

# CHRONOS®

## IDP7600 DIGITAL POSITIONER



**VALTEK™**  
SULAMERICANA

## Chronos IDP7600 Digital Positioner

The Chronos IDP7600 Digital Positioner is an advanced electro-pneumatic industrial valve positioning device with HART® (Highway Addressable Remote Transducer) protocol for remote communication.

The superior control technology is provided by a high-speed microprocessor, proven control algorithms and robust relay, and guarantees that the Chronos IDP7600 positioner will give high responsiveness and precise control.

The modular architecture of the Chronos positioner separates the pneumatic and electronic components. Robust and compact, it allows for quick assembly, and easy configuration and calibration using a local interface or software tools based on EDDL® and FDT/DTM® open technologies.

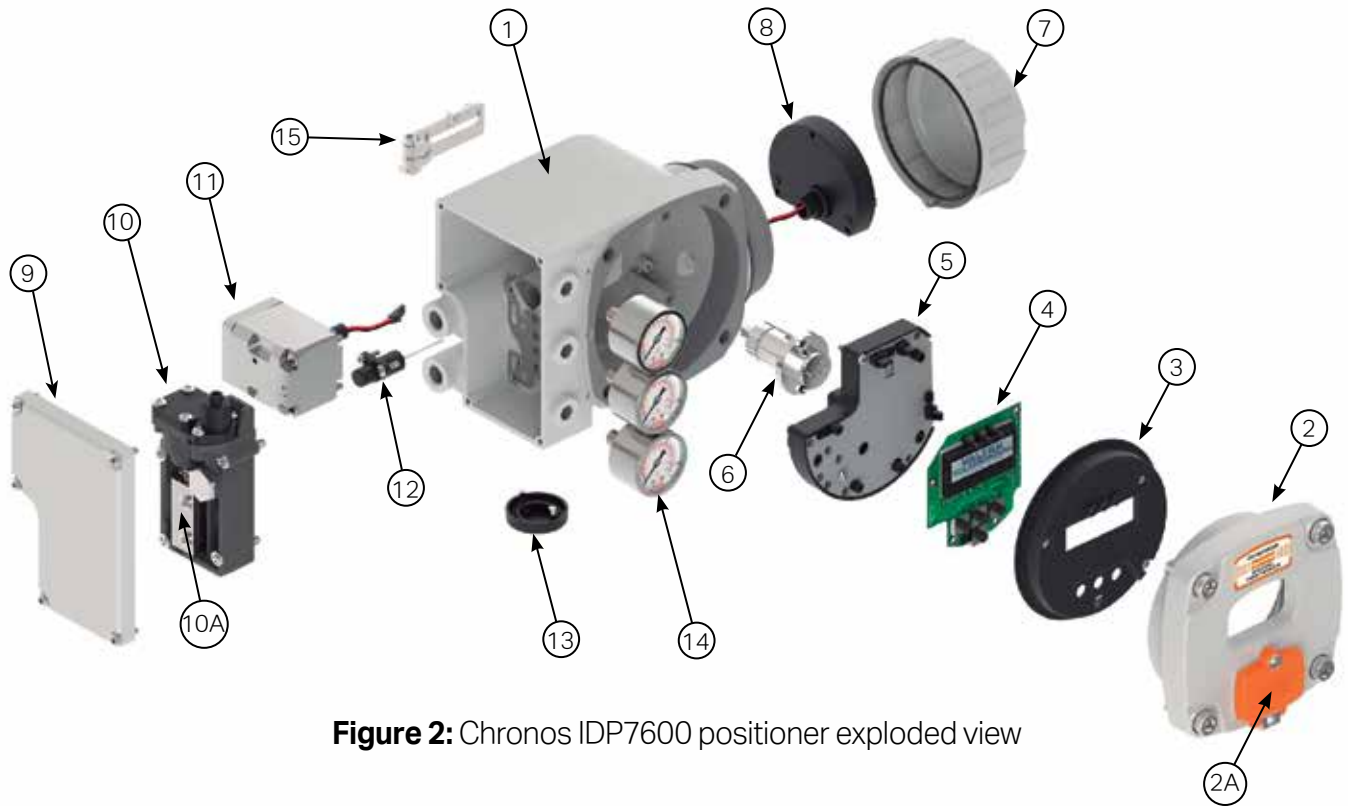


**Figure 1:** Chronos Positioner Installed in a ValtekSul Globe Valve

# Chronos IDP7600 Digital Positioner

## Components

The main components of the Chronos positioner are shown in Figure 2 and Table 1:



**Figure 2:** Chronos IDP7600 positioner exploded view

**Table 1:** Chronos IDP7600 positioner components

Item	Description
1	Housing
2	Front Cover assembly
2A	Button Cover assembly
3	Plastic Protective Cover assembly
4	User Interface Circuit Board assembly
5	Main Circuit Board assembly
6	Feedback Potentiometer assembly
7	Field Terminal Lid assembly
8	Field Terminals Circuit Board assembly
9	Pneumatic Cover assembly
10	Pilot-Relay assembly
10A	Spool Valve assembly
11	I/P module
12	Hall Effect Sensor assembly
13	Vent Cover assembly
14	Pressure Gauges kit
15	Feedback Lever kit

## Chronos IDP7600 Digital Positioner

The Chronos positioner was designed for harsh environments with internal, encapsulated components and positive pneumatic bleed pressure. It is assembled with a high strength explosion proof housing, the standard model manufactured in copper-free aluminum alloy with electrostatic-resistant paint. Or choose the 300 series stainless steel housing for the ultimate protection against the most corrosive environments.

