RESILIENT
NAVIGATION
SYSTEMS

Safe and secure navigation for UAV in GNSS denied environments

JAMMER OFF

TRUE PATH FOR UAV

1–3% ERROR IN DISTANCE TRAVELLED

RESILIENT NAVIGATION SYSTEM
GPSDOME + HCINS + HRVS

JAMMER LOCATION

GPSDOME + HCINS

GPSDOME ONLY
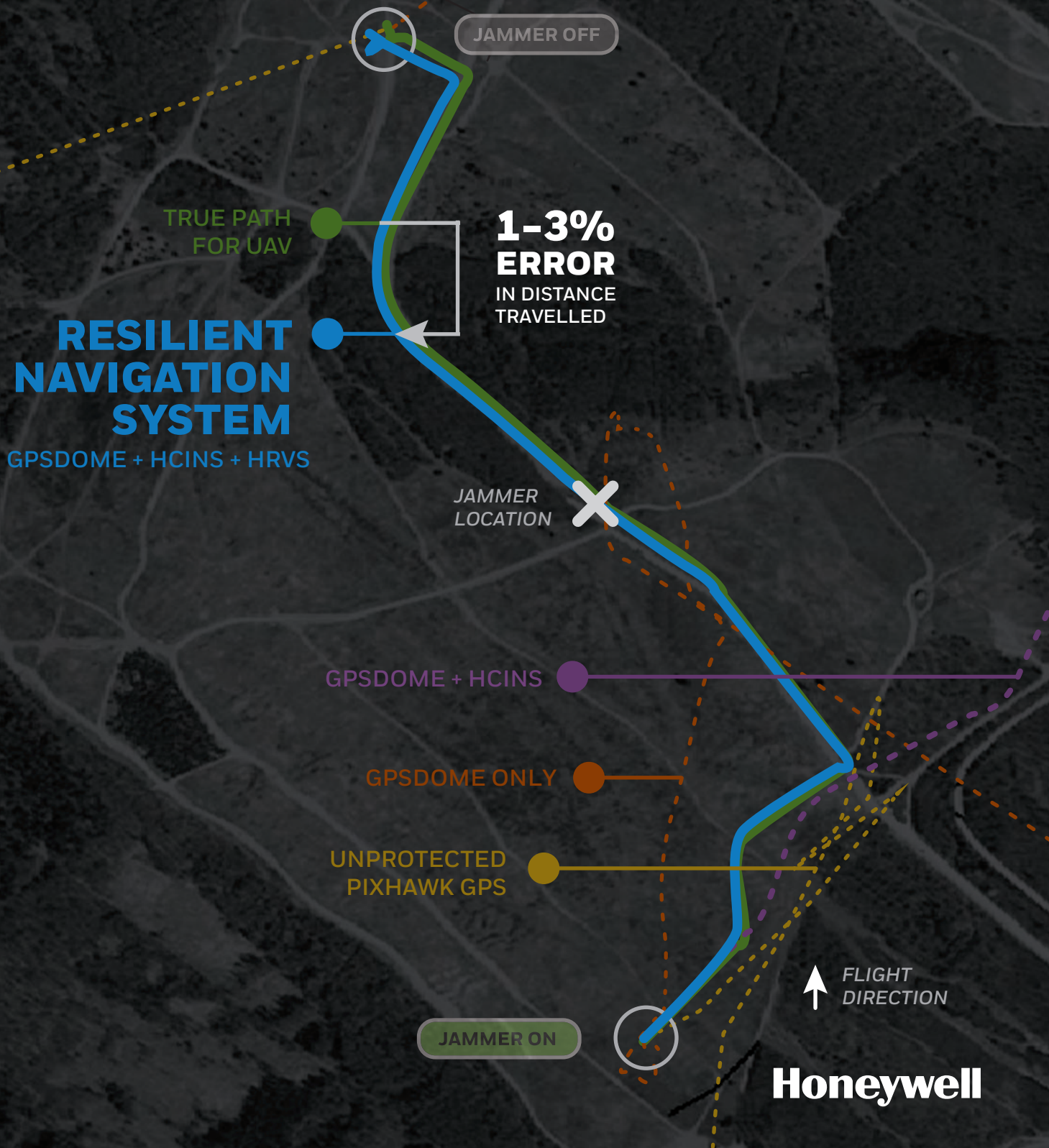
UNPROTECTED PIXHAWK GPS

FLIGHT DIRECTION

JAMMER ON

Honeywell

RESILIENT NAVIGATION SYSTEM

Safe and secure navigation for UAV in GNSS denied environments

Resilient Navigation System is a low size, weight and power navigation system that combines GNSS, INS, anti-jammer and alternative navigation technologies to provide **three layers of resilience for safe navigation.**

