Hydraulic Power Unit 2-Stage Braking

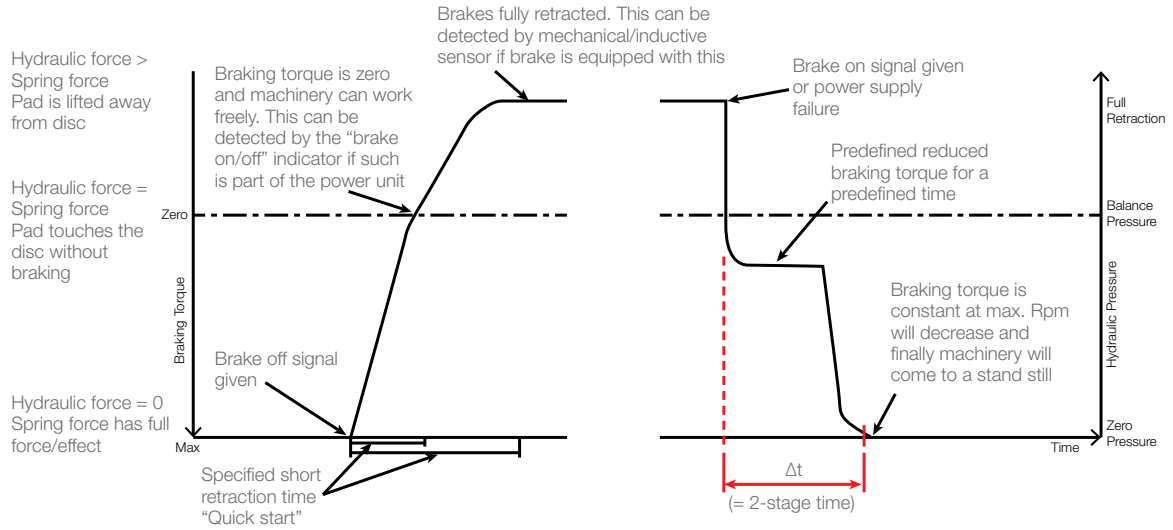
Svendborg Brakes®
Altra Industrial Motion

WHERE TO USE

The 2-stage hydraulic power unit provide a 2-stage controlled braking sequence for use with hydraulic fail-safe spring applied disc brakes. The 2-stage braking sequence is used to prevent a hard braking sequence, which in worst case can cause too high stress on the mechanical parts, or unwanted wear of the system through uncontrolled braking.

BRAKING PERFORMANCE

During opening of the brakes the pressure is build up and thereby opening the brake(s). The first stage of the braking sequence is dumping the pressure to the correct pressure and after the 2-stage braking time the pressure is smoothly reduced and thereby increasing the braking torque.



FUNCTIONAL DESCRIPTION

Operation (Not Braking)

Electrical power is connected to the electrical motor and the solenoid valve(s) is/are energized. The braking valve(s) is/are closed and block the connection to tank. The hydraulic pressure is built up and disengages the brake and charges the accumulator.

The electrical power is disconnected from the motor by means of the motor pressure switch. The braking valve(s) is/are constantly energized. If the pressure is decreasing to the lower set point for motor pressure switch the motor will restart and increase the pressure again.

Applying the Brake with Controlled Braking Torque

The electrical power is disconnected to the braking valve(s) and motor. The hydraulic oil pressure is released to the tank through the counter pressure valve(s) and the throttle valve(s), resulting in a constant reduced braking torque (MT%).

The reduced braking time is set by the flow control valve by bleeding the oil from the accumulator slowly through the flow control valve, maintaining a constant pressure in the brakes. When the accumulator is fully discharged the pressure in the brake will go to zero, and full braking torque is applied.

The constant brake torque and braking time is pre-set from factory as specified or if not specified set to 50% (MT%) of maximum torque and approximately 10sec stopping time (Δt).

Operation in Case of Power Failure

In case of power failure the brakes will be applied as described in the section: Applying the brake with controlled braking torque.

FEATURES

The hydraulic power unit is available in two versions; a basic (single dump) and a premium (dual dump) with cabinet / enclosure with various options and accessories.

