xylem
Let's Solve Water

Technical Specification

884318_9.0

N3231, N3306, N3312, N3356, N3400, N3531, N3800

Large Submersible Pumps

FLYGT
a xylem brand

Table of Contents

1 Product Description

1.1 Product overview

Pump	Description
N3306, N3400	A submersible pump for efficient pumping of clean water, surface water, and wastewater containing solids or long-fibered material. The pump is designed for sustained high efficiency.
N3231, N3312, N3356, N3531, N3800	A submersible pump for efficient pumping of clean water, surface water, and wastewater containing solids or long-fibered material. The pump is designed for sustained high efficiency. For abrasive media, Hard-Iron™ is required.

Installations

Pump	Installation			
	P	S	T	Z
N3231	X	X	X	X
N3306	X	X	X	X
N3312	X	X	X	X
N3356	X		X	X
N3400	X		X	X
N3531	X		X	X
N3800	X		X	X

Accessories

Mechanical accessories which are available include the following:

- Cable handling systems
- Lifting equipment

Electrical accessories which are available include the following:

- Pump controller
- Control panels
- Starters
- MAS and other monitoring relays

See your local sales and service representative for further information.

Options

The following options are available:

- Zinc anodes for corrosion protection
- Special coating system (with epoxy base coat) for demanding environments
- Power monitoring
- Monitoring options for temperature, vibration and water in the oil housing

1.2 Materials

Impeller and insert ring

Table 1: Available impeller materials

Pump	Impeller material		
	Cast iron	Duplex stainless steel	Hard-Iron™
N3231	X	X	X

Pump	Impeller material		
	Cast iron	Duplex stainless steel	Hard-Iron™
N3306	X		X
N3312	X	X	X
N3356	X	X	X
N3400	X		X
N3531	X	X	X
N3800	X	X	X

Table 2: Insert ring—impeller combinations: N3231, N3306, N3312, N3356, N3400

Impeller	Insert ring	
	Cast iron	Hard-Iron™
Cast iron	X	
Duplex stainless steel	X	
Hard-Iron™		X

Table 3: Insert ring—impeller combinations: N3531, N3800

Impeller	Insert ring		
	Cast iron	Duplex stainless steel	Hard-Iron™
Cast iron	X		
Duplex stainless steel		X	
Hard-Iron™			X

Table 4: Description of materials

Material	Internal material number	Standard	
		Europe	USA
Cast iron	M0314.0125.00	EN 1561 No. JL 1040	ASTM-A 48 – No 35 B
Duplex stainless steel	M0344.2324.12	EN 10283 No. 1.4474	ASTM (CD-4MCuN)
Hard-Iron™	M0314.0466	EN 12513 No. JN 3049	ASTM-A 532 – Alloy III A

Pump housing

Table 5: N3231, N3306, N3312, N3356, N3400, N3531, N3800

Material	Internal material number	Standard	
		Europe	USA
Cast iron	M0314.0125.00	EN 1561 No. JL 1040	ASTM-A 48 – No 35 B

Mechanical face seals

The inner seal is always corrosion resistant cemented tungsten carbide (WCCR). The outer seal can be either corrosion resistant cemented tungsten carbide (WCCR), or corrosion resistant silicon carbide (RSiC).

Seal	Material, rotating ring	Material, stationary ring
Inner	Corrosion resistant cemented tungsten carbide (WCCR)	WCCR

Seal	Material, rotating ring	Material, stationary ring
Outer	WCCR	WCCR
	Corrosion resistant silicon carbide (RSiC)	RSiC

Drive unit shaft

Material	Internal material number	Standard	
		Europe	USA
Martensitic stainless steel	M0344.2321.03	EN 10088-3 No. 1.4057	ASTM/AISI 431
Duplex stainless steel	M0344.2324.02	EN 10088-3 No. 1.4460	ASTM/AISI 329

O-rings

Material	Internal material number	Standard	
		Europe	USA
Nitrile rubber 70º IRH	M0516.2637.04	—	—

Coating system

The following table describes the two variants of paint systems available for the pump, Standard and Special. The choice of coating system depends upon the service environment.

