

# mHPU



## Mobile Hydraulic Power Unit



### Overview

mHPU(mobile Hydraulic Power Unit), operated by a battery unit, is a small, portable, and strong power unit for hydraulic robots.

mHPU consists of a hydraulic controller, a manifold, and pump modules. The number of pump modules depends on the required maximum flow rate.

mHPU supports communication methods such as high-speed CAN and Ethernet(UDP), allowing the user to control and check the state of mHPU.

#### Hydraulic module

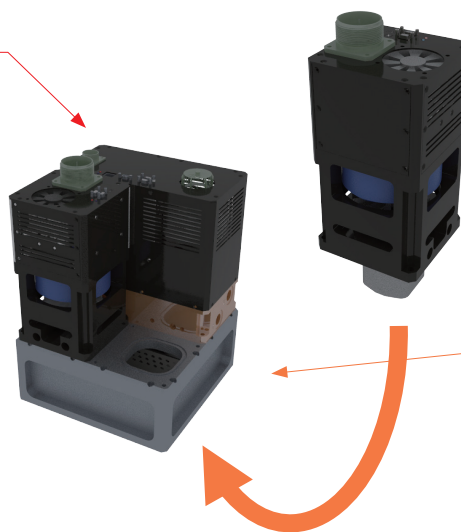
- Manifold
- Prop. Relief valve
- Relief valve(Direct)
- Accumulator
- Pressure Sensor
- Temp. Sensor
- Controller

#### Pump module

- Pump
- Motor
- Motor-driver
- Encoder
- Temp. Sensor(x2)
- Controller
- Fan

#### Tank

- Operation Oil
- Angled Deaeration Screen



## FEATURES

- ☞ Stable pressure control system
- ☞ High efficiency system
- ☞ High performance CPU included for reliable system control
- ☞ Anti-shock pressure control valve
- ☞ Operating pressure of 14MPa
- ☞ Maximum flow rate of 5.5LPM per pump module

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### Your Benefit

#### High Efficiency

KNR's mHPU is a controllable and programmable hydraulic power unit that can control flow rate and pressure according to the requirements of applied system. This optimizes control results with high efficiency to save energy required to drive Power Units.



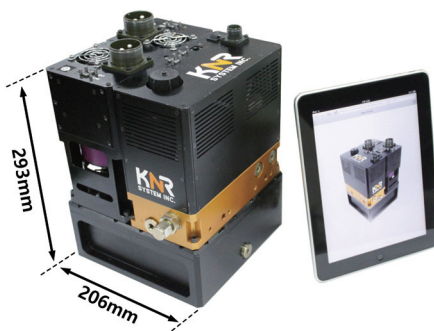
#### Flexibility

mHPU consists of a hydraulic module and several pump modules. The maximum flow rate of the HPU system depends on the number of pump modules.



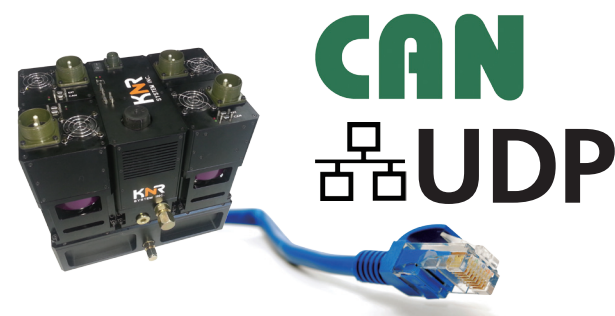
#### Compact Design

Using compact design technology, KNR offers mHPU which is small in size while high in performance, supplying enough flow rate to be applied in the robotics field.



#### Convenience

mHPU offers multiple communication interfaces, giving Users freedom in application.



