IMS-GNS183

Product Highlights

- 72-channel multi-GNSS clock module for optimum reception of GPS, Galileo, BeiDou, and GLONASS satellites from a fixed or mobile location
- Available as one slot-wide or two slot-wide models* with support for formatted time string output and the Meinberg IMS-XHE^{Rb} Rubidium expansion unit
- Ease of configuration through IMS web interface
- Compliant with ITU-T G.8272 PRTC-A specifications

A High-Accuracy Clock Module for GPS & Galileo Reception

The IMS-GNS183 clock module for Meinberg's IMS family of modular time servers is symbolic of Meinberg's longest tradition of GNSS-based timekeeping—a robust 72-channel clock module capable of acquiring the widely available GPS, Galileo, BeiDou, and GLONASS signals and using these to generate ultra-precise 10 MHz frequency signals, 1PPS clock signals as well as various time-of-day string formats for high-accuracy timekeeping.

The IMS-GNS183 is offered as single-slot designs with either a dedicated 9-pin RS-232 D-Sub port for the exchange of specifically formatted time strings or an XHE-SPI connector for the integration of an external Meinberg IMS-XHE^{Rb} Rubidium expansion unit for exceptional holdover performance, and also as an two slot-wide model that offers both the aforementioned RS-232 and XHE-SPI connectors.

* Models described as "two slots wide" or "two slots tall" in this data sheet only use two 'slots' of chassis space by virtue of their higher profile resulting from the size of the components on the printed circuit board and/or the need to accommodate more connectors. The faceplate of such high-profile modules is therefore two slots in width/height, which can prevent the use of adjacent interfaces in M500 and M1000(S) systems. Such modules do not require two physical interfaces in your IMS system.

Meinberg Funkuhren GmbH & Co. KG
Lange Wand 9
31812 Bad Pyrmont

sales@meinberg.de
www.meinbergglobal.com

Phone: +49 5281 9309-0

Basic Specifications

Receiver Type	72-channel multi-GNSS receiver
Compatible Antennas	PCTEL Multi-GNSS antenna (available from Meinberg), Meinberg GNSS Multi-Band Antenna

GNSS Signal Support

The IMS-GNS183 allows simultaneous reception of signals from the GNSS services listed below.

GPS	L1 C/A code (GPS L1 band, 1575.42 MHz) (CDMA)
Galileo	E1 OS (Galileo E1 band, B/C channels, 1575.42 MHz) (CDMA)
BeiDou	B1I (1561.098 MHz) (CDMA)
GLONASS	L1OF (GLONASS L1 band, 1602 MHz + *k**562.5 kHz) (FDMA) *k* represents the channel (between -7 and +6) within the corresponding GLONASS frequency band

Accessories Included

- A Meinberg Multi-GNSS Antenna for outdoor installation, a mounting kit containing all the accessories required to mount the antenna on a pole or wall, and a 20 m (65.6 ft) Belden H155 coaxial cable with pre-fitted connectors as standard*.
- XHE-SPI cable for connection with an external XHE^{Rb} Rubidium expansion unit (only with models featuring XHE-SPI connectivity)
- Optional: MBG-S-PRO surge protector for in-line installation between the antenna and your IMS-GNS183 module.

* Meinberg also offers customized antenna cables to accommodate your specific installation requirements. Please reach out to your Meinberg Sales Representative for more information

Oscillator Options

The IMS-GNS183 is shipped as standard with a "**OCXO SQ**" type oscillator (oven-controlled crystal oscillator), which provides excellent holdover performance if your IMS system loses synchronization with its upstream references for any reason. The IMS-GNS183 may also be shipped on request with a more powerful holdover solution; the options available and their performance metrics are listed below:

Type	Short-Term Stability (τ = 1 second)	Holdover Temperature Drift	Holdover Performance (1 Day)[1]	Holdover Performance (1 Year)[1]
OCXO SQ	5×10^{-9}	$\pm 1 \times 10^{-7}$ (–10 to 70 °C)	± 220 µs	± 4.7 s
OCXO MQ	2×10^{-10}	$\pm 5 \times 10^{-8}$ (–20 to 70 °C)	± 65 µs	± 1.6 s
OCXO HQ	5×10^{-12}	$\pm 1 \times 10^{-8}$ (5 to 70 °C)	± 22 µs	± 788 ms
OCXO DHQ[2]	2×10^{-12}	$\pm 2 \times 10^{-10}$ (5 to 70 °C)	± 4.5 µs	± 158 ms
XHE^{Rb} Rubidium	2×10^{-11}	$\pm 6 \times 10^{-10}$ (–25 to 70 °C)	± 800 ns	± 8 ms

1 Full holdover performance requires the system to have been synchronized for 24 hours previously.

2 IMS-GNS183 modules with OCXO DHQ oscillators are only available in two-slot wide models due to the size of the oscillator.

