2024

CERTIFIED ISO 9001

TRANSFLUID®

industrial & marine

HYBRID & ELECTRIC TECHNOLOGY

drive with us

Transfluid's Hybrid

The industrial market has been focused ondeveloping new technologies to reduce their ecological impact on land and sea.
Global awareness of air, noise and water pollution attributed to internal combustion engines has caused vehicle manufacturers to invest large amounts of money and resources into developing hybrid systems used in automobiles and small commercial vehicles.
However, because of the wide variety of driveline designs used in industrial and marine markets, a standardized, quality, heavy duty "hybrid product" has been impractical to develop.
Accepting the challenge to provide a hybrid product for this neglected market Transfluid is ready to introduce a solution for low to medium power marine and industrial applications.
For decades Transfluid has been manufacturing a wide range of power transmission equipments and electric motors/generators.
Profiting from their experience in thousands of industrial and marine applications and using their existing technology it resulted in the development of the technology of the future.

The System

The hybrid system works in three specific modes:

- **Electric propulsion** to drive or sail at ZERO emissions and in absolute silence
- **Engine propulsio**n that uses the electric machine as generator to recharge the batteries
- **"booster" function** that allows the electric motor, during acceleration, to assist the engine in providing extra torque to the driveline

How It Works

The input side is a hydraulic or pneumatic controlled clutch.
When disengaged, the engine is disconnected from the rest of the driveline allowing the vehicle or vessel to be operated by the electric motor instead of the engine.
During engine operation, the clutch is engaged and the electric motor becomes a generator, recharging the batteries, if required.
By operating the engine and electric motor at the same time, the "booster" operation is engaged, increasing the total available power to the driven machine.
All operations are controlled via Transfluid's proprietary electronic controller MPCB-R5, which communicates with all equipments through CAN BUS protocol, making the system a simple "plug and play" solution.

Certificates

Hybrid Transmissions HM

TYPE APPROVED PRODUCT DNV DNV.COM/AF

BUREAU VERITAS 1828 BUREAU VERITAS

Batteries

TYPE APPROVED PRODUCT DNV DNV.COM/AF

Our battery System successfully passed all the DNV-GL tests including the new 2018 forced thermal runaway and this makes it compliant with Norwegian Maritime Authority (NMA) Propagation Test 1

CESNI COMPLIANT

All Bellmarine Systems are compliant with the European Standard Technical Requirements for Inland Navigation vessels (ES-TRIN)

Sjøfartsdirektoratet Norwegian Maritime Authority

Maritime & Coastguard Agency

ABS

BUREAU VERITAS 1828 BUREAU VERITAS

Electric Motors

TYPE APPROVED PRODUCT DNV DNV.COM/AF

CESNI COMPLIANT

All Bellmarine Systems are compliant with the European Standard Technical Requirements for Inland Navigation vessels (ES-TRIN)

BUREAU VERITAS 1828 BUREAU VERITAS

ABS

Motor Controller

Only for 288V and 384V

TYPE APPROVED PRODUCT DNV DNV.COM/AF

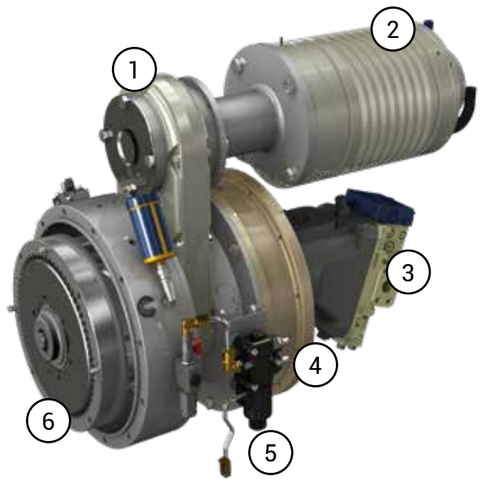
CESNI COMPLIANT

All Bellmarine Systems are compliant with the European Standard Technical Requirements for Inland Navigation vessels (ES-TRIN)

Work in progress

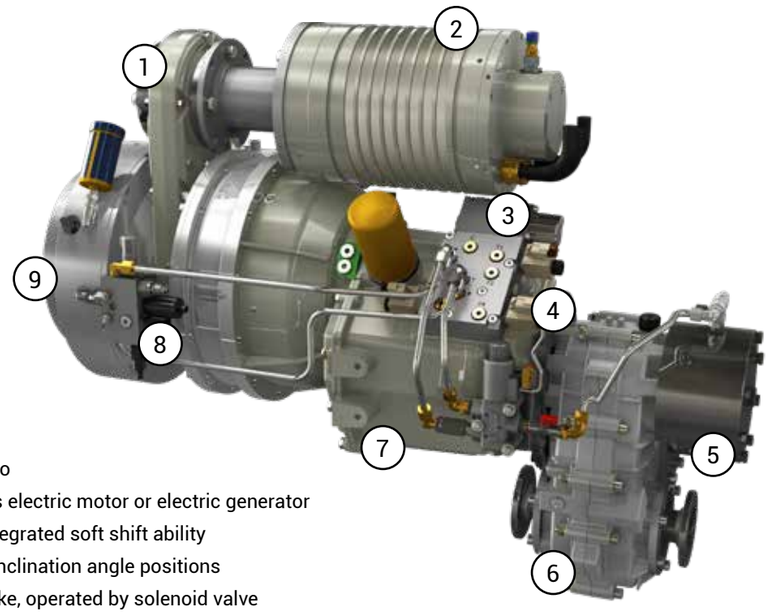
KOMSA (South Korea)
Type approval work in progress

