

ZEUS HYDRATECH LTD
Global Suppliers of Premium Hydraulic Components

Official UK Distributor for Duplomatic Hydraulic Components

T: +44(0)1172 130042. E: sales@zeushydratech.com. W: zeushydratech.com

SUT

SUPER UNIT (HYBRID HYDRAULIC POWER UNIT) SERIES 40

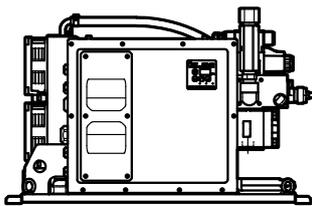
TANK CAPACITY
100 litres

MOTOR PUMP FLOW RATE
up to 83 l/min

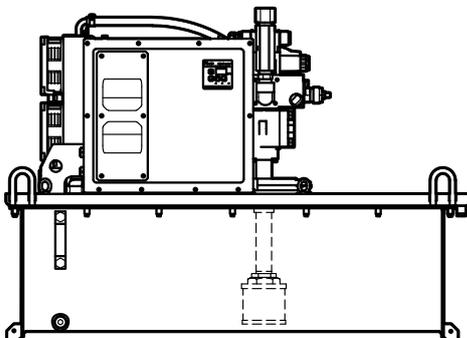


DESCRIPTION

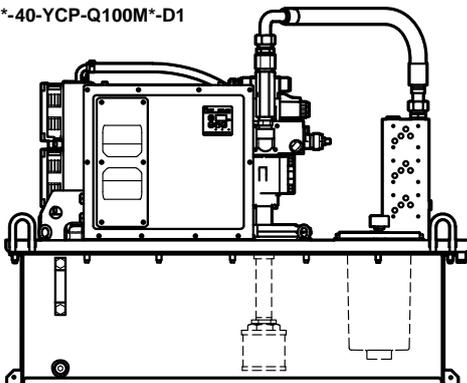
SUT****-40-YCP-Q-D1



SUT****-40-YCP-Q100-D1



SUT****-40-YCP-Q100M*-D1



The hybrid SUPER UNITS are designed and manufactured by Daikin Industries LTD., merging the hydraulics technology with an interior permanent magnet synchronous motor.

The result is a power pack that achieves high torque and maximum efficiency while suppressing heat and noise generation.

The high efficiency of the motor-pump ensures that oil heating is minimal. This results in advantages for the machinery on which the SUPER UNIT works in terms of oil and heat-sensitive parts life, and less heat dissipation in the surrounding ambient.

The power pack is designed for 3-phase AC 380 to 480V 50/60 Hz.

On SUTs equipped with a double pump, the primary pump delivers high pressure and limited flow. When the flow rate request is higher than the flow rate that the primary pump can supply, the second pump is also activated guaranteeing the required flow, with lower pressure.

The transition from single to combined operation is done by a solenoid valve, that can be managed automatically by the SUT, or activated by an external signal from the PLC.

The SUPER UNITS are deliverable with:

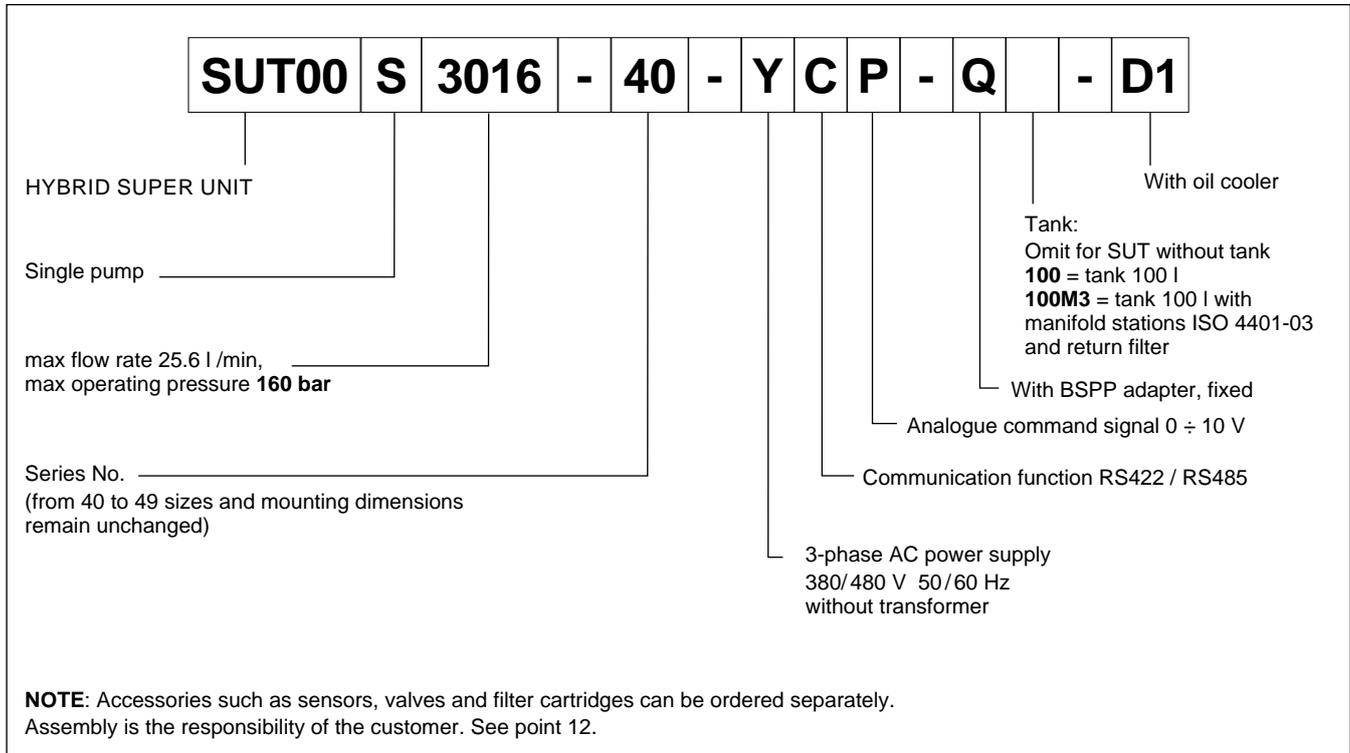
- mounting frame, no tank
- 100-litres tank, equipped with suction filter, level switch and blind plate that customers may customize.
- 100-litres tank equipped with suction filter, level switch, multi-station manifold for stackable valves and return filter.

Accessories and valves can be ordered separately.

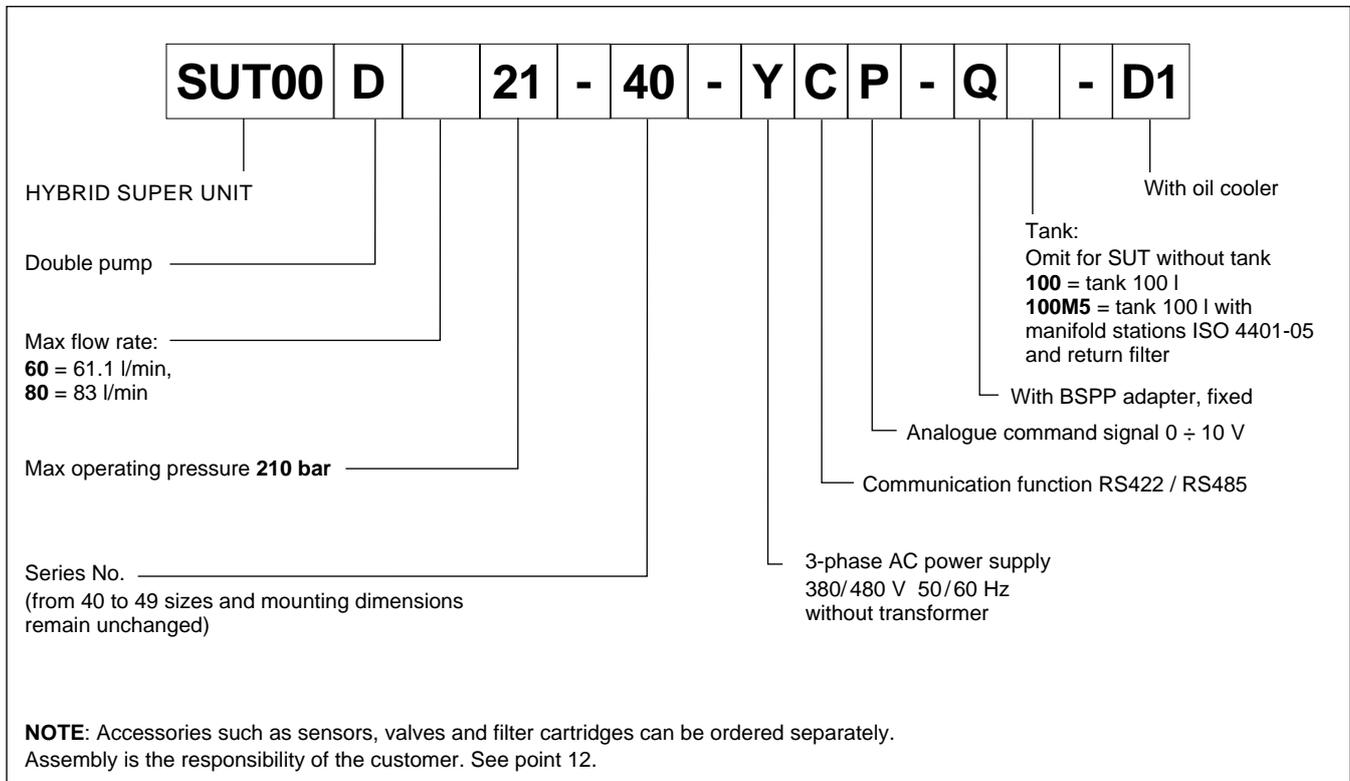


1 - IDENTIFICATION CODE

1.1 - Version with single pump



1.2 - Version with double pump





2 - SPECIFICATIONS

		SUT00S3016		SUT00D6021		SUT00D8021	
		Q	Q100	Q	Q100	Q	Q100
Maximum operating pressure	bar	160		210		210	
Operating pressure range: - 1 st pump (HP) - 1 st + 2 nd pump (HP+LP)	bar	5 ÷ 160 -		5 ÷ 210 5 ÷ 70		5 ÷ 210 5 ÷ 70	
Operating flow range (NOTE 1): - 1 st pump (HP) - 1 st + 2 nd pump (HP+LP)	l/min	3.5 ÷ 24.3 -		3.1 ÷ 21.2 8.8 ÷ 61		4.1 ÷ 28.7 11.6 ÷ 82	
Tank capacity	l	-	100	-	100	-	100
Oscillating volume			30	-	30	-	30
Main supply voltage permissible voltage fluctuation		3-phase AC 380 V to 480 V - 50 / 60 Hz ±10%					
Controller supply voltage		-		24V DC (min 50 W)			
Nominal motor power	kW	3.0		3.0		4.0	
Rated current	A	9.3		10.3		14.1	
No-fuse breaker capacity	A	15		15		20	
Ambient temperature range	°C	0 to +40					
Fluid temperature range in the tank	°C	0 to +60 (recommended +15 to +50)					
Fluid contamination degree		ISO 4406:1999 class 20/18/15					
Viscosity		Viscosity grade: ISO VG32 to 68 • Viscosity range: 15 to 400 mm ² /s					
Operating ambient humidity	RH	< 85%, without condensation					
Protection class		IP44					
Noise level (NOTE 2): - 1 st pump (HP) - 1 st + 2 nd pump (HP+LP)	dB	DH (160 bar) 52 dBA 25.6 l/min (20 bar) 70 dBA		DH (210 bar) 57 dBA 61.1 l/min (20 bar) 74 dBA		DH (210 bar) 57 dBA 83 l/min (20 bar) 77 dBA	
Installation		altitude max 1000 m, indoor, fixed on a flat surface without vibrations.					
Mass: - without tank - 100 - 100M*	kg	56 - -	- 126 132	62 - -	- 133 148	76 - -	- 147 164