The junction box / terminal box is mounted internally in the upper left hand side. Cable entry is in left hand side with removable entry plate in brass. The cabinet door is hinged either left hand or right hand side. The pressure connection / bulkhead (JIC as standard / Ermeto fitting 10L as optional) is mounted in left hand side but can be mounted in the right hand side or in the bottom as well.

2-Stage Braking Special Features

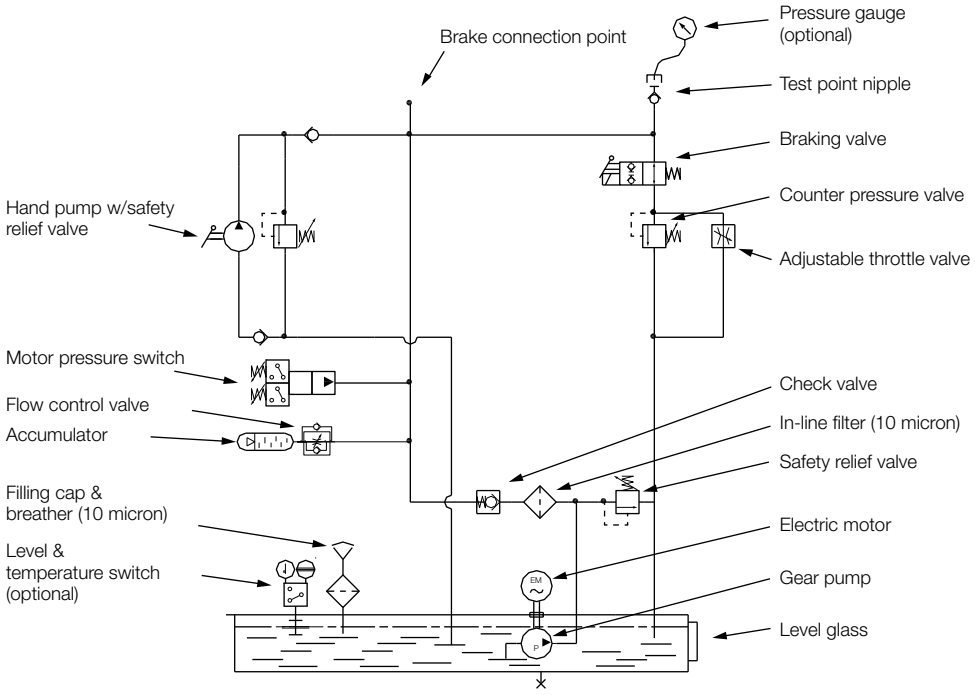
- Single return line / dump (Basic) or Dual return lines / dump for redundancy (Premium)
- Counter pressure valve(s) and throttle valve(s)
- Equipped with hand pump for manual release of brake
- Inline high pressure filter
- LED's on solenoids
- Test point for readout / bleeding of manifold
- Pressure switch either electronic or mechanical type
- Level & temperature switch in tank
- Pressure gauge mounted on test point (minimess) hose inside cabinet
- Stainless steel enclosure mounted on bracket with vibration dampers
- Enclosure door with cam lock with double bit as standard or upgraded with stainless pad-lockable swing handle (optional)
- Removable drip tray to capture spills
- HPU can be mounted on slides for easy maintenance (optional)
- Sun roof / dirt cover 30° (optional)

HYDRAULIC DIAGRAM

The schematics illustrates the difference between basic (single return) & premium (double return). The additional circuit on the premium version is marked with red in the below image.