1st LAYER OF RESILIENCE

GPSdome–SunStone
Ensures GPS availability during low power jamming conditions

2nd LAYER OF RESILIENCE

Honeywell Compact Inertial Navigation System (HCINS)
Enables safe navigation for UAVs during intermittent GNSS disruptions

3rd LAYER OF RESILIENCE

Honeywell Radar Velocity System (HRVS)
Enables safe navigation for UAVs during continuous GNSS disruptions

Safe and reliable navigation in challenging environments is essential for BVLOS* missions

Mission failure results in not just loss of the asset but the information on asset becomes a liability

| **Multi-Layer Resiliency**	Enables **GNSS-Denied BVLOS* Missions**	**Arducopter PX4**	Works in **Degraded Visual Environments**	**1–3 %** Distance Traveled CEP **< 800 g** Total system weight including accessories	**No Dependency**
GNSS + anti-jammer + INS + Alternative Navigation		Integrated with commonly used UAV flight controls			on maps or environment

*Beyond Visual Line of Sight

LAYER 1
GPSDOME-SUNSTONE

Industry's only non-ITAR GPS anti-jammer
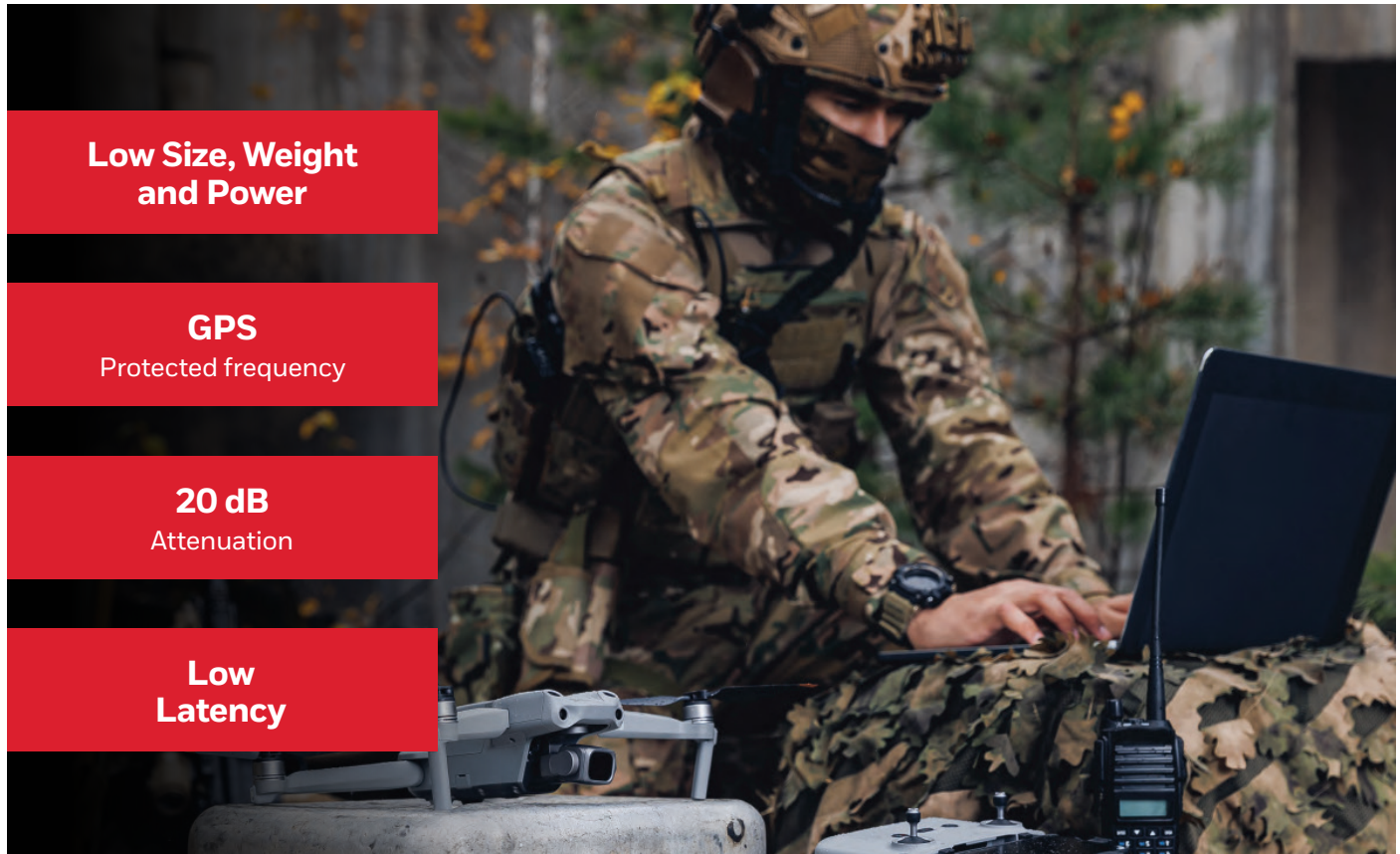
Low Size, Weight and Power

