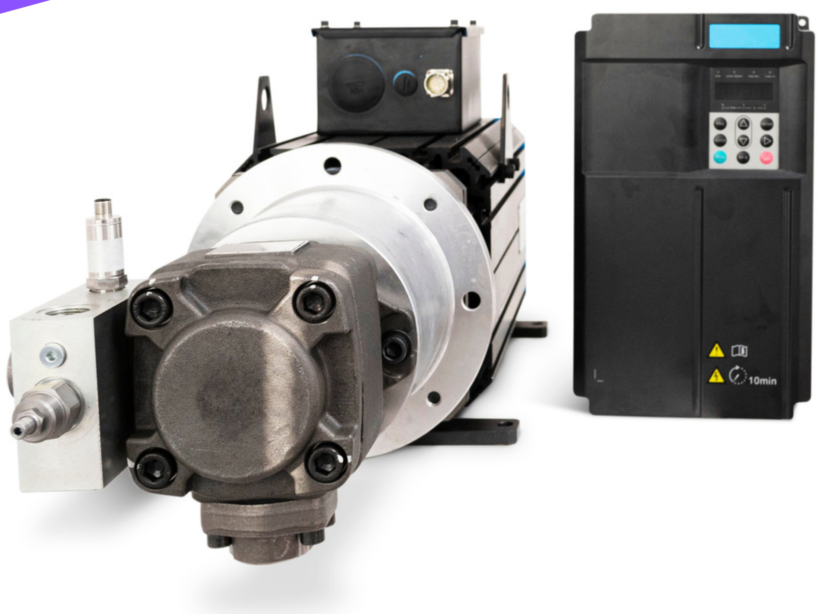
# KSPH

KIT SERVO PUMP HYDRAUT

Plug & Play
Turnkey Electro-Hydraulic Hybrid System
for energy saving




hydraut

# Contents

# Turnkey Electro Hydraulic Hybrid System

In the world of industrial automation, a system that combines an electric motor with a hydraulic pump is defined as a “servo-pump”.  For this reason, it is often referred to in common jargon as an “electro-hydraulic hybrid system”.

In a servo-pump system, the mechanical movement of the shaft is piloted by an inverter, an electric (servo) motor, coupled to a pump group that constitutes the core of a hydraulic plant.

Hydraut has engineered KSPH to meet the energy saving requirement unanimously expressed by OEMs, system builders and end-users, by supplying a “turnkey” system that cuts selection and system implementation times.

KSPH Hydraut consists of standard motor-pump groups (the core of energy-hungry machines and systems) configured in standardized packages made up of:

1. Inverter drive.
2. High power density brushless motor.
3. Internal gear pump.

Maximum advantages are achievable with machines or systems with operational pauses in their work cycle, which do not require active hydraulic energy. The higher the ratio of the “pause” to the operative phase, the greater the possible advantages.

According to the type of machine, the configured packages may guarantee:

- Energy saving up to 80%.
- Optimized regulation of Flow rate and Pressure in each phase of the production process.
- Simplification of the hydraulic system, with a further reduction in consumption and maintenance costs.
- Reduction of the size and volumes required for the application.
- Noise reduction of up to 20 dB during operative phases with possible elimination of noise during pauses.
- Longer life expectancy for the pump and fluid.
- High overall system performance.
- Reduction of environmental and fluid overheating.

The most suitable package for individual requirements can be identified very easily, thanks to the tools in the following technical section.

**Some of the application fields**


Metalworking


Plastic and rubber injection

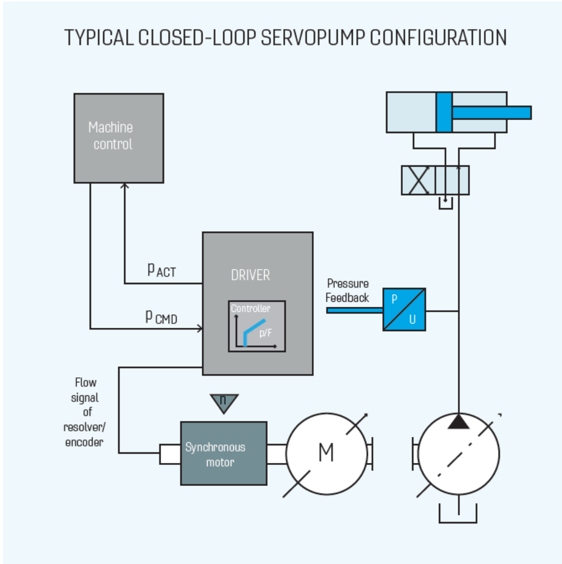

Diecasting

## Maximizing efficiency

The KSPH servo-pump is designed to optimize the efficiency of the power expressed by the motor-pump group.

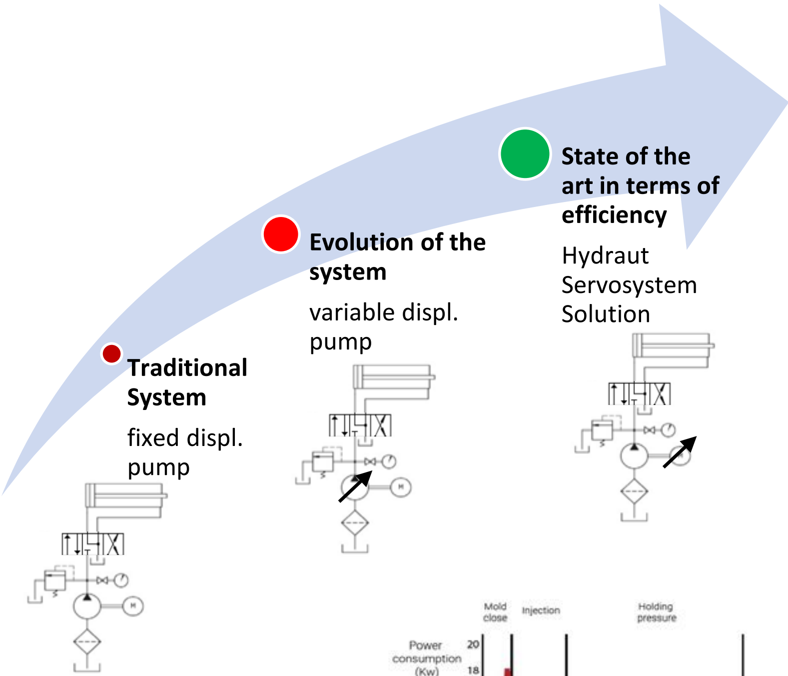
Thanks to the rotational speed modulation of the fixed displacement internal gear pump, the KSPH system enables the creation of a motor-pump group with a variable flow rate (Q) of high performance and volumetric efficiency.

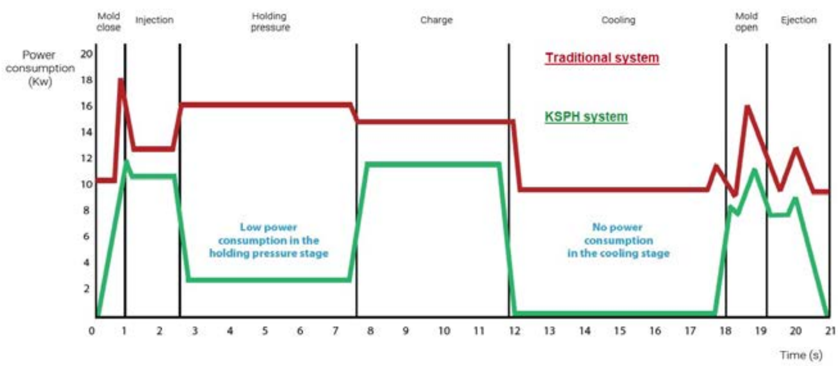
Thanks to integrated pressure control (P), it is possible to cross check the pressure requirements of each phase with the instant pressure of the plant. Consequently, it is possible to verify the Q flow rate generated by the group to supply the required flow rate values at each specific phase.



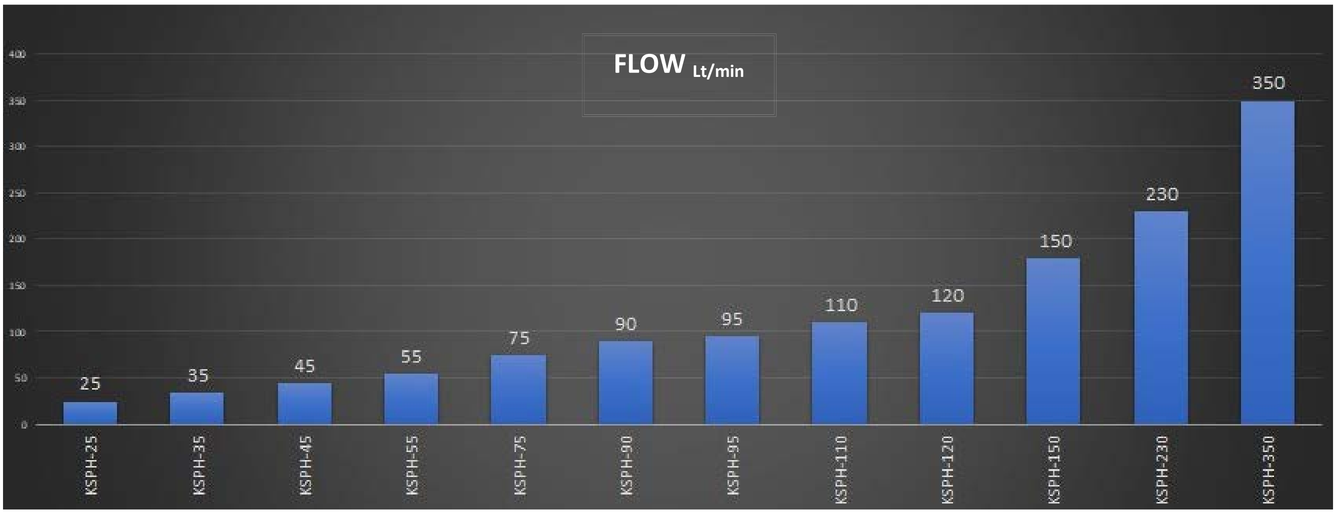

This control technique, known in jargon as P/Q, is integrated in the firmware of the inverter starter and allows for:

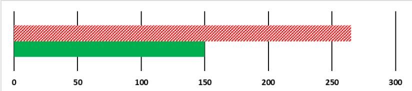
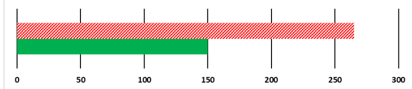
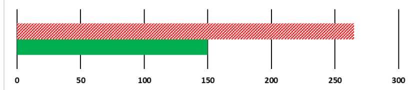
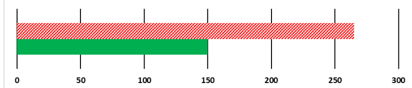
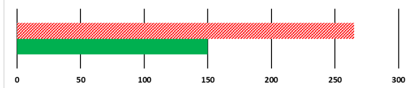
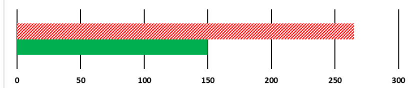
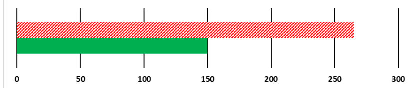
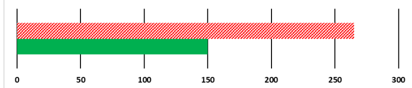
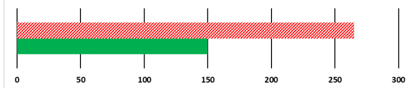
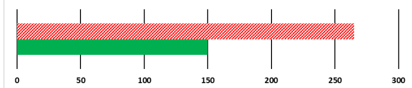
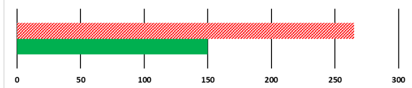
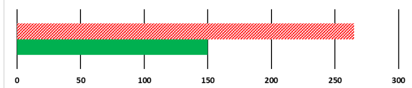
- safeguarding of the machine, set-ups and workpiece, thereby preventing damage caused by excess operating pressure;
- fewer components required to control pressure in each phase, with the consequential simplification of the circuit;
- reduction of excess input power because the power supply is limited to the exact requirements of each phase;
- minimization of necessary rotation ranges, both during pressure control and during machine cycle standstills.



