KSL
VARIABLE FILL FLUID COUPLINGS
INTRODUCTION
Transfluid designed the KSL series variable fill fluid coupling to overcome difficulties experienced during ‘start up’ and ‘speed variation’ operation for medium or high powered machines, driven by electric motors or internal combustion engines.

WORKING OPERATION
Extremely efficient performance is achieved utilizing the KSL’s very simple and effective principle. Oil, as the power medium, is pumped from a sump to the hydrodynamic coupling circuit, where it is finally ‘drained-off’ through a series of orifice plugs, back into the sump.

The variable fill principle:
By controlling the oil flow to the working circuit through a frequency converter, changes occur inside the coupling’s working circuit which alter the coupling’s slip characteristics dramatically softening the ‘start up’.

Torque limiting function:
Having all the same advantages of fluid couplings, variable fill-drain type fluid couplings build up torque gradually.

Disconnect:
Interrupting the oil flow into the coupling empties the working circuit and disconnects the input from the output.

In summary, it is possible to:
• have a long start up acceleration, up to several minutes, for high inertia machines.
• position the driven machine for loading, unloading and maintenance.
• obtain a sequential starting for more than one drive motor.
• adjust or limit the torque
• disconnect the load even with the motor running
• use for conveyors, for the reduction of the tension to a minimum level or the possibility of running at an inspection speed.
• vary the speed within a 5:1 range for centrifugal machines.

CHARACTERISTICS
Soft starter
The KSL working circuit is gradually filled by oil from an empty condition to a fully filled one. Such behaviour provides an extremely soft controlled start up, especially with high inertia machinery. The KSL variable oil feed system is controlled by a frequency converter during the ramp up, producing ideal soft starting.

Accurate speed variation
By remote signal, the KSL always guarantees output speed accuracy, as required by the operator or control system. Speed variation is also possible by manual flow control valve operation. A frequency converter electronic bypass is supplied standard

Vibration Dampening
One of the most important characteristics of KSL fluid coupling is its torsional vibration dampening effect, protecting both the driven gear box, fan, or pump machinery, as well as the motor or engine.

Overload Protection
This is a fluid coupling advantage and a big benefit to users.

High Efficiency
The KSL is an extremely efficient device compared to the constant filled type fluid coupling, because the working circuit volume is controlled at the fullest possible level to maintain a very small slip rate.

The Transfluid JET RECOVERY POWER system, provides increased efficiency and lower noise level thanks to an improved oil path through the orifice plugs.

Shaft Labyrinth Sealing
This type of seal helps the KSL series to be a low maintenance machine.

Easy of Maintenance
Thanks to its split casing design, it is possible to remove the complete fluid coupling impeller assembly without having to move either the motor/engine or driven machinery, saving the need for realignment and costly down time.

Optional
Auxiliary Lubrication unit for prime mover and/or driven machine bearing.

ATEX EEx
Upon request.

APPLICATIONS
Mills, crushers, conveyors, fans, blowers, pumps, compressors, centrifuges, mixers, generators, marine propulsion drives.

- Can Bus upon request

SELECTION
To correctly select the KSL, Transfluid needs to know the following data:
• motor/engine type, power and speed
• driven machinery type, power, speed and inertia
• output speed range
• environmental conditions
• cooling water/air characteristics
• drive and driven shaft dimensions and tolerances
• available voltage for motors and instruments
AUTOMATIC
All parameters under control such as:
speed, start up modulation, oil pressure, oil
temperature, filter clogging, oil level, heat
exchanger pump thermostatic control.

CONTROL PANEL

1 - variable flow feed pump with variable frequency converter
2 - lubrication oil pump
3 - heat exchanger oil pump
4 - pressure gauge
5 - pressure differential transducer
6 - bleeding orifices
7 - heat exchanger
8 - oil level switch and gauge
9 - max temperature switch

Variable flow
feed oil pump

main drive motor

Gear box

Driven machine

10 - feed oil filter
11 - lub. oil filter
12 - vacuum switch
13 - pressure gauge
14 - temperature gauge
15 - thermistor Pt100
16 - speed sensors
17 - heat exch. pump thermostat
18 - manual flow control valve
PERFORMANCES

