

## Active Debris Removal Tool

### ReSOLVE iX extreme-performance instrumented wireline intervention service

Efficient vacuum removal of wellbore debris

-  **Temperature rating:**  
302 degF [150 degC]
-  **Pressure rating:**  
20,000 psi [138 MPa]
-  **Certification:**  
NACE MR0175 compliant
-  **Real time:**  
Progress monitoring and control
-  **Debris particle size:**  
0.05 mm [0.002 in] to 1.9 cm [0.75 in]
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#### Applications

- Debris removal
- Obstruction cleaning
- High-pressure washing with reversible progressive cavity pump (PCP)
- Customization for debris type, size, volume, and settled surface

#### Benefits

- More effective intervention from higher debris suction force
- Higher operational efficiency of wellbore debris removal optimized with real-time progress measurements and modular configurability to address any downhole condition

- Reduced risk of getting stuck because of the reversible PCP
- Debris secured before return to surface
- Expanded access to hostile downhole environments including sour conditions
- No additional pumping fluid required because downhole-generated localized fluid circulation collects debris into bailer for capture
- Standard wireline footprint for deployment
- Wireline depth accuracy for precise tool placement at specific completion elements

#### Features

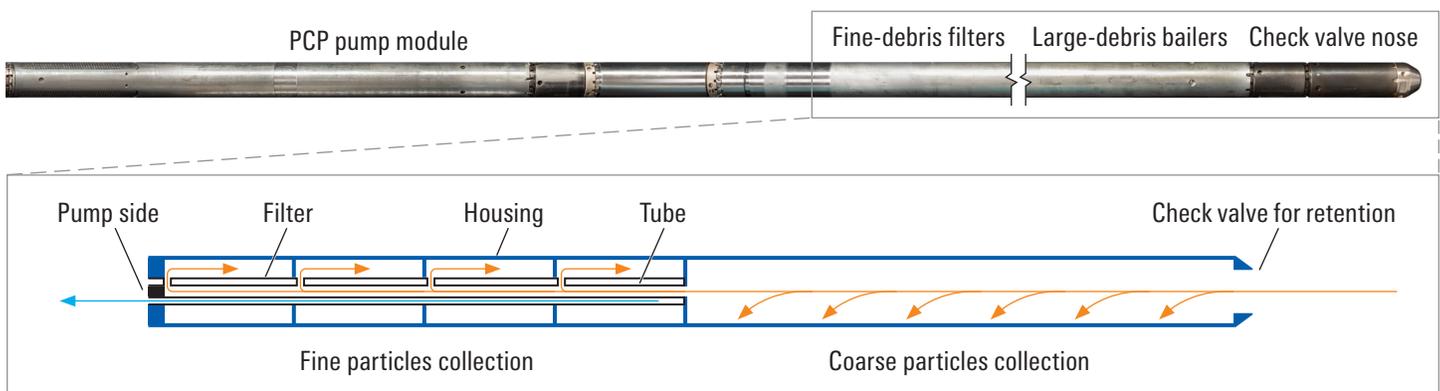
- PCP pump, instead of turbine, for improved performance, maximized debris suction power, and reversible flow
- Staged bailer configuration with parallel flow filters and open bailers for maximum fill efficiency
- Real-time measurement during debris removal operation
  - Pump rotor speed
  - Pump rotor torque
- Sour service qualification
- High-pressure rating
- Surface control of PCP rate
- Full combinability with TuffTRAC iX\* extreme-performance wireline tractor and new-generation high-strength WIREd\* wireline inline release device

#### Expanding debris removal options

The problems caused by wellbore debris are well documented, and many different technologies have been developed to remove debris for enabling wellbore access and restoring production or injection flow. Large quantities of debris can be circulated out of the wellbore by flowing from the surface using drillpipe or coiled tubing. Small quantities of unconsolidated debris can be bailed in vertical sections using slickline-conveyed hydrostatic or pump bailers. However, between the cost and capability extremes of coiled tubing and slickline bailers, there are many applications in which a wireline debris removal tool is the most appropriate technology.

The active debris removal tool of ReSOLVE iX\* extreme-performance instrumented wireline intervention service performs efficiently in high-pressure, deviated, restricted access, and sour well conditions. Conveyance is on wireline by gravity or on tractor in highly deviated and horizontal wells.