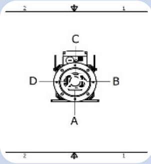



# KSPH: comparison

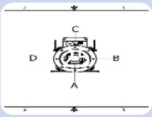



| KIT NAME | INVERTER POWER kW | ToT POWER kW | FLOW RATE MAX lt/min | FLOW RATE Min lt/min | PRESSURE RANGE BAR (GREEN CONTINUOUS SERVICE S1 - RED SHORT TIME DEPENDS ON THE CYCLE) | MAX PRESS. S1 | MAX PRESS. SHORT TIME | TECH. DETAIL |
|---|---|---|---|---|---|---|---|---|
| KSPH-25 | 11 | 10.5 | 25 | 8 |  | 150 bar | 265 bar | Pg. 10 |
| KSPH-35 | 11 | 12 | 35 | 8 |  | 150 bar | 265 bar | Pg. 11 |
| KSPH-45 | 15 | 19.3 | 45 | 5 |  | 150 bar | 265 bar | Pg. 12 |
| KSPH-55 | 18.5 | 22 | 55 | 12 |  | 150 bar | 265 bar | Pg. 13 |
| KSPH-75 | 22 | 24.1 | 75 | 8 |  | 150 bar | 265 bar | Pg. 14 |
| KSPH-90 | 22 | 22 | 90 | 7 |  | 150 bar | 265 bar | Pg. 15 |
| KSPH-95 | 30 | 31.5 | 95 | 10 |  | 150 bar | 265 bar | Pg. 16 |
| KSPH-110 | 30 | 30 | 110 | 8 |  | 150 bar | 265 bar | Pg. 17 |
| KSPH-120 | 45 | 35.6 | 120 | 13 |  | 150 bar | 265 bar | Pg. 18 |
| KSPH-150 | 45 | 42 | 150 | 13 |  | 150 bar | 265 bar | Pg. 19 |
| KSPH-230 | 75 | 92.1 | 230 | 25 |  | 150 bar | 265 bar | Pg. 20 |
| KSPH-350 | 90 | 75 | 350 | 25 |  | 150 bar | 265 bar | Pg. 21 |

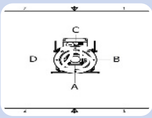
# Code Selection

| KSPH - | MAX FLOW - | - suction position | safety - manifold option | - fieldbus | P-MAX - @100% OF DEMANDED SIGNAL PRESSURE REFERENCE | Q-MAX - @100% OF DEMANDED SIGNAL FLOW REFERENCE |
|---|---|---|---|---|---|---|
| KIT SERVO PUMP HYDRAUT | 25 |  | NB standard manifold with pressure transducer and relief safety valve | AN = ANALOG SIGNAL | NP- P/Q control is not required, ONLY FLOW CONTROL OR | FROM 50% OF MAX FLOW (EXPRESSED IN lt/min) |
| | 35 | A = lower | STD standard manifold with pressure transducer and relief safety valve | BC = CANopen | FROM 50 bar ... TO 265 bar | example - 60 - (with 10V =100% the system limit at max flow at 60 lt/min |
| | 45 | B = right | LKG As standard manifold plus on-off valve for leakage-pump cooling function | BL = CANlink | example - 225 - (with 10V =100% the system limit at max pressure at 225 bar) | |
| | 55 | C = upper | | BP = PROFIBUS dp | | |
| | 75 | D = left | | MD = MODBUS RS485 | | |
| | 90 | | | | | |
| | 95 | | | | | |
| | 110 | | | | | |
| | 120 | | | | | |
| | 150 | | | | | |
| | 230 | | | | | |
| | 350 | | | | | |

EXAMPLES: KSPH-75-A-STD-AN-225-60

| KSPH - | 75 - | - A | - STD | - AN | -225 | - 60 |
|---|---|---|---|---|---|---|
| KIT SERVO PUMP HYDRAUT | 75 LT/MIN |  A = lower | STD standard manifold with pressure transducer and relief safety valve | AN = ANALOG SIGNAL | example - 225 - (with 10V =100% the system limit at max pressure at 225 bar) | example - 60 - (with 10V =100% the system limit at max flow at 60 Lt/min |

OR KSPH-150-D-LKG-BC-150-150

| KSPH - | 150 - | - D | - LKG | - BC | 150 - | 150 - |
|---|---|---|---|---|---|---|
| KIT SERVO PUMP HYDRAUT | 150 LT/MIN |  D = left | LKG As standard manifold plus on-off valve for leakage- pump cooling function | BC = CANopen | example - 150 - (with 10V =100% the system limit at max pressure at 150 bar) | example - 150 - (with 10V =100% the system limit at max flow at 60 Lt/min |

# Machine cycle analysis – application formulas

| KIT SELECTION | | FLOW MAX | CONTINUOUS PRESSURE | MAX. PRESSURE FOR SHOT TIME |
|---|---|---|---|---|
| | | | | |

| MACHINE CYCLE ANALYTICS | | | | | |
|---|---|---|---|---|---|
| PHASE N° | PHASE NAME | TIME IN SEC. | PRESSURE REQUEST | FLOW REQUEST | OVERLOAD<br>SEE THE OVERLOAD CHART |
| 1 | LOADING PIECE | 2 | 40 | 65 | |
| 2 | LOCK PIECE | 1 | 70 | 5 | |
| 3 | TABLE ROTATION | 3 | 20 | 10 | |
| 4 | AXIS 1 APPROACH | 10 | 80 | 60 | |
| 5 | AXIS 1 PRE-PRESSURING | 2 | 150 | 20 | |
| 6 | PRESS PHASE AXIS1 | 10 | 225 | 40 | |
| 7 | MOLD EXTRACTION | 5 | 80 | 65 | |
| 8 | UNLOADING PIECE | 2 | 40 | 40 | |
| 9 | PAUSE | 20 | 20 | 2 | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | | | | |
| 24 | | | | | |
| 25 | | | | | |
| MACHINE CYCLE TOTAL TIME | | 55 | | | |

**ASSESSMENT OF OVERLOAD PEAKS**

To understand whether the KSPH system is suited to your plant, it is necessary to verify the overload peaks required by the machine cycle. The value of the duty cycle overload is obtainable from the pressure value shown on the chart and by performing a calculation based on the machine cycle total, using the following formula:

$$\text{DUTY CICLE OVERLOAD} = \frac{\sum T \text{ phase @ 210 BAR}}{\sum T \text{ all phase}} = \leq \text{CHART \%}$$

*Example given in the chart: the use of the OVERLOAD PHASE is 18%*
***[PRESS PHASE AXIS1 (10 Sec.) / MACHINE CYCLE TOTAL TIME (55 Sec) = 18%]***

NOTE:
The control system of the inverter counts the overload peaks and totalizes them. If they exceed the maximum threshold, this will cause a machine stoppage.
Every 5 minutes, the inverter resets the alarm counter. To avoid a machine blockage, it is necessary to check that the sum total of the time in OVERLOAD pertaining to the various machine cycles in the 5-minute window is inferior to the maximum time indicated in the chart.

Data checked at the ambiance temperature of the electric panel 40°C

## Hydraulic solutions on the market

- **CONVENTIONAL SOLUTION:** Constant rotational speed motor and fixed displacement pump.
  - **PRO:** cost-effective solution;
  - **CONS**: the motor-pump group supplies maximum pressure P, and maximum flow rate at all times. Any excess flow rate not required by the single processes is dissipated in the form of heat by the maximum pressure safety valve. The pump is noisy.

- **EVOLUTION OF THE CONVENTIONAL SOLUTION**: Constant rotational speed motor and variable displacement pump.
  - **PRO:** the required flow rate is supplied in each single phase of the machine cycle.
  - **CONS**: the internal inertia of the moving parts, combined with the internal discharge of the pump flow rate, entails a "basic" energy consumption over and above the consumption of each single process. Also in this case, the pump is noisy.

- **SERVOSYISTEM SOLUTION HYDRAUT KSPH:** Brushless variable rotation motor and internal gear fixed displacement pump.
  - **PRO:** the required flow rate is supplied in each single phase of the machine cycle, pump performance compares favourably with that of the variable displacement pump. It is possible to stop the motor during standstill and therefore reduce consumption in the overall machine cycle.
  - **CONS**: it is necessary to install a Drive inverter on the machine panel.

In all three solutions, **power may be calculated for each phase** using the following formula:

$$\text{kW PHASE IN TIME} = \left(\frac{\mathrm{P\ bar} * \mathrm{Q}\,\frac{\mathrm{lit}}{\mathrm{min}}}{612 * \eta}\right) * Time\ phase\ (in\ sec.)$$

Once all the kilowatts in the temporal unit of each phase have been calculated, it is then possible to obtain the energy consumption of the machine using the following formula:

$$\text{kWh Machine Cycle:} = \left(\frac{\sum kwatt\ phase\ in\ time}{total\ machine\ cycle}\right)$$

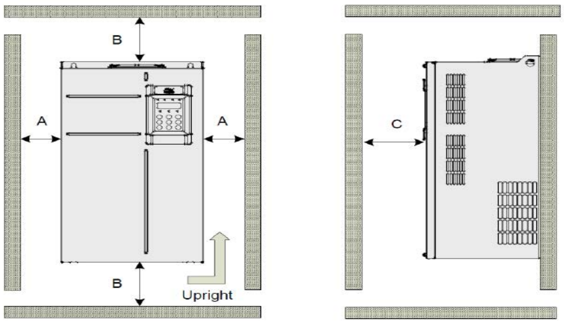
Having analyzed the machine cycle in the example and in the form provided, we now present a comparative analysis of energy consumption by solution type examined:

| | | | |
|---|---|---|---|
| **ENERGY CONSUMPTION COMPARISON FOR DIFFERENT SOLUTIONS** (MACHINE CYCLE IN EXAMPLE) | **kW/HR** | | |
| | **5,56 kW/h** | **6,91 kW/h** | **23,20 kW/h** |
| | **HYDRAUT SERVO SOLUTION** | **VARIABLE DISPLACEMENT PUMP** | **CONVENTIONAL FIXED DISPLACEMENT PUMP** |
| | **HYDRAUT SERVO SOLUTION ENERGY SAVING** | **-20%** | **-76%** |

| TYPE | ADDRESS | STANDARD FUNCTION | VALUE | SIGNAL |
|---|---|---|---|---|
| ANALOG INPUT | AI 1 | PRESSURE REQUEST | 0-100 % | 0 - 10 Volt |
| | AI 2 | FLOW REQUEST | | |
| | AI3 | PRESSURE FEEDBACK FOR CLOSED LOOP CONTROL | | |
| ANALOG OUTPUT | AO 1 | FLOW RATE FEEDBACK FOR MACHINE PLC | 0 – 100% OF MAX FLOW | |
| | AO 2 | PRESSURE FEEDBACK FOR MACHINE PLC | 0 – 100% OF MAX FLOW | |
| DIGITAL INPUT | DI 1 | ENABLE FORWARD | ON - OFF | 0 – 24 Vdc |
| | DI 2 | PID1 SELECTION | | |
| | DI 3 | JOG FOWARD | | |
| | DI 4 | FAUL RESET | | |
| | DI 5 | ENABLE CANOPEN COMMUNICATION | | |
| DIGITAL OUTPUT | DO 1 | PRESSURE CONTROL (n/c) | ON – OFF PNP | |
| | T/A1 | FAULT OUTPUT COMMON | ON – OFF RELAY | SPDT DRY CONTACT |
| | T/B1 | FAULT OUTPUT N/O | | |
| | T/C1 | FAULT OUTPUT N/C | | |
| | T/A2 | SWITCH PUMP DISPLAC. COMMON | ON – OFF | SPST DRY CONTACT |
| | T/C2 | SWITCH PUMP DISPLACEMENT N/O | | |

| FRAME SIZE | | Three-phase 380 to 480 VAC | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 020 | 030 | 035 | 040 | 050 | 070 | 080 | 100 | 140 | 170 | 210 |
| | | T5 | | | | T6 | | T7 | | T8 | | |
| Dimension[(1)] | Height<br>Width<br>Depth | [H]: 350 mm<br>[W]: 210 mm<br>[D]: 192 mm | | | | [H]: 400 mm<br>[W]: 250 mm<br>[D]: 220 mm | | [H]: 540 mm<br>[W]: 300 mm<br>[D]: 275 mm | | [H]: 580 mm<br>[W]: 338 mm<br>[D]: 320 mm | | |
| Drive Output | Rated power, [kW] | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 |
| Drive Output | Rated output current, [A] | 25 | 32 | 37 | 45 | 60 | 75 | 91 | 112 | 150 | 176 | 210 |
| Drive Output | Default carrier frequency, [kHz] | 6 | 6 | 4 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 2 |
| Drive Output | Carrier frequency range, [kHz] | 1 to 8 | | | | | | | | | | |
| Drive Output | Overload capacity | 150% for 60 sec & 180% for 2 sec | | | | | | | | | | |
| Drive Output | Max. output voltage | Three-phase 380 to 480 VAC (proportional to input voltage) | | | | | | | | | | |
| Drive Output | Max. output frequency | 300 Hz | | | | | | | | | | |
| Drive Input | Rated input voltage | Three-phase 380 to 480v, -15% to +10% | | | | | | | | | | |
| Drive Input | Rated input current, [A] | 36.3 | 45.1 | 49.5 | 59 | 57 | 69 | 89 | 106 | 139 | 164 | 196 |
| Drive Input | Rated input frequency | 50/60 Hz, ±5% | | | | | | | | | | |
| Power capacity, [kVA] | | 30 | 39 | 45 | 54 | 52 | 63 | 81 | 97 | 127 | 150 | 179 |
| Braking Resistor | Recommended power, [kW] | 0.8 | 1 | 1.3 | 1.5 | 2.5 | 3.7 | 4.5 | 5.5 | 7.5 | 9 | 5.5 x 2 |
| Braking Resistor | Min. Resistance, [Ω] | 43 | 32 | 25 | 22 | 16 | 16 | 16 | 16 | 12 | 8 | 12 x 2 |

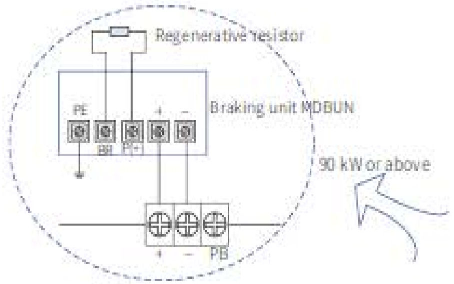
| Power Rating | Clearance Requirements | | |
|---|---|---|---|
| 11 to 22 kW | A ≥ 10 mm | B ≥ 200 mm | C ≥ 40 mm |
| 30 to 37 kW | A ≥ 50 mm | B ≥ 200 mm | C ≥ 40 mm |
| 45 to 160 kW | A ≥ 50 mm | B ≥ 300 mm | C ≥ 40 mm |

