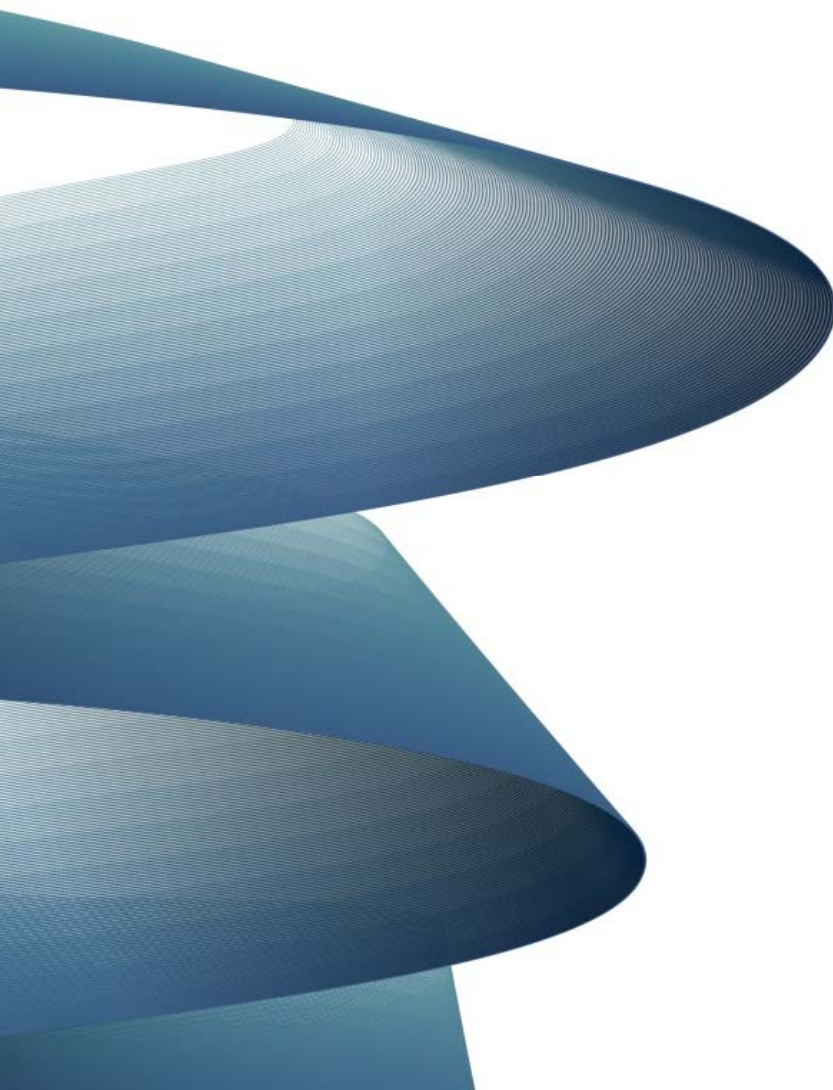


Guide to Modelling Hydro-Brake Optimum[®]
using WinDes[®] w11 (and earlier) from XP Solutions



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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