GPS
Protected frequency

20 dB
Attenuation

Low Latency

SunStone is a small-sized, add-on device that provides protection against GPS jamming, ensuring continuity of autonomous navigation and operation during jamming conditions. No other solution that offers the same protection is as small, light, affordable or as easily installed as SunStone.

FEATURES

- GPS anti-jammer
- Protected frequency: GPS L1 (C/A Code)
- Nominal 20dB attenuation of hostile signal
- Protection from 1 jamming signal

- IP67, -40°C to +85°C (enclosed)
- Minimal latency: 100ns ±15ns (constant)
- Compatible with most off-the-shelf active GNSS antennas

- Null steering technology in tiny form factor
- Dual use (non-ITAR) (ECCN: 7A005.b)

Size: 74x47x25 mm
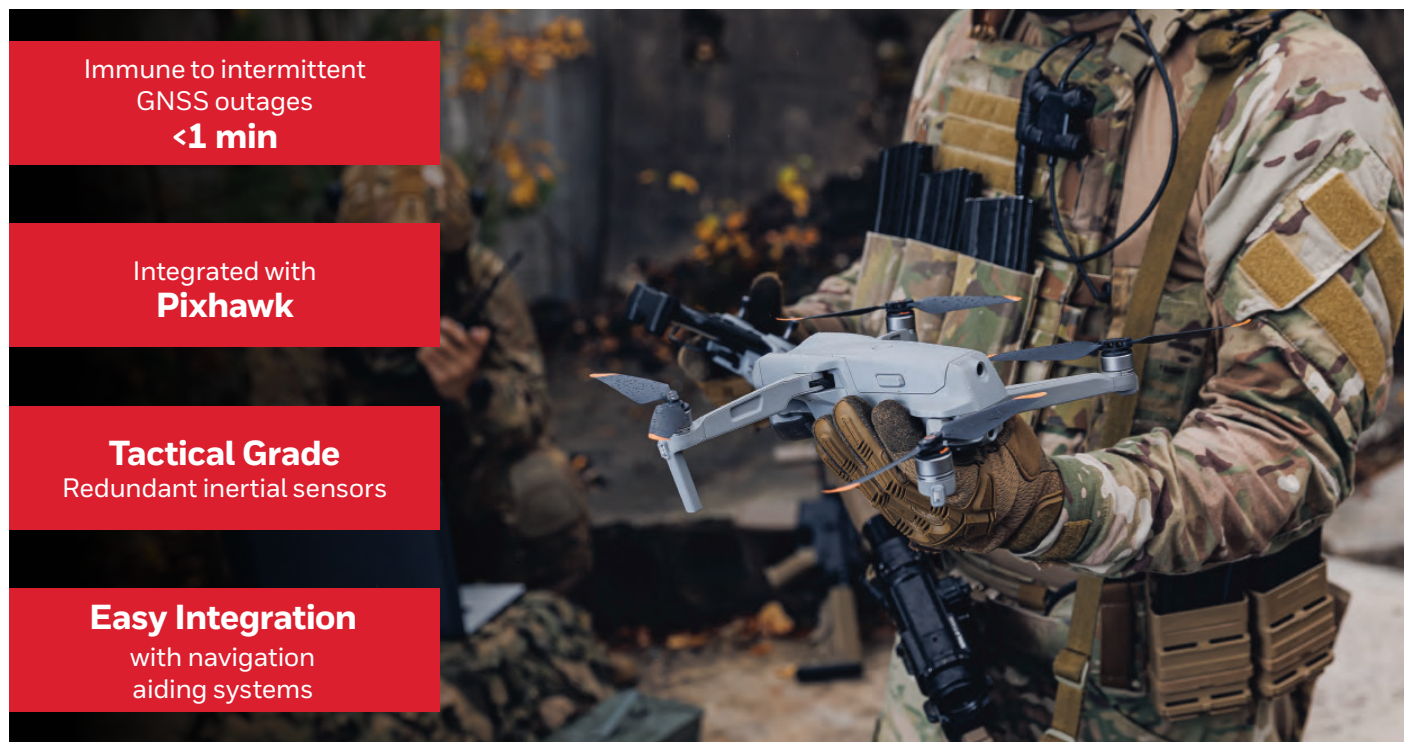**Weight:** 150g
Maximum power consumption: <1W

Commercially available

LAYER 2
HONEYWELL COMPACT INERTIAL NAVIGATION SYSTEM

Combined GNSS and inertial navigation system for UAVs

Immune to intermittent
GNSS outages
<1 min

Integrated with
Pixhawk

Tactical Grade
Redundant inertial sensors

Easy Integration
with navigation
aiding systems

The Honeywell compact inertial navigation system (HCINS) for UAVs is a low size, weight and power (SWaP) inertial navigation system that is suitable for all types of UAVs. It enables safe navigation for UAVs during intermittent GNSS disruptions.

FEATURES

- Small inertial navigation system with dual GNSS receivers
- Tactical grade redundant inertial sensors
- Integrated with Pixhawk
  (Arducopter, PX4, and Mission Planner)
- Horizontal drift after 30s GNSS outage with no aiding ~ 5m

- SD card for data storage
- Navigation health monitor
- Ethernet interface

- Easy integration with aiding systems (radar, vision)
- Not export controlled (ECCN: 7A994)