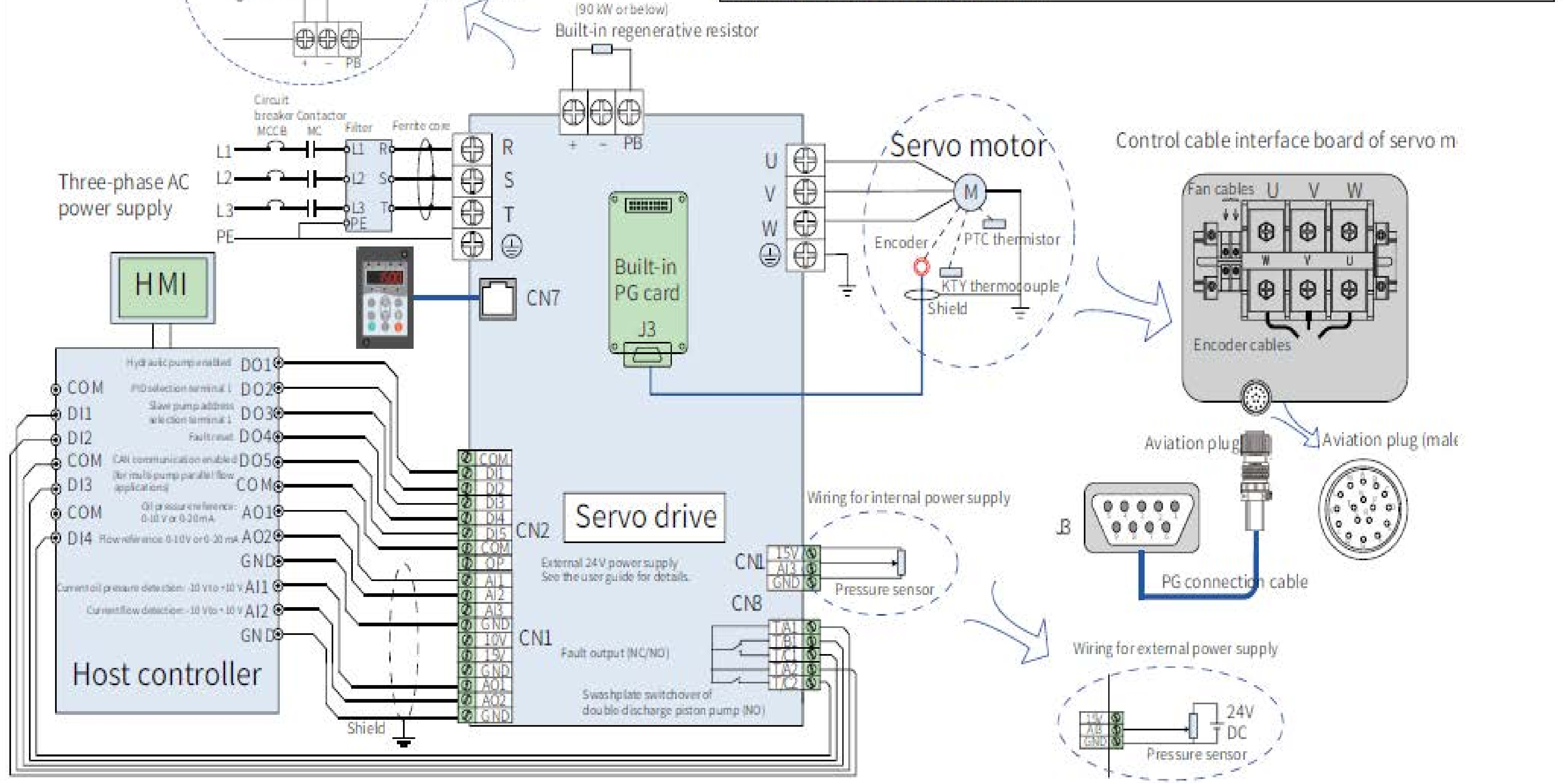


| Male of DB9 connector on resolver PG card | 1 | 2 | 3 | 4 | 5 | 9 | 7 | 8 | | 6 | Housing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 17P aviation plug | A | B | C | D | E | F | G | H | L | K | J |
| Signal | REF- | REF+ | Cos+ | Cos- | Sin+ | Sin- | PTC+ | KTY- | PTC- | KTY+ | Shield |
| Color of cable core | Yellow/Black | Red/Black | Red | Black | Yellow | Blue | Orange | Brown | | Gray | Shield |
| Remarks | One pair | | One pair | | One pair | | | Common point of KTY and PTC | | | |

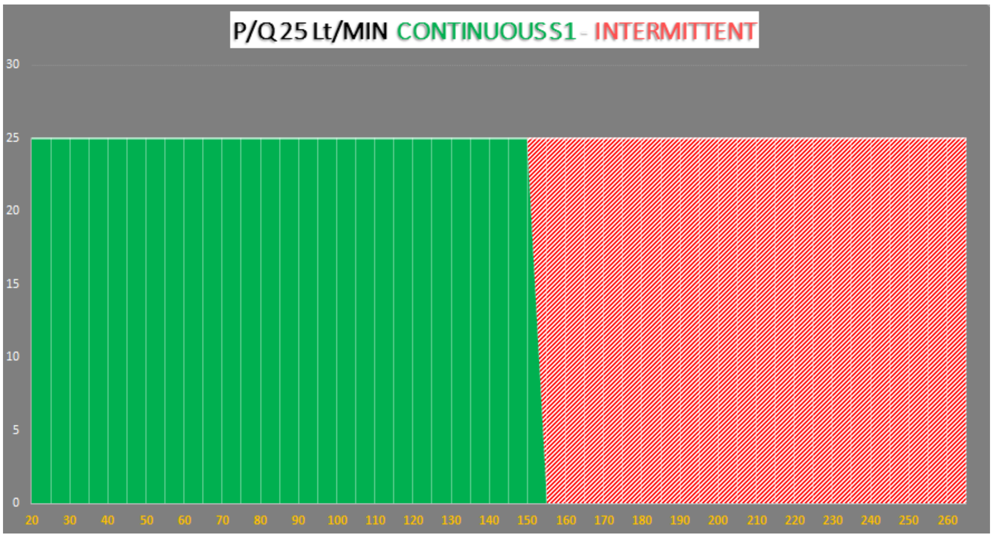
| Male of DB9 connector on 23-bit PG card | 1 | 2 | 5 | 9 | 7 | 8 | Housing |
|---|---|---|---|---|---|---|---|
| 17P aviation plug | A | B | L | M | G | H | J |
| Signal | PS+ | PS- | KTY- | KTY+ | +5V | GND | Shield |
| Color of cable core | Yellow | Yellow/Black | Green | White | Red | Black | Shield |
| Remarks | Twisted pair | | Twisted pair | | Twisted pair | | - |

Note: When the servo drive works with a 23-bit PG card, the UVW phases of the motor must be con-sistent with those of the servo drive to implement the "auto-tuning free" function.

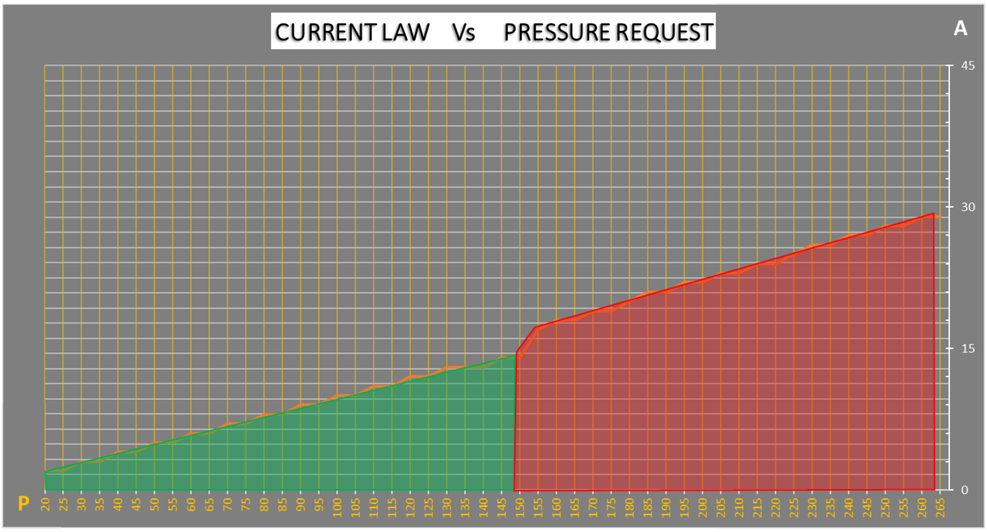


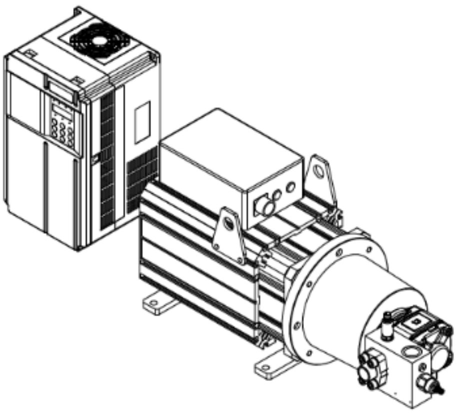
# KSPH-25

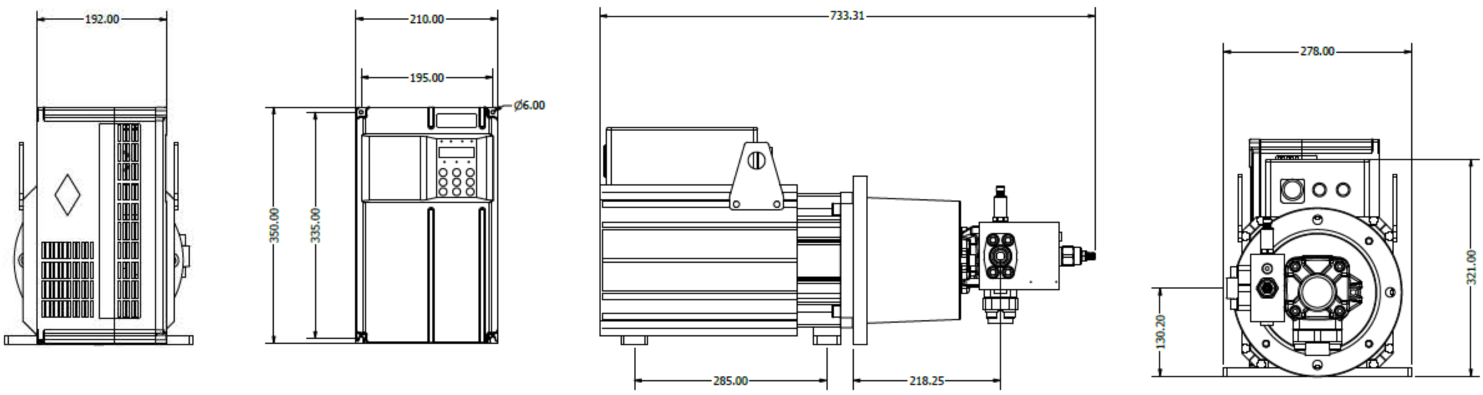


P/Q 25 Lt/MIN CONTINUOUS S1 - INTERMITTENT
30
25
20
15
10
5
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260

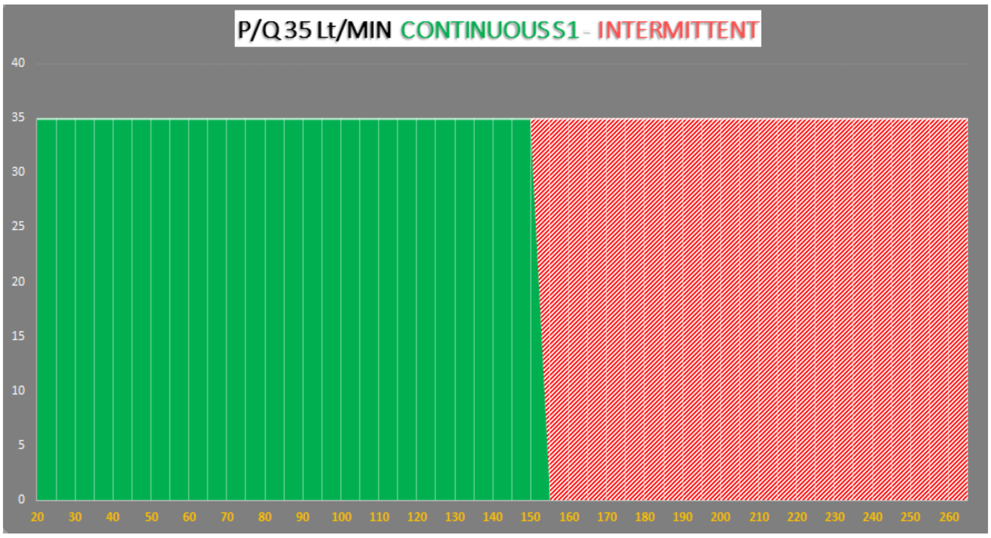
CURRENT LAW Vs PRESSURE REQUEST
A
45
30
15
0
P
20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265

