to an existing or new preset, the Last Recall/Save preset will no longer reflect the current configuration.

Power On Default

This preset is applied whenever the instrument is powered on. Save the current settings to the Power-On Default preset so they are automatically restored when the instrument is restarted. Recall this preset to reset the configuration since the last time the system was restarted or since this preset was updated. This is useful for applications when the SPG9000 is frequently powered off and on again, such as between different locations for a mobile broadcast truck.

Factory Default

This preset includes the fixed factory default values for most configurable settings in the instrument. Recall this preset to restore the instrument to a known state. The Factory Default preset cannot be updated.

Preset File

There are several options for existing preset files:

Recall User-defined Preset

A saved JSON file can be recalled at any time and the configuration parameters from the preset file restored to the instrument:

1. In the Preset File menu, select the preset file with the needed parameters.
2. Select **Recall**.

Update User-defined Preset

You can update an existing user-defined preset file and overwrite the preset file with the current configuration parameters for the instrument:

1. In the Preset File menu, select the preset file to update.
2. Select **Save Current**.

Download User-defined Preset

You can download a user-defined preset file from the instrument to your computer:

Note: This function is available only on the web interface.

1. In the Preset File menu, select the preset file to download.
2. Select **Download** to open a dialog box from the browser window.
3. In the dialog box, select the folder on your computer to save the preset file to and select **Save**.

Delete User-defined Preset

You can delete a user-defined preset file from the instrument. This removes the file from the list of files in the Preset File menu:

1. In the Preset File menu, select the preset file to delete.
2. Select **Delete**.

Upload User-defined Preset

You can upload a user-defined preset file from your computer and save it on the instrument. It will be added to the list of files in the Preset File menu:

Note: This function is only available on the web interface.

1. Create a preset file on your computer.
There are several ways to create a JSON text file with the correct preset parameters. This is the easiest way:
 - A. Save the current instrument settings to a new file on the instrument.
 - B. Download the file to your computer.
 - C. Edit the file with a text editor.
 - D. Save the edited file.
2. Select **Choose File** and locate the file on your computer.
3. Select **Upload**.

New Preset File

User-defined presets are saved as JSON text files in non-volatile memory on the instrument. To create a new user defined preset:

1. In the New Preset File field, enter the preset name.
2. Select **Save as New**.

The .json filename suffix is added automatically. The new file is added to the menu for the Preset File actions.

Configuration Settings Not Saved in Presets

Several parameters are saved in non-volatile memory of the SPG9000 so they are restored when the instrument is powered off and on again, but they are not saved in

preset files. These are parameters that typically would not change in different operational environments, such as between different mobile production locations:

- Enabled software licenses
- Network parameters:
 - Hostname and domain name
 - Management port IP address, subnet mask, gateway address, DNS server address, system name, and location
 - PTP and IP port addresses, subnet masks, and gateway addresses
- Web server configuration:
 - Web interface passwords
 - API key
 - SSL certificates
- Syslog configuration:
 - Server address
 - Transport protocol
 - Severity level
- SNMP configuration:
 - SNMP and trap enable
 - Trap destination addresses
 - Username and password keys
- NMOS configuration
 - NMOS enable
 - Registry server address
- Front-panel interface settings:
 - Timeout duration
 - Display backlight brightness
 - Beeper enable
- System font selection for text video overlays

File Management

The SPG9000 has non-volatile internal storage for several types of user-created and system-created files:

Presets: Text files (JSON format) that include complete configuration settings for the instrument, or a subset of configuration settings for selected parameters. See [Presets](#).

Images: Full-frame picture files (TIFF format) that can be used for video test signal outputs. See [Test Signal](#).

Logos: Picture files (PNG format) that can be used as an overlay on top of the current background test signal image. See [Overlay](#).