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

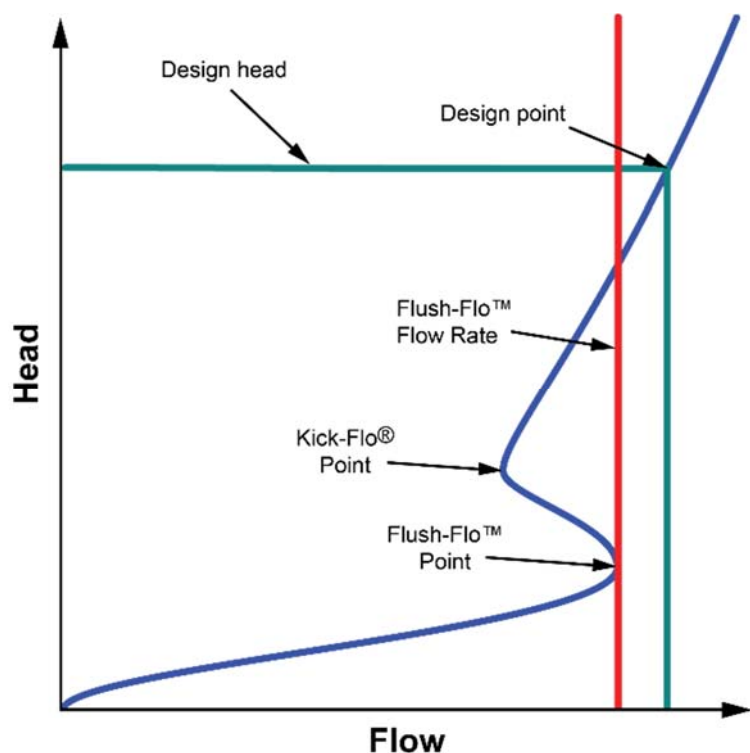


Figure 1 - Hydro-Brake® Flow Control Hydraulic Characteristics

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® versions w11 and earlier.

The Md13 and Md14 types of Hydro-Brake® Flow Control were introduced in WinDes® w12 and so are also not available in earlier versions. Whilst the Md3 is supported in WinDes® w11 and earlier, this unit has since been withdrawn and so should not be used for new designs. The supported units are summarised in Table 1 below.

Range	Type	Style/Typical Shape	Application	Design/Installation Notes
Hydro-Brake® Flow control – Conical Type Units	Md1, Md2, Md3 *, Md4	Conical 	Foul/combined and surface/storm water	The Md3 has been withdrawn and should not be used for new designs. Conical units generally require larger manholes than equivalent sump-type units.
Hydro-Brake® Flow control – Sump Type Units	Md5, Md6, Md7, Md12,	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.

* Since withdrawn – do not use

Table 1 - WinDes® w11 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.