Industrial hybrid



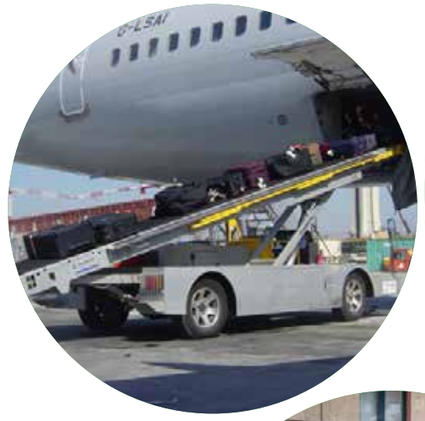
HM560 with Hydrostatic Transmission

1. Split power drive drive with SAE B pto
2. Electric machine that can operate as electric motor or electric generator
3. Hydraulic Pump
4. Single Pump drive
5. Clutch actuation solenoid valve
6. SAE standard dry clutch, operated by solenoid valve, to connect and disconnect internal combustion engine

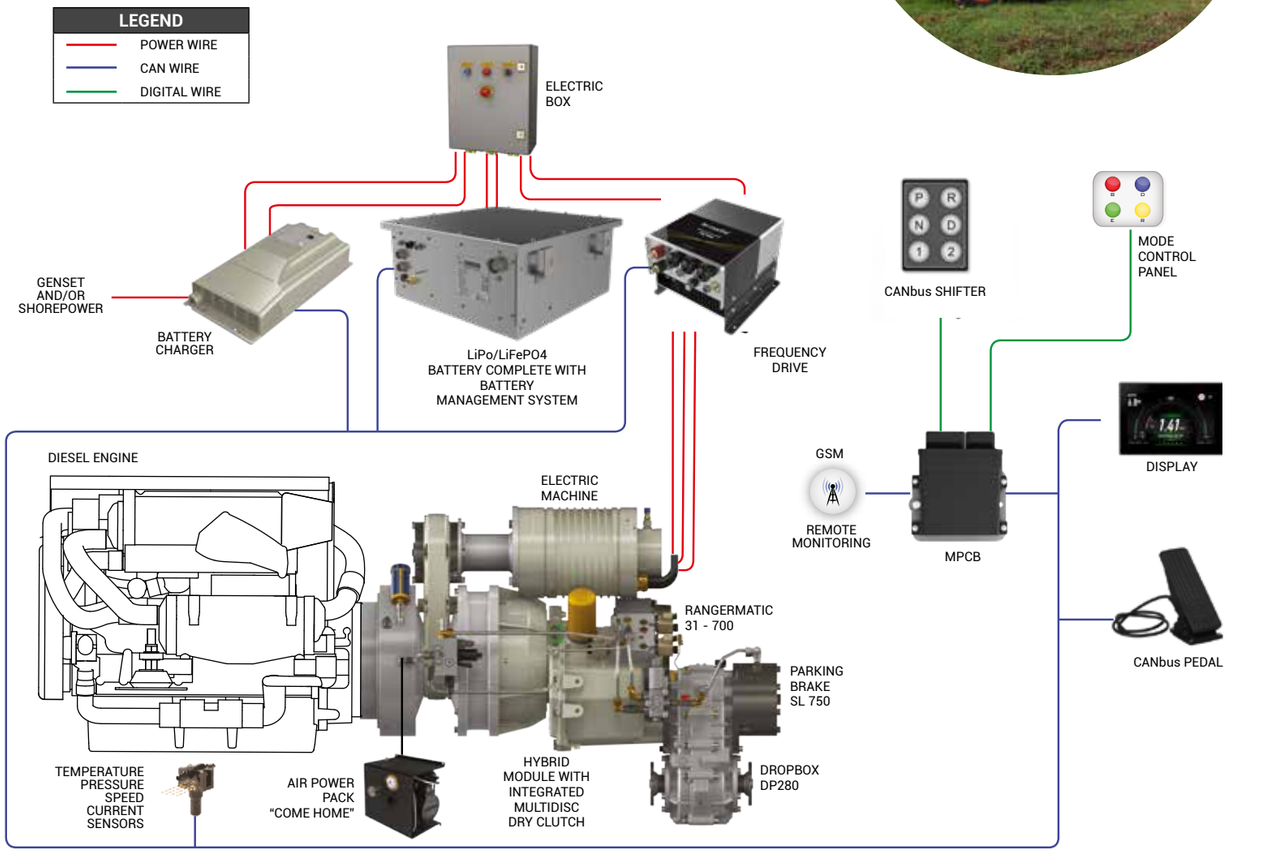


HTV700

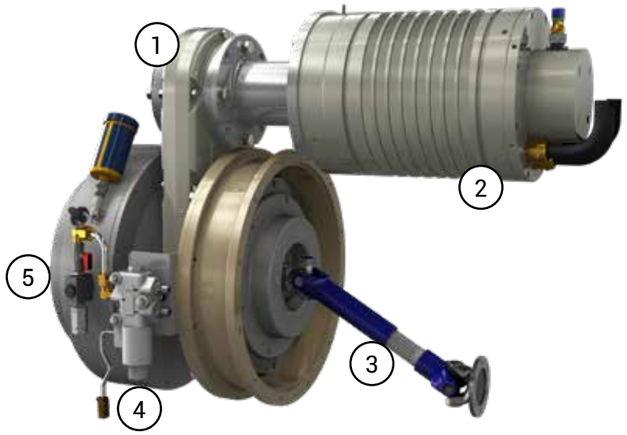
1. Split power drive drive with SAE B pto
2. Electric machine that can operate as electric motor or electric generator
3. Electric selector control unit with integrated soft shift ability
4. Drop box installation with different inclination angle positions