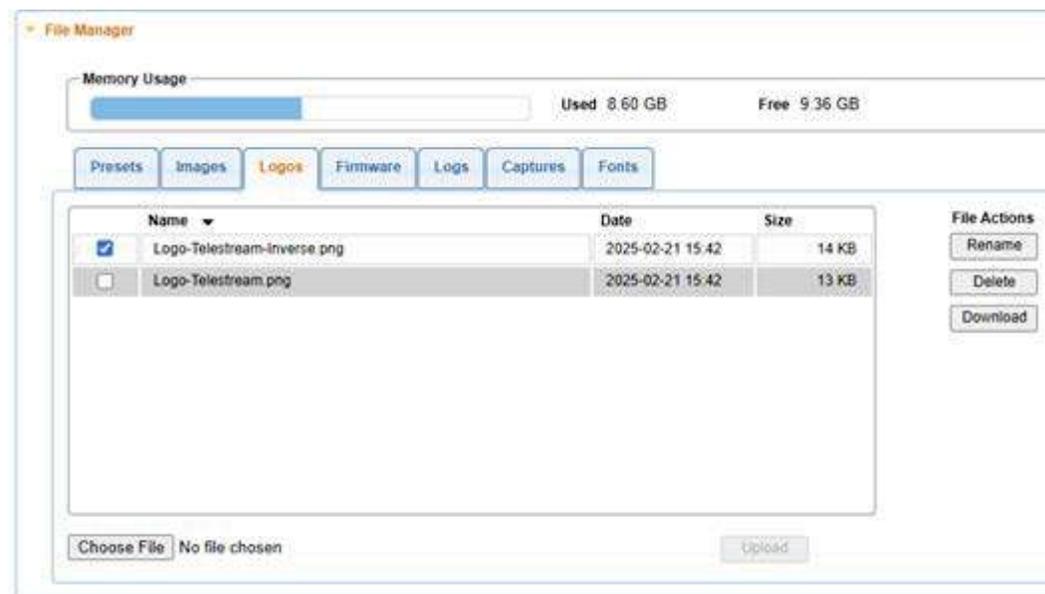
Firmware: System firmware packages that can be used to upgrade the system firmware. See [Upgrade Instrument Firmware](#).

Logs: Syslog files that are saved in volatile memory but can be downloaded to your computer. See [Syslog](#).

Captures: Network packet capture files (pcap format) that can be created from network traffic that is sent and received from the PTP and IP ports. See [Network Packet Capture](#).

You can upload to the instrument, download from the instrument, rename, or delete these files using the File Manager.

On the SPG9000 web interface, select the **System** tab and then select the **File Manager** section.



The gauge at the top of the section indicates the current storage memory usage, with the approximate used space and free space displayed.

Note: The memory usage also includes the space used by the operating system and SPG9000 software, not just the space for user files. Therefore, approximately 6-7 GB of space will be shown as "Used" for a SPG9000 system that has no saved user files.

Below the memory usage gauge are a set of tabs that correspond to each type of file. Select the tab to view the files of that type.

Within the tab you will see a table of files, including the filename, date that the file was created, and approximate file size. The checkbox in the leftmost column of each row is used to select one or more files upon which an action can be performed. Select a file and buttons will be enabled on the right side of the table:

Rename: Select to rename the checked file. You can only rename one file at a time, so if two or more files have their checkboxes selected, this button will be unavailable.

Delete: Select to remove the checked file(s) from SPG9000 storage.

Download: Select to download the checked file(s) to your local computer. Your web browser might open a Save As dialog box where you can complete the process, or the file will be automatically saved to the folder configured in your browser settings.

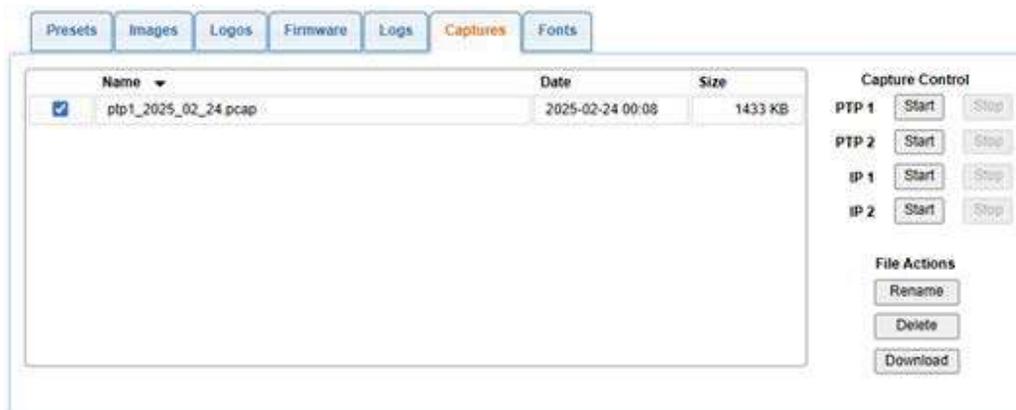
Below the table of files are controls to upload new files from your local computer to the SPG9000.

1. Select **Choose File** to open a file selection dialog box from your web browser. Select a file from your local computer and select **Open**.
2. On the SPG9000 web interface, the selected filename will be displayed to the right of the button. Select **Upload** to complete the process.

Network Packet Capture

For troubleshooting issues with the media ports (PTP 1 & 2 and IP 1 & 2), you can capture network packets on any of these interfaces for offline analysis using programs such as [Wireshark](#). The "pcap" file format is used for packet capture files.