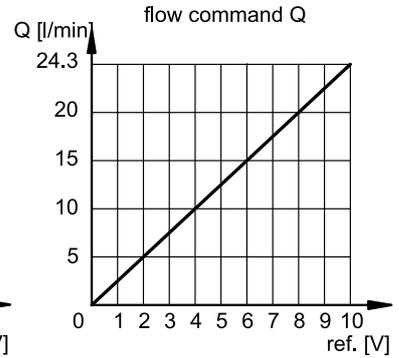
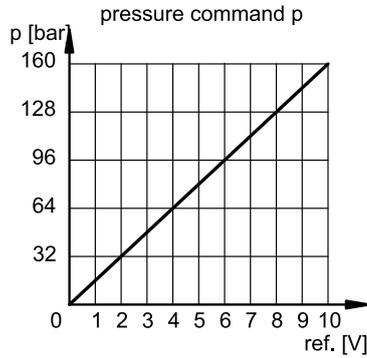
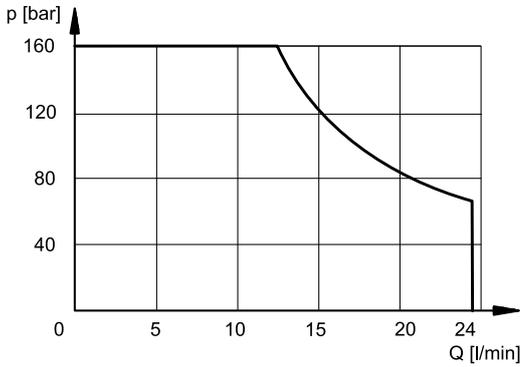
external input signals	analogue input	2 channels; pressure command 0 ÷ 10 V; flow command 0 ÷ 10 V.
	digital input	6 channels, photo coupler insulation, 24V DC (max 27 V DC), 5 mA per channel.
external output signals	analogue output	2 channels; pressure monitor 0 ÷ 10 V; flow monitor ± 10 V.
	digital output	2 channels, photo coupler insulation, open collector output, 24V DC, 50 mA max per channel.
	contact output	1, relay output, contact capacity: 30 V DC; resistance load 0.5 A; 1 common contact.

NOTE 1: The maximum flow rate is the theoretical flow rate and is not guaranteed.

NOTE 2: The noise level is representative of the four-way average at a distance of 1 m.

3 - SUT00S3016 - CHARACTERISTICS

Values obtained and rated for ambient temperature $\leq 40\text{ }^{\circ}\text{C}$ and fluid temperature $\leq 60\text{ }^{\circ}\text{C}$, in continuous operation (S1)



4 - SUT00S WITHOUT TANK

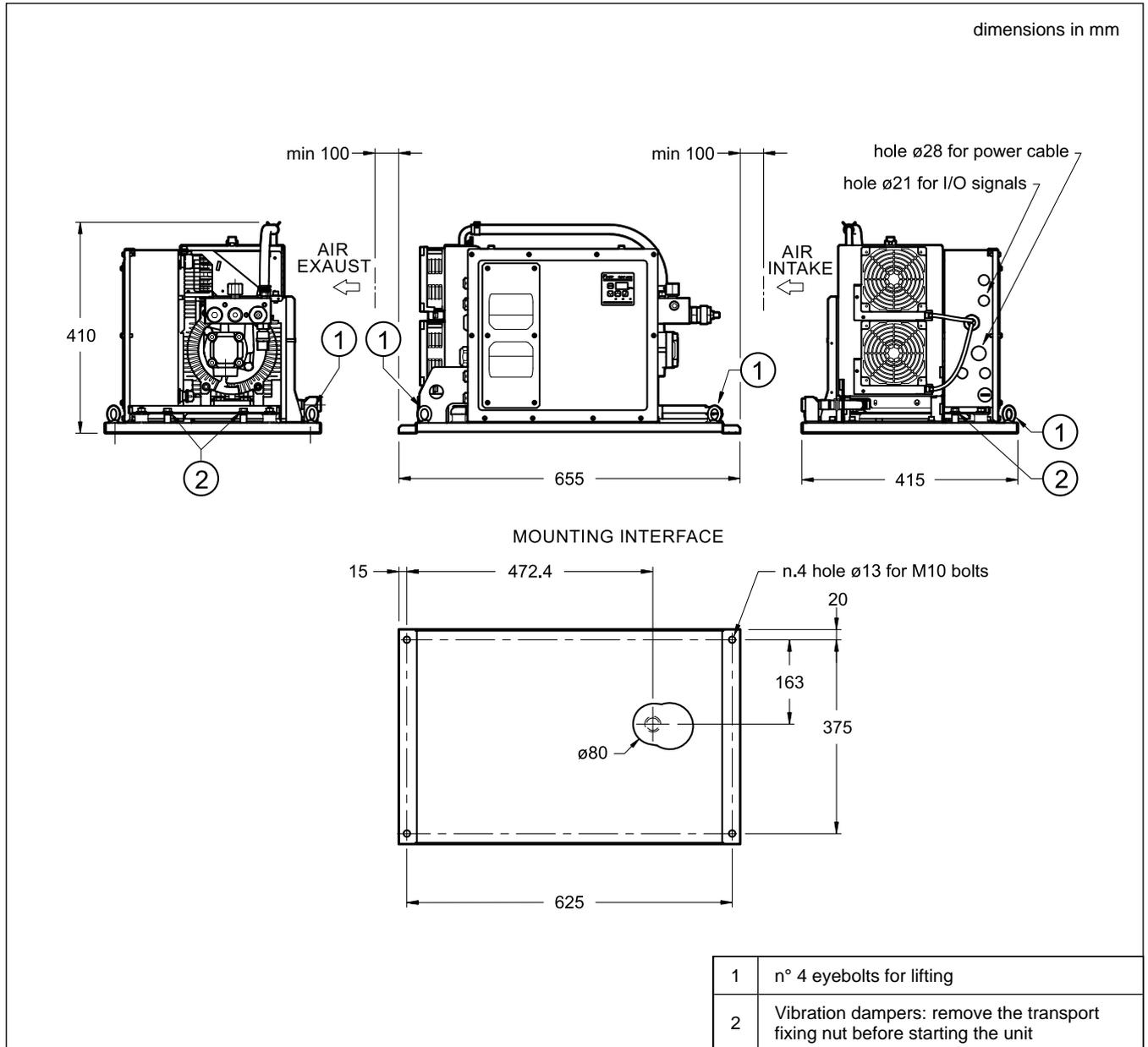
4.1 - SUT00S3016-40-YCP-Q-D1 - Main parts and options

CIRCUIT DIAGRAM

P	Pressure port: 3/8" BSPP delivered with resin cap
S	Suction port: 3/4" BSPP N. 1 OR type 4093 (23.4x3.5) delivered with resin cap
DR	Drain port: 3/8" BSPP delivered with resin cap

1	Control panel
2	Cooler
3	Fixing frame

4.2 - SUT00S3016-40-YCP-Q-D1 - Overall dimensions and mounting



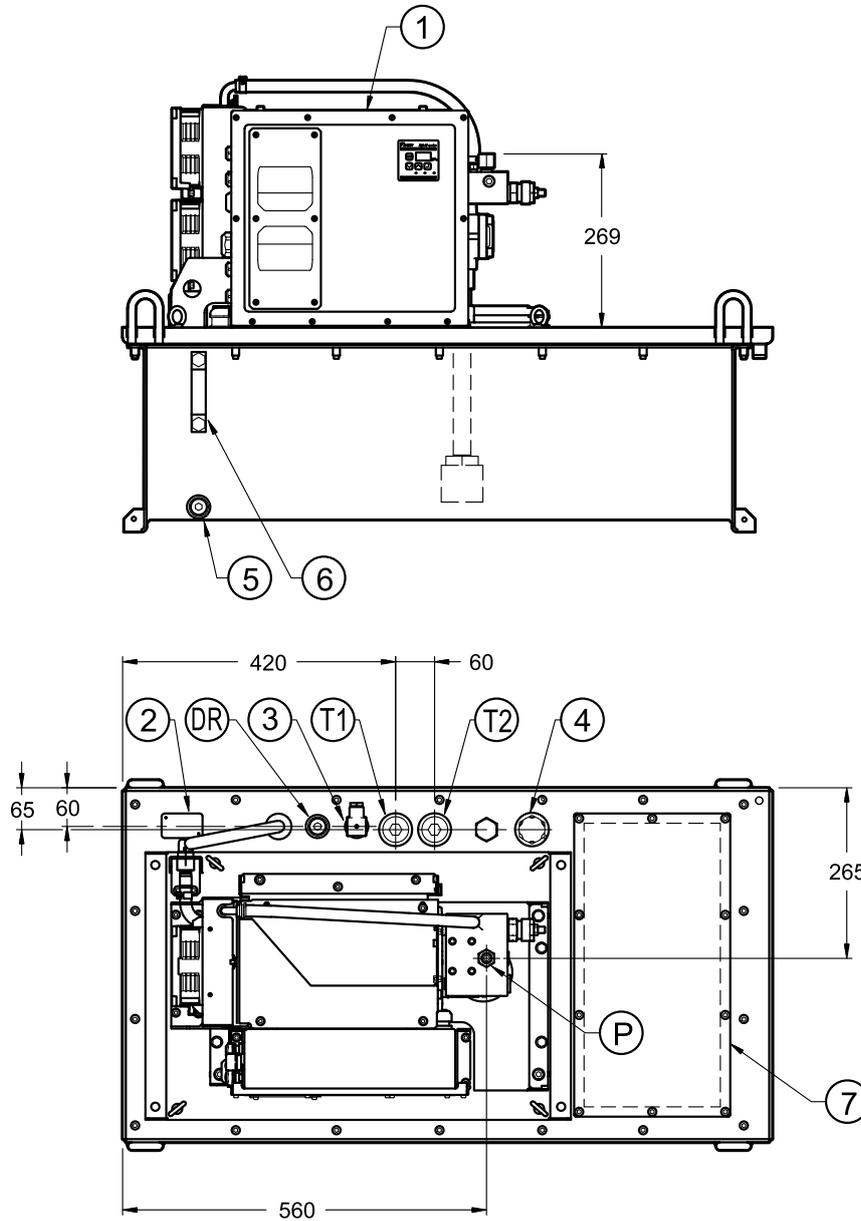
NOTE: The use of hose whip restraints devices both at pump side and at manifold side is strongly recommended to avoid the possible swip-off from the hose fitting during operation.