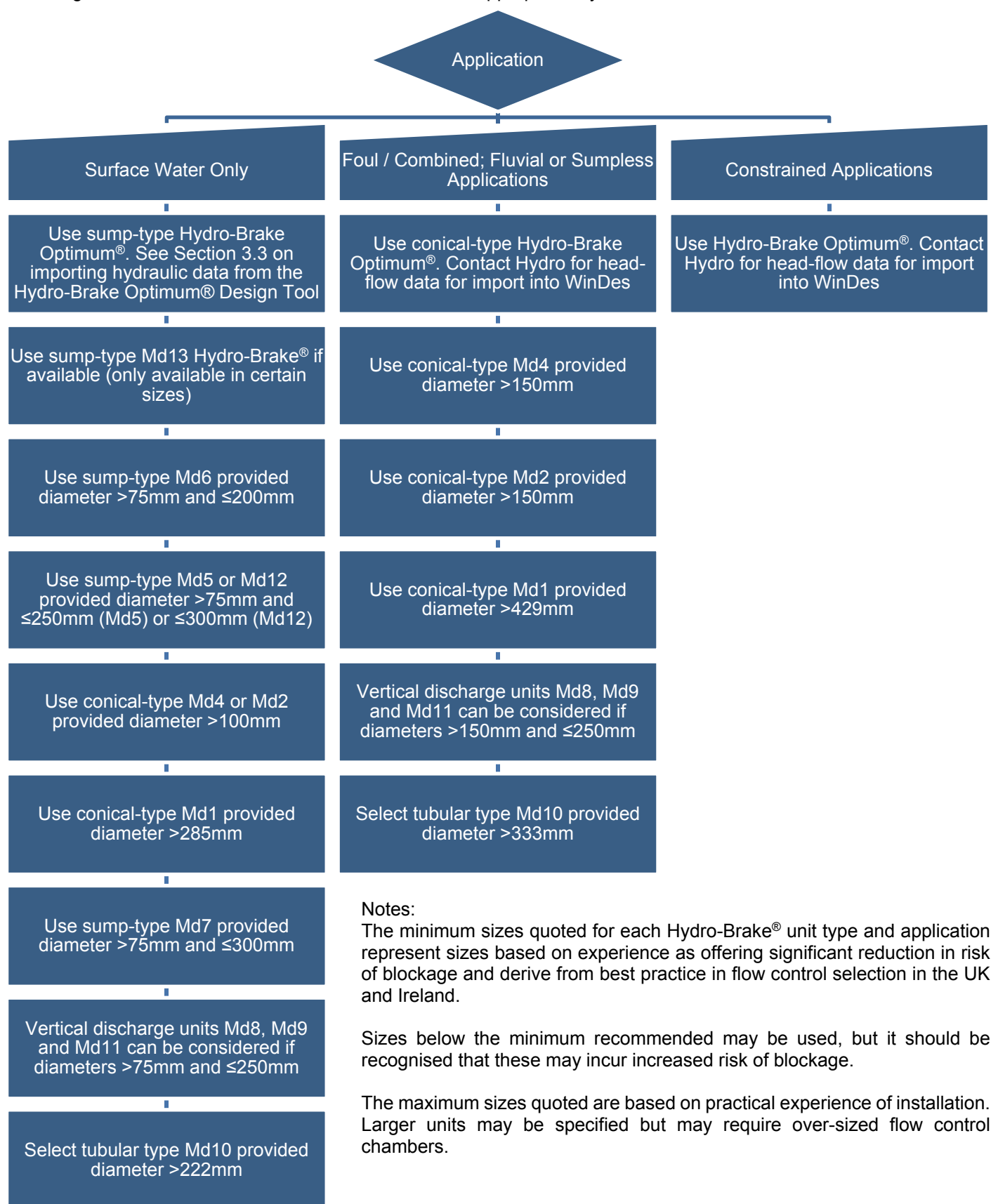


Figure 2 - WinDes® w11 Design Flowchart

3.3 Importing Hydraulic Data into WinDes® w11 and earlier

It is recommended to use the Hydro-Brake Optimum®.

For Surface Water Only Applications, an appropriate unit can be designed using the Hydro-Brake Optimum® Design Tool at 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 0.1 m or 0.2 m Head Increments (.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	G	H
1	Depth (m)	Outflow (l/s)		Hydro International				
2	0.1	3.556		Hydraulic modelling data for				
3	0.2	4.818		SHE-0105-5000-1000-5000				
4	0.3	4.942		Hydro-Brake Optimum®				
5	0.4	4.87		for use in Micro Drainage WinDes w11.4 and earlier				
6	0.5	4.7						
7	0.6	4.297		Site				
8	0.7	4.212		Ref				
9	0.8	4.479						
10	0.9	4.73		TECHNICAL				
11	1	4.966		SPECIFICATION				
12	1.1	5.191			HEAD (m)	FLOW (l/s)		
13				Design	1	4.966		
14				Flush-Flo	0.295	4.943		
15				Kick-Flo®	0.636	4.03		
16				Mean Flow over head		4.306		
17								
18				Minimum Clearance (m²)		0.0088		
19								
20				A guide to modelling the Hydro-Brake Optimum				
21				using Micro Drainage WinDes is				
22				available from Hydro International				
23								
24				Mark Goodger	30/01/2014	14:23:58		
25				v1.0.1.0				
26				Copyright © 2014 Hydro International				
27				This information is supplied in confidence.				
28				It must not be used for any purpose other than that for which				
29				and must not be reproduced in whole or in part without prior p				
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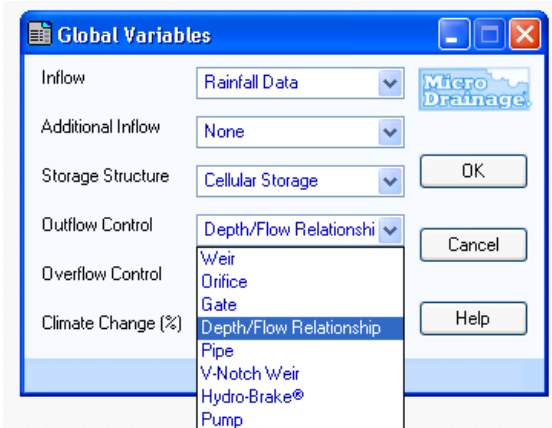


