

Hydraulic Investigator 3

User Manual ver. 2.0



About us SPX FLOW designs, manufactures, and markets Johnson Pump brand pumps.

The tradition in the pump industry goes back to the 19th century and combines technological know-how with long lasting quality pumps. Johnson Pump is one of a few pump producers in the Netherlands for centrifugal pumps. We have our own Research & Development department and a test bed to perform all relevant tests required. The design standards for our centrifugal pumps are EN (DIN), ISO and API.

Serving a multitude of industrial engineering sectors, as well as the global horticulture, shipbuilding, water treatment and automotive markets, Johnson Pump has always put customer needs first. Supplying an expansive portfolio of pumps (based on positive displacement and centrifugal mechanisms), plus all the necessary accessories. Through close interaction with the global customer base, Johnson Pump can provide focused solutions that exactly match specific application requirements. This is facilitated by our modular approach to design - which allows greater interchangeability between component parts, thereby simplifying logistical aspects (thanks to the ordering and storing of fewer part numbers) and allowing a wider array of different pump variants to be covered using a smaller inventory. The Johnson Pump portfolio covers internal gear pumps, impeller pumps and circulation pumps. All these items deliver strong performance and continued reliability.

Besides the Netherlands we are represented in several European countries and the USA by SPX FLOW sales offices, as well as through distributors and agents world-wide. Production facilities are in the Netherlands, Belgium, Poland, the U.S.A., and India.

For more information about Johnson Pump products please visit <u>https://www.spxflow.com/johnson-pump/.</u>

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> Johnson Pump[•]

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About this manual

This manual is a user guide to the Hydraulic Investigator 3 (HI-3). It contains a concise description of the software.

Structure of this manual

The structure of the HI-3 - user manual is described below:

Chapter 1 – Introduction to the HI-3, contains a brief introduction of the software.

Chapter 2– Using the HI-3, gives step-by-step instructions for operating the software.

Recommended display settings to use HI-3 application

Resolution - Full HD (1920x1080) **Scale -** 100% *Note -* Change in recommended settings cause the UI looks odd. To make use of better experience use the recommended settings.

Guidelines to use this manual

The conventions used in this manual are given below:

Bold Bold Text denotes User Roles, the names of Buttons, Tabs or Screens.

Paths Paths in this manual are denoted using backslashes (\) to separate drive names, directories and files, as in

C:\dir1name\dir2name\filename



Chapter 1 - Introduction to HI-3

1.1. Introduction

1.1.1. Centrifugal pumps

Centrifugal Pumps are the most common and well-established pumps on the market. They come in many different models and can transfer fluids with high efficiency over a wide range of flows and pressures. We offer several series of centrifugal pumps, many of which comply with ISO, DIN, and API standards.

1.1.2. HI-3

HI-3 is the web-based pump selection software for centrifugal pumps. It indicates the hydraulic performance per pump type with different impeller diameters and standard speeds. The power absorbed, the required NPSH and the efficiency can directly be read. The pump type and the impeller diameter are based on the duty point capacity and head specified by the user. The pump performance curve established is within the tolerances according to EN ISO 9906 Grade 3B.

1.2. List of Abbreviations

The following abbreviations have been used in the software and in this document:

- API American Petroleum Institute
- BEP Best Efficiency Point
- CS CombiSump
- DIN Deutsches Institut für Normung
- Eff Efficiency
- EN European Norm
- H Total developed Head
- HI-3 Hydraulic Investigator 3
- ISO International Organization for Standardization
- MEI Minimum Efficiency Index
- NPSH Net Positive Suction Head
- NPSH req. Net Positive Suction Head required
- P Power absorbed
- Q Capacity
- TSM Technical Sales Manual



Chapter 2 - Using the HI-3

2.1. Application URL and Login Screen

Url: <u>https://hiapp.spxflow.com</u>. Use this URL to launch the application. Which will take you to the screen below.

HI-3
SIGN IN TO CONTINUE
Login
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Figure 2.1: Entry Screen

Hitting the login button gets you to the SPX FLOW login page as shown below, where the user is supposed to enter their login ID and password. The SPX FLOW Employees can hit the SPX FLOW button to login using their SPX FLOW account as below.

	Lo	gin	
	SPX FLOW Employee Login:	External Partner Login:	
	Click the logo to SSO with your SPX FLOW Account.	Log in with your email and password.	
	SPXFLOW	Email *	
	•	Password *	
		Keep me logged-in	
		Ecronit passwort? Submit	
		1 have an account yel?	
tice of legal restrictions on use of this web site			
EASE READ THE FOLLOWING LEGAL INFORM	ATION BEFORE USING THIS SITE.		
ank you for visiting the SPX FLOW, Inc. ("SPX FL	OW") Web Site (the "Site"). In light of the complexities governing the use and operat	ion of web sites, we have set forth below a series of Site Acces	is and Use Terms ("SATS") that apply to your access to and use of the
e. Also included in these SATS are the Data Priva SATS are required in order for you to have acces	cy and privacy terms, including European Union terms, that can be accessed and re is to and use of the Site. Please read the SATS very carefully. We hope that you will	viewed by clicking through from the term 'Data Privacy' that ap understand that, in the complex legal world of the Internet, acc	spears on the tirst page of the Site. Compliance with and acceptance of sess and use terms are required. We have also included below, as part
SATS, an identification of SPX FLOW's agent for	receipt of notice regarding copyright claims and other communications regarding the	e Site. If you do not agree with or do not accept any of the SAT	S, please immediately exit the Site and refrain from further access. BY
	UARE EXPRESSLY AGREEING TO BE BOUND BY THESE SATS.		
IOOSING TO ACCESS AND USE THIS SITE, YO			

Figure 2.2: Login Screen

If the user has no Login ID/SPX FLOW account, then he needs to create a new Login ID and password by clicking "Don't have an account yet?"

