



# DS-018

# Pixhawk Autopilot

# v6C Standard

Revision: 0.1.0

Revision date: December 13, 2022

## Abstract

This document is the formal version of the Pixhawk industry standard that includes all aspects of the hardware standard required to build compatible autopilots.

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## Document Revisions

Revision	Date	Editor	Reviewer	Comments
0.1.0	12/13/22	Vince Poon	Ramón Roche	Initial specification

## Contact and Public Developer Call

This standard is being developed on a [public developer call](#).

For further questions, please contact the maintainer of the standard, [lorenz@px4.io](mailto:lorenz@px4.io).

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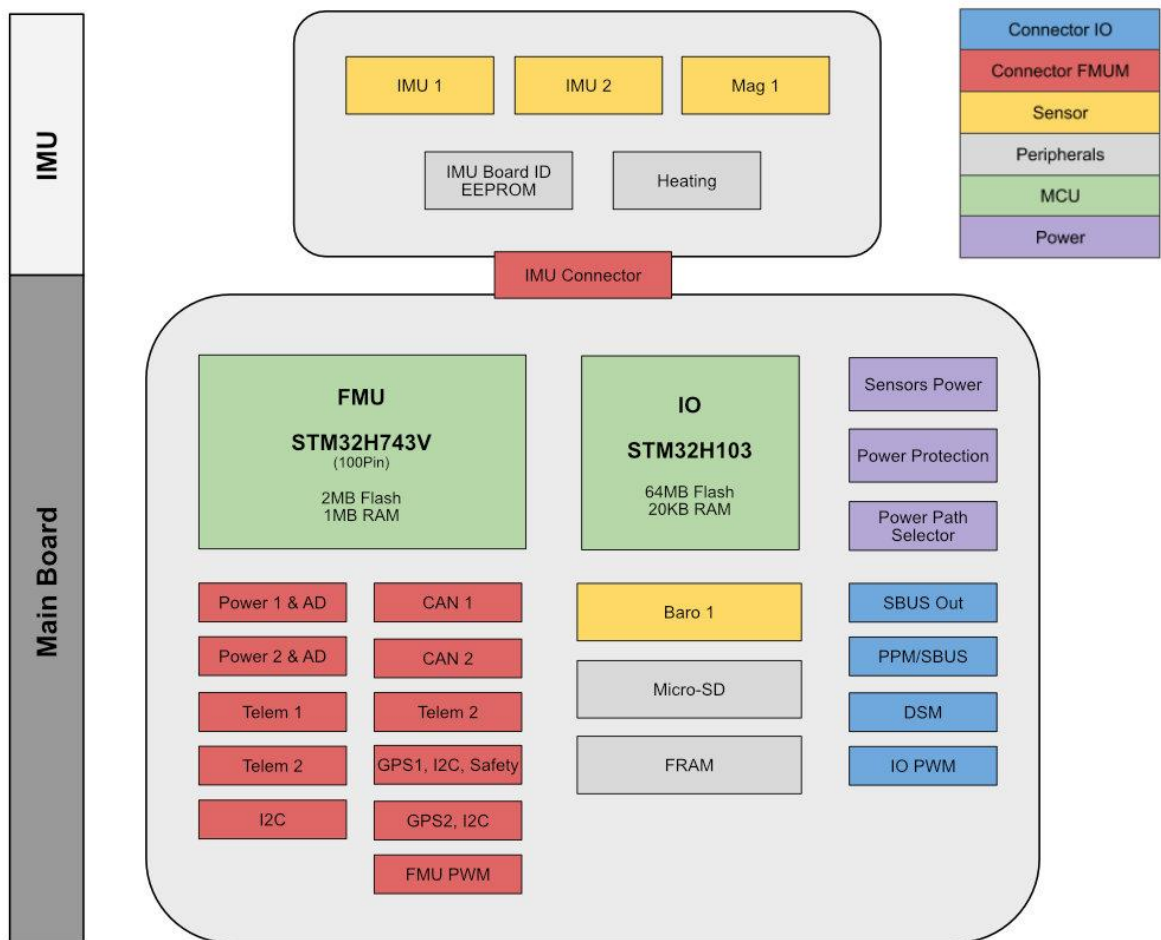
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## Related Standards

- [DS-009 Pixhawk Connector Standard](#)

