



HydroPull™ Extended Reach

- Motor Gas Separator (MGS™)
- HydroPull™ SC Tool (Stimulation and Cleanout)
- Water Bypass AV Sub (WBS)
- High Pressure Rotary Jet (JetRotor™)
- Job Planning Software
- Engineering Services
- Custom Tool Development

U.S. Patents  
8,528,649 & 8,939,217

## Tempress HydroPull™ Tool

The Tempress HydroPull tool is the most powerful friction-breaking tool on the market. This tool incorporates a cycling valve that momentarily interrupts the flow to create water-hammer pressure pulses inside coiled or jointed tubing used in horizontal well interventions. The water-hammer effect generates traction forces that pull the tubing into the well at 20 ft/min (6 m/min) or more. These periodic pulses also vibrate the tubing, which reduces friction drag and extends the lateral reach of the tubing by delaying the onset of helical buckling and lockup.

The HydroPull tool is typically run above a downhole motor for milling applications. **The HydroPull tool continues to set and break all existing records for extended reach applications. The tool is fully tunable for various impact levels and custom applications.**

### Applications

- Fishing
- Coiled and Jointed tubing
- Composite bridge plug milling
- Ball seat milling
- Sand cleanout
- Valve shifting
- Extended-reach well service
- Acidizing
- Chemical placement
- Screen and perforation cleaning
- Scale removal
- Depleted well service



Feature	Benefit
<b>Pulling Force</b>	<ul style="list-style-type: none"> <li>• Pulls tubing into long tortuous wells</li> <li>• Reduces plug milling time</li> <li>• Eliminates the need for friction-reducing beads and chemicals</li> <li>• <b>Routine entry of over 11,000 ft horizontals</b></li> </ul>
<b>Flow Pulsation</b>	<ul style="list-style-type: none"> <li>• Better hole cleaning</li> <li>• Fewer short trips</li> <li>• <b>Mill 48+ plugs per day</b></li> </ul>
<b>Low Pressure Differential</b>	<ul style="list-style-type: none"> <li>• Effective on various coil sizes or high-pressure wells</li> </ul>
<b>High Reliability</b>	<ul style="list-style-type: none"> <li>• Multiday extreme-reach jobs without tripping</li> <li>• Over 99% downhole success rate</li> <li>• <b>Mill 70+ plugs in a single run</b></li> </ul>
<b>Polymer Gel Compatibility</b>	<ul style="list-style-type: none"> <li>• Effective sweeps minimize short trips</li> </ul>
<b>Nitrogen Compatibility</b>	<ul style="list-style-type: none"> <li>• Effective on commingled fluid for depleted well service</li> </ul>



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## Specifications

Tools	1.69-in. Standard Flow	2.12-in. Std Flow 2.38-in. Std Flow	2.12-in. High Flow 2.38-in. High Flow
Design flow rate	0.9-1.8 bpm (140-290 lpm)	1.0-2.0 bpm (160-320 lpm)	1.2-2.4 bpm (190-380 lpm)
Max intermittent (jarring) flow rate	2.3 bpm (370 lpm)	2.6 bpm (410 lpm)	3.1 bpm (490 lpm)
Average pressure differential	230-800 psid (1.6-5.5 MPa)	220-640 psid (1.5-4.4 MPa)	200-600 psid (1.4-4.1 MPa)
Max traction (impact) force at design flow	1,900 lbf (860 daN)	1,900 lbf (860 daN)	1,500 lbf (670 daN)
Pulse cycle rate	7-14 Hz	7-14 Hz	6-13 Hz

Tools	2.88-in. Standard Flow	2.88-in. High Flow	3.12-in. High Flow 3.38-in. High Flow 3.50-in. High Flow
Design flow rate	1.9 – 3.8 bpm (300 – 600 lpm)	2.3 – 4.5 bpm (360 – 710 lpm)	2.5 – 5.0 bpm (400 – 790 lpm)
Max intermittent (jarring) flow rate	4.5 bpm (710 lpm)	5.5 bpm (870 lpm)	6.0 bpm (950 lpm)
Average pressure differential	100 – 550 psid (0.7 – 3.8 MPa)	150 – 590 psid (1.0 – 4.1 MPa)	150 – 560 psid (1.0 – 3.9 MPa)
Max traction (impact) force at design flow	3,200 lbf (1,400 daN)	3,900 lbf (1,700 daN)	4,400 lbf (2,000 daN)
Pulse cycle rate	2 – 6 Hz		

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## Case Histories

The HydroPull tool is consistently setting or breaking existing records. Please contact us or visit our website for the most recent HydroPull Case Histories.

### CONTACT INFORMATION:

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Phone: 425.251.8120

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



## Flow Rate Effect

The traction force is linearly proportional to the flow rate in the coil and is magnified by the impact configuration. Several HydroPull tool configurations are available for most applications including Standard Impact, Medium Impact, High Impact, and the Max Impact for the most demanding applications.

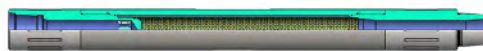
## Two-Phase Flow

The HydroPull tool is designed to operate on two-phase flow. The presence of nitrogen dampens the pulse. The tool can also be run with a Tempress Motor Gas Separator (MGS™). The HydroPull tool may also be run downhole with straight gas, if required.