The SUT00S3016-40-YCP-Q100M3-D1 models come already equipped with these devices.

5 - SUT00S WITH TANK

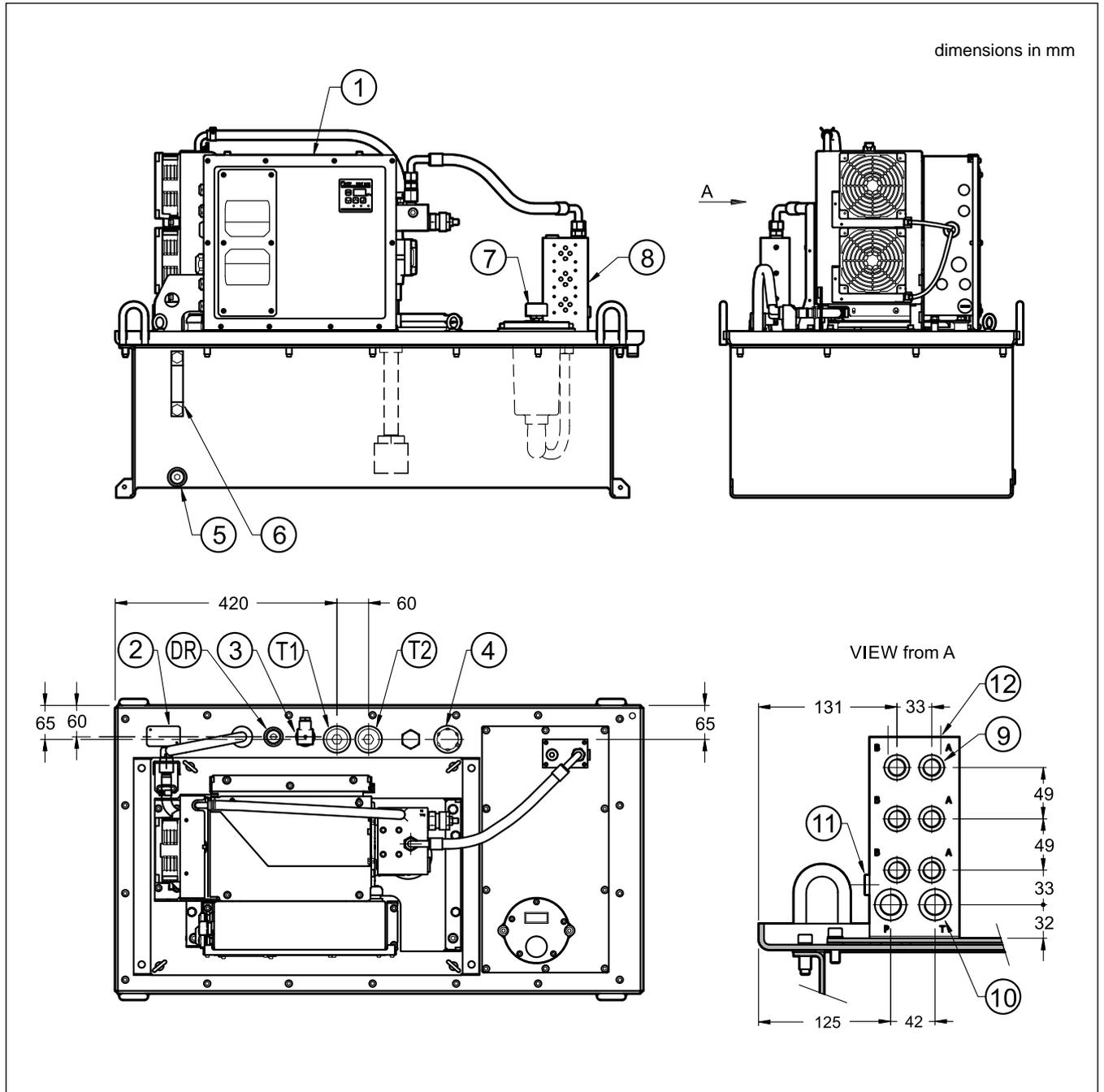
5.1 - SUT00S3016-40-YCP-Q100 - Main parts and options

dimensions in mm



		1	SUT hybrid unit
		2	Identification label
		3	Level switch
		4	Oil filler port with air breather
		5	Oil sampling and tank drain port
		6	Oil level indicator: upper 100 L; lower 70 L
		7	Blind plate 230x460 mm
P	Pressure port: 3/8" BSPP delivered with plug		
T1	Port for return line: 1" BSPP delivered with plug		
T2	Port for return line: 1" BSPP delivered with plug		
DR	Drain port: 1/2" BSPP delivered with plug		

5.2 - SUT00S3016-40-YCP-Q100M3 - Main parts and options

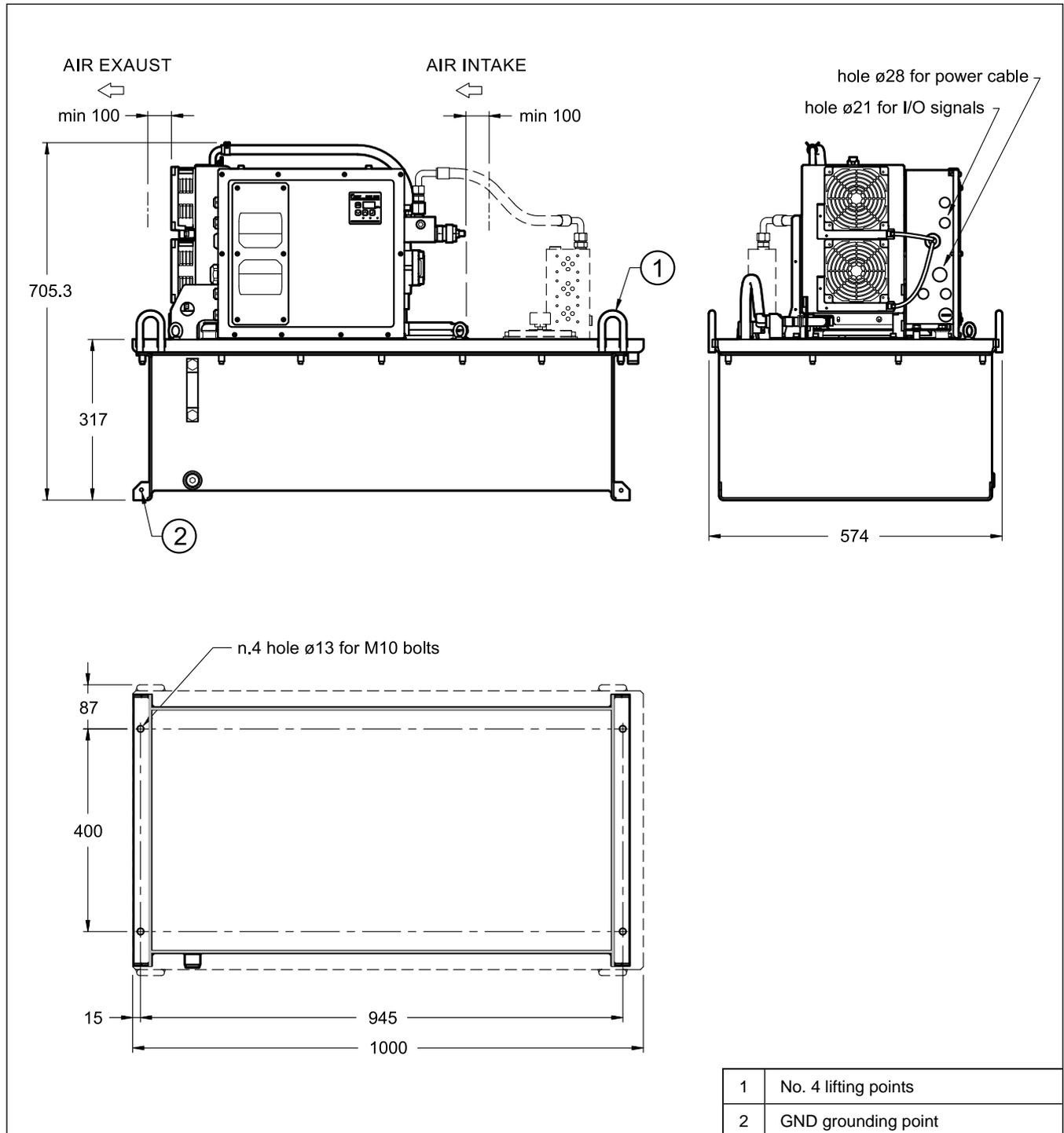


T1	Port for return line: 1" BSPP delivered with plug
T2	Port for return line: 1" BSPP delivered with plug
DR	Drain port: 1/2" BSPP delivered with plug
1	SUT hybrid unit
2	Identification label
3	Level switch
4	Oil filler port with air breather
5	Oil sampling and tank drain port

6	Oil level indicator: upper 100 L; lower 70 L
7	Return filter with visual clogging indicator
8	3-station manifold for ISO 4401-03 valves
9	A, B working lines: 3/8" BSPP
10	P, T ports: 1/2" BSPP
11	Pressure gauge port: 1/4" BSPP
12	Mounting interface for P2 stackable subplate (see catalogue 52 000)