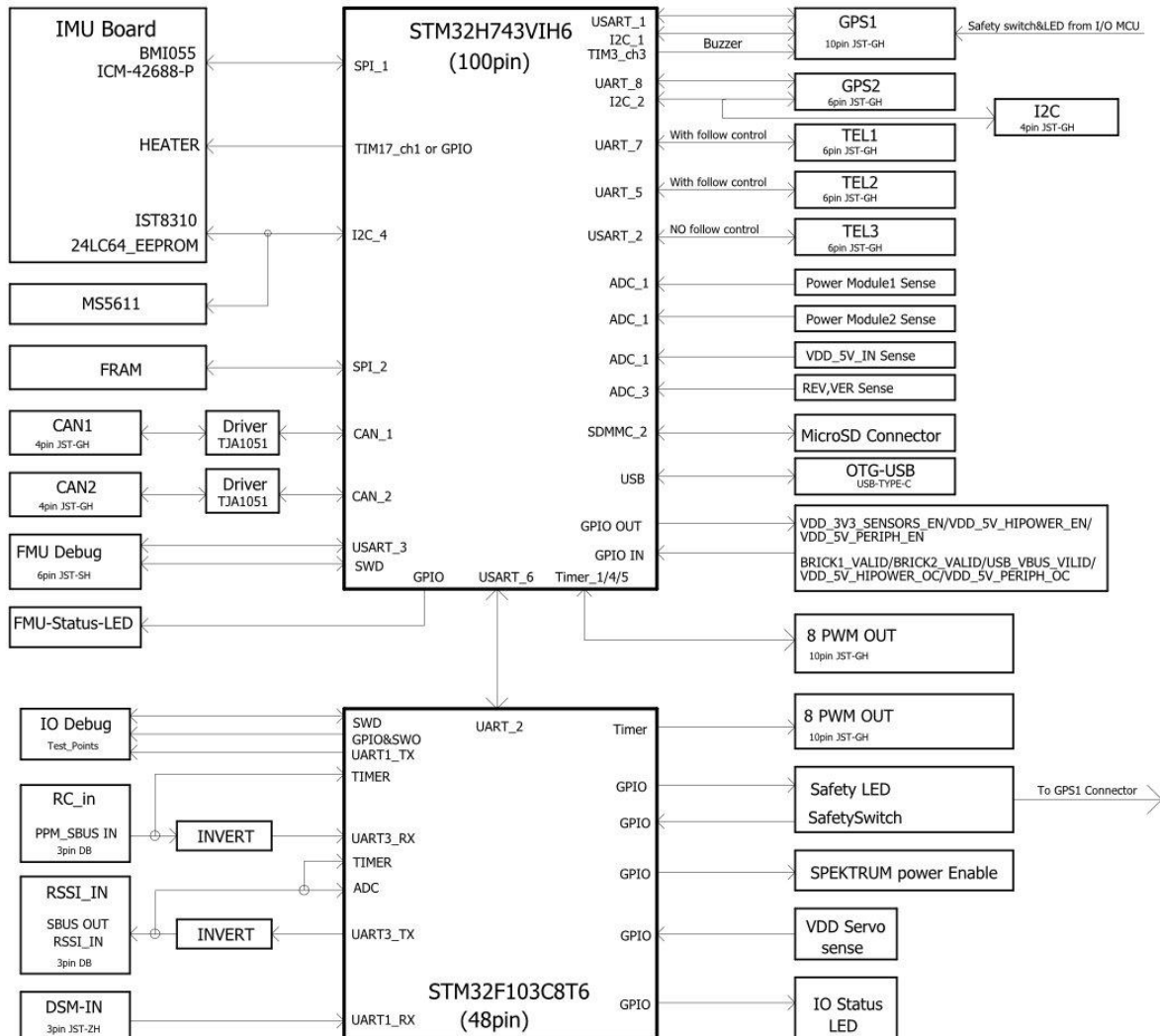
## FMUv6C Summary

### Overview



**NOTE:** Connectors as shown are optional

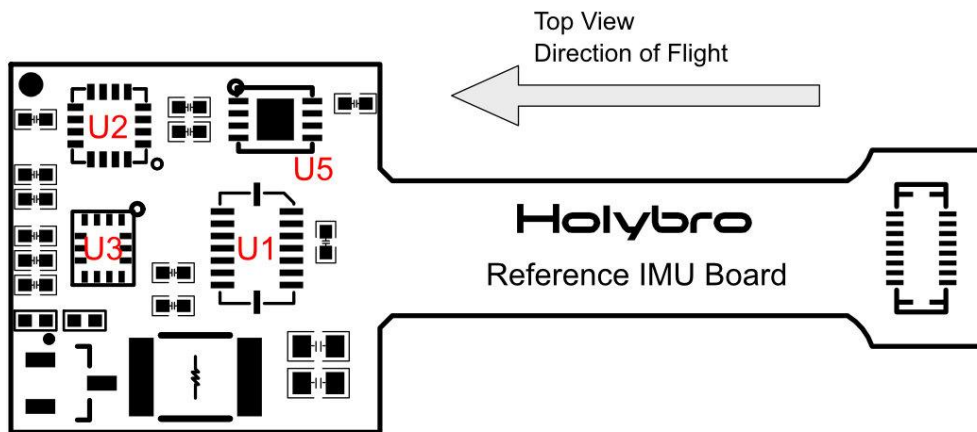
## Detailed Block Diagram Reference



- Redundant IMU sensors
  - TDK Invensense ICM-42688-P (Vibration Isolated)
  - Bosch BMI055 (Vibration Isolated)
  - iSentek IST8310 compass (Vibration Isolated)
  - TE Connectivity MS5611 or Bosch BMP388 (Vibration Isolated)
  - On-IMU calibration EEPROM memory for high-accuracy sensors
- Automated sensor calibration eliminating varying signals and temperature
- Operating temperature -40 to +85°C
- FRAM memory for configuration data (SPI2)
- Extensive power monitoring
  - Two smart batteries on SMBus or more on DroneCAN
  - 5V rail monitoring
  - 3.3V rail monitoring for CPU
  - 3.3V rail monitoring for each sensor domain

- Redundant power supply: The autopilot can be powered from up to three power sources and every sensor set is powered by an independent LDO with independent power control
- Battery-backed real time clock for running security applications without GPS coverage

## FMUv6C Sensors Locations



## Sensor Sets

Sensor sets comprised an Main Board set of sensors and an IMU set of sensors. These are revisioned in pairs. (Rev 1, Rev 2, Rev 3, etc)

### Sensor Set

#### Sensor Set (Rev 0 & 1)

##### Main Board

Name	Sensor Type	Bus	Chip Select/ 7 Bit Addr	DRDY	Power Domain
