

SIRIUS®

 **DEWESoft®**

TECHNICAL REFERENCE MANUAL

SIRIUS® V25-1



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2. About this document

This is the Technical Reference Manual for SIRIUS® Systems.

SIRIUS is a versatile data acquisition hardware line which comes in many different form factors and can be equipped with a wide range of different amplifiers, so that you can use it for virtually any measurement task. Each system also includes a professional license for our award-winning Dewesoft data acquisition software.

The manual is divided into several chapters. You will find:

- A detailed description of the SIRIUS hardware and the main combination and expansion options
- A description of the connection variants and the pin assignments on the inputs and outputs
- A comprehensive introduction to the configuration of the modules using DewesoftX®
- Detailed technical data: Specifications, etc.

2.1. Legend

The following symbols and formats will be used throughout the document.



Important

Gives you important information about a subject.
Please read carefully!



Hint

Gives you a Hint or provides additional information about a subject.



Example

Gives you an example of a specific subject.

Safety symbols in the manual:



Warning

Calls attention to a procedure, practice, or condition that could cause the body injury or death



Caution

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

2.2. Online versions

2.2.1. SIRIUS® Technical Reference Manual

The most recent version of this manual can be downloaded from our homepage:
<https://dewesoft.com/download/manuals>

2.2.2. DewesoftX® User Manual

The DewesoftX® User Manual document provides basics and additional information and examples for working with DewesoftX® and certain parts of the program.

See: <https://dewesoft.com/download/manuals>



Important

Read safety instructions first in chapter Safety instructions

4. System Overview

SIRIUS

The world's most versatile USB and EtherCAT data acquisition system.
Any signal, any sensor, packed with cutting edge technology.



Voltage



Strain / Stress



Quarter Bridge



Half Bridge



Full Bridge



Thermocouple



Digital IO



IEPE



Charge



Current



Shock rating



PT100
RTD



Resistance



DSI Compatible



TEDS
Compatible



EtherCAT



IP50



-10 °C to +50 °C



High Voltage



LVDT



Counter
Encoder



CAN BUS



OBDII



J1939



Analog out



USB 2.0

4.1. Main features

- **USB/ETHERCAT INTERFACE:** SIRIUS DAQ system can be connected via USB or EtherCAT to any Windows compatible PC or to one of our high-performance [SBOX data loggers](#).
- **ANY SENSOR:** Array of different amplifiers are available that can acquire data from virtually any sensor on the market. IEPE, voltage, high voltage, charge, full / half / quarter bridge, LVDT, RTD, thermocouples, current, resistance, counter, encoder, and digital inputs are available.
- **UNIVERSAL ANALOG INPUTS:** Universal analog amplifiers can accept voltage and full / half / quarter bridge signals natively as well as IEPE, charge, thermocouples, RTD, current, resistance, and LVDT signals with the use of [DSI adapters](#).
- **160 dB DYNAMIC RANGE:** Our DualCoreADC® technology boosts dual 24-bit delta-sigma ADC's with an anti-aliasing filter on each analog channel, achieving astonishing 160 dB dynamic range in time and frequency domain with 200 kHz sampling rate per channel.
- **1 MHz SAMPLING RATE:** A combination of software and hardware allows for acquisition speeds up to 1 MHz per channel on SIRIUS HS devices with real-time data processing and streaming to disk.
- **HIGH ISOLATION:** High channel-to-channel and channel-to-ground isolation prevents damage to the systems from excessive voltage and avoids ground loops.
- **FLEXIBLE AND SCALABLE:** SIRIUS DAQ system can grow with your needs. You can start with a single channel and scale the system to thousands of channels at any time.
- **SENSOR POWER SUPPLY:** Amplifiers provide channel-independent, programmable power supply for sensor excitation.
- **DIGITAL/COUNTER/ENCODER INPUTS:** Each channel is capable of 3x digital inputs, 1x event counter, encoder, period, pulse-width, duty-cycle, and precise frequency and angle measurement using patented SUPERCOUNTER® technology.
- **ISOLATED CAN INPUT:** High speed CAN 2.0b channels with 1 Mbit/sec data throughput with additional support for CCP, OBDII, J1939, and CAN output.
- **ANALOG OUTPUTS/FUNCTION GENERATOR:** SIRIUS slice can be configured with 8 analog outputs which can also function as a multi-channel function generator (software option upgrade required), analog replay, or control device with the output voltage signal of ± 10 V.
- **FULLY SYNCHRONIZED:** Each channel, analog, digital, or CAN is synchronized with microsecond accuracy.
- **SOFTWARE INCLUDED WITH FREE LIFETIME UPGRADES:** The easy-to-use but rich in functionality, award-winning [DewesoftX® software](#) is included. All upgrades to the software are free forever with no hidden licensing costs.

