



**DATADIGITAL-SVR SERIES
STATIC VOLTAGE REGULATOR USER MANUAL**

**80V – 480V
3,5 kVA – 3500kVA**

January 2019



IMPORTANT

This users manual contains setup, operation and maintenance information for DATADIGITAL-SVR Series Static voltage Regulators.

In this user manual, DATADIGITAL-SVR Series Static Voltage Regulator will hereinafter be referred to as SVR briefly

Before starting setup and operation of the equipment, complete users manual should be read carefully.

Before operation, the SVR should be prepared by an authorized technical personnel approved by DATATURK. The warranty will be void, if this direction is not followed.

Please contact DATATURK customer service, if you see any problem about any process described in this users manual.

The manufacturer reserves the right to change the design of the equipment without notice.

HIGH LEAKAGE CURRENT

Because of the high leakage current, this equipment should be operated only after it is earthed.

ELECTROMAGNETIC COMPABILITY

This equipment is compatible to EMC directive 89/336/EEC and to conditions in released technical specifications. The compatibility remains only if related directions are followed and only if the equipment is used with accessories approved by the manufacturer.

IMPORTANT

In custom designs, there can be minor differences between this manual and the equipment.



CAUTION

1. There are no user servicable parts inside.
2. Even after the equipment is disconnected from input and output connections, a intervention to the interior of the equipment contains risk of electric shock, because of charged capacitors.
3. Ventilation holes should be kept open and no objects should be inserted.
4. In the environment where the equipment will be operated, the temperature and humidity should be relevant.
5. The equipment can not be operated in an environment having flammable and explosive devices.
6. Setup, maintenance and repair of the equipment should be performed only by trained, experienced and authorised technical personnel.
7. When working on live equipment a second person who is aware of all safety precautions and emergency actions should be present at all times.
8. It is the responsibility of each individual to be aware of national legislation, local legislation and site rules governing safety and working practices.
9. Use only good quality insulated tools and accessories, properly maintained and calibrated instruments, and suitable and adequate supports and lifting equipment.
10. Electrical energy can be supplied from the AC supply, load or the external alarm or auxiliary control terminals.



1. GENERAL INTRODUCTION

1.1 SYSTEM DESCRIPTION

DATADIGITAL-SVR Series Static Voltage Regulator (SVR) is the electronic device that corrects the value of 1 phase or 3 phase AC voltage. It provides smooth and regulated AC voltage for the load, especially in environments where the voltage rating is too low or too high.

