Section 7.12
[Pump functions] - [Pump characteristics]

[Pump characteristics] PCr - Menu

Access

[Complete settings] ➡ [Pump functions] ➡ [Pump characteristics]

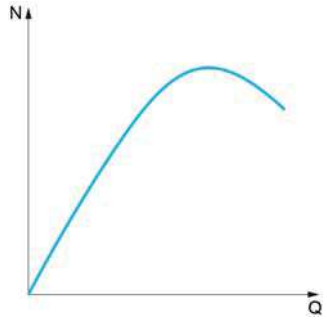
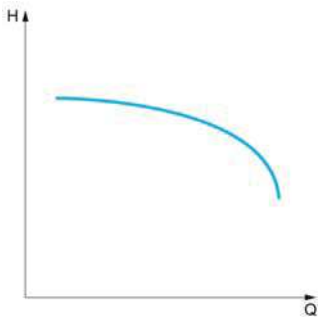
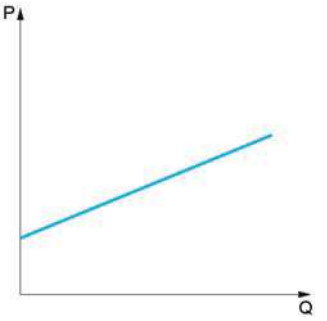
About This Menu

Centrifugal pump characteristic allows you to define the curve points for:
- Head
- Mechanical power
- Efficiency

The pump manufacture supplies these elements and it is necessary to define the performances of a pump at a given speed.

Pump data is characterized in several points and for a given speed (typically nominal speed):
- Speed (N) used for characterization: typically nominal speed.
- Flow (Q) on each characteristic point.
- Head (H) on each characteristic point.
- Power (P) on each characteristic point.

Example for simplified pump data curves:

Efficiency / Flow rate	Head / Flow rate	Power / Flow rate
		

This function allows to:
- interpolate the curves at a given speed, thus minimizing interpolation errors,
- interpolate the curves for other pump speeds using affinity motor control types.

Use-case

Several functions need **[HQ]** *HQ* or **[PQ]** *PQ* curves before being used.

Monitoring of pump working point on pump curve:

Use-case	Characterized Pump Data (vs. pump speed)	
	HQ	PQ
"Head vs Flow" curve	X	
"Power vs Flow" curve		X
"Power vs Speed" (fixed Q values)		X

Sensorless flow estimation:

Use-case	Characterized Pump Data (vs. pump speed)	
	HQ	PQ
Estimation of flow from head	X	
Estimation of flow from power		X

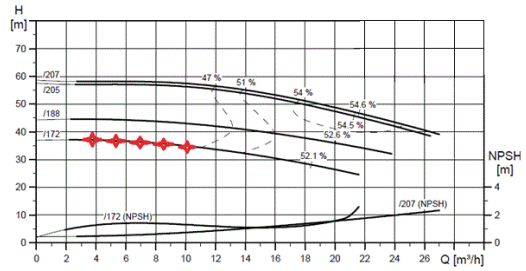
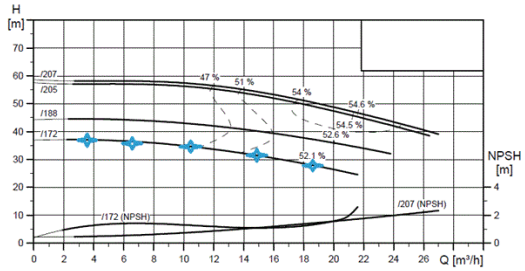
Function Activation

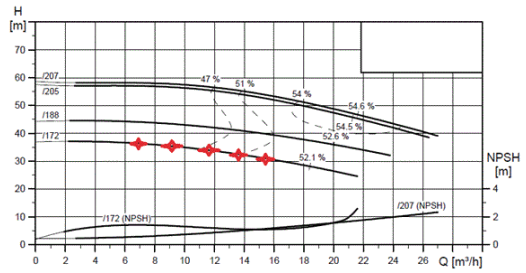
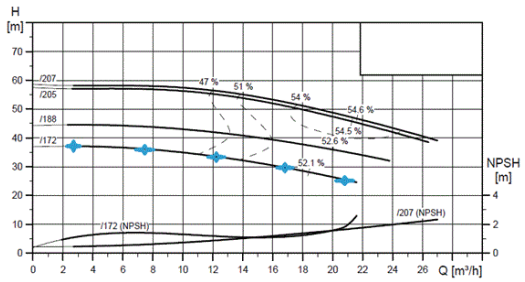
To activate this function, set **[Mode]** *PCM* to **[HQ]** *HQ* or **[PQ]** *PQ* or **[PHQ]** *PHQ*. It depends on the data you enter.