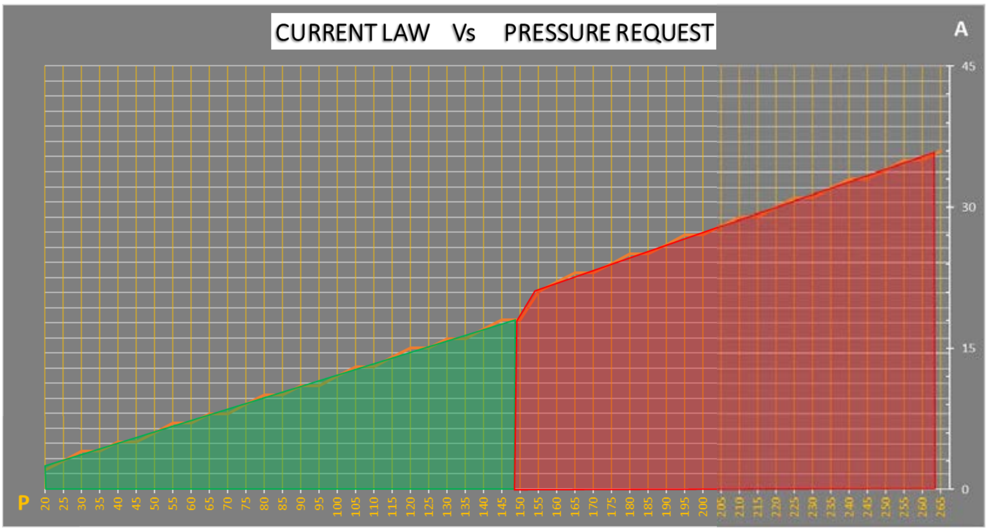



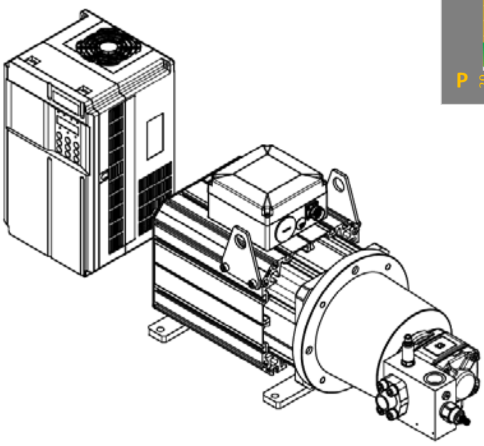


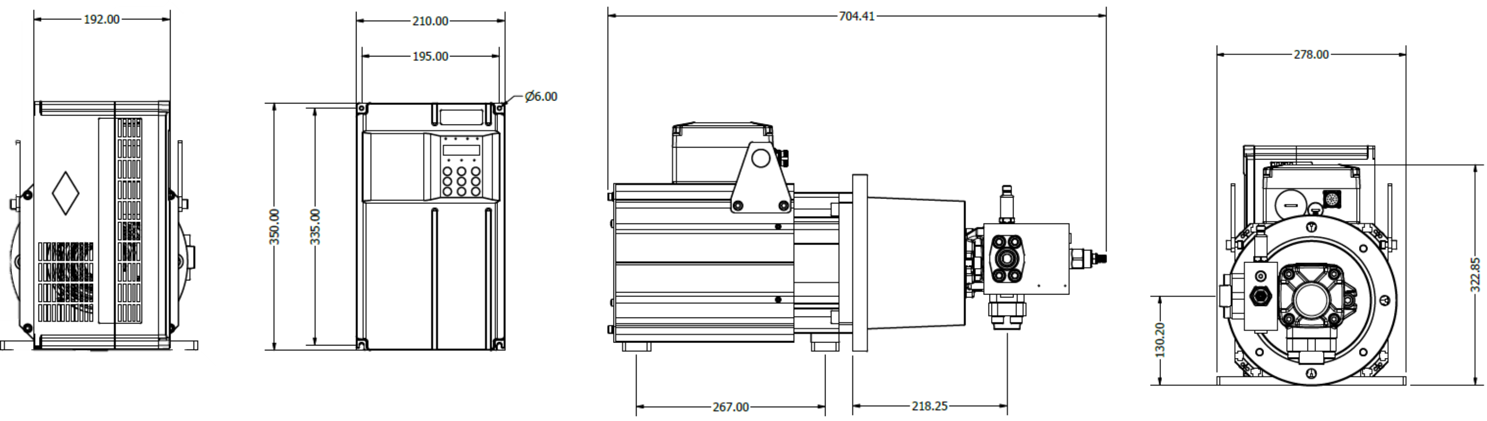
192.00
210.00
195.00
Ø6.00
350.00
335.00
733.31
285.00
218.25
278.00
321.00
130.20

# KSPH-35

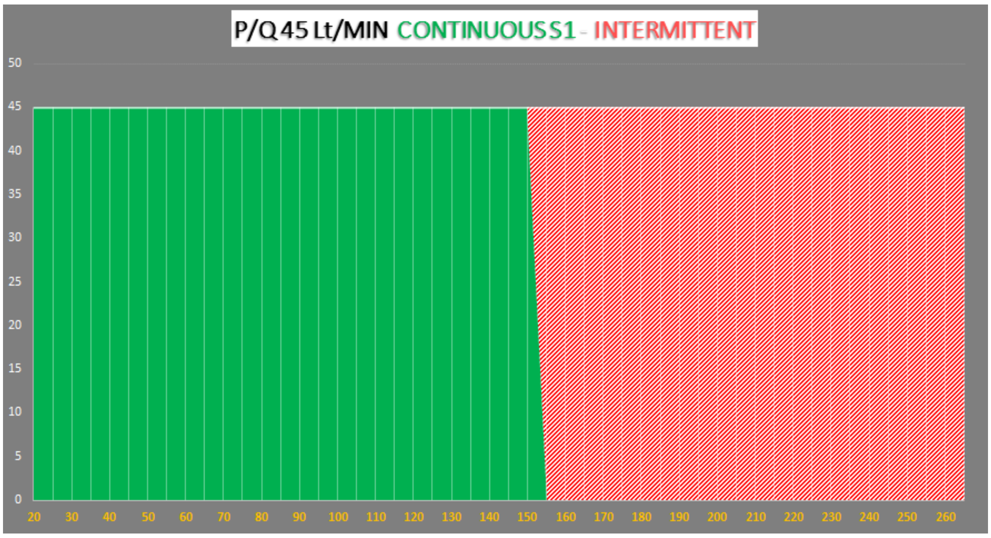

P/Q 35 Lt/MIN CONTINUOUS S1 - INTERMITTENT
0 5 10 15 20 25 30 35 40
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260

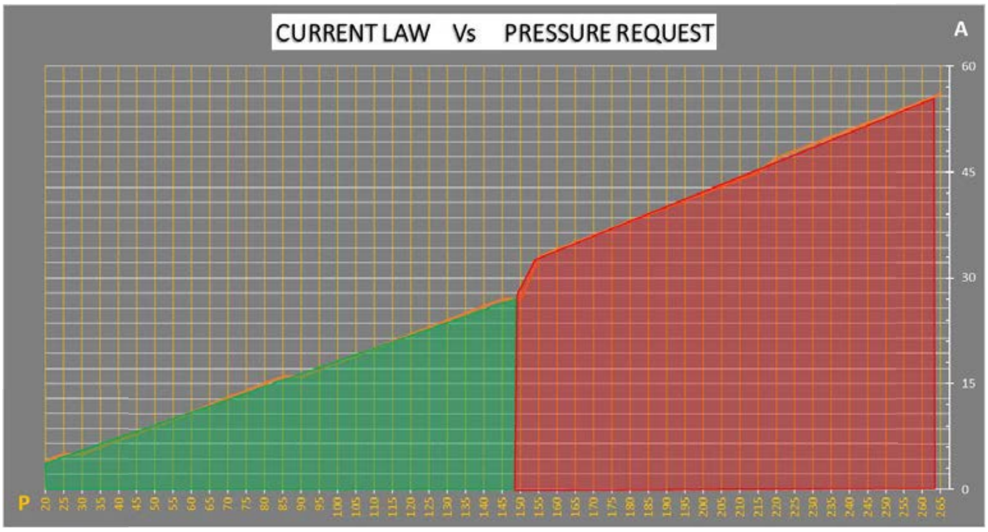

CURRENT LAW Vs PRESSURE REQUEST
A
0 15 30 45
P
20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265

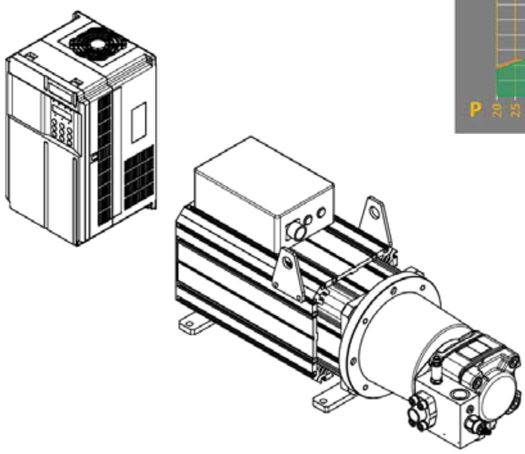


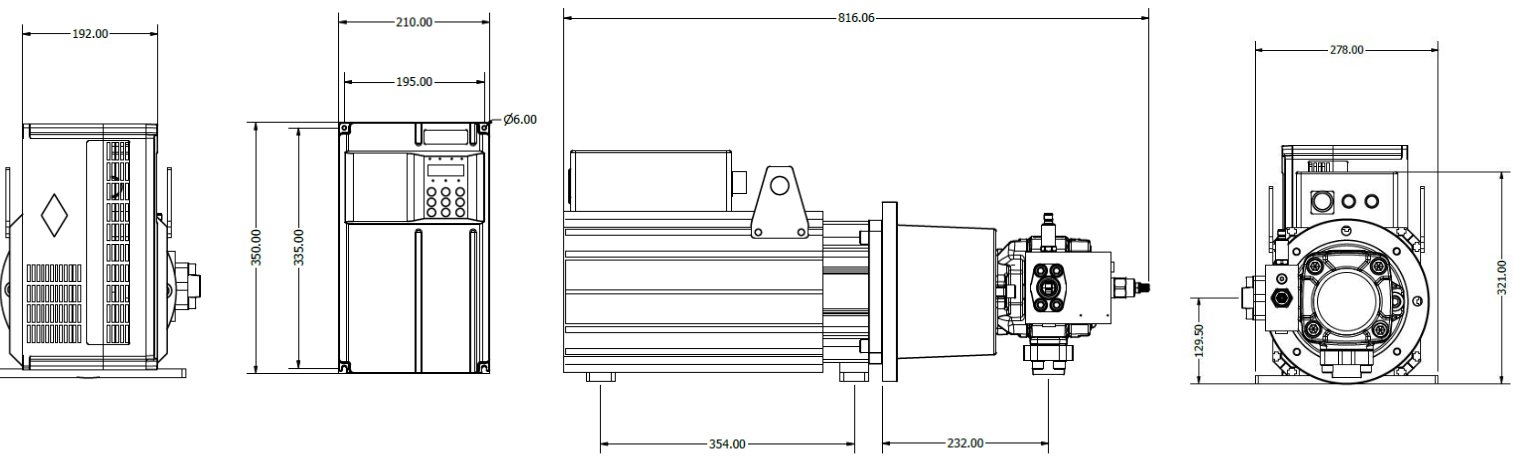

192.00
210.00
195.00
Ø6.00
350.00
335.00
704.41
267.00
218.25
278.00
322.85
130.20

# KSPH-45

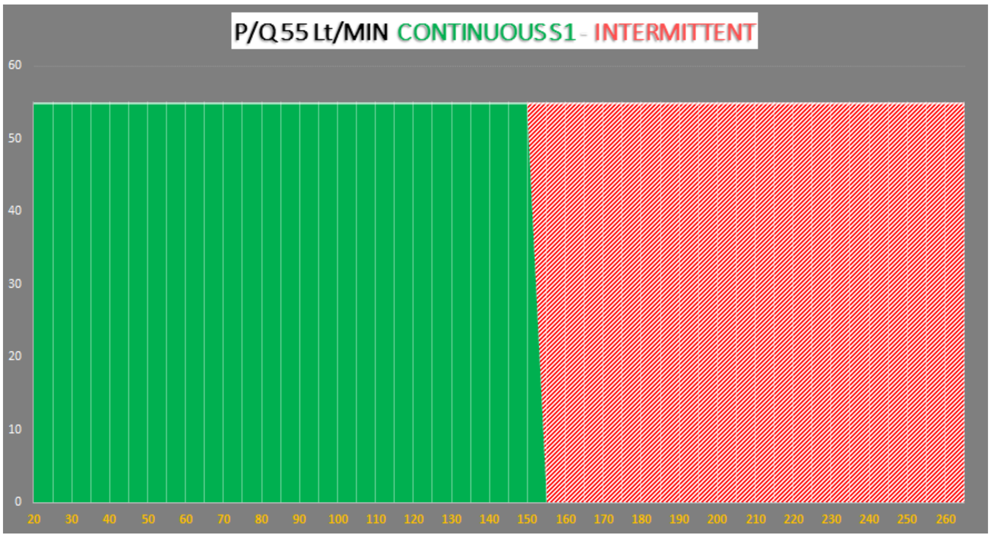

P/Q 45 Lt/MIN CONTINUOUS S1 - INTERMITTENT
50
45
40
35
30
25
20
15
10
5
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260