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# Mobile Hydraulic Power Unit

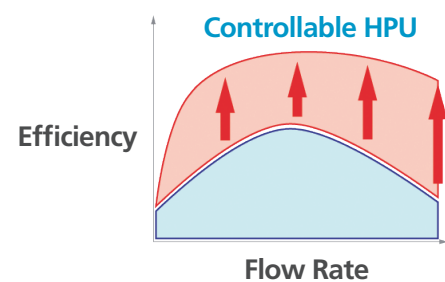


## High Efficiency

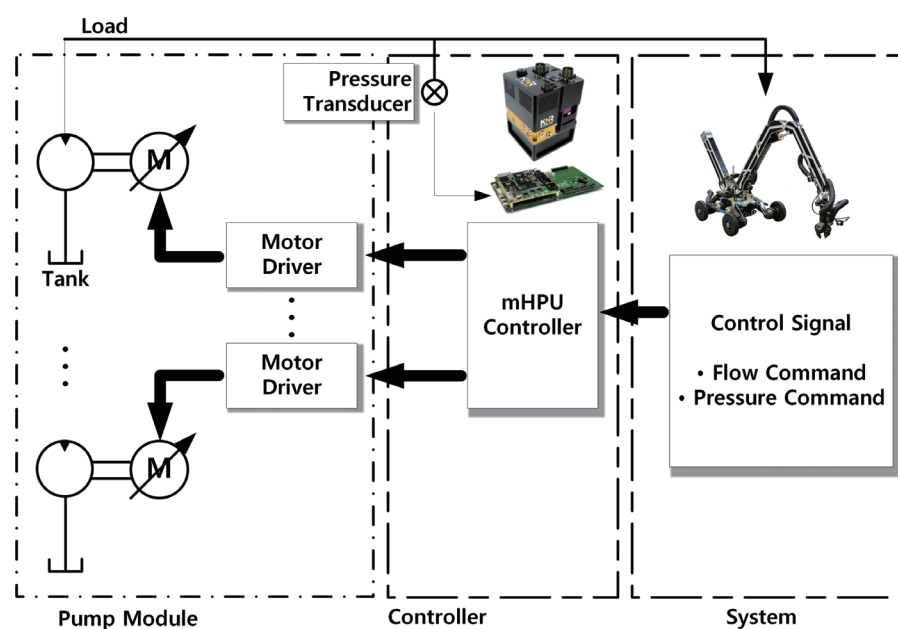
As the adaption of hydraulics in field robots increases, small and lightweight power units are becoming an essential technology. The general problem with HPUs is that they constantly supply more flow rate than necessary, causing a loss in energy efficiency.

The lost energy produces heat, requiring larger cooling systems to maintain proper temperature. Larger cooling systems also cause the robot to be heavier, requiring larger battery capacity. In order to handle these problems, KNR developed the mobile hydraulic power unit (mHPU) that supplies optimum flow rate for the system. mHPU can control the flow rate in a continuous range, and by setting the output flow rate just enough to cover the operating flow rate energy loss is minimized and efficiency is maximized.

mHPU has two modes: economic driving mode(focused on saving power) and dynamic mode(focused on response time and performance.)



## Adjustable Flow Rate to Match the System Specification



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# mHPU



## Mobile Hydraulic Power Unit

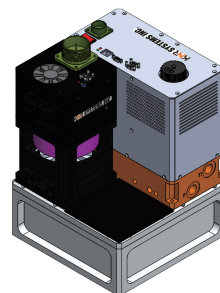
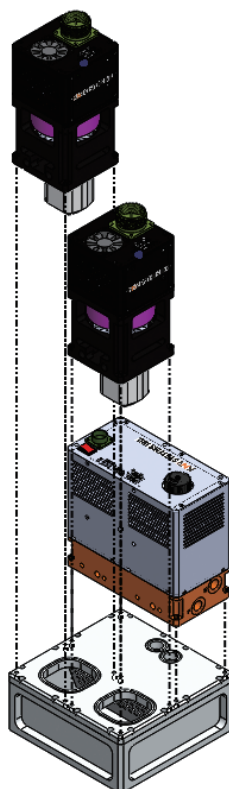


### Flexibility

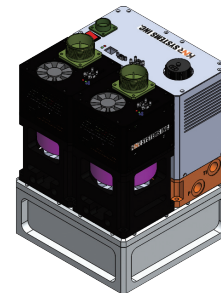
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The number of pump modules depends on the required flow rate. mHPU supports user communication, such as high-speed CAN and Ethernet(UDP), allowing them to control and check the state of the mHPU.