MRS Synchronization Options

The MRS (Multi-Reference Source) functionality of the IMS-GNS183 allows the clock to be synchronized not only on the basis of a GNSS reference (GPS, Galileo, BeiDou, or GLONASS) but also alternatively or redundantly by any of the following reference sources:

Source	Synchronization Types	Additional Input Module Required
External NTP server	Time of day only	None[1]
External PTP master	Time of day, phase, frequency	IMS-HPS100 module
Synchronous Ethernet	Frequency only	IMS-HPS100 module
Pulse-per-second + time string (models with COM port only)	Time of day, phase	None
External frequency signal	Frequency only	Any IMS module with a frequency input (e.g., IMS-ESI, IMS-MRI); supported frequencies dependent on module
Black burst with VITC[2] (Pro AV/Broadcasting)	Time of day, phase, frequency	IMS-VSI module
Black burst without VITC (Pro AV/Broadcasting)	Frequency only	IMS-VSI module
LTC[2] (Pro AV/Broadcasting)	Time of day, phase	IMS-VSI module
DARS/word clock (Pro AV/Broadcasting)	Frequency only	IMS-VSI module
Framed E1 bitstream (2048 kbps) (Telecom)	Frequency only	IMS-ESI module
IMS-XHE^{Rb} rubidium clock (models with IMS-XHE^{Rb} port only)	Frequency only	None

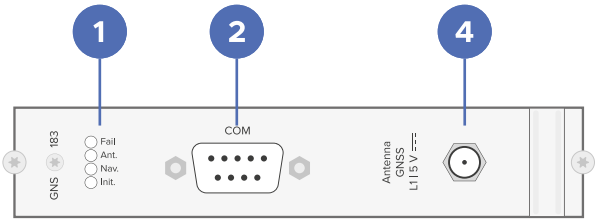
1 IMS-LNE module may be necessary for additional network connectivity.

2 Time-of-day synchronization requires SMPTE 309, SMPTE 309 MJD, or ITU-R BR.1353 VITC. Standard SMPTE 12M time code is not suitable for time-of-day synchronization.

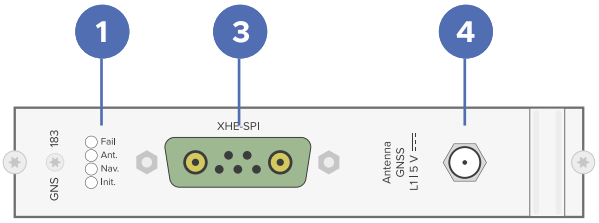
Connectors and Variants

The IMS-GNS183 models featuring a COM port allow the clock to output time strings and also to receive time strings for synchronization with an external time string source.

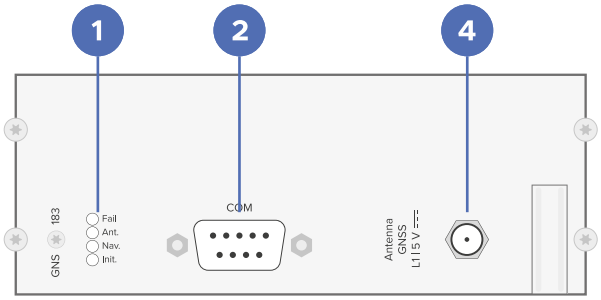
The models featuring an IMS-XHE^{Rb} port allow the clock to be synchronized via an external Meinberg IMS-XHE^{Rb} Rubidium clock for high accuracy in holdover conditions.