CURRENT LAW Vs PRESSURE REQUEST
A
60
45
30
15
0
P



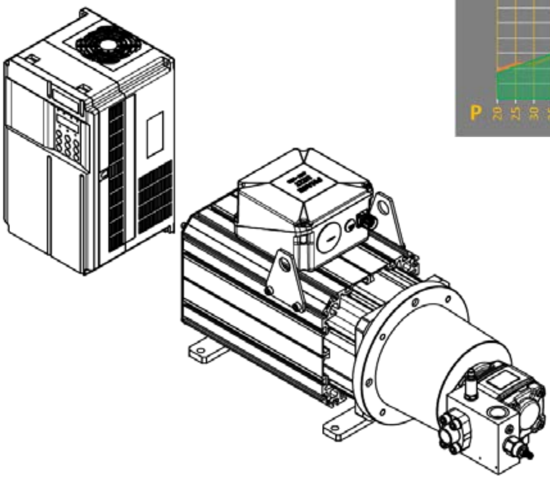

192.00
210.00
195.00
Ø6.00
350.00
335.00
816.06
354.00
232.00
278.00
321.00
129.50

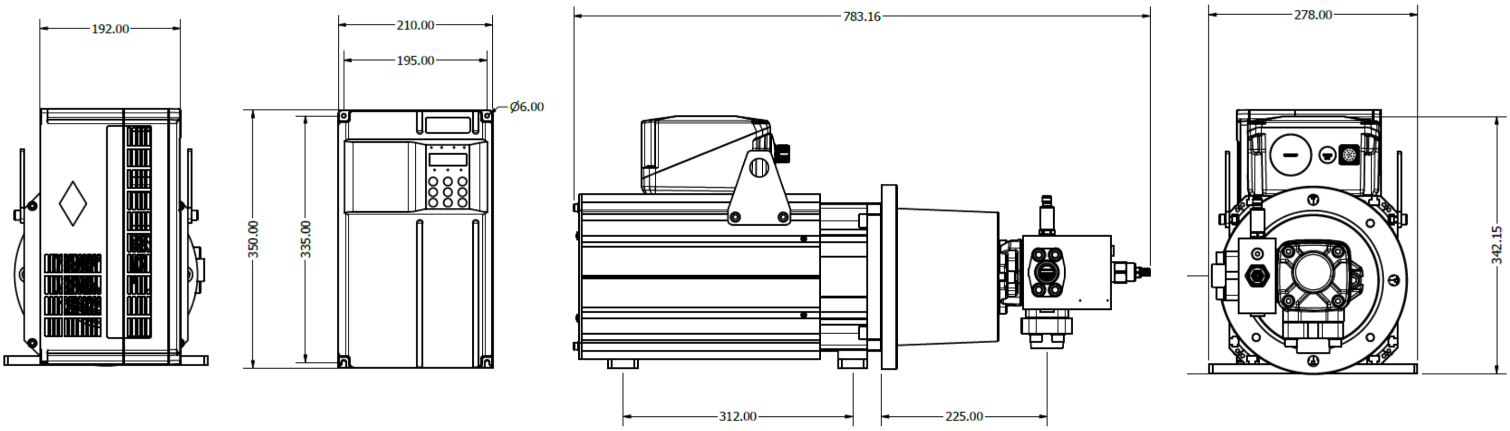
## KSPH-55



P/Q 55 Lt/MIN CONTINUOUS S1 - INTERMITTENT

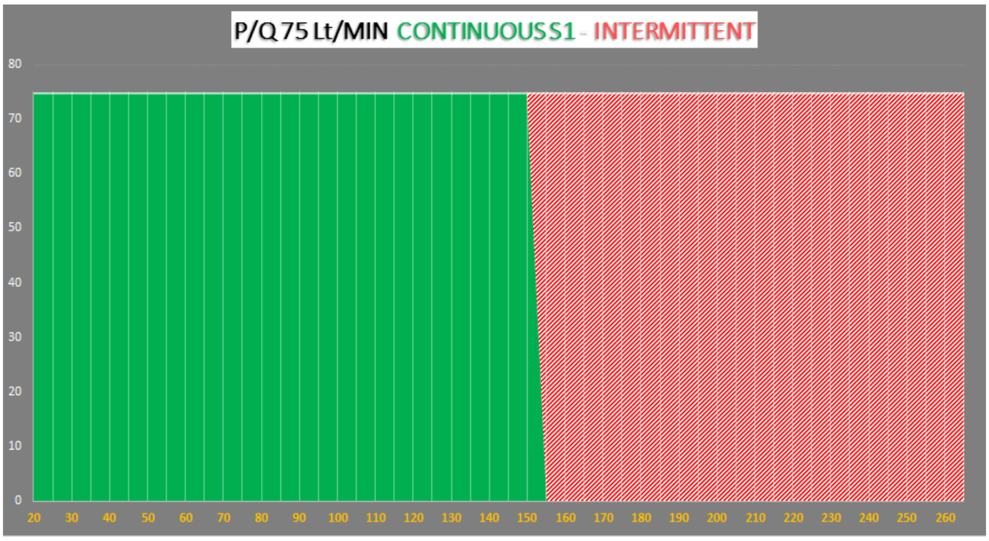

CURRENT LAW Vs PRESSURE REQUEST
A
P

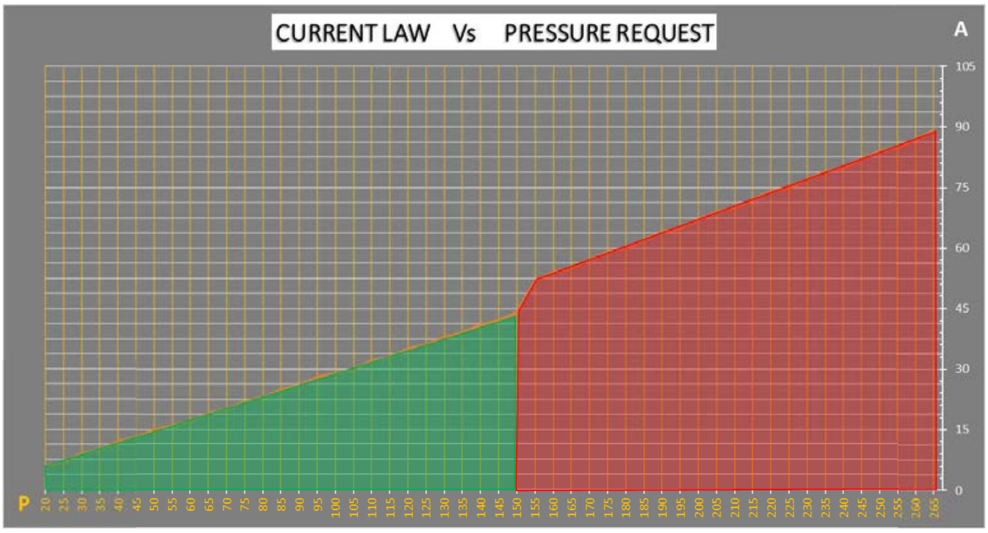



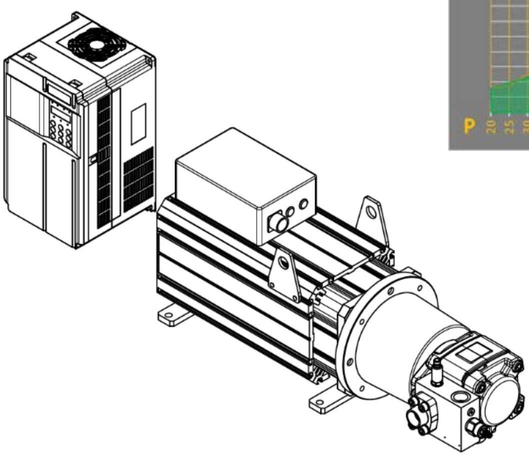


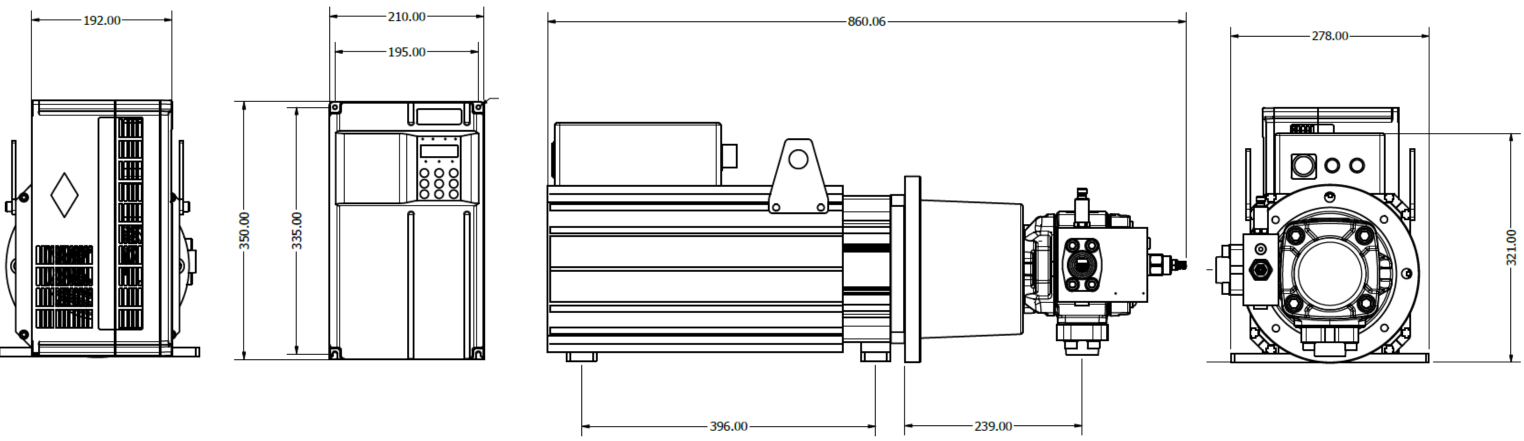
192.00
210.00
195.00
Ø6.00
350.00
335.00
783.16
312.00
225.00
278.00
342.15

# KSPH-75

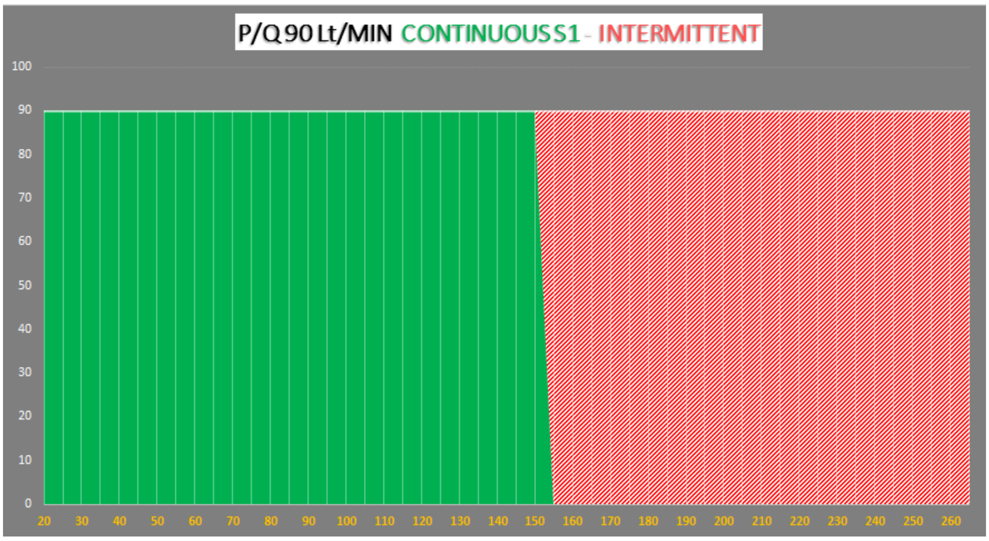

P/Q 75 Lt/MIN CONTINUOUS S1 - INTERMITTENT
80
70
60
50
40
30
20
10
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260

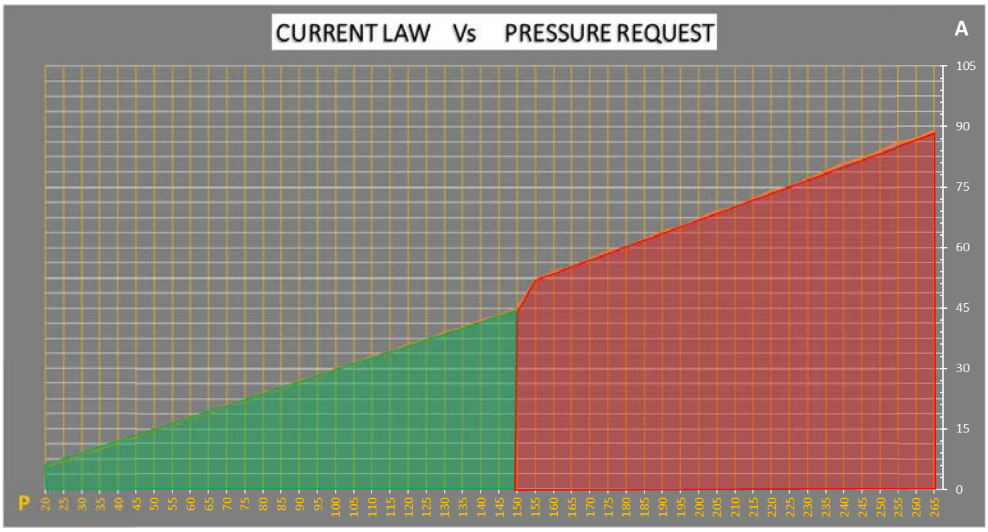

CURRENT LAW Vs PRESSURE REQUEST
A
105
90
75
60
45
30
15
0
P

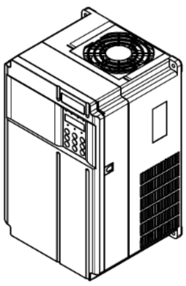


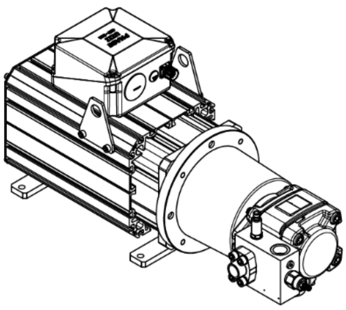

192.00
210.00
195.00
350.00
335.00
860.06
396.00
239.00
278.00
321.00

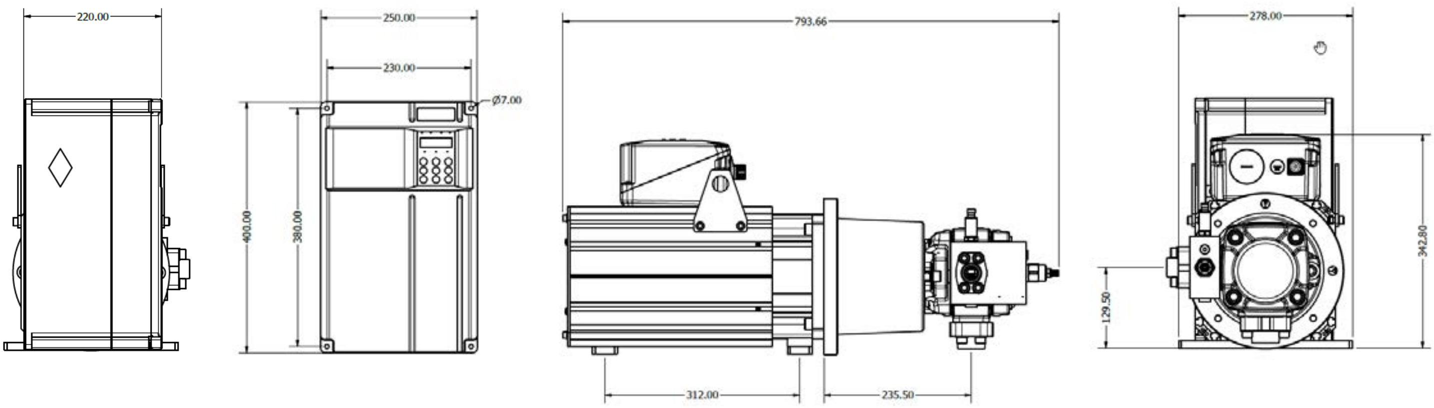
# KSPH-90


P/Q 90 Lt/MIN CONTINUOUS S1 - INTERMITTENT
100
90
80
70
60
50
40
30
20
10
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260

