[System Architecture] ΠPS - Menu

Access

[Complete settings] ➡ **[Pump functions]** ➡ **[Booster control]** ➡ **[System architecture]**

About This Menu

This menu is used to define the equipment architecture.

The architecture is chosen by setting **[Pump System Architecture]** ΠPSA to **[Single Drive]** undoL: one variable speed pump and up to five fixed speed pumps.

The total number of pumps is set with **[Nb Of Pumps]** ΠPPn:

- With lead pump alternation, using interlocked switching relays for all pumps to connect them on mains or on the drive.
- Without lead pump alternation, using digital outputs to command the auxiliary pumps (with soft starters for example). The lead pump is always connected to the drive.

Pump Cycling Mode

This functionality allows changing the start order of all available pumps in order to manage their wear. There are several ways to perform the pump cycling strategy by setting **[Pump Cycling Mode]** ΠPPC:

- Cycling based on pump order:
  - **[FIFO]** F iFo mode: pumps are started and stopped in ascending order
  - **[LIFO]** L iFo mode: pumps are started in ascending order while they are stopped in descending order
- Cycling based on running time:
  - **[Runtime]** rt iΠE: the available pump with the lowest running time is started first and the running pump with the highest running time is stopped first.
  - **[Runtime&LIFO]** rtLF : cycling based on a combination of running time and LIFO mode. The available pump with the lowest running time is started first and the running pump started at latest is stopped first.

Lead Pump Alternation

The lead pump alternation function allows permuting the available pumps in order that each pump can become the lead pump (variable speed pump) instead of an auxiliary pump (fixed speed pump).

The lead pump is the first pump to be started and the last pump to be stopped. It is always associated to the variable speed drive.

The function can be activated by setting **[Lead Pump Alternation]** ΠPLA:

- **[No]** no: no lead pump alternation, the pump 1 is always the lead pump. The pump cycling is applied only on auxiliary pumps.
- **[Start]** YES: the lead pump is permuted between all available pumps at each pump operation start.
- **[Redundancy]** rEd: lead pump alternation is effective only if the pump 1 is not available.

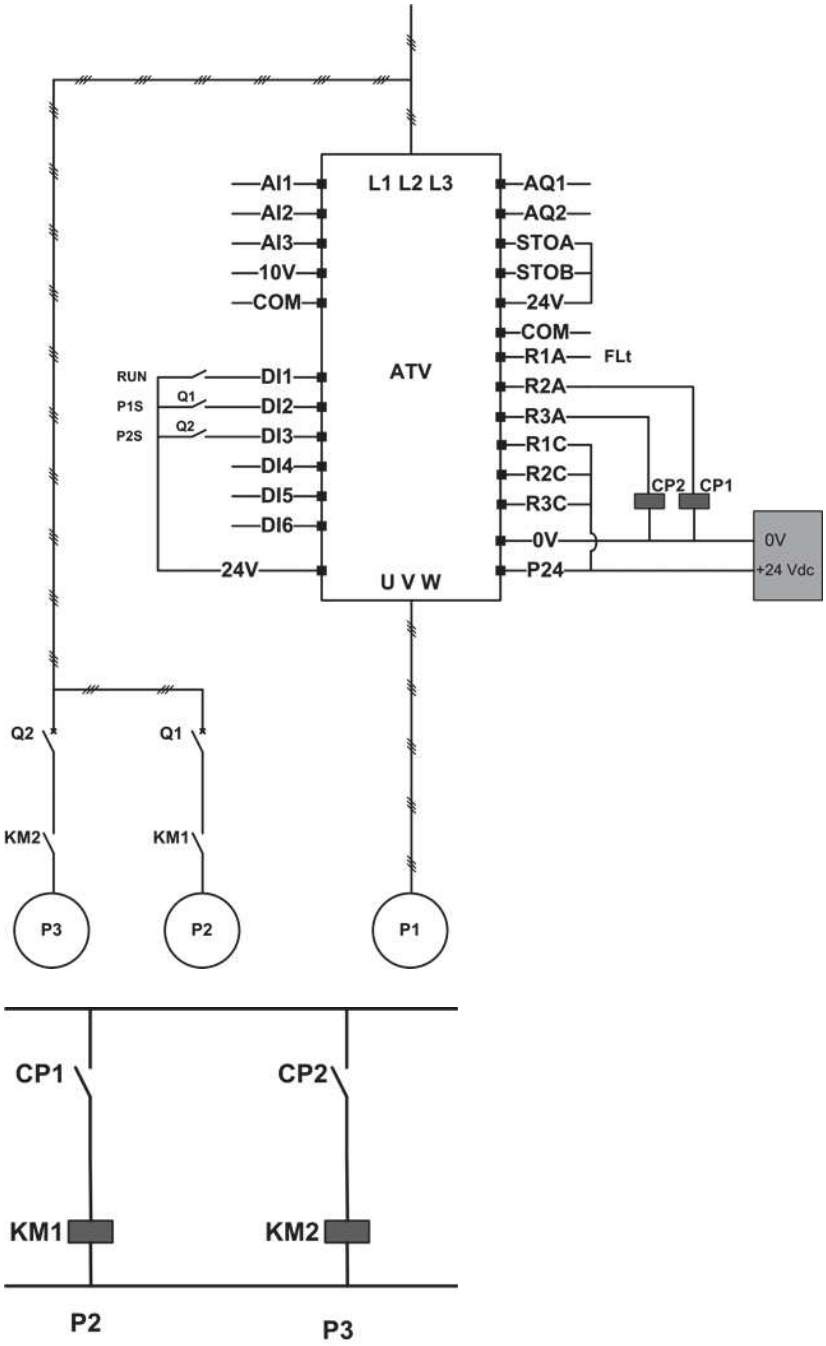
When lead pump alternation is activated, catch on fly function should be configured to reduce over current when a pump is started as the lead pump while it was running as auxiliary pump before. It is also possible to set **[Pump Ready Delay]** ΠP id to delay the availability of an auxiliary pump for a new start after it has been stopped.