The dual pneumatic relay system is equipped with a high flow capacity (CV) pilot valve for fast filling and exhausting of the actuator. This technology, in combination with advanced positioning algorithms, allows efficient control of both small and large set-point adjustment changes, leading to optimal process control efficiency.

### Local Interface

The local interface of the Chronos positioner consists of an LCD (Liquid Crystal Display) and 4 pushbuttons for navigation. This interface is simple and user-friendly. It allows for quick access to calibrate, configure, monitor status, and view alarms.

This local interface is explosion proof to function even in hazardous areas. A sophisticated detection mechanism prevents any button failure or sticking from causing any false inputs.



**Figure 3:** Buttons cover closed



**Figure 4:** Buttons cover open

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## Housing

The Chronos positioner housing offers two material options, high strength aluminum alloy and series 300 stainless steel. The aluminum housing is built using a high pressure metal injection process in an alloy with a low copper aluminum alloy (less than 0.5% copper) to protect against corrosive environments.

The 316 L series stainless steel version (UNS S 31600) is used in extremely corrosive environments. Stainless steel bolts and other peripheral parts are also included with the stainless steel housing.

Additionally, the arrangement of the housing keeps the magnetic relay sensor and other components optimally shielded from magnetic or electromagnetic interference.



**Figure 5:** Housing

## I/P

The I/P module (current to pressure converter) employs a wound coil assembly. As it receives an electrical signal from the main circuit board, it applies a magnetic force on a flapper assembly. This flapper opens and closes a pneumatic orifice that controls the pneumatic flow to the relay.

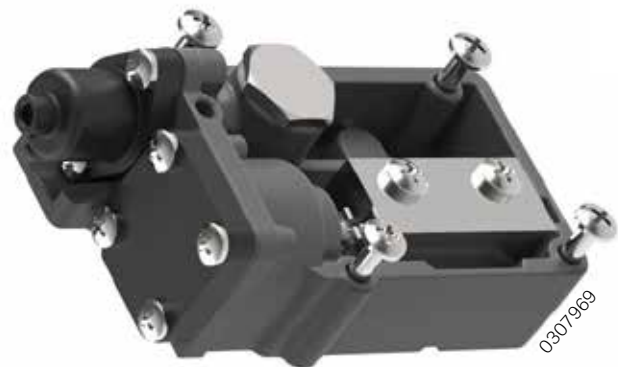
This highly precise and responsive I/P assembly maintains steady, yet rapid control of the relay.



**Figure 6:** I/P Assembly

## Pilot Relay

The pneumatic relay consists of a spool and block pilot valve assembly that modulates the actuator pressures. The pilot valve both supplies and exhausts the actuator chambers in a precisely controlled way. The generous air passages in the pneumatic circuit of the Chronos positioner housing and relay allow for quick valve response.



**Figure 7:** Pilot Relay

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## Characteristics

The Chronos positioner main features are:

- HART® communication protocol, version 7.
- Temperature and pressure sensors.
- Large and backlit graphical LCD display.
- High bright warning LEDs.
- Quick setup assistant menu.
- Local interface with protected setup buttons.
- DTM with diverse setup parameters, graphics and diagnosis.
- Configurable characterization curve.
- Autocalibration and autotune.
- Automatic or manual gain adjustment of the local PID control.
- Execution of diverse signatures tests, such as ramp test (with friction analysis), step test, multi step test and the valve partial stroke test.
- RFI and EMI immune.
- Explosion proof housing Exd IIC T5/T6 (IECEx/ATEX/ INMETRO), IP66.
- Advanced technology two-stage relay.
- Modular design, with the electronic part separated from the pneumatic part.

## Advantages and Benefits

The Chronos positioner main advantages and benefits are:

- Multilingual texts and messages in plain language.
- Precise control.
- Allows reading in dimly lit places.
- High responsiveness.
- Easy to assemble on a wide range of linear and rotary actuators.
- Fast setup and calibration processes.
- Upgradeable firmware.
- Excellent value for money.
- The setup does not require the use of personal computers or handhelds in most cases.
- When needed, maintenance tasks are simplified.
- Cut-off function.
- Assembly on ValtekSul actuators does not require additional manifolds.
- Robust, resistant.
- Manufacturing in metallic structure.

## On-site Operation

On-site operations, such as setting parameters and executing automatic commands, can be performed on the Chronos positioner through its local interface. This interface consists of a generously sized graphical and multilingual LCD display. The display is back-lit for easy viewing even in dimly lit areas.

A set of bright green, yellow and red LEDs complement the information on the display and show operating alerts even from a distance.

Status information can be observed locally and is presented in plain language that does not require decoding.

All interface menu items can be accessed via four pushbuttons that operate with the positioner front cover closed. This allows access to the positioner without the use of a handheld calibrator or a personal computer.