Select the **System** tab and then select the **File Manager** section. Select the **Captures** tab within that section.



Packet capture is manually controlled from the Start and Stop buttons. These buttons will be disabled if there is no SFP module installed for the corresponding port, or if the port is currently disabled. See [Configuration Settings for PTP Network Interfaces](#) and [Configuration Settings for IP Network Interfaces](#). The capture control buttons are independent for each of the four media ports. Both received and transmitted packets are captured for each port.

Note: The SPG9000-PTP license must be enabled to capture packets for the PTP 1 and PTP 2 interfaces, and the SPG9000-IP license must be enabled to capture packets for the IP 1 and IP 2 interfaces.

The SPG9000 does not forward all Ethernet packets to the internal CPU. Notably, high-bandwidth ST 2110 traffic is filtered by hardware because these packets do not need to be processed by the system. Therefore, the SPG9000 will only capture management plane and control plane protocols such as:

- PTP (Precision Time Protocol)
- ARP (Address Resolution Protocol)
- DHCP (Dynamic Host Configuration Protocol)
- IGMP (Internet Group Management Protocol)
- LLDP (Link Layer Discovery Protocol)
- mDNS (multicast DNS)

When capture is stopped, a new pcap file will be created with a filename that includes the interface name, date, and sequence number. You can rename the file in the SPG9000's storage location or download it to your computer. Deleting the file on the SPG9000 will free its storage space.

Note: Some browsers may consider .pcap files as insecure and block the file download. It is safe to keep these files.



Fonts

The ID text overlay feature uses a system font for character rendering. You can choose the most appropriate font file for the language(s) you will use for ID text. See [ID Text](#) for additional configuration options.

Select the **System** tab and then select the **File Manager** section. Select the **Fonts** tab within that section.



Note: The Action buttons available for other file types are not used for font files. You cannot upload, download, rename or delete the system font files.

Widely used characters, such as uppercase and lowercase Latin letters (with or without accent marks), Arabic numerals, punctuation marks and other symbols are available in every font.

System Status and Monitoring

The SPG9000 has multiple features for monitoring the status of the instrument and its reference signals. The front panel has colored LED indicators for quickly checking several status items, and a set of menus accessed from the STATUS button for more detailed information. The web interface also shows the same indicators on the banner at the top of the page and has a Status tab with detailed information. The web services API has several messages for getting the status of the reference, GNSS, and PTP functions.

Indicators

There are nine colored LED indicators on the front panel of the instrument:



These indicators are mirrored on the web interface, on the right side of the banner at the top of the page. When a physical front-panel indicator changes state, the web page indicator also changes.



The front-panel indicators are grouped according to function:

Reference

The INT and EXT indicators (located under the REF button) show the status of the reference source. See [Reference Sources](#).

Reference Source	EXT LED State	INT LED State	Operational Status
Internal	Off	Solid green	Good
	Off	Blinking green	Warming up
Genlock Input	Solid green	Off	Locked
	Solid yellow	Off	Near Loss of Lock
	Solid red	Solid green	Unlocked
GNSS Signal ¹	Solid green	Off	Locked
	Blinking green	Off	Secondary reference is active and locked. See Secondary Reference .
	Solid yellow	Off	FOM is less than the GNSS signal warning threshold. See Signal Warning Threshold .
	Blinking yellow	Off	Secondary reference is active but has a lock warning
	Solid red	Solid green	Unlocked or Holdover
PTP Follower ²	Solid green	Off	Locked
	Solid yellow	Off	The reference is locked to the PTP time, but the time from the grandmaster is near the lock range limit of the system.
	Solid red	Solid green	Unlocked or Holdover

1. Option SPG9000-GNSS must be licensed to select GNSS Signal as the reference source.
2. Option SPG9000-PTP must be licensed to select PTP Follower as the reference source.

Time

The INPUT indicator (located under the TIME button) shows the status of the main time-of-day (MTOD) source. On the web interface, the INPUT indicator is labeled TIME. See [Time-of-Day Sources](#) for information on the MTOD source.

Time of Day Source	(TIME) INPUT LED State	Operational Status
Internal	Off	Time is based on the internal main time-of-day register. This might have been previously set by an external source or by manual input.