Display Parameters

A set of parameters to display the system is available in **[Display]** Mon - **[Pump parameters]** PPr - **[Multipump System]** ΠPS -:

- The state of the system **[MultiPump State]** ΠPS.
- The quantity of pumps available **[Available Pumps]** ΠPAn and the quantity of pump already staged **[Nb of Staged Pumps]** ΠPSn.
- The number of the pump selected to be the lead pump **[Lead Pump]** PL id.
- The number of the next pump to be staged **[Next Staged Pump]** Pnt S and de-staged **[Next Destaged Pump]** Pntd.
- For each pump (pump 1 in the example):
  - The state **[Pump 1 State]** P 1S
  - The type **[Pump 1 Type]** P 1t
  - The cumulated run time **[Pump 1 Runtime]** P 1ot
  - The cumulated number of starts **[Pump 1 Nb Starts]** P 1nS

Example of Architecture Without Lead Pump Alternation and Two Fixed Speed Pumps



Pump 2 and pump 3 are controlled by relay outputs R2 and R3.

The state of each pump is provided to the drive via digital inputs DI2 and DI3:

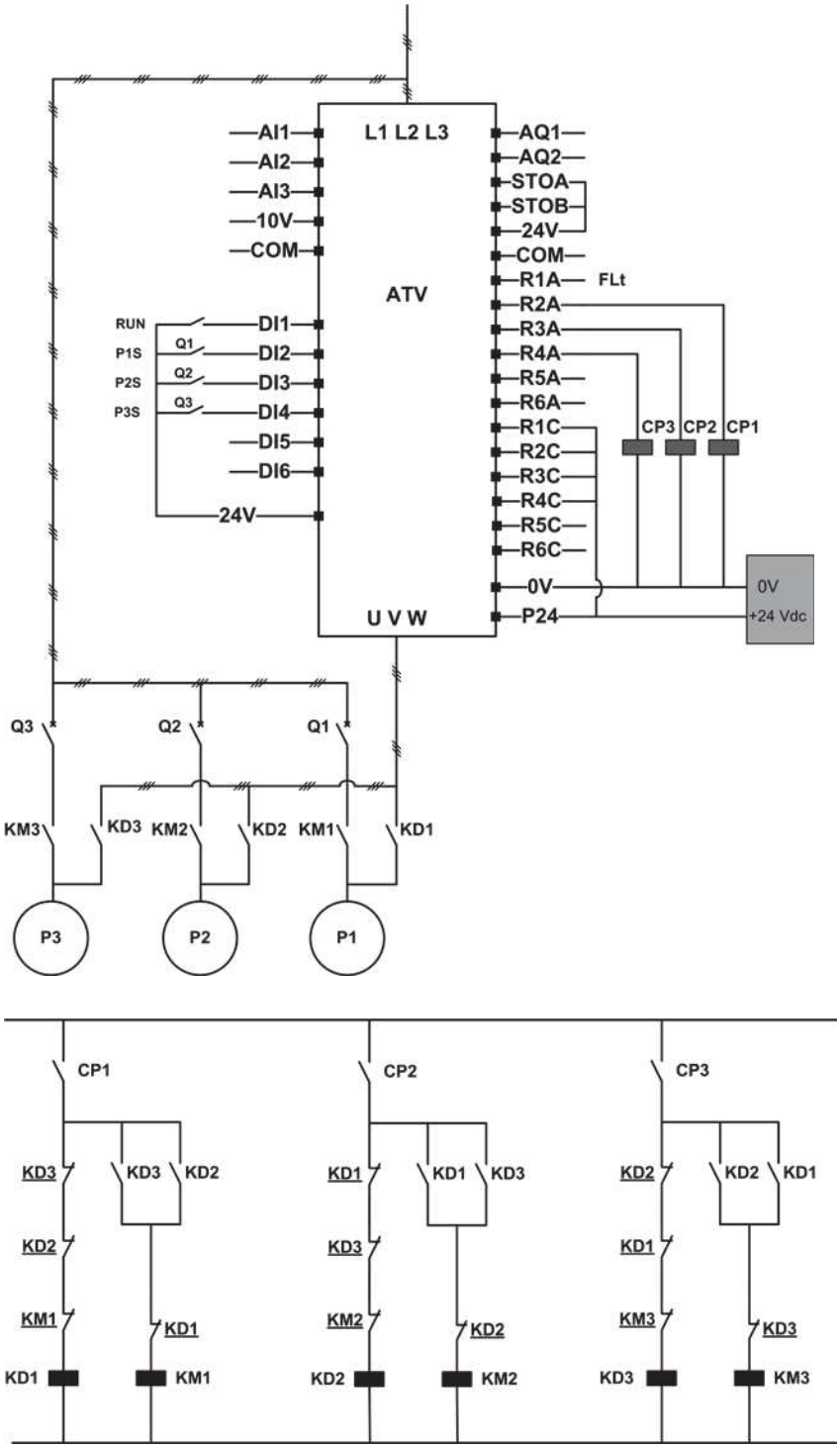
- 1 = the pump is ready to operate.
- 0 = the pump is not available.

KM1 is switched ON when CP1 is activated. CP1 is controlled via the relay output R2.

KM2 is switched ON when CP2 is activated. CP2 is controlled via the relay output R3.

Q1 and Q2 must be switched ON to have both pump 2 and pump 3 ready to operate.

Example of Architecture with Lead Pump Alternation on Three Pumps



Each pump is controlled by a relay output:

- Pump 1 control via relay output R2.
- Pump 2 control via relay output R3.
- Pump 3 control via relay output R4.

The state of each pump is provided to the drive via digital inputs DI2, DI3, and DI4:

- 1 = the pump is ready to operate.
- 0 = the pump is not available.

If the relay output R2 is the first activated, the pump 1 becomes the lead pump. CP1 is switched ON via relay output R2, KD1 is switched ON and the pump 1 is connected to the drive.

The other pumps cannot be connected to the drive thanks to KD1 (switched OFF) which prevent KD2 and KD3 to be activated when CP2 and CP3 are switched ON. The other pumps become auxiliary pumps and they are connected to the supply mains trough KM2 and KM3 which are activated when, respectively, CP2 and CP3 are switched ON, that is, when R3 and R4 are activated.