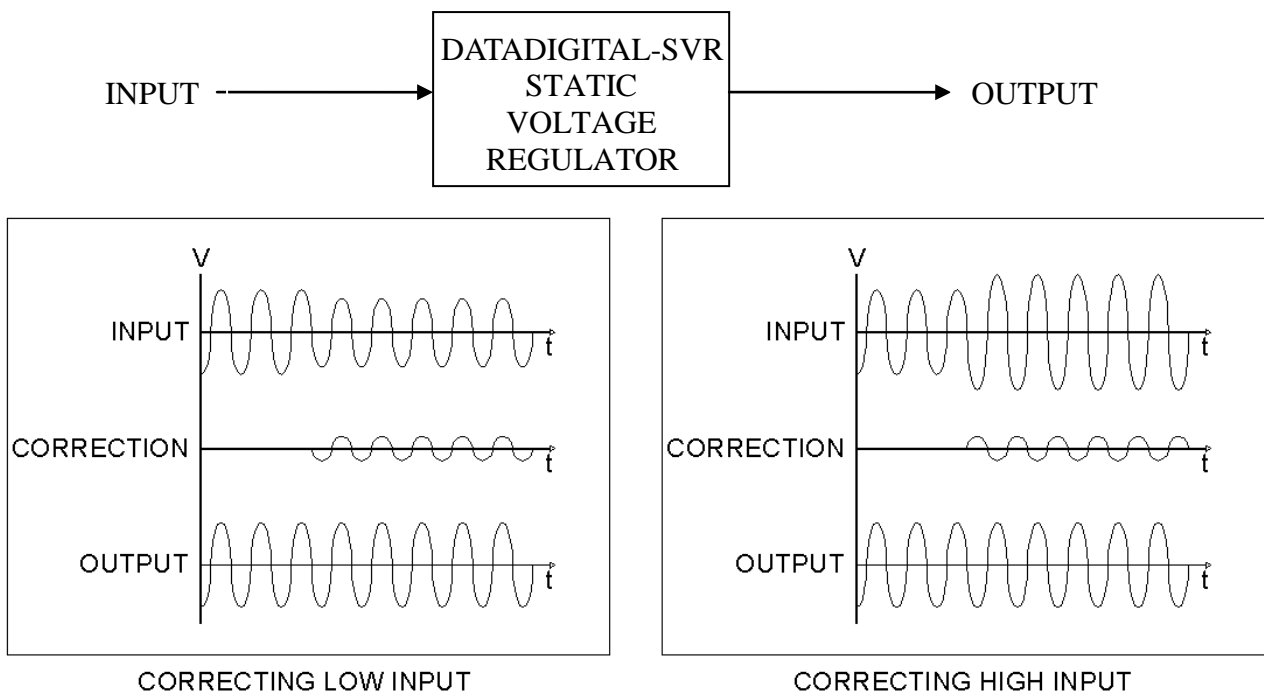
This device incorporates DSP (Digital Signal Processor) control and takes full advantage of it. The system offers advanced user interface, intelligent diagnostics and advanced communication features.

The device offers many additional options to the user, including input isolation transformer and output isolation transformer.

This device does not generate any uninterrupted power at the output load, it just regulates the voltage present at the input and outputs it to the output, so the output is present as long as the input is present.

1.2 OPERATION THEORY

As a general working principle, the device passes the input voltage over a transformer system which is switched with thyristor switches, thus creating a regulated voltage with respect to the input. After measuring that the generated voltage is within the proper limits, it transmits the voltage to the load by switching a relay on at the output.



The unit has no moving parts other than the cooling fans and the outlet contactor. Regulation is done by switching semiconductor thyristors, which are completely static elements. All controls on the device are made through a Digital Signal Processor (DSP). In 3-phase devices, each phase is controlled by a separate DSP. The DSP, which controls the L1 phase, is also responsible for the front panel functions. All DSPs communicate with each other with the CANBUS protocol.



DataDigital-SVR Static Voltage Regulator block diagram is shown below.

