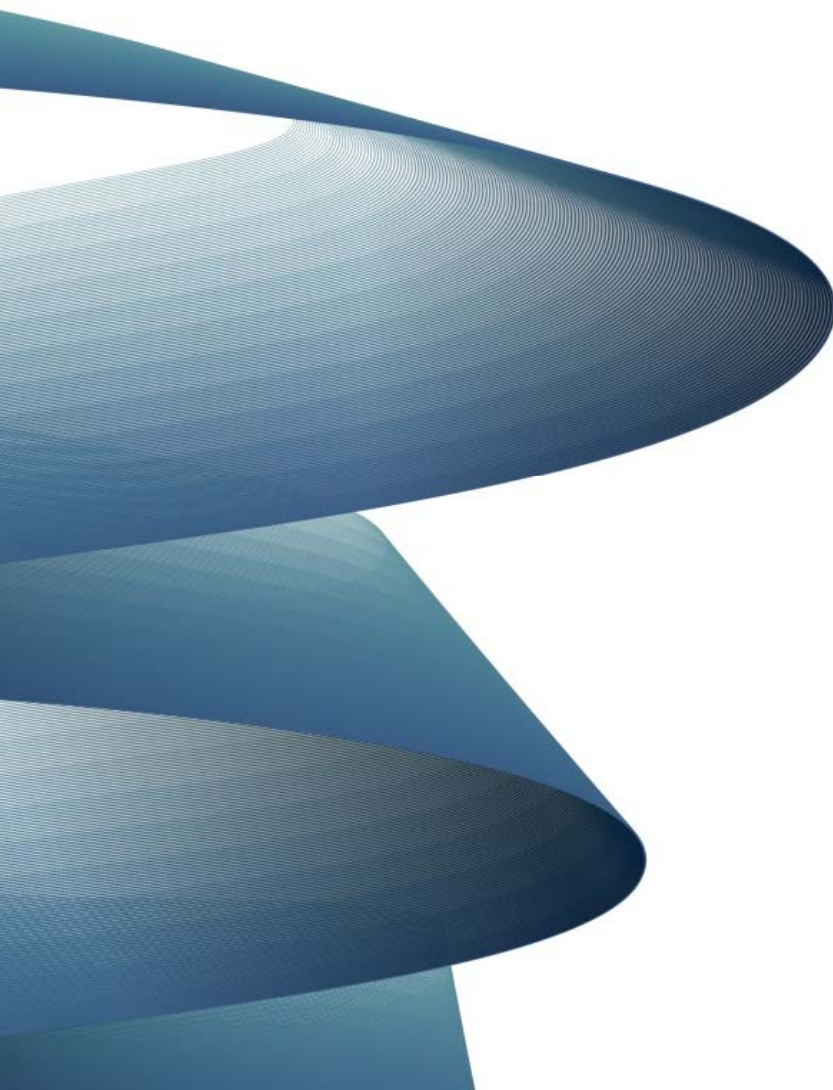


Guide to Modelling Hydro-Brake Optimum<sup>®</sup>  
using WinDes<sup>®</sup> 2013 or w12 from XP Solutions

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## 1.0 Introduction

Hydro-Brake® Flow Controls have long been a feature within the Micro Drainage design suite (formerly known as WinDes®) from XP Solutions in order to give system designers the very best tools available.

Hydro International have developed a self-contained Hydro-Brake® Optimum design engine which has been seamlessly integrated into Micro Drainage 2014 by XP Solutions' programmers to allow engineers to design drainage networks around the Hydro-Brake Optimum®.



In conjunction with this Hydro International have also developed an online Hydro-Brake Optimum® Design Tool, which not only complements the integrated design engine built into Micro Drainage 2014, but also allows users of older XP Solutions packages to make full use of the Hydro-Brake Optimum® within their drainage designs.

Click the image below to launch the Hydro-Brake Optimum® Design Tool or visit:

[www.hydrobrakeoptimum.com](http://www.hydrobrakeoptimum.com)



Download the Hydro-Brake Optimum® Design Tool User Guide [here](#).

## Hydro-Brake Optimum® Design Tool

The Hydro-Brake Optimum® Design Tool allows you to quickly and easily compare a number of different flow control options for your site to develop the most robust and sustainable drainage solution possible.

In just 3 simple steps you can obtain:

- Detailed dimensional drawings.
- Head / flow characteristic curves.
- Hydraulic modelling data for direct import or copy/paste into commercial hydraulic modelling software.