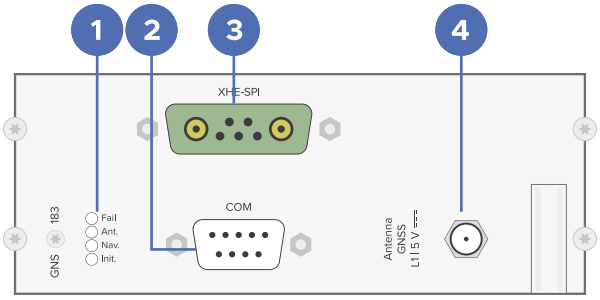
One slot COM Port Model



One slot IMS-XHE^{Rb} Connector Model



Two slot COM Port Model (OCXO DHQ)



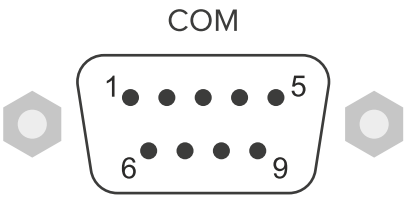
Two slot IMS-XHE^{Rb} Connector and COM Model

1 LED Status Indicators

"Fail" LED System Status	"Ant." LED Reference Signal Status	"Nav." LED Geolocation Status	"Init." LED Initialization Status
Indicates that the clock is running in free-run mode off the onboard oscillator	Indicates whether the antenna is correctly connected and functional and whether a signal has been received	Indicates whether the GNS183 module has been able to complete geolocation by locating at least four satellites	Indicates initialization by the on-board firmware and the host operating system and the warm-up state of the onboard oscillator

2 RS-232 COM Serial Time String Output

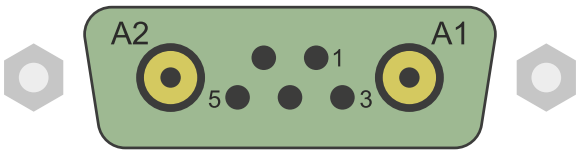
Pin	Function
1	PPS In
2	RxD (Receive)
3	TxD (Transmit)
5	GND (Ground)



Connector Type	D-Sub 9-pin Male
Supported Time Strings	Meinberg Standard *(Default)*, Meinberg Capture, Meinberg GPS, SAT, NMEA RMC, NMEA GGA, NMEA ZDA, NMEA RMC GGA *(RMC followed by GGA),* NMEA GGA ZDA *(GGA followed by ZDA),* Uni Erlangen, Computime, Sysplex 1, SPA, RACAL, ION, ION Blanked, IRIG-J-1, 6021, Freelance
Baud Rates	300, 600, 1200, 2400, 4800, 9600, 19200 *(Default)*
Framing Options	7N2, 7E1, 7E2, 8N1 (Default), 8N2, 8E1, 7O1, 7O2, 8O1, 8E2

3 XHE-SPI Connector

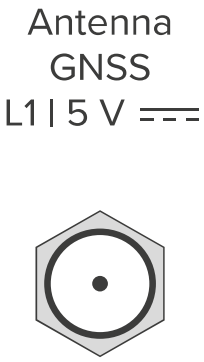
Pin	Function
A1	PPS In
A2	PPS Out
1	SCL_Out (SPI Clock)
2	CS (Chip Select)
3	MOSI (Master Out, Slave In)
4	MISO (Master In, Slave Out)
5	Ground (GND)



Connector Type	XHE-SPI Female (for connection of external Meinberg IMS-XHE^{Rb} Rubidium expansion unit)

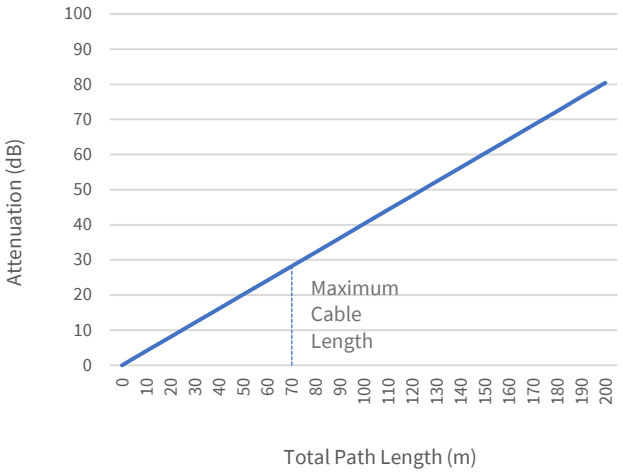
4 GNSS Antenna Input

Connector Type	Subminiature Type-A (SMA) connector for coaxial cable
Power Supply	5 V, 100 mA to antenna via antenna cable
Supported Cable Length	Max. 70 m (Belden H155) Max. 150 m (H2010 Ultraflex)