MOTOR POWER - kW

<table>
<thead>
<tr>
<th>rpm</th>
<th>21 HS</th>
<th>D21 HS</th>
<th>27</th>
<th>29</th>
<th>34</th>
<th>D34</th>
<th>46</th>
<th>D46</th>
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<td>-</td>
<td>200</td>
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<td>750</td>
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<td>1800</td>
<td>3500</td>
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<td>-</td>
<td>-</td>
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<td>630</td>
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<td>2300</td>
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<tr>
<td>1500</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>1200</td>
<td>1600</td>
<td>2400*</td>
<td>3350*</td>
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<td></td>
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<tr>
<td>3000</td>
<td>1900</td>
<td>3500</td>
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</table>

* With steel impellers

NOTE: Standard squirrel cage motors should NOT be derated
Efficiency of electric motor is NOT affected by KSL application
Value of electric motor efficiency can be found in manufacturer’s catalogue
Slip can vary ±10% according to driven machine characteristics

CENTRIFUGAL APPLICATION

\[
\text{input} = K n_1^2 + K (n_1 - n_2) n_2^2 \\
\text{output} = K n_2^2 \\
\text{losses} = K (n_1 - n_2) n_2^2
\]

\[K = \text{max input power} / n_1^2\]

\[n_1 = \text{input speed}\]

\[n_2 = \text{output speed}\]

LOSSES % | OUTPUT SPEED %
--- | ---
0 | 100
8.1 | 90
12.8 | 80
14.8 | 70
14.4 | 60
12.5 | 50
9.6 | 40
6.3 | 30
3.2 | 20

average value = 9.6
APPLICATIONS

BOILER FEED WATER PUMPS, PIPE LINE PUMPS, CENTRIFUGAL GAS COMPRESSORS, CITY FEED WATER PUMPS, RECYCLING PUMPS, ALL FANS AND BLOWERS

HAMMER MILLS, BALL MILLS, STONE CRUSHERS, METAL SHREDDERS, WOOD CHIPPERS

VOLUMETRIC MACHINES

BELT CONVEYORS
DIMENSIONS

Dimensions (mm)

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Weight kg (without oil)</th>
<th>Oil l</th>
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<tbody>
<tr>
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<td>940</td>
<td>1500</td>
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<td>1100</td>
<td>660</td>
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<tr>
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<td>1200</td>
<td>5600</td>
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WEIGHT ACCORDING TO STANDARD VERSIONS
DIMENSIONS ARE SUBJECT TO ALTERATION WITHOUT NOTICE

1. Variable flow pump
2. Lubrication oil pump
3. Feed filter with vacuum switch
4. Lube filter with differential pressure transducer
5. Feed pressure gauge
6. Lube pressure gauge
7. Temperature gauge
8. Filter by-pass valve
9. Proximity switch
10. Temperature switch
11. Drain tap
12. Electric wiring box
13. Breather
14. Level switch and gauge
15. Manual control valve
16. Cooler
17. Lifting ears
18. Cooler pump
19. Alignment couplings
APPLICATION EXAMPLES

2x034 KSL, 2000 kW - 1200 rpm, Fan drive (Brazil)

2x34 KSL, 630 kW - 1000 rpm, Ceramic mill (Italy)
Tables for the preliminary selection of the coolers:
- KSL with oil cooler motor pump (2 poles motor)
- Refer to available speed drive or start up drive column
- Max power = max power at max speed
- Output water temperature 35°C
- For power higher than those listed below, please apply Transfluid

### VARIABLE SPEED APPLICATION

<table>
<thead>
<tr>
<th>Fluid Coupling max. power (kW)</th>
<th>Water-Oil Cooler Model</th>
<th>Required Water Flow (l/min) at 25°C</th>
<th>Cooler Oil Pump Model</th>
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<tbody>
<tr>
<td>700</td>
<td>08084 SP3-31</td>
<td>220</td>
<td>GR55SMT250L</td>
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<td>2000</td>
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<td>628</td>
<td>GR55SMT800L</td>
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</table>

* Tube bundle heat exchanger
** Plate heat exchanger

Before ordering, ask TRANSFLUID for a dedicated check of the heat exchanger

### START-UP APPLICATION

<table>
<thead>
<tr>
<th>Fluid Coupling max. power (kW)</th>
<th>Water-Oil Cooler Model</th>
<th>Required Water Flow (l/min) at 25°C</th>
<th>Cooler Oil Pump Model</th>
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<tr>
<td>900</td>
<td>06060 SP3-11 **</td>
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<tr>
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<td>1600</td>
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<td>125</td>
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<tr>
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