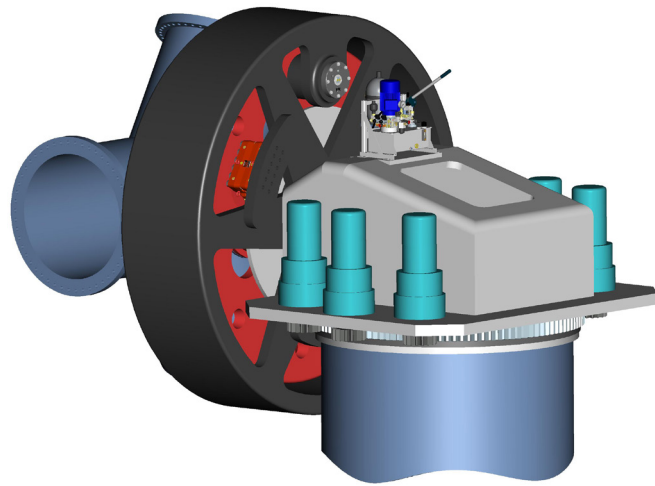


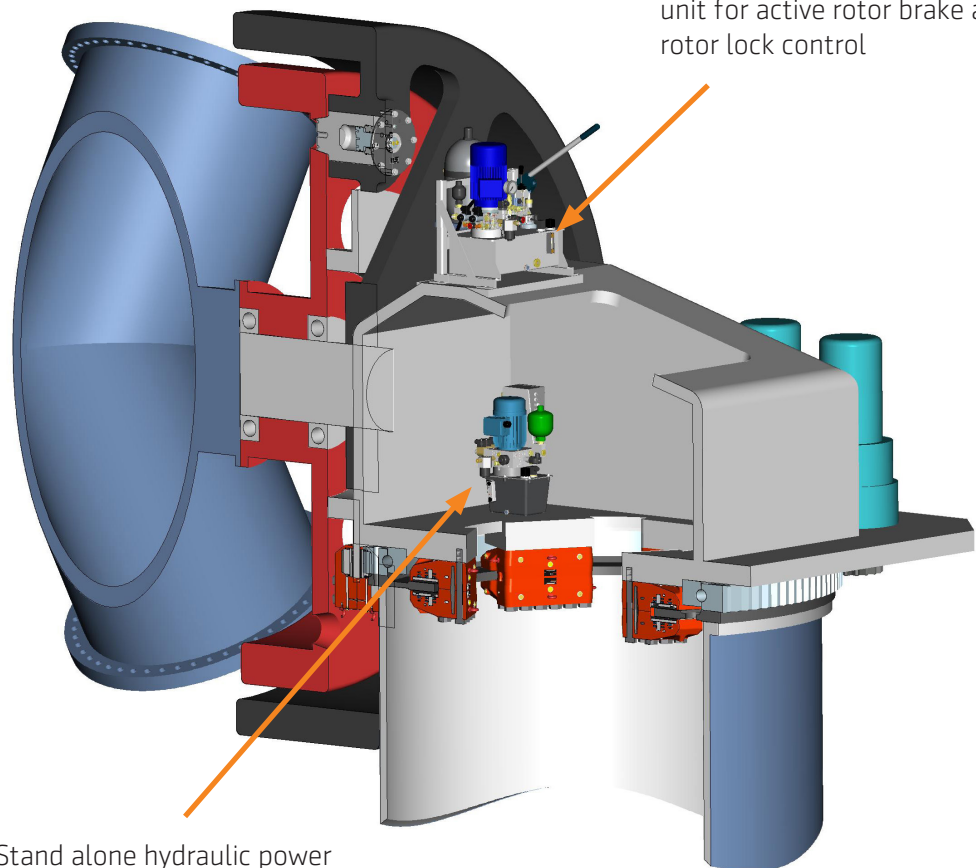
SVENDBORG BRAKES RANGE

Svendborg Brakes is the global market leader in intelligent braking solutions. This is why.

Example for a DIRECT Drive Wind Turbine



Combined hydraulic power unit for active rotor brake and rotor lock control



Stand alone hydraulic power unit for yaw brake control

Example for a DIRECT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The System pressure can be released manually by shut-off cock or manual override of the valves. A High pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. A Certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for active rotor brakes and rotor lock control

1010-0124-8XX

GENERAL FEATURES:

- compact and cost efficient design mounted on 20 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR BRAKE CIRCUIT:

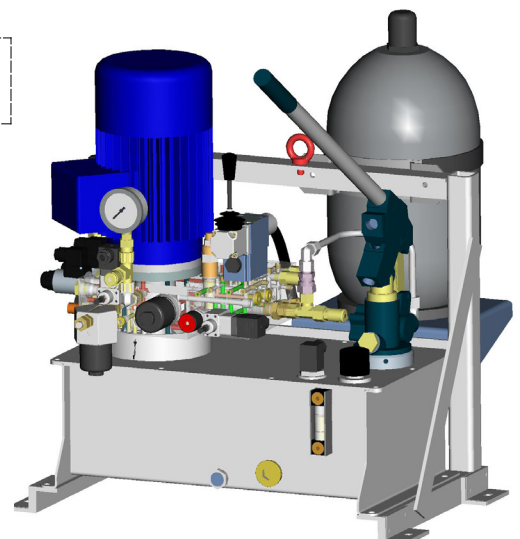
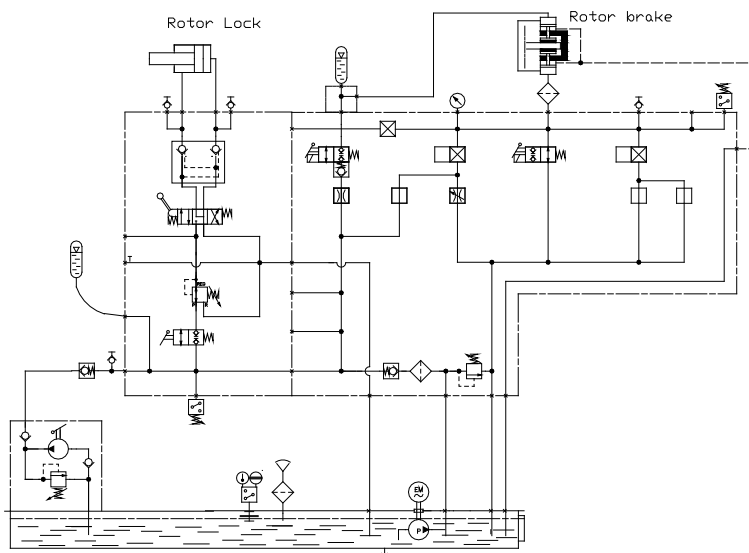
- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control
- flushing function with filter in return line

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V electrical motor
- 60Hz
- Handpump
- pressure gauge for visual inspection

ROTOR LOCK CIRCUIT:

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- 'cylinder holding function' included



Functions:

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The System pressure can be released manually by cock or a manual override of the valves. A High pressure filter between the pump and the system ensures cleanliness of the hydraulic system. A Certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
 -)160 bar for holding function
 -)30 bar for slewing
 -)0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

