ValveExpert 8.2.4C

DIETZ automation

Test Equipment for Servo– and Proportional Valves ValveExpert 8.2.4C

Industrial Applications

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Review of Specifications

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Review of Specifications

The test stand ValveExpert 8.2.4C is based on the test equipment ValveExpert 8.x.x series, which is generally used for aerospace and industrial applications. It is an automatic test equipment for checking, maintenance, and adjustment of servo– and proportional valves. The test stand is developed in according to the standards established in SAE ARP 490, SAE ARP 4493, ISO 10770-1, ISO 10770-2, and ISO 10770-3. Below are the main specifications of the stand ValveExpert 8.2.4C

Applications

Test stand ValveExpert 8.2.4C is developed for checking, maintenance and adjustment of two, three and four ways servo– and proportional valves.[1] Working pressure of the stand is up to $315bar$ ($4500psi$). The maximal test flow is about $80L/min$ ($21Gal/min$).

Control signals of the main interface electronics

Main interface electronics of the test stand has got an analogue output to control servo– and proportional valves. It is also equipped with an input channel to read the actual value of the command signal. A servo– or proportional valve under testing can be controlled by voltage or current command signal. The following modes for the control signal are supported: $\pm 10V$, $\pm 10mA$, $\pm 20mA$, $\pm 50mA$, $\pm 100mA$, and $4mA \ldots 20mA$. A short circuit protection limits the current within the the interval $-25mA \cdots + 25mA$ for the range $\pm 10V$. The system allows to measure resistance of the load in case of current mode control. Built-in relays can change polarity of control signal and coil configurations: Serial, Parallel, Coil No.1, and Coil No.2.[2]

Universal high current PWM amplifier

The test stand is equipped with a high current PWM amplifier. It allows to control proportional valves with single or dual unipolar coils ($0A \ldots 3.55A$), and direct drive valves with a bipolar coils ($-1.15A \cdots + 1.15A$). The amplifier is based on two MOSFET half-bridges, two precision current sensors, and PID controller based on the FPGA card controlled by the main computer. The PID parameters of the amplifier, as well as data to calibrate the amplifier are software adjustable.

Enable signal

In order to support servo– or proportional valves with an enable input, the main interface electronics of the test stand has got an analogue output to control the enable signal, and an additional input channel reads the actual values. Range of the enable signal is approximately $-25V \cdots + 25V$. To protect the output from the short circuit, maximal current of this output is limited by $-20mA \cdots + 20mA$.

Spool position signals (feedback)

The most of modern servo– or proportional valves with a built in electronics are equipped by spool position transducers. ValveExpert 8.2.4C can check the signal from such a transducer.

[1] We assume that the test stand will not be used for other purposes, like using it as an external hydraulic power unit or similar.

[2] For servovalves with two coils.

The standard signal ranges $\pm 10V$, $\pm 10mA$, $\pm 20mA$, and $4 \ldots 20mA$ are supported. Spool position transducers can be used for static tests as well as for frequency response and step response analysis.

Frequency response cylinder (optional)

In case if a servo- or proportional valve under test does not have a spool position transducer, a frequency response cylinder should be used for frequency response analysis. This analysis expressed by amplitude ratio and phase angle which are constructed for harmonic signals from a specific frequency range. The cylinder must be equipped with a position and a velocity transducers with linear voltage outputs. Signals of these transducers should not exceed $\pm 10V$ range. Optionally, the stand can be equipped with a cylinder ValveExpert FRC 2.2. Effective piston area is about $1850mm^2$ and total stroke is about $30mm$ ($\pm 15mm$).

Available electric power supplies

The test stand is equipped with a power supply $+24V$ which can be used by operator. Maximal current of this power supply is $5A$. An additional $\pm 15V$ source can be used for servovalves with build in electronics or other needs. The Maximal current for $\pm 15V$ power supply is $2A$. The all power suppliers are short-circuit protected. Enabling of the output voltage is controlled from the software (both - *Automatic* and *Manual* modes).

Hydraulic fluid

The test stand ValveExpert 8.2.4C is generally designed for mineral-based hydraulic fluids with viscosity about $30 - 50cSt$. We recommend you to use Mobil DTE24, Shell Tellus 29, MIL-H-5606 or oil with the similar parameters. The integrated filtration system achieves the cleanliness level 5 of NAS1638 (level 16/14/11 of ISO4406) or better. The capacity of the oil tank is about $200L$. For a better performance, we recommend to keep the tank at least 80% full.

Main hydraulic power pack

The test stand does not require an external hydraulic power supply. A modern high efficient and low noise $45.6kW$ hydraulic power station is built in the stand. Maximal working flow of the power station is about $80L/min$ ($21Gal/min$). Working pressure is up to $315bar$ ($4560psi$). The supply pressure regulator of the hydraulic power pack utilizes a high precision pressure transmitters and FPGA based PID controllers. The PID parameters of pressure controller are software adjustable.