Coating system	Basecoat	Topcoat	Total dry film thickness
Standard	Acrylic (waterborne) or alkyd (solventborne)	Oxirane ester, 2–pack	120–350 µm
Special (option)	Waterborne primer	Oxirane ester, 2–pack	350–700 µm
Special (option): For drinking water, seawater, or high temperature applications	Solvent-free 2-component epoxy	Solvent-free 2-component epoxy	400–600 µm

See the Xylem internal standard M0700.00.0001 (Coating Selection Guidelines).

1.3 Mounting-related data

Depth of immersion

The maximum depth of immersion is 20 m (65 ft).

Weight

See the dimensional drawing for pump weights.

Cables

Table 6: N3231, N3306, N3356

SUBCAB™	Maximum voltage 600–1000 V, intended for drive units up to 1 kV. Consult Xylem for the cable dimensions.

Table 7: N3312, N3400, N3531, N3800

SUBCAB™	Maximum voltage 600–1000 V, intended for drive units up to 1 kV. Consult Xylem for the cable dimensions.
TSCGEWCOEUS	For use with medium voltage (1.2–6.6 kV) drive units. Consult Xylem for the cable dimensions.

Engineering data

Performance curves, motor data, and dimensional drawings are available from the local sales and service representative.

Impeller throughlet

See the dimensional drawing.

1.4 Drive units

N3231

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	605	615	15
	665	675	15
Up to 1 kV	705	715	15
	735	745	15
	765	775	15
Up to 1 kV	706	716	10
	736	746	10
	766	776	10

N3306

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	605	615	15
	665	675	15
Up to 1 kV	705	715	15
	735	745	15
	765	775	15
Up to 1 kV	706	716	10
	736	746	10
	766	776	10

N3312

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	705	715	15
	735	745	15
	765	775	15
Up to 1 kV	706	716	10
	736	746	10
	766	776	10
Up to 1 kV	835	845 (2)	15
	865	875 (2)	15
Up to 1 kV	836	846 (2)	10
	866	876 (2)	10
1.2–6.6 kV	863	873 (1)	10
	883	893 (1)	10

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
(1) FM: 2.3–4.16 kV (2) FM: Up to 600 V			

N3356

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	605	615	15
	665	675	15
Up to 1 kV	705	715	15
	735	745	15
	765	775	15
Up to 1 kV	706	716	10
	736	746	10
	766	776	10

N3400

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	705	715	15
	735	745	15
	765	775	15
Up to 1 kV	706	716	10
	736	746	10
	766	776	10
Up to 1 kV	805	815 (2)	15
	835	845 (2)	15
	865	875 (2)	15
Up to 1 kV	806	816 (2)	10
	836	846 (2)	10
	866	876 (2)	10
1.2–6.6 kV	863	873 (1)	10
	883	893 (1)	10
(1) FM: 2.3–4.16 kV (2) FM: Up to 600 V			

N3531

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	705	715	15
	735	745	15
	765	775	15
Up to 1 kV	706	716	10
	736	746	10
	766	776	10
Up to 1 kV	805	815 (2)	15

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
	835	845 (2)	15
	865	875 (2)	15
Up to 1 kV	806	816 (2)	10
	836	846 (2)	10
	866	876 (2)	10
Up to 1 kV	905	915	10
	935	945	10
	965	975	10
Up to 1 kV	906	916	10
	936	946	10
	966	976	10
1.2–6.6 kV	863	873 (1)	10
	883	893 (1)	10
1.2–6.6 kV	950	960	10
	985	995	10
	988	998	10
1.2–6.6 kV	951	961	10
	986	996	10
	987	997	10
(1) FM: 2.3–4.16 kV (2) FM: Up to 600 V			

N3800

Voltage range	Standard drive units	Ex-proof drive units	Maximum number of starts per hour
Up to 1 kV	905	915	10
	935	945	10
	965	975	10
Up to 1 kV	906	916	10
	936	946	10
	966	976	10
1.2–6.6 kV	950	960	10
	985	995	10
	988	998	10
1.2–6.6 kV	951	961	10
	986	996	10
	987	997	10