5.3 - SUT00S3016-* with tank - Overall dimensions and mounting

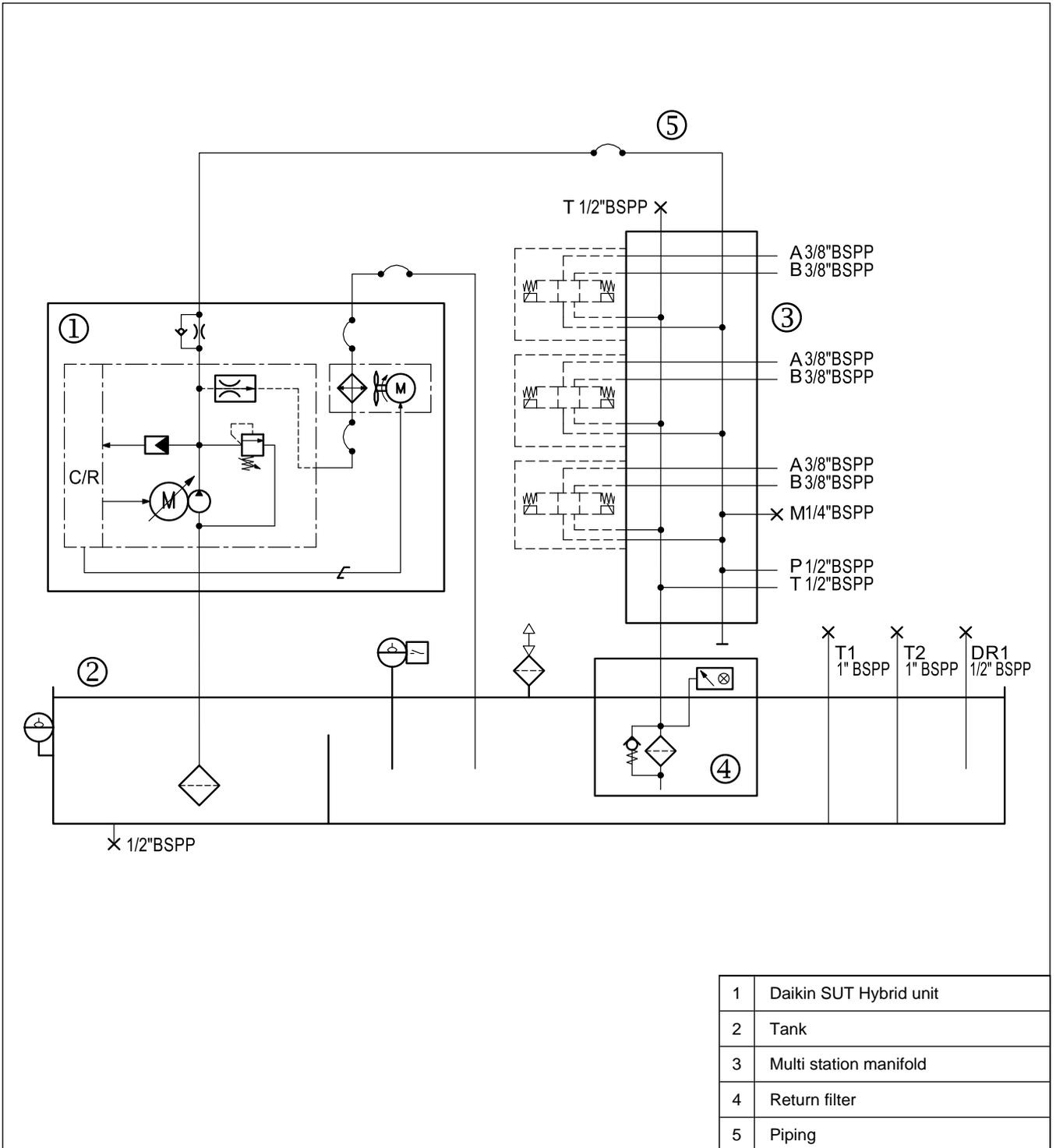
The drawing is representative of both the versions with tank.



NOTE: The use of hose whip restraints devices both at pump side and at manifold side is strongly recommended to avoid the possible swip-off from the hose fitting during operation.

The SUT00S3016-40-YCP-Q100M3-D1 models come already equipped with these devices.

5.4 - SUT00S3016-* with tank - Circuit diagram



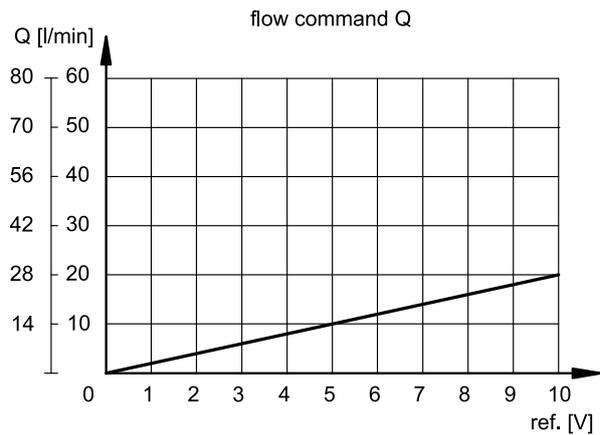
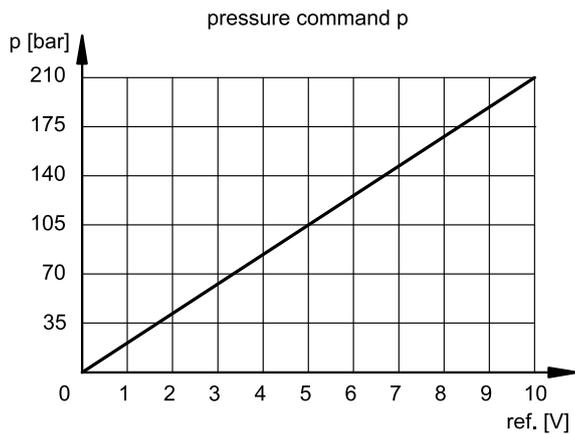
6 - SUT00D* - CHARACTERISTICS CURVES AND P/Q COMMANDS

Double pump type units enable selection of combination or single flow rate using a dedicated solenoid valve to achieve sustained high-pressure control, switching between a low pressure with high flow rate and a high pressure with low flow rate, as is often required for presses and other equipment.

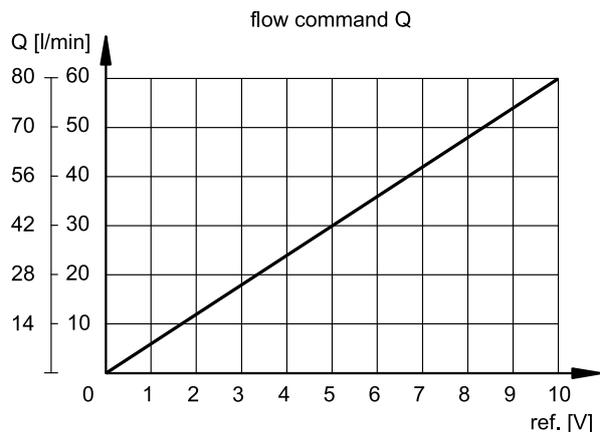
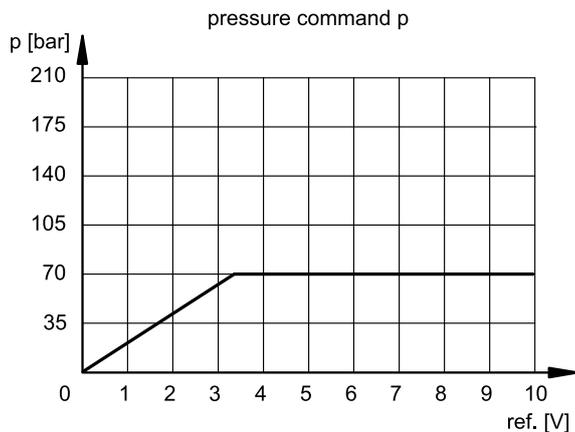
The pumps can be switched autonomously by the SUPER UNIT or from the machine, according to the parameter setting (see points 9.4 and 9.5).

Diagrams below shows the relationship between the PQ analogue inputs and the SUT internal command.

6.1 - HIGH PRESSURE MODE / low flow rate (PH, DIN 06 = OFF)

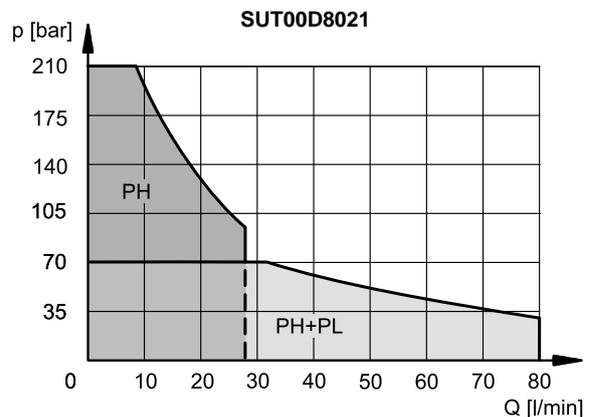
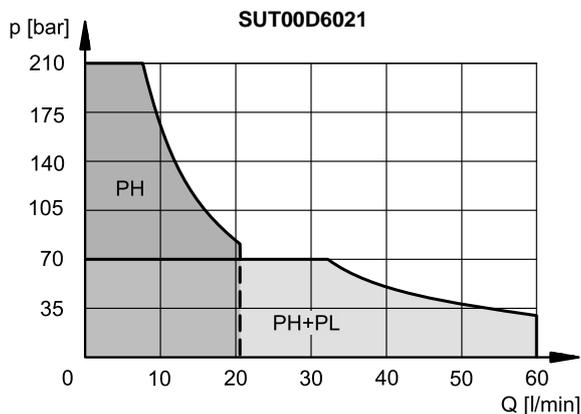


6.2 - LOW PRESSURE MODE / high flow rate (PH+PL, DIN 06 = ON)



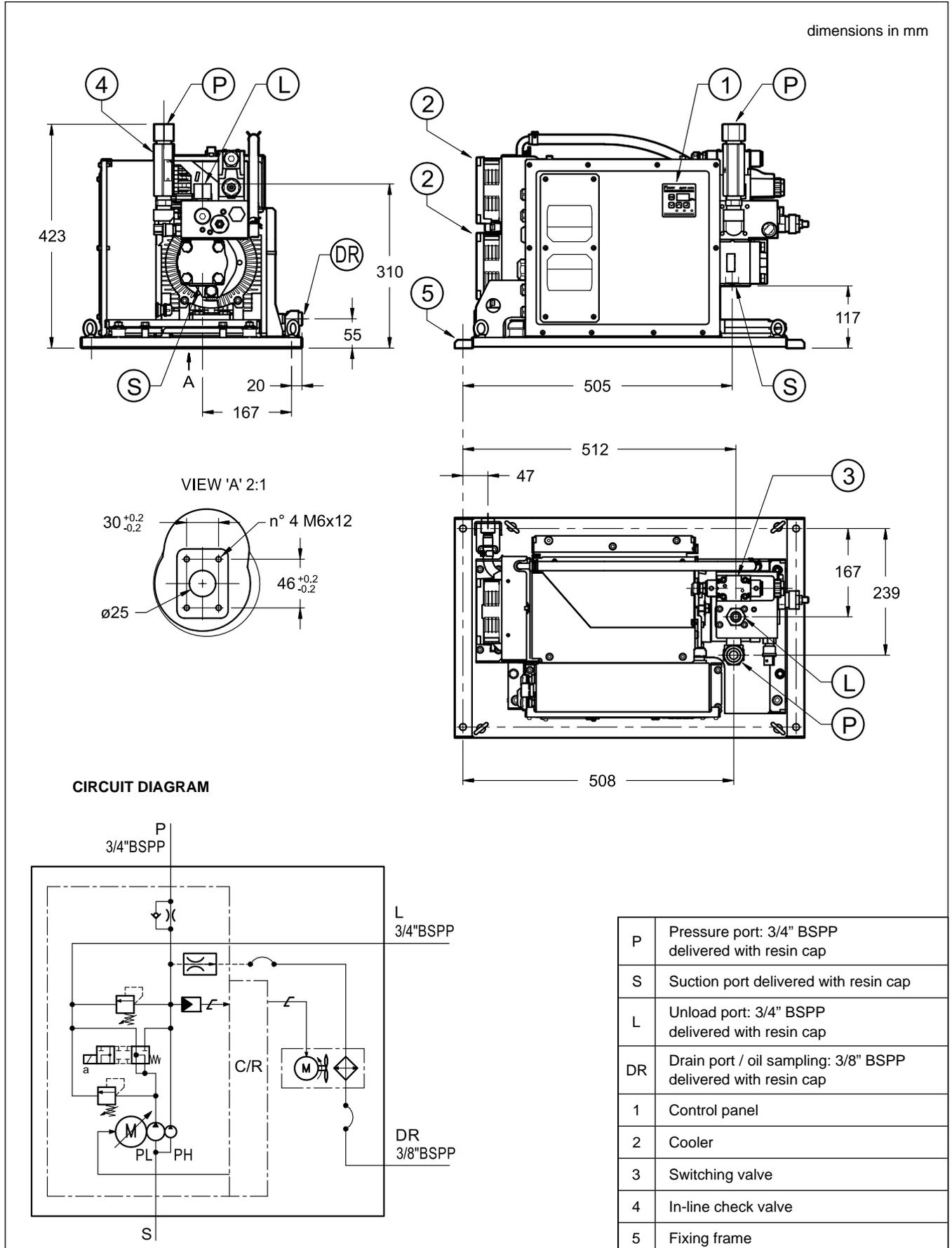
6.3 - Pressure - flow rate diagrams

Values obtained and rated for ambient temperature $\leq 40^\circ\text{C}$ and fluid temperature $\leq 60^\circ\text{C}$, in continuous operation (S1)