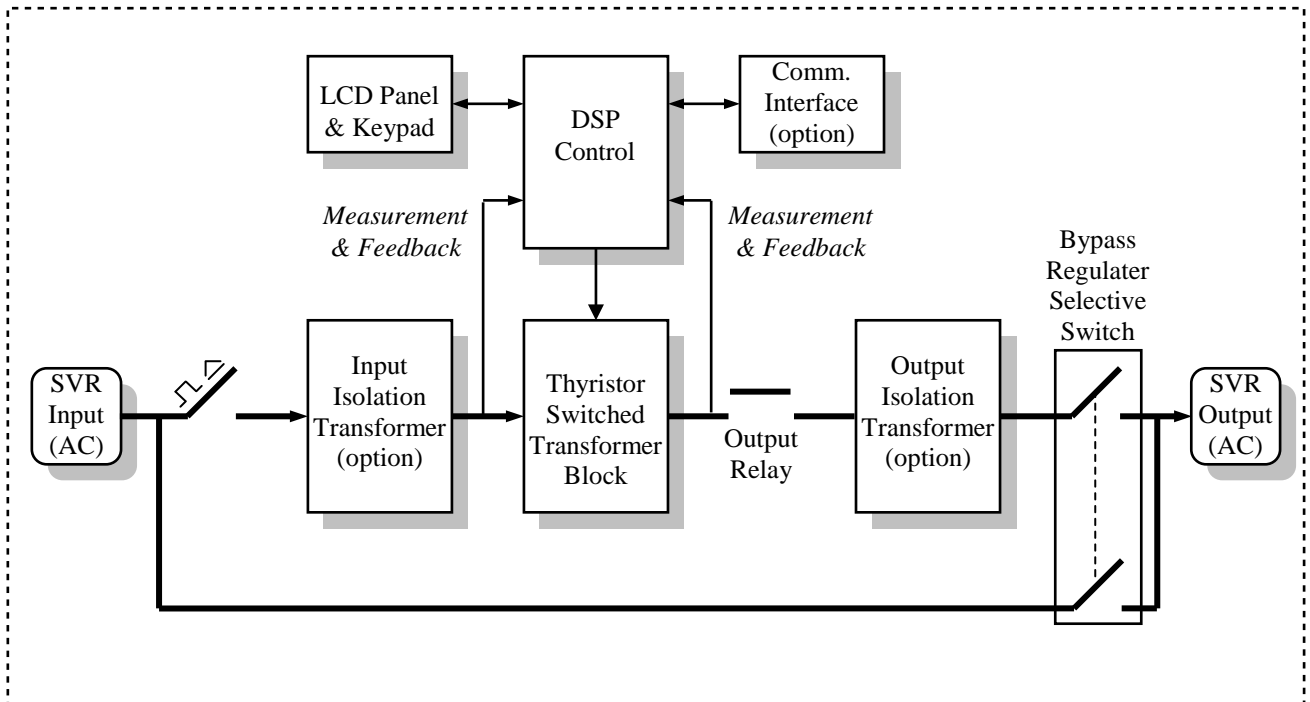


Figure 1.1 DataDigital-SVR Series Static Voltage Regulator