InertialLabs
Attitude is Everything

MILANO SYSTEMS
ADVANCED TECHNOLOGICAL SYSTEMS

Sistemi di navigazione inerziale con doppia antenna e supporto GPS

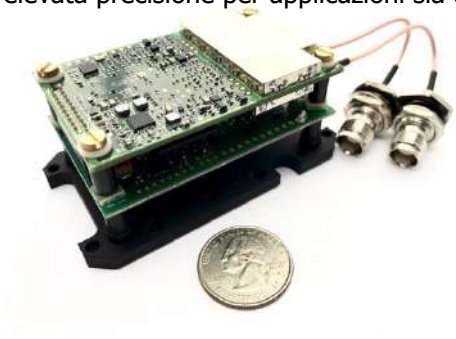
INS-D-OEM
INS-DL-OEM

- Tempo reale (RTK) e post elaborazione (PPK)
- Precisione della posizione = 0,5 cm (PPK) / 1 cm (RTK)
- Precisione della direzione = 0,03 gradi (PPK) / 0,05 gradi (RTK)
- Precisione Pitch & Roll = 0,006 gradi (PPK) / 0,08 gradi (RTK)
- Ricevitore GNSS a doppia antenna ad alta precisione
- Soluzione ideale per precise cloud points
- Dimensioni ridotte, leggero
- Compatibile con LIDAR, fotocamera ottica
- Applicazioni: controllo di volo, telerilevamento, fotogrammetria

CERTIFIED ISO 9001:2015 COMPANY

MADE IN THE USA

Il sistema di navigazione inerziale GPS assistito da GPS Inertial Labs (INS-D / DL-OEM) è la versione OEM di nuova generazione, doppia antenna GNSS, GPS integrato, GLONASS, GALILEO e BEIDOU GNSS completamente integrato e sistema strapdown ad alte prestazioni, che determina la posizione, la velocità e l'orientamento assoluto (Heading, Pitch and Roll) per qualsiasi dispositivo su cui è montato. La posizione orizzontale e verticale, la velocità, la doppia direzione dell'antenna, il pitch e il rollio sono determinati con elevata precisione per applicazioni sia dinamiche che immobili.



L'Inertial Labs INS-D / DL-OEM utilizza un ricevitore GNSS avanzato a doppia antenna a 3 assi (ciascuno calibrato nella gamma completa di temperature operative), Accelerometri MEMS avanzati e giroscopi di nuova generazione di grado tattico per fornire posizione, velocità, direzione, inclinazione e precisione del dispositivo.

INS-D / DL-OEM contiene i nuovi filtri di fusione dei sensori di bordo di Inertial Labs, algoritmi di navigazione e guida all'avanguardia e software di calibrazione.

CARATTERISTICHE, VANTAGGI E FUNZIONALITÀ PRINCIPALI

- Sistema di navigazione inerziale GPS con doppia antenna (esportabile commercialmente)
- Dimensioni 85 x 47 x 36 mm e 150 (o 160) grammi. Calibrazione completa della temperatura di tutti gli elementi sensibili
- IMU di livello industriale e tattico (giroscopi da 1 a 3 gradi / ora Stabilità in corsa di bias)
- Segnali supportati: GPS, GLONASS, BEIDOU, SBAS, DGPS, RTK
- Intestazione: fino a 0,05 gradi e precisione di inclinazione e rollio di 0,08 gradi
- Compatibilità con LiDAR e telecamere ottiche per applicazioni di telerilevamento
- INS fino a 200 Hz, IMU fino a 2000 Hz, posizioni GNSS 50 Hz, velocità misurazioni GNSS 20 Hz
- Algoritmi di fusione integrati, estensibili e basati su filtro Kalman
- Algoritmi all'avanguardia per diversi movimenti dinamici di navi, navi, elicotteri, UAV, UUV, UGV, AGV, ROV, Gimbals e veicoli terrestriImplemented ZUPT, GNSS tracking angle features