**Figure 8:** Screen examples of the Chronos positioner local interface graphic display

# Chronos IDP7600 Digital Positioner

## HART and DTM Communication

Each year, the number of field devices that are connected to control systems through various types of digital communication increases greatly. As these devices acquire more intelligence, the tasks of adjustment, configuration, commissioning, fault diagnostics, maintenance, among others, become increasingly complex for control systems, management tools, and users.

The FDT Group, formed by several manufacturers of control systems and field devices, has developed a software architecture where field devices can be managed on an open software platform, independent of specific control systems.

This software architecture, called FDT (Field Device Tool), allows a specific software component of a field device, called DTM (Device Type Manager), to be integrated with the control systems and management tools.

## Chronos Positioner DTM

ValtekSul supplies the Chronos positioner DTM to be integrated into any open system that supports FDT/DTM® technology and HART® digital communication.

The well-organized and intuitive DTM page structure allows the user access to all of the Chronos positioner configuration parameters and its diagnostic and alert information. Additionally, the user can execute automatic commands such as signature tests and autocalibration.

The available DTM pages are:

- Dashboard
- Alert
- Configuration
- Gain control (Tuning)
- Signature tests
- Diagnostics
- Calibration
- Positioner setup
- Device information

## Dashboard

The Dashboard page presents general information about the valve and positioner. The page includes the status of the position set-point, current position, actuator pressure readings, main board temperature, I/O terminals, and the overall equipment integrity information including any activated error messages.

The page also presents the most relevant settings, such as air action, signal when closed, and characterization, and command source among others.

The following image represents the Chronos positioner DTM Dashboard page:

# Chronos IDP7600 Digital Positioner



Figure 9: Chronos positioner DTM Dashboard page

## Alert

This page displays the status of alerts related to electronic board errors, operation and calibration alerts, as represented by the image:

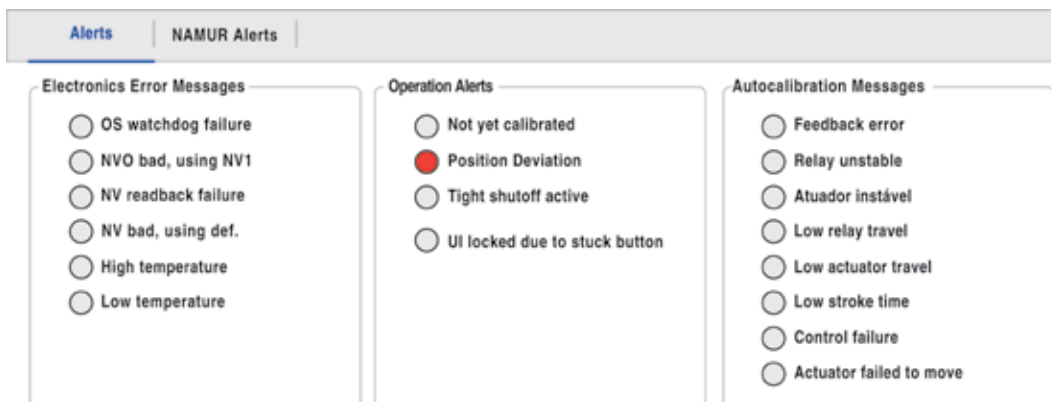


Figure 10: Chronos positioner DTM Alert page

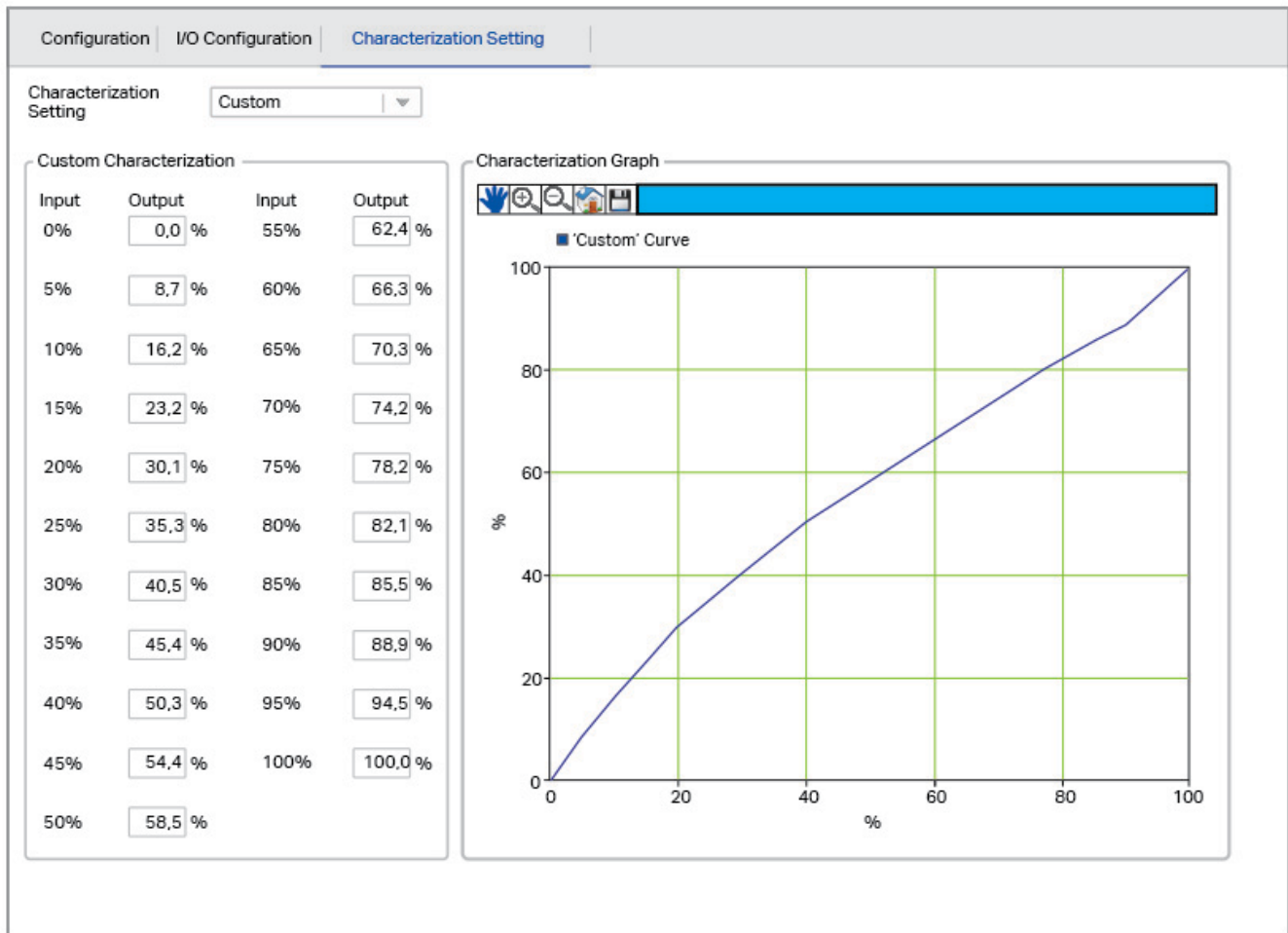


# Chronos IDP7600 Digital Positioner

## Configuration

The Configuration pages present the various configuration parameters supported by the Chronos positioner. These include air action, feedback direction, soft lim-

its, I/O configuration, and characterization parameters. Figure 11 represents the Characterization Setting page:



**Figure 11:** Chronos positioner DTM Characterization Configuration page

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## Gain Control (Tuning)

This page features gain control adjustment options and various parameters for configuring the Chronos positioner's local PID control loop. The convenient Autotune feature lets you quickly adjust the overall stability and performance of the valve.

## Off-Line Signature Tests

The off-line signature pages present parameters for the execution of offline tests including ramp and ramp friction tests, step test, multi-step test and HDRL (Hysteresis, Deadband, Repeatability and Linearity) analysis. Each test includes the signature, a graph of the different positioner signals over time. These signals include position setpoint, valve position, relay information, and actuator pressures, among others. The Multi-Step signature page is represented by Figure 12:

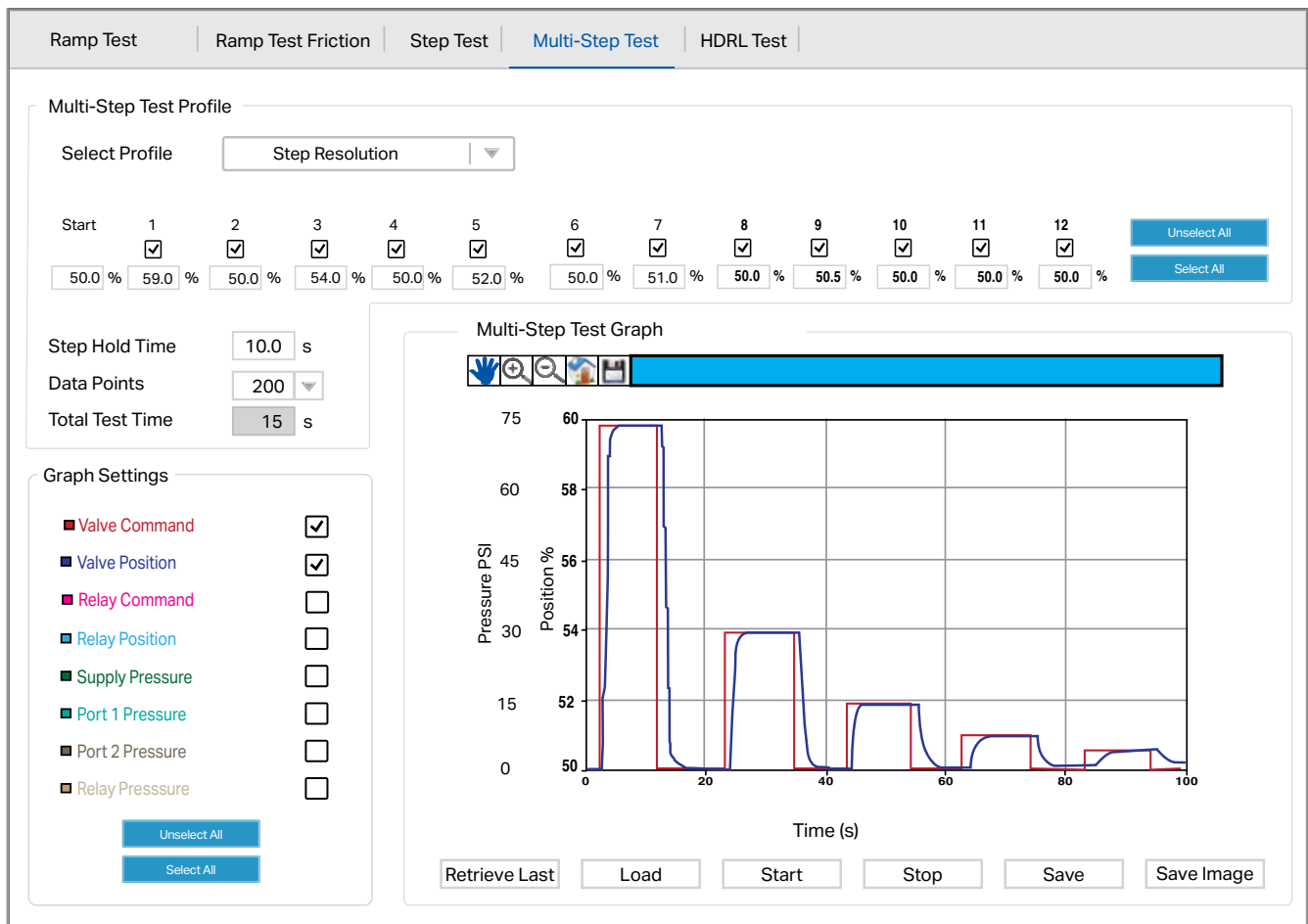


Figure 12: Chronos positioner DTM multi-step test page

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## On-line Signature Tests

These pages allow for performing the partial stroke test (PST) and for monitoring the positioner signals while the valve is in service using the Signal-Time Graph.

Each page collects position set-point, current position, pressure signals and other positioner signals. The Signal-Time Graph is represented by Figure 13:

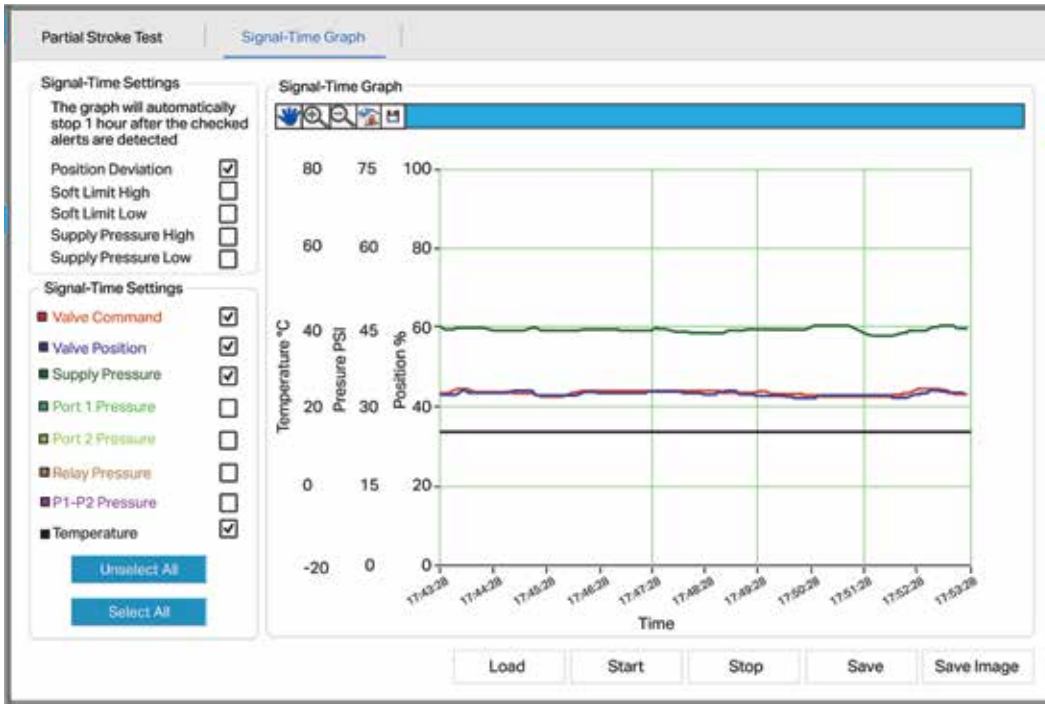


Figure 13: Chronos IDP 7600 positioner DTM Signal x Time Graphic page

## Diagnostics

This page features diagnostic information such as counters, offset configuration and stroke times.

## Calibration

This page features autocalibration performance, loop current calibration, and pressure sensor calibration, as well as counting information (zero current, null spool, MIN stem, and MAX stem).

## Device Setup

This page features various Chronos positioner setup parameters, such as interface-related parameters (language, LCD orientation, etc.), date and time, and HART.

## Device Information

This page displays Chronos positioner information parameters, such as HART network related parameters, optional features (licensed features, hardware options and main board revision) and version information (universal, field device, software and hardware).

Please consult the ValtekSul's Sales Engineering Department regarding the availability of the Chronos positioner enabled with pressure sensors.