5. Spring loaded wet discs parking brake, operated by solenoid valve
6. Drop box for 2 or 4 wheel drive, available with wide variety of reduction ratios
7. Three speed forward, one speed reverse Powershift Transmission
8. Clutch actuation solenoid valve
9. SAE standard dry clutch, operated by solenoid valve, to connect and disconnect internal combustion engine



Working scheme

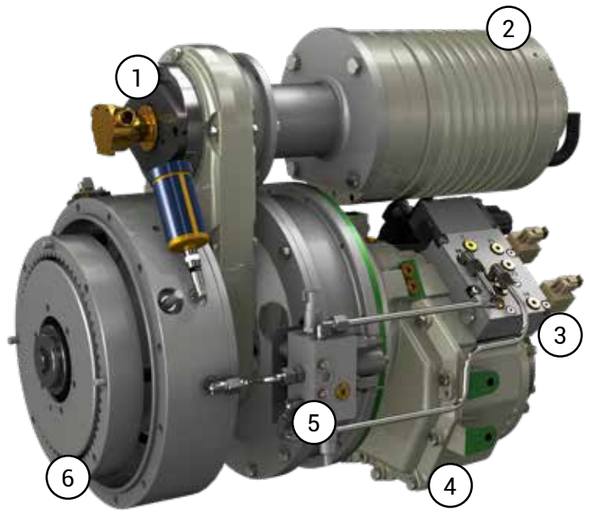


Marine hybrid



HM560 with Cardan Shaft

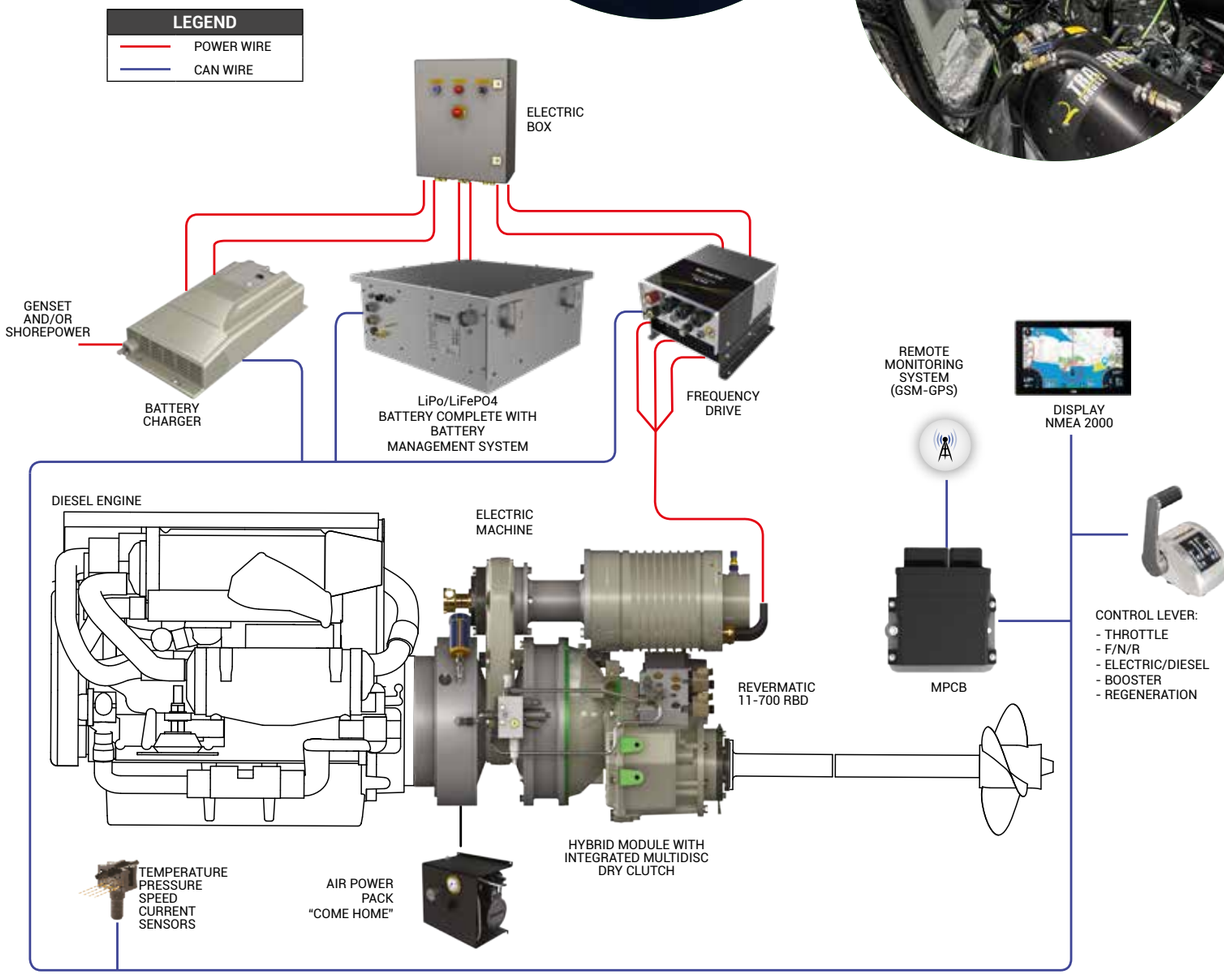
1. Split power drive with SAE B pto
2. Electric machine that can operate as electric motor or electric generator
3. Cardan shaft
4. Clutch actuation solenoid valve
5. SAE standard dry Clutch, operated by solenoid valve, to connect and disconnect internal combustion engine