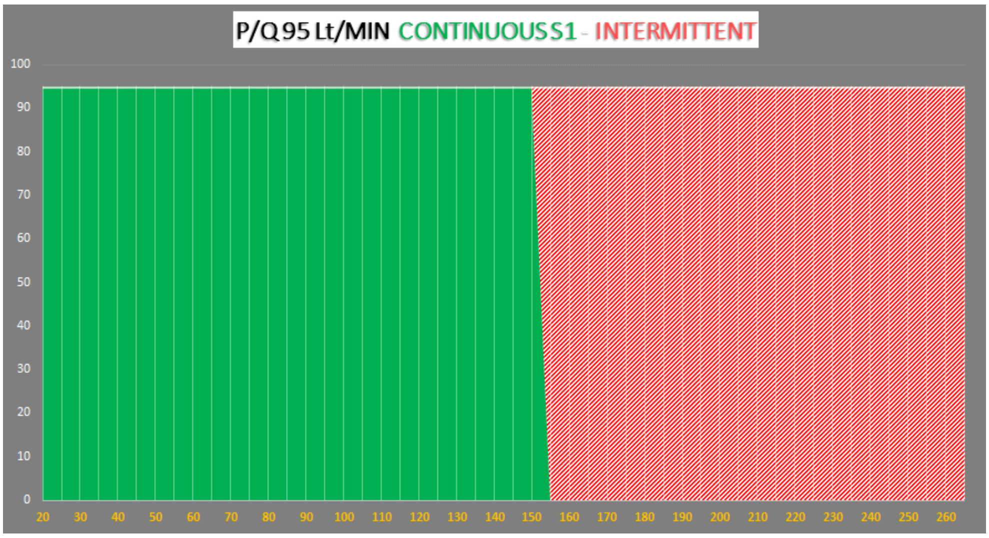

CURRENT LAW Vs PRESSURE REQUEST
A
105
90
75
60
45
30
15
0
P
20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265

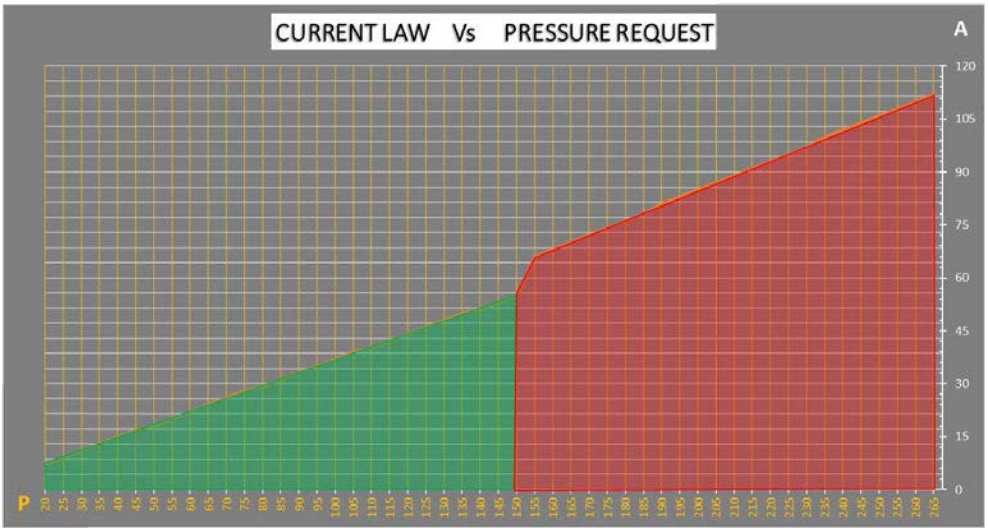


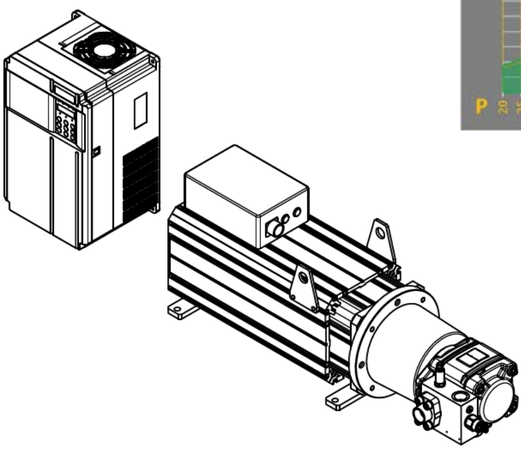


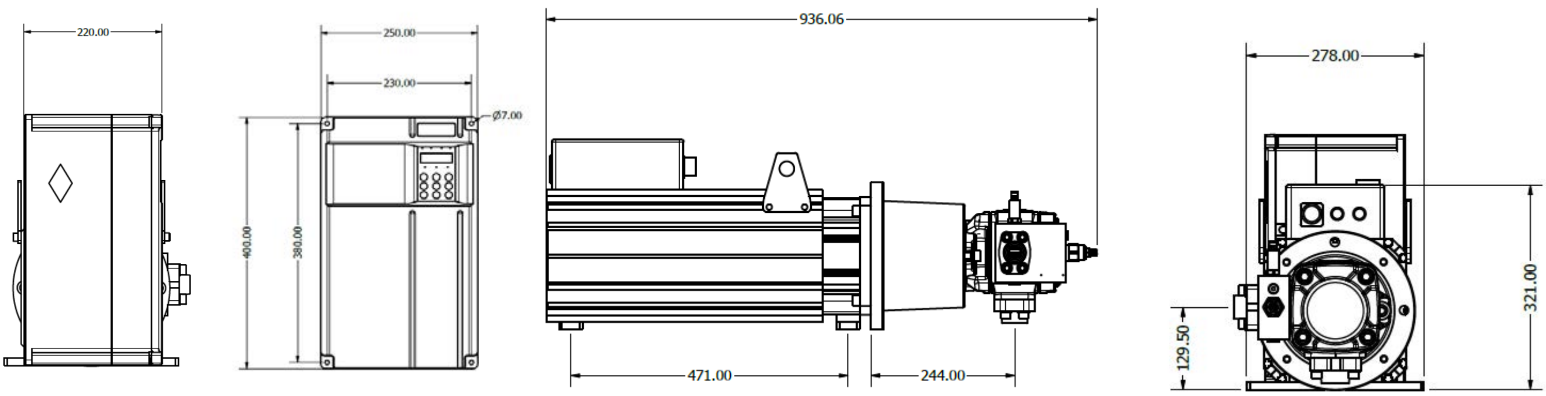

220.00
250.00
230.00
Ø7.00
400.00
380.00
793.66
312.00
235.50
278.00
342.80
129.50

## KSPH-95

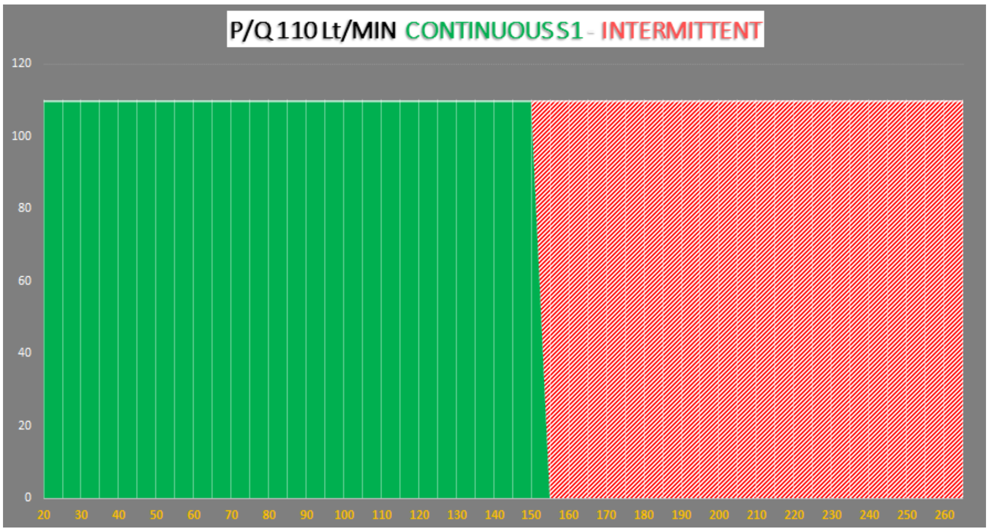

P/Q 95 Lt/MIN CONTINUOUS S1 - INTERMITTENT

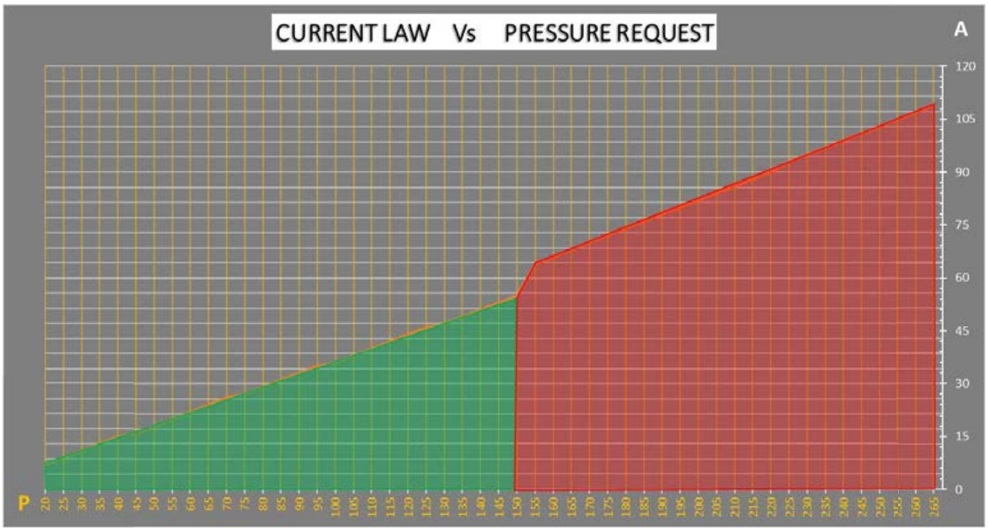

CURRENT LAW Vs PRESSURE REQUEST
A
P

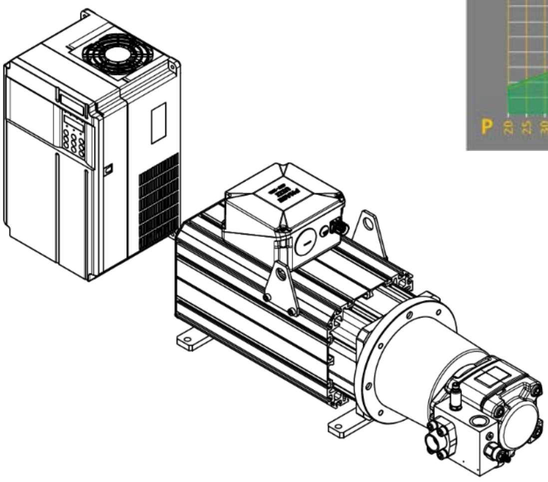


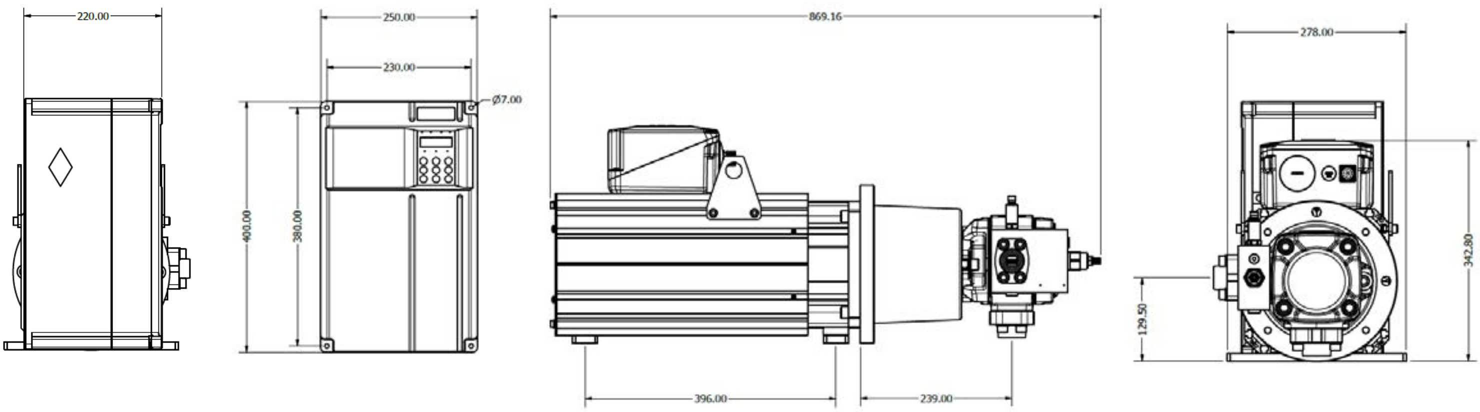

220.00
250.00
230.00
Ø7.00
400.00
380.00
936.06
471.00
244.00
278.00
321.00
129.50

## KSPH-110

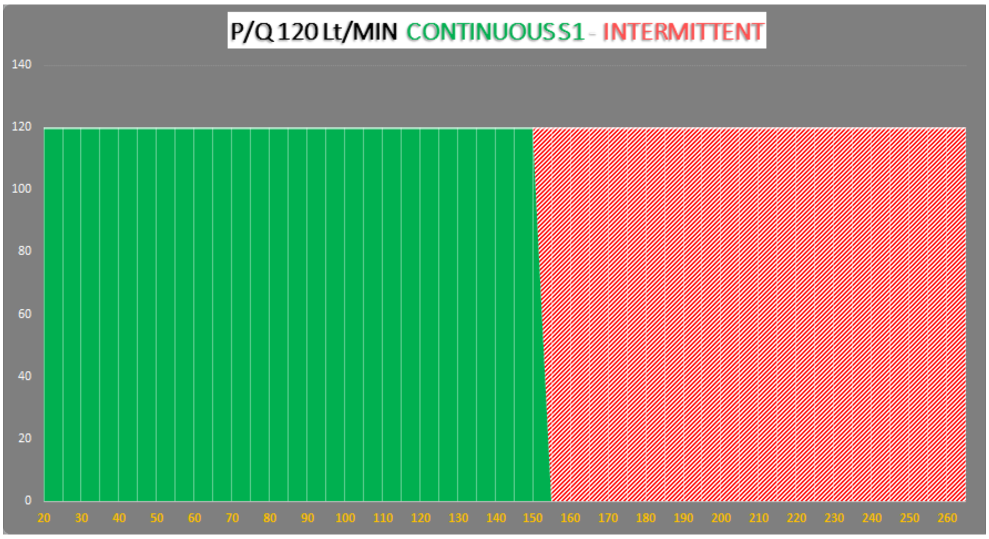

P/Q 110 Lt/MIN CONTINUOUS S1 - INTERMITTENT
120
100
80
60
40
20
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260