This chapter contains all information about SIRIUS® systems. The various measurement modules have their own chapter: SIRIUS® Measurement Modules.

SIRIUS® is a data acquisition system, which offers the highest flexibility for inputs like the voltage, current, temperature, strain, vibration, pressure, counters, CAN and more. The data transfer to the PC can be done via USB or EtherCAT®.

The SIRIUS® system consists of Slices which contain up to 8 measurement Modules

Each SIRIUS® module typically has one analog channel. The HD-series has 2 channels per module. Some modules are available with an additional counter channel - those modules have a plus sign + at the end: e.g. SIRIUS ACC+ or, SIRIUS STGM+.

Optionally available is a version with 8 analog outputs on the rear side of a Slice.

Multiple Slices can be combined and synced together to get a multi-channel solution.

4.1.1. Naming of variants, suffix description



Important

See table below for SIRIUS, Rack and SBOX suffix descriptions / abbreviations.

Suffix	Device	Description
i	SIRIUSi	Isolated version
e	SIRIUSe SBOXe	EtherCAT version SBOX with integrated Sync Junction
f	SIRIUSf	Fanless version
r	SIRIUSr	Rack version
m	SIRIUSm	Mini 4-channel SIRIUS version
im	SIRIUSim	Isolated Mini 4-channel CAN SIRIUS version
ie	SIRIUSie	Isolated EtherCAT version
if	SIRIUSif	Isolated Fanless version
ir	SIRIUSir	Isolated Rack version
fe	SIRIUSfe SBOXfe	Fanless EtherCAT version Fanless SBOX with integrated Sync Junction
re	SIRIUSre SBOXre	EtherCAT version for Rack instruments SBOX with integrated Sync Junction for Rack instruments
se	SBOXse	EtherCAT version for Rack instruments Slim version
we	SIRIUSwe SBOXwe	Watertight EtherCAT version Watertight SBOX with integrated Sync Junction
ife	SIRIUSife	Isolated Fanless EtherCAT version
ire	SIRIUSire	Isolated Rack EtherCAT version
iwe	SIRIUSiwe	Isolated Watertight EtherCAT version
rt	Rack rt	Real Time EtherCAT slave port version
D	Rack d	Rack with display version
B	Rack b	Rack with battery power version
DB	Rack db	Rack with display and battery version

4.4.1.5. EtherCAT® slave port

DAQ AND CONTROL: R_rt instrument is an upgrade of the Rack DAQ system. It uses the same DAQ technology, data logging, and data processing capabilities, but includes an additional EtherCAT slave port that can send the real-time data feed to any 3rd party EtherCAT master controller.