### Step 1: Enter Design Inputs



### Step 2: Review Design Online



### Step 3: Receive Detailed Design Outputs Direct to your Email Inbox



## 2.0 Hydro-Brake® Flow Control Hydraulic Characteristics

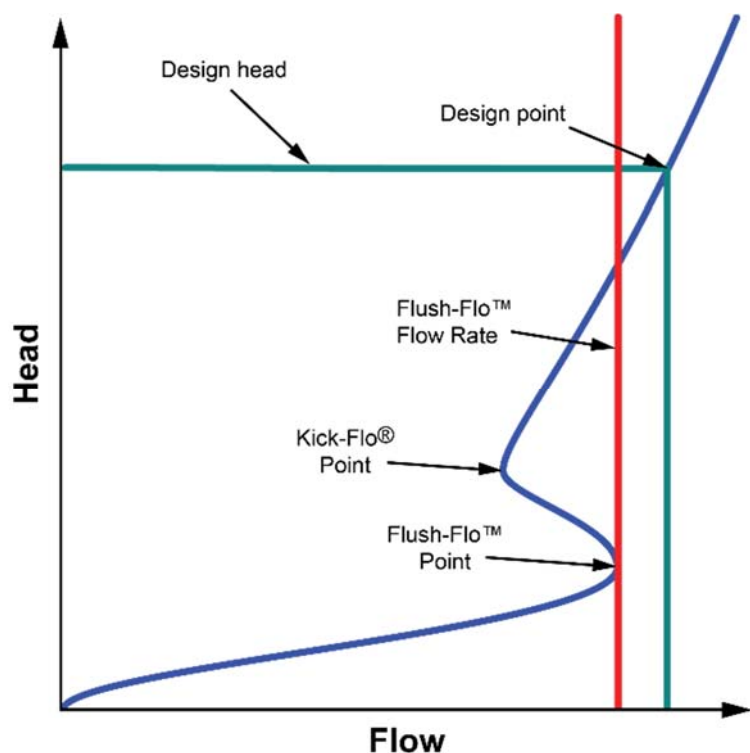


Figure 1 - Hydro-Brake® Flow Control Hydraulic Characteristics

Where a drainage system design has been completed around the use of a particular vortex flow control, the same flow control, or a flow control that has been confirmed to provide equivalent hydraulic performance over the full range of heads, must be used in the final installation.

Calculations within the program are based on a consideration of the full hydraulic characteristic of the flow control, not just the design / duty point. It is essential that the full unit reference / type, diameter (where given), objective (where stated) and control points (where stated) are included on any specification.

The hydraulic behaviour of any Hydro-Brake® Flow Control is described by its hydraulic characteristic curve, which relates the head acting upon the unit to the discharge flow.

The hydraulic characteristic curve contains three distinct control points, each corresponding to different governing flow control behavior:

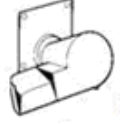



**1) Flush Flo™** – the point at which the vortex begins to initiate and have a throttling effect. A red line on the characteristic curve highlights the flow rate at the Flush-Flo™ point (see Figure 1). This point on the Hydro-Brake® curve is usually much nearer to the maximum design flow (Design Point), than other vortex flow controls leading to more water passing through the unit during the earlier stages of a storm, thus reducing the amount of water that needs to be stored upstream.

**2) Kick Flo®** - the point at which the vortex has initiated and at which the curve begins to return back to follow the orifice curve.

**3) Design/Duty Point** – The desired head / flow condition, at which point the vortex is fully initiated.

### 3.1 Supported Hydro-Brake® Ranges & Models

The Hydro-Brake Optimum® Range is not supported in WinDes®, but the full suite of 13 Hydro-Brake® Flow Control types are supported. The supported units are shown in Table 1 below.

Range	Type	Style/Typical Shape	Application	Design/Installation Notes
Hydro-Brake® Flow control – Conical Type Units	Md1, Md2, Md3 (obsolete), Md4, Md14	Conical 	Foul/combined and surface/storm water	With the exception of the Md3 and Md14, conical units require benching into the intake (the Md3 and Md14 have a piped intake). They generally require larger manholes than equivalent sump-type units.
Hydro-Brake® Flow control – Sump Type Units	Md5, Md6, Md7, Md12, Md13*	Sump-type 	Surface/storm water only	Sump-type units require the provision of a sump to accommodate the flow control. Sump-type units are unsuitable for use in foul/combined systems.
Hydro-Brake® Flow control for specialist applications	Md8, Md9, Md11	Vertical discharge 	Foul/combined and surface/storm water	Vertical discharge units require a chamber design to accommodate the vertically directed outlet. They do not have S-shaped head/discharge curves and are for special applications only - refer to your local Hydro-Brake® Flow Control distributor for advice.
	Md10	Tubular 	Foul/combined and surface/storm water	Tubular units require benching into the intake. They do not have S-shaped head/discharge curves and are for special applications only – refer to your local Hydro-Brake® Flow Control distributor for advice.

