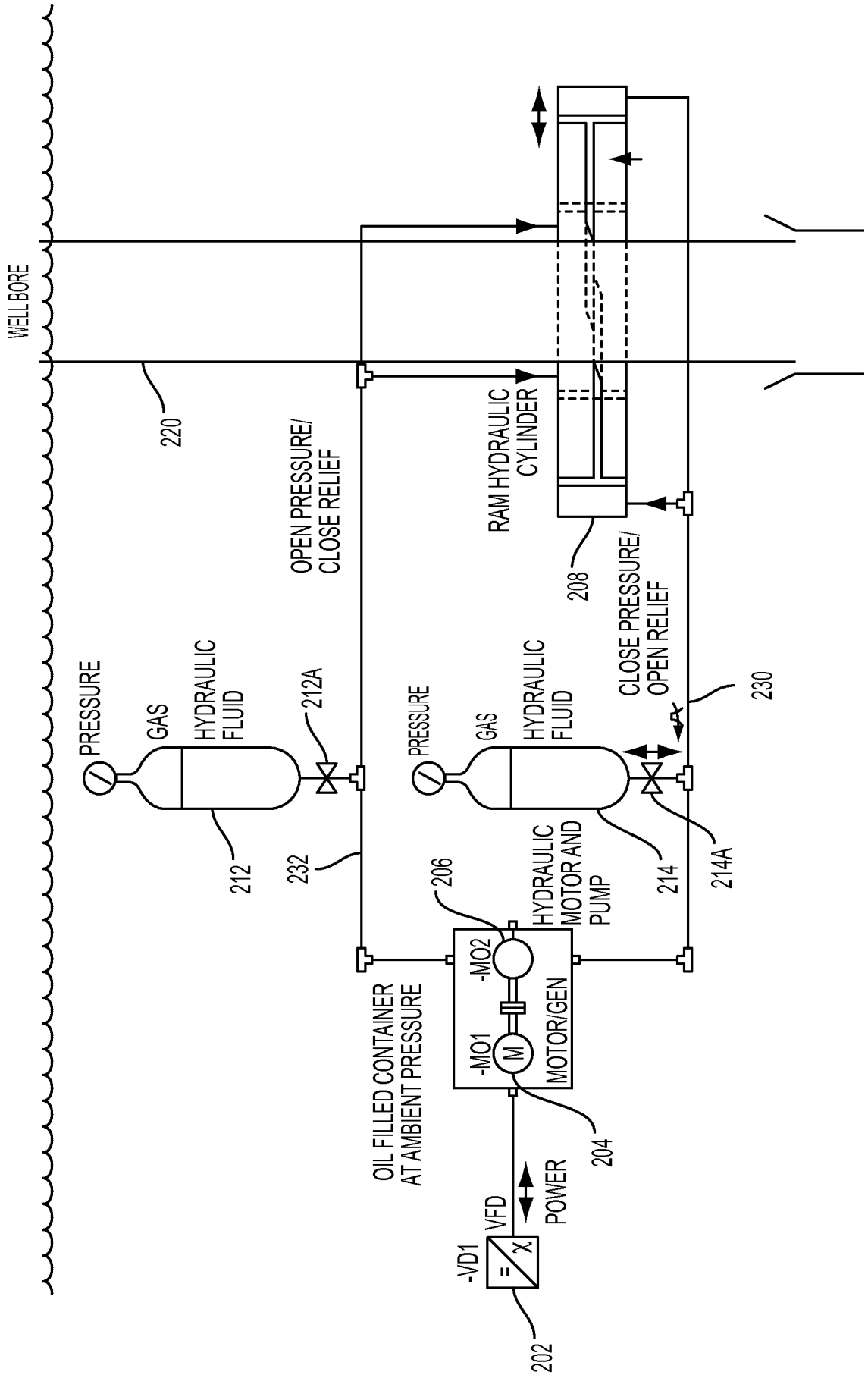
WELL BORE
220
OPEN PRESSURE/
CLOSE RELIEF
RAM HYDRAULIC
CYLINDER
208
CLOSE PRESSURE/
OPEN RELIEF
230
PRESSURE
GAS
HYDRAULIC
FLUID
212A
212
232
PRESSURE
GAS
HYDRAULIC
FLUID
214
214A
206
HYDRAULIC
MOTOR AND
PUMP
-MO2
-MO1
M
MOTOR/GEN
OIL FILLED CONTAINER
AT AMBIENT PRESSURE
204
VFD
POWER
-VD1
202

FIG. 1

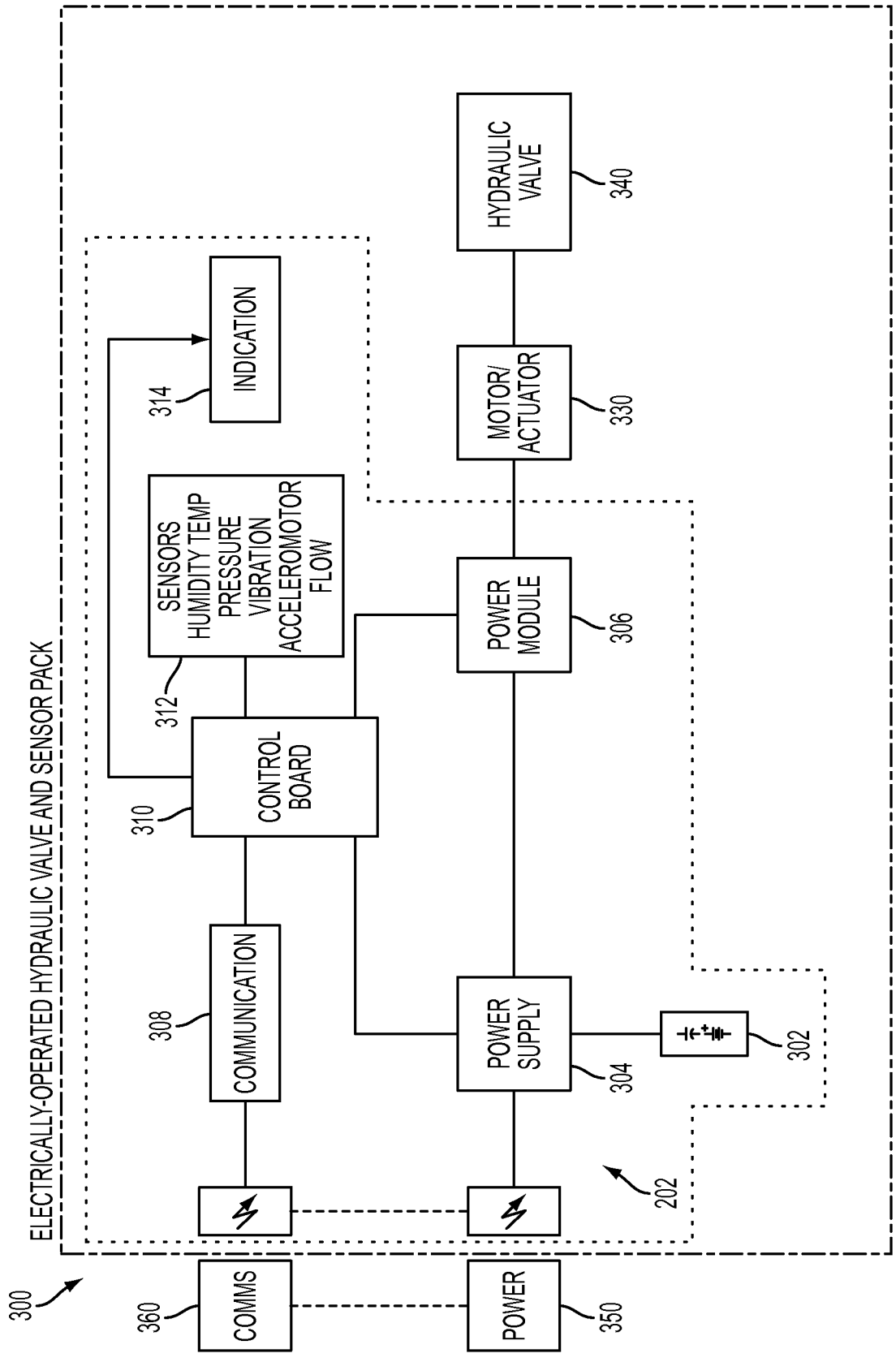
ELECTRICALLY-OPERATED HYDRAULIC VALVE AND SENSOR PACK
300
360
COMMS
350
POWER
202
HYDRAULIC VALVE
340
MOTOR/ ACTUATOR
330
INDICATION
314