2 Operational Data

2.1 Application limits

Data	Description
Liquid temperature	Maximum 40°C (104°F)
pH of the pumped media	5.5–14
Liquid density	1100 kg/m³ (9.2 lb for each US gal) maximum
Depth of immersion	Maximum 20 m (65 ft)

2.2 Motor data

Motor characteristics

Feature	Description
Frequency	50 Hz or 60 Hz
Stator insulation class	H (180°C [356°F])
Voltage variation	Max. +/- 10%
Voltage imbalance between the phases	2%

Motor encapsulation

Motor encapsulation is in accordance with IP68.

2.3 Monitoring systems

The pump is designed to be used with the following monitoring systems:

- MAS 801
- MAS 711

2.3.1 Comparison of MAS 801 and MAS 711

Drive units up to 1 kV

Description		MAS 801	MAS 711
Signal cable		Built into the motor cable.	Separate signal cable(1), with 12 or 24 leads, is needed.
PEM		Standard	N/A
Pump current, 1 phase		Standard	A current transformer in the control cabinet is needed.
Pump current, 3 phase		A current transformer in the control cabinet is needed.	A current transformer in the control cabinet is needed.
Power monitoring	PAN 312	Optional. Separate electronic instrument with three current transformers.	
Vibration in three directions	Micro electro mechanical sensor (MEMS) built into PEM	Standard	N/A
Vibration in one direction	VIS 10	N/A	Optional (2)
Leakage in the junction box	Float switch leakage sensor, FLS	Standard	Standard

Description		MAS 801	MAS 711
Stator winding temperature in one phase	Pt100 analog temperature sensor in one stator winding	Standard	Standard
Stator winding temperature Thermal contacts or PTC thermistors	Thermal contacts (3)	Standard	Standard
	PTC thermistors (3)	Optional	Optional
Stator winding temperature in phases 2 and 3	Pt100 analog temperature sensors in two more stator windings	Optional	Optional (2)
Main bearing temperature	Pt100 analog temperature sensor	Standard	Standard
Leakage in the stator housing or inspection chamber	Float switch leakage sensor (FLS)	Standard	Standard
Water in oil: Not applicable for EX drive units, or drive units with internal closed-loop cooling.	Capacitive leakage sensor (CLS)	Optional	Optional (2)
Support bearing temperature	Pt100 analog temperature sensor	Optional	Optional (2)
Pump memory		Included in PEM	Standard
(1) Also known as auxiliary, control, or pilot cable. (2) The signal cable must have 24 leads.			

Drive units 1.2–6.6 kV

Description		MAS 801	MAS 711
Signal cable		Built into the motor cable.	Separate signal cable(1), with 24 leads, is needed.
PEM		Standard	N/A
Pump current, 1 phase		Standard	A current transformer in the control cabinet is needed.
Pump current, 3 phase		A current transformer in the control cabinet is needed.	A current transformer in the control cabinet is needed.
Power monitoring	PAN 312	Optional. Separate electronic instrument with three current transformers.	
Vibration in three directions	Built into PEM	Standard	N/A
Vibration in one direction	VIS 10	N/A	Optional
Leakage in the junction box	Float switch leakage sensor (FLS)	Standard	Standard
Stator winding temperature	PTC thermistors: 3+3 (3)	Standard	Standard
Stator winding temperature in phases 1, 2 and 3	Pt100 analog temperature sensors in each stator winding: 3+3 (3)	Standard	Standard
Main bearing temperature	Pt100 analog temperature sensor	Standard	Standard
Leakage in the stator housing	Float switch leakage sensor (FLS)	Standard	Standard

Description		MAS 801	MAS 711
Water in oil: Not applicable for EX drive units, or drive units with internal closed-loop cooling.	Capacitive leakage sensor (CLS)	Optional	Optional
Support bearing temperature	Pt100 analog temperature sensor	Optional	Optional
Pump memory		Included in PEM	Standard
(1) Also known as auxiliary, control, or pilot cable. (3) 6 total: 3 sensors are connected and 3 are built-in spares.			