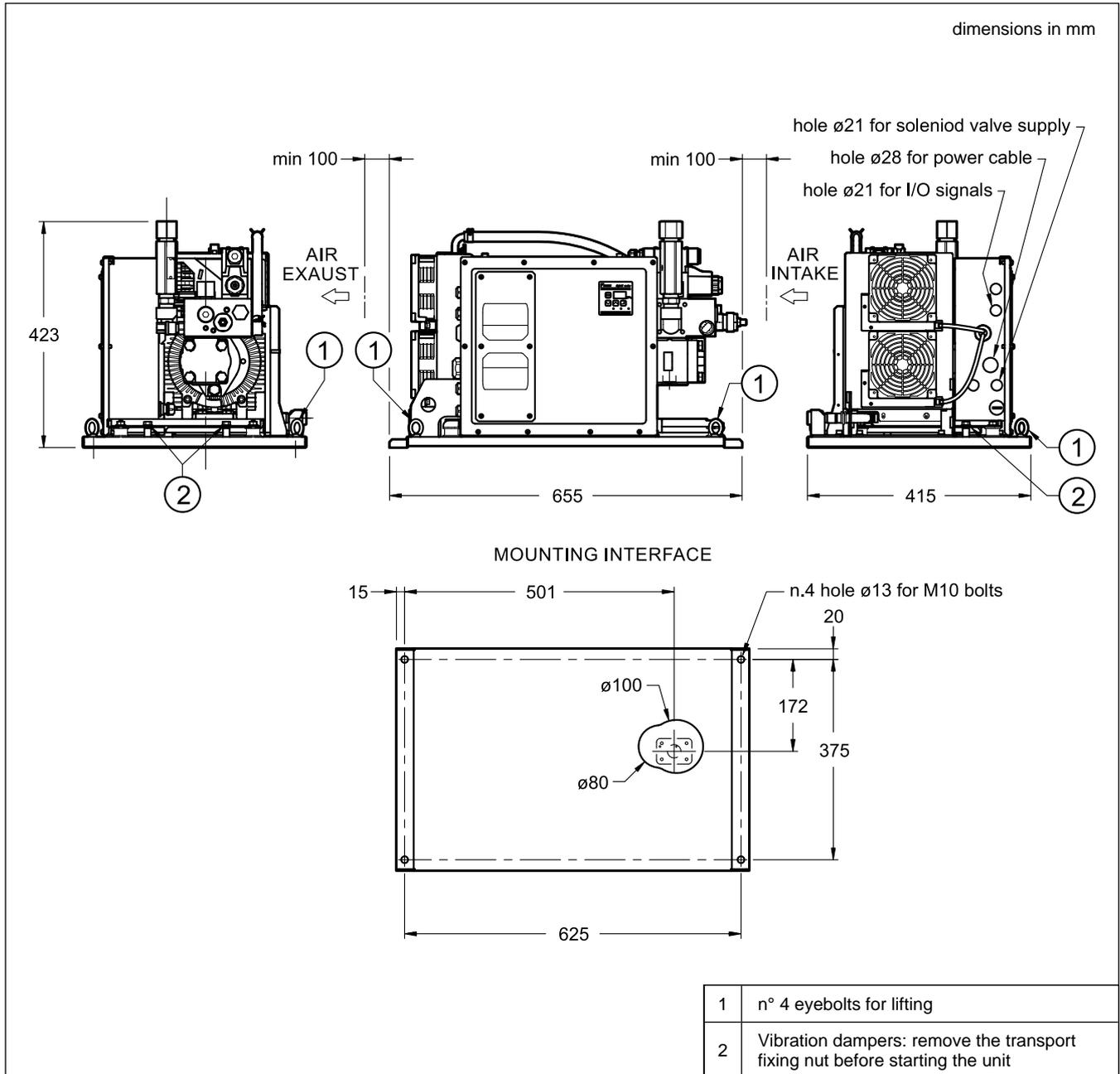


7 - SUT00D* - MODELS WITHOUT TANK

7.1 - SUT00D6021-40-YCP-Q-D1 - Main parts and options



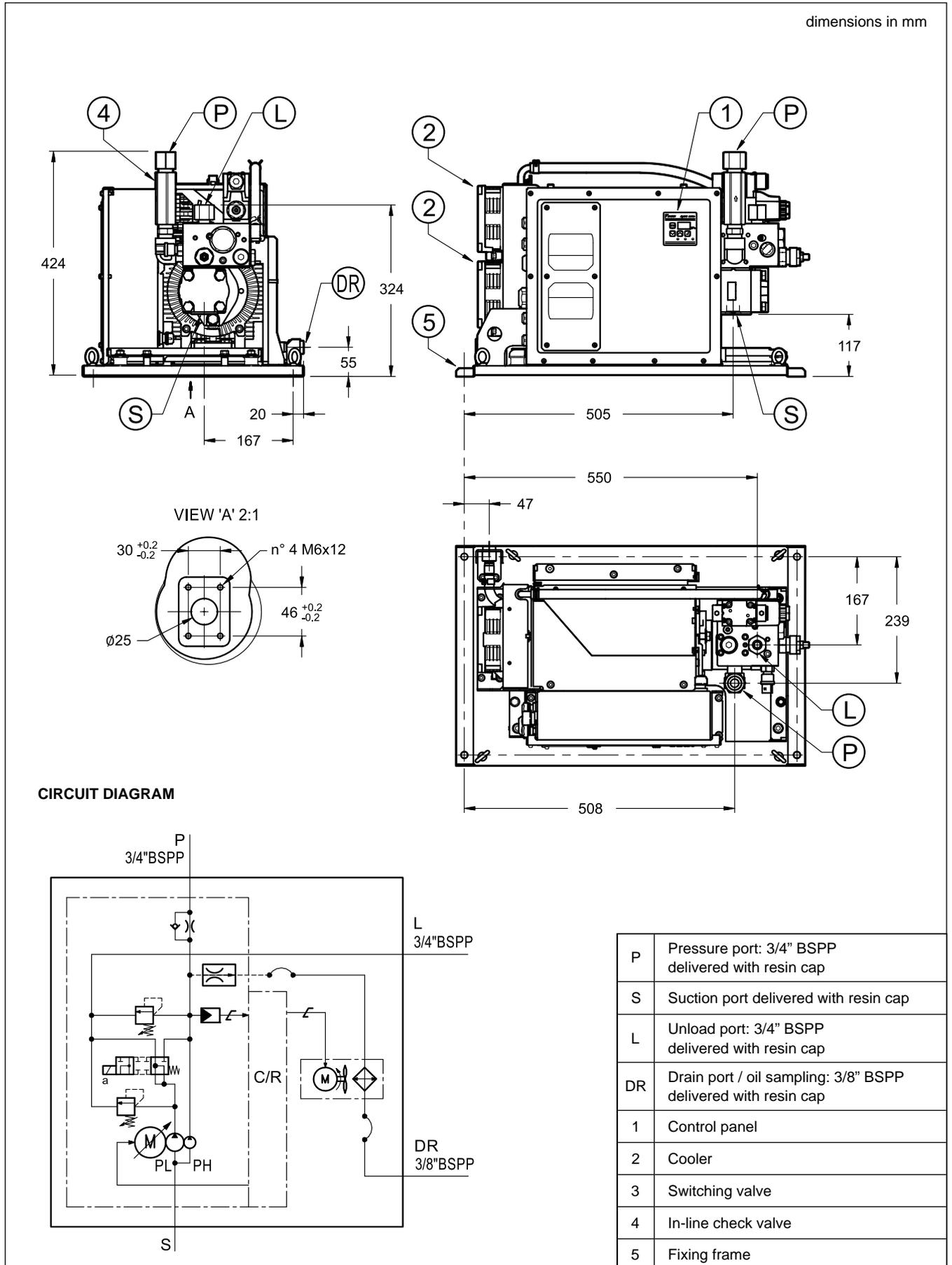
7.2 - SUT00D6021-40-YCP-Q-D1 - Overall dimensions and mounting



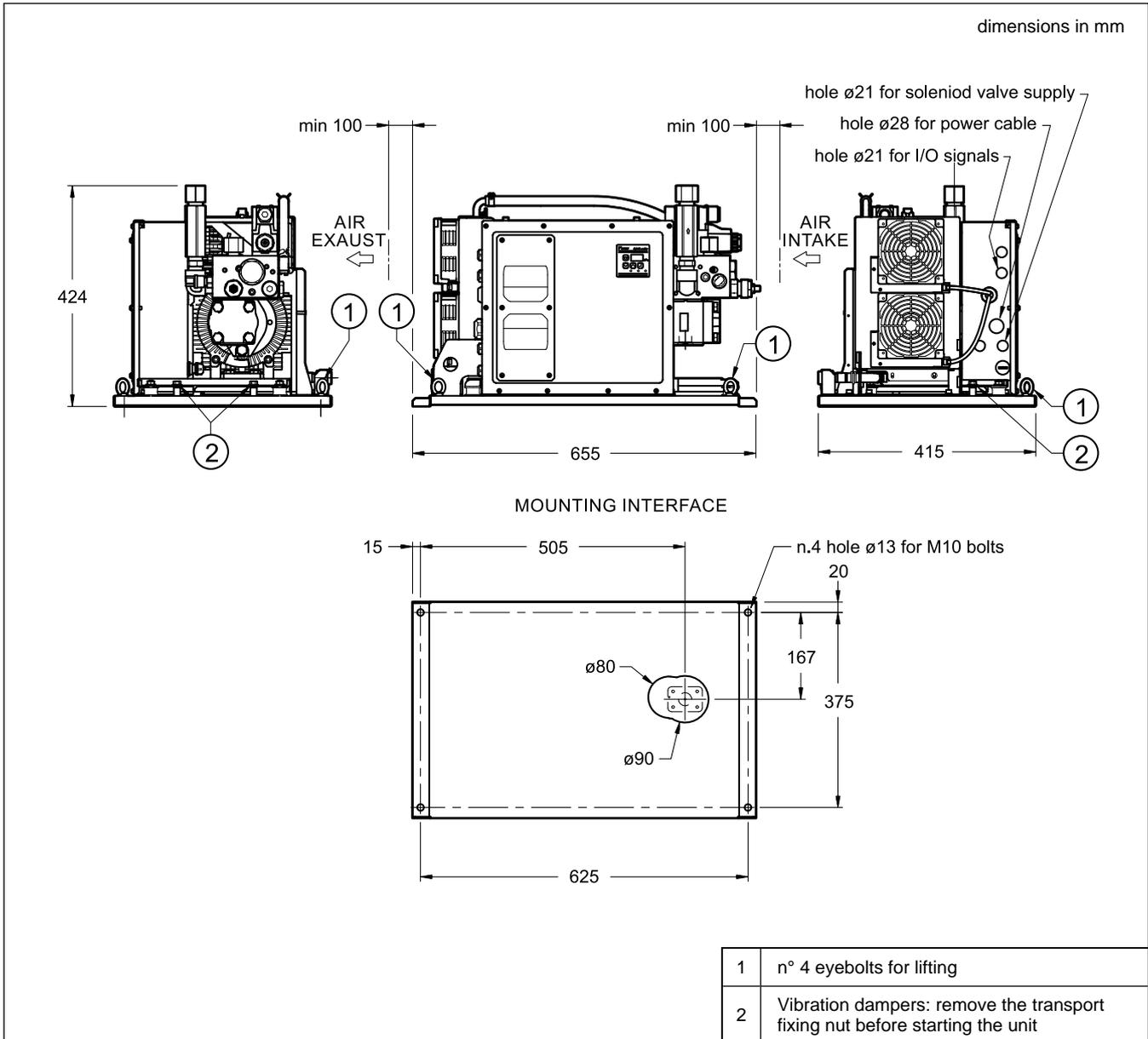
NOTE: The use of hose whip restraints devices both at pump side and at manifold side is strongly recommended to avoid the possible swip-off from the hose fitting during operation.