SENSORS HUMIDITY TEMP PRESSURE VIBRATION ACCELEROMOTOR FLOW
312
POWER MODULE
306
CONTROL BOARD
310
COMMUNICATION
308
POWER SUPPLY
304
302

FIG. 2

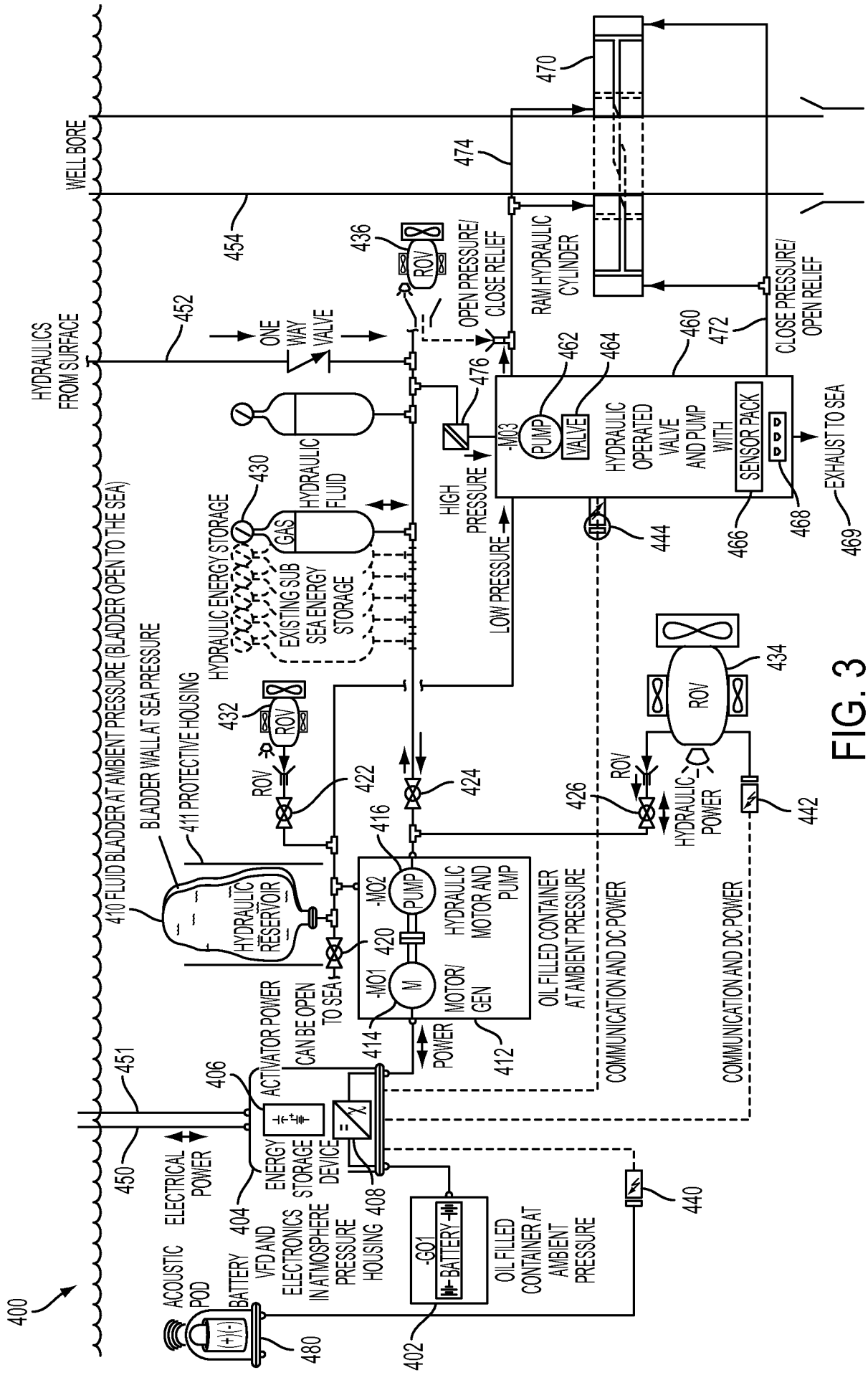
400
WELL BORE
HYDRAULICS FROM SURFACE
452
454
ONE WAY VALVE
436
ROV
OPEN PRESSURE/ CLOSE RELIEF
RAM HYDRAULIC CYLINDER
470
474
460
472
CLOSE PRESSURE/ OPEN RELIEF
476
462
464
-MO3
PUMP
VALVE
HYDRAULIC OPERATED VALVE AND PUMP WITH SENSOR PACK
HIGH PRESSURE
LOW PRESSURE
444
466
468
469
EXHAUST TO SEA
430
HYDRAULIC FLUID
GAS