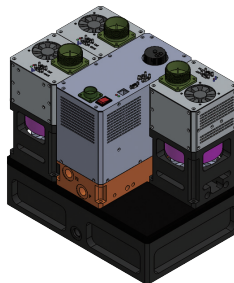
The number of pump modules attached to the mHPU can be modified, each pump module having its own internal controller. This provides optimum control of output and uses CAN 2.0A for communication. mHPU performs best when the control algorithm adapts to the module configuration.



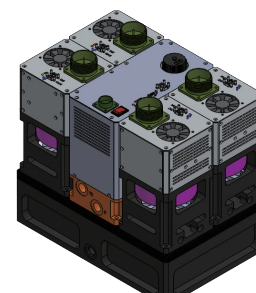
1 Module (5.5LPM)



2 Module (11LPM)



3 Module (16.5LPM)



4 Module (22LPM)

# mHPU



## Mobile Hydraulic Power Unit



### Application



### Manipulator



MP3  
(KNR's Multi-Purpose Manipulator)

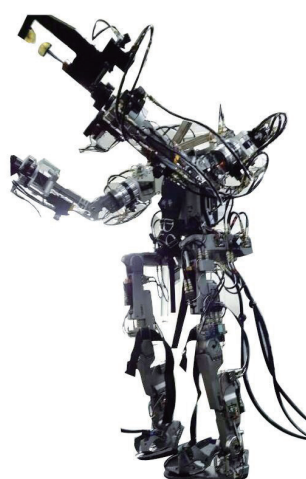


UW2  
(KNR's Underwater Manipulator)

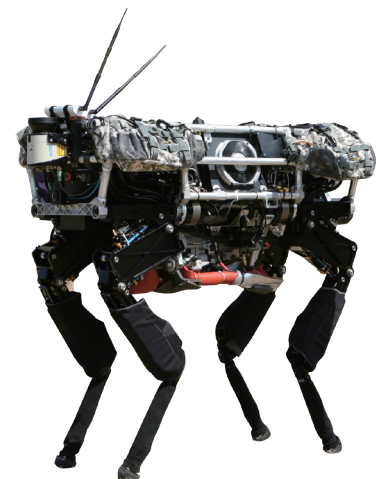
### Robot



Gibbon  
(KNR's Hydraulic Mobile Robot in a nuclear power plant)  
(Body:  $10^5$  (Rad/hr), Grip:  $10^6$  (Rad/hr))



*Project supported by MOTIE,  
"Development of Wearable Robot  
for Industrial Labor Support."*



*Project supported by MKE,  
"Development of Quadruped  
Legged Robot Platform Technology"*

# mHPU



## Mobile Hydraulic Power Unit



### Specification

Hydraulic Module	
Voltage	34VDC ~ 42VDC
Current Consumption	2A(max)
Connector	MS-3102-12S-3-P(MIL-5105 type)
Recommended Cable	20AWG(min)
Pressure	140bar(max)
Flow rate	5.5LPM x Number of pump modules
Control mode	Economic mode for saving power Dynamic mode for fast response of flow rate
User Interface(CAN) Connector	CAN 2.0A, 1Mbps Micro D-sub 9pin
User Interface (UDP)	RJ-45
Option(External installation)	Bootstrap Inline Filter Cooling Fan

Pump Module	
Operating Temperature	Air temperature : 20℃~40℃ System : 20℃~80℃
Voltage	Rated Voltage : 37VDC(34VDC ~ 42VDC)
Current Consumption	70A(max)
Connector	3102A-24-9-P(MIL-5015 type)
Recommended Cable	6AWG(min)
Flow rate	5.5LPM(max)
External Interface (CAN)	Connector : Micro D-sub 9pin CAN 2.0A 1Mbps