The SUT00D*021-40-YCP-Q100M5-D1 models come already equipped with these devices.

7.3 - SUT00D8021-40-YCP-Q-D1 - Main parts and options



7.4 - SUT00D8021-40-YCP-Q-D1 - Overall dimensions and mounting



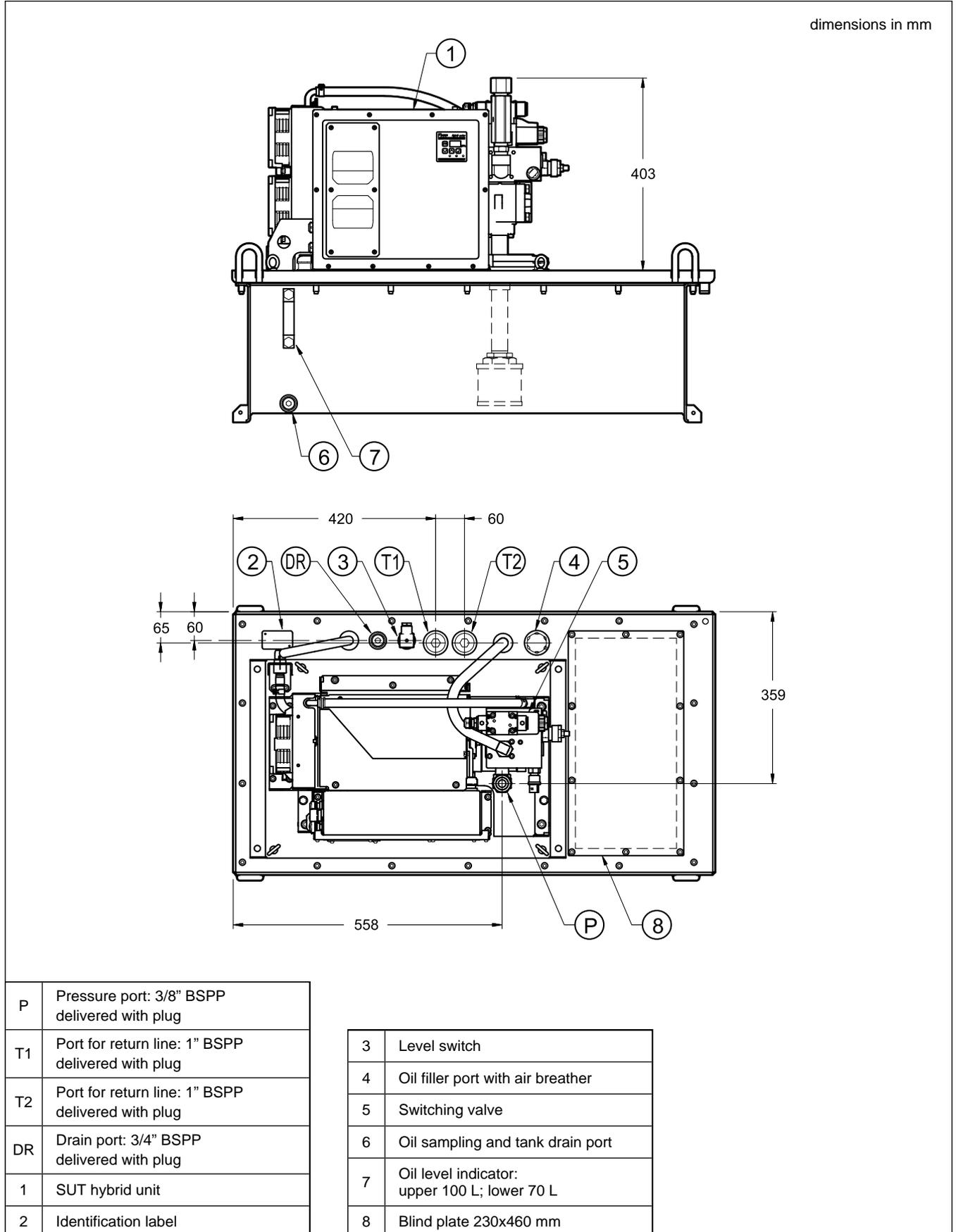
NOTE: The use of hose whip restraints devices both at pump side and at manifold side is strongly recommended to avoid the possible swip-off from the hose fitting during operation.

The SUT00D*021-40-YCP-Q100M5-D1 models come already equipped with these devices.

8 - SUT00D* - MODELS WITH TANK

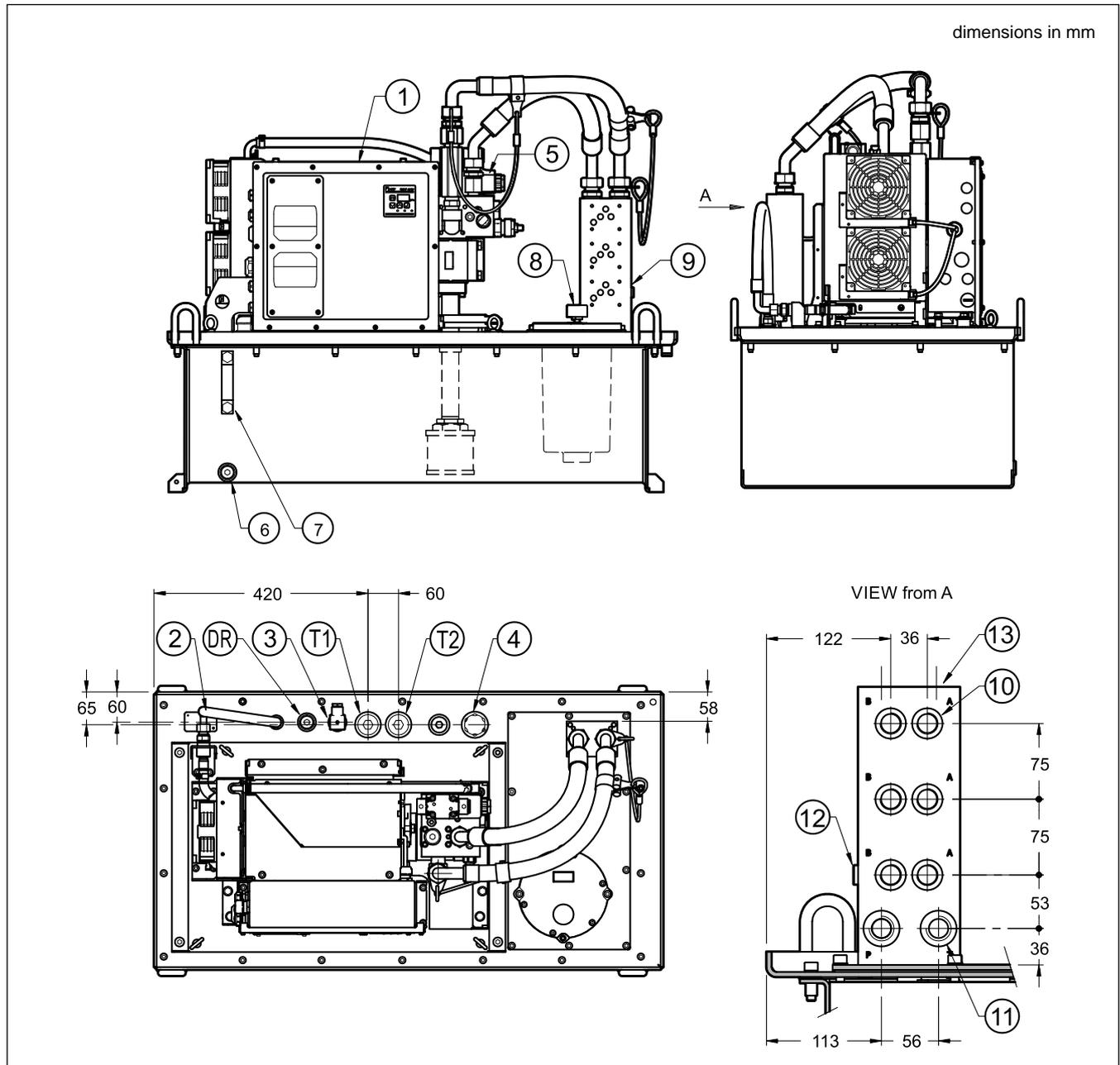
8.1 - SUT00D*021-40-YCP-Q100 - Main parts and options

The drawing is representative of both SUTD6021 and SUTD8021 versions with tank.



8.2 - SUT00D*021-40-YCP-Q100M5 - Main parts and options

The drawing is representative of both SUTD6021 and SUTD8021 versions with tank.