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Figure 2.3: Create new Login ID

When the button above is hit, the screen below loads and asks the user to complete the External account registration form with all the mandatory fields. Please make sure that you have selected "**Hydraulic Investigator 3 and CAPS 2**" under Application Access category. Please review and accept the terms of use. After submitting the form, a second screen with the message "Account registration complete" appears for confirmation.

SPX FLOW External A	oount Registration Form
Brand Access (Select all SPX FLOW brands you are authorized to sell)*	Email*
Anhydro	First name *
■ APV	
Bolting Systems	Last name *
Bran+Luebbe Gerstenbern Schröder	Company *
Hytec	City *
Johnson Pump	
Johnson Pump Marine	State / Province / Region *
Lightnin	Country *
Philadelphia Mixing Solutions	Afghanistan ~
Plenty	Business Phone Number
Seital Separation	SPX FLOW Customer ID
Stelzer	
Stone	Password *
Uutechnic U	Confirm password *
Waukesha Cherry-Burrell	I have read and understood the Terms of Use
SPX FLOW Contractor (N/A for channel partners) Application Access	Submit
(Select all applications you are requestion access to)*	
Media Hub	

Figure 2.4: Creating login ID and password



Account registration complete	
Your registration for the SPX FLOW Media Hub has been received and is being review	ved.
After account approval you will receive in email from noreply@hubmail.spxflow.com that will allow you to finish se	etting up your account and log in.
kolce of legal restrictions on use of this web site	
LEASE READ THE FOLLOWING LEGAL INFORMATION BEFORE USING THIS SITE.	
hank you for visiting the SPX FLOW (in C (SPX FLOW)) Web Site (the "Site") In light of the complexities governing the use and operation of web sites, we have sel forth below a series Site. Also included in these SATS are the Data Privacy and privacy terms, including European Union terms, that can be accessed and reviewed by clicking through from the term "Data P the SATS are required in order for you to have access to and use of the Site. Fibers read the SATS very carefully. We hope that you will understand that, in the complex legal world of the the SATS are required in order for you to have access to and use of the Site. Fibers read the SATS very carefully. We hope that you will understand that, in the complex legal world of the the SATS, an identification of SPX FLOW's agent for receipt of notice regarding copyright claims and other communications regarding the Set. If you do not agree with or do not accept a #JOGING TO JACCESAND USE THIS STET, YOU JARE EXPRESARD JACEENEN TO DE EXPLORE SATS.	of Site Access and Use Terms ("SATS") that apply to your access to and use of the maay" that appears on the first page of the Site. Compliance with and acceptance internet, access and use terms are required. We have also included below, as pa ny of the SATS, please immediately exit the Site and refrain from further access. B
hank you for your understanding. We hope that you enjoy the Site and find it useful. Also, please keep in mind that information provided on this site and via linked sites is not for the purp	poses of seeking or encouraging investment unless specifically designated as such

Figure 2.5: Confirmation Screen

Reloading the screen takes you to the entry screen. When you click the login button after creating a Login ID, you are immediately logged in and taken to the main screen.

In the unlikely event that the user forgets their password, they can reset it to a different one by clicking the "forgot password?", as seen below.

	Login	
SPX FLOW Employee Login: Click the logo to SSO with your SPX FLOW Account.		External Partner Login: Log in with your email and password:
SPXFLOW		Email *
	or	Password *
		Keep me logged-in Forgot password? Submit
	Don't hav	<u>re an account yet?</u>

Figure 2.6: Forgot Password

On clicking "forgot password?", the user is directed to a page requesting the email address they used to create their Login ID. This is shown in the illustration below.

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> Johnson Pump[®]

Forgot Password	
Please enter your email address to reset your password:	
Email: *	
Submit	
Back to Login	

Figure 2.7: Provide email

An email regarding the password change is sent when the submit button is pressed.

Forgot Password	
An email regarding your password change has been sent to your email address.	
Back to Login	

Figure 2.8: Back to login page

You can access the login page by selecting "Back to Login" after updating your password. The user can now log in and utilise the application there.

Note: The user's login will be valid for 8 hours from the time of Login, Once the timeout occurs and the user seems active, the refresh token with a validity of 7 days will be generated automatically, and the session will be maintained. After this timeout the user will be taken to Login Screen.



2.2. Main Screen

Once the Login is valid the Main screen will open with the Q-H selection tab as default. The Options available in Main Screen are explained below.

- **Q-H Selection -** Q-H Selection tab is used to select pumps from the database by entering a Q-H value (and supplementary criteria) the whole database is automatically searched for suitable pumps. Pumps that fall under the selections made will be filtered and listed.
- **Pump Selection** Pump Selection tab, can be used to choose pump type directly by selecting the desired Pump Family and Pump SubType. Based on the selected Family and Pump type, the pump graphs with the pump data can be viewed in the graph screen.
- Fullscreen To toggle between Fullscreen mode and normal mode.
- Units selection Use radio button to select the required set of units (US or Metric).
- **Logout** To logout from the HI-3 application.
- User profile To view the user details, changes in the user's "application and geolocation" details lead to different pump results. The application options available are Industrial and Horticulture. The Geolocation options are EMEA, APAC and AMERICAS.
- Help The Help screen provides access to the User Manual, Release Notes, FAQs, and details about the Software and Database Versions. For any feedback or queries, users can reach out to us via email at *hi3support@spxflow.com*.