U1 (FRAM)	FM25V02A-G	SPI2	CS1	-NONE	FMU VDD3V3
U7 (BARO)	Ms5611	I2C4	0x77	-NONE	1

##### IMU Board

Name	Sensor Type	Bus	Chip Select/ 7 Bit Addr	DRDY	Power Domain
U1 (IMU1)	BMI055 ACCEL	SPI1	CS1	DRDY1	1
U1 (IMU1)	BMI055 GYRO	SPI1	CS2	DRDY2	1
U3 (IMU2)	ICM-42688-P	SPI1	CS3	DRDY3	1
U2 (MAG)	IST8310	I2C4	0x0C	-NONE	1
U5	EEPROM	I2C4	0x51	-NONE	1



## Full FMUv6C Pinout

The official Pinout for FMUv6C is covered in this [pinout sheet](#).

		STM32H743 Signal	Usage
PA	0	TIM5_CH1	FMU_CH7
PA	1	TIM5_CH2	FMU_CH8
PA	2	ADC1_INP14	FMU_BAT2_I
PA	3	USART2_RX	FMU_USART2_RX_TEL3
PA	4	ADC1_INP18	FMU_SCALED_V5
PA	5	SPI1_SCK	FMU_SPI1_SCK_SENSOR
PA	6	SPI1_MISO	FMU_SPI1_MISO_SENSOR
PA	7	SPI1_MOSI	FMU_SPI1_MOSI_SENSOR
PA	8	TIM1_CH1	FMU_CH1
PA	9	USB_OTG_FS_VBUS	FMU_VBUS_SENSE
PA	10	USART1_RX	FMU_UART1_RX_GPS1
PA	11	USB_OTG_FS_DM	FMU_USB_DM
PA	12	USB_OTG_FS_DP	FMU_USB_DP
PA	13	SWDIO	FMU_SWDIO
PA	14	SWCLK	FMU_SWCLK
PA	15	PA15	N_BRICK1_VALID
PB	0	TIM3_CH3	FMU_BUZZER
PB	1	ADC1_INP5	FMU_BAT2_V
PB	2	PB2	VDD_3V3_SENSORS_EN
PB	3	SDMMC2_D2	FMU_SDMMC2_D2
PB	4	SDMMC2_D3	FMU_SDMMC2_D3
PB	5	CAN2_RX	FMU_CAN2_RX
PB	6	USART1_TX	FMU_USART1_TX_GPS1
PB	7	I2C1_SDA	FMU_I2C1_SDA_GPS1_MAG_LED
PB	8	I2C1_SCL	FMU_I2C1_SCL_GPS1_MAG_LED
PB	9	TIM17_CH1	FMU_HEATER
PB	10	I2C2_SCL	FMU_I2C2_SCL_GPS2_MAG_LED
PB	11	I2C2_SDA	FMU_I2C2_SDA_GPS2_MAG_LED
PB	12	PB12	N_BRICK2_VALID

