

ENGINEERING  
TOMORROW



# Hydraulic and Electronic Control Solutions **Concrete Pump Truck**

## **Best Partner**

for a future of intelligence

Quality products and systems indicate lower maintenance cost and longer service life. Our global network and quick response will support smooth running of your equipment.



# Hydraulic and Electronic Control Solutions

## Concrete Pump Truck



INQUIRY

PROJECT SPECIFICATION

- Detailed project plan
- Technical system specification

CONCEPT PHASE

- Different system proposals
- Evaluation and selection of approach

# Focus on Customer and Join hands for a Better Future

With decades of development, China has become the largest market for concretes pump equipment in the world, where a number of suppliers are competing fiercely. The customers have increasingly higher expectation for the equipment. In addition to low fuel consumption, high performance and high reliability, intelligent and precise controls are playing more important roles in this market.

Faced with a more competitive market and ever growing expectations from end users, pump equipment manufacturers need to integrate resource and focus on customers to meet the market demands constantly.

As the global leader in mobile hydraulics, Danfoss Power Solution started to work with the leading pump truck enterprise in Germany over three decades ago. The quality hydraulic and electronic control products and solutions provided by Danfoss will enable you to develop more competitive systems to fulfill needs of specific customers.



## DESIGN

- Sizing and selection of compatible components
- Advanced simulation tests and system FMEA

## IMPLEMENTATION

- Installation in prototype
- Real-life work condition tests at Danfoss' on-site test-track
- Careful system performance analysis for optimization and trouble-shooting

## RELEASE


- Final review
- Final report
- Documentation
- Start-up help



# Closed Pumping System

DP700  
Graphic Display  


OMH 500  
Orbital Motor

Sensor  
(Temperature and Pressure)  