Because the tool is deployed on wireline, only a standard wireline footprint is necessary at surface, eliminating surface rig-up complexities. ReSOLVE iX service's debris removal tool does not require additional pumping fluid since localized well fluid circulation generated downhole collects debris into bailer for capture. Furthermore, wireline depth accuracy enables focused



A wide range of debris particle sizes from 0.05 mm [0.002 in] to 1.9 cm [0.75 in] can be optimally collected in one run due to the configurability of the multistage bailer module of ReSOLVE iX service.

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debris removal at specific completion elements instead of in the general vicinity, resulting in operational time saving.

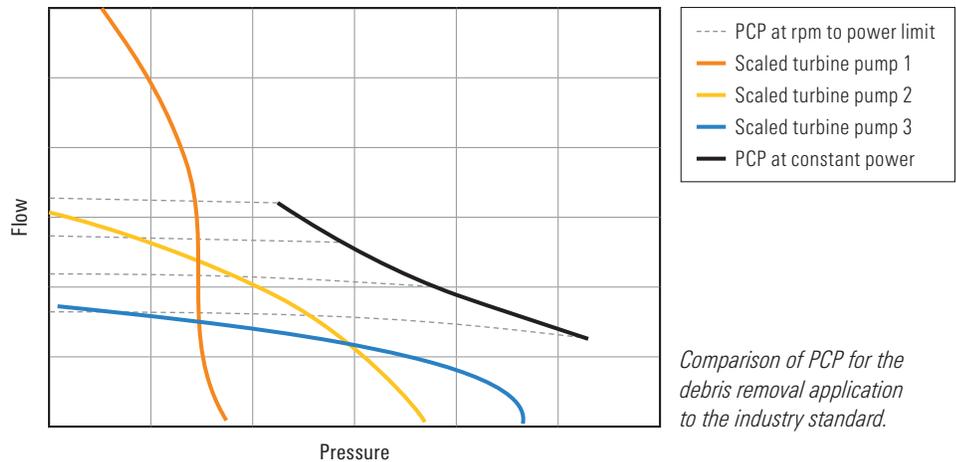
During operations, the instrumented toolstring provides real-time monitoring, dynamic tool control, and verified downhole actuation to set new standards for success in well intervention operations. Sensors incorporated in the ReSOLVE iX service tools enable the engineer to monitor tool activity and the progress of downhole operations while responsively controlling the tool for optimal performance. By integrating monitoring and control of the modular PCP, the active debris removal tool of ReSOLVE iX service saves trips and time by knowing exactly when to pull out of hole. It also eliminates the reliance on estimates and assumptions that is typical with conventional turbine-powered debris removal tools.

## A novel approach to wellbore debris removal

The active debris removal tool efficiently vacuums wellbore debris to enable access for further intervention or tractor conveyance. It uses a powerful downhole PCP to generate localized circulation of the wellbore fluid for collecting settled and cohesive debris. Bailers remove solids from the flow through a combination of open bailing and filtration. Bailers remove solids from the flow through a combination of open bailing and filtration. A check valve embedded in the bottom nose traps debris to eliminate the risk of debris loss as the toolstring is recovered to surface.

The bailer system includes a system of filters, traps, and valves for capturing and retaining collected debris, with these elements uniquely packaged to leverage the continuous higher-pressure pumping capability and increase the volume of recovered debris per run. Viscous slurries and large solids are captured using a check valve in the lower stage of the bailers, and fine solids are captured using coaxial filters in the upper stage of the bailers. This staged approach enables the active debris removal tool to collect a wide variety of debris in a single run.

In addition to collection circulation for the debris removal, the pump can be reversed and operated in a high-pressure washing function in the same run. This capability makes it possible to unblock the bailer intake or stir up settled debris as needed. It can also be used to free the toolstring if it becomes buried in debris and close the bottom nose check valve to securely recover collected debris.



The real-time measurement capability of ReSOLVE iX service during debris removal operations enables operators to detect when the bailers are clogged or full to appropriately adjust the pumping rate, initiate jetting, or work the toolstring. The result is optimized collection efficiency and operational time savings.