PB	13	CAN2_TX	FMU_CAN2_TX
PB	14	SDMMC2_D0	FMU_SDMMC2_D0
PB	15	SDMMC2_D1	FMU_SDMMC2_D1
PC	0	ADC3_INP10	HW_REV_SENSE
PC	1	ADC3_INP11	HW_VER_SENSE
PC	2	SPI2_MISO	FMU_SPI2_MISO_FRAM
PC	3	SPI2_MOSI	FMU_SPI2_MOSI_FRAM
PC	4	ADC1_INP4	FMU_BAT1_I
PC	5	ADC1_INP8	FMU_BAT1_V
PC	6	USART6_TX	FMU_USART6_TX_TO_IO
PC	7	USART6_RX	FMU_USART6_RX_FROM_IO
PC	8	UART5_RTS	FMU_UART5_RTS_TEL2
PC	9	UART5_CTS	FMU_UART5_CTS_TEL2
PC	10	PC10	N_VDD_5V_HIPOWER_EN
PC	11	PC11	N_VDD_5V_HIPOWER_OC
PC	12	UART5_TX	FMU_UART5_TX_TEL2
PC	13	PC13	FMU_SPI1_CS3_ICM42688
PC	14	PC14	FMU_SPI1_CS2_BMI055_GYRO
PC	15	PC15	FMU_SPI1_CS1_BMI055_ACC
PD	0	CAN1_RX	FMU_CAN1_RX
PD	1	CAN1_TX	FMU_CAN1_TX
PD	2	UART5_RX	FMU_UART5_RX_TEL2
PD	3	SPI2_SCK	FMU_SPI2_SCK_FRAM
PD	4	PD4	FMU_SPI2_CS_FRAM
PD	5	USART2_TX	FMU_USART2_TX_TEL3
PD	6	SDMMC2_CK	FMU_SDMMC2_CK
PD	7	SDMMC2_CMD	FMU_SDMMC2_CMD
PD	8	USART3_TX	FMU_USART3_TX_DEBUG
PD	9	USART3_RX	FMU_USART3_RX_TEBUG
PD	10	PD10	N_FMU_LED_RED
PD	11	PD11	N_FMU_LED_BLUE
PD	12	I2C4_SCL	FMU_I2C4_SCL
PD	13	I2C4_SDA	FMU_I2C4_SDA
PD	14	TIM4_CH3	FMU_CH5

PD	15	TIM4_CH4	FMU_CH6
PE	0	UART8_RX	FMU_UART8_RX_GPS2
PE	1	UART8_TX	FMU_UART8_TX_GPS2
PE	2	PE2	N_VDD_5V_PERIPH_EN
PE	3	PE3	N_VDD_5V_PERIPH_OC
PE	4	PE4	FMU_SPI1_DRDY1_BMI055_ACC
PE	5	PE5	FMU_SPI1_DRDY2_BMI055_GYRO
PE	6	PE6	FMU_SPI1_DRDY3_ICM42688
PE	7	UART7_RX	FMU_UART7_RX_TEL1
PE	8	UART7_TX	FMU_UART7_TX_TEL1
PE	9	UART7_RTS	FMU_UART7_RTS_TEL1
PE	10	UART7_CTS	FMU_UART7_CTS_TEL1
PE	11	TIM1_CH2	FMU_CH2
PE	12	PE12	HW_VER_REV_DRIVE
PE	13	TIM2_CH3	FMU_CH3
PE	14	TIM2_CH4	FMU_CH4
PE	15	PE15	N_USB_VBUS_VALID