VMR  
Orbital Motor

SGM  
Fan Drive  
Gear Motor


PLUS+1®  
MC050 Microcontroller


PVG 32  
Load Sensing  
Proportional  
Valve  


Control Valve  
for Flushing  
and Mixing

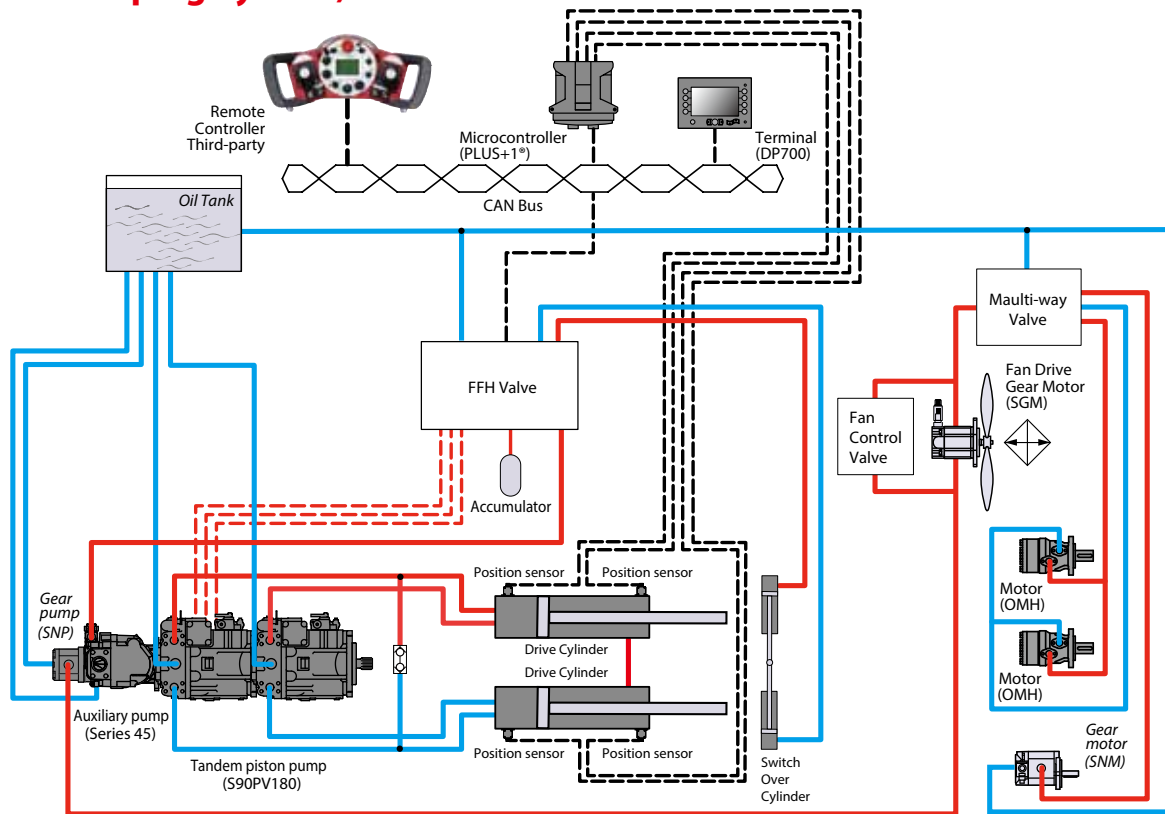
SNM  
Flushing  
Drive Gear  
Motor

SNP  
Gear Motor

Series 45  
Axial Piston  
Open Circuit Pump  


Series 90  
Axial Piston Tandem Pump  
(180+180cc / 130cc)  