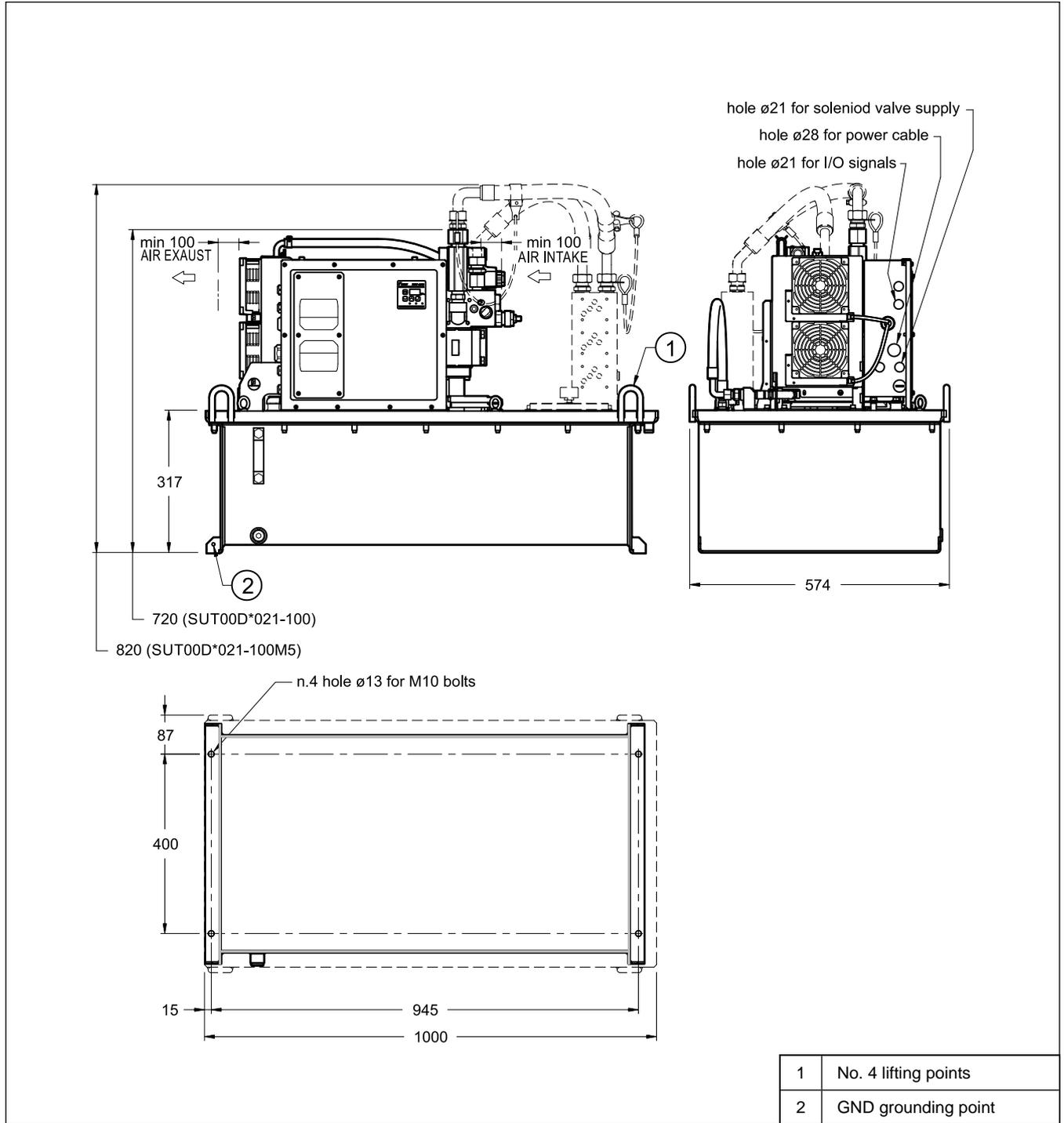
dimensions in mm

T1	Port for return line: 1" BSPP delivered with plug
T2	Port for return line: 1" BSPP delivered with plug
DR	Drain port: 3/4" BSPP delivered with plug
1	SUT hybrid unit
2	Identification label
3	Level switch
4	Oil filler port with air breather
5	Switching valve
6	Oil sampling and tank drain port

7	Oil level indicator: upper 100 L; lower 70 L
8	Return filter with visual clogging indicator
8	3-station manifold for ISO 4401-05 valves
10	A, B working lines: 1/2" BSPP
11	P, T ports: 3/4" BSPP
12	Pressure gauge port: 1/4" BSPP
13	Mounting interface for P4D stackable subplate (see catalogue 53 000)

8.3 - SUT00D*021 - with tank - Overall dimensions and mounting

The drawing is representative of both the versions with tank.

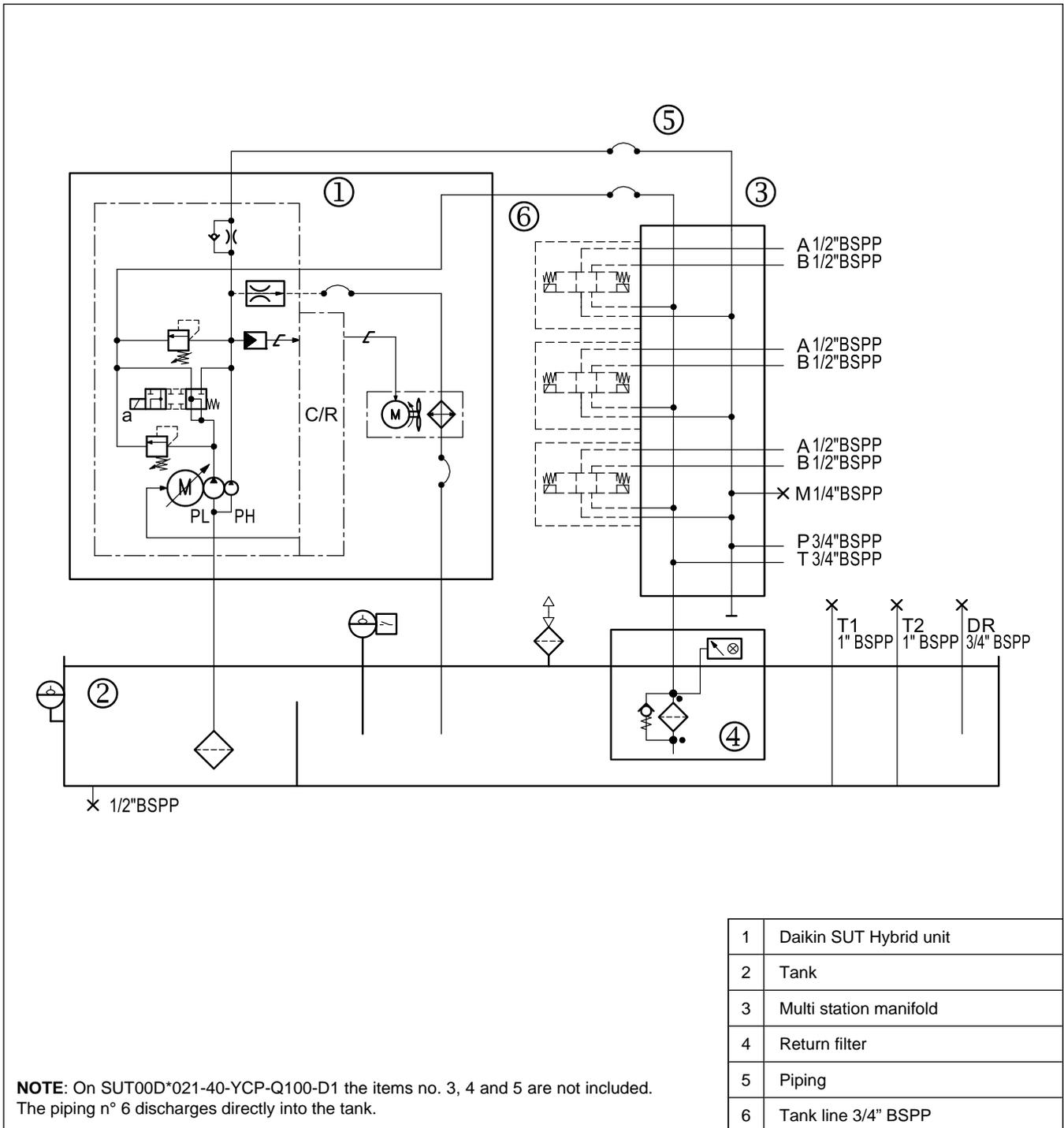


NOTE: The use of hose whip restraints devices both at pump side and at manifold side is strongly recommended to avoid the possible swip-off from the hose fitting during operation.

The SUT00D*021-40-YCP-Q100M5-D1 models come already equipped with these devices.

8.4 - SUT00D*021 with tank - Circuit diagram

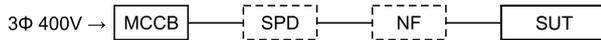
The drawing is representative of all the SUT00D*021 with tank.



9 - WIRING

9.1 - EMC 2014/30/EU compliance

The EN 61800-3:2004 (Second environment / PDS Category "C3") requires the installation of a surge protection device and a noise filter between the breaker and the SUT hybrid unit on the power source line.



The assessment for the installation of these components is the responsibility of the machine manufacturer, as compliance with EMC regulations involves the entire machine on which the SUT unit will be installed. If SUT has to be compliance EMC 2014/30/EU as a standalone, noise filter and protection device are must have.

Surge protection device (SPD) and noise filters can be ordered separately. See point 12.

9.2 - Wiring notes

- Install a no-fuse breaker and a ground fault interrupter compliant with European Standard EN 60947-2 in the main power supply of SUT, to protect the electrical circuits against shorting and overcurrent, and to prevent electric shocks.
- Use straight type terminals for the power supply wiring.
- Use suitable electric cable in accordance with the power supply capacity. In addition, connect the cables correctly in accordance with the wiring guide.
- Provide a ground connection in compliance with the law in the relevant country. Connect the grounding wire directly with no breaker in the line.
- Avoid the entry of waste metal such as screws and wiring debris, or combustible matter such as wood waste or oil, inside the control unit.
- Use a commercial power supply for the power source. The use of an inverter power supply may cause burn damage to the unit.
- Before accessing the interior of the control unit, check that the unit's power supply has turned OFF **and then wait at least 5 minutes**.

9.3 - Cables

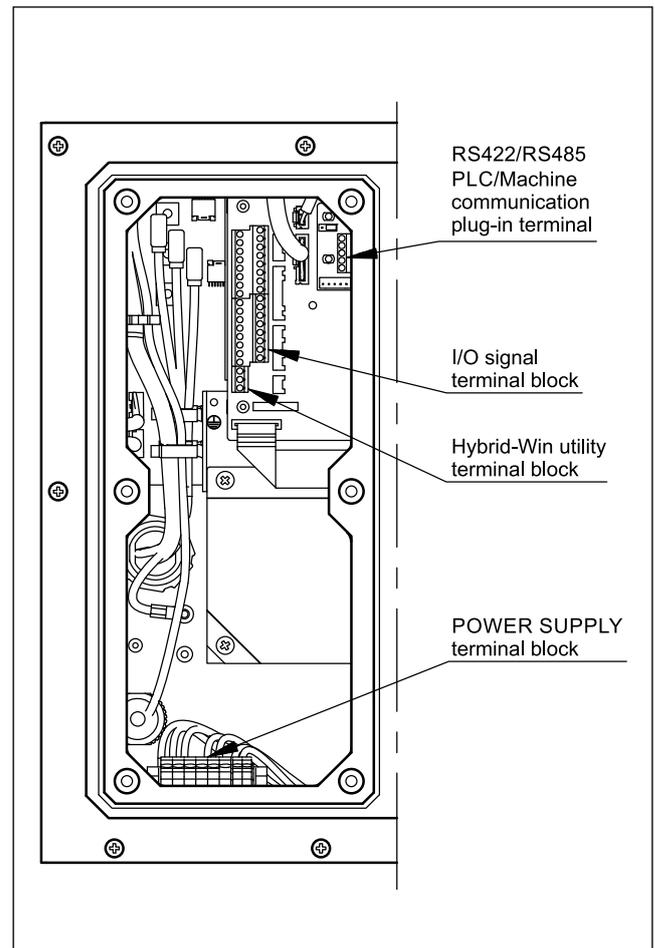
For the main power connection (L1, L2 and L3) use cables with 4-wires.