\* Only available in certain sizes

*Table 1 - Micro Drainage Supported Hydro-Brake® Flow Control Model Types*

## 3.2 Hydro-Brake® Flow Control Selection Guidance

The design flow chart below should be used to select the appropriate Hydro-Brake® Flow Control.

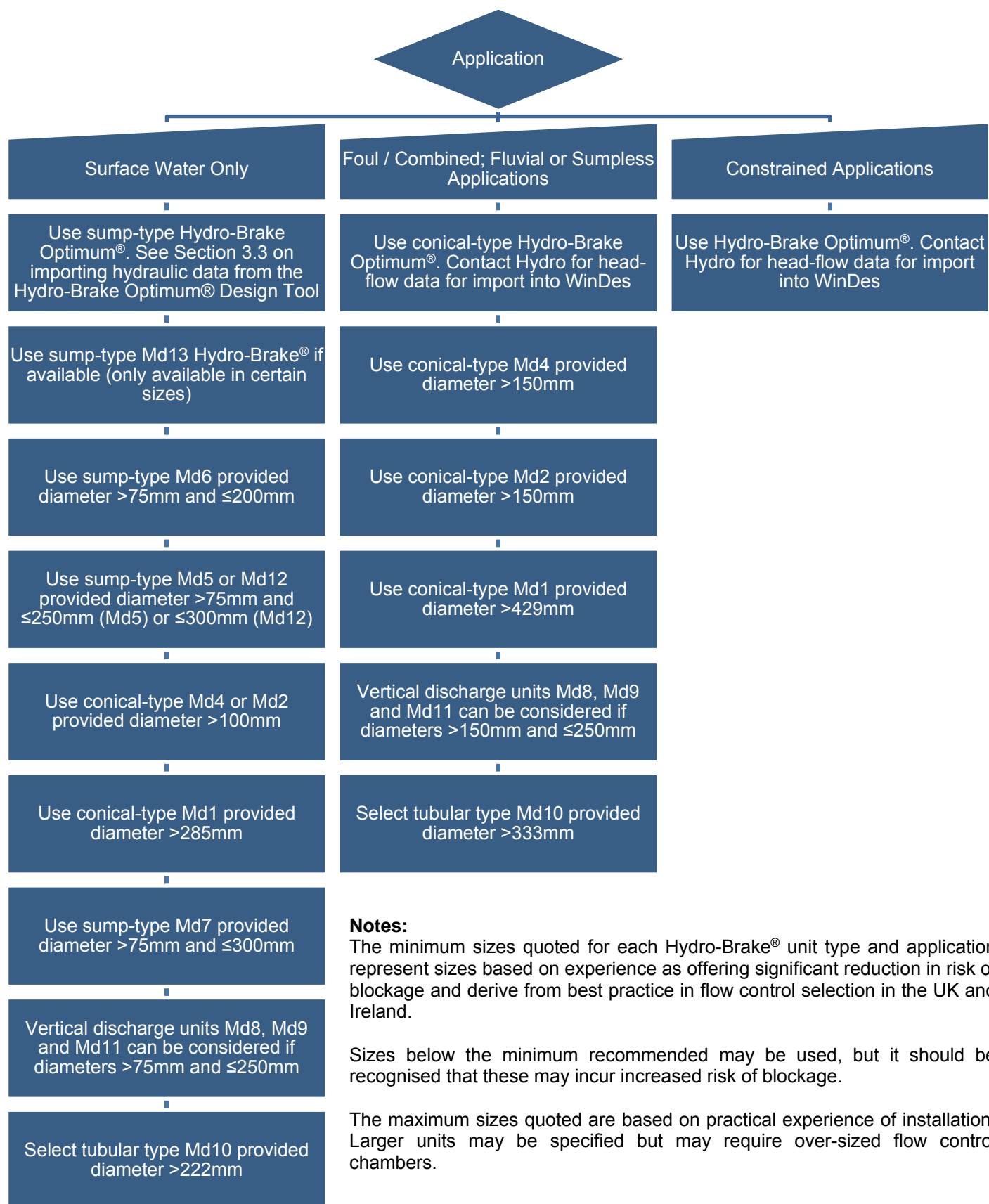


Figure 2 - WinDes® 2013 and w12 Design Flowchart

### 3.3 Importing Hydro-Brake Optimum® Hydraulic Data into WinDes® 2013 and w12

It is recommended to use the Hydro-Brake Optimum® for all new designs.

An appropriate unit for Surface Water Only Applications can be designed using the Hydro-Brake Optimum® Design Tool at [www.hydrobrakeoptimum.com](http://www.hydrobrakeoptimum.com).

A step-by-step guide to the Hydro-Brake Optimum® Design Tool is available [here](#) or a full User Guide can be downloaded [here](#).