## Diagram for Pumping System (Closed Pumping System)



## Diagram for Arm System

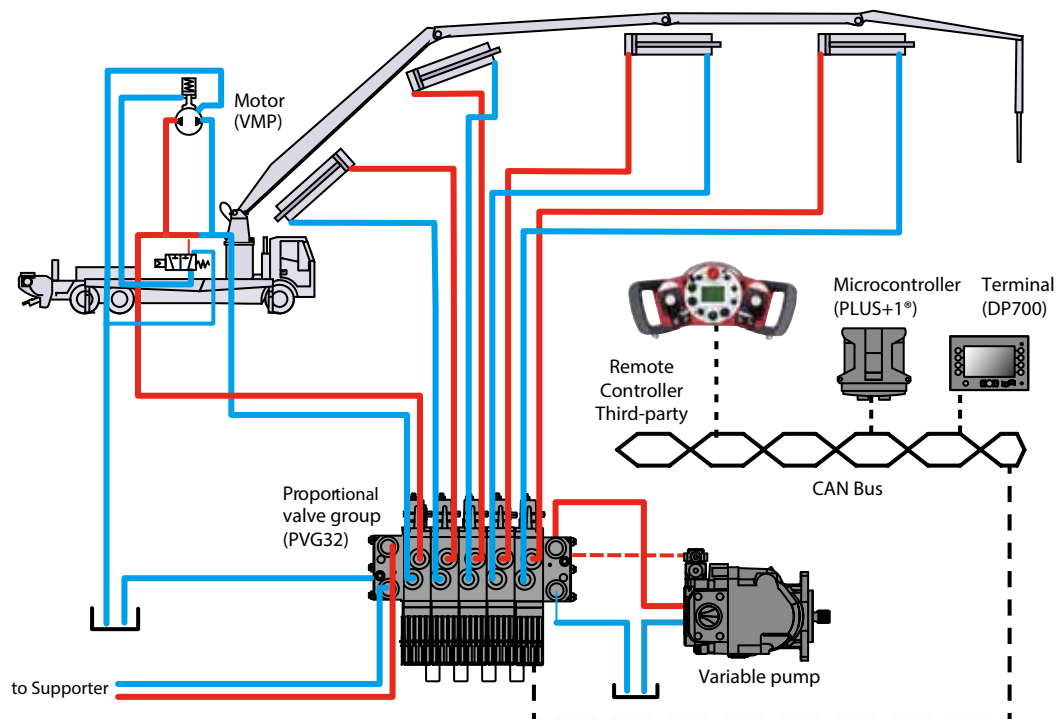
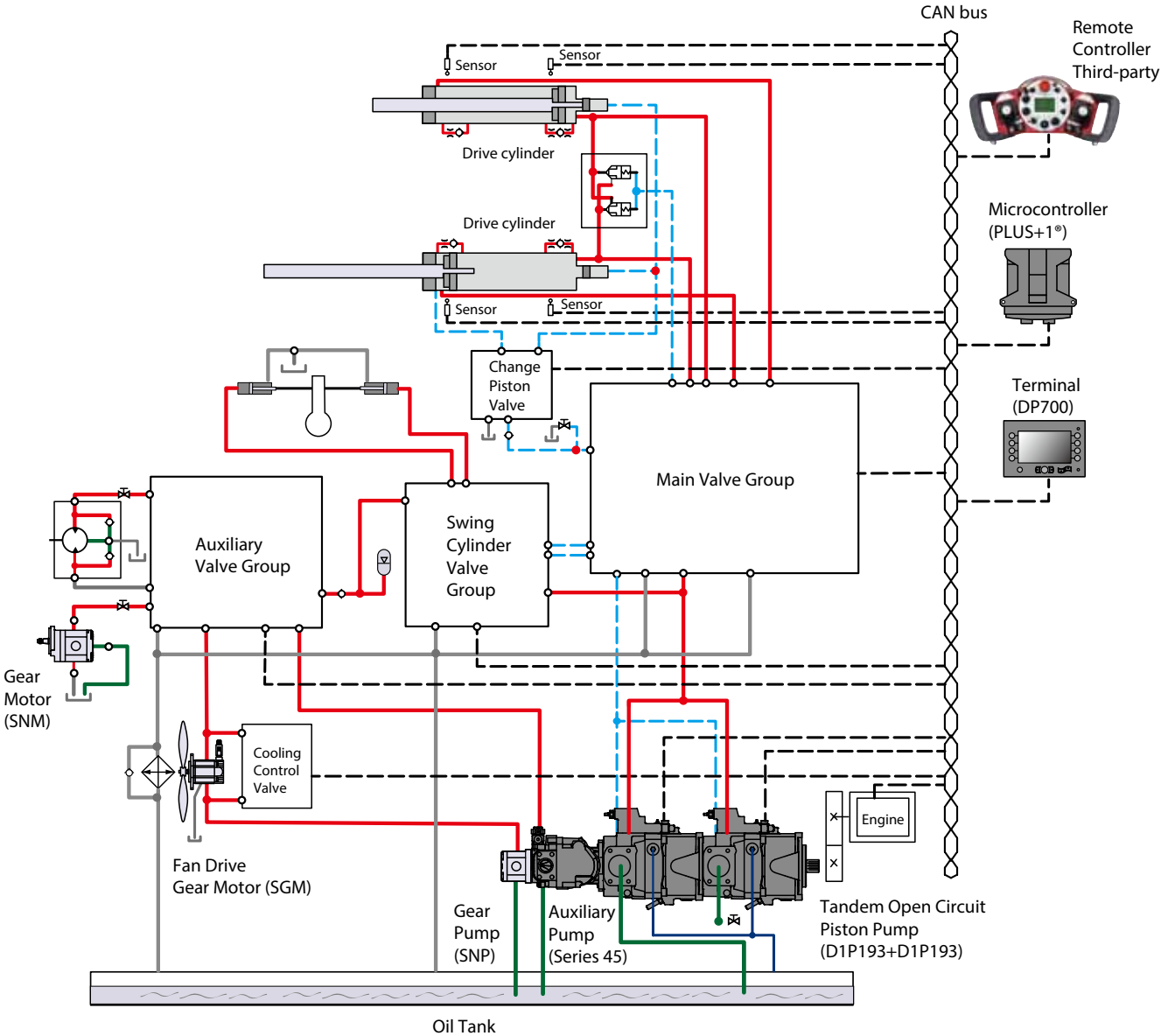


Diagram for Pumping System  
(Open Pumping System)