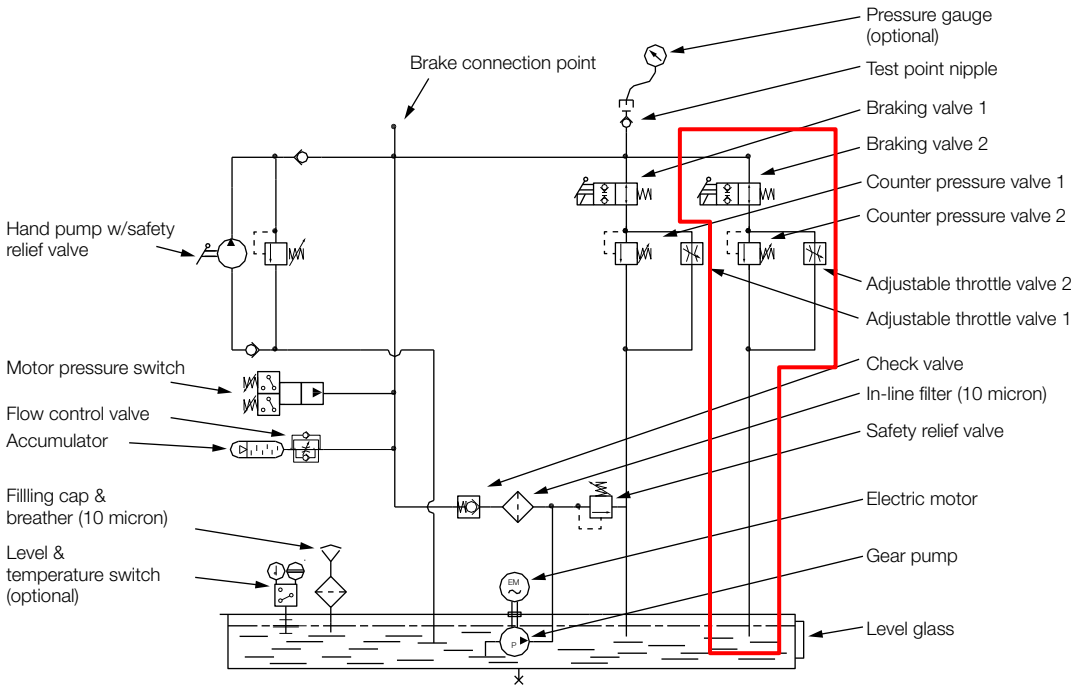
The motor pressure switch can either be mechanical type (2 switches) or electronic type (IFM) (1 switch) – here shown as electronic type.

Basic Version: Single Dump / Single Return Line



Premium Version: Double Dump / Dual Return Line

Red area indicates additional circuit for redundant return/dump



ELECTRICAL DIAGRAM / SCHEMATIC

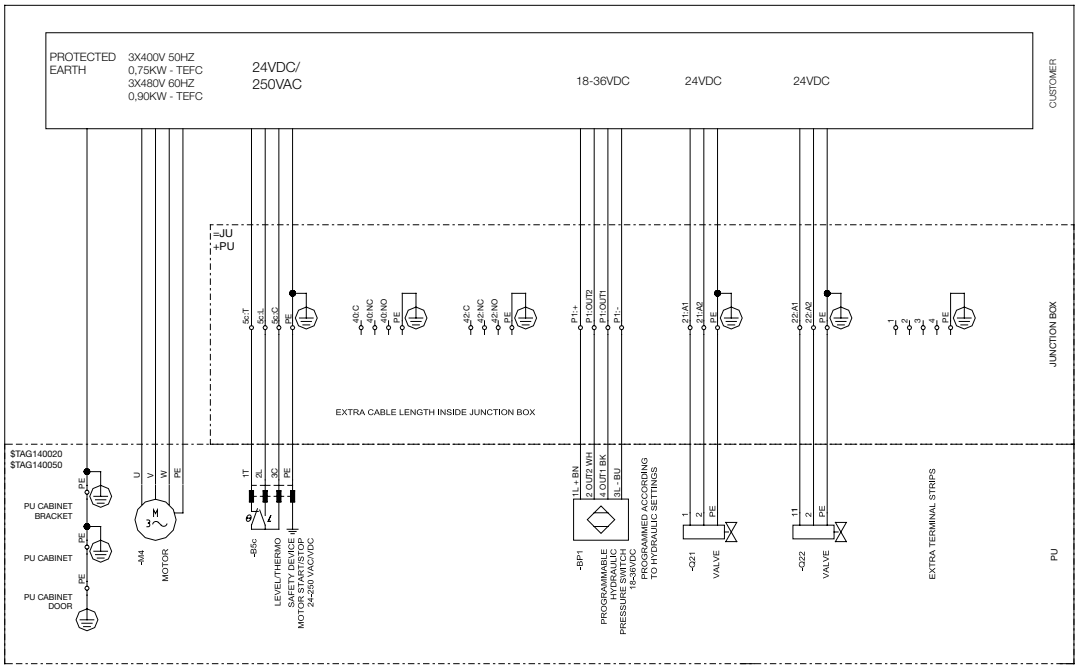
The electrical components on the hydraulic power unit – excluding the motor - are prewired to the junction box.