CURRENT LAW Vs PRESSURE REQUEST
A
120
105
90
75
60
45
30
15
0
P

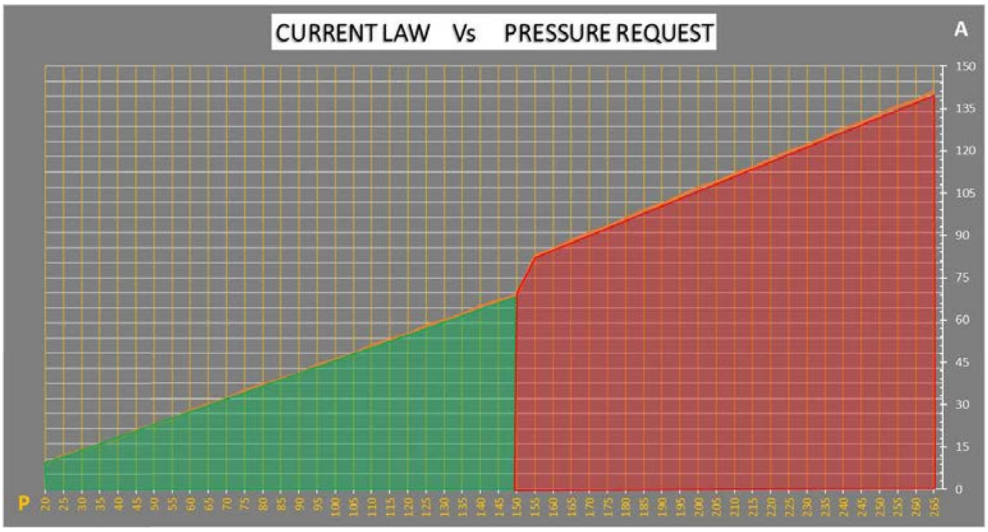



220.00
250.00
230.00
Ø7.00
400.00
380.00
869.16
396.00
239.00
278.00
129.50
342.80

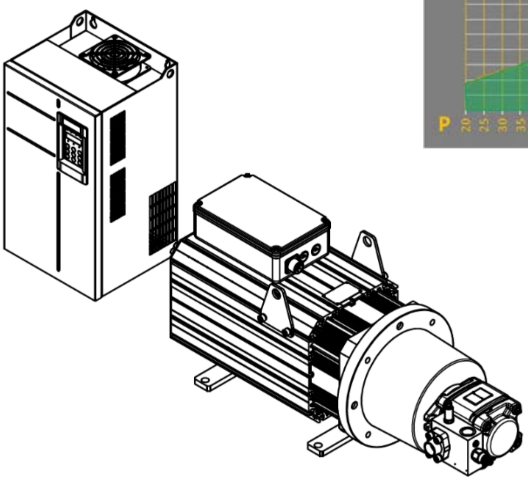
# KSPH-120

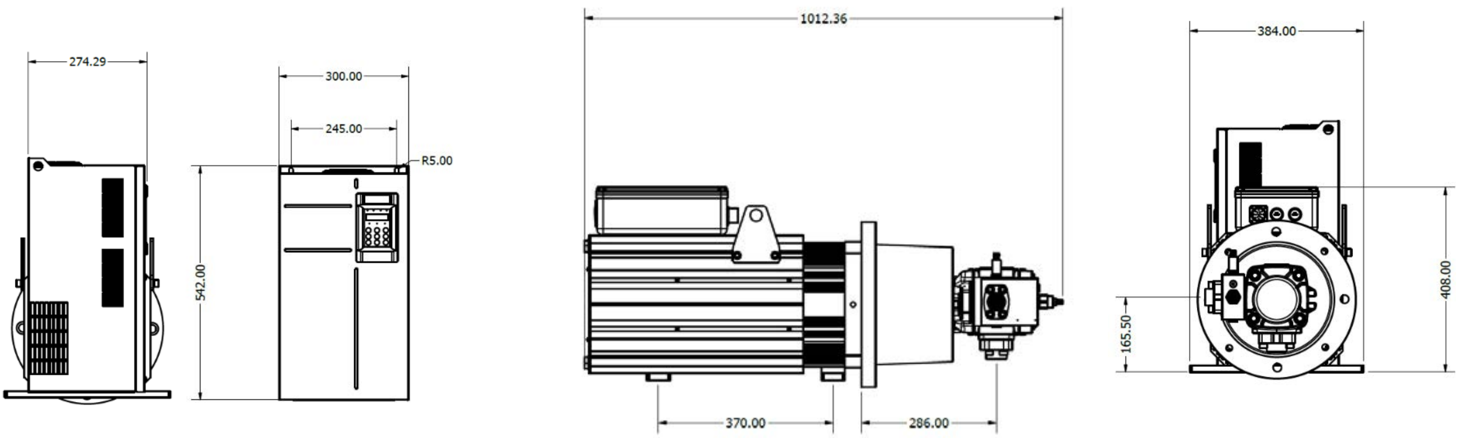


P/Q 120 Lt/MIN CONTINUOUS S1 - INTERMITTENT

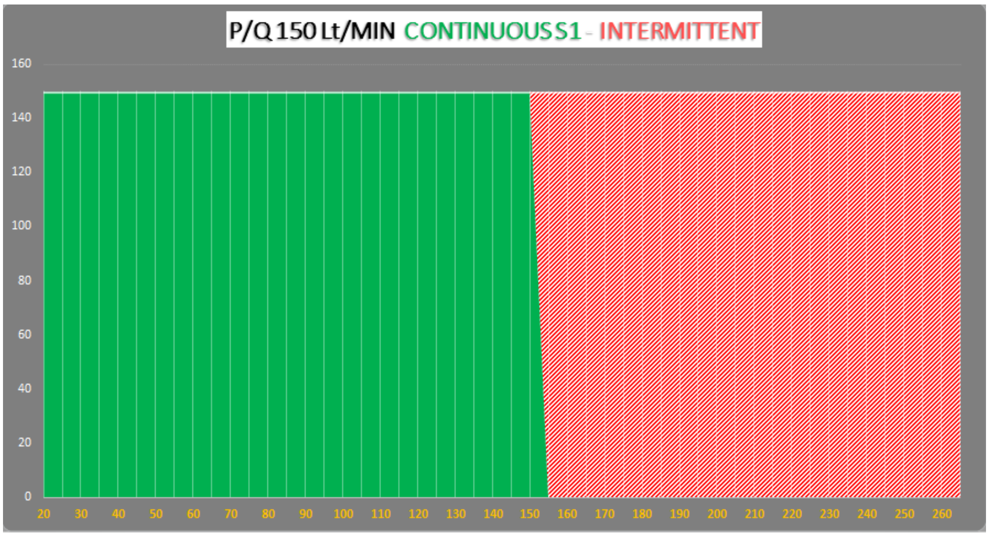
CURRENT LAW Vs PRESSURE REQUEST
A
P

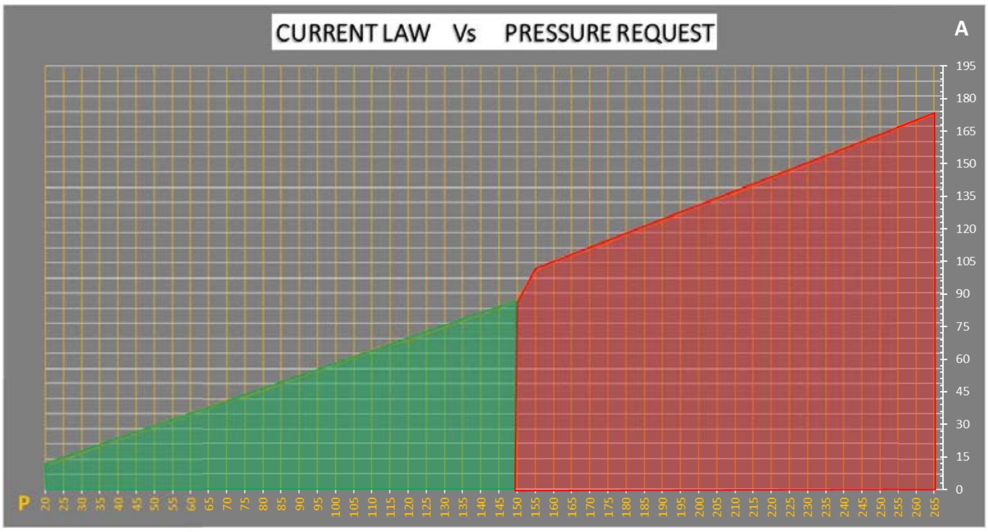


274.29
300.00
245.00
R5.00
542.00
1012.36
370.00
286.00
384.00
165.50
408.00

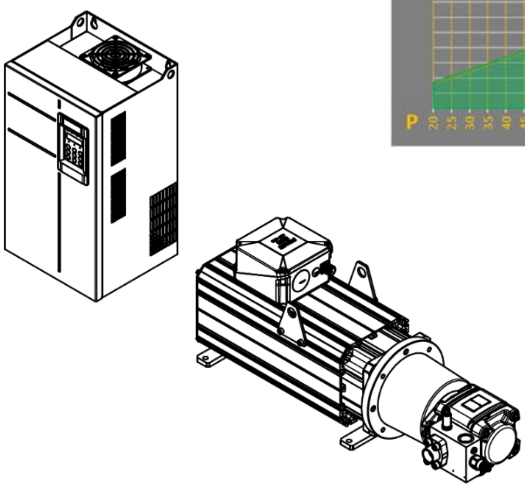
## KSPH-150

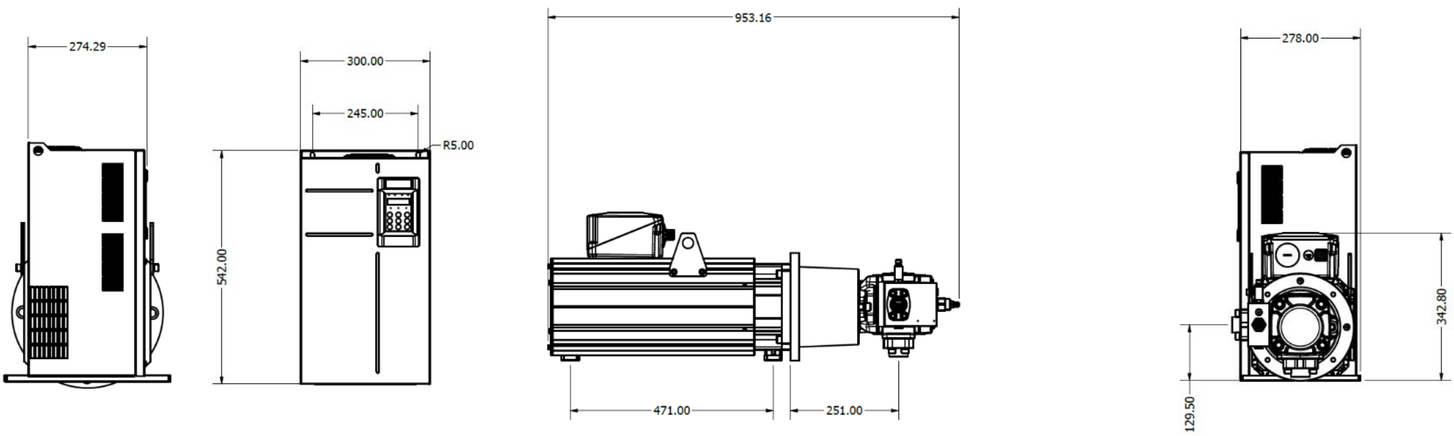


P/Q 150 Lt/MIN CONTINUOUS S1 - INTERMITTENT

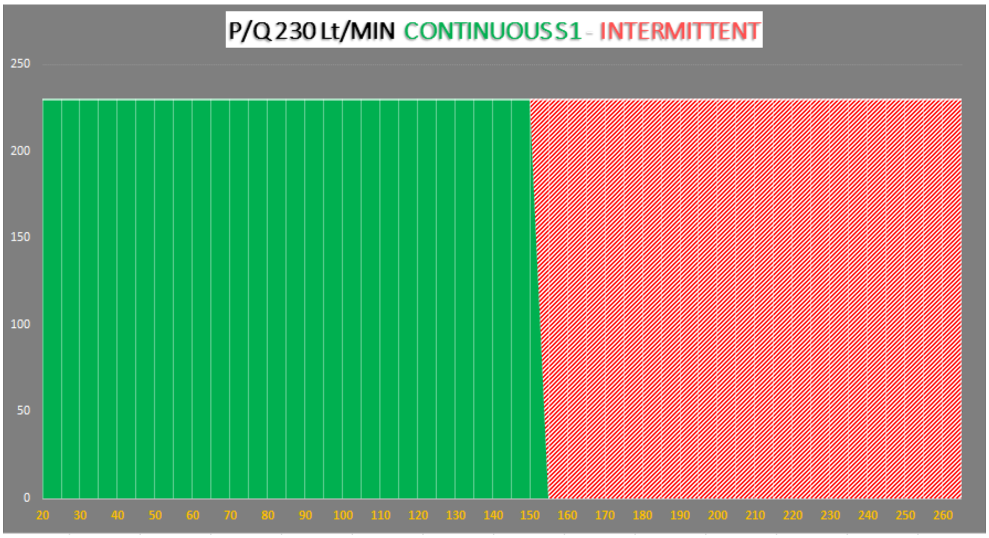
CURRENT LAW Vs PRESSURE REQUEST
A
P

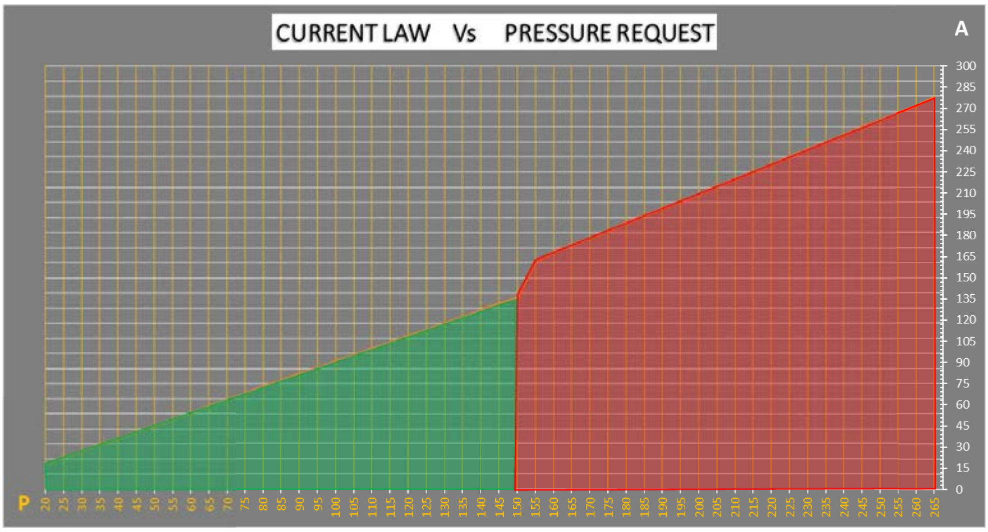



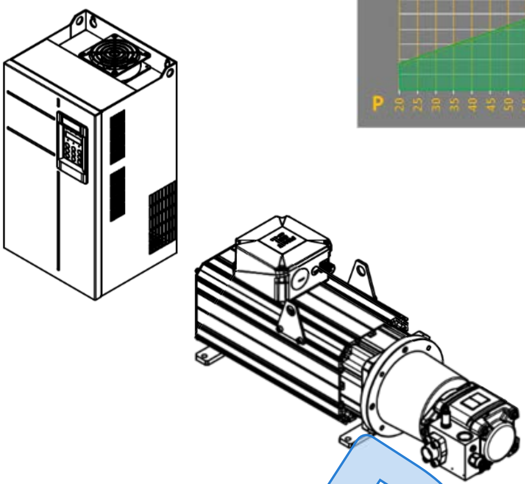


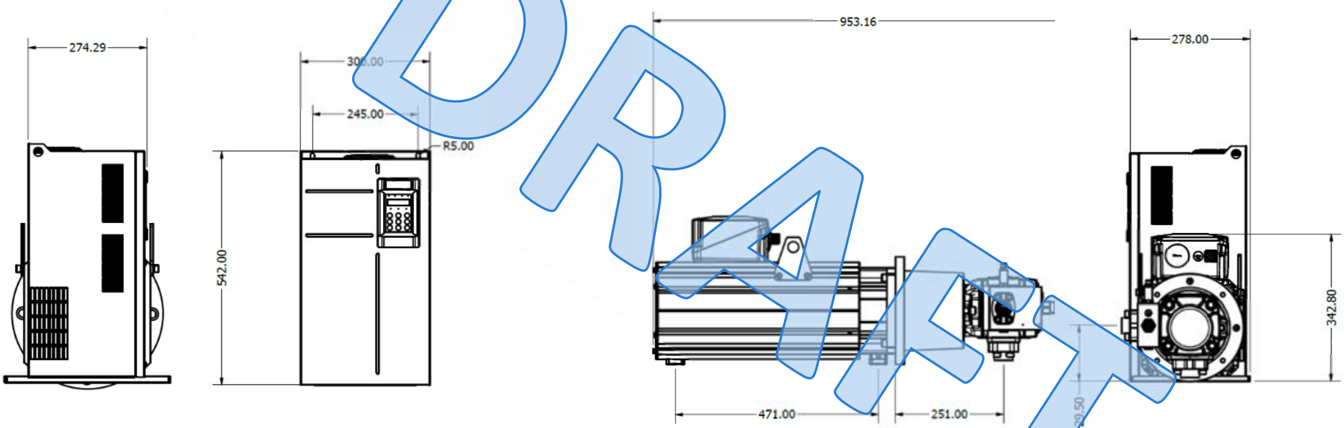
274.29
300.00
245.00
R5.00
542.00
953.16
471.00
251.00
278.00
342.80
129.50

# KSPH-230

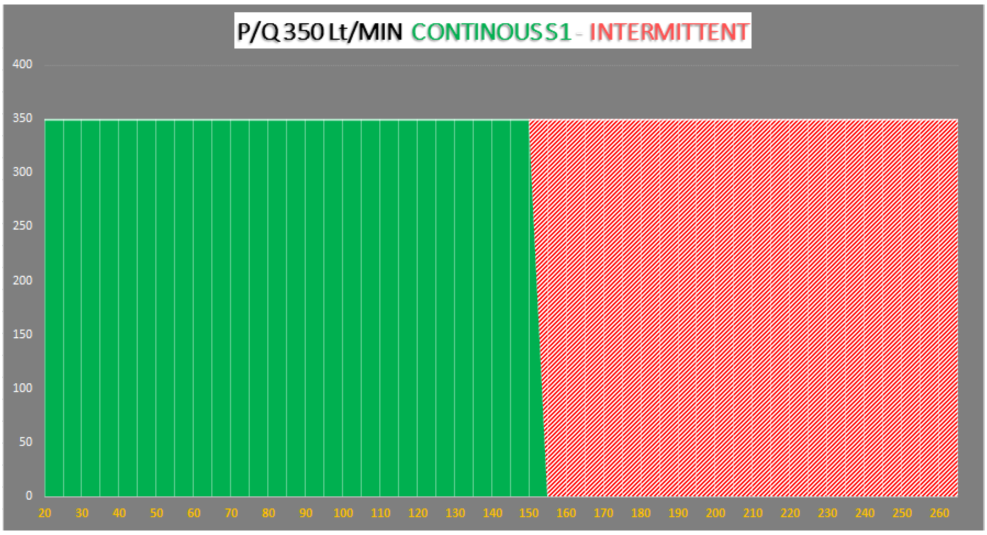

P/Q 230 Lt/MIN CONTINUOUS S1 - INTERMITTENT
250
200
150
100
50
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260

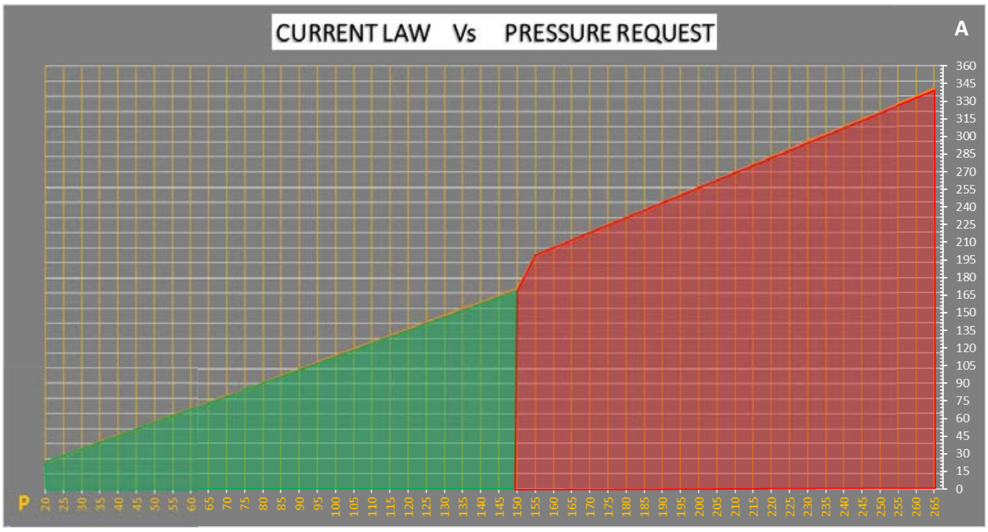

CURRENT LAW Vs PRESSURE REQUEST
A
P

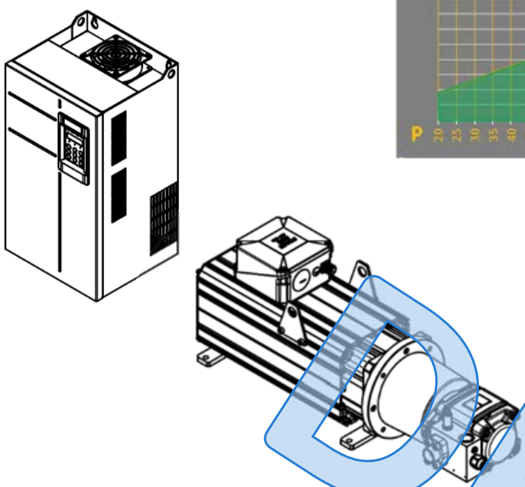


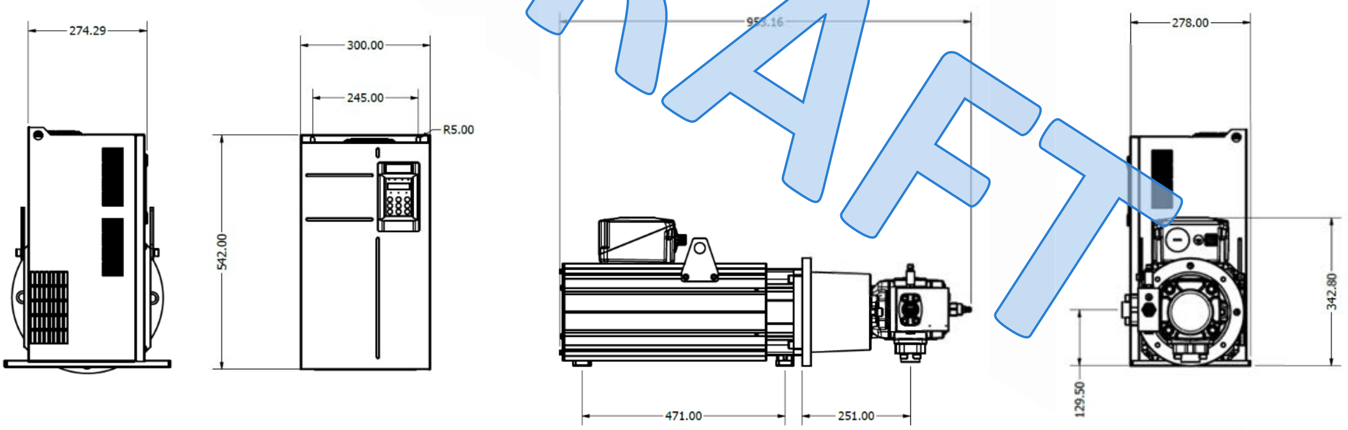

274.29
300.00
245.00
R5.00
542.00
953.16
471.00
251.00
278.00
342.80

# KSPH-350


P/Q 350 Lt/MIN CONTINOUS S1 - INTERMITTENT
400
350
300
250
200
150
100
50
0
20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260


CURRENT LAW Vs PRESSURE REQUEST
A
P




274.29
300.00
245.00
R5.00
542.00
471.00
251.00
278.00
342.80
129.50

# Accessories

| External line filters not necessary for cable length between motor and inverter less than 6 mt<br>(it is necessary to exclude the integrated line filter in the driver) | | |