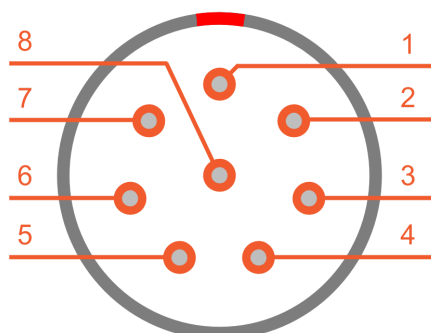
Important



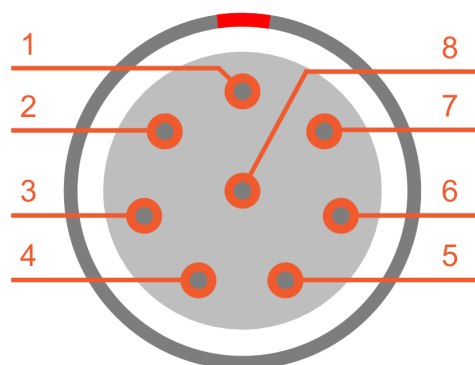
List of supported systems

R2rt	R4rt	R8rt

DUAL MODE: EtherCAT slave interface can be used to provide real-time data to a 3rd party control system while the Internal bus allows full-speed data recording to Dewesoft X software in parallel, serving both worlds of data acquisition and control which have been so far separated.



EtherCAT SLAVE IN connector: pin-out (8-pin LEMO male)



EtherCAT SLAVE OUT connector: pin-out (8-pin LEMO female)

Pin	Name	Description
1	TX_P	Transmission +
2	TX_N	Transmission -
3	RX_P	Reception +
4	RX_N	Reception -
5	VIN+	Power (see 1)
6	VIN+	Power (see 1)
7	VIN-	Ground (see 1)
8	VIN-	Ground (see 1)

1) VIN+ and VIN- are not connected to internal Power or Ground signals. Only pass-through between IN / OUT connectors is made.

Connectors (on the device):
EGG.IT.308.CLN LEMO 8-pin female
EGJ.IT.308.CLD LEMO 8-pin male

Mating connector (for the cable):
FGG.IT.308.CLA.1433 male
FGJ.IT.308.CLL.1433 female

4.10.4. SIRIUS-R4-HUB: Specification

Interfaces and options	
USB Front	1x USB 2.0, USB Mini B
Synchronisation	2x SIRIUS® SYNC
USB 2.0 hub	
Bandwidth	Minimum 20 MB/sec Typical 25 MB/sec Maximum 28 MB/sec
SIRIUS Dual Core	32 AI Channels at 200 kS/sec @ 25.6 MB/sec
SIRIUS HS	32 AI Channels, 450 kS/sec @ 28.8 MB/sec 8 AI Channels + 1 Counter, 1000 kS/sec @ 20 MB/sec
Power	
Power supply	9 - 36 V DC
Connector	3-pin LEMO male
Power consumption	Typ. 4.8 W (Max. 6.8 W) (excl. SIRIUS® slices)
Environmental	
Operating Temperature	-10 to 50°C
Storage Temperature	-40 to 85°C
Humidity	95 % RH non condensing @ 50°C
IP rating	IP20
Shock & Vibration	Vibration sweep sinus (EN 60068-2-6:2008)\ Vibration random (EN 60721-3-2: 1997 - Class 2M2) Shock (EN 60068-2-27:2009) MIL-STD-810D
Physical	
Dimensions	276 x 251 x 150 mm
Weight	2.75 kg (excl. SIRIUS® slices)

4.10.7. SIRIUS-R2-HUB/R4-HUB: Front side



SIRIUS-R4-HUB

Name	Description
SYNC	2x 4-pin LEMO male sync connector
GND	Protective Ground banana plug and screw connector
USB	USB 2.0, USB Mini B
PWR	To switch the System on/off.
IN	Power in 3-pin LEMO male connector

9. Warranty information

Notice

The information contained in this document is subject to change without notice.

Note:

Dewesoft d.o.o. shall not be liable for any errors contained in this document. Dewesoft MAKES NO WARRANTIES OF ANY KIND WITH REGARD TO THIS DOCUMENT, WHETHER EXPRESS OR IMPLIED. DEWESOFT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Dewesoft shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory, in connection with the furnishing of this document or the use of the information in this document.

The copy of the specific warranty terms applicable to your Dewesoft product and replacement parts can be obtained from your local sales and service office. To find a local dealer for your country, please visit <https://dewesoft.com/support/distributors>.