The motor supply wire and motor starter is not part of the unit and must be provided locally.

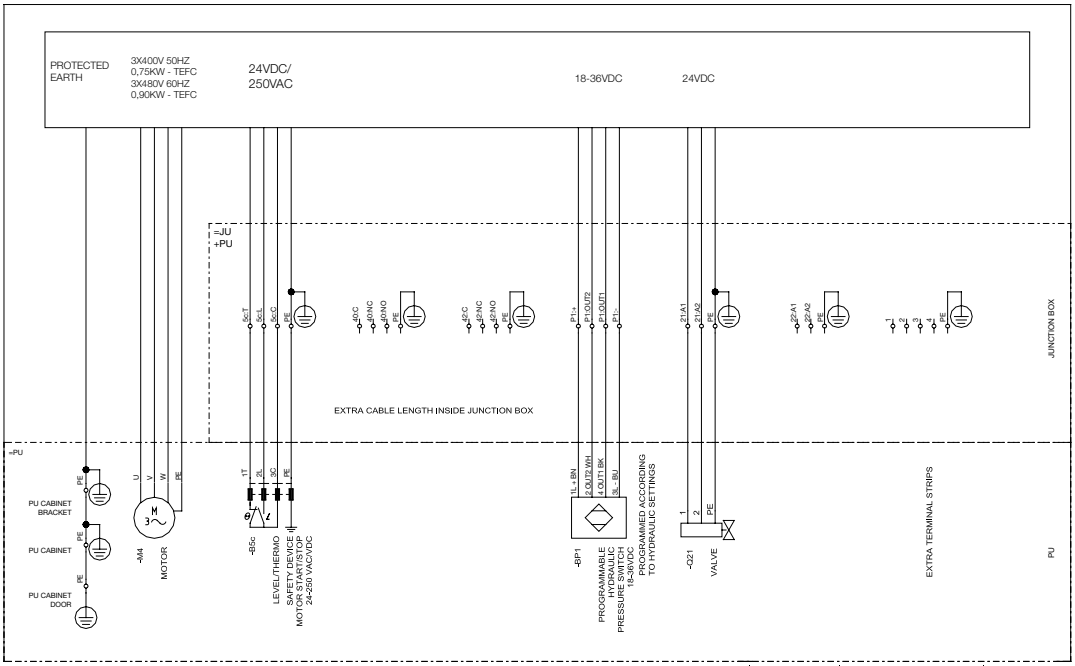
The connection from installation to junction box and motor is to be made through the removable brass entry plate in the left hand side and must be made during installation. It is not normal to connect the brake indicators though the junction box on the unit.

The electrical diagram / schematic vary according to the selections made (basic / premium / mechanical or electronic pressure switch) – below two typical schematics

Premium Version (Redundant Valves) with IFM Pressure Switch:



Premium Version (Redundant Valves) with Mechanical Pressure Switch:



Component List (Quantities depend on configuration)

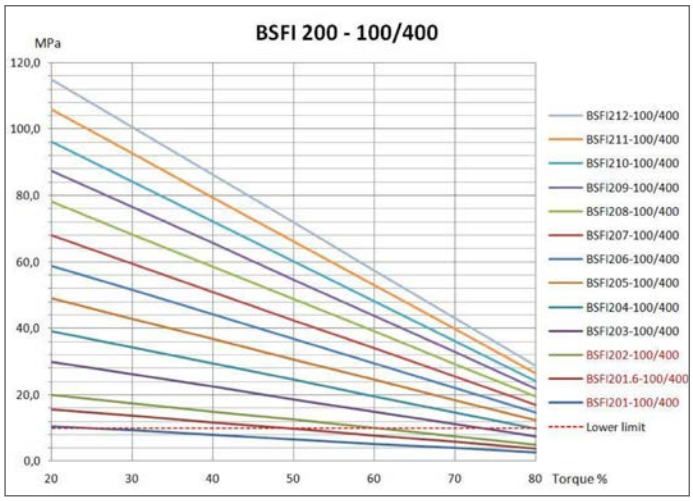
Valves / Coil	Directional poppet valve 2/2 & coil 21W (1x or 2x) - Hydac
Pressure switch	Electronic sensor (1x) – IFM 7001 Mechanical pressure switch (2x) - Bosch Rexroth HED5
Level & temperature switch	Level indicator with temperature switch 70°C - Lund & Sorensen
Motor	IEC common motor 0,75kW for 50Hz / 0,90kW for 60Hz
Terminals (in JB)	Screw terminals - Wago
Wire colors	IEC Power circuit wiring colors Protective earth (PE) Green-yellow Neutral (N) Blue Line, single phase (L) Brown Line, 3 phase (L1) Brown Line, 3 phase (L2) Black Line, 3 phase (L3) Grey