After entering all the data (curve + BEP), set **[Pump Curve Activate]** *PCA* to **[YES]** *YES*.

Curve Setting

The entering points should be spaced as evenly as possible over the operating range for the given speed:

Wrong points spacing	Right points spacing
	

Wrong points entering	Right points entering
	

For **[HQ]** *HQ* or **[PQ]** *PQ* curves, 5 points are advised:

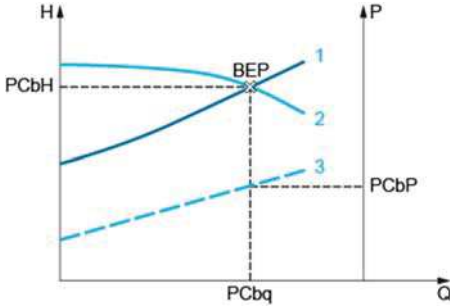
- Q1 near the zero flow point.
- Q3 near the BEP point.
- Q5 near the zero head point.
- Q2 equidistant between Q1 and Q3.
- Q4 equidistant between Q3 and Q5.

Configuration of Best Efficiency Point (BEP)

The configuration of BEP allows you to display this on H q, P q and E q curve:

- Pump curve flow rate at BEP: **[Flow at BEP]** P C b q.
- Pump curve head at BEP: **[Head BEP]** P C b H.
- Pump curve power at BEP: **[Power BEP]** P C b P.

This graphic represents the curve and the BEP:



1 System curve
2 Pump H q curve
3 Pump P q curve

[Mode] P C M

Pump curve mode.

Select which curve data are managed and is entered on.

Setting	Code / Value	Description
[No]	n o	Function is not activated **Factory setting**
[HQ]	H q	H, Q data is activated
[PQ]	P q	P, Q data is activated
[PHQ]	P H q	P, H, Q data is activated

[Pump Flow Assign.] F S 2 A ★

Pump flow sensor assignment.

This parameter can be accessed if **[PumpLF Monitoring]** P L F M is set to **[Flow]** q or to **[Flow vs Speed]** q n.

Setting	Code / Value	Description
[Not Configured]	n o	Not assigned **Factory setting**
[AI1]...**[AI3]**	A I 1...A I 3	Analog input AI1...AI3
[AI4]...**[AI5]**	A I 4...A I 5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]	A I V 1	Virtual analogic input 1
[PulseInput Assignment On DI5]...**[PulseInput Assignment On DI6]**	P I 5...P I 6	Digital input DI5...DI6 used as pulse input
[Flow Estimation]	S L P F	Sensor less estimated flow

[Pump Curve Activate] PCA ★

Pump curve activation.

Parameter used to reset or validate data to be used by other functions.

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** nO.

Setting	Code / Value	Description
[No]	nO	Pump characteristics are deactivated and data can be modified **Factory setting**
[YES]	YES	Ask for pump characteristic activation. If it does not succeed, write back NO; else lock data modification

[Status] PCS ★

Pump curve status.

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** nO.

Setting	Code / Value	Description
[None]	nOnE	Function is not configured **Factory setting**
[INACTIVE]	nACt	Function is configured but inactive (data is unlocked)
[ACTIVE]	ACt iVE	Data is activated and can be used for other functions (data is locked)
[FAILED]	FAiLEd	Data activation does not succeed (some points have not been entered or data entered does not comply with the rules)

[Pump Speed] PCSP ★

Pump speed for which curves are entered.

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** nO.

Setting	Description
0...32,767 rpm	Setting range **Factory setting**: 0 rpm

[Flow at BEP] PCb9 ★

Pump curve flow rate at BEP.

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** nO.

Setting ( )	Description
0...32,767	Setting range according to **[Flow rate unit]** SUFr **Factory setting**: 0

[Head BEP] PCbH ★

Pump curve head at BEP.

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** nO.

Setting ( )	Description
0...32,767	Setting range according to **[P sensor unit]** SUPr **Factory setting**: 0

[Power BEP] PCbP ★

Pump curve power at BEP.

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** no.

Setting	Description
0...32,767	Setting range according to **[Motor Standard]** bFr **Factory setting**: 0

[Flow 1] PC9 1 ★

Pump curve flow rate for point 1.

Flow rate entered at point 1 (for HQ and PQ curves).

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** no.

Setting	Description
0...32,767	Setting range according to **[Flow rate unit]** SuFr **Factory setting**: 0

[Head 1] PCH 1 ★

Pump curve head for point 1.