Prestazioni INS-D-OEM e INS-DL-OEM durante le interruzioni del GNSS

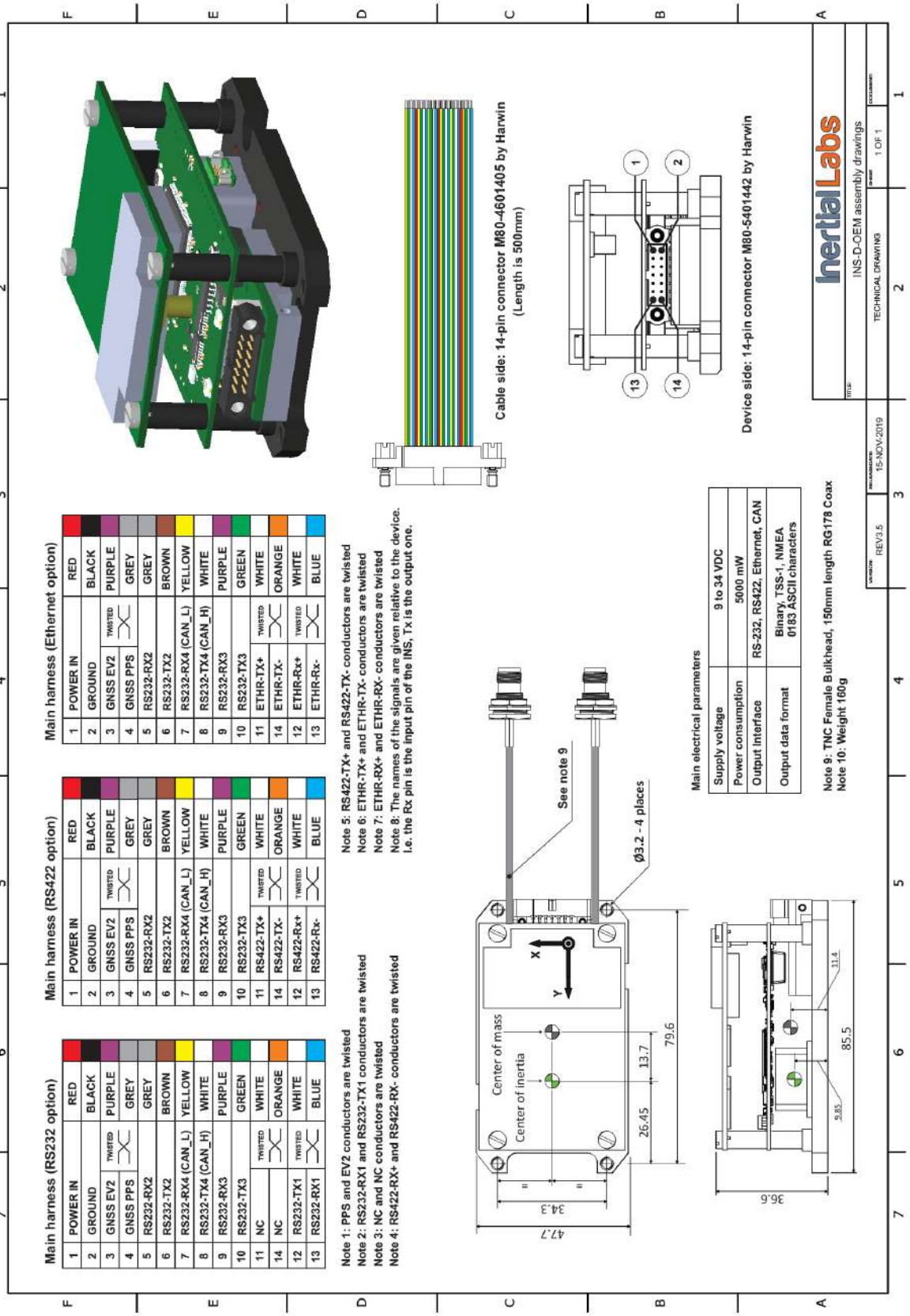
Model	Outage duration	Mode	Position accuracy (meters, RMS)		Velocity accuracy (meters/sec, RMS)		Attitude accuracy (degree, RMS)	
			Horizontal	Vertical	Horizontal	Vertical	Pitch, Roll	Heading*
INS-D-OEM	0 sec	RTK	0.01 + 1ppm	0.02 + 1ppm	0.02	0.01	0.015	0.05
		SP	1.2	1.0	0.03	0.02	0.08	0.08
		PP	0.005	0.01	0.02	0.01	0.006	0.03
	60 sec	RTK	7	2	0.3	0.1	0.05	0.08
		SP	8	3	0.3	0.1	0.1	0.1
		PP	0.3	0.2	0.03	0.05	0.01	0.05
INS-DL-OEM	0 sec	RTK	0.01 + 1ppm	0.02 + 1ppm	0.03	0.02	0.09	0.06
		SP	1.2	1.0	0.04	0.03	0.1	0.09
		PP	0.009	0.015	0.025	0.02	0.009	0.035
	60 sec	RTK	8	3	0.4	0.3	0.06	0.09
		SP	9	4	0.45	0.5	0.15	0.15
		PP	0.45	0.35	0.04	0.065	0.025	0.07