Recommended Brake Limits for 2 Stage Pressures

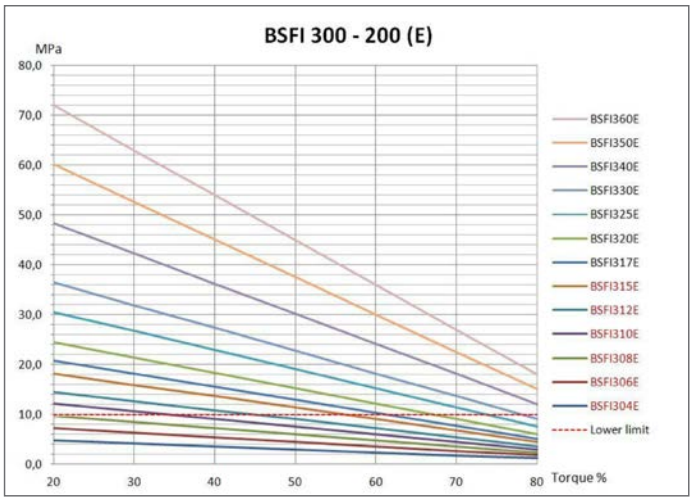
Choosing brake torques and brake sizes that result in a hydraulic two stage pressure lower than 10bar (lower limit) is not recommended as the counter pressure valve is very difficult to set at this low pressure.

The brake pressure curves indicate the two stage pressure at the corresponding torque. If pressure is below the 'lower limit' the combination is not recommended.

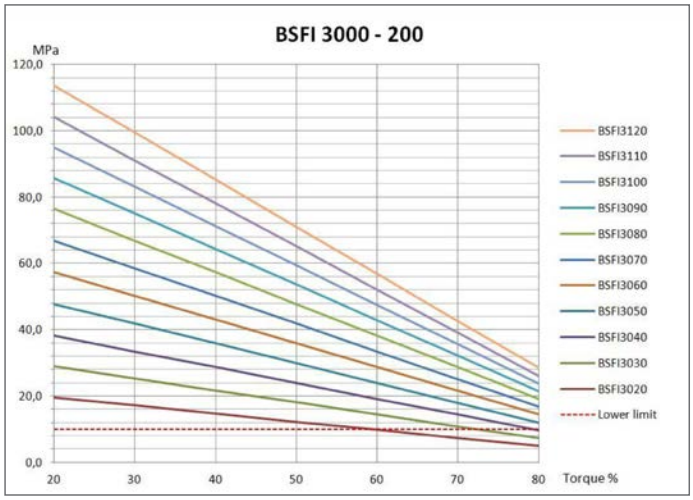
BSFI 200 Series:



BSFI 300 Series:

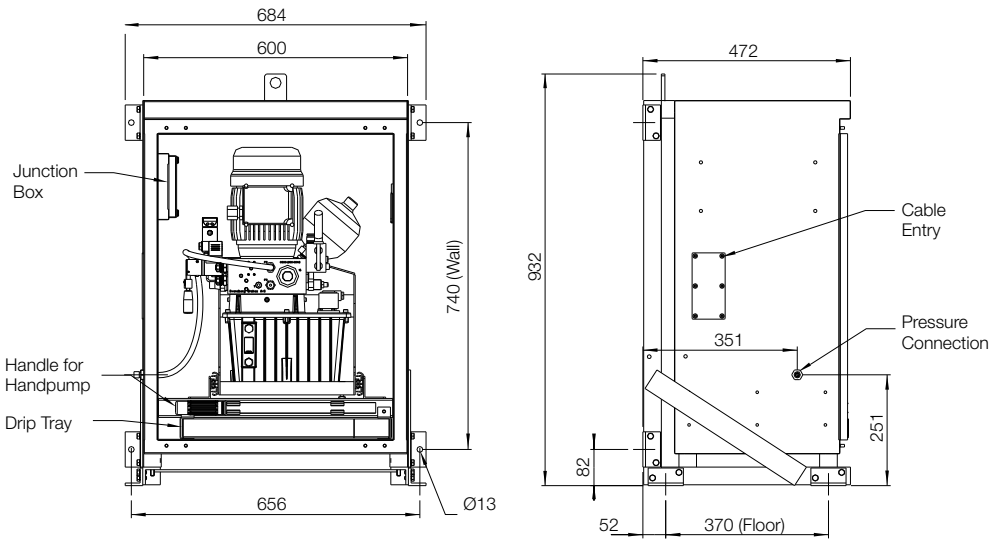


BSFI 3000 Series:



SELECTION SHEET – 2 STAGE HYDRAULIC POWER UNIT

Dimensions (600x800x400mm) (WxHxD)



HPU Selection Sheet

Version (select one)			**Accesories (select one)**
Premium (dual return)			Unit mounted on slides (default)
Basic (single return)			Unit fixed on bracket
Motor (AC 50 Hz/60Hz) TEFC =Fan cooled TENC = Non Ventilated	**(Select one)** TENV	TEFC	**Door mounting (select one)** Left side mounted (default)
1x230V 50 Hz / 1x230V 60 Hz	–		Right side mounted
3x400V 50 Hz / 3x480V 60 Hz			**Cabinet accesories**
3x500V 50 Hz / 3x575V 60 Hz	–		Cam lock with double bit (default)
3x690V 50 Hz / 6x690V 60 Hz	–		Pad-Lockable swing handle
Coil voltage (select one)	AC	DC	Flat cabinet (no sun roof)(default)
12 VDC	–		Dust cover / sun roof 30°
24 VDC	–		**Pressure connection entry (select one)**
48 VAC / VDC			Left side mounted (default)
110 VAC		–	Right side mounted
230 VAC		–	Bottom (left) mounted
Pressure switch (select one)			**Pressure connection type (select one)**
Electrical (IFM) (Port P1)			JIC connection (default)
Mechanical (Port 40 & 42)			Ermeto connection (10L)

Hydraulic / brake parameters:

Brake series / size: _____

Type of brake (Mono / Dual) _____

Number of brakes: _____ pcs

Braking torque M_T% (30-70%):(% of 100% torque) _____ %

Braking time Δt (5-25sec): (2-stage time) _____ Sec

Standard (if no values given): M_T% =50% & Δt =10 sec

Customer Name / Project:

Other Information:

Name & Date:

Technical Specifications

Motor standard
IEC – TEFC (fan cooled)
IEC – TENV (non ventilated)

Available motor voltages
AC 50Hz / 60 Hz
1 x 230V
3 x 400V / 480V
3 x 500V / 575V
3 x 690V / 690V

All AC motors have voltage tolerance ± 10%
Power consumption:
0.75kW (50Hz)
0.90KW (60Hz)

Available Coil Voltages
DC: 12V, 24V, 48V, 110V
AC: 110V, 230V

Power consumption: 19W (one coil)

Oil Tank Size
6 liter / 1.58 gallon (US) / 1.32 gallon (imperial)

Hand Pump
Inclusive

Pressure Switch
Electronic or Mechanical

Cabinet / Enclosure
Stainless steel (1.4305 / AISI 304) incl. junction box

Protection class IP66
Protection class for electrical components IP55

Internal wiring according to IEC EN 60204-1

Mounted on suspension bracket with dampers and lifting point.
Drip tray to take spills.
Slides for easy maintenance (optional).

Ambient Temperature Limits
-20°C to +50°C /
-4°F to +122°F
The hydraulic fluid must match temperature level

Altitude
Below 1000 MASL

Weight
Approx.: 100kg / 220lb
(without oil)

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Gearing & Specialty Components

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Engine Braking Systems

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