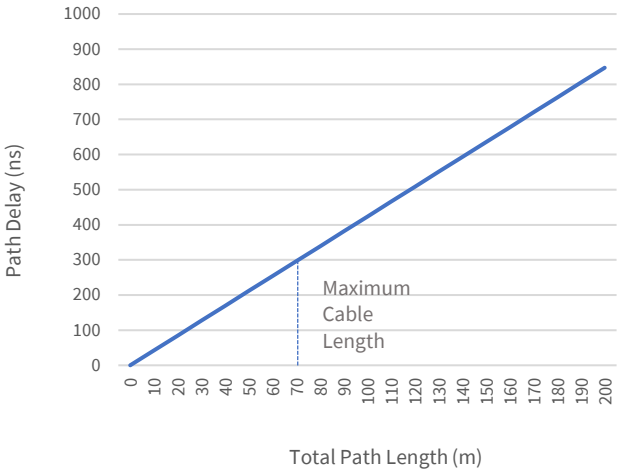


Coaxial Cable Options: Signal Transmission Performance

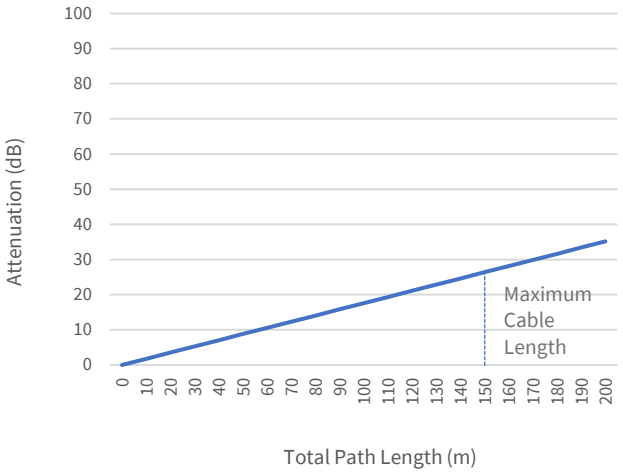
Signal Attenuation: Belden H155 Cable at 1575 MHz*



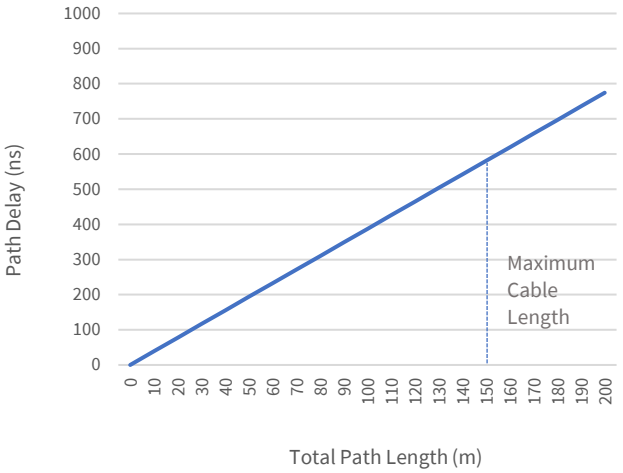
Signal Path Delay: Belden H155 Cable at 1575 MHz*



Signal Attenuation: H2010 Ultraflex Cable at 1575 MHz*



Signal Path Delay: H2010 Ultraflex Cable at 1575 MHz*



* **Test conditions**: Propagation time and signal attenuation measured on 50 m of Belden H155 and 150 m of H2010 Ultraflex coaxial cable. Graph calculated based on the known assumptions that (a) if cable specifications and frequency are constant, path attenuation has a linear relationship to path length and (b) if cable specifications are constant, path delay has a linear relationship to path length.

1575 MHz was selected as the representative frequency due to its use as the GPS L1 and Galileo E1 bands. The described cables will exhibit slight variations in attenuation values when conveying signals from the BeiDou (~1561 MHz) and GLONASS (~1602 MHz) constellations, but these differences are negligible.