Specifiche INS-D-OEM e INS-DL-OEM

	Parameter	Units	INS-DL-OEM Low cost dual antenna			INS-D-OEM High precision dual antenna		
General	Input signals		• Marine application: DVL (Doppler Velocity Log) • Land application: Odometer, Wheel sensor, Encoder, DMI • Aerial application: Wind sensor, Air Speed Sensor, Doppler shift from locator (for long-term GPS denied) • All: External Stand Alone Magnetic Compass (SAMC/AHRS)					
	Output signals		• Horizontal and Vertical Positions, Heading, Pitch & Roll, Velocity, Accelerations, Angular rates, Barometric data, PPS • Direct AT_ITINS message with Position, Heading, Pitch & Roll to COBHAM AVIATOR UAV 200					
	Main features		Affordable price Dual antenna Heading 1 cm RTK position			High precision dual antenna Heading, 1 cm RTK position, Tactical-grade IMU		
	Data rate (INS)	Hz	Up to 200 (user settable)			Up to 200 (user settable)		
	Data rate (IMU)	Hz	Up to 2000 (user settable)			Up to 2000 (user settable)		
	Start-up time	sec	<1			<1		
	Positions, Velocity and Timestamps	Units	INS-DL-OEM			INS-D-OEM		
Navigation	Horizontal position accuracy (SP, L1), RMS	meters	1.5			1.5		
	Horizontal position accuracy (SP, L1/L2), RMS	meters	1.2			1.2		
	Horizontal position accuracy (SBAS), RMS [1]	meters	0.6			0.6		
	Horizontal position accuracy (DGPS), RMS	meters	0.4			0.4		
	Horizontal position accuracy (post processing) [2]	meters	0.005			0.005		
	Horizontal position accuracy (RTK), RMS	meters	0.01 + 1 ppm			0.01 + 1 ppm		
	Vertical position accuracy (SP), RMS	meters	<2			<1		
	Vertical position accuracy (RTK), RMS	meters	0.02 + 1 ppm			0.02 + 1 ppm		
	Velocity accuracy, RMS	meters/sec	0.03			0.02		
	PPS timestamps accuracy	nano sec	20			20		
	Heading	Units	INS-DL-OEM			INS-D-OEM		
Orientation	Range	deg	0 to 360			0 to 360		
	Static Accuracy [3]	deg RMS	0.15 (1 meter base line) 0.08 (2 meters baseline)			0.15 (1 meter base line) 0.08 (2 meters baseline)		
	Dynamic accuracy (GNSS) [6]	deg RMS						
	Post processing accuracy [2]	deg RMS	0.03			0.03		
	Pitch and Roll	Units	INS-DL-OEM			INS-D-OEM		
	Range: Pitch, Roll	deg	±90, ±180			±90, ±180		
	Angular Resolution	deg	0.01			0.01		
	Static Accuracy in whole Temperature Range	deg	0.05			0.03		
	Dynamic Accuracy [6]	deg RMS	0.1			0.08		
	Post processing accuracy [2]	deg RMS	0.01			0.006		
	GNSS receiver	Units	INS-DL-OEM			INS-D-OEM		
GNSS	Number of GNSS Antennas		Dual			Dual		
	Supported GNSS signals & corrections (optional)		GPS L1/L2, GLONASS L1/L2, BEIDOU B1/B2, GALILEO E1/E5, QZSS L1/L5, SBAS, DGPS, RTK			GPS L1/L2; GLONASS L1/L2; BeiDou B1/B2; SBAS; DGPS; RTK		
	Channel configuration [4]		435 Channels			555 Channels		
	GNSS Positions data rate [5]	Hz	20			20, 50		
	RTK corrections		RTCM 2.3/3.0/3.2			RTCM 2.1/2.3/3.0/3.1		
	GNSS Measurements (raw) data rate	Hz	20			20		
	Velocity accuracy, RMS	meters/sec	<0.04			<0.03		
	Initialization time	Sec	<50 (cold start), <30 (hot start)			<50 (cold start), <30 (hot start)		
	Time accuracy (clock drift) [7]	nano sec	20			20		
	Gyroscopes	Units	INS-DL-OEM			INS-D-OEM		
IMU	Type		Industrial-grade			Tactical-grade		
	Measurement range	deg/sec	±450 / ±950 / ±2000			±450 / ±950 / ±2000		
	Bias in-run stability (RMS, Allan Variance)	deg/hr	3			1		
	Bias error over temperature range (RMS)	deg/hr	<50			<30		
	Angular Random Walk	deg/√hr	<0.3			<0.2		
	Accelerometers	Units	INS-DL-OEM			INS-D-OEM		
	Type		Industrial-grade			Tactical-grade		
	Measurement range	g	±8 g	±15 g	±40 g	±8 g	±15 g	±40 g
	Bias in-run stability (RMS, Allan Variance)	mg	0.01	0.03	0.05	0.005	0.02	0.03
	Bias error over temperature range (RMS)	mg	0.7	1.1	1.5	0.5	0.7	1.2
	Bias one-year repeatability	mg	1.5	2.0	2.5	1.0	1.3	1.5
	Velocity Random Walk	m/s/√hr	0.02	0.045	0.06	0.015	0.035	0.045
	Environment	Units	INS-DL-OEM			INS-D-OEM		
Electrical and Physical	Operating temperature	deg C	-40 to +75			-40 to +75		
	Storage temperature	deg C	-50 to +85			-50 to +85		
	MTBF	hours	55,500			55,500		
	Electrical	Units	INS-DL-OEM			INS-D-OEM		
	Supply voltage	V DC	9 - 36			9 - 36		
	Power consumption	Watts	5			5		
	Output Interface (options)	-	RS-232 or RS-422, CAN Ethernet (optional)			RS-232 or RS-422, CAN Ethernet (optional)		
	Output data format	-	Binary, NMEA 0183 ASCII			Binary, NMEA 0183 ASCII		
	Physical	Units	INS-DL-OEM			INS-D-OEM		
	Size	mm	85 x 47 x 36			85 x 47 x 36		
	Weight	gram	150 - 160			150 - 160		