9.1. Calibration

Every instrument needs to be calibrated at regular intervals. The standard norm across nearly every industry is annual calibration. Before your Dewesoft data acquisition system is delivered, it is calibrated. Detailed calibration reports for your Dewesoft system can be requested. We retain them for at least one year, after system delivery.

9.2. Support

Dewesoft has a team of people ready to assist you if you have any questions or any technical difficulties regarding the system. For any support please contact your local distributor first or Dewesoft directly.

Dewesoft d.o.o.
Gabrsko 11a
1420 Trbovlje Slovenia

Europe Tel.: +386 356 25 300

Web: <http://www.dewesoft.com>

The telephone hotline is available Monday to Friday from 07:00 to 16:00 CET (GMT +1:00)

9.3. Service/repair

The team of Dewesoft also performs any kind of repairs to your system to assure safe and proper operation in the future. For information regarding service and repairs please contact your local distributor first or Dewesoft directly on <https://dewesoft.com/support/rma-service>.

9.4. Restricted rights

Use Slovenian law for duplication or disclosure. Dewesoft d.o.o. Gabrsko 11a, 1420 Trbovlje, Slovenia / Europe.

9.5. Copyright

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9.6. Trademarks

We take pride in our products and we take care that all key products and technologies are registered as trademarks all over the world. The Dewesoft name is a registered trademark. Product families (KRYPTON, SIRIUS, DSI, DS-NET, IOLITE) and technologies (DualCoreADC, SuperCounter, GrandView) are registered trademarks as well. When used as the logo or as part of any graphic material, the registered trademark sign is used as a part of the logo. When used in text representing the company, product or technology name, the ® sign is not used. The Dewesoft triangle logo is a registered trademark but the ® sign is not used in the visual representation of the triangle logo.

10. Safety instructions

Your safety is our primary concern! Please be safe!

10.1. Safety symbols in the manual



Warning

Calls attention to a procedure, practice, or condition that could cause body injury or death



Caution

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

10.2. General Safety Instructions



Warning

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Dewesoft d.o.o. assumes no liability for the customer's failure to comply with these requirements.

All accessories shown in this document are available as an option and will not be shipped as standard parts.

10.2.1. Environmental considerations

Information about the environmental impact of the product.

10.2.2. Product End-of-Life handling

Observe the following guidelines when recycling a Dewesoft system:

10.2.3. System and components recycling

Production of these components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at its end of life! Please recycle this product in an appropriate way to avoid unnecessary pollution of the environment and to keep natural resources.



This symbol indicates that this system complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further information about recycling on the Dewesoft web site www.dewesoft.com

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment and is outside the scope of the 2002/95/EC RoHS Directive. However, we take care of our environment and the product is lead-free.

10.2.4. General safety and hazard warnings for all Dewesoft systems

The safety of the operator and the unit depend on following these rules.

- Use this system under the terms of the specifications only to avoid any possible danger.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- DO NOT touch internal wiring!
- DO NOT use any higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- You may not connect higher voltages than rated to any connectors.
- The power cable and connector serve as Power-Breaker. The cable must not exceed 3 meters, the disconnect function must be possible without tools.
- Maintenance must be executed by qualified staff only.
- During the use of the system, it might be possible to access other parts of a more comprehensive system. Please read and follow the safety instructions provided in the manuals of all other components regarding warning and security advice for using the system.
- With this product, only use the power cable delivered or defined for the host country.
- DO NOT connect or disconnect sensors, probes or test leads, as these parts are connected to a voltage supply unit.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), a non-interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals.
- Please note the characteristics and indicators of the system to avoid fire or electric shocks. Before connecting the system, please read the corresponding specifications in the product manual carefully.
- The inputs must not, unless otherwise noted (CATx identification), be connected to the main circuit of category II, III and IV.
- The power cord separates the system from the power supply. Do not block the power cord, since it has to be accessible for the users.
- DO NOT use the system if equipment covers or shields are removed.
- If you assume the system is damaged, get it examined by authorized personnel only.