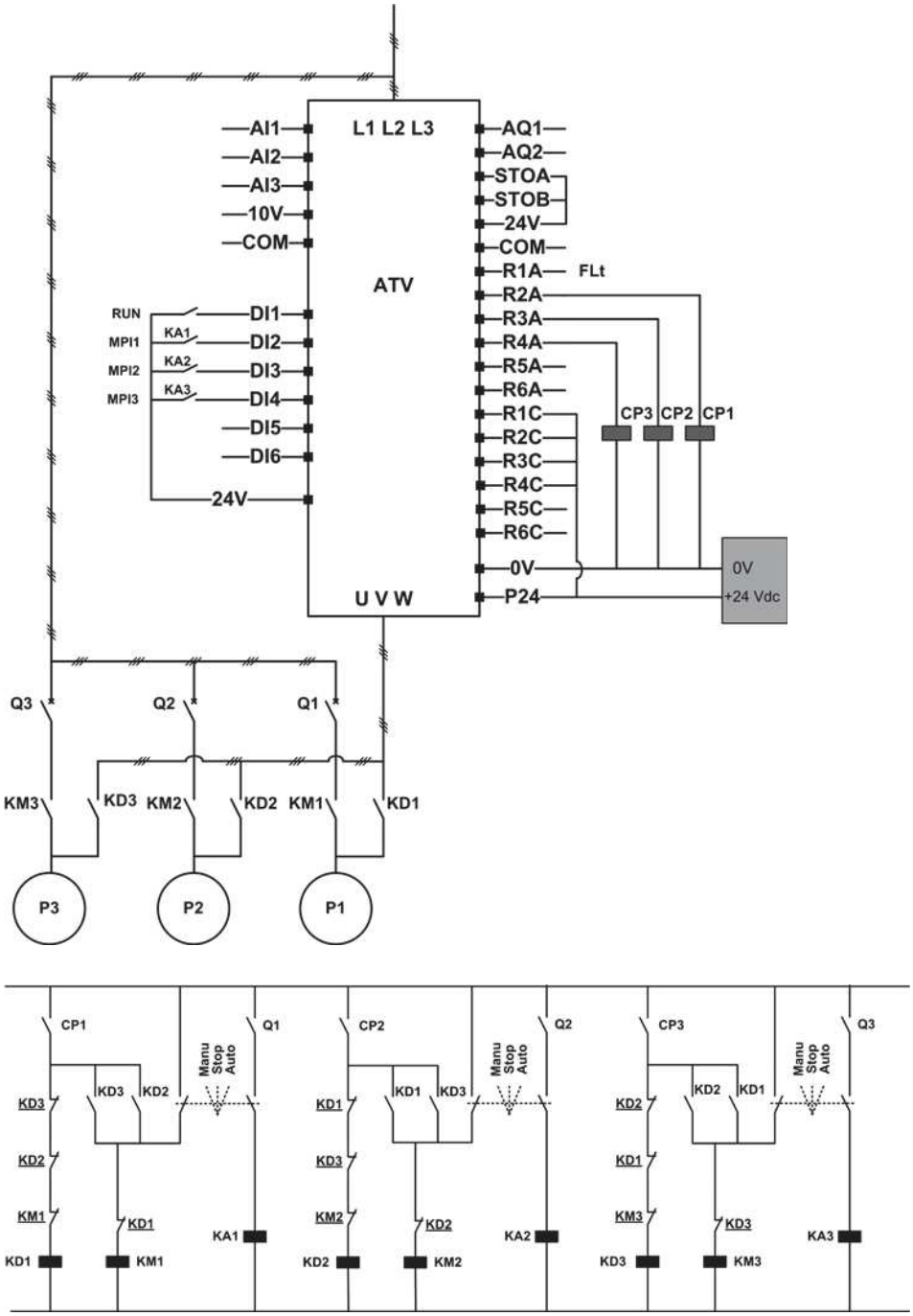
When relay output R3 is the first activated, the pump 2 becomes the lead pump. The other pumps become auxiliary pumps which are connected to the supply mains via KM1 and KM3.

When relay output R4 is the first activated, the pump 3 becomes the lead pump. The other pumps become auxiliary pumps which are connected to the supply mains via KM1 and KM2.

Q1, Q2, and Q3 must be switched ON to have all pumps ready to operate.

To change the lead pump, it is necessary to deactivate all relay outputs which means that all pumps must be already stopped. It is then possible to decide which relay output to be activated first and so defining the new lead pump.

Example of Architecture with Lead Pump Alternation on Three Pumps and Auto/Manu Switch



Each pump is controlled by a relay output:
- Pump 1 control via relay output R2.
- Pump 2 control via relay output R3.
- Pump 3 control via relay output R4.

The state of each pump is provided to the drive via digital inputs DI2, DI3, and DI4:
- 1 = the pump is ready to operate.
- 0 = the pump is not available (stopped or in manual mode).

In automatic mode: Same principle as previous architecture with lead pump alternation.

In manual mode: All pumps are connected to the supply mains through KM1, KM2, and KM3.

[Pump System Architecture] ΠPSA

Pump system architecture selection.