P×FLOW	HI-3 v1.3.0								🤁 Help	Balakumaran.Thanika	ichalam@spxflow.com	¢ #
H Selection	QH SELECTIO	N									Units OUS	Metric
B no Selection	Selection Crite	eria		Search Graph						S	ort by Efficiency: High t	to Low 🛛 🗸
	Capacity *	Search Capacity	m3/h	FAMILY	TYPE	EFF%	IMP. TYPE	IMP , MAT	NPSHR	SPEED	OPER.REGION INRAN	NGE
	Head *	Search Head	m									
	Viscosity	1	mPa s [cP] 👻									
	Density ¥ 1000 kg/m3											
	Frequency	50	♥ Hz									
	Poles 👻	Select	✓ Poles									
	NPSHa	Search NPSHa	m				No data t	o show				
	Efficiency >=	Search Efficiency	- 96									
	Oper Region	Standard	*									
		20 %- 120	% of BEP									
	Fixed & Multi S	Stage	CS Bearings									
	Tolerance	5 % */- N	C 0									
	Filter Options											
	Family	All X	x ~									
	Sub Type	All X	x ~									
	Impeller Type	All X	× ~									
	Material	AL X	x ~									
	 Required Fields 											
	20 % 20 % of B2P Fixed & Muhi Stage Tolerance 5 % 0 / A Filter Options Family M X × ↓ ↓ Sub Type Impetier Type M X × ↓ ↓ M X × ↓ ↓ M X × ↓ ↓ M X × ↓ ↓											
	Fixed & Multi Stage CS Bearings Tolerance 5 40 Filter Options Image: State Type Family Image: State Type Maximum Image: State Type Maximum Image: State Type * Required Fields											

Figure 2.9: Main Screen- Fullscreen Toggle Button and Units selection



LOW									🔁 Help	Balakumaran.Thanik	ichalam@spxflow.com	
E lection	QH SELECTIO	ч									Units OUS	🖲 Metri
	Selection Crite	eria		Search Graph						5	ort by Efficiency: High	h to Low
erection	Capacity *	Search Capacity	m3/h	FAMILY	TYPE	EFF%	IMP. TYPE	IMP. MAT	NPSHR	SPEED	OPER.REGION INRA	ANGE
	Head *	Search Head	m									
	Viscosity	1	mPa s [cP] 🗸 🗸									
	Density 👻	1000	kg/m3									
	Frequency	50	✓ Hz									
	Poles 👻	Select	✓ Poles									
	NPSHa	Search NPSHa	m				No data te	o show				
	Efficiency >=	Search Efficiency	96									
	Oper Region	Standard	*									
		20 % - 120 %	of BEP									
	Fixed & Multi S	Stage	Bearings									
	Tolerance	5 % •/- Nr.	0									
	Filter Options											
	Family	All X	x ~									
	Sub Type	All X	x ~									
	Impeller Type	All X	x ~									
	Material	All X	× ~									
	* Required Fields											



FLOW	HI-3 v1.3.0								😗 Help	Balakumaran.Thanikach	alam@spxflow.com	• •
Election	QH SELECTION	4									Units OUS	 Metric
	Selection Crite	ria		Search Graph						Sort	by Efficiency: High	to Low
	Capacity *	Search Capacity	m3/h	FAMILY	TYPE	EFF%	IMP. TYPE	IMP . MAT	NPSHR	SPEED	OPER.REGION INRA	NGE
	Head *	Search Head	m									
	Viscosity	1	mPais [cP] 👻									
	Density 👻	1000	kg/m3									
	Frequency	50	♥ Hz									
	Poles 🛩	Select	✓ Poles									
	NPSHa	Search NPSHa	m				No data to	show				
	Efficiency >=	Search Efficiency	96									
	Oper Region	Standard	~									
		20 % - 120	% of BEP									
	Fixed & Multi S	tage	CS Bearings									
	Tolerance	5 % +/- Nr.	• 0									
	Filter Options											
	Family	All X	× ~									
	Sub Type	All X	× ~									
	Impeller Type	All X	× ~									
	Material	All X	x ~									
	* Required Fields											

Figure 2.11: User Profile



P FLOW	H-3v13.0				🔁 Help	Balakumaran.Thanikachalam@spxflow.com	•
E Selection	HELP						
E ump Selection		ABOUT US SPK FLOW designs, manufactures, and markets shipbuilding, water treatment, and automotive, interchangeability, simplifying logistics and invo supported by global sales offices and distributo	Johnson Pump brand pumps, known for their long Johnson Pump prioritizes customer needs with a entory management. With R&D facilities and produ rs, For more information about Johnson Pump pro	-lasting quality and expertise in centrifugal pumps. diverse portfolio of pumps and accessories. Our mo ction sites in the Netherlands, Belgium, Poland, the ducts please visit https://www.spaflow.com/johns	Serving various industries, inc dular design approach enhanc USA, and India, Johnson Pum on-pump/	łuding ces part p is	
		User Manual	Release Notes	Version	Contact Us		
		You can find the user manual for the H-3 application here, which differs comprehensive guidance on experiant, moviablemoting, and effectively using all the app3 features and functions. It also provides solutions to common susces or questions. Cash the Hak	You can access the release notes for both the latest and previous versions here. This document outlines the log finas and technical modifications made to the database in each release. The database version formula IS XCV, where XX represents.	A version refers to a specific iteration of the application that includes significant updates or new feature. Please ensure that you are using the latest released software version.	Do you have a question or w feedback?	want to give us	
		user nanual.	der freides year and in mutanes der database revision. Click the link below to view the release notes. Download	Software Version: 1.3.0 Database Version: 24.02_d	Please much out to us at hi3support@spxflow.com		
		FAQ					
		What should I do if I haven't received a confirmati	on email after registering?			~	
		Who should I contact if I still have trouble logging	into the app?			~	
		How can I switch between US and Metric units in t	he app?			v	

Figure 2.12: Help screen

Q-H Selection	USER PROFILE			C Edit Profile	
E Pump Selection		Email Current Role Application	Balakumaran.Thanikachalam@sportfow.com User Industrial		
	© 2024 - 39% Flow				

Figure 2.13: User profile details

Using the Edit Profile button, one can edit their application and geolocation options. The application options are Industrial and Horticulture. Geo location options available for the user to select are EMEA, AMERICAS and APAC (Asia Pacific). Please be noted that based on the selected location and application, pump family and pump types availability may vary. For example, Horticulture application will only have pump families that are sold under that category.