- Adverse environmental conditions are Moisture or high humidity Dust, flammable gases, fumes or dissolver Thunderstorm or thunderstorm conditions (except assembly PNA) Electrostatic fields, etc.
- The measurement category can be adjusted depending on the module configuration.
- Any other use than described above may damage your system and is attended with dangers like short-circuiting, fire or electric shocks.
- The whole system must not be changed, rebuilt or opened.
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until the safe operation can be verified by service-trained personnel. If necessary, return the product to the Dewesoft sales and service office for service and repair to ensure that safety features are maintained.
- If you assume a more riskless use is not provided anymore, the system has to be rendered inoperative and should be protected against inadvertent operation. It is assumed that a more riskless operation is not possible anymore if the system is damaged obviously or causes strange noises. the system does not work anymore. the system has been exposed to long storage in adverse environments. the system has been exposed to heavy shipment strain.
- Warranty void if damages caused by disregarding this manual. For consequential damages, NO liability will be assumed!
- Warranty void if damage to property or persons caused by improper use or disregarding the safety instructions.
- Unauthorized changing or rebuilding the system is prohibited due to safety and permission reasons (CE).
- Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.
- The product heats during operation. Make sure there is adequate ventilation. Ventilation slots must not be covered!
- Only fuses of the specified type and nominal current may be used. The use of patched fuses is prohibited.
- Prevent using metal bare wires! Risk of short circuit and fire hazard!
- DO NOT use the system before, during or shortly after a thunderstorm (risk of lightning and high energy over-voltage). An advanced range of applications under certain conditions is allowed with therefore designed products only. For details please refer to the specifications.
- Make sure that your hands, shoes, clothes, the floor, the system or measuring leads, integrated circuits and so on, are dry.
- DO NOT use the system in rooms with flammable gases, fumes or dust or in adverse environmental conditions.
- Avoid operation in the immediate vicinity of high magnetic or electromagnetic fields, transmitting antennas or high-frequency generators, for exact values please refer to enclosed specifications.
- Use measurement leads or measurement accessories aligned with the specification of the system only. Fire hazard in case of overload!
- Lithium ion batteries are classified as not hazardous when used according to the recommendations of the manufacturer described in Battery Safety Data Sheet, which is available for download from our homepage: <http://www.dewesoft.com/download>.
- Do not switch on the system after transporting it from a cold into a warm room and vice versa. The thereby created condensation may damage your system. Acclimatize the system unpowered to room temperature.

- Do not disassemble the system! There is a high risk of getting a perilous electric shock. Capacitors still might be charged, even if the system has been removed from the power supply.
- The electrical installations and equipment in industrial facilities must be observed by the security regulations and insurance institutions.
- The use of the measuring system in schools and other training facilities must be observed by skilled personnel.
- The measuring systems are not designed for use in humans and animals.
- Please contact a professional if you have doubts about the method of operation, safety or the connection of the system.
- Please be careful with the product. Shocks, hits and dropping it from already- lower level may damage your system.
- Please also consider the detailed technical reference manual as well as the security advice of the connected systems.
- This product has left the factory in safety-related flawlessness and in proper condition. In order to maintain this condition and guarantee safety use, the user has to consider the security advice and warnings in this manual.

EN 61326-3-1:2008

IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications intended to perform safety functions as defined in IEC 61508 with SIL 1-3.

The electromagnetic environments encompassed by this product family standard are industrial, both indoor and outdoor, as described for industrial locations in IEC 61000-6-2 or defined in 3.7 of IEC 61326-1.

Equipment and systems intended for use in other electromagnetic environments, for example, in the process industry or in environments with potentially explosive atmospheres, are excluded from the scope of this product family standard, IEC 61326-3-1.

Devices and systems according to IEC 61508 or IEC 61511 which are considered as “operationally well-tried”, are excluded from the scope of IEC 61326-3-1.

Fire-alarm and safety-alarm systems, intended for the protection of buildings, are excluded from the scope of IEC 61326-3-1.