For more information on the Chronos positioner, visit the website:

[positioners.valteksul.com](http://positioners.valteksul.com)

or contact ValtekSul's Sales Engineering Department.

# Chronos IDP7600 Digital Positioner

## HART and EDD Communication

EDDL (Electronic Device Description Language) is governed by an international standard (IEC-61804). It describes available features of a field device (such as a positioner) via an encoded EDD (Electronic Device Description) file.

The EDD file can describe any type of product (controllers, transmitters, positioners, among others). Its content differs based on the communication protocol and the product type. A control system can load the EDD file to present the user readable and organized data received from a product.

## Chronos Positioner EDD

In addition to the DTM, ValtekSul supplies the Chronos positioner EDD file to be integrated into any system that supports the EDDL standard and the HART® digital communication.

The page structure provided by the EDD file allows the

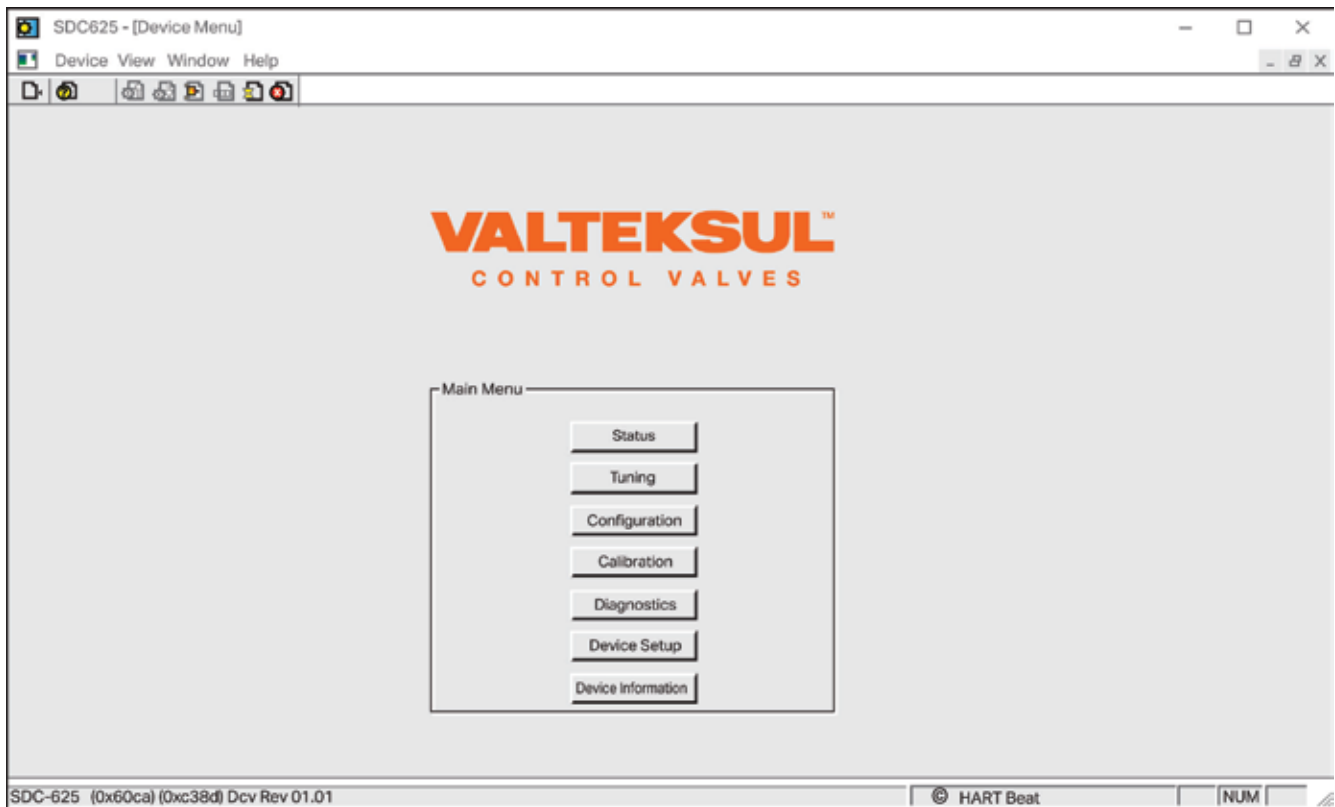
user to access all Chronos positioner configuration parameters, and diagnostic and alert information. With it the user can execute automatic commands such as autocalibration.

The pages provided by the Chronos positioner EDD file are:

- Main Menu
- Status
- Tuning
- Configuration
- Calibration
- Diagnostics
- Device Setup
- Device Information

## Main Menu

The main menu presents links to the other available pages, as shown in Figure 14:



**Figure 14:** Chronos positioner EDD file Main Menu page

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## Status

This page presents general positioner information such as position set-point, current valve position, input signal, main board temperature and data quality.

## Tuning

This page contains the PID Gains tab which presents parameters for configuring the local PID control loop, and the Tuning Mode tab that presents simple Autotune gain control adjustment options.

## Configuration

This page contains tabs to various Chronos positioner configuration parameters including Air Action, Feedback Direction, Characterization (as shown in Figure 15), Tight Shutoff, Position Offset and Setpoint Source.