HTM700

1. Split power drive with SAE B pto
2. Electric machine that can operate as electric motor or electric generator
3. Electric selector with integrated Soft-Shift ability
4. Forward-Reverse Powershift marine gear
5. Clutch actuation solenoid valve
6. SAE standard dry Clutch, operated by solenoid valve, to connect and disconnect internal combustion engine

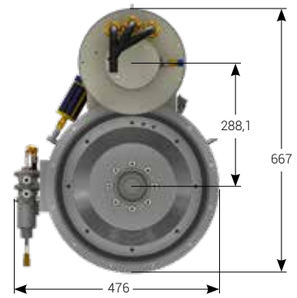
Working scheme

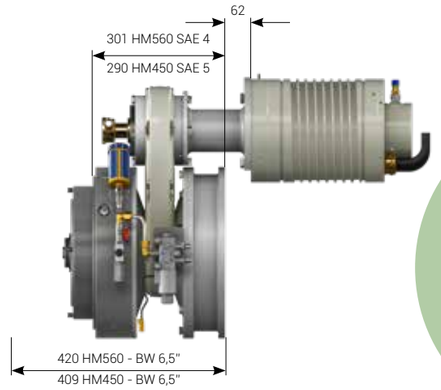


The hybrid series Technical specifications

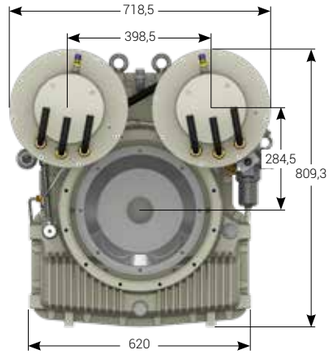
In close cooperation with leading battery and motor controller manufacturers the HM Module series (450-560-2000-3350-6300) was developed to provide a standard, simple, quality solution. Designed to “sandwich” between an engine with a SAE flywheel and housing and transmission with a SAE input, the HM mo-dule provides a seamless solution that is easier to apply and simpler to operate than any application specific solution. Addi-tionally, the electric machine (the motor generator) can be mounted in multiple positions in order to provide the best fit for the engine ompartment. To install, all that is required is a short distance between the engine and transmission, this make it an ideal solution for retrofits and new designs.

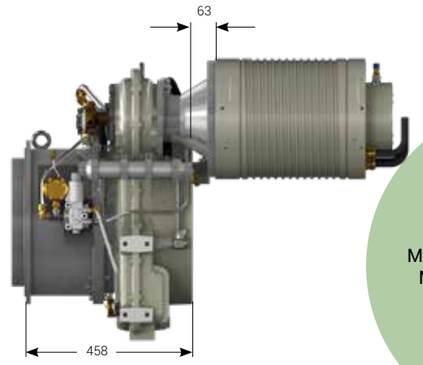
Transfluid also provides two packages that couple the HM technology with their power shift transmissions and marine pro-ducts. The HTV700 is a complete vehicle transmission product utilizing a power shift transmission, 4WD drop box and bra-ke. Designed to be exceptionally compact it is ideal for ground support equipment and small mining and construction ma-chines. The HTM700 is a hybrid marine transmission. The electric function is becoming mandatory in many ports where they are trying to mitigate the air and water pollution caused by tendering and docking vessels. The HTV700 is applicable for en-gines up to 95 kW (127 hp) while the HTM700 is capable of 140kW (187 hp). Both Packages are equipped with a come home feature.



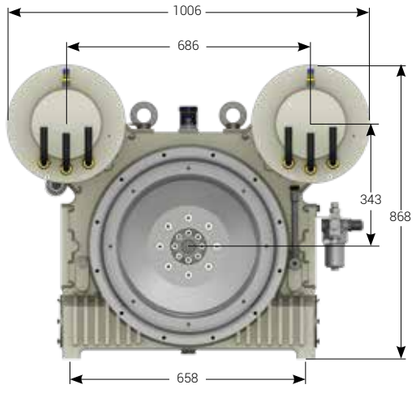


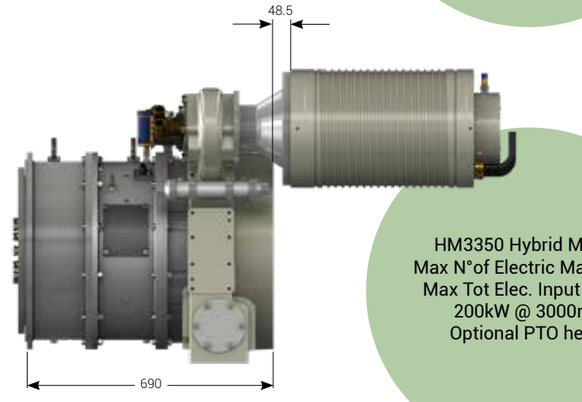
HM450 Hybrid Module
HM560 Hybrid Module
Max N° of Electric Machine: 1
Max Tot Elec. Input Power:
35kW @ 3000rpm