Block Diagram

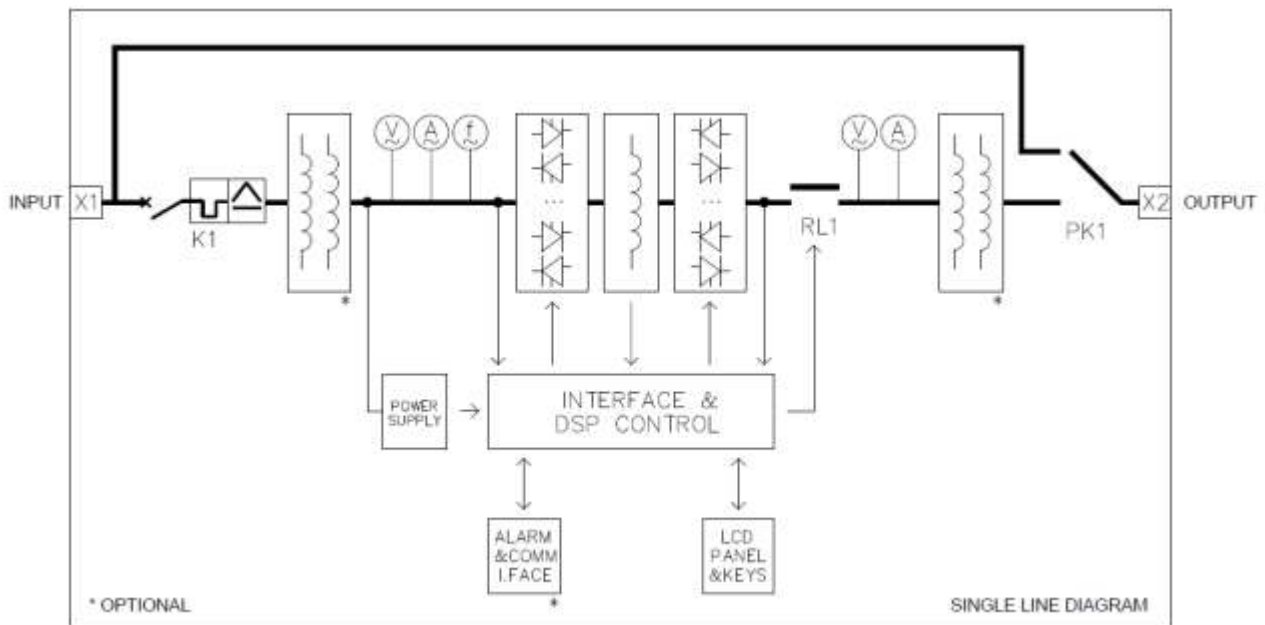
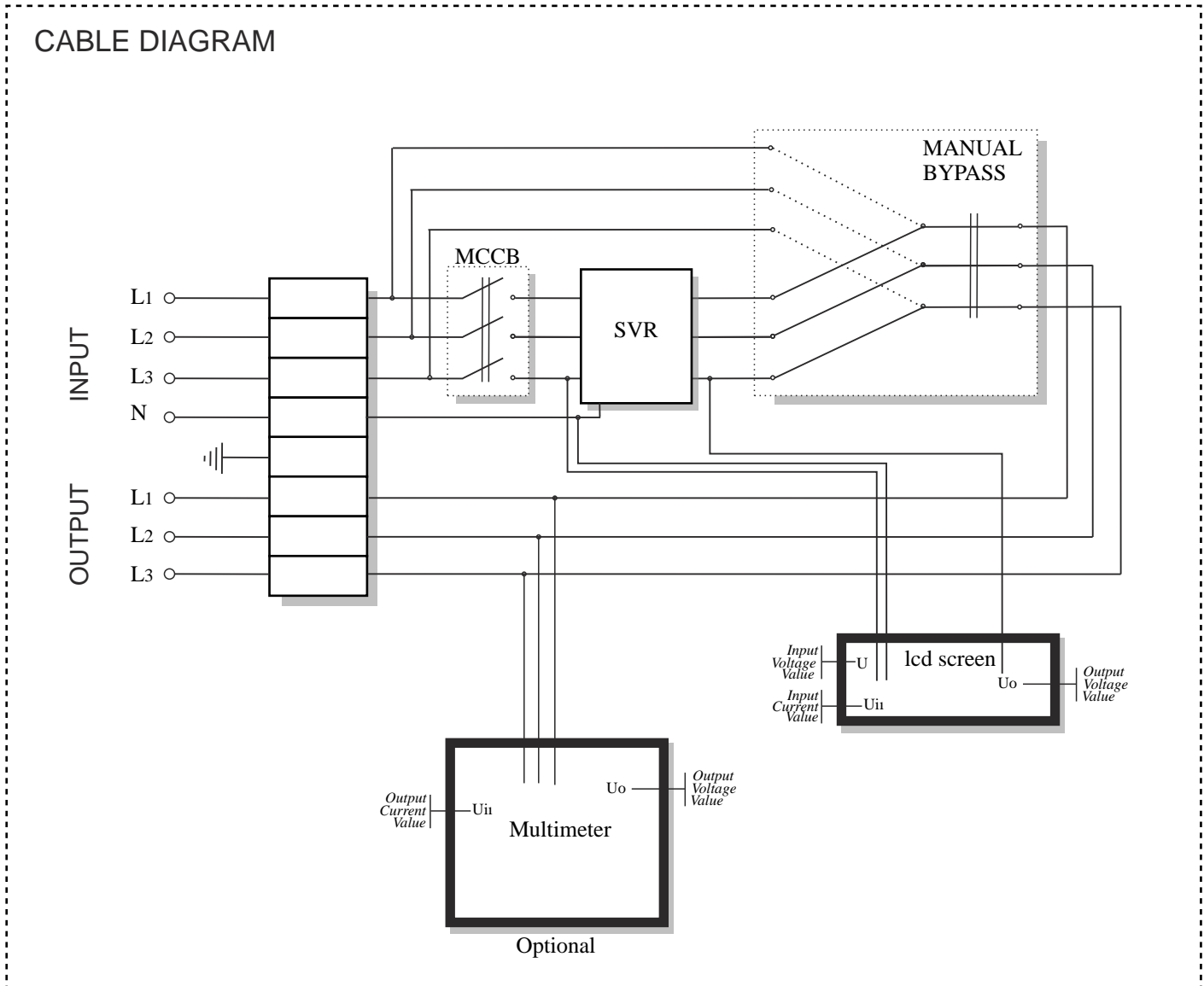