HYDRAULIC ENERGY STORAGE EXISTING SUB SEA ENERGY STORAGE
410 FLUID BLADDER AT AMBIENT PRESSURE (BLADDER OPEN TO THE SEA)
BLADDER WALL AT SEA PRESSURE
411 PROTECTIVE HOUSING
HYDRAULIC RESERVOIR
432
ROV
422
424
416
-MO2
PUMP
HYDRAULIC MOTOR AND PUMP
420
-MO1
M
MOTOR/ GEN
OIL FILLED CONTAINER AT AMBIENT PRESSURE
ACTIVATOR POWER
CAN BE OPEN TO SEA
414
POWER
412
COMMUNICATION AND DC POWER
426
HYDRAULIC POWER
434
442
451
406
450
ELECTRICAL POWER
ENERGY STORAGE DEVICE
404
VFD AND ELECTRONICS IN ATMOSPHERE PRESSURE HOUSING
408
-GO1
BATTERY
OIL FILLED CONTAINER AT AMBIENT PRESSURE
440
ACOUSTIC POD
BATTERY
480
402

FIG. 3

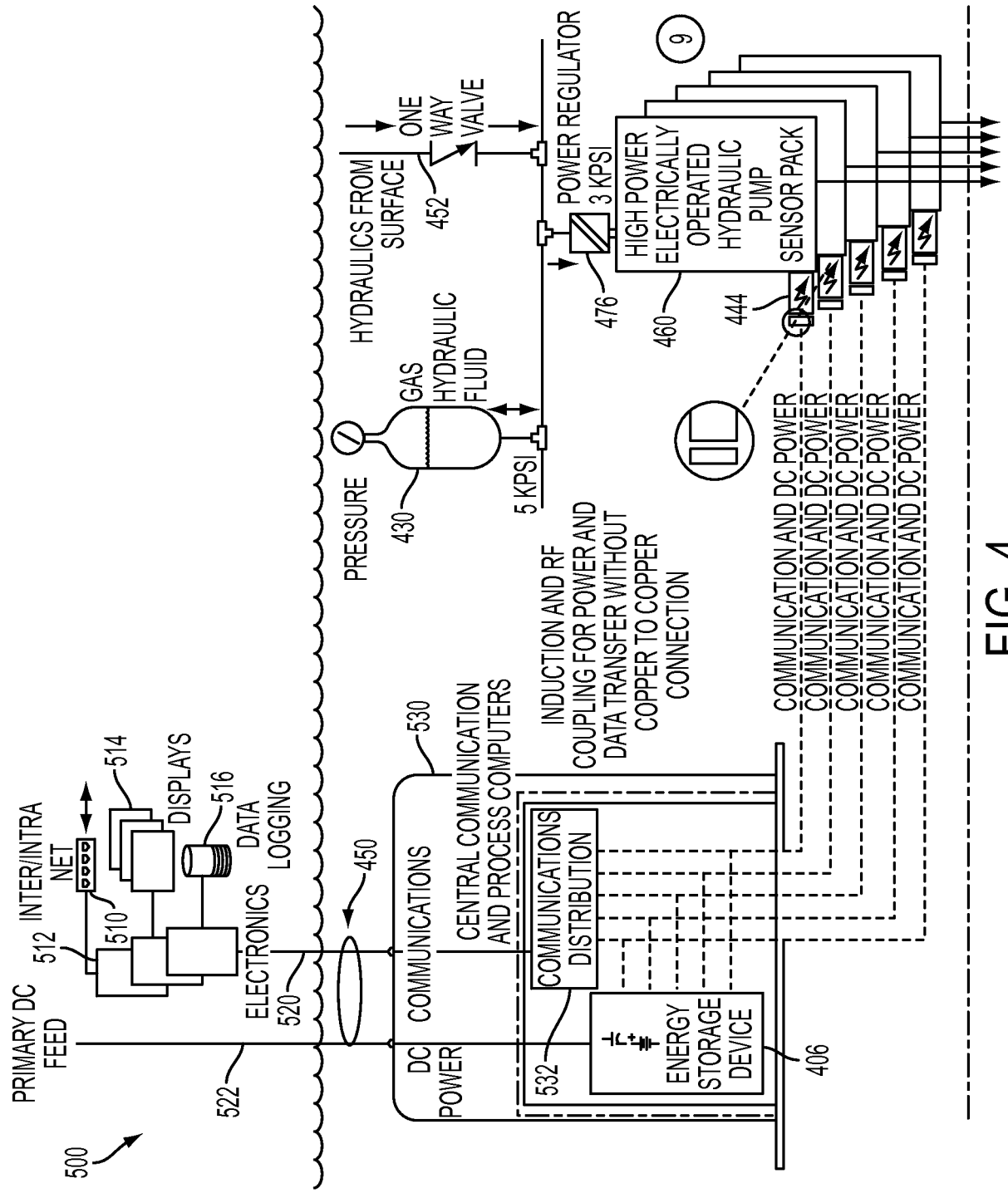
500
PRIMARY DC FEED
522
INTER/INTRA NET
512
510
514
DISPLAYS
516
DATA LOGGING
ELECTRONICS
520
450
COMMUNICATIONS
DC POWER
530
CENTRAL COMMUNICATION AND PROCESS COMPUTERS
COMMUNICATIONS DISTRIBUTION
532
ENERGY STORAGE DEVICE
406
INDUCTION AND RF COUPLING FOR POWER AND DATA TRANSFER WITHOUT COPPER TO COPPER CONNECTION
PRESSURE
430
GAS
HYDRAULIC FLUID
5 KPSI
HYDRAULICS FROM SURFACE
ONE WAY VALVE
452
POWER REGULATOR
3 KPSI
476