## Calibration

This page presents functions and parameters related to calibration, through the following tabs: Temperature Calibration, Current Loop Calibration and Control Calibration.

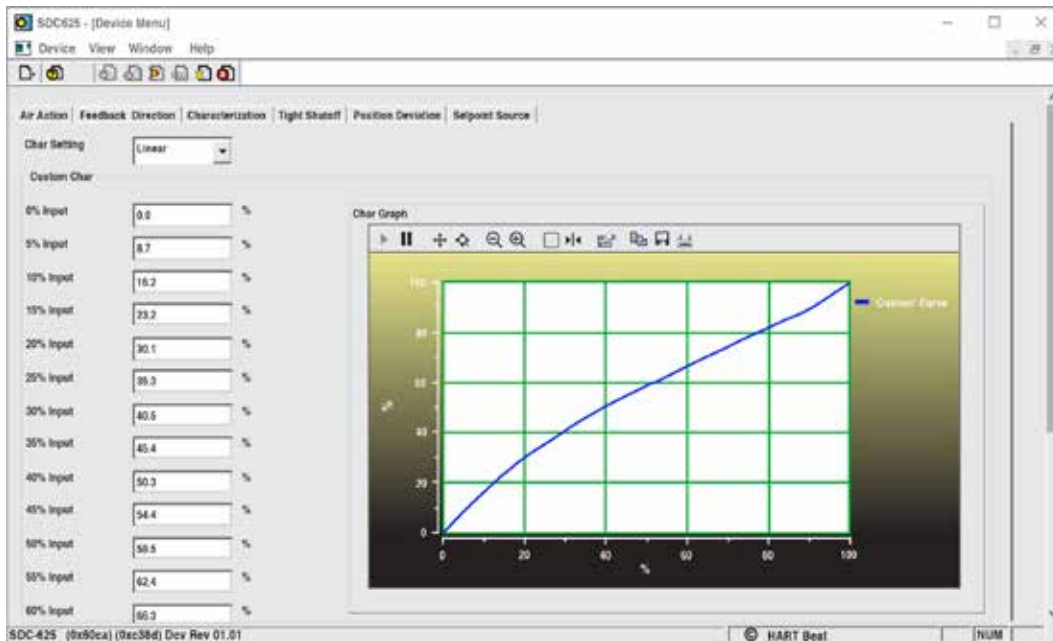


Figure 15 : Characterization Tab of the Chronos positioner EDD File Setting page

## Diagnostics

This page presents parameters related to diagnosis, through the tabs: Counters and Stroke Times.

## Device Installation

This page presents parameters related to the installation of the Chronos positioner, through the tabs: Local Interface, Time and Date, and HART.

## Device Information

This page presents parameters related to the installation of the Chronos positioner, through the tabs: HART Information and Revision Numbers.

For more information on the Chronos positioner EDD file, visit the website:

<https://www.valteksul.com/posicionadores-eng>

or contact ValtekSul's Sales Engineering Department.

# Chronos IDP7600 Digital Positioner

## General Information

Table 2 presents technical specifications and materials of construction for the Chronos positioner. Table 3 presents performance data.

**Table 2 - Chronos positioner technical specifications and manufacturing materials**

<b>Communication Protocol</b>	<ul style="list-style-type: none"> <li>HART®, version 7</li> </ul>	<b>Housing Material</b>	<ul style="list-style-type: none"> <li>Injected aluminum with low copper content and polyester-based powder coating (standard)</li> <li>300 series stainless steel (optional)</li> </ul>
<b>Supply</b>	<ul style="list-style-type: none"> <li>2 wires, loop powered, 4-20 mA, reverse polarity protected</li> </ul>	<b>Internal Components</b>	<ul style="list-style-type: none"> <li>Aluminum and 300 series stainless steel</li> </ul>
<b>Operating Current</b>	<ul style="list-style-type: none"> <li>4-20 mA (3.8 mA minimum)</li> </ul>	<b>Soft Parts</b>	<ul style="list-style-type: none"> <li>Buna-N, silicone</li> </ul>
<b>Load Voltage</b>	<ul style="list-style-type: none"> <li>10.4 Vcc @ 20 mA (typical)</li> </ul>	<b>Hazardous Areas Certification</b>	<ul style="list-style-type: none"> <li>Explosion proof, flameproof and nonincendive housing - IECEx / ATEX / INMETRO</li> </ul>
<b>Equivalent Resistance</b>	<ul style="list-style-type: none"> <li>520 Ω @ 20 mA (typical)</li> </ul>	<b>Housing Protection Class</b>	<ul style="list-style-type: none"> <li>IP66</li> </ul>
<b>Characteristic</b>	<ul style="list-style-type: none"> <li>Linear, equal percentage or user defined curve by 21 points</li> </ul>	<b>Electrical Connections</b>	<ul style="list-style-type: none"> <li>1/2" - 14 NPT (standard)</li> <li>M20 x 1.5 (optional)</li> </ul>
<b>Assembly</b>	<ul style="list-style-type: none"> <li>Linear actuator</li> <li>Rotary actuator</li> </ul>	<b>Pneumatic Connections</b>	<ul style="list-style-type: none"> <li>1/4" - 18 NPT</li> <li>1/8" - 27 NPT (manometer)</li> </ul>
<b>Pneumatic Supply</b>	<ul style="list-style-type: none"> <li>Compressed air according to the ISA 7.0.01(1) standard or nitrogen</li> </ul>	<b>Weight</b>	<ul style="list-style-type: none"> <li>Aluminum version: 9.6 pounds (4. kg)</li> <li>Stainless version: 20.6 pounds (9.4 kg)</li> </ul>
<b>Supply Pressure</b>	<ul style="list-style-type: none"> <li>30 to 120 psig (2.1 to 8.3 bar)</li> </ul>	<b>Dimensions</b>	<ul style="list-style-type: none"> <li>8.4 x 5.7 x 65 in. (22 x 15 x 17 cm)</li> </ul>
<b>Operating Temperature</b>	<ul style="list-style-type: none"> <li>-4 to 185°F (-20 to 85°C)</li> </ul>		
<b>Humidity Range</b>	<ul style="list-style-type: none"> <li>0 to 95% U. R. non-condensing</li> </ul>		