## Coiled Tubing Connection

A high-quality coiled tubing connection is recommended when the HydroPull tool is operated at the high end of its design flow rate range. Refer to the HydroPull Operation Guide for pressure test and pull test recommendations.

## Last Chance Screen



Clean fluid with no sand should be run. A last chance screen is included with each tool to prevent gravel and other debris from blocking the tool and to minimize the chance for premature failure of other bottomhole assembly components. The screen openings are 0.06-in. (1600 microns) to 0.16-in. (3900 microns) depending on tool size and job requirements.

## HydroPull Operation Guide

An operation guide is included with the HydroPull tool that provides operating instructions and job reporting requirements. These guides are also located within our Client Login site on our website.



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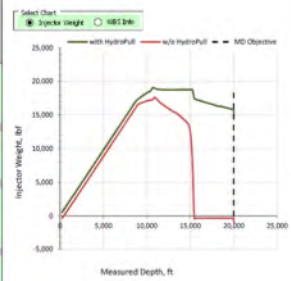
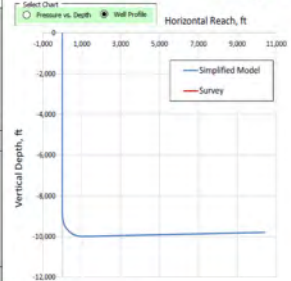
## HydroPull™ Performance Software

HydroPull™ Extended Reach Model-Simplified Well Profile		Enter All Blue Data	©Tempress OSES 2017
Well Designation & Date		Wellname	mm/dd/yy
Well Data	Select units	US Units	
	Kickoff point (TVD)	9,000	R
	End of curve/landing point (TVD)	10,000	R
	Toe depth (TVD)	9,800	R
	Measured Depth (MD) Objective	20,000	R
	ID of casing in vertical and curve	4.67	in
	Lateral ID (cased or open hole)	4.67	in
Average dog leg severity in horizontal	3	1/100 ft	
Working (Separate Tab)	Static friction coefficient	0.24	.24 for pipe-on-pipe friction reducer; with no FR, .30 if no coil straightener
	Coil CG	2,000	in
BHA	Coil Wall Thickness	0.199	in Displayed For Reference
	Minimum flow ID in motorhead	0.70	in
	HydroPull™ tool diameter	2.89	in
	HydroPull™ Configuration (Flow - Impact Rating)	Standard Flow, High Impact	
	# of Nozzle Ports (jet, bullnose)	8	see Tempress Nozzle Sizes
	Nozzle Port diameter	0.375	in
	Tempress® Water Bypass Sub	No	
Operating Parameters	No-load motor pressure (see Motor Data Tab)	60	psid 0 if no motor
	On-off bottom motor pressure differential	750	psid 0 if no motor
	Pump flow rate	3.00	gpm
	Minimum Weight on Bit	500	lbf
	Wellhead circulating pressure (lbf/in²)	100	psig
	Fluid friction reducer effect	50%	% reduction
	Fluid density	8.34	ppg Spec. Gravity= 1.00
Results	Est. fluid lost to ( ) or gained from ( ) formation	0.00	gpm Default is 0
	Total BHA pressure drop	1,920	psi differential
	Pump pressure (drilling/milling)	3490	psi
	Bottomhole circulating pressure (BHCP)	4359	psi
	Wellhead snubbing force	360	lbf
	Hydraulic Lift-off force	275	lbf
	Water hammer pulse in annulus	187	psi differential
Water hammer pulse in work string	1236	psi	
Minimum rupture disk rating	3747	psi	
Impact force at BHA	3166	lbf	
Fluid velocity in horizontal section	219	fpm OK	
Vertical cuttings transport ratio (1-in sand)	74%	OK	
Water Flow to Motor	3.0	gpm	
Water Bypass (if WBS selected)	-	gpm	
On-Off Bottom Motor Flow Variation w/WBS	-		
Maximum coil feed rate at toe of well	17	ft/min	
Coil lockup MD without HydroPull™	15246	R	
MD with HydroPull™	21998	R	
Reach increase due to HydroPull™	6752	R	

Refer to HydroPull™ Operators Guide for more information or call 425.201.8120 for well planning assistance

TEMPRESS®

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A proprietary software program is available for HydroPull tool job planning. The software evaluates circulating pressures in the well and horizontal reach capabilities based on a set of input parameters. The program also calculates pump pressure requirements, the transport of sand and cuttings in the horizontal and vertical sections of the well, predicted lockup, and the rate at which the tool will pull tubing into the well. This software is located within our Client Login site on our website.

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## Competitor Analysis – Friction Breaking Tool

	The Tempress HydroPull™ Tool	Fluidic Flow Modulation Tool	Rotary Valve Pulse Tool with Rotor/Stator
Most powerful friction-breaking tool on the market	✓		
Lowest pressure differential on the market	✓		
Minimal or no elastomeric components	✓	✓	
Compatible with high BHT >400 °F	✓		
Highly effective in extreme, extended reach laterals	✓		
Relatively short length	✓	✓	
Most reliable friction breaking tool on the market	✓		
Nitrogen compatible	✓	✓	
High chemical compatibility	✓	✓	
No moving parts		✓	
Wide operating range	✓	✓	✓
Fully tunable for various impact levels	✓		
Pulls the tubing in the well at >20 ft/min	✓		
Enhances the MWD signal	✓		