2.3. Q-H Selection Tab

The Q-H selection tab used to choose pumps from the database by selecting and sorting manually with the required Q-H value and some other criteria.



QH SELECTIO	IN											Units OUS		
Selection Crit	teria			Sear	Search Graph So									
Capacity "	50	m3/b			FAMILY	TYPE	EFF%	IMP. TYPE	IMP . MAT	NPSHR	SPEED	OPER.REGION INRANG		
Head *	10	m			CombiLine	80-200-2.2/50	78.2	CL	CI	0	1450	True		
Viscosity	1	mPar	[cP] ¥		CombiLineBloc	80-200	74	CL.	BZ	2.29	1450	True		
Density ¥	1000	kg/m	3		CombiLineBloc	80-200	74	CL.	a	2.29	1450	True		
Frequency	50.	✓ Hz			CombiLine	100-160-2.2/50	73	CL	a	0	1450	True		
Bolar M	Ealast	H Dolor			CombiBloc	65C-200	72.8	cL	55	0.99	1450	True		
roles *		- Pole		•	CombiTherm	65C-200	72,8	cL	SS	0.99	1450	True		
NPSHa	Search NP5Ha	m			CombiSump	65C-200	72.8	CL	SS	0.99	1450	True		
Efficiency >=	Search Efficiency	55			CombiChem	65C-200	72.8	CL.	SS	0.99	1450	True		
Oper Region	Standard •				CombiMagBloc	65C-200	72.8	CL.	55	0.99	1450	True		
	20 % - 120 % of BEP				CombiNorm	65C-200	72.8	CL.	55	0.99	1450	True		
Fixed & Multi	Stare	CS Bearings			CombiMag	65C-200	72.8	CL.	SS	0.99	1450	True		
Tolerance		Nr			CombiLine	80A-250	72.6	cı	a	0	950	True		
Torerance	5 % O+	0			CombiPro	80AC-200	72.4	CL	55	1.01	1450	True		
Filter Options					CombiSump	80-250	71.8	CL.	55	0.72	970	True		
Family	(manifold				CombiBloc	80-250	71.8	CL.	SS	0.72	970	True		
Sub Tune	(ALL X		× ~		CombiFlex-U	80-250	71.8	CL	SS	0.72	970	True		
100 Type	AB X		X V		CombiMag	80-250	71.8	CL	55	0.72	970	True		
Impetter Type	All X		× ~		CombiChem	80-250	71.8	CL	55	0.72	970	True		
Material	All X		x ~]	-	CombiSump	800-200	71.6	ci	55	0.79	1450	True		
· Required Fields				-	CombiBloc	80C-200	71.6	cL	SS	0.79	1450	True		
					CombiTherm	800-200	71.6	cL	SS	0.79	1450	True		
				-	CombiMag	800-200	71.6	CL.	55	0.79	1450	True		
					CombiNorm	80C-200	71.6	CL	SS	0.79	1450	True		

Figure 2.14: Q-H Selection Tab

Based on the selection made in the Q-H Selection Tab, the Pump records will be filtered.

2.4. Procedure to select a Pump

2.4.1. Selection Criteria

• There are choices for unit selection. If Metric is chosen, then all capacities are entered in m³/h and head in metres. If 'US' is chosen, the capacity must be entered in USGPM and head in feet.

IP×FLOW										🕄 Help	Balakumaran.Thanik	achalam@spxflow.com 😃 🕻
H Selection	QH SELECTION	N										Units OUS Metric
8	Selection Crite	eria		Search	Graph							Sort by Efficiency: High to Low
imp selection	Capacity *	Search Capacity	m3/h	FAM	ILY	TYPE	EFF%	IMP. TYPE	IMP . MAT	NPSHR	SPEED	OPER.REGION INRANGE
	Head *	Search Head	m									
	Viscosity	1	mPais [cP] 👻									
	Density 👻	1000	kg/m3									
	Frequency	50 🗸	Hz									
	Poles 👻	Select	Poles									
	NPSHa	Search NPSHa	m					No data to	show			
	Efficiency >=	Search Efficiency	96									
	Oper Region	Standard										
		20 % - 120 % of	BEP									
	Fixed & Multi S	Stage CS B	arings									
	Tolerance	5 % •+/- Nr.	0									
	Filter Options											
	Family	All X	× ~									
	Sub Type	All X	x ~									
	Impeller Type	AIL X	x ~									
	Material	All X	× ~									
	 Required Fields 											

Figure 2.15: Q-H Selection Tab: Unit Selection

• The minimum information required is the **Q-value** (**Capacity**) and **H-value** (**Head**), which are specified with an asterisk (*). If these are not entered, a warning message appears.