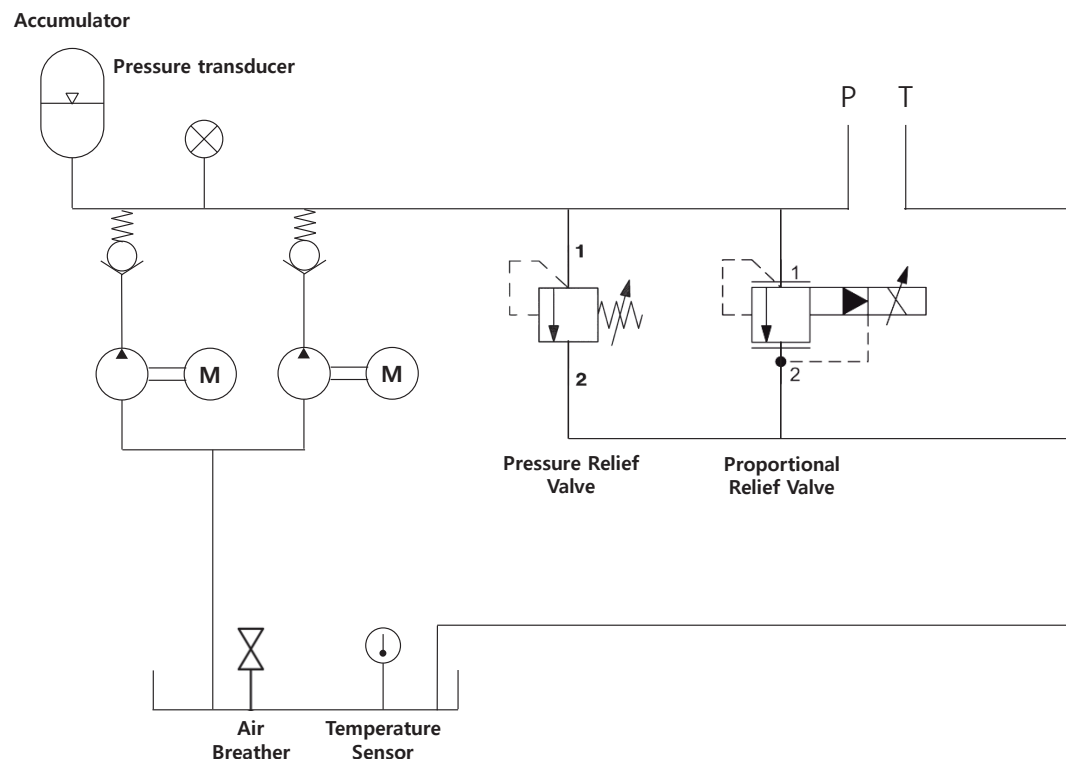
mHPU



# Mobile Hydraulic Power Unit



## Specification(Hydraulic Circuit)



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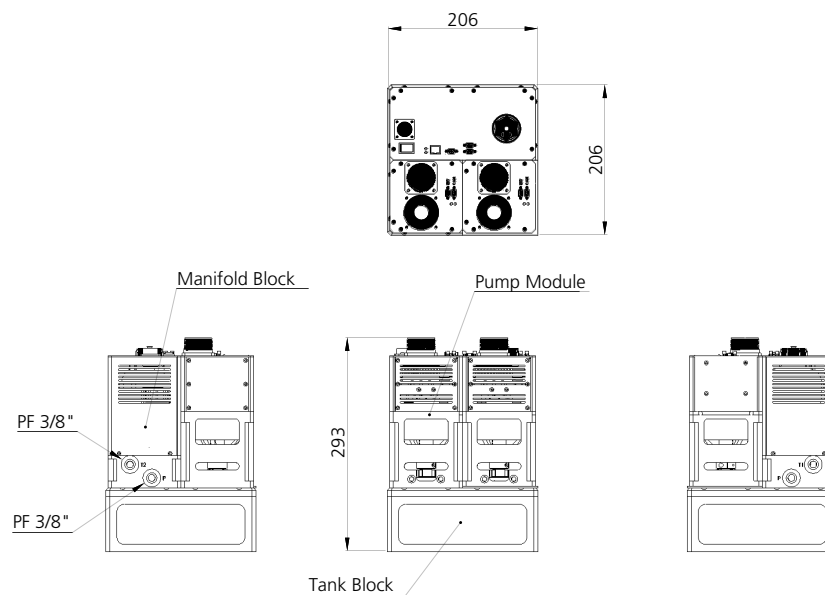


## Mobile Hydraulic Power Unit

MAY, 2016



### 2 Module



### 4 Module