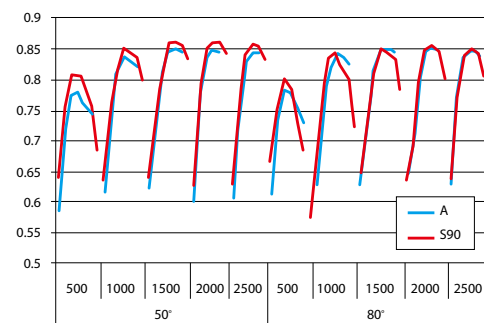


# Pumping, Swinging, Mixing, and Flushing System

- **Closed Pumping System Solution:** S90 series closed pumping system can meet a variety of control requirements, including pump capacity, regular and reverse pumping, constant output, high pressure overflow, reversing impact mitigation, etc.. The integrated flushing valves, shuttle valves and other functional modules make the customer system more concise.
  - **Open Pumping System Solution:** Under the leadership of the most experienced piston pump R&D director from Germany, Danfoss has developed D1P193, an open high-pressure piston pump with high quality, which has gone through long-term verification in pump truck under harsh conditions. The control function of the piston pump can fully satisfy the requirements of the pumping system in a pump truck, including the control of Electric displacement control, Power control, Pressure compensated control, etc..
  - **S Valve Swinging System Solution:** S45 series variable open pumps have integrated constant pressure controls for long-time high-pressure operating conditions.
  - **Mixing System Solution:** OMH Series Orbital motors can work under high-torque demanded by the system.
  - **Flushing System Solution:** Quality SNP gear boxes and SNM gear boxes make the system more reliable.
  - Develop specific solutions based on customer demands to promote the competitiveness of their products.
- Core technology creates values for customers – The closed pump, specially developed by Danfoss plant in German for pumping system in pump truck, has the following features:

## A High Efficiency

When the oil pump for pump truck adopts the most commonly-used operating parameters (pressure: 35 bar – 300 bar, rotational velocity: 1500 rpm – 2500 rpm), it will stay in highly efficient working range, with a total efficiency over 85%. Compared with current technology, high efficiency oil pump can reduce fuel consumption by 3% - 5% for each pumping.



Efficiency Comparison Curve

## B High Reliability and Long Service Life

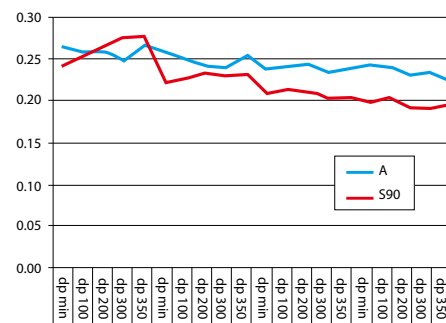
For over 3 decades, Danfoss has employed strict zero-defect processes and "long service life" concept in Europe, to eradicate any loss caused by faults and offer a long-lived pump truck "heart" to our customers. The high reliability and long service life of its products, which our German plant takes great pride, are well-proven in a wide range of rigor construction environments and widely recognized by the market.



S90PV180 Tandem Pump

## C Quick Pump Control Reversing Technology

According to numerous comparison tests, the average reversing time of Danfoss pumps is 0.222s, 8% faster than 0.242s of our competitors'. This advantage not only saves fuel consumption for our customer, but also promotes concrete flowability, and thus decreases the impact of flow pulse caused by concrete reversing.



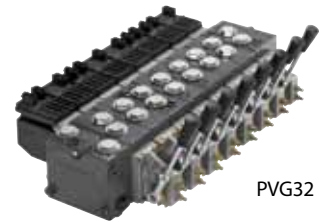
Reversing Time Comparison Curve

# Arm System

Developed specially for pump truck,  
PVG32 arm serves as the proof of customer-oriented R&D concept of Danfoss.