Time of Day Source	(TIME) INPUT LED State	Operational Status
VITC Input	Solid green	VITC data is present in the genlock input signal and is being used for the MTOD source.
	Solid red	There is no genlock input signal, or the signal is present and there is no VITC data detected, or the VITC data is discontinuous.
LTC Input	Solid green	The LTC input signal is present and is being used for the MTOD source.
	Solid yellow	The timing of the LTC input signal and the genlock input signal are the same frame rate, but the relative timing is outside the SMPTE ST 12 specification.
	Solid red	The LTC input signal is missing, the LTC data is discontinuous, or the LTC frame rate is badly timed relative to the genlock input signal.
GNSS Signal ¹	Solid green	The system is using the time from the GNSS receiver as the MTOD source.
	Solid red	The system is not locked to the GNSS signal.
PTP Follower ²	Solid green	The system is using PTP time as the MTOD source.
	Solid red	The system is not locked to a PTP leader.

1. Option SPG9000-GNSS must be licensed to select GNSS Signal as the time and reference source
2. Option SPG9000-PTP must be licensed to select PTP Follower as the time and reference source

The X-REF indicator (also located under the TIME button) is for future use.

PTP

The GM 1 and GM 2 indicators (located under the PTP button) show the grandmaster status of the PTP 1 and PTP 2 instances respectively. See [PTP Configuration](#). Option SPG9000-PTP must be licensed to enable PTP operation.

GM LED State	PTP Status
Bright green	Active Leader
Dim green	Passive Leader
Red	Faulty
Off	Listening, Disabled, or Follower

FAULT

The FAULT indicator is illuminated when there is a problem with the instrument hardware.

FAULT LED State	Instrument Condition	Examples
Off	The instrument is operating properly.	
Solid yellow	A fault condition exists, but the instrument is still usable.	<ul style="list-style-type: none"> The phase-locked loops (PLLs) are unlocked. A power supply module has reached the TWH limit. See Temperature-Weighted Hours.
Blinking red	A fault condition exists that has the potential to damage the instrument hardware.	<ul style="list-style-type: none"> The main fans have stopped. The internal temperature is too high.
Solid red	A fault condition exists that renders the instrument unusable.	<ul style="list-style-type: none"> A fan speed is out of range. An internal voltage is out of range.

See [System Status](#) to view the detailed diagnostic data. If the FAULT indicator is blinking red or solid red, record the fault details, unplug the instrument from the power source, and contact Telestream customer support.

PWR 1 and PWR 2

These two indicators show the status of the two power supply modules.

Note: If the SPG9000 was purchased with option SPG9000-SPW, only one power supply module is installed in the instrument. If it was purchased with option SPG9000-DPW, two power supply modules are installed in the instrument. A second or replacement power supply can be added at any time by purchasing option SPG9000-ACC-DPW.

When one power supply module is installed, the corresponding PWR 1 or PWR 2 indicator is on and the other indicator is off.

PWR1 / PWR2 Indicator State	Power Supply Module Condition	Description	User Actions
Green	No faults	Normal operation	None

PWR1 / PWR2 Indicator State	Power Supply Module Condition	Description	User Actions
Yellow	Warning	<ul style="list-style-type: none"> • A marginally out-of-range power supply voltage is detected. • The supply has exceeded the specified TWH. See Temperature-Weighted Hours. • The power supply fan has stopped. 	<ol style="list-style-type: none"> 1. Install a second power supply module. 2. Remove the faulted power supply module for repair.
Red	Fault	The power supply voltage is out of range.	<ol style="list-style-type: none"> 1. Install a second power supply module. 2. Remove the faulted power supply module for repair.

When two power supplies are installed, both PWR 1 and PWR 2 indicators are on.

PWR1 / PWR2 Indicator State	Power Supply Module Condition	Description	User Actions
Off	Not installed	The power supply is not properly installed; the system is only detecting one power supply.	Check that the module is fully inserted into its rear panel slot.
Bright green	No faults	This is normal operation for the active power supply.	None
Dim green	No faults	This is normal operation for the inactive (backup) power supply.	None
Yellow	Warning or fault in the active supply	<ul style="list-style-type: none"> • A marginally out-of-range power supply voltage for the active supply is detected. • The supply has exceeded the specified TWH. See Temperature-Weighted Hours. • The active supply fan has stopped. 	<p>If the status of the inactive supply is not faulted (dim green), remove the faulted power supply module for repair. The other supply becomes active.</p> <p>If the status of the inactive supply is also faulted (red), remove that power supply module for repair first.</p>

PWR1 / PWR2 Indicator State	Power Supply Module Condition	Description	User Actions
Red	Fault or no power	<ul style="list-style-type: none"> The power cable for the supply is unplugged, or there is no power from the source. The power supply voltage of the active supply is out of range. The fan of the backup supply has stopped. <hr/> <p>Note: In the case of a failed fan on both supplies, the instrument operates as long as the voltage is adequate.</p>	<ul style="list-style-type: none"> Verify the power cable is connected to the power supply module and the power cable is connected to the power source. Remove the associated power supply module for repair.