Stand-alone hydraulic power unit for yaw brakes control

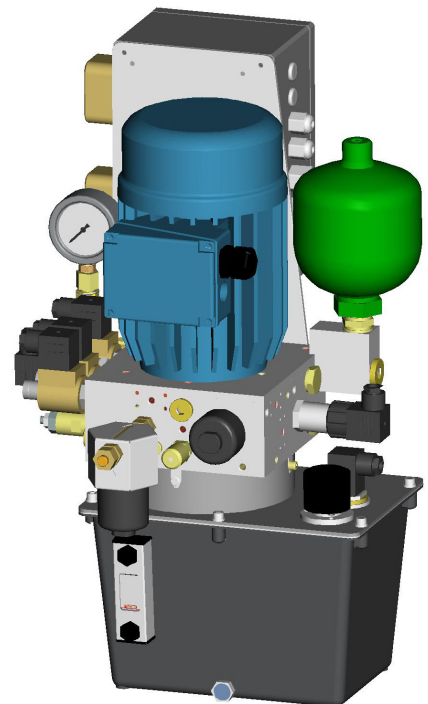
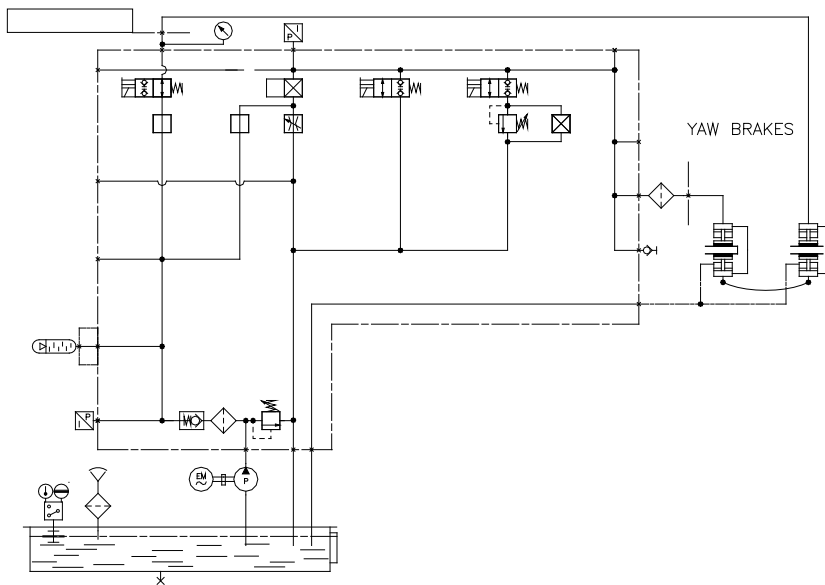
1010-0084-8XX

GENERAL FEATURES:

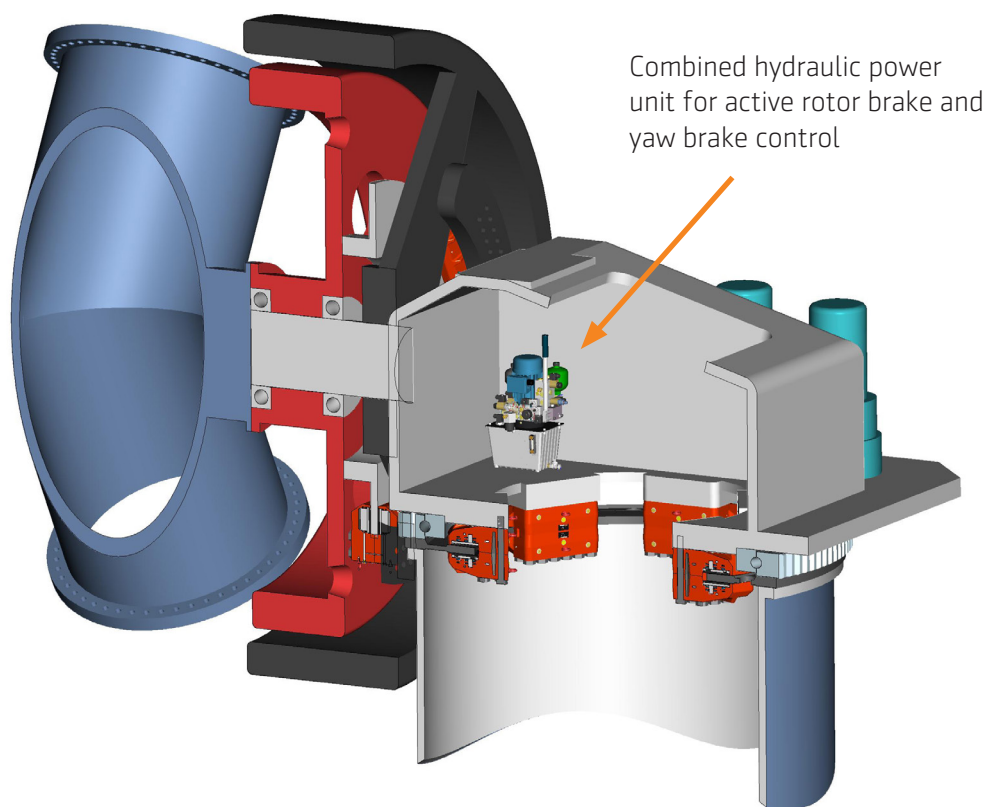
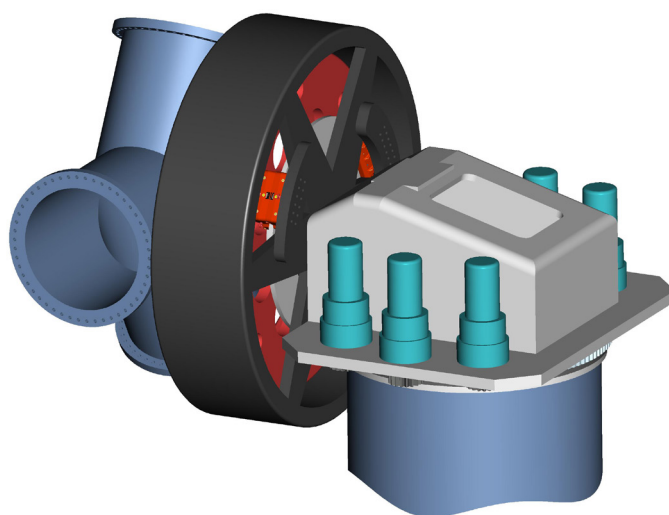
- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump



Example for a DIRECT Drive Wind Turbine



Example for a DIRECT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for active rotor brakes of BSAB series and yaw brake control

1010-0099-8XX

TYPICAL APPLICATION:

-hydraulic Power pack for gearless turbines.

GENERAL FEATURES:

- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

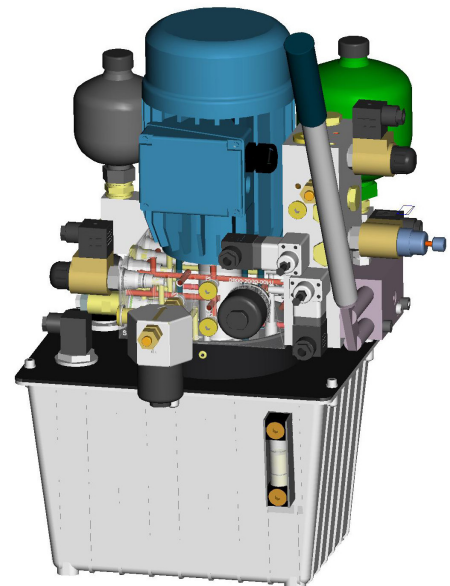
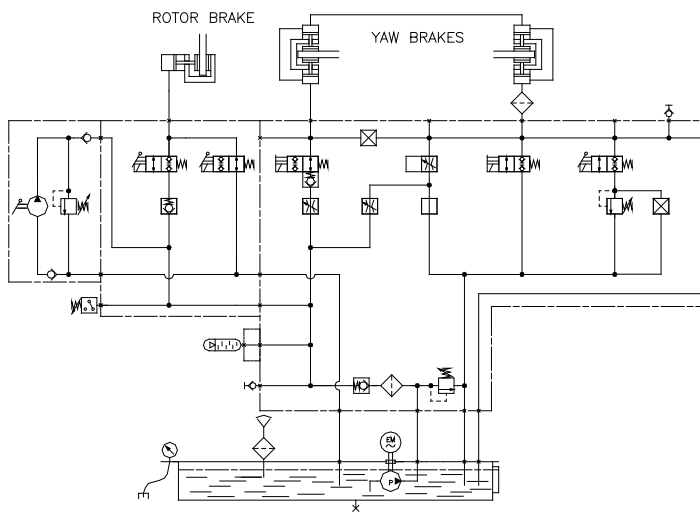
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

ROTOR BRAKE CIRCUIT:

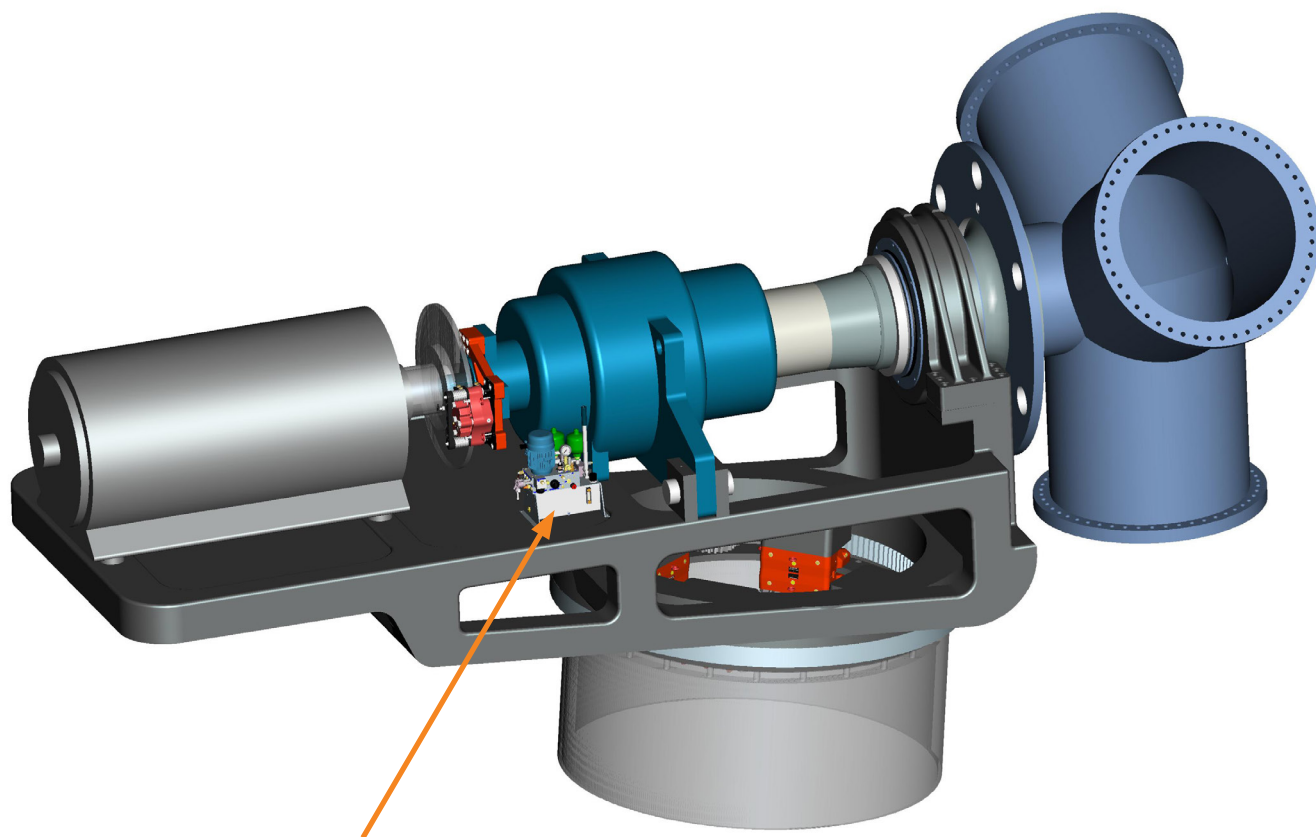
- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
 -)160 bar for holding function
 -)30 bar for yaw operation
 -)0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control



Example for a CONVENTIONAL Wind Turbine



Combined hydraulic power unit for
active rotor brake and yaw brake
control

Example for a CONVENTIONAL Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for active rotor brakes and yaw brake control

1010-0139-8XX

GENERAL FEATURES:

- compact and cost efficient design mounted on 10 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR BRAKE CIRCUIT:

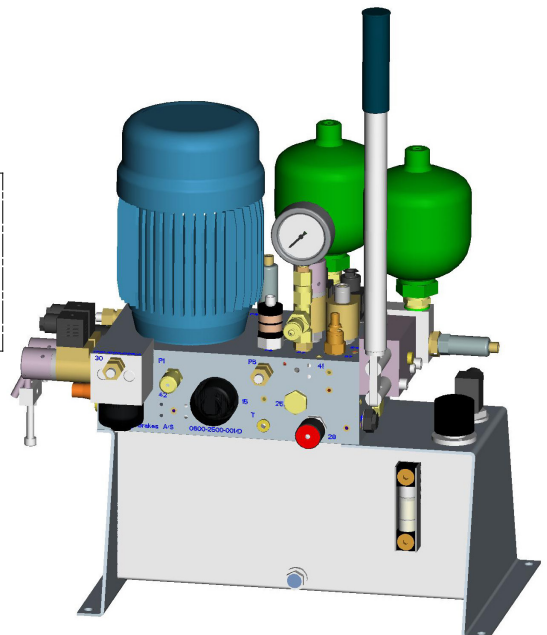
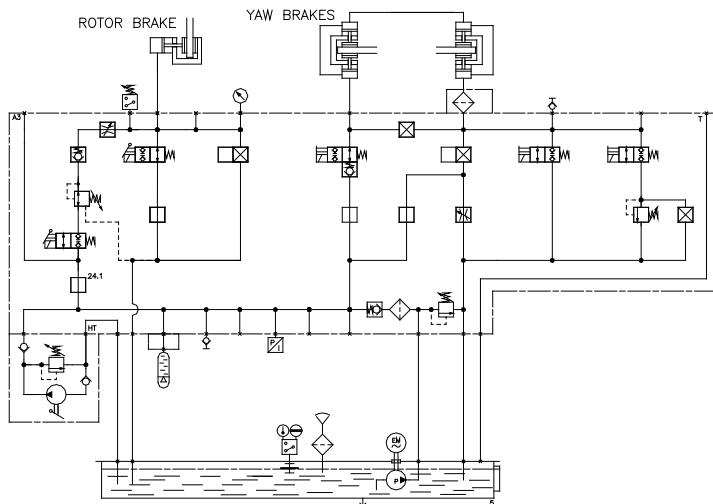
- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control

OPTIONAL FEATURES:

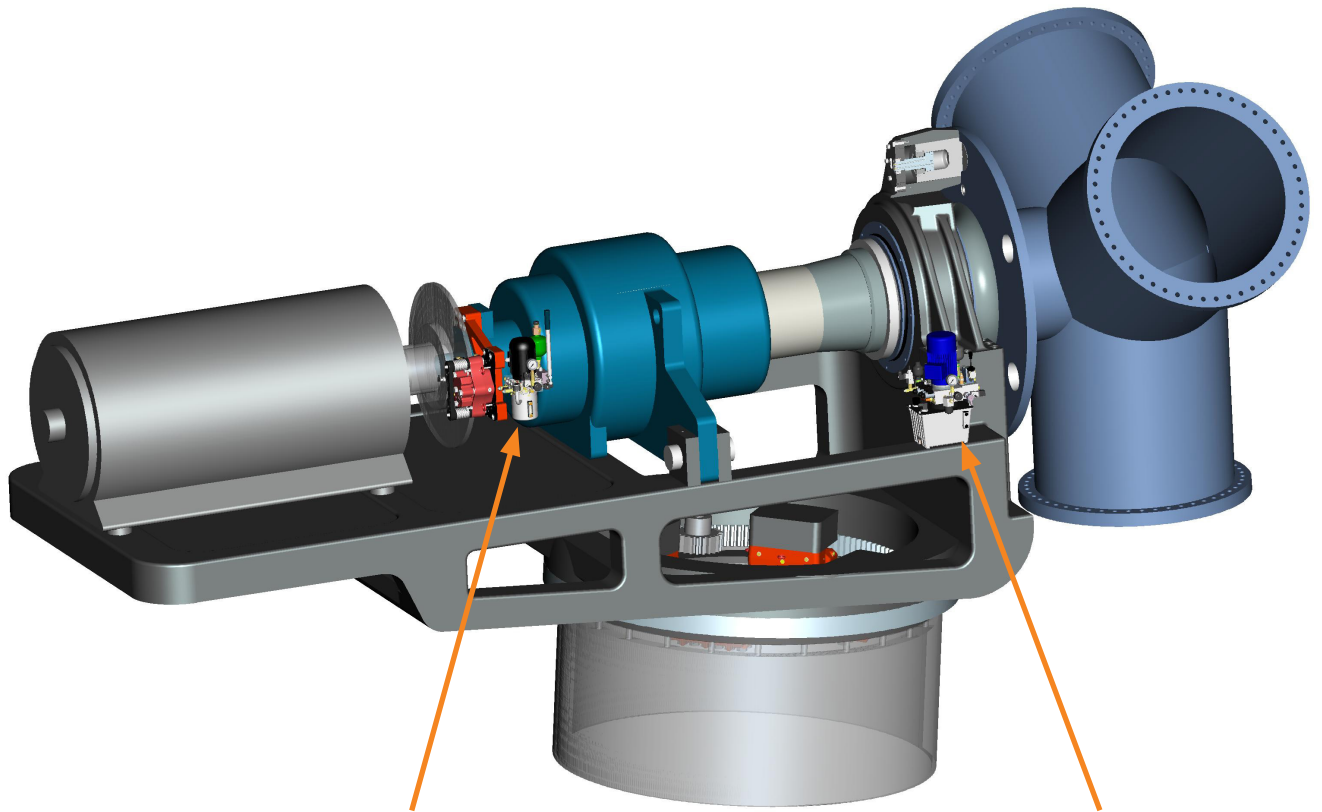
- UL approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
 -)160 bar for holding function
 -)30 bar for yaw operation
 -)0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control