ReSOLVE iX service's active debris removal capabilities are easily configurable to adapt to all potential downhole conditions. The combination of PCP suction power with a wide variety of bailers and bottom noses ensures a best fit for various downhole debris conditions, from loose to cohesive debris and settled on any surface.

## What it replaces

Conventional debris removal tools do not collect or use downhole measurements within an in-tool hierarchal control ecosystem. ReSOLVE iX service's active debris removal tool resolves this gap to improve operational efficiency and reduce operational risks:

- Effective collection is accelerated by allowing the PCP to pump at higher rpm.
- The service quality of prolonged debris removal operations is augmented through the engineer's full awareness of tool status.
- Operational risk is reduced through advanced diagnostics that trigger tool hardware protection actions for temperature, and overcurrent, based on real-time data rates that are unachievable with conventional tools. The head-voltage stabilization controller adjusts the surface power supply to prevent voltage spikes to the downhole tool and overvoltage occurring.

## What else I should know

ReSOLVE iX service's cleanout application capabilities are easily configurable to adapt to all potential downhole conditions. The wide variety of bailers and bottom noses ensures a best fit for a well's downhole configuration. For unique application of the active debris removal tool, such as for spotting acid and cement plug dispensing, customization is available on request—designed, qualified, and built by a dedicated engineering team.



Reversible progressive cavity pump.

# Active Debris Removal Tool

The active debris removal tool of ReSOLVE iX service is a suitable contingency whenever fill restricts access to a wellbore or an associated completion accessory. Operational efficiency is maximized with its pinpoint depth control combined with surface read out of the tool status and positive indication when the bailers are full.

## Technical details

For more information, read [SPE-194279](#).

Specifications	
	ReSOLVE iX Service's Active Debris Removal Tool <sup>†</sup>
Output	Pump rotor torque and speed
	Motor temperature
	Head tension
	Casing collar locator (CCL) and optional gamma ray
	Wellbore pressure
	Wellbore temperature
Debris size—max. <sup>‡</sup>	¾ in [19 mm]
Debris size—min. <sup>‡</sup>	1.97 × 10 <sup>-3</sup> in [0.05 mm]
Reversible PCP	Real-time flow rate control
	Max. flow rate: 15.32 galUS/min [58.0 L/min]
	Max. achievable differential pressure: 300 psi [2,068 kPa] <sup>§</sup>
	Pump rotor torque measurement resolution: 0.14 lbf.ft [0.19 N.m] and 0.5 rpm
Bailers <sup>†</sup>	Max. volume
	Large debris collected: 0.09 galUS/ft of bailer [1.12 L/m]
	Fine debris collected: 0.07 galUS/ft of bailer [0.87 L/m]
	Standard length of bailers: 45 ft [13.7 m] for 4.08-galUS [15.44-L] max. volume collected
Mud type and weight	All
Pressure rating	20,000 psi [138 MPa]
Temperature range	32 to 302 degF [0 to 150 degC] <sup>**</sup>
Hole size—min.	2.2 in [55.9 mm]
Outside diameter <sup>†</sup>	2½ in [53.97 mm]
Min. length (15-ft bailer configuration)	27.21 ft [8.29 m]
Weight <sup>†</sup>	204.48 lbm [92.75 kg]
Tension	25,000 lbf [111,200 N]
Compression	25,000 lbf [111,200 N]
Special applications	NACE MR0175 compliant for H <sub>2</sub> S and CO <sub>2</sub> resistance
	Custom applications on request for bidirectional pump capabilities to clean, high-pressure wash, circulate, and spot
	Tractoring conveyance: TuffTRAC iX extreme-performance wireline tractor
	Fishing capability: Optional 3⅝- or 2⅞-in [79.38- or 53.97-mm] WIREd wireline inline release devices above and below tractors

<sup>†</sup> All values are for standard specifications and are subject to change without notice. A dedicated engineering team is available for customizing tools to address your challenges.

<sup>‡</sup> Values depend on configuration.

<sup>§</sup> PCP capabilities depend on circulation flow rate, debris collected, and downhole conditions.

<sup>\*\*</sup> For applications between 302 and 351 degF [150 to 177 degC], contact Schlumberger representative.

[slb.com/ReSOLVE](http://slb.com/ReSOLVE)