Contact us for Hydro-Brake Optimum® hydraulic data for units for foul / combined water; fluvial; sumpless or constrained applications. We will provide a 0.1 m or 0.2 m Head Increments data file in comma separated value (.csv) format that can be opened in Microsoft Excel or similar.

This data can be imported into WinDes® w11 (or earlier) using the following steps:

Step 1: Global Variables / Online Controls

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



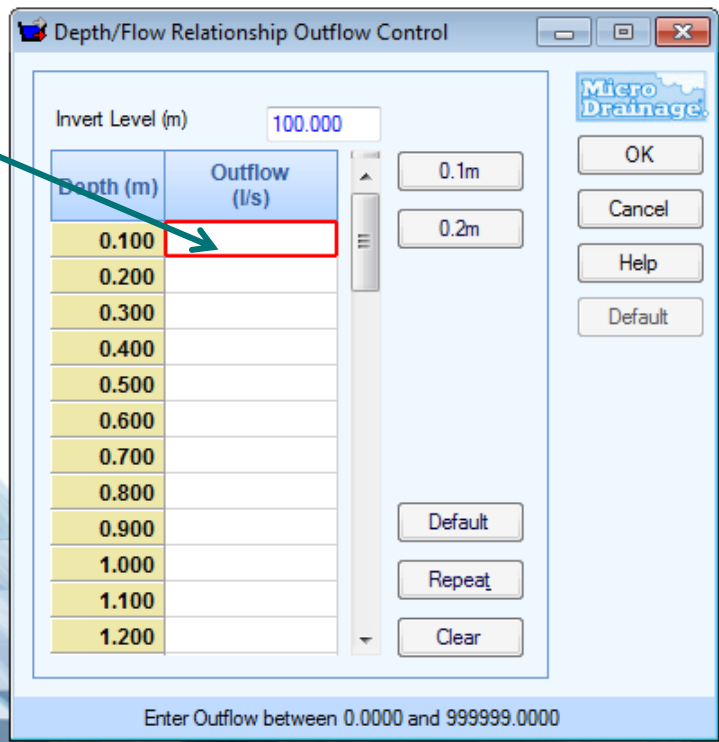
Step 2: Copy Hydro-Brake Optimum® depth / flow data

The *Depth/Flow Relationship Outflow Control* dialogue window in WinDes® w11 (and earlier) is sized to accept values at increments of either 0.1 m or 0.2 m depth.

For systems where the Design Head is less than or equal to 3.0 m, the modelling data from the Hydro-Brake Optimum® Design Tool will be provided in 0.1 m depth increments. For systems where the Design Head is greater than 3.0 m, the modelling data from the Hydro-Brake Optimum® Design Tool will be provided in 0.2 m depth increments

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

Depth (m)	Outflow (l/s)	HEAD (m)	FLOW (l/s)
0.1	3.556	1	4.966
0.2	4.818	0.295	4.943
0.3	4.942	0.636	4.03
0.4	4.87		4.306
0.5	4.7		
0.6	4.297		
0.7	4.212		
0.8	4.479		
0.9	4.73		
1	4.966		
1.1	5.191		



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

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

Hydro International
Stormwater Division
Clevedon Hall Estate
Victoria Road, Clevedon
BS21 7RD

Tel: 01275 878371
Fax: 01275 874979

www.hydro-int.com

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