Stator winding temperature

MAS 801 and MAS 711 offer the same monitoring configurations for stator winding temperature. They are shown in the following table.

Table 8: Stator winding temperature, monitoring configurations

Drive units	Sensors in coil ends of stator windings	Additional sensors, which are incorporated in the stator windings:	
		Always present	Extra option
Up to 1 kV	One of the following choices: • Standard: 3 thermal contacts • Optional: 3 PTC thermistors	Standard: Pt100 analogue temperature sensor in 1 stator winding	Optional: Pt100 analogue temperature sensors in 2 more stator windings
1.2–6.6 kV	PTC thermistors (3+3) 3 sensors are connected in series, and 3 are built-in reserves.	Pt100 analogue temperature sensors in all 3 stator windings (3+3) Each winding has 1 sensor that is connected, and one sensor that is a built-in reserve.	

2.4 Monitoring with MAS 801

Pumps with the standard MAS 801 equipment are mounted with the following items:

- Thermal contacts or PTC thermistors for stator winding temperature monitoring (3 in series)
- Leakage sensor in the stator housing
- Leakage sensor in the junction box
- Pt100 sensor for main bearing temperature monitoring
- Pt100 sensor for stator winding temperature in one phase
- Vibration in three directions
- Current transformer for pump current and frequency measurement

The following options are possible with MAS 801:

- Pt100 sensors for stator winding temperature measurement in phases 2 and 3
- Pt100 sensor for support bearing temperature measurement
- Leakage sensor in the oil housing (CLS)

Optional monitoring channels by using power analyzer PAN 312

- Three-phase power
- Power factor
- System voltage
- Voltage imbalance

- Pump current
- Current imbalance

2.4.1 System overview

The MAS 801 is a monitoring system that protects the pumps, by using measurements from pump sensors and measurement modules. The system offers considerable functionality for the benefit of different user categories:

- A graphical user interface, the configuration and analysis tool, for computer and HMI
- Local and remote presentation of pump status, key data, and alarms
- Analysis and troubleshooting that is based on graph functions, alarm lists, and black boxes
- Service reminders and reporting
- Configuration of the system and monitoring channels
- Protocols for communication with external automation electronics, SCADA, and cloud applications

The system consists of a central unit a base unit, a pump electronic module, and an HMI.