Electric power requirements

Hydraulic power pack of ValveExpert 8.2.4C requires a 3–phase 4–wire grounded electric power: $340VAC \ldots 528VAC$, $45Hz \ldots 65Hz$, $120A$. Low power electronics of the test stand requires single-phase electric power: $120VAC \ldots 240VAC$, $45Hz \ldots 65Hz$, $16A$. Note, connection to the low power electronics can be done separately or it is possible to use one phase with the neutral wire of the 3–phase 5–wire grounded electric power for low power electronics.[3]

[3]Requirements to adopt the test stand to a specific electric power source should be defined at the purchasing.

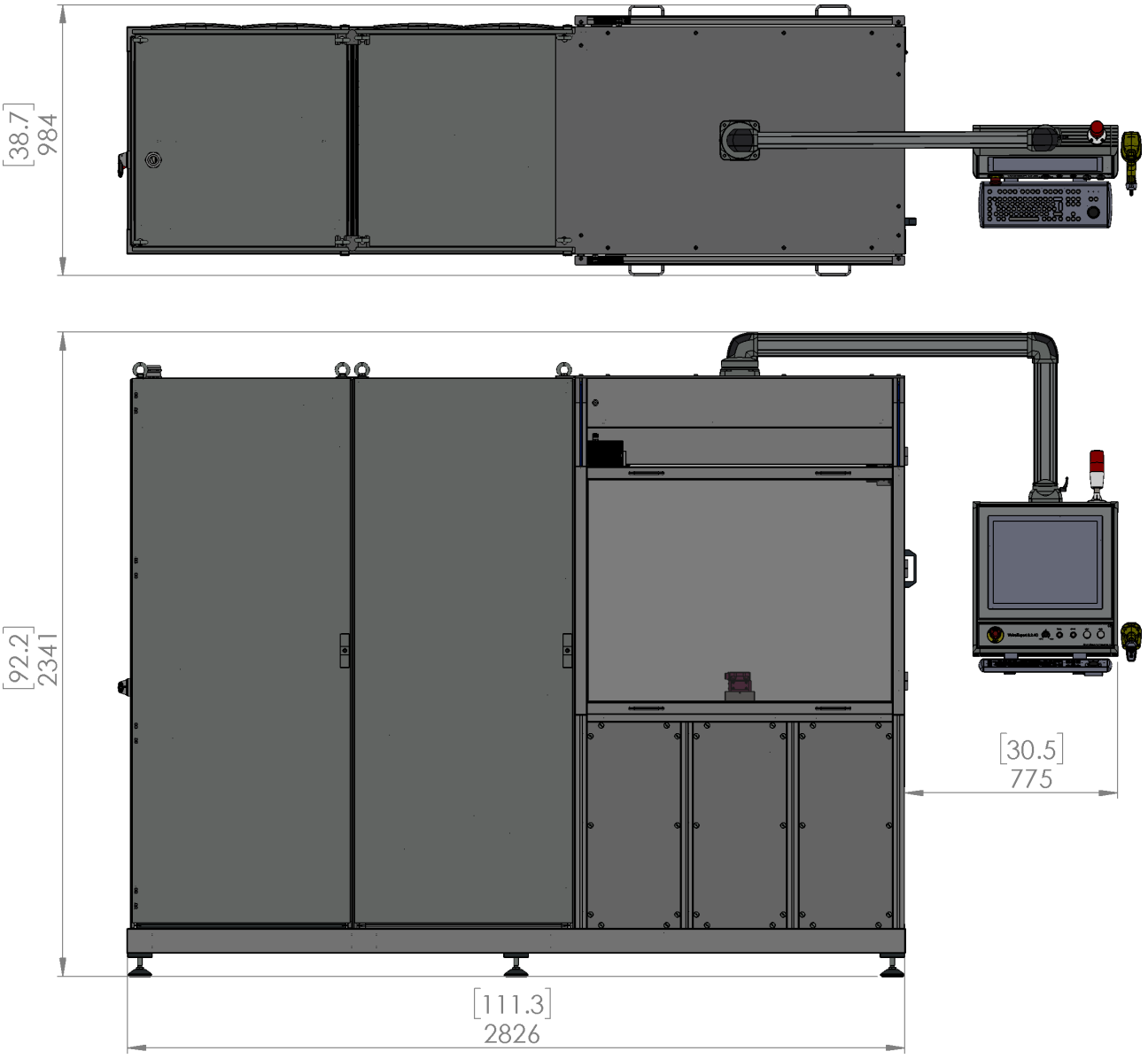

Figure 1: Dimensions of the test stand ValveExpert 8.2.4C.

Water cooling

Water connection for cooling system is required for oil temperature regulation. Note, the temperature control system allows to stabilize the oil temperature in a specified range with tolerance $\pm 2°C$.

Dimensions and weight

Dimensions of the test stand ValveExpert 8.2.4C are shown on Figure 1.[4] Weight of the stand is about $1900kg$. Approximate dimensions of a wood box for transport are: $3060mm \times 1230mm \times 2550mm$ ($Length \times Width \times Height$). Tara weight is about $300kg$. Customs tariff number: HTS 9031.20.0000 Test Bench.

[4]Detailed drawings of the test stand are supplied in additional.

Figure 2: Elements of ValveExpert 8.2.4C

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