Head entered at point 1 (for HQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[HQ]** H9 or **[PHQ]** PH9.

Setting	Description
0...32,767	Setting range according to **[P sensor unit]** SuPr **Factory setting**: 0

[Power 1] PCP 1 ★

Pump curve power for point 1.

Mechanical power entered at point 1 (for PQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[PQ]** P9 or **[PHQ]** PH9.

Setting	Description
0...32,767	Setting range according to **[Motor Standard]** bFr **Factory setting**: 0

[Flow 2] PC92 ★

Pump curve flow rate for point 2.

Flow rate entered at point 2 (for HQ and PQ curves).

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** no.

Setting	Description
0...32,767	Setting range according to **[Flow rate unit]** SuFr **Factory setting**: 0

[Head 2] PCH2 ★

Pump curve head for point 2.

Head entered at point 2 (for HQ curve).

Setting	Description
0...32,767	Setting range according to **[P sensor unit]** SuPr **Factory setting**: 0

[Power 2] PCP2 ★

Pump curve power for point 2.

Mechanical power entered at point 2 (for PQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[PQ]** PQ or **[PHQ]** PHQ.

Setting	Description
0...32,767	Setting range according to **[Motor Standard]** bFr **Factory setting**: 0

[Flow 3] PCQ3 ★

Pump curve flow rate for point 3.

Flow rate entered at point 3 (for HQ and PQ curves).

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** no.

Setting	Description
0...32,767	Setting range according to **[Flow rate unit]** SuFr **Factory setting**: 0

[Head 3] PCH3 ★

Pump curve head for point 3.

Head entered at point 3 (for HQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[HQ]** HQ or **[PHQ]** PHQ.

Setting	Description
0...32,767	Setting range according to **[P sensor unit]** SuPr **Factory setting**: 0

[Power 3] PCP3 ★

Pump curve power for point 3.

Mechanical power entered at point 3 (for PQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[PQ]** PQ or **[PHQ]** PHQ.

Setting	Description
0...32,767	Setting range according to **[Motor Standard]** bFr **Factory setting**: 0

[Flow 4] PC94 ★

Pump curve flow rate for point 4.

Flow rate entered at point 4 (for HQ and PQ curves).

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** no.

Setting	Description
0...32,767	Setting range according to **[Flow rate unit]** SuFr **Factory setting**: 0

[Head 4] PCH4 ★

Pump curve head for point 4.

Head entered at point 4 (for HQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[HQ]** H9 or **[PHQ]** PH9.

Setting	Description
0...32,767	Setting range according to **[P sensor unit]** SuPr **Factory setting**: 0

[Power 4] PCP4 ★

Pump curve power for point 4.

Mechanical power entered at point 4 (for PQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[PQ]** P9 or **[PHQ]** PH9.

Setting	Description
0...32,767	Setting range according to **[Motor Standard]** bFr **Factory setting**: 0

[Flow 5] PC95 ★

Pump curve flow rate for point 5.

Flow rate entered at point 5 (for HQ and PQ curves).

This parameter can be accessed if **[Mode]** PCM is not set to **[No]** no.

Setting	Description
0...32,767	Setting range according to **[Flow rate unit]** SuFr **Factory setting**: 0

[Head 5] PCH5 ★

Pump curve head for point 5.

Head entered at point 5 (for HQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[HQ]** H9 or **[PHQ]** PH9.

Setting	Description
0...32,767	Setting range according to **[P sensor unit]** SuPr **Factory setting**: 0

[Power 5] PCP5 ★

Pump curve power for point 5.

Mechanical power entered at point 5 (for PQ curve).

This parameter ca be accessed if **[Mode]** PCM is set to **[PQ]** PQ or **[PHQ]** PHQ.

Setting	Description
0...32,767	Setting range according to **[Motor Standard]** bFr **Factory setting**: 0

[Head Static Offset] HEo ★

Head static offset.

This parameter can be accessed if **[Flow Estimation Mode]** FEM is set to **[HQ]** HQ.

Setting	Description
0.0...100.0%	Setting range **Factory setting**: 0.0%

[Head Dynamic Gain] HEG ★

Head dynamic gain.

This parameter can be accessed if **[Flow Estimation Mode]** FEM is set to **[HQ]** HQ.

Setting	Description
-100.0...100.0%	Setting range **Factory setting**: 0.0%

[Head Estimated] SLHu

Head estimation: Value.

Setting	Description
-32,767...32,767	Setting range according to **[P sensor unit]** SuPr **Factory setting**: 0