(1) Supply air dew point must be at least 18°F (10°C) below ambient temperature, the amount of oil must not exceed one part per million, and solid particle size should be less than 5 microns (1 micron is recommended).

**Table 3 - Chronos positioner performance data**

<b>Air Flow</b>	<ul style="list-style-type: none"> <li>14 scfm @ 60 psig (22.5 Nm<sup>3</sup>/h @ 4.1 barg)</li> </ul>	<b>Repeatability</b>	<ul style="list-style-type: none"> <li>&lt; 0.05% F.S.</li> </ul>
<b>Constant Air Consumption</b>	<ul style="list-style-type: none"> <li>0.6 scfm @ 60 psig (&lt; 1.0 Nm<sup>3</sup>/h @ 4.1 barg)</li> </ul>	<b>Linearity</b>	<ul style="list-style-type: none"> <li>&lt; 0.8% F.S. (linear actuators)</li> <li>&lt; 0.5% F.S. (rotary actuators)</li> </ul>
<b>Dead Band</b>	<ul style="list-style-type: none"> <li>&lt; 0.2% S.F. <sup>(1)</sup></li> </ul>	<b>Temperature Effects</b>	<ul style="list-style-type: none"> <li>± 0.04% F.S./°F ( ± 0.08% F.S. / °C)</li> </ul>
		<b>Maximum Vibration</b>	<ul style="list-style-type: none"> <li>4G (5 to 15 Hz) / 2G (15 to 2000 Hz)</li> </ul>
		<b>Assembly Orientation Effect</b>	<ul style="list-style-type: none"> <li>Negligible</li> </ul>

(1) S.F. = Scale Factor

# Chronos IDP7600 Digital Positioner

## Model Code

The following table shows the model code of the Chronos IDP7600 positioner.

**Table 4: Chronos positioner model code**

PROTOCOL	
6	HART®
8	Foundation Fieldbus® (1)
9	Profibus-PA® (1)
DIAGNOSTICS	
0	Standard
1	Advanced diagnosis (with pressure sensors)
2	Premium diagnosis (with pressure sensors)
HOUSING	
0	Aluminum with gray polyester-based paint (ValtekSul standard) and LCD display
1	Aluminum with gray polyester-based paint (ValtekSul standard) and blind cover
2	Stainless Steel with LCD display
3	Stainless Steel with blind cover
S	Special paint version (on request)
CERTIFICATION	
G	General Use
E	Explosion Proof
SHAFT	
D	Standard D in stainless steel AISI-316 (UNS S 31600), for linear and rotary actuators
N	NAMUR, in stainless steel AISI-316
ELECTRICAL CONNECTION	
I	1/2" NPT
M	M20
ACTION	
40	4-ways (double action)
30	3- ways (single action)
4V	4- ways with vent (double action)
3V	3- ways with vent (single action)
TEMPERATURE	
S	Standard Operating Temperature (-20°C to +85°C)
L	Low Operating Temperature (-40°C to +85°C)
GAUGES	
SB	Stainless steel with brass inner (psi/bar)
SS	Stainless steel with stainless steel inner (psi/bar)
SO	Special manometers (customer specified)
NG	No manometers
SPECIAL CIRCUITS	
00	No special circuits
PT	Position transmitter with 4-20 mA feedback <sup>(3)</sup>
4S	PT plus 2 DOs and 1 DI <sup>(2)(3)</sup>
AX	Auxiliary circuits
SPECIAL OPTIONS	
00	No special options

<b>IDP7</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>E</b>	<b>D</b>	<b>M</b>	<b>-</b>	<b>30</b>	<b>L</b>	<b>SB</b>	<b>-</b>	<b>PT</b>	
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Notes: (1) Consult ValtekSul's Sales Engineering Department.  
 (2) Position transmitter with 4-20mA feedback, plus 2 digital outputs and 1 digital input.  
 (3) Not available with Foundation Fieldbus and Profibus-PA versions.

## Quality Management System



**ISO 9001-2015**  
Certificate nº 31001 QM 15  
DQS GmbH  
DQS Brazil  
ISO 14001™ Certified



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Chronos is registered trademark.

Valtek Sulamericana is registered trademark.

ValtekSul is registered trademark.

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