HIGH POWER ELECTRICALLY OPERATED HYDRAULIC PUMP
460
SENSOR PACK
444
9
COMMUNICATION AND DC POWER
COMMUNICATION AND DC POWER
COMMUNICATION AND DC POWER
COMMUNICATION AND DC POWER
COMMUNICATION AND DC POWER

FIG. 4

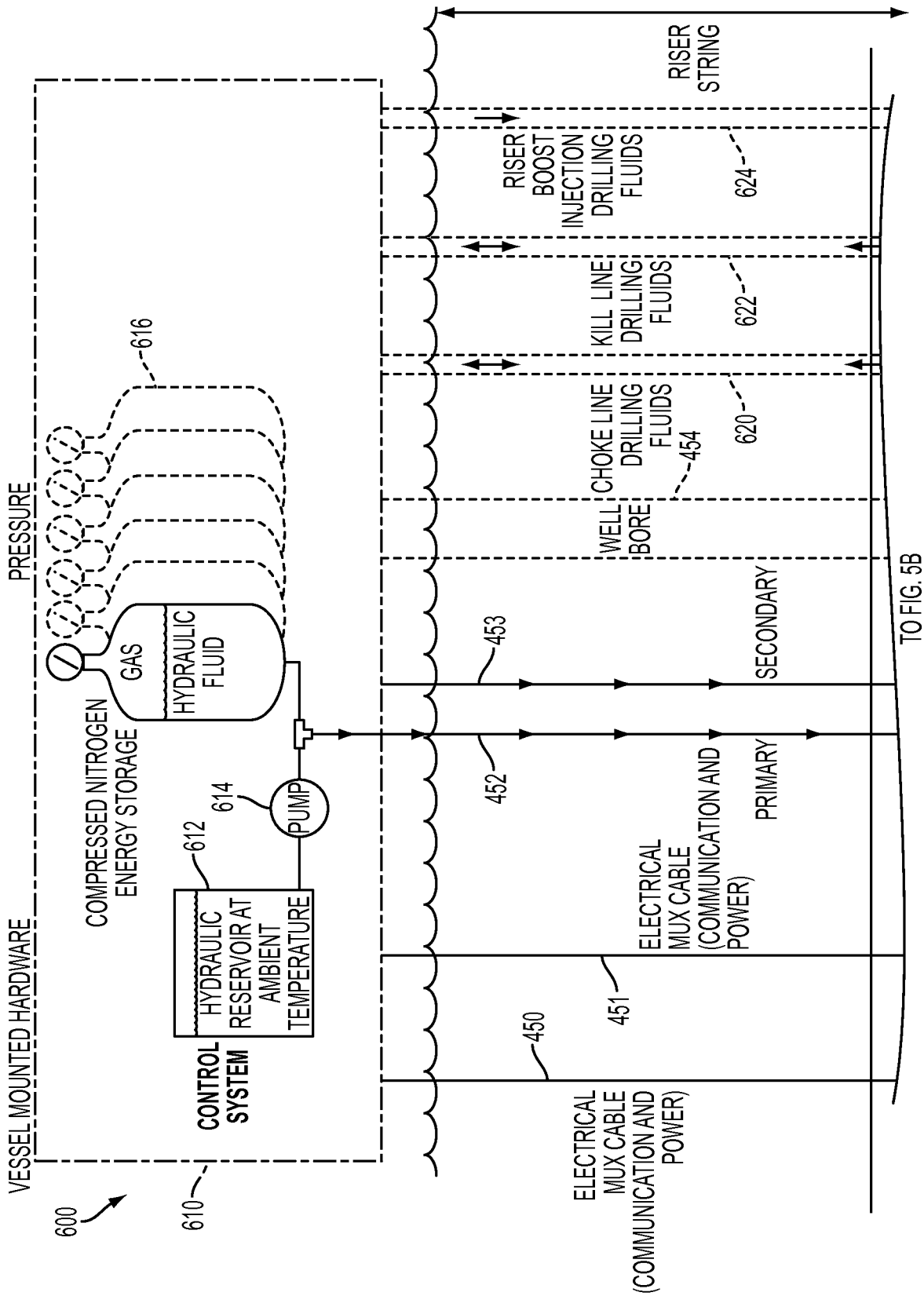
VESSEL MOUNTED HARDWARE
600
610
CONTROL SYSTEM
HYDRAULIC RESERVOIR AT AMBIENT TEMPERATURE
612
PUMP
614
COMPRESSED NITROGEN ENERGY STORAGE
GAS
HYDRAULIC FLUID
PRESSURE
616
ELECTRICAL MUX CABLE (COMMUNICATION AND POWER)
450
451
ELECTRICAL MUX CABLE (COMMUNICATION AND POWER)