Figure 2.16: Q-H Selection Tab: Missing Required Fields

- Information about the medium to be pumped can be filled under **Viscosity** and **Spec. gravity/Density**. The viscosity can be entered in mm²/sec (=cSt) or in mPa s (=cP). The density affects viscosity and power. Default value is 1000 kg/m³. It must be a positive value.
- Under the **Frequency** section, you can enter the net frequency as either 50Hz or 60Hz. When selected, the corresponding correct speeds are applied automatically. In the **Poles/Speed** field, you can choose the number of poles in the motor or manually enter a specific speed if needed.

n.												🕄 Help	Balakumaran.Thanik	achalam@spxflow.com
on	QH SELECTIO	N												Units OUS 🖲 Metr
	Selection Crite	eria				Sear	ch Graph						:	Sort by Efficiency: High to Low
	Capacity *	Search Capacity		m3/h			FAMILY	TYPE	EFF%	IMP . TYPE	IMP . MAT	NPSHR	SPEED	OPER.REGION INRANGE
	Head *	Search Head		m										
	Viscosity	1		mPas [cP]	~									
	Density 👻	1000		kg/m3										
	Frequency	50	~	Hz										
	Poles 🛩	Select	×	Poles										
	Poles	Search NPSHa		m						No data t	o show			
	Efficiency >=	Search Efficiency		96										
	Oper Region	Standard	~											
		20 %- 120	% of B	EP										
	Fixed & Multi S	Stage	CS Bea	rings										
	Tolerance	5 %	Nr. 0											
	Filter Options													
	Family	All X		×										
	Sub Type	All X		X										
	Impeller Type	All X		×										
	Material	All X		×I										
	* Required Fields													

Figure 2.17: Q-H Selection Tab: Poles/Speed option



- If the available **NPSHa** is known, this value can also be included in the selection. Here, a safety margin of 0.5 meters must be kept (for trimmed impellers or at the end of the curve: 1m).
- Under **Efficiency**, the required minimum efficiency can be entered if known. This concerns the pump efficiency associated with the graph.
- In the Oper Region section, you can choose from Standard, API 610, and User options. The Standard operating region ranges from 20% to 120% of the Best Efficiency Point (BEP). Pumps that fall outside this region will be highlighted in red, and a separate column labeled "OPER. REGION INRANGE" will indicate False. You can also switch to the API 610 region, which corresponds to 80% to 110% of BEP, or define a custom User region.

SPKFLOW	HI-3 v1.3.0									🕄 Help	Balakumaran.Thanii	achalam@spxflow.com	٠
E 2-H Selection	QH SELECTIO	N										Units OUS 🖲 Met	tric
8	Selection Crite	ria		Searc	hGraph							Sort by Efficiency: High to Low $ \lor$	
amp artection	Capacity*	50	m3/h		FAMILY	TYPE	EFF%	IMP. TYPE	IMP . MAT	NPSHR	SPEED	OPER.REGION INRANGE	
	Head *	30	m	•	CombiMag	50C-200	65.2	CL	CI	2.77	2960	True	•
	Viscosity	1	mPa s [cP]	•	CombiChem	50C-200	65.2	CL	ci	2.77	2960	True	
	Density v	1000	ke/m3	•	CombiMagBloc	50C-200	65.2	CL	CI	2.77	2960	True	
	Frequency		u Ha	•	мсн	20a*(4-5)	64.8	CL .	ci	2.8	2900	False	
		50	- 14	•	мсн	20a*(1-3)	64.8	α	ci	2.8	2900	False	
	Poles V	Select	✓ Poles	•	мсу	20a*4	64.8	CL .	ci	2.8	2900	False	
	NPSHa	Search NPSHa	m	•	MCV	20a*(1-3)	64.8	CL .	ci	2.8	2900	False	
	Efficiency >=	Search Efficiency	96	•	CombiFlex-U	65A-200	63.7	CL	SS	3.16	2960	True	
	Oper Region	Standard	~		CombiTherm	65C-160	63.5	CL.	CI	3.64	2900	True	
		20 %- 120	% of BEP	•	CombiFlex	65-160	63.5	CL	BZ	2.49	2960	True	
	20 70- 120			•	CombiBloc	65C-160	63.5	CL	BZ	3.64	2900	True	
	Fixed & Multi S	itage C	S Bearings	•	CombiNorm	65C-160	63.5	CL	BZ	3.64	2900	True	
	Tolerance	5 % •+/- Nr.	0		CombiBloc	65C-160	63.5	CL.	CI	3.64	2900	True	
				•	CombiMag	65C-160	63.5	CL	CI	3.64	2900	True	117
	Filter Options			•	CombiNorm	65C-160	63.5	CL	cı	3.64	2900	True	11
	Family	All X	× ~	•	CombiMagBloc	65C-160	63.5	CL	ci	3.64	2900	True	11
	Sub Type	All X	x ~	•	CombiSump	65C-160	63.5	CL.	ci	3.64	2900	True	11
	Impeller Type	All X	x ~	•	CombiFlex-U	65-160	63.5	CL	BZ	2.49	2960	True	11
	Material	All X	x ~	•	CombiChem	65C-160	63.5	CL	BZ	3.64	2900	True	
	Pequired Eiclide			•	CombiFlex	65-160	63.5	CL	CI	2.49	2960	True	
	required Fields			•	CombiChem	65C-160	63.5	CL	CI	3.64	2900	True	
				•	CombiFlex-U	65-160	63.5	CL	CI	2.49	2960	True	
				•	CombiPro	50BA-200	63.3	CL	SS	2.3	2900	False	
				100	· · · · ·	umber of Pumps Found - 310	Number of Pe	mps Selected - 100					
				100 pe	a page	annoes of Camps Pound - 320	runner of Pa	mps servered - 100				2 3 4 1	ш,

Figure 2.18: Q-H Selection Tab: Operating Region option

2.4.2. Impeller diameter

For pumps having variable impeller diameter, the impeller diameter is calculated in such a way that the curve goes straight through the entered duty point. Pumps with fixed impeller diameter always have a curve with a deviation from the entered duty point.

With multistage pumps the maximum speed depends on the number of stages. To prevent selection of pumps beyond maximum speed, the multistage pumps have been divided into several subgroups, like in the TSM on page "operational range".