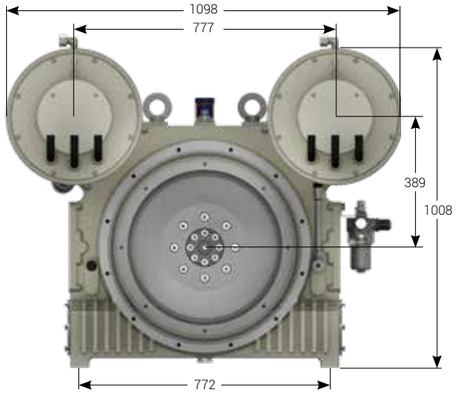


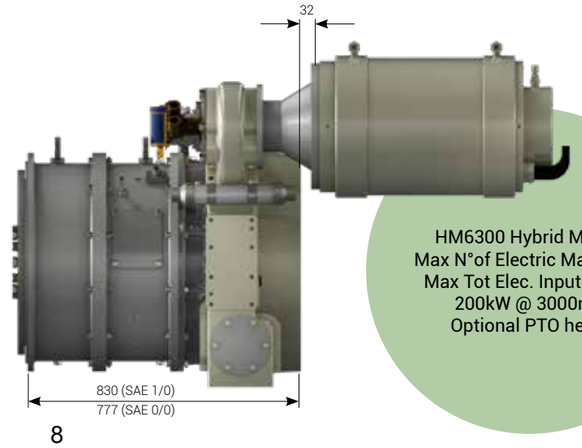
HM2000 Hybrid Module
Max N° of Electric Machine: 2
Max Tot Elec. Input Power:
150kW @ 3000rpm





HM3350 Hybrid Module
Max N°of Electric Machine: 2
Max Tot Elec. Input Power:
200kW @ 3000rpm
Optional PTO heads





HM6300 Hybrid Module
Max N°of Electric Machine: 2
Max Tot Elec. Input Power:
200kW @ 3000rpm
Optional PTO heads

Why Transfluid

By dedicating significant resources in the research and development of the Hybrid System range of products Transfluid is capable of providing complete hybrid solutions as well as the technical support required by manufacturers to implement these products.

Transfluid's Hybrid System easily integrates into traditional propulsion systems assuring an efficient solution to green power and fuel economy.

All modules fit between the engine and transmission, occupying limited space, as though they are an integrated and independent component in the propulsion driveline.

Not only the ecological sustainability is one of the advantages of Hybrid solutions but fuel savings and energy management are of the same importance. With the "booster" function, designers can consider a lower power engine yet still maintain the desired performances.

Ship owners can retrofit their vessels thereby providing lower costs and profiting from immediate benefits.

Transfluid is not just a supplier, but also a partner. By providing innovative technology coupled with competitive pricing, even the most difficult hybrid problems can be quickly solved.

HYBRID MARINE TRANSMISSION	INPUT & OUTPUT Standard(1) SAE J617 & J620	MAX INPUT TORQUE Nm (lb-ft)	MARINE kW (hp) - rpm	WEIGHT kg (lbs)
HM450	SAE5-8" (5)	450 (332)	100 (134)-3500	95 (209)
HM560	SAE4-10" (5)	560 (414)	165 (220)-3500	120 (265)
HM2000	SAE3-11.5"	2000 (1478)	435 (580)-3300	350 (772)
HM3350	SAE1-14"	3350 (2476)	620 (830)-2300	560 (1236)
HM6300	SAE1/0-14"/18"	6300 (4647)	1230 (1650)-2300	900 (1986)
HTM700	SAE4-10"(4)	560 (414)	140 (185)-3200	221 (487)
HTM1000	SAE3-11.5"	700 (517)	175 (238)-3200	450 (992)

(1)SAE J620: different Input or Output connections available upon request
(2) Without drop box & brake
(3) With cooler
(4) DIN 120 and SAE 1410 available
(5) BW 6,5" available (max torque 350 Nm/160 lb-ft)
(6) for marine application to find the approved internal combustion engine nominal torque, divide the above listed max torque by 1.25 service factor