Size: 104x60x28 mm
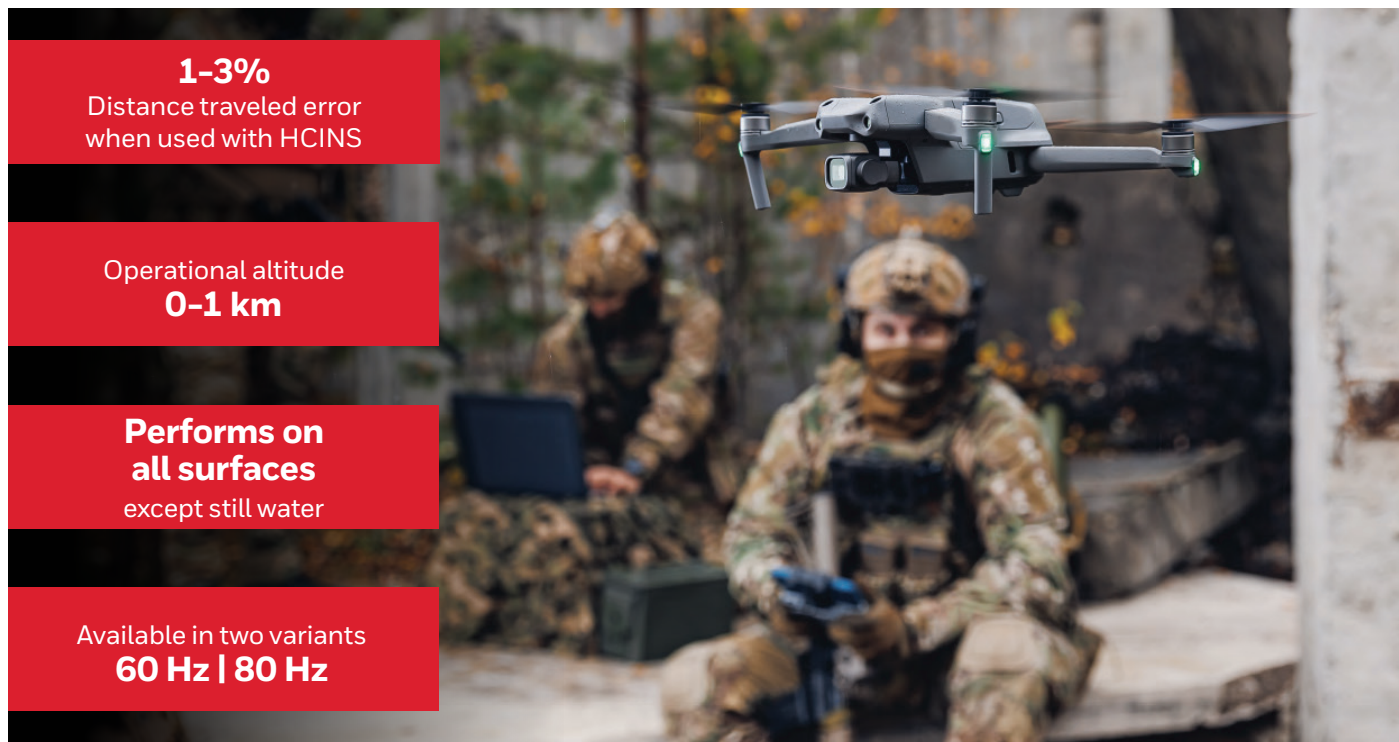**Weight:** 140g
Maximum power consumption: <3W

60 mm

28 mm

104 mm

Available in Q2 2023

LAYER 3
HONEYWELL RADAR VELOCITY SYSTEM

Range and velocity without GNSS

1–3%
Distance traveled error when used with HCINS

Operational altitude
0–1 km

Performs on all surfaces
except still water

Available in two variants
60 Hz | 80 Hz

The Honeywell Radar Velocity System (HRVS) is a low size, weight and power (SWaP) millimeter radar-based navigation aiding system.