SUT003016S, SUT00D6021: > 1.5 mm² section (AWG 16).

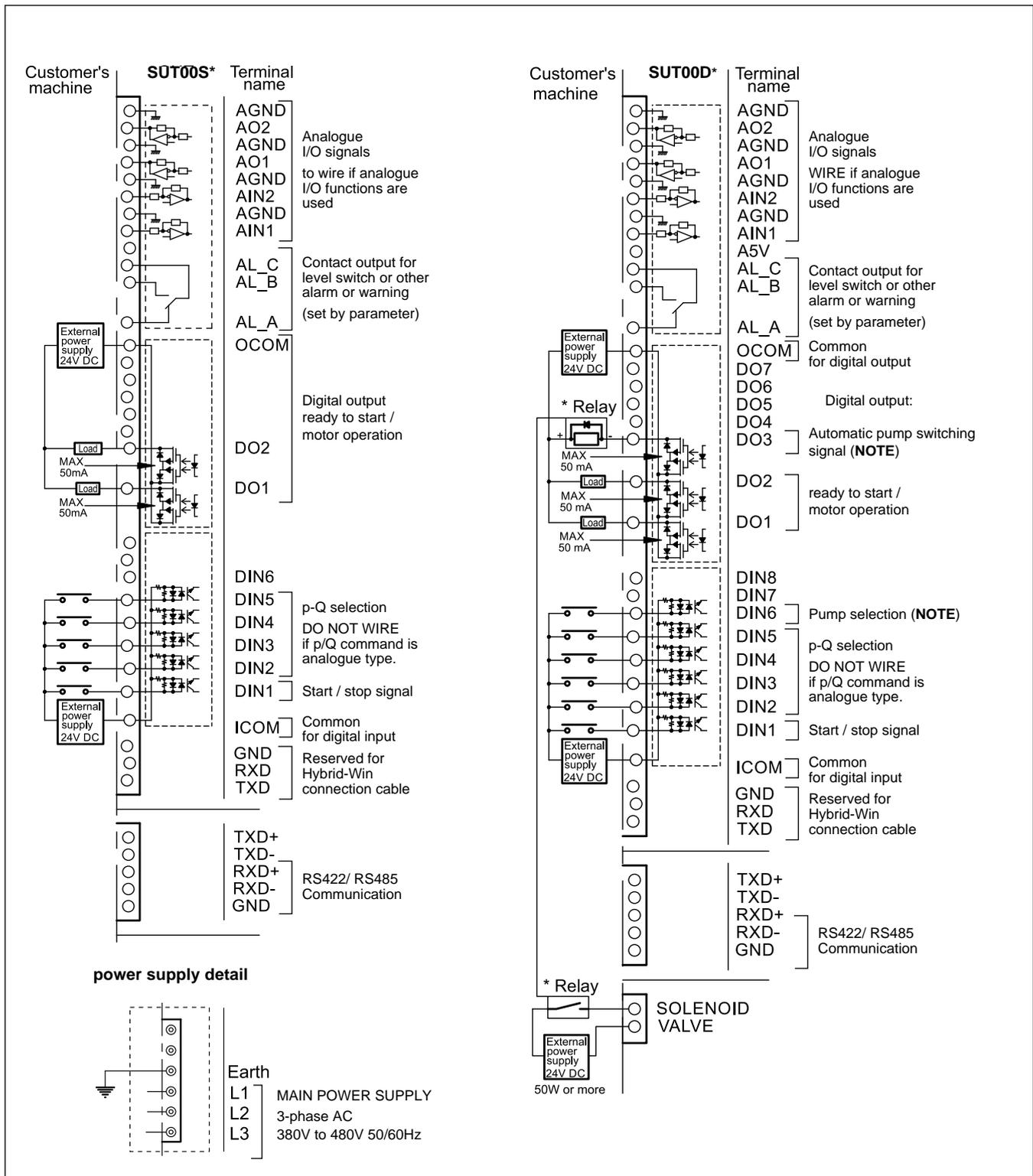
SUT00D8021: > 2.5 mm² section (AWG 14).

For signals and for ModBUS communication to the PLC use shielded cables with section from 0.35 mm² to 0.5 mm² (AWG 20 ~ 22).

Related cable clamps must be IP54 min.



9.4 - Wiring schemes



NOTE: The controller automatically generates the output signal on D03 to by-pass the low pressure / high flow pump on SUT00D*.

This occurs whether you are using the digital P/Q selections or with the analog P and Q commands. If, using the analogue P and Q commands, it becomes necessary to force the activation of the solenoid valve, then the DIN6 input must be enabled. Enabling the DIN6 input activates the output signal on D03.

The Customer has to provide the relay in the machine tool cabinet and the related wiring from D03 output on the SUT and to the solenoid valve. Relay requirements: 24V DC (max 50 mA) coil, single stable, with diode coil surge killer, 24V DC 5A / 220V AC 5A contact rating.

9.5 - Digital I/O & alarm signals

terminal	description	value	function / notes	
AGND	analogue ground	0V GND		
A02	flow rate monitor	± 10 V	- QMAX ÷ QMAX	
AGND	analogue ground	0V GND		
A01	pressure monitor	0 ÷ 10 V	0 ÷ PMAX	
AGND	analogue ground	0V GND		
AIN2	flow rate command	0 ÷ 10 V	0 ÷ QMAX	
AGND	analogue ground	0V GND		
AIN1	pressure command	0 ÷ 10 V	0 ÷ PMAX	
A5V			unused	
AL_C	common alarm output (NO)		common	
AL_B	alarm output B	switching 30 V DC 0.5A, resistive (min load 10 mV DC 10 μ A approx)	Connected with the common terminal when the pressure switch is activated, alarm or warning signal output (choice set by parameter)	
AL_A	alarm output A (NC)		Normally connected with the common terminal	
OCOM	common digital output		Can be either positive or negative	
DO7	digital output 7	24 V DC (± 1 V, 0.5 A) I max 50 mA resistive	Unused	
DO6	digital output 6			
DO5	digital output 5			
DO4	digital output 4			
DO3	digital output 3			Pump solenoid valve switching signal. For SUT**D only.
DO2	digital output 2			Output the alarm. (choice set by parameter)
DO1	digital output 1			Output completion signal or motor operation signal. (choice set by parameter)
DIN8	digital input 8	24 V DC (± 10 %) I max 5 mA resistive	Unused	
DIN7	digital input 7			
DIN6	digital input 6			Pump selection . For SUT**D only. Used with analogue input.
DIN5	digital input 5			Digital p/Q selection (0 to 15) Not used with analogue input.
DIN4	digital input 4			They still available and can be set and activated by parameters. Refer to the Instruction Manual for details.
DIN3	digital input 3			
DIN2	digital input 2			
DIN1	digital input 1			Used for start/stop control. According to the parameter setting, the operation mode (ON/OFF with input signal) can be changed.
ICOM	common digital input		Can be either positive or negative	

9.6 - Communication ports

terminal	description	function / notes
GND	digital ground	RS232C communication Hybrid-Win utility port
RXD	received data	
TXD	transmit data	

terminal	description	function / notes
TXD+		unused
TXD-		
RXD+	data+	RS422 / RS485 communication main machine / PLC port
RXD-	data-	
GND	digital ground	



10 - INSTALLATION NOTES

10.1 - Installation and piping

- The unit is a stationary type. Fix it with bolts on a level location that is free of vibration.
- Keep obstacles that will obstruct air intake and emission at least 100 mm away from all around the unit. Install the unit at a location with good air flow so that heated air can be vented.

10.2 - Hydraulic fluid

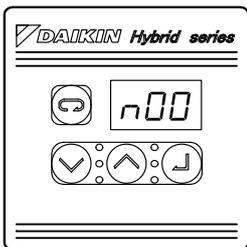
- Use mineral-oil base hydraulic oil. Use of hydraulic oils other than mineral-oil based type (e.g., hydrous/synthetic) is prohibited.

10.3 - Other precautions

- If a failure occurs in the hydraulic unit, the system indicates an alarm and terminates. If a failure or malfunction of this unit is expected to cause death or pose a danger to human beings, adopt appropriate safety measures in the facilities.
- Turning the power supply ON/OFF frequently will significantly shorten the life of the controller. Use the start/stop digital inputs to start/stop this hydraulic unit. Leave an interval of at least 5 minutes between operation stops invoked by turning the power supply ON/OFF. Also, when starting and stopping the unit using the start/stop signals, leave an interval of at least 0.5 seconds between a stop command and restarting.
- It takes approximately 3 seconds for this hydraulic unit to start up after being powered ON. Depending on the piping conditions, the unit may take longer to increase the pressure to the pressure switch's preset level, resulting in pressure switch signal output. In this case, set the machine up so that it will not accept this alarm output during this period.

11 - DEVICE SETUP

The SUT control unit is configured by connecting the terminal located inside the unit control panel to a device with the Hybrid-win software installed by means of a dedicated cable. It is always possible to modify the parameters also by keys on the control panel.



The SUT unit communicates with the machinery via Modbus-RTU protocol. The communication setting between them is done from the operation panel of the hydraulic unit.

11.1 - Hybrid-win software

The software allows to monitor the operating data in real time through a graphical interface; to read and set parameters, to monitor alarms and warnings history and to save and copy the parameter set.

The software is compliant with Microsoft Windows OS.

The connection between the SUT and the PC requires a dedicated cable that can be ordered separately. For PCs not equipped with a serial port, is required a common USB-to-serial converter. We offer a kit with both of them. See point 12.

The Hybrid-win software can be downloaded from the product section > Customer's Page at www.hyd.daikin.com after subscribing the membership for free.

11.2 - Parameters table

Please refer to the *Instruction Manual* delivered with the product for a complete list of parameters and their settings.

12 - ACCESSORIES

These additional options are supplied spare and their assembly on the SUT is charged to the customer.

ordering code	description	
3906500015	LS-B12-140/10-D24K1-SPDT	Level switch SPDT 1/2" BSPP. (NOTE)
3906500012	TS-B12-170-60/10-D24K1-SPDT	Temperature switch 1/2" BSPP - 24V DC switching temperature 60 °C.
3906500014	Surge protection device (SCHNEIDER ELECTRIC A9L20321)	
3906500013	Noise filter (SCHAFFNER FN3025HP-10-71)	
3906510010	SUTPC/10 - Kit for Hybrid-Win software connection	

NOTE: This device is already installed as standard on the power packs with tank. Available for spare parts.