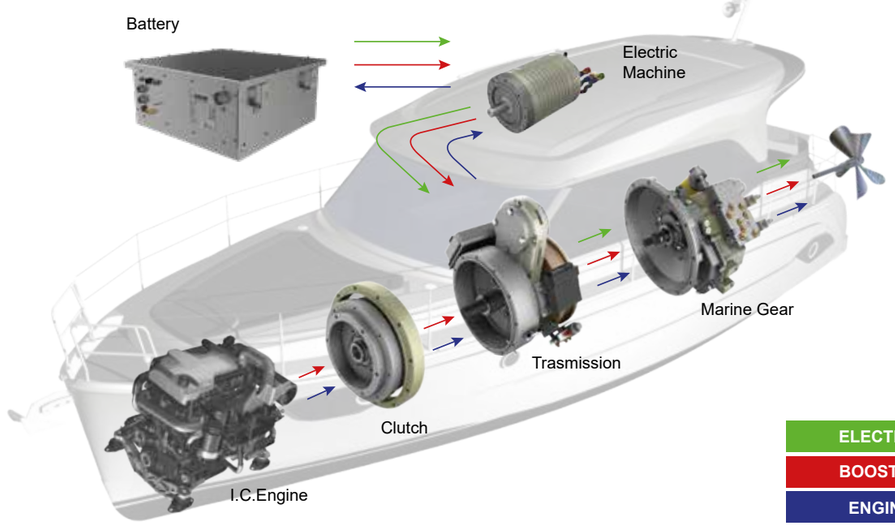
HYBRID INDUSTRIAL TRANSMISSION	INPUT & OUTPUT Standard(1) SAE J617 & J620	MAX INPUT TORQUE Nm (lb-ft)	IINDUSTRIAL kW (hp) - rpm	WEIGHT kg (lbs)
HM450	SAE5-8" (5)	450 (332)	65 (87)-3000	95 (209)
HM560	SAE4-10" (5)	560 (414)	115 (155)-3000	120 (265)
HM2000	SAE3-11.5"	2000 (1478)	350 (470)-2600	350 (772)
HM3350	SAE1-14"	3350 (2476)	500(670)-2200	560 (1236)
HM6300	SAE1/0-14"/18"	6300 (4647)	920(1230)-2100	900 (1986)
HTV700	SAE4-10"(4)	300 (222)	95(125)-3000	245(2) (540)

(1)SAE J620: different Input or Output connections available upon request
(2) Without drop box & brake
(3) With cooler
(4) DIN 120 and SAE 1410 available
(5) For industrial application to find the approved internal combustion engine nominal torque, divide the above listed max torque by 1.5 service factor

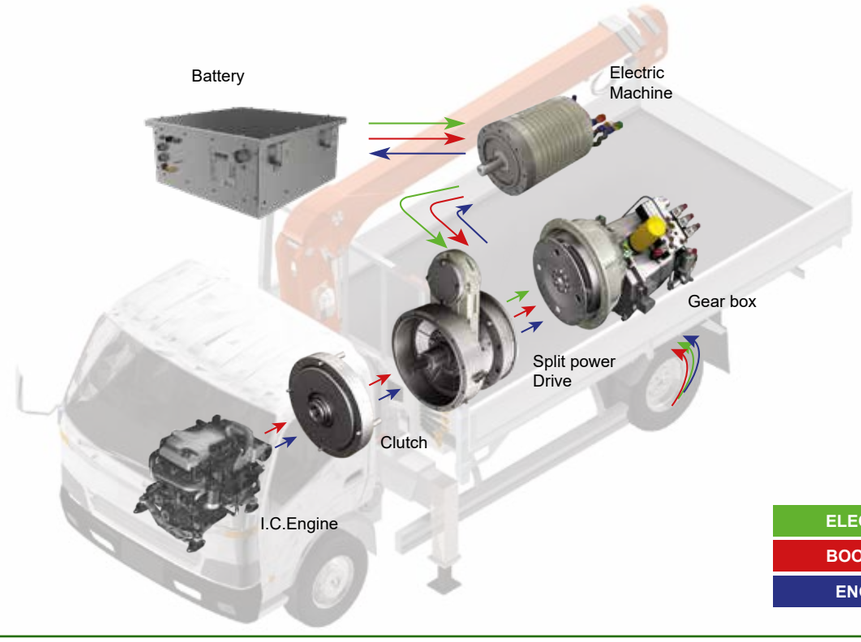
E. MACHINE	WEIGHT kg (lbs)	MAX SPEED rpm	BATTERY Vdc	HYBRID TRANSMISSION
EM180-8	25 (55)	3000	96	HM450
EM180-12	35 (76)	3000	96	HM560-HT700
EM220-20	55 (120)	3000	96	HM560-HT700-HM2000
EM220-35	80 (175)	3000	288	HM560-HM2000-HM3350
EM300-50	135 (295)	3000	288	HM2000-HM3350-HM6300
EM300-75	185 (404)	3000	288	HM2000-HM3350-HM6300
EM300-100	195 (425)	3000	384	HM3350-HM6300

E. MACHINE	MOTOR POWER CONTINUOS kW (hp)	MOTOR PEAK POWER kW (hp)	GENERATOR kW (hp)
EM180-8	8 (11)	10.5	7 (10)
EM180-12	12 (16)	16	10 (14)
EM220-20	20 (27)	25	17 (23)
EM220-35	35 (48)	45	33 (45)
EM300-50	50 (68)	65	49 (67)
EM300-75	75 (100)	100	72 (98)
EM300-100	100 (134)	130	97 (132)