Example for a CONVENTIONAL Wind Turbine



Stand alone hydraulic power unit for active rotor brake control

Combined hydraulic power unit for yaw brake and rotor lock control

Example for a CONVENTIONAL Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures cleanliness of hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for yaw brake and rotor lock control

1010-0124-802

GENERAL FEATURES:

- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR LOCK CIRCUIT:

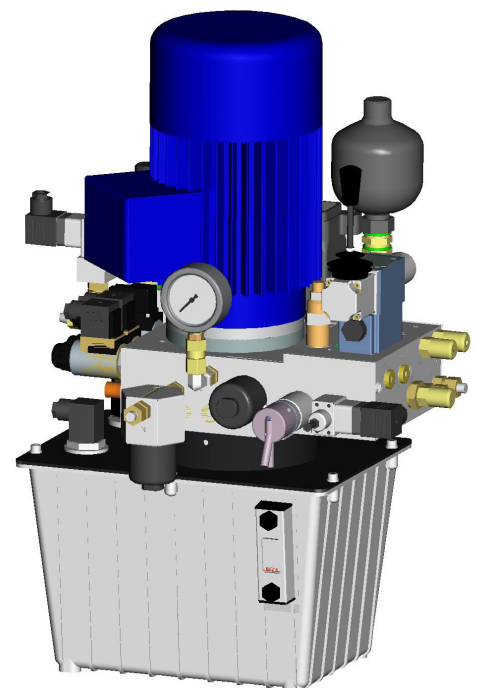
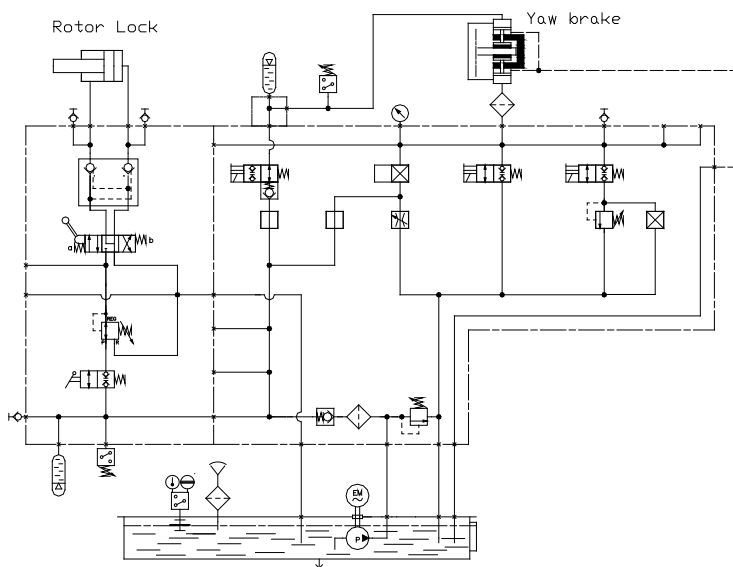
- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- 'cylinder holding function' included

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- handpump
- pressure gauge for visual inspection

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
 -)160 bar for holding function
 -)30 bar for yaw operation
 -)0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control



Example for a CONVENTIONAL Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Stand-alone hydraulic power unit for active rotor brakes (on hss)

1010-006X-8XX

GENERAL FEATURES:

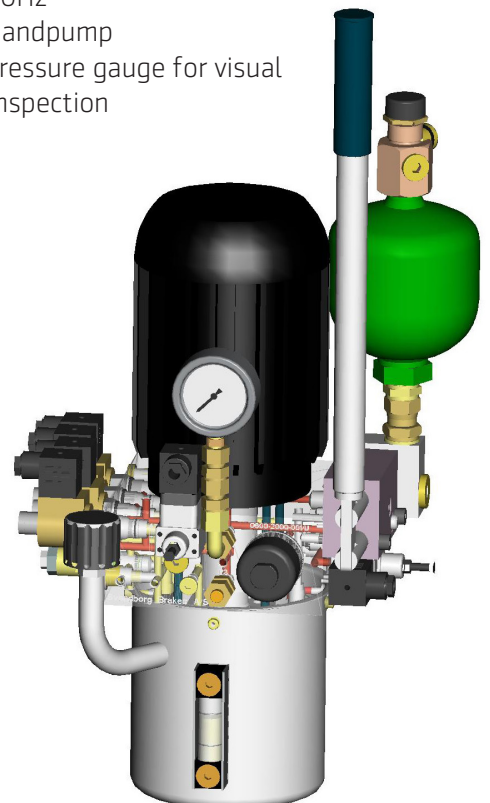
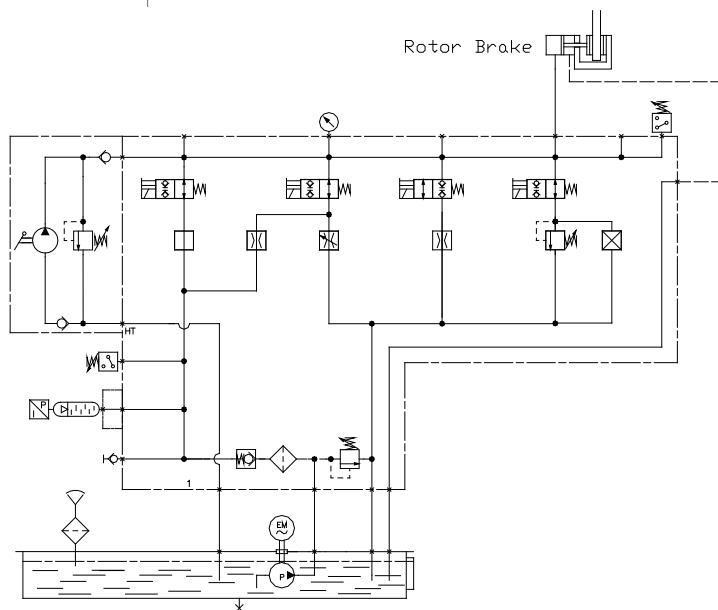
- compact and cost efficient design mounted on 3 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR BRAKE CIRCUIT