Select Micro Drainage Compatible (.csv) from the Modelling Data Export drop down menu on the Design File Service page. This will email a data file containing the head / flow values to the email address provided during registration. The data file can be opened using Microsoft Excel (or similar).



	A	B	C	D	E	F
1	Depth (m)	Outflow (l/s)	Hydro International			
2	0.031	0.502	Hydraulic modelling data for			
3	0.061	1.737	SHE-0103-5500-1500-5500			
4	0.092	3.129	Hydro-Brake Optimum®			
5	0.122	4.159	for use in Micro Drainage WinDes			
6	0.153	4.556				
7	0.184	4.797	Site			
8	0.214	4.983	Ref			
9	0.245	5.126				
10	0.276	5.234	TECHNICAL			
11	0.306	5.315	SPECIFICATION			
12	0.337	5.372		HEAD (m)	FLOW (l/s)	
13	0.367	5.411	Design	1.5	5.5	
14	0.398	5.434	Flush Valve	0.446	5.447	
15	0.429	5.445	Kick Jo	0.914	4.334	
16	0.459	5.446	Design Flow over head		4.784	
17	0.49	5.438				
18	0.52	5.423	Minimum Clearance (m²)		0.0084	
19	0.551	5.423				
20	0.582	5.375	A guide to modelling the Hydro-Brake Optim			
21	0.612	5.341	using Micro Drainage WinDes is			
22	0.643	5.301	available from Hydro International			
23	0.673	5.252				
24	0.704	5.194	Neil McCarthy	24/10/2013	10:46:02	
25	0.735	5.124	V1.0.0.0			
26	0.765	5.04	Copyright © 2013 Hydro International			
27	0.796	4.939	This information is supplied in confidence.			
28	0.827	4.819	It must not be used for any purpose other than			
29	0.857	4.677	and must not be reproduced in whole or in part			
30	0.888	4.51				
31	0.918	4.346				
32	0.949	4.41				
33	0.98	4.475				
34	1.01	4.539				

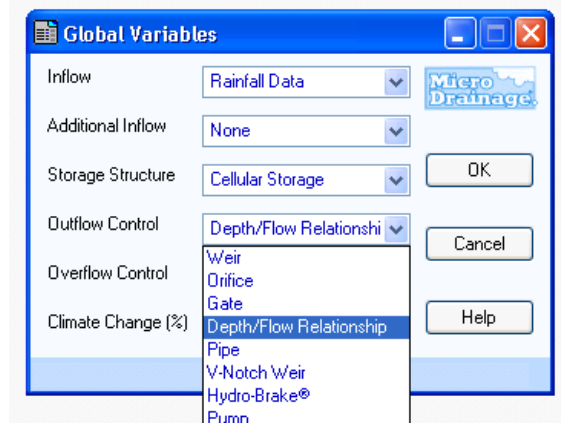
Contact us for Hydro-Brake Optimum® hydraulic data for units for foul / combined water; fluvial; sumpless or constrained applications. We will provide a *Micro Drainage Compatible* data file in comma separated value (.csv) format that can be opened in Microsoft Excel or similar.



Whether obtained from the online design tool, or from Hydro International, this data can be imported into WinDes® 2013 and WinDes® w12 using the following steps:

### Step 1: Global Variables / Online Controls

Choose 'Depth/Flow Relationship' from the drop down list.



### Step 2: Copy Hydro-Brake Optimum® depth / flow data

The *Depth/Flow Relationship Outflow Control* dialogue window in WinDes® is sized to accept 51 values of depth and flow. The depth / flow data as provided by Hydro International will also contain 51 values at equal depth increments to suit the design criteria for the site. An allowance is added above the maximum design water depth to allow for surcharge of the network and design storm exceedance.

Open the Hydro-Brake Optimum® depth / flow data in Microsoft Excel (or similar), select and copy the *Depth* and *Outflow* data and paste this data directly into the WinDes® *Depth/Flow Relationship Outflow Control* dialogue box.



## Expert Design Service

Hydro's professional engineers are on hand to provide free support to aid with correct design and application of Hydro products within each drainage design.

Our dedicated design support team is available to advise on all aspects of Hydro-Brake Optimum® design, including use of the Hydro-Brake Optimum® Design Tool and modelling of the Hydro-Brake Optimum® in commercial modelling software. We can also provide you with a detailed quotation for any units designed using the Hydro-Brake Optimum® Design Tool.

Hydro-Brake Optimum® Hotline: 01275 337937

Email: [enquiries@hydro-int.com](mailto:enquiries@hydro-int.com)

The Hydro-Brake Optimum® has been assessed to the very highest level by the BBA and WRc. These assessments include:

- Hydraulic design and performance.
- Structural design and performance.
- Material and manufacturing quality.
- Practicability and ease of installation.



## Stormwater Solutions

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