31 mm
65 mm
113 mm

FEATURES

- 3D velocity aiding system
- 4 radars and 1 interconnection board for UAV applications
- Only 1 radar for surface applications
- CEP error of 1-3% distance traveled when integrated with HCINS
- Two variants – 60GHz and 80GHz
- Altitude < 400m (60GHz), <1000m (80GHz) at speed <20m/s

- Indefinite precise hover
- Works over all surfaces (except still water)
- Impervious to environmental conditions

- Not export controlled (ECCN: 6A998.a)
- Needs FCC waiver for US

Size: 113x65x31 mm
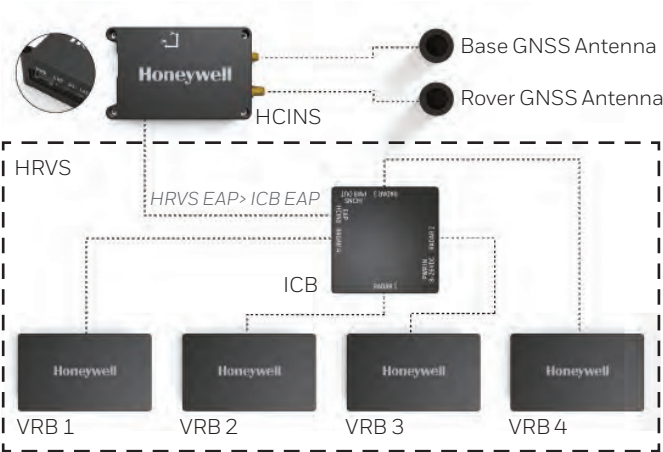**Weight:** 63g (1 Radar), 290g (4Radars and 1 ICB)
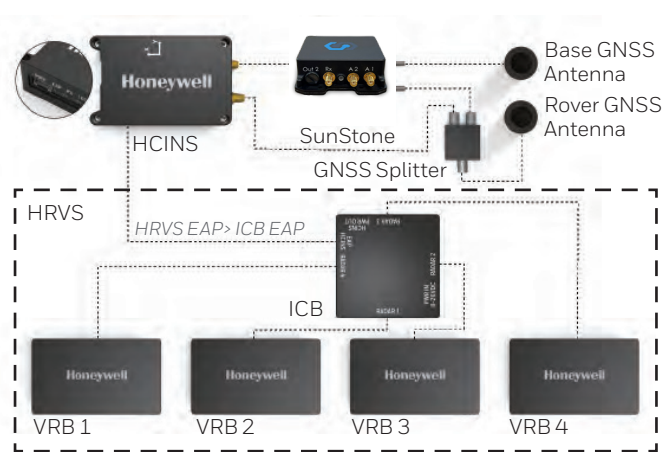**Maximum power consumption:** <2W per Radar

Radar 2
Radar 1
ICB
Radar 3
Radar 4

Available in Q2 2023

INTERCONNECTIONS DIAGRAM

WITHOUT SUNSTONE

WITH SUNSTONE

RESILIENT NAVIGATION SUITE

PART NUMBER	QUANTITY	DESCRIPTION
68013252-1	01	SunStone
88003168	01	Honeywell Compact Inertial Navigation System (HCINS) 2.4
88004275 88004276 88004277	01	Damping Platform for HCINS
53700092-2	01	SD card – inserted in HCINS
88003160	01	Power Cable for HCINS
88003161 - 1	01	Ethernet Cable for HCINS
88003162	01	External Aiding Port (EAP) Cable for HCINS
88003163	01	Pixhawk Cable for HCINS
88003442	04	Velocity Radar Board (VRB) 3.3
88003436	01	Interconnection Board (ICB)
88003432	04	VRB-ICB Cable flat 15 cm cable
88003445	04	VRB-ICB Cable rounded 25 cm cable (Optional)
88003445-001	04	VRB-ICB Cable rounded 35 cm cable (Optional)
88003445-002	04	VRB-ICB Cable rounded 40 cm cable (Optional)
88003445-003	04	VRB-ICB Cable rounded 50 cm cable (Optional)
88003445-004	04	VRB-ICB Cable rounded 100 cm cable (Optional)
53700060 - 2	02	GNSS Antenna (Optional)
53700144-1	01	GNSS Splitter (Optional)

THE FUTURE IS WHAT WE MAKE IT

Honeywell