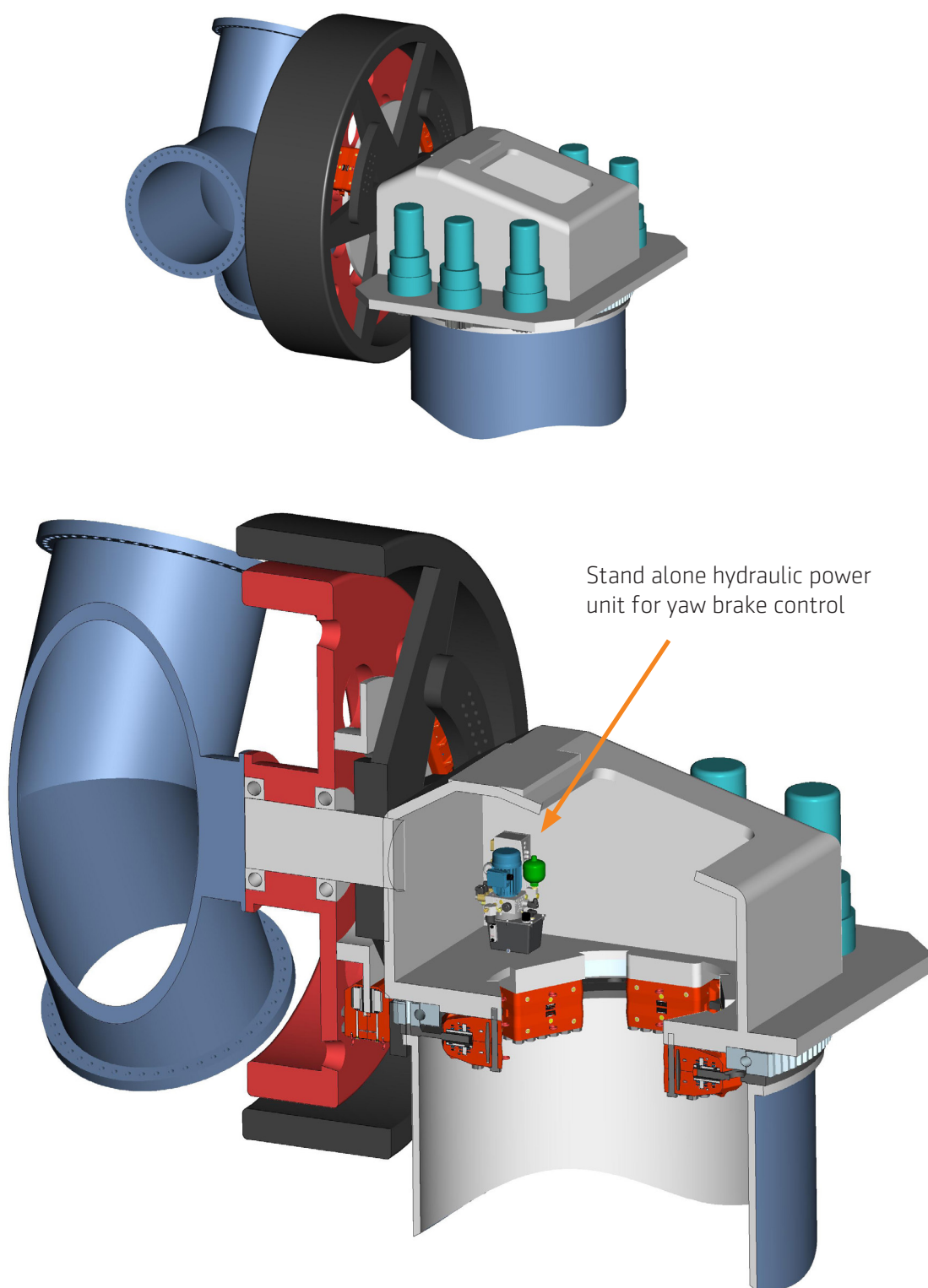
- fail safe brake activation or idling function in case of power loss
- 2 modes of brake activation, with and without delay
- 2 step braking torque, i.e. reduced torque for braking, full torque for holding function
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection



Example for a DIRECT Drive Wind Turbine



Example for a DIRECT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on the system accumulator for checking the nitrogen pre-charge.

YAW BRAKE CIRCUIT

-yaw brakes with 3 pressure levels, i.e.
) 160 bar for holding function
) 30 bar for yaw operation
) 0 bar for cable loop unwinding operation
 -flushing function with filter in return line
 -24h / 7 days pressure holding capacity
 -pressure switch or transmitter for brake status control

Stand-alone hydraulic power unit for yaw brakes control

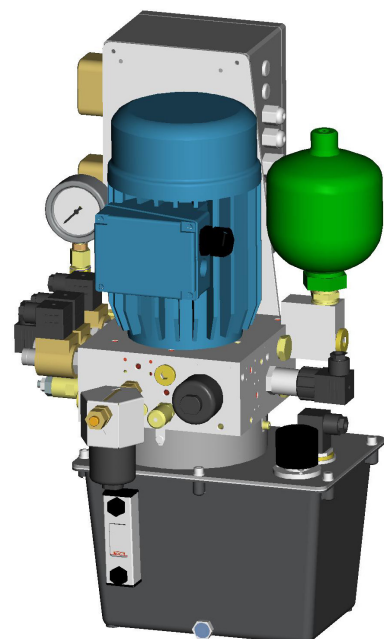
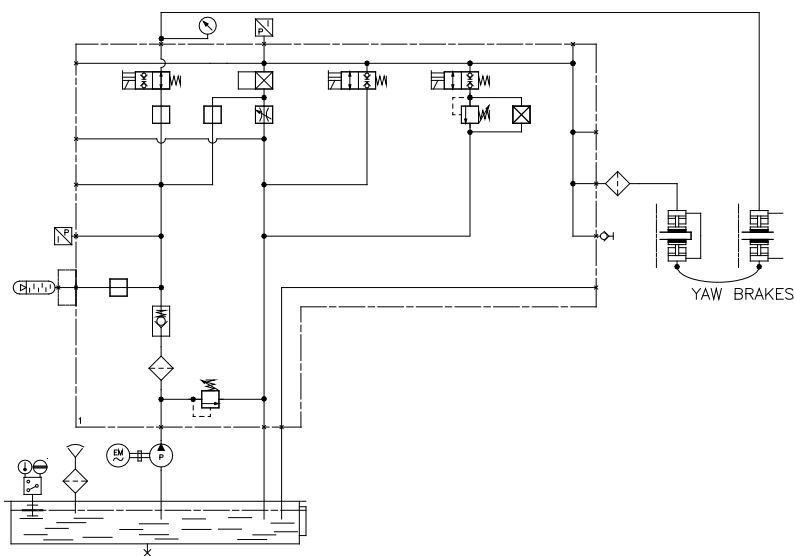
1010-0084-8XX

GENERAL FEATURES:

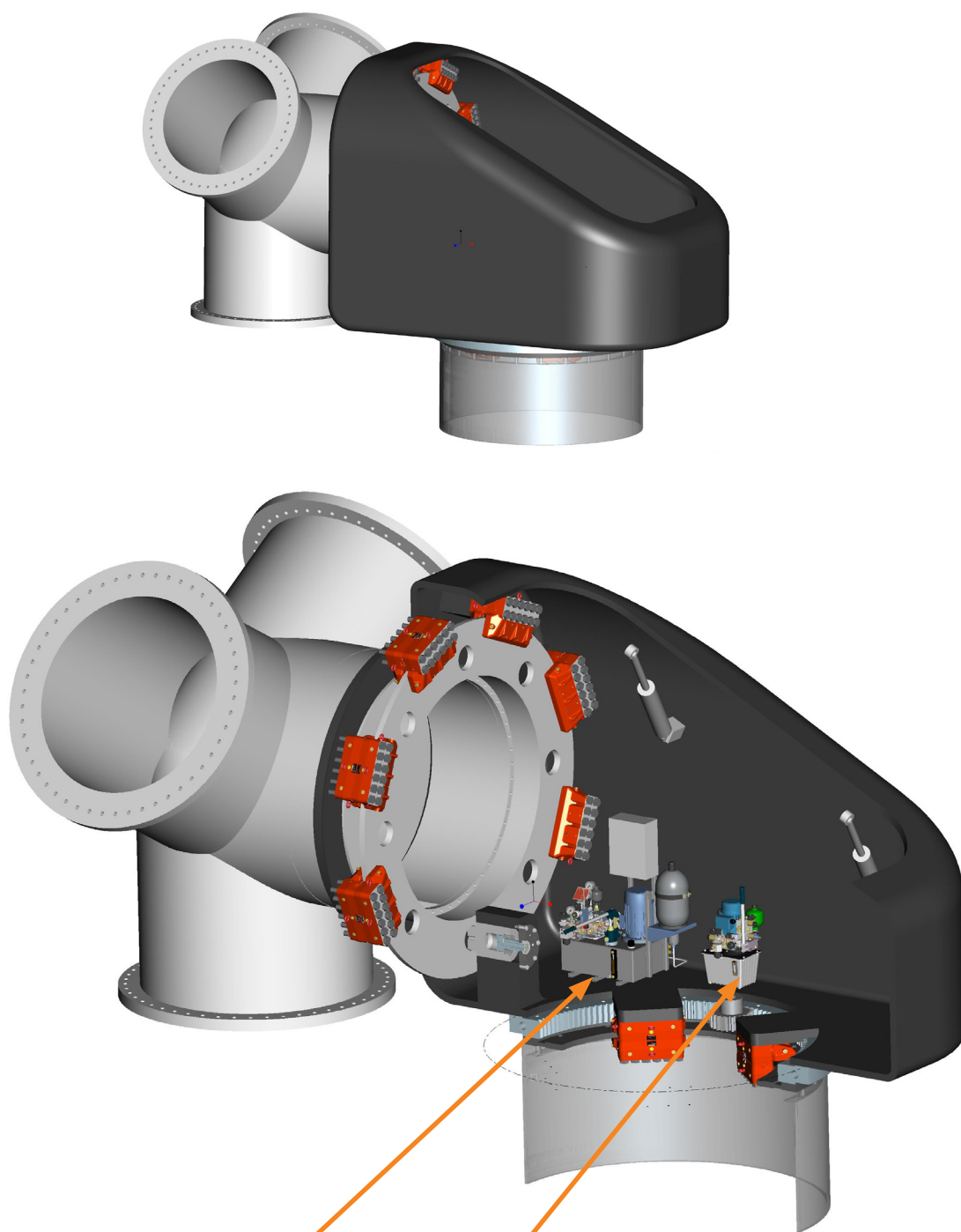
- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection



Example for a COMPACT Drive Wind Turbine



Combined hydraulic power unit for rotor lock and roof hatch control

Combined hydraulic power unit for yaw brake and rotor brake control

Example for a COMPACT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gear-pump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures.

Combined hydraulic power unit for activating rotor locks and roof hatch control

1110-0002-8XX

TYPICAL APPLICATION:

-Service hydraulic for multi-megawatt turbines

GENERAL FEATURES:

- compact and cost efficient design mounted on 25 liter tank
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

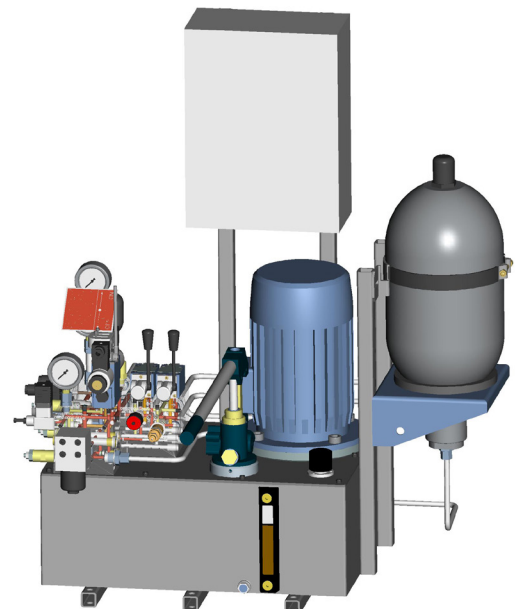
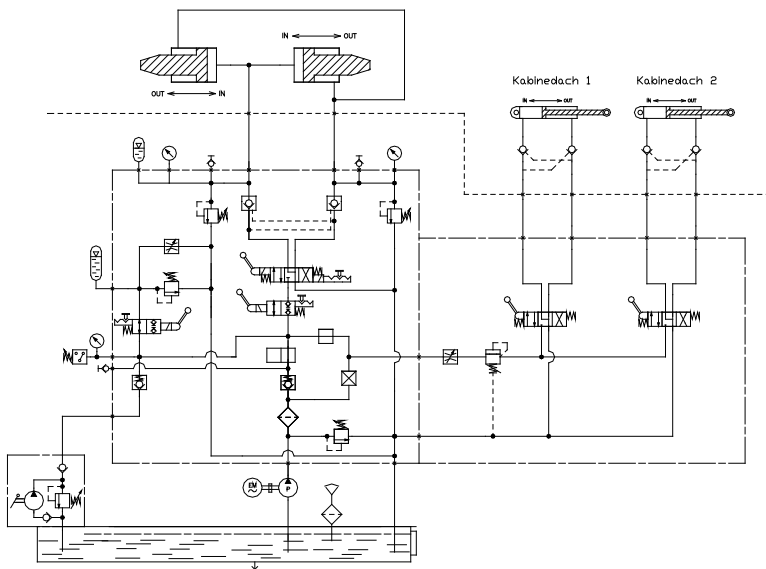
- UL-approved electrical components
- drip pan
- electrical cabinet
- remote control operating panel
- customer specific electrical plugconnection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection

ROTOR LOCK CIRCUIT:

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included
- over pressure protection with pressure relief valves
- manual activation of the valve or via remote control
- ‘Auto-Rolo’ capable

ROOF HATCHES CIRCUIT:

- hyd. cylinder for hatches can be operated separately
- adjustable pressure
- manual activation of the valves or via remote control



Example for a COMPACT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for active rotor brakes of BSAB series and yaw brake control

1010-0099-8XX

GENERAL FEATURES:

- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universe manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR BRAKE CIRCUIT:

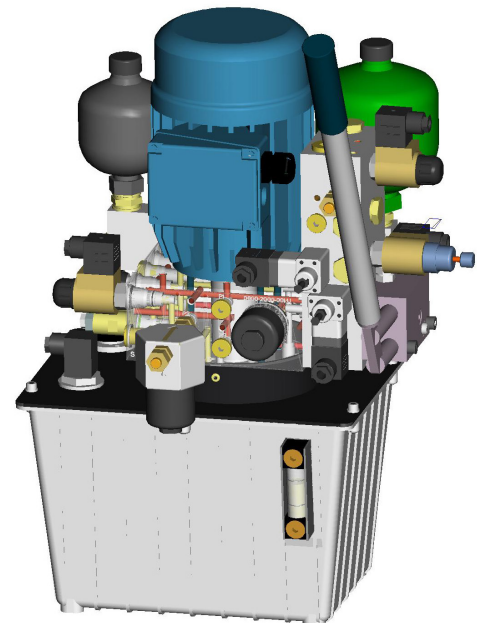
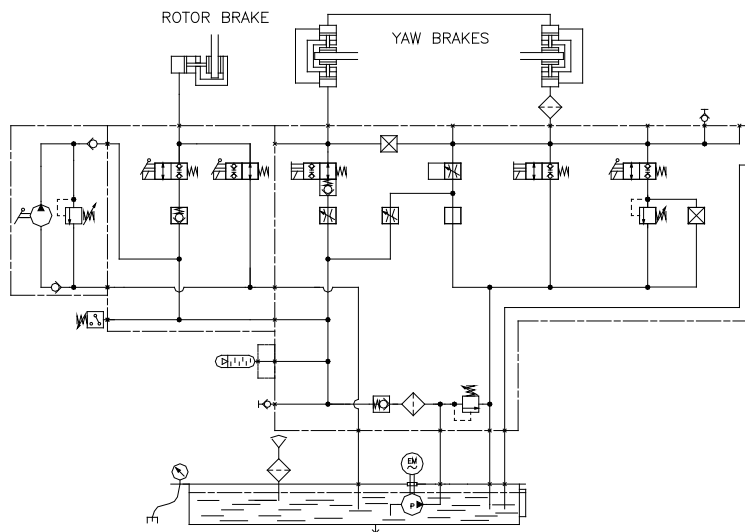
- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

OPTIONAL FEATURES:

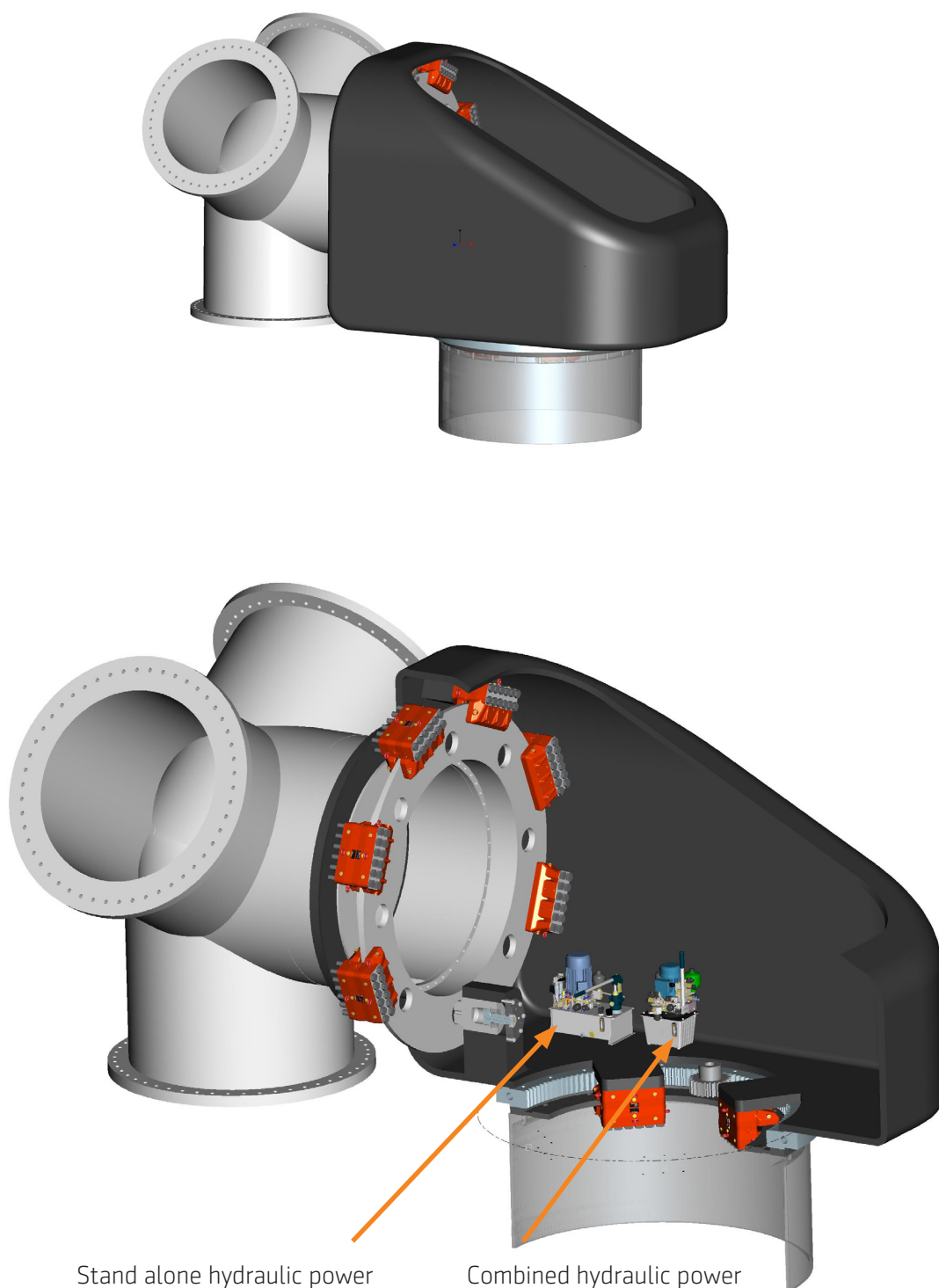
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
 -)160 bar for holding function
 -)30 bar for yaw operation
 -)0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control



Example for a COMPACT Drive Wind Turbine



Stand alone hydraulic power unit for active rotor lock control

Combined hydraulic power unit for yaw brake and rotor brake control

Example for a COMPACT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for active rotor brakes of BSAB series and yaw brake control

1010-0099-8XX

GENERAL FEATURES:

- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR BRAKE CIRCUIT:

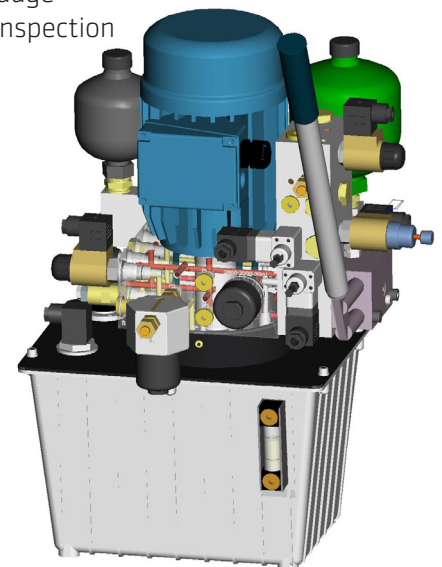
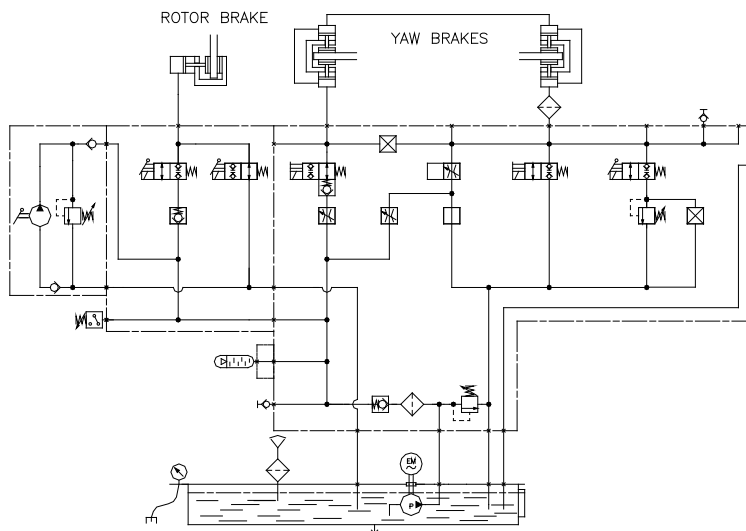
- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
 -)160 bar for holding function
 -)30 bar for yaw operation
 -)0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control



Example for a COMPACT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures.

ROTOR LOCK CIRCUIT:

- control valve is protected by additional 2/2 valve
- 24h / 7 days pressure holding capacity
- 'cylinder holding function' included
- manual activation of the valve or via remote control

Stand-alone hydraulic power unit for rotor lock control

1110-0012-8XX

TYPICAL APPLICATION:

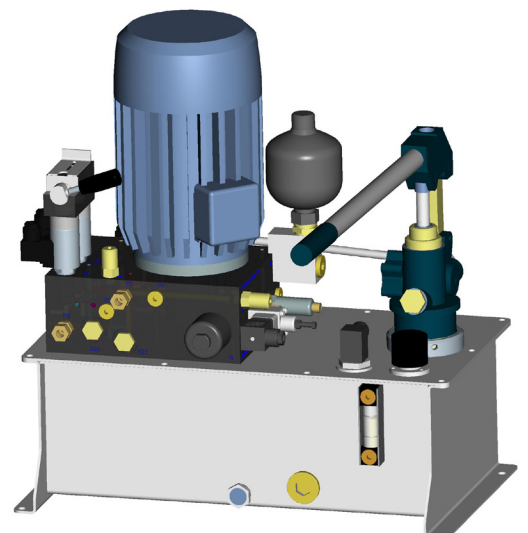
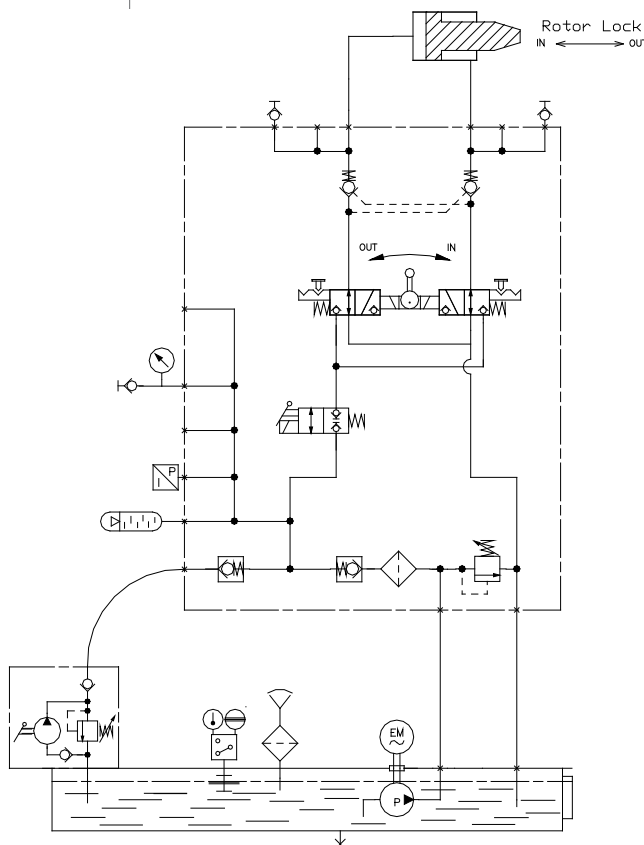
- Service hydraulic for multi-megawatt turbines