Setting	Code / Value	Description
[No]	nO	Multi-pump control deactivated **Factory setting**
[Single Drive]	VndoL	Single drive with or without auxiliary pumps

[Nb Of Pumps] ΠPPn ★

Number of pumps.

This parameter can be accessed if **[Pump System Architecture]** ΠPSA is set to **[Single Drive]** VndoL.

Setting	Description
1...6	Setting range **Factory setting**: 1

[Pumps configuration] PUMP - Menu

Access

[Complete settings] ➡ **[Pump functions]** ➡ **[Booster control]** ➡ **[System architecture]** ➡ **[Pumps configuration]**

Input and Output Configuration for Each Pump

For each pump (pump 1 in the example), it is necessary to set:

- The drive digital output for the command: **[Pump 1 Cmd Assign]** MPO 1 if **[Lead Pump Alternation]** MPLA is not set to **[No]** NO.
- The drive digital input for the pump availability information: **[Pump 1 Ready Assign]** MP I1. If not configured, the pump is considered as always available.

An internal configurable delay **[Pump Ready Delay]** MP Id is available. When the digital input assigned to **[Pump 1 Ready Assign]** MP I1 switches to the active state or after de-staging, the related pump is considered as not available during **[Pump Ready Delay]** MP Id.

This is used to wait that the auxiliary pumps are stopped and that all contactors between the drive and the motor (if existing) are closed before staging.

Warnings and Errors Handling

If the available capacity of the systemis exceeded:

- **[MultiPump Capacity Warn]** MPCA warning is active if the number of pumps to be started is higher than the number of available pumps.

If the selected lead pump is not available:

- A **[Lead Pump Warn]** MPLA warning is active if the lead pump becomes not available while in run or if there is no lead pump available at run command.
- A **[Lead Pump Error]** MPLF error is active if the lead pump becomes not available while in run. If configured, the delay **[Pump Ready Delay]** MP Id is applied on the error triggering if there is no lead pump available at run command.
  This error is handled whatever the active command channel if booster control or level control function is configured.

The drive response to a **[Lead Pump Error]** MPLF is set with **[MultiPump ErrorResp]** MPFB parameter.

[Pump 1 Cmd Assign] MPO 1 ★

Command assignment for pump 1.

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[1]** 1 or above.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...**[R3]**	r2...r3	Relay output R2...R3
[R4]...**[R6]**	r4...r6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[Analog output DQ11]...**[Analog output DQ12]**	do11...do12	Analog / digital output DO11...DO12 if VW3A3203 I/O extension module has been inserted

[Pump 1 Ready Assign] ПР ı 1 ★

Pump 1 ready to operate assignment.

This parameter can be accessed if **[Nb Of Pumps]** ПРРn is set to **[1]** 1 or above.

Setting	Code / Value	Description
[Not Assigned]	nо	Not assigned **Factory setting**
[DI1]...**[DI6]**	L ı 1...L ı 6	Digital input DI1...DI6
[DI11]...**[DI16]**	L ı 11...L ı 16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]...**[CD10]**	Cd00...Cd10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** ıо configuration
[CD11]...**[CD15]**	Cd11...Cd15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[C100]...**[C110]**	C100...C110	Virtual digital input CMD1.0...CMD1.10 with integrated Modbus Serial in **[I/O profile]** ıо configuration
[C111]...**[C115]**	C111...C115	Virtual digital input CMD1.11...CMD1.15 with integrated Modbus Serial regardless of configuration
[C200]...**[C210]**	C200...C210	Virtual digital input CMD2.0...CMD2.10 with CANopen® fieldbus module in **[I/O profile]** ıо configuration
[C211]...**[C215]**	C211...C215	Virtual digital input CMD2.11...CMD2.15 with CANopen® fieldbus module regardless of configuration
[C300]...**[C310]**	C300...C310	Virtual digital input CMD3.0...CMD3.10 with a fieldbus module in **[I/O profile]** ıо configuration
[C311]...**[C315]**	C311...C315	Virtual digital input CMD3.11...CMD3.15 with a fieldbus module regardless of configuration
[C500]...**[C510]**	C500...C510	Virtual digital input CMD5.0...CMD5.10 with integrated Ethernet Modbus TCP in **[I/O profile]** ıо configuration
[C511]...**[C515]**	C511...C515	Virtual digital input CMD5.11...CMD5.15 with integrated Ethernet Modbus TCP regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L 1L ...L 6L	Digital input DI1...DI6 used at low level
[DI11 (Low level)]...**[DI16 (Low level)]**	L 11L ...L 16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Pump 2 Cmd Assign] ПРо2 ★

Command assignment for pump 2.