IMS System Bus Connector Specifications

Connector Type	96-pin IEC 60603-2 (DIN 41612) connector IMS clock pin layout standard

Pin No.	Row A	Row B	Row C
1	V_{cc} in (+5V)	V_{cc} in (+5V)	V_{cc} in (+5V)
2	V_{cc} in (+12V)	V_{cc} in (+12V)	V_{cc} in (+12V)
3	V_{DD} in (TCXO/OCXO)	V_{DD} in (TCXO/OCXO)	V_{DD} in (TCXO/OCXO)
4	Reserved (FreqAdjust Out)	PPS IMS Out	Prog. Pulse 3 Out
5	Fixed Frequency Out	GND	10 MHz IMS In
6	PPS IMS In	Custom	PPS Out
7	DCLS Time Code IMS In	GND	PPS 2 In
8	External Clock In / PPS Rubidium In	Not connected	PPM Out
9	10 MHz Sine Out	Not connected	PPS Rubidium Out
10	100 kHz TTL out	Custom	Prog. Pulse 0 Out
11	1 MHz TTL out	Custom	Prog. Pulse 1 Out
12	10 MHz TTL out	Not connected	Prog. Pulse 2 Out
13	DCLS Time Code Out	Not connected	Not connected
14	AM Time Code Out	GND	COM4 RxD In
15	COM2 RxD In	Not connected	Custom
16	COM2 TxD Out	Not connected	Custom
17	COM3 RxD In	Not connected	DCF77 Mark Out
18	COM3 TxD Out	Not connected	Reserved
19	GND	Not connected	Timesync Out
20	GND	GND	Custom
21	GND	Not connected	Freq. Synth TTL Out
22	GND	GND	Freq. Synth OD Out
23	GND	Not connected	Freq. Synth Sine Out
24	GND	Not connected	COM1 TxD Out
25	GND	Slot ID 0	COM4 TxD Out
26	GND	Slot ID 1	COM0 TxD Out
27	GND	Slot ID 2	CAP1 In
28	GND	Slot ID 3	CAP0 In
29	GND	+USB	COM1 RxD In
30	GND	-USB	COM0 RxD In
31	GND	GND	GND
32	GND	GND	GND

IMS System Compatibility

Compatible Base Chassis Types	All IMS LANTIME systems (M500[1], M1000(S)[2], 2000S, M3000(S), M4000)
Compatible Slots	CLK (Clock)
LANTIME OS Requirements	Requires LANTIME OS Version 7.08 for full feature support

1 While the IMS-GNS183 is fully compatible with the IMS LANTIME M500, please note that two slot-wide modules featuring a DHQ oscillator and/or both a COM output and IMS-XHE^{Rb} connector will occupy the space otherwise used for the MRI slot; as such, it will not be possible to insert another module into this MRI slot.

2 While the IMS-GNS183 is fully compatible with the standard IMS LANTIME M1000 and M1000S systems, please note that two slot-tall modules featuring a DHQ oscillator and/or both a COM output and IMS-XHE^{Rb} connector will occupy the space otherwise used for the IO2 slot; as such, it will not be possible to insert another module into this slot. In M1000 models with clock redundancy, the use of a two slot-tall IMS-GNS183 will make it impossible to install a redundant clock module.

Miscellaneous Technical Information

Card Type	Eurocard format
Power Consumption (Typical)	3.85 W (OCXO SQ oscillator, other oscillators may draw higher current)
Current Draw (Typical)	0.77 A (OCXO SQ oscillator, other oscillators may draw higher current)
Operating Voltage	5 V
Supported Operating Temp.	0 °C to 55 °C (32 °F to 131 °F)
Supported Humidity Conditions	Max. 85 %
Surge Immunity	IEC 61000-4-5 Level 4 (test voltage: 4000 V; max. peak current given 2 Ω load: 2000 A)
Other Surge Protection	Integrated surge protector to protect connected antenna from voltage surges

Miscellaneous Support & Compliance Information

Technical Support	Free lifetime support via telephone and email, including firmware updates
Warranty	Three-year warranty, extendable upon request
Firmware Updates	Firmware is field-upgradeable; updates can be installed directly from the unit or via a remote network connection. Software updates are provided free of charge for the lifetime of your Meinberg product.
RoHS Compliance	The product is fully RoHS-compliant.
WEEE Status	The purchase of this product is considered to be a “B2B” transaction (non-household product) for the purposes of the European Union Waste of Electrical and Electronic Equipment Directive; the product falls under Category 6, “Small IT and Telecommunications Equipment”. For disposal, it must be returned to the manufacturer to ensure WEEE compliance. Any transportation expenses for returning this product (at end-of-life) must be covered by the end user, while Meinberg will cover the costs for the waste disposal itself.