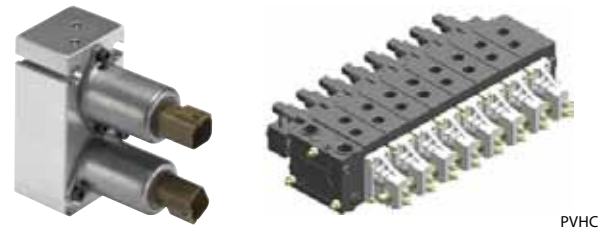
The valve has the following features:

- **Flow control technology, independent of load:**  
Better maneuverability for operator, resulting in better controllability of arms.
- **LS load sensitive control technology:**  
Reduce fuel consumption and prolong service life of hydraulic components.
- **Advanced electro-hydraulic proportion control technology:**  
Make the operating speed of arms under free control.
- Detailed customer requirements – Danfoss selects three arm valve plans for pump truck.



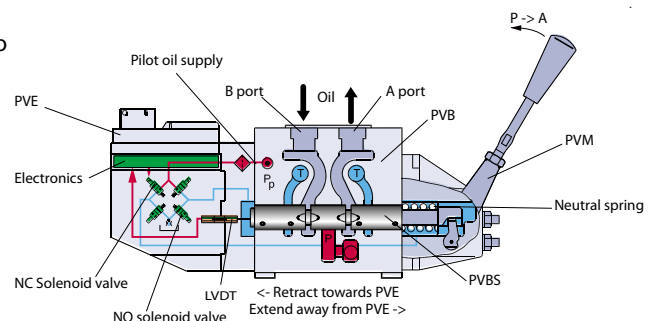
## A Low-Cost Plan

This plan can cut OEM purchasing cost without impairing the performance of arm valves on the market.



## B Advanced Control Plan

Unlike arm valve control technology available on current market, PVE arm valves adopt closed loop controls to reduce magnetic hysteresis inherent to electromagnet from 20% to 1% and significantly promote control accuracy. Moreover, the price performance ratio of this plan is higher, as its cost is equivalent to those of common products on the market.



PVE

## C More Advanced Digital Control Plan

- This plan can be used with CAN-BUS, enabling customers to develop more intelligent and higher level equipment.
- This plan can be equipped with SIL 2 certified digital driver PVED-CX (up to EU or US Safety Standards), enable customers expand business to European or US market.



PVG32



Simple Analogue module

Microprocessor add-on module

PVED-CC



# Electronic Control System

Tailored to concrete pump truck, the electronic control system has a number of advantages, including excellent performance, clear objective, strong applicability, high reliability and so on.

## A An Excellent Performance

- A main frequency of 150 MHZ brings about ultra-fast operating speed and powerful data and algorithm processing ability, which can complete a whole procedure scanning cycle in 1 ms only.
- PWM control, with a minimum of resolution of 0.1 mA, greatly upgrades the operability and smoothness.
- 12 digit A/D conversion raise the measurement accuracy and controllability.



Electronic Control System Components for Pump Truck

## B Clear Objective

- Proven functional modules in pump truck control software facilitate programming, code understanding, and functional addition.
- Powerful Service Tool Monitoring Software provides more convenient graphical debugging, parameter modification and system monitoring functions.
- The magnetic hysteresis removal function specially designed for proportional valve in pump truck, when used with PVG32 valve group, will improve the accuracy and stability of arm operation.



Software Functions and Test Data

## C Better extensibility and High Reliability

- Assemble and add I/O module according to customer demands, to meet the customization needs for different pump trucks.
- Reserve a CAN BUS interface, to facilitate the GPRS communication with BUS remote controller.
- Conform to requirements on IP 67 protection degree, vibration, impact and electronic compatibility stipulated by application standards in construction engineering.



Expansion Module and One-off Encapsulation Requirement

# One of the Industry's Broadest Product Portfolios

**Our aim is to be the best partner in mobile hydraulics.**

**Based on 45 years' experience in off-highway vehicles, we can provide expertise in a great variety of industries, including but not limited to construction, agriculture, material handling, road construction, lawn care, forestry, as well as multi-functional purpose-built vehicles**

## HYDROSTATICS

We can provide solutions applications of low, medium and high output, including single and double-side driving systems and enclosed drive.