GENERAL FEATURES:

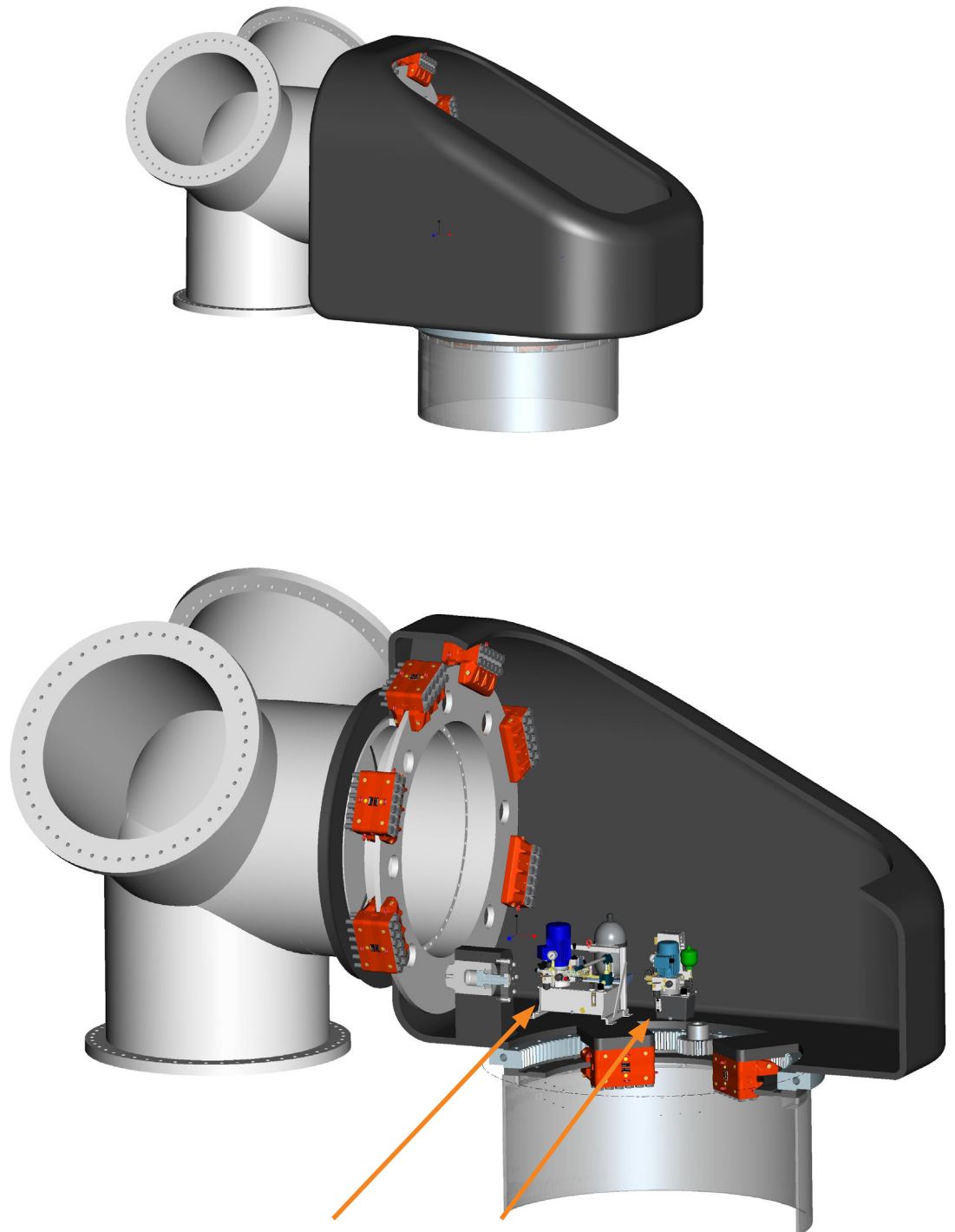
- compact and cost efficient design mounted on 20 liter tank
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- remote control operating panel
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection



Example for a COMPACT Drive Wind Turbine



Combined hydraulic power unit for active rotor lock and rotor brake control

Stand alone hydraulic power unit for yaw brake control

Example for a COMPACT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on the system accumulator for checking the nitrogen pre-charge.

YAW BRAKE CIRCUIT:

-yaw brakes with 3 pressure levels, i.e.
) 160 bar for holding function
) 30 bar for yaw operation
) 0 bar for cable loop unwinding operation
 -flushing function with filter in return line
 -24h / 7 days pressure holding capacity
 -pressure switch or transmitter for brake status control

Stand-alone hydraulic power unit for yaw brakes control

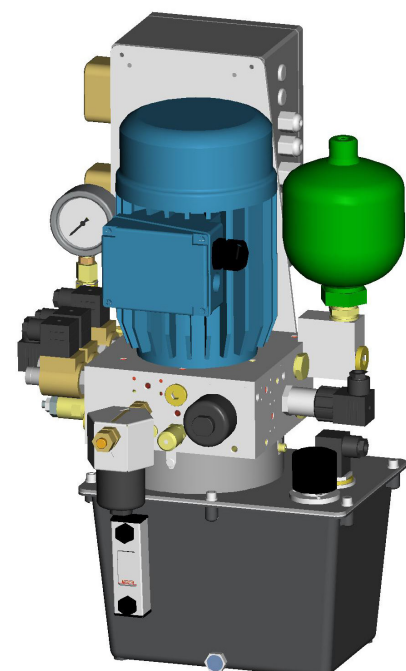
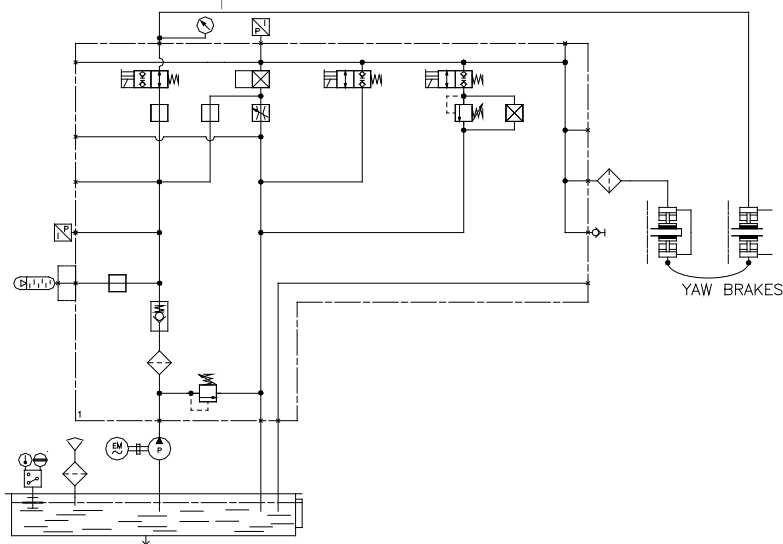
1010-0084-8XX

GENERAL FEATURES:

- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection



Example for a COMPACT Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. Pump feeds the system accumulator, controlled by pressure switch or transmitter. System pressure can be released manually by cock or manual override on valves. High pressure filter between pump and system ensures cleanliness of hyd. system. Certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

Combined hydraulic power unit for active rotor brakes and rotor lock control

1010-0124-804

GENERAL FEATURES:

- compact and cost efficient design mounted on 20 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universe manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

ROTOR BRAKE CIRCUIT:

- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control
- flushing function with filter in return line

OPTIONAL FEATURES:

- UL el. components
- drip pan
- el. cabinet
- customer specific el. plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- manometer for visual inspection

ROTOR LOCK CIRCUIT:

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- 'cylinder holding function' included