Curves of pumps with fixed impeller diameter mostly never go straight through the duty pint. The maximum permitted deviation is entered under **Max. tolerance**. This is set at +/-5% by default. It is also possible to set +5%.



2.4.3. Adjustment of absorbed power

CombiSump pumps have an increased absorbed power consumption because of the use of intermediate bearings. The number of bearings can be entered in the field **CS Bearings**. The power will be adjusted according to the number of bearings.

Also, the self-priming part of the CombiPrime H and CombiPrime V and MCHZ pumps cause an increase of absorbed power. This will be calculated automatically.

2.4.4. Pre-selection options

• A pre-selection of pump family, impeller type and impeller material type can be made to get precise results. This can be done under Filter options with the help of down arrows available in Family, Sub type, Impeller type and Material.

Filter Options		
Family	Combi 🗙	x ~
Sub Type	Chem X	× ~
Impeller Type	CL - Closed X	× ~
Material	SS - Steel Alloy 🗙	× ~

Figure 2.19: Q-H Selection Tab: Filter Options

2.4.5. Activating and proceeding with the selection

• After all the desired selection criteria and other additional have been made, then the pump selection is activated using the **Search** button in the Q-H selection screen.



QH SELECTIO	N										Units OUS
Selection Crite	eria		Sear	ch Graph							Sort by Efficiency: High to
Capacity "	50	m3/h		FAMILY	TYPE	EFF%	IMP. TYPE	IMP , MAT	NPSHR	SPEED	OPER.REGION INRAN
Head *	30	m		CombiFlex	50-160	76.5	CL	BZ	3.01	2900	True
Viscosity	1	mPas[cP] 👻		CombiFlex	50-160	76.5	CL.	ci	3.01	2900	True
Density 🛩	1000	kg/m3	۰	CombiFlex-U	50-160	76.5	CL.	a	3.01	2900	True
Frequency	50	× H+		CombiFlex-U	50-160	76.5	CL.	BZ	3.01	2900	True
Dalas a		an Delas		CombiBloc	50C-160	71.9	CL.	55	1.58	2900	True
Poles	4	+ Poles		CombiTherm	50C-160	71.9	α.	55	1.58	2900	True
NPSHa	Search NPSHa	m		CombiNorm	50C-160	71.9	CL	55	1.58	2900	True
Efficiency >=	Search Efficiency	96		CombiMagBloc	50C-160	71.9	CL	SS	1.58	2900	True
Oper Region	Standard	~		CombiSump	50C-160	71,9	CL.	55	1.55	2900	True
	20 %- 120 % of BEP			CombiMag	50C-160	71.9	CL.	55	1.58	2900	True
Fixed & Multi	Stana	CS Bearings		CombiChem	50C-160	71.9	cr.	55	1.58	2900	True
Tologan		co bearings		CombiBloc	50C-160	69.9	CL	BZ	2.48	2900	True
Toterance	5 % O+			CombiNorm	50C-160	69.9	CL.	ci	2.48	2900	True
Filter Options				CombiMag	50C-160	69.9	CL.	a	2.48	2900	True
Family				CombiSump	50C-160	69.9	CL.	ci	2.48	2900	True
	Contbi x	× ~		CombiMagBloc	50C-160	69.9	CL.	a	2.45	2900	True
Sub Type	Alt X	× ♥		CombiChem	50C-160	69.9	CL.	ci	2.48	2900	True
Impeller Type	A0 X	⇒ ×		CombiNorm	50C-160	69.9	CL	BZ	2.48	2900	True
Material	Alt X	x v		CombiBloc	50C-160	69.9	CL	CI	2.48	2900	True
* Required Fields				CombiTherm	50C-160	69.9	CL.	a	2.48	2900	True
				CombiChem	50C-160	69.9	CL	BZ	2.48	2900	True
				CombiMagBloc	40C-160	68.6	a	55	3.09	2900	True
				CombiBloc	40C-160	68.6	CL	SS	3.09	2900	True

Figure 2.20: Q-H Selection Tab: Search Button and selection results

• A list is shown of all graphs that meet the specified requirements. Pumps outside the chosen operating region are shown in red. These results are sorted according to their efficiency in descending order. However, using the Sort by menu, other sorting options such as NPSHA and Speed are also possible. By default, all search results are selected but if desired pumps can be removed from the selection list by single-clicking the check box (dark blue colour disappears) on the relevant pump.

QH SELECTI	ON										Units OUS
Selection C	riteria		Searc	Graph		Sort by Efficiency: High to Lc					
Capacity *	50	m3/h		FAMILY	TYPE	EFF%	IMP . TYPE	IMP , MAT	NPSHR	SPEED	OPER.REGION INRANG
Head *	30	m		CombiFlex	50-160	76.5	CL.	BZ	3.01	2900	True
Viscosity	1	mPas[cP] 👻		CombiFlex	50-160	76.5	CL.	ci	3.01	2900	True
Density V	1000	kg/m3		CombiFlex-U	50-160	76.5	CL.	CI.	3.01	2900	True
Frequency	50	¥ Hz		CombiFlex-U	50-160	76.5	CL	BZ	3.01	2900	True
Dolas	2	V Dolas		CombiBloc	500-160	71.9	CL.	55	1.58	2900	True
Poles *	-	• Poles		CombiTherm	50C-160	71.9	CL	55	1.58	2900	True
NPSHa		m	•	CombiNorm	50C-160	71.9	cr	55	1.58	2900	True
Efficiency >=	Search Efficiency	96		CombiMagBloc	50C-160	71.9	CL	55	1.58	2900	True
Oper Region	Standard	*		CombiSump	50C-160	71.9	CL.	55	1.58	2900	True
	er Region Standard - 20 % - 120 % of BEP			CombiMag	50C-160	71.9	CL.	\$\$	1.58	2900	True
Fixed & Mul	ti Stage C	S Bearings		CombiChem	50C-160	71.9	CL.	55	1.58	2900	True
Tolerance	• • +/- Nr.			CombiBloc	50C-160	69.9	CL	BZ	2.48	2900	True
	° 0+	0		CombiNorm	500-160	69.9	cı	CI	2.48	2900	True
Filter Optio	ns			CombiMag	50C-160	69.9	CL	CI	2.48	2900	True
Family	Cambi X	V 14	-	CombiSump	50C-160	69,9	CL .	ci	2.48	2900	True
Sub Type		^ *	-	CombiMagBloc	500-160	69.9	a	a	2.48	2900	True
Interallies Tores	AIL X	X Y		CombiChem	500-160	69.9	a	ci	2.48	2900	True
impener type	AU X	× ~		Combiniorm	500-200	69.9	a	62	2.46	2900	True
Material	All X	x ~		Combiblioc	500.160	63.3	0	0	2.46	2500	True
* Required Field	6			CombiChem	505-160	(0.0	0	87	3.48	2900	True
				CombiMarBlor	405-160	63.6	0	55	3.09	2900	True
				Cambibles	405.150				1.00	2000	Taux