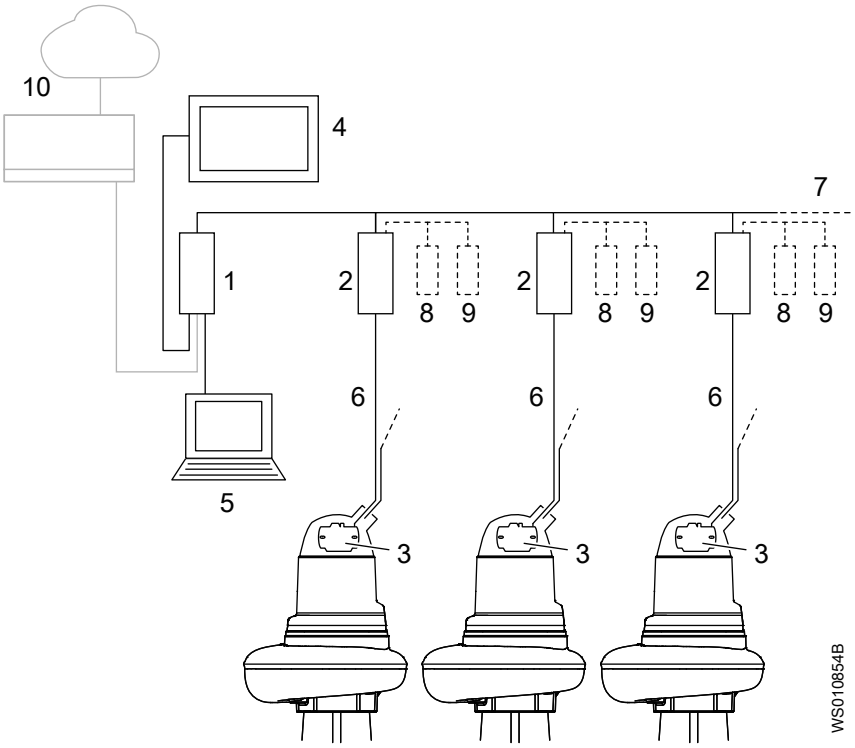

Table 9: Parts

Number	Part	Product name	Description
1	Central unit (CU)	MAS CU 801	The central unit communicates with all base units in the system, up the maximum ten base units. The central unit includes the configuration and analysis tool, embedded webpages, that is used to interact in the system. The central unit is typically installed in an electrical cabinet.
2	Base unit (BU)	MAS BU 811	The base unit communicates data between the pump electronic module and the central unit. If needed, for pump protection, the base unit stops the pump. The base unit is typically installed in an electrical cabinet.

Number	Part	Product name	Description
3	Pump electronic module (PEM)	MAS PEM 811	The pump electronic module communicates with the base unit and contains factory settings, specific to the individual pump. It is connected to the pump sensors and stores measured data. The pump electronic module is mounted in the pump junction box.
4	Human-machine interface (HMI)	FOP 402	The HMI is connected to the central unit and displays the configuration and analysis tool, for user interaction. The HMI is typically front-mounted in an electrical cabinet door.
5	Computer	-	A computer can be connected to the central unit locally or remotely, and displays the configuration and analysis tool, for user interaction.
6	Two-wire communication	-	Bus communication between the pump electronic module and the base unit in a SUBCAB® cable. The bus communication is tolerant to electromagnetic interference.
7	DeviceNet	-	Communication bus connecting the central unit with base units.
8	Power analyzer, optional	PAN 312	Measures power, power factor, current in three phases, voltage in three phases, voltage imbalance, energy
9	Controller SCADA system	-	Not part of the MAS 801 system. MAS 801 uses open protocol for communication with external controller or SCADA systems.

Communication

Measurements and pump information are transmitted over the two wires from each pump electronic module. The data goes through the base unit and further on to the central unit over the DeviceNet bus. This way two equal databases (CU and PEM) of pump information are continually updated securing redundancy and providing different access possibilities.

2.5 Monitoring with MAS 711

With the Flygt MAS 711 monitoring system, the parameters that are tracked can include the following:

- Temperature: main and support bearings, stator windings
- Vibration
- Leakage: in stator housing, junction box, and water into oil chamber
- Power monitoring

Table 10: Parameters monitored

Description	Sensor	Standard or optional
Pump memory	Printed circuit board for pump memory includes a temperature sensor.	Standard
Leakage in the junction box	Float switch leakage sensor, FLS	Standard
Main bearing temperature	Pt100 analogue temperature sensor	Standard
Leakage in the stator housing or inspection chamber	Float switch leakage sensor, FLS	Standard
Stator winding temperature	See the following table.	Standard
Support bearing temperature	Pt100 analogue temperature sensor	Optional
Water in oil Not applicable for drive units with internal closed-loop cooling	Capacitive leakage sensor (CLS)	Optional

Description	Sensor	Standard or optional
Vibration	VIS 10	Optional
Power monitoring	Separate electronic instrument which uses three current transformers.	Optional
Pump current	A current transformer in the control cabinet is required.	

Xylem |’zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We’re a global team unified in a common purpose: creating advanced technology solutions to the world’s water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com

xylem
Let’s Solve Water

Xylem Water Solutions Global Services AB 556782-9253
361 80 Emmaboda
Sweden
Tel: +46-471-24 70 00
Fax: +46-471-24 74 01
http://tpi.xyleminc.com
www.xylemwatersolutions.com/contacts/

Visit our Web site for the latest version of this document and more information

The original instruction is in English. All non-English instructions are translations of the original instruction.

884318_9.0_en-US_2021-12_TS_N3231, N3306, N3312, N3356, N3400, N3531, N3800