11. Documentation version history

Version	Date [dd.mm.yyyy]	Notes
V20-1	01.07.2020	The NEW SIRIUS manual - Reworked and revised version
V20-2	19.10.2020	- HS filtering description updated - Corrected pin-out on Multi module
V21-1	26.01.2021	Modes added and Input termination, impedance updated in General Counter specifications
V21-2	26.02.2021	- Updated section 11.2.4. General safety and hazard warnings for all Dewesoft systems - Removed Sirius LV 20V range in SIRIUS dual core specifications table 4.8.4. Added scope of supply for R2DB
V22-1	25.01.2022	- Updated naming for R8D and R8DB - Front side was renamed to Amplifier side - Rear side was renamed to Display side 4.3.2. Added a description of the Krypton side holder 5.3.3. Added pictures of other SIRIUSiwe devices 5.7.3. Included information on Low-pass filters on Sirius HS 6.1.3.3 Bandwidth vs. Aliasing-free bandwidth - updated picture - Added products: - SIRIUSi 8xMIC200 - SIRIUSi 8xUNI
V22-2	18.07.2022	5.5. Sirius HS-ACC fixed the minimum voltage range 5.6. SIRIUSwe updated information about internal shunt resistor 4.4.2.1. SBOX GPS updated pinouts for 10Hz and 100Hz GPS 4.4.3. Added VGPS-DISP pinout 5.4. General specifications: added Power consumption for UNI and MIC200 amplifiers 5.25 Analog Out: Correction for Signal conditioning option for HD series
V22-3	16.12.2022	5.22.1. HS-HVv2: Specifications changed Gain Drift and Offset Drift 5.22.2. HS-HVv3: Specifications added specs of an upgraded version of HS-HV 4.5.1. SIRIUS-SBOXe/fe: Specifications added specs for SBOXe v2, the upgraded version 4.11.1. SIRIUS-SBOXre - changed description to match new specifications, - Added specifications table for SBOXre v1 and SBOXre v2 4.11.2. SIRIUS-R8: Specifications changed table of specifications according to the version of SBOXre

V23-1	03.04.2023	• 5.26. CAN: new chapter • Added or updated specifications for multiple amplifiers and systems including: ◦ Enclosure overview ◦ Charging power on some systems ◦ Derating information ◦ Overvoltage protection information ◦ Bridge mode accuracy and additional information for all strain amplifiers ◦ SBOX RAM capabilities ◦ Display information • 5.25 Analog Out: added note on switching slices with AO on R2/R4/R8 Systems • 8.3. Strain amplifiers: new chapter • Excluded Appendix chapter • Changed renders for R1 / R2 systems • 6.1.5.1. Analog filter: additional information on SW LP filters • Updated descriptions of connections for STG and LV amplifiers
V23-2	19.09.2023	• Open sky conditions added in GPS technical specifications • Added LED blinking configuration on new version of SBOXre • Modified the Accessories section, all accessories are now available in different accessories manuals
V24-1	29.01.2024	• SIRIUS-HV-TB added • SIRIUS HV amplifier specifications • SBOXse and SBOXfe v2 added • 4.11.4. SIRIUS-R8DB: Amplifier side: Added a note on how to remove slices from R8 system • 5.12.2 SIRIUS LV: broken link to Accessories manual was replaced to Current transducers manual
V24-2	10.6.2024	• SIRIUS CAN-FD default upgrade of HD and DualCore modular • SIRIUS mini tech specs update • SIRIUS MULTI added analog bandwidth of AO
V25-1	31.1.2025	• Updated SIRIUS-HS-CHG specifications • Added voltage levels for GPS connector Remote-on pin • Added STG-L1B7f, UNI-L1B7f pinouts

11.1. Previous versions history

Version	Date [dd.mm.yyyy]	Notes
1.3.0	13.11.2014	• New orange logo and style • non-isolated is now called differential • Added CHG, LV, HD-ACC, HS-CHG, HS-HV, HS-LV, HS-STG • Replaced STGM with STGMv2, HV with HVv2 and STG with STGv2