Figure 2.21: Q-H Selection Tab: Graph Button

• The graph button will be enabled only if at least one pump is selected. Clicking the graph button takes to the graph screen with pump curves of first pump in the list. It is also possible to select one pump from the list by double-clicking on it.



2.5. Interpretation of the selection results

The following points must be considered when looking at the selected curves:

- The curves represented a selection of hydraulics and **not** pumps.
- The selected graph must always be checked for its availability in the product supply range.
- The speed / impeller diameter combination, speed / number of stages combinations and the maximum speed must be checked in the TSM.

2.6. Pump Selection Tab

- The second way of selecting a graph is via the option **Pump Selection**. Using this, a list is displayed of all pump families which are available in HI3.
- After selecting a pump family and, if available, a pump subtype, a pump type can be chosen using the **search** bar. The checkboxes allow for the selection of multiple pump types simultaneously. To deselect all selected pump types, you can use the **Clear** button.

IPXFLOW	HI-3 v1.3.0			🕄 Help Ba	alakumaran.Thanikachalam@spxflow.com 🔿 🛟
H Selection	PUMP SELECTION			C	Search Type Clear Graph
B ump Selection	Pump Family	Pump SubType	Туре	Imp.type	Imp.mat
	(R) NUK	Bloc	25-125	но	55
	BUS	Chem	25-125	но	a
	Combi	Flex	25-160	но	CI
	CombiBlocHorti	Flex-U	25-160	но	55
		Use	32-125	CL.	CI
	Container	Handler	32-125	CL.	BZ
	Contactine	Hagoloc	32-125	CL .	55
	CompiLineBioc	Norm	320-125	а. С	BZ
	CombiPro	Pact	320-125	6L	
	CombiProLine	Prime-H	224.100	а. а	07
	FRE	Prime-V	228-160	c.	22
	HCR	Sump	324-160	a	
	KGE	Therm	32,160	CL CL	87
	мсн	Well	32-160	а.	9
	MCHZ		32-160	CL.	SS
	MCV		32C-160	CL	BZ
	MDR		32C-160	CL.	a
	MSH		32C-160	CL	55
			32-200	CL	ci
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Figure 2.22: Pump Selection Tab with search option and clear button

• The graph is displayed by selecting the relevant type and then clicking the Graph button.



Pump family	Embedded Pump families
(R) NUK	
BUS	
	CombiBloc
	CombiChem
	CombiFlex
	CombiFlex-U
	CombiMag
	CombiMagBloc
Combi	CombiNorm
	CombiPact
	CombiPrime H
	CombiPrime V
	CombiSump
	CombiTherm
	CombiWell
CombiLine	
CombiLineBloc	
CombiBlocHorti	
CombiDirt	
CombiPro	
CombiProLine	
CombiThermPlus	
	FRE
FRE	FRES
	FREF
	FREM
HCR	
KGE	
МСН	
MCHZ	
MCV	
MDR	
MSH	
MSO/MSF	
NURT	
VRD	
L	

2.6.1. Sub-classification of pump families



2.7. Graph Tab

2.7.1. Graph section

The graph section is divided into 3 charts.

- First chart on the top shows the **capacity power curve**.
- Second chart on the middle shows the following information:
 - ★ The selected **capacity head curve**.
 - The efficiency curve (2nd Y-axis on right side of the graph).
 - The capacity system resistance curve (system curve) based on the specified duty point.
 - The specified **Duty point**.
- Third chart on the bottom shows the capacity NPSH curve.





- The NPSH req.Curve drop down list can be used to select the desired curve(s) for **NPSH curve** in the bottom chart.
- The Efficiency Curve drop down list can be used to select the desired curve(s) for **Efficiency Graph** in the middle chart.
- Static Head input box can be used to set the required static head.



.

- **Parallel Pump** drop down list can be used to set a graph for 2, 3 or 4 pumps arranged in parallel.
- The **Characteristic curve** checkbox is used for the visibility of the capacity system resistance curve based on the specified working point.
- NPSH req.Curve: Efficiency Curve: Parallel Pump: Static Head[m]: Curve 2 × x Curve 2 × None ~ X V 0.000 None Curve 1 Curve 1 2 pumps 3 pumps Curve 2 Curve 2 4 pumps Curve 3 Curve 3 Curve 4 Curve 4
- The **Duty Point** checkbox is used for the visibility of the specified working point.