This parameter can be accessed if **[Nb Of Pumps]** ПРРn is set to **[2]** 2 or above.

Identical to **[Pump 1 Cmd Assign]** ПРо 1 *(see page 269)*.

[Pump 2 Ready Assign] ПР ı2 ★

Pump 2 ready to operate assignment.

This parameter can be accessed if **[Nb Of Pumps]** ПРРn is set to **[2]** 2 or above.

Identical to **[Pump 1 Ready Assign]** ПР ı 1 *(see page 270)*.

[Pump 3 Cmd Assign] ПРо3 ★

Command assignment for pump 3.

This parameter can be accessed if **[Nb Of Pumps]** ПРРn is set to **[3]** 3 or above.

Identical to **[Pump 1 Cmd Assign]** ПРо 1 *(see page 269)*.

[Pump 3 Ready Assign] ПР ı3 ★

Pump 3 ready to operate assignment.

This parameter can be accessed if **[Nb Of Pumps]** ПРРn is set to **[3]** 3 or above.

Identical to **[Pump 1 Ready Assign]** ПР ı 1 *(see page 270)*.

[Pump 4 Cmd Assign] *ПРо4* ★

Command assignment for pump 4.

This parameter can be accessed if **[Nb Of Pumps]** *ПРРn* is set to **[4]** *4* or above.

Identical to **[Pump 1 Cmd Assign]** *ПРо1* *(see page 269)*.

[Pump 4 Ready Assign] *ПР_4* ★

Pump 4 ready to operate assignment.

This parameter can be accessed if **[Nb Of Pumps]** *ПРРn* is set to **[4]** *4* or above.

Identical to **[Pump 1 Ready Assign]** *ПР_1* *(see page 270)*.

[Pump 5 Cmd Assign] *ПРо5* ★

Command assignment for pump 5.

This parameter can be accessed if **[Nb Of Pumps]** *ПРРn* is set to **[5]** *5* or above.

Identical to **[Pump 1 Cmd Assign]** *ПРо1* *(see page 269)*.

[Pump 5 Ready Assign] *ПР_5* ★

Pump 5 ready to operate assignment.

This parameter can be accessed if **[Nb Of Pumps]** *ПРРn* is set to **[5]** *5* or above.

Identical to **[Pump 1 Ready Assign]** *ПР_1* *(see page 270)*.

[Pump 6 Cmd Assign] *ПРо6* ★

Command assignment for pump 6.

This parameter can be accessed if **[Nb Of Pumps]** *ПРРn* is set to **[6]** *6* or above.

Identical to **[Pump 1 Cmd Assign]** *ПРо1* *(see page 269)*.

[Pump 6 Ready Assign] *ПР_6* ★

Pump 6 ready to operate assignment.

This parameter can be accessed if **[Nb Of Pumps]** *ПРРn* is set to **[6]** *6* or above.

Identical to **[Pump 1 Ready Assign]** *ПР_1* *(see page 270)*.

[System Architecture] ΠPq - Menu

Access

[Complete settings] ➡ [Pump functions] ➡ [Boost control] ➡ [System architecture]

[Pump Cycling Mode] ΠPPC

Pump cycling mode.

Setting	Code / Value	Description
[FIFO]	FiFo	First in first out
[LIFO]	LiFo	Last in first out
[Runtime]	rtiME	Pump runtime **Factory setting**
[Runtime&LIFO]	rtLF	Runtime and Last in first out

[Lead Pump Alternation] ΠPLA

Lead pump alternation.

Setting	Code / Value	Description
[No]	no	Deactivated **Factory setting**
[Standard]	YES	Standard alternation
[Redundancy]	rEd	Redundancy mode

[Pump Ready Delay] ΠP id

Pump ready delay.

It corresponds to the stop time of the auxiliary pumps. The auxiliary pumps are considered as in running state and can not be staged during this delay, whatever the active command channel.

Setting	Description
0...3600 s	Setting range **Factory setting**: 0 s

[MultiPump ErrorResp] ΠPFb

Response to multipump error.

Setting	Code / Value	Description
[Ignore]	no	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Per STT]	Stt	Stop according to **[Type of stop]** Stt parameter but without an error triggered after stop
[Ramp stop]	rMP	Stop on ramp