[1] GPS only; [2] RMS, incremental error growth from steady state accuracy. Post-processing results using third party software; [3] 2 meters base line between two GNSS antennas; [4] tracks up to 60 L1/L2 satellites; [5] 50 Hz while tracking up to 20 satellites. 20 Hz position update rate for Basic model of INS; [6] dynamic accuracy may depend on type of motion; [7] time accuracy does not include biases due to RF or antenna delay

INS-D/DL-OEM disegni dell'interfaccia Elettrica e meccanica



Struttura part number:

Model	Gyroscope	Accel	Calibration	Connector	Encoder	GNSS receiver	Version	Interface
INS-D-OEM	G450	A8	TGA	C4	E (option)	O7720	VD4	1
	G950	A15		C6		WOR	VD42	2
	G2000	A40		C8			VD43	3
								4
								5
								11
								22
								145
								245

Model	Gyroscope	Accel	Calibration	Connector	Encoder	GNSS receiver	Version	Interface
INS-DL-OEM	G450	A8	TGA	C4	E (Option)	B482	VD9	1
	G950	A15		C6		WOR		2
	G2000	A40		C8				3
								4
								5
								11
								22
								145
								245

Example: INS-DL-OEM-G450-A15-TGA-C6-B482-VD9.1

- INS-D-OEM: Dual Antenna GPS-Aided Inertial Navigation System
- INS-DL-OEM: Low cost Dual Antenna GPS-Aided Inertial Navigation System
- G450: Gyroscopes measurement range = ±450 deg/sec
- G950: Gyroscopes measurement range = ±950 deg/sec
- G2000: Gyroscopes measurement range = ±2000 deg/sec
- A8: Accelerometers measurement range = ±8 g –> recommended for applications with low level of operational vibrations
- A15: Accelerometers measurement range ±15 g –> recommended for applications with medium level of operational vibrations
- A40: Accelerometers measurement range ±40 g –> recommended for high dynamic applications or/and with high level of vibration
- TGA: Gyroscopes and Accelerometers
- C4: Aluminum Base Plate - 26 pin header and ribbon cable (20021121-00026T4LF by Amphenol)
- C6: Aluminum Base Plate - 14 pin screw-lock connector (M80-5401442 by Harwin)
- C8: Aluminum Base Plate - 25 pin enclosed cable with screw lock connector (CCA-025-I36R152 by NorComp)
- E: Encoder support
- O7720: Novatel OEM7720 dual antenna GNSS receiver (INS-D only)
- B482: Inertial Labs B482 dual antenna GNSS receiver (INS-DL only)
- WOR: without GNSS receiver
- VD4: GPS L1/L2, Dual antenna Heading, SBAS, DGPS, 20 Hz positions (INS-D only)
- VD42: GPS L1/L2, GLONASS L1/L2, Dual GNSS Heading, SBAS, DGPS, RTK, 20 Hz measurements, 20 Hz positions (INS-D-OEM only)
- VD43: GPS L1/L2, GLONASS L1/L2, Dual antenna Heading, SBAS, DGPS, 20 Hz positions (INS-D-OEM only)
- VD9: GPS L1/L2, GLONASS L1/L2, BEIDOU B1/B2, GALILEO E1/E5, QZSS L1/L5, DGPS, RTK, Dual GNSS Heading, 20 Hz measurements, 20 Hz positions (INS-DL-OEM only)
- VX.1: RS-232 interface
- VX.2: RS-422 interface
- VX.3: RS-485 interface (temporary is not available)
- VX.4: CAN interface
- VX.5: Ethernet interface
- VX.11: two RS-232 interfaces
- VX.22: two RS-422 interfaces
- VX.145: RS-232, CAN and Ethernet interfaces (with optional Encoder support)
- VX.245: RS-422, CAN and Ethernet interfaces (without Encoder support)