Working mode



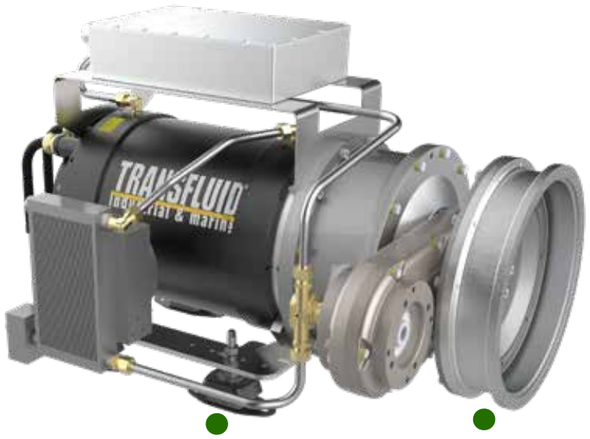
ELECTRIC MODE
BOOSTER MODE
ENGINE MODE



ELECTRIC MODE
BOOSTER MODE
ENGINE MODE

Electric Propulsion System

The EPS (ELECTRIC PROPULSION SYSTEM) provides innovative electric propulsion through the combination of standard Transfluid products. Integrating standard components and adhering to SAE standards produces a new product which easily interfaces with any user and application.
When used with commercial vehicles, the EPS system includes an automatic “Powershift” RANGERMATIC or REVERMATIC transmission.
For marine propulsion the REVERMATIC marine gear uses the reliable RBD coupling.
Both transmissions can be installed with Transfluid's permanent magnets electric motor. This improves the operations of the vehicle or boat by using the efficiency and performance of the electrical machine.



Electric machine

SAE4-10" OUTPUT
with cooling system (closed loop) and PTO.
Temperature and pressure switch gauge

Gearbox
with torque converter or elastic couplings

Dropbox

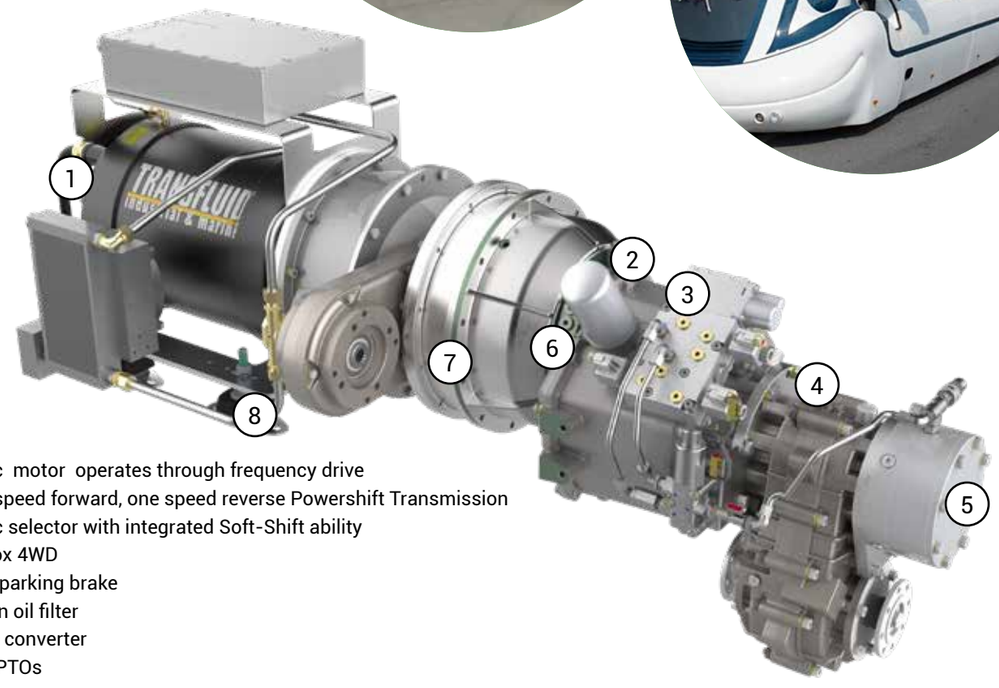
Pump drive

TYPE	POWER at 3000 rpm kW (hp)	PEAK POWER at 3000 rpm kW (hp)	BATTERY VOLTAGE Vdc	WEIGHT kg (lbs)	GEAR BOX	PUMP DRIVE	DROPBOX
EPS05	4 (5)	5 (7)	96 (102)	18 (40)	-	SRBD for hydraulic pump	DP280 2WD or 4WD
EPS10	8 (11)	10.5 (13)		25 (55)	-		
EPS16	12 (16)	16 (21)		35 (76)	-		
EPS25	20 (27)	25 (34)	288 (307)	55 (120)	REVERMATIC Single speed or RANGERMATIC two or three speed (for ratios see catalogue)		
EPS45	35 (48)	45 (60)		80 (175)			
EPS65	50 (68)	65 (85)		135 (295)			
EPS100	75 (100)	100 (127)	384 (409)	185 (404)			
EPS130	100 (136)	130 (169)		195 (425)			

Technical features, dimensions and any other data are not binding. Transfluid S.p.A. reserves the right to change the without notice

EPS industrial system

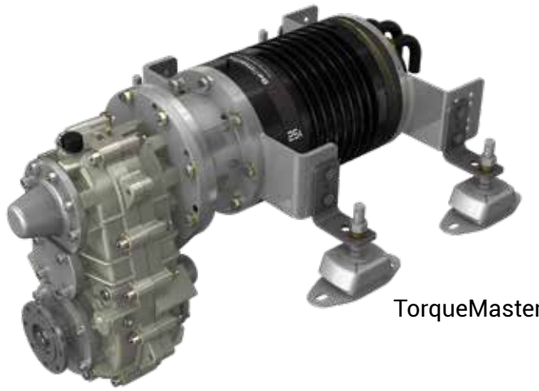
[Example of full power-train supply]