Status Information

Detailed status information can be viewed on the Status tab of the web interface. The displays are updated in real-time, so the user can see changes as they occur. A subset of important status information can also be viewed from the front-panel STATUS menu.

Web Interface for Status

On the SPG9000 web interface, click the **Status** tab.

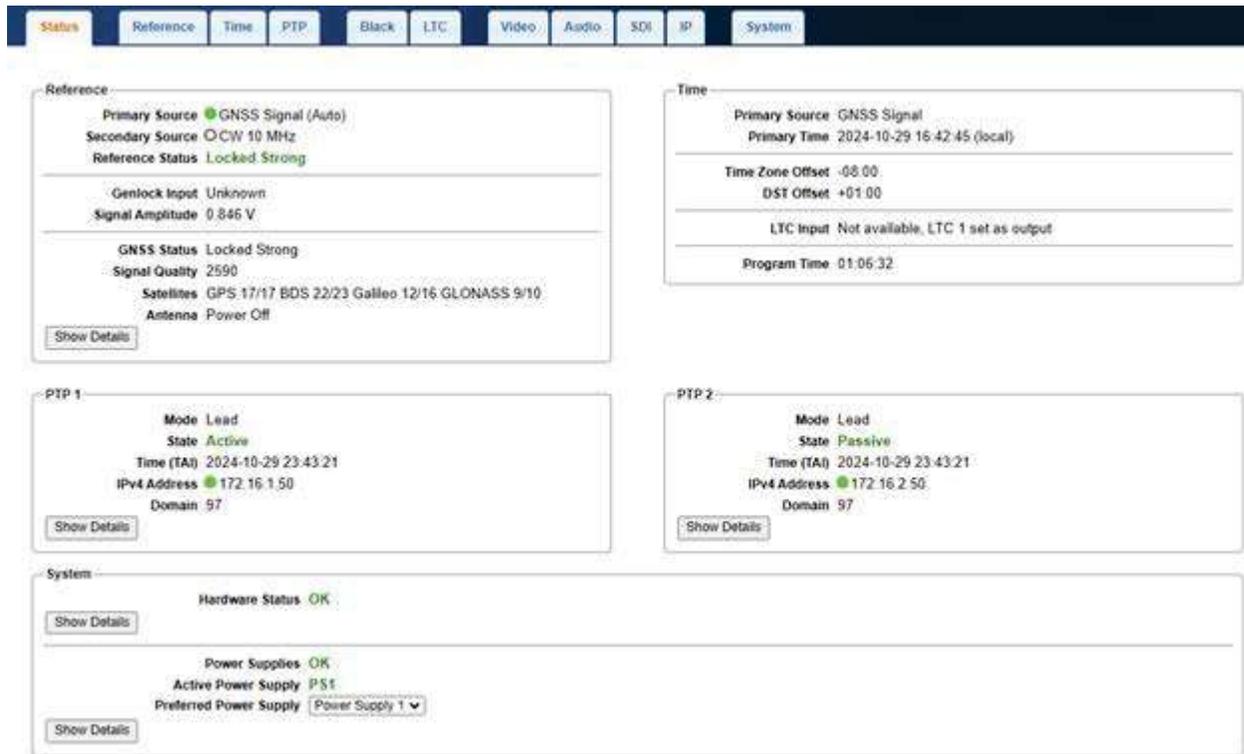
The web page Status contents are organized into several main sections:

Reference includes information about the status of the primary and secondary reference sources, the genlock input signal, and the GNSS receiver status.

Time includes the current time-of-day from its primary source, any local time offsets, status of any time code input, and the current value of the program time counter.

PTP 1 and **PTP 2** include status for the two PTP instances.

System includes diagnostic information for the system hardware, including the power supply modules.



Front-Panel Menu for STATUS

To use the front panel of the SPG9000 for this process, press **STATUS**. See [Menu Operations](#) for details of using the front-panel menus.

The table shows the submenus for the STATUS menu.

STATUS :

FAULT

ALERT

REFERENCE

TIME :

PTP 1 : Only available if the SPG9000-PTP license is enabled

PTP 2 : Only available if the SPG9000-PTP license is enabled

GNSS : Only available if the SPG9000-GNSS license is enabled

The front-panel menus for STATUS are multiple-page menus (see [Multiple-Page Menus](#)), so the user can press the left and right arrow buttons to see all the available information for the current menu.

The FAULT submenu provides additional details if the FAULT indicator is illuminated. See [FAULT](#). If the indicator is not lit, the submenu will display "No faults".