2.7.2. Data section

The data section in the graph screen reveals the performance of the pumps at 4 columns describing different situations. Each column can be switched on and off by ticking the box at the top of the relevant column. The non-editable fields are grouped and highlighted under red, and rest of the fields are editable. The values edited in this section will show its impact in the graph screen.

The number of fields in this section will vary across the nature of pumps, For Example: In case of multistage pumps the field name "No of Stages" will be added into this section.

When a CombiMag or CombiMagBloc has been selected, an extra field appears in the data section as **Mag.Corr.** The value of the magnet correction can be entered from the CombiMag calculation program, and it indicates the power absorption of the magnet coupling.

Special Handlings:

The spin button-based value change is handled for the No. of Stages field as it can have custom value change.

Note: *The KeyBoard Arrows* $(\uparrow\downarrow)$ *can be used to increase and decrease the values in the editable fields*

Check Boxes:

The check boxes at the top of this data table will decide the visibility of curves and data in the Graph Section and as well as in the Print Sheet.

The check boxes at the bottom - Orifice, will decide the visibility of Pressure Drop and Diameter.

- The impeller diameter can be varied between the minimum and maximum value for the relevant pump type.
- If known, the viscosity of the medium to be pumped can be entered in the Viscosity field.
- The relative density of the medium can be entered in Density field.
- The motor speed can be varied up to the maximum speed for the type of pump. Which can be entered in the Speed field.

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• The effect of an orifice can be seen by ticking the checkbox at the top of the relevant column. The Pressure drop at the working point or the diameter (of the hole in the orifice) can then be entered.

uty Points				5	2			23			~	4	
Impeller Dia	174	^	*	148	^	*	148	^	*	125	^	*	mm
Q	60.4			50.3			50.3			41.4			m3/h
н	36.5			25.2			25.2			17.1			m
Р	8.23			4.63			4.63			2.55			kW
NPSH req	2			1.6			1.6			1.5			m
Efficiency	72.9			74.6			74.6			75.5			%
Efficiency BEP	76.7			77.2			77.2			77.2			96
Q/Qbep	75.2			79.7			79.7			84.4			%
S Value	10052			10052			10052			10052			
MEI Value	> 0.40			> 0.40			> 0.40			> 0.40			
Spec.Speed ns	31.19			31.19			31.19			31.19			
Dia.BackVanes	145			145			145			125			mm
Kin.Viscosity	1			1			1			1			mm2/s[cSt
Dyn.Viscosity	1			1			1			1			mPa s [cP]
Density	1000			1000			1000			1000			kg/m3
Motor													
Speed	2900			2900			2900			2900			1/min
Max.Power	10.36			5.64			5.64			3.01			kW
Orifice		1		(2			03			04	ł	
Pressure Drop													m
Diameter													mm

Figure 2.25: Data section

A graph can be opened from both the Q-H selection tab and the Pump selection tab. In both cases the tab displayed below becomes visible. This tab is split into a left and right section. The left section shows the graph, the right section shows the associated data.





Figure 2.26: Graph Tab

• To view another graph from the selection, **Navigation keys** at the top right of the data section can be used.

First Previous Next Last	
--------------------------	--

• It is also possible to compare two curves with each other. To do this, the **Split Screen** Button at the top of the Data section can be used. Using the navigation keys or the selection menu, all the curves in the selection can now be looked at one by one.



Figure 2.27: Split Screen

• It is also possible to print the data. Print Button at the top of the Data section can be used. The pop-up will appear on clicking the Print Button. By Filling the Required Field one can print the data. Also, it is possible to save the Pump curves with data as PDF with the use of a PDF printer driver like Microsoft Print to PDF.

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B p Selection	CombiNorm 100C-200 CL/SS NPSH req.Curve: Curve 2 × × × ×	Efficiency Curve:	Penny SalaChon × Origin ∫rine Data Sheet. Graph No:				Sel	et Pamps	Split Screen 🔒 Print
			Print Cancel						
				_	2 1	2 2	2 3		2 4
	- 60			Impeller Dia	220	✓ 220 ▲	• 220 •	✓ 190	* * mm
	Maj 9	12		Q		270	270	208	m3/h
	20-	4		н	54.6	54.6	54.6	32.4	m
	a 40 80			9	43.63	48.63	48.63	24.35	św.
		120 160 2 Q [m3/h]	00 240 280 320 360	NP5H reg				4.4	
	10			Efficiency	82.6	82.6	82.6	75.4	-
	40-	12		Efficiency BEP	82.7	82.7	82.7		(M)
	F 50-		-100	Q/Qbep				104.3	
	± 40-	4_2	10 Z	5 Value	13464	13464	13464	13464	
	30-			MEI Value	= 0.40	> 0.40	= 0.40	= 0.40	
	20 40 10			Spor_Speed ns	40.34	40.34	40.34	40.34	
	0		100 Q(m3/N) 200 240 286 320 360	Dia.BackVanes	200	200	200	180	mm
	0 40 80	Q [m3/h]		KinAliscosity					mm2/s[cSt]
	IN I			Dyn.Viscosity					mPas[cP]
				Density	3000	1000	1998	1000	kg/m3
		2		Motor					
	2-			Speed	2960	2960	2960	2960	1/min
	0 40 80	120 160 25	a 240 250 320 360	Max.Power	51.44	53.44	51.44	25.48	kw.
		(Thread)		Orifice					04

Figure 2.28: Pop-up after pressing Print Button



Figure 2.29: Printed Graph example



2.7.3. Temporary Data Storage & Allocations

- Since this is a web-based application, the data will be temporarily stored with the respective login ID. Until another search is performed, the user data remains unchanged.
- The data are unique and unaffected while another user uses this application at the same time with another user ID.
- There can be any number of user IDs, and each has its own data stored separately according to the user ID.