Figure 1.2 DataDigital-SVR Series Static Voltage Regulator Single Line Diagram (includes optional hardware)



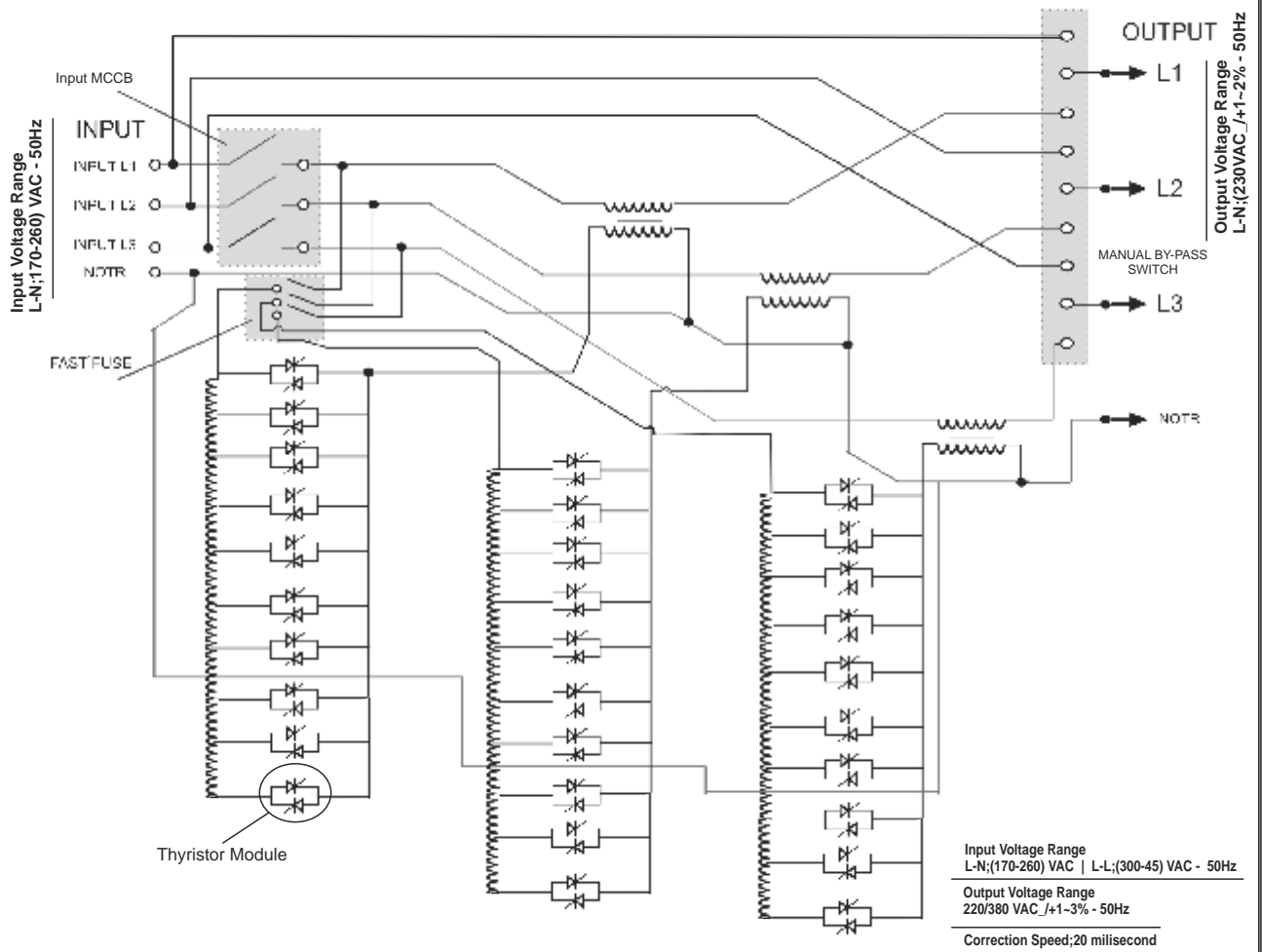
DataDigital-SVR Static Voltage Regulator block diagram is shown below.