Our products contains the best-in-class axial-flow variable single piston pump and tandem pump, SIL 2 certified vehicle drive mode products (H1 AC), axial-flow piston fixed displacement motor and double displacement motor, bent Axis variable displacement motor, complete pump system, mixer products, axial-flow variable piston pump for working system, etc..



## VALVES

Our well-proven valve products, with reliable quality and modularized design concept, can be used in almost every circumstance.

We provide load sensitive, electronic control proportional valves, as well as proportional valves independent of load. With our valve products, you can adopt various control methods to satisfy the most demanding requirements, while keeping the system operating stably and durably.



## STEERING COMPONENTS AND SYSTEMS

As for steering products, we provide standard steering device, electro-hydraulic steering components, mini-steering gear, dedicated steering gear, flow amplifier, etc., which covers all application needs, including common two-wheel steering, four-wheel steering, articulated steering, and automatic steering controlled by sensors or satellite signals.

The steering system solutions provided by Danfoss are taking the lead in the market and have set the benchmarks for reliable, safe and comfort control systems for off-road vehicles. We provide independent and ready-to-use components, which can be used in highly efficient steering, mobile, operating and control systems.



## ORBITAL MOTORS

In orbital motor market, we can provide the widest range of high quality, durable, efficient and reliable products, which are able to endure high axial force and radial force and provide high start-up torque and stable output torque. The shaft seals can withstand high pressure, so motors can have longer service life even in adverse operating environment.



## MOBILE ELECTRONIC COMPONENTS AND SYSTEMS

Our product portfolio includes various high performance electronic products used for off-highway vehicles. We can offer a series of standard as well customized products, including software, handle, PLUS+1 controller, sensor, display and GPS device. With these products and PLUS+1 control platform, you can establish a vehicle control system quickly, cut development cost, and put your vehicles on the market in shorter time.



## YOUR STRONGEST PARTNER IN MOBILE HYDRAULICS

The increasingly rigor regulations on motor exhaust emission and the launch of new European safety regulations will have influence design and development of almost all off-road vehicles. In order to help our customers to address the above and other industrial challenges, we provide intelligent solutions, including various hydraulic products, electronic control components, and vehicle control recommendations. The comprehensive measure makes us the best partner of your business.



## About Danfoss Power Solutions

**Danfoss Power Solutions** is a global manufacturer and supplier of high-quality hydraulic and electronic components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of off-highway vehicles. We help OEMs around the world speed up system development, reduce costs and bring vehicles to market faster.

Danfoss Power Solutions – your strongest partner in mobile hydraulics.

### Products we offer:

- Bent Axis Motors
- Closed Circuit Axial Piston Pumps and Motors
- Displays
- Electrohydraulic Power Steering
- Electrohydraulics
- Hydraulic Power Steering
- Integrated Systems
- Joysticks and Control Handles
- Microcontrollers and Software
- Open Circuit Axial Piston Pumps
- Orbital Motors
- PLUS+1® GUIDE
- Proportional Valves
- Sensors
- Steering
- Transit Mixer Drives

Wherever off-highway vehicles are at work, so is Danfoss Power Solutions. We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Go to **[www.powersolutions.danfoss.com](http://www.powersolutions.danfoss.com)** for further product information.

### Danfoss Power Solutions (US) Company

2800 East 13th Street  
Ames, IA 50010, USA  
Phone: +1 515 239 6000

### Danfoss Power Solutions ApS

Nordborgvej 81  
DK-6430 Nordborg, Denmark  
Phone: +45 7488 2222

### Danfoss Power Solutions GmbH & Co. OHG

Krokamp 35  
D-24539 Neumünster, Germany  
Phone: +49 4321 871 0

### Danfoss Power Solutions Trading (Shanghai) Co. Ltd.

Building #22, No. 1000 Jin Hai Rd  
Jin Qiao, Pudong New District  
Shanghai, China 201206  
Phone: +86 21 3418 5200