|---|---|---|
| **CODE** | **DESCRIPTION** | **DIMENSIONS** |
| KSPH-FN3258-42-33 | For KSPH-25 & KSPH-35 RATED CURRENT 36.3 A | 310*50*85mm |
| KSPH-FN3258-55-34 | For KSPH-45 & KSPH-55 RATED CURRENT 45 A | 250*85*90mm |
| KSPH-FN3258-75-34 | For KSPH-55 & KSPH-75 RATED CURRENT 59 A | 270*80*135mm |
| KSPH-FN3258-100-35 | For KSPH-75 - KSPH-90 - KSPH-95 – KSPH-110 RATED CURRENT 90 A | 270*90*150mm |
| KSPH-FN3258-150-40 | For KSPH-95 - KSPH-110 - KSPH-120 – KSPH-150 – KSPH-230 – KSPH-350 RATED CURRENT 160 A | 380*120*170mm |

| AC INPUT REACTOR | | |
|---|---|---|
| **CODE** | **DESCRIPTION** | **DIMENSIONS** |
| KSPH-LR3-40-3-50 | For KSPH-25 – KSPH-35 – KSPH-45 RATED CURRENT 50 A | 160*195*92mm |
| KSPH-LR3 40-3-63 | For KSPH-55 & KSPH-75 RATED CURRENT 63 A | |
| KSPH-LR3 40-3-80 | For KSPH-75 & KSPH-90 RATED CURRENT 80 A | 188*160*135mm |
| KSPH-LR3 40-3-90 | For KSPH-90 - KSPH-95 – KSPH-110 RATED CURRENT 90 A | |
| KSPH-LR3 40-3-125 | For KSPH-95 - KSPH-110 - KSPH-120 RATED CURRENT 125 A | 250*230*155mm |
| KSPH-LR3 40-3-200 | For KSPH-120 - KSPH-150 - KSPH-230 RATED CURRENT 200 A | 250*230*175mm |
| KSPH-LR3 40-3-250 | For KSPH-230 - KSPH-350 RATED CURRENT 250 A | 250*260*175mm |

| BREAKING RESISTOR | | |
|---|---|---|
| **CODE** | **DESCRIPTION** | **DIMENSIONS** |
| N.A. | From KSPH-25 to KSPH-230 BUILD IN | |
| KSPH-MDBUN-60-5T | KSPH-350 N°2 PCS | 200*70*15mm |

| ELETRONICS EXPANSIONS FOR ALL KSPH MODELS | |
|---|---|
| **CODE** | **DESCRIPTION** |
| KSPH-MD32NKE1 | EXTENSIONAL OPERATION KEYPAD FOR DRIVE |
| KSPH-MD38CAN1 | SUPPORTS FOR CANlink |
| KSPH-MD38CAN2 | SUPPORTS FOR CANopen |
| KSPH-MD38DP2 | SUPPORTS FOR PROFIBUS DP |
| KSPH-MD38TX1 | SUPPORTS FOR MODBUS, RS485 |
| KSPH-MDPCKIT02 | COMMUNICATION KIT FOR PC VIA RJ45 |

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