DataDigital-SVR 1000-3500kVA Static Voltage Regulator block diagram is shown below.

3 Phase Power Connection Plan



1000-3500kVA STATIC AVR



1.3 GENERAL FEATURES

Characteristics of the DataDigital-SVR Series Static Voltage Regulator are as following :

- 1 phase input or 3 phase input models
- options 80-270VAC / 90-280VAC / 110-260VAC / 130-260VAC / 150-260VAC / 170-260VAC
- 50 / 60 Hz operation
- Power range from 3,5kVA to 3500kVA
- Regular band / Wide band regulation options
- Regulation capability up to 25 steps
- Intelligent control and high reliability with DSP (Digital Signal Processor)
- 2x16 character LCD display that can display measurement, status and alarm messages
- Ability to calibrate measurement quantities from the front panel
- Language selection from front panel (English, Turkish)
- Input Low / High, Input Too Low, Over Temperature, Overload, Overcurrent protections
- Program all operation parameters (password protected)
- Monitoring and control via RS232-RS485, Modbus communication Option
- Input and Output Isolation Transformer Option
- Easy monitoring with gauges (input / output voltages and currents)



1.4 PHYSICAL FEATURES

INDICATIONS AND ALARMS	
Digital Measurements (On LCD Display)	Input Voltage Output Voltage Frequency Current
Alarm Messages (On LCD Display)	Output Fail / Low Input Low / High Input Too Low Overload Overcurrent
Led Indicators	Operation

COMMUNICATION & REMOTE MONITORING	
Serial Communication	RS232 / RS485 Isolated Serial Port (Modbus Comm.) *Option MODBUS TCP by adding external adapter / gateway *Option
Dry Contact Outputs	1 general purpose common alarm relay *Option
ENVIRONMENTAL FEATURES	
Protection Degree	IP20, higher optional
Operation Temperature	-5°C / + 50°C *1
Storage Temperature	-20°C / + 50°C
Cooling	Fan Forced
Relative Humidity	0% – 90% (non condensing)
Operation Altitude	2000 meters maximum
GENERAL	
Standards	TS EN 61000-6-2: 2006 - TS EN 61000-6-3: 2007 (EMC), IEC60204-1+A1:2008(LVD)
Mechanical bypass	Hand operation line - regulator
Static bypass	Optional



1.5 ELECTRICAL FEATURES (1 phase devices)

CAPACITY	3,5kVA...160kVA
INPUT	
Voltage Regulation Range * ¹	Regular range : -25% / +15% (170V / 260V) Wide range : -65% / +25% (80V / 270 V) *Option
Operation Frequency	45 Hz – 65 Hz, automatic adapted
OUTPUT	
Voltage * ²	230V ±3% 230V ±2% *Option
Efficiency	> 97 %
Correction speed	5000V / seconds

*¹ Consult your dealer for wider regulation ranges.

*² Consult your dealer for 110V, 120V, 220V, 240V operation voltages.

1.6 ELECTRICAL FEATURES (3 phase devices)

CAPACITY	30kVA...3500kVA
INPUT	
Voltage Regulation Range * ¹	Regular range : -25% / +15% (300