PRIMARY
452
SECONDARY
453
WELL BORE
CHOKE LINE DRILLING FLUIDS
454
620
KILL LINE DRILLING FLUIDS
622
RISER BOOST INJECTION DRILLING FLUIDS
624
RISER STRING
TO FIG. 5B

FIG. 5A

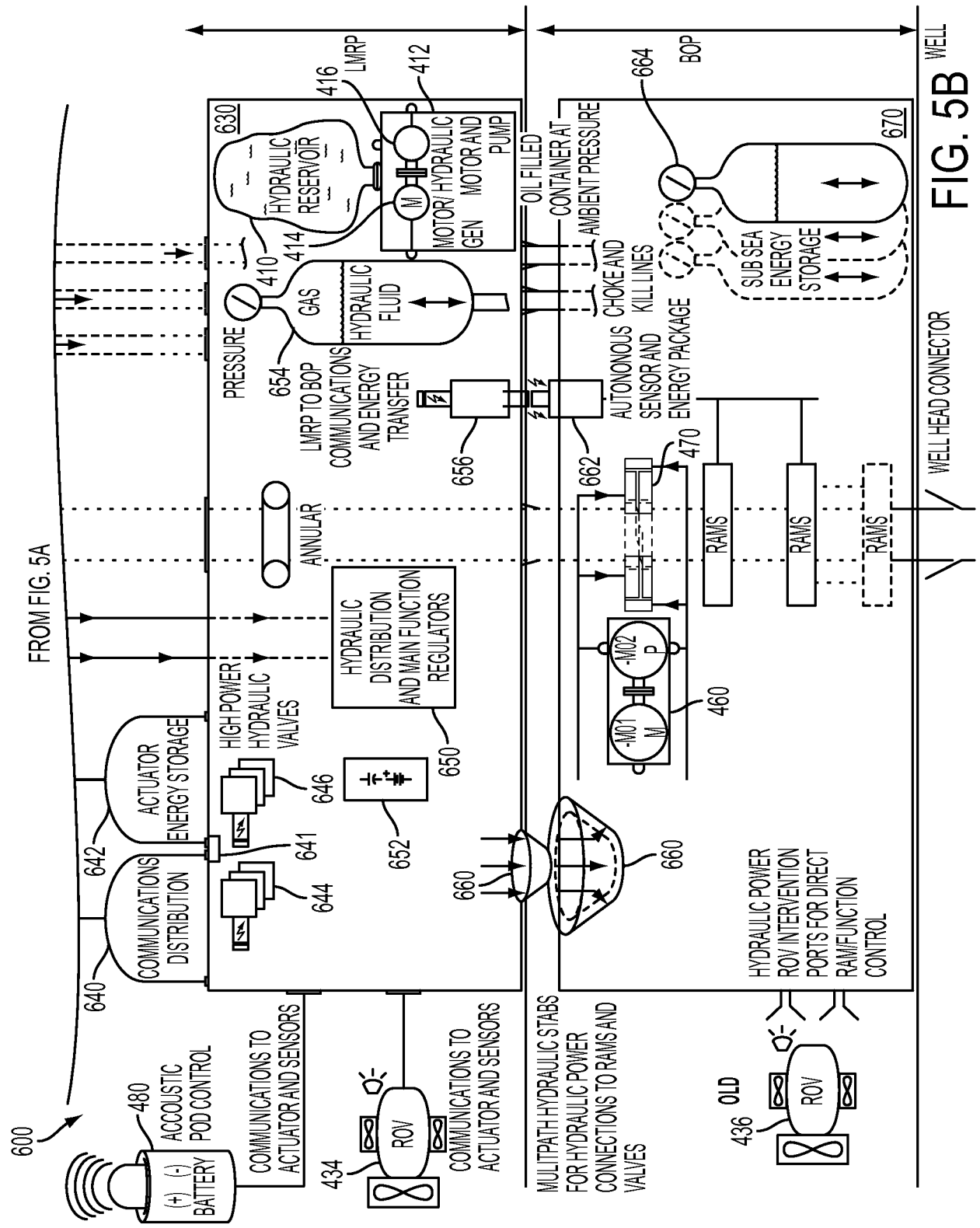
FROM FIG. 5A
600
480
ACOUSTIC POD CONTROL
(+) (-) BATTERY
COMMUNICATIONS TO ACTUATOR AND SENSORS
640
642
COMMUNICATIONS DISTRIBUTION
ACTUATOR ENERGY STORAGE
641
644
646
HIGH POWER HYDRAULIC VALVES
652
650
HYDRAULIC DISTRIBUTION AND MAIN FUNCTION REGULATORS
ANNULAR
630
HYDRAULIC RESERVOIR
416
LMRP
412
MOTOR/ GEN
HYDRAULIC MOTOR AND PUMP
414
410
PRESSURE
654
GAS
HYDRAULIC FLUID
LMRP TO BOP COMMUNICATIONS AND ENERGY TRANSFER
656
660
434
ROV
COMMUNICATIONS TO ACTUATOR AND SENSORS
MULTIPATH HYDRAULIC STABS FOR HYDRAULIC POWER CONNECTIONS TO RAMS AND VALVES
OIL FILLED CONTAINER AT AMBIENT PRESSURE
662
AUTONOMOUS SENSOR AND ENERGY PACKAGE
CHOKE AND KILL LINES
470
-M02
-M01
460
RAMS
RAMS
RAMS
664
BOP
670
SUB SEA ENERGY STORAGE
WELL HEAD CONNECTOR
WELL
HYDRAULIC POWER ROV INTERVENTION PORTS FOR DIRECT RAM/FUNCTION CONTROL
OLD
436
ROV

FIG. 5B