1. Electric motor operates through frequency drive
2. Three speed forward, one speed reverse Powershift Transmission
3. Electric selector with integrated Soft-Shift ability
4. Dropbox 4WD
5. Safety parking brake
6. Spin-on oil filter
7. Torque converter
8. 2 Live PTOs

The innovative concept of EPS consists of an automatic RANGERMATIC “Powershift” transmission coupled to a permanent magnet electric motor. This optimizes the driving experience of the vehicle and enhances the performance of the motor. The RANGERMATIC reduction ratios allow the user to select the optimal ratio according to the operating conditions. The addition of the DROP BOX DP280 on the output of the EPS system provides additional gear ratios to enhance the electric motor performances. Additionally, the drop box is available with two outputs for four-wheel drive applications. This provides identical use and driving of the EPS system to those of a combustion engine.The use of batteries, indispensable for the supply of the electric machines, allows the recovery of kinetic energy during deceleration and braking (Kinetic Energy Recovery System) storing energy that would otherwise be lost, increasing the autonomy of the vehicle.

EPS marine system

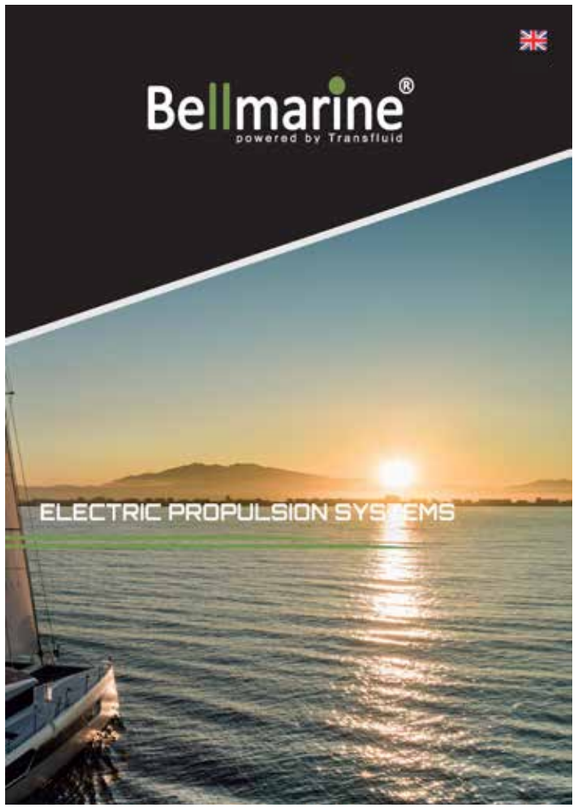


TorqueMaster

DriveMaster

OutboardMaster

SailMaster



(See also Transfluid-Bellmarine catalogue)

SternMaster

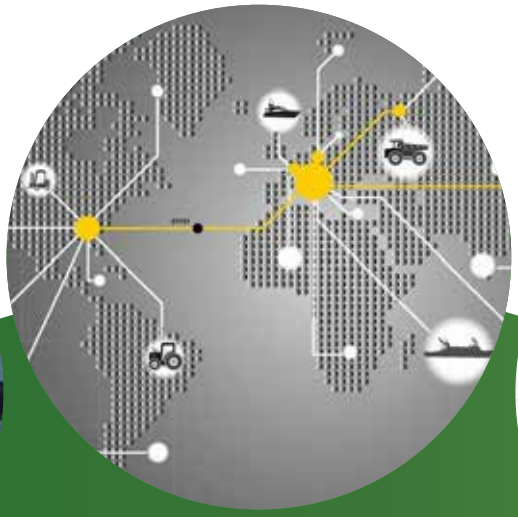
ShaftMaster

DriveMaster Modular

Remote monitoring - Fast service
Safe - Reliable - Timely

Annual subscription for remote monitoring and service of Hybrid or Electric System through web portal with password access

- Gift box with emergency spares kit
- Delivery of spares sparts to the nearest service center within 72 hours
- Advance notice for maintenance
- Online monitoring



TRANSFLUID
industrial & marine

ITALY - HEADQUARTER
TRANSFLUID S.p.A.
Via Guido Rossa, 4
21013 Gallarate (VA)
Ph. +39.0331.28421
info@transfluid.eu

CHINA
TRANSFLUID BEIJING TRADE CO.LTD
101300 Beijing
Ph. +86.1060442301-2
tbtcinfo@transfluid.cn

FRANCE
TRANSFLUID FRANCE s.a.r.l.
38110 Rochetoirin
Ph. +33.9.75635310
tffrance@transfluid.eu

THE NETHERLANDS
BELLMARINE
NL- 3992 AK, Houten
Ph. +31 (0)85 4868530
info@bellmarine.nl

U.S.A.
TRANSFLUID LLC
Auburn, GA 30011
Ph. +1.770.8221.777
tfusa@transfluid.us

U.K.
TRANSFLUID UK LTD
London
Ph. +44.7445501066
marine@transfluid.co.uk

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www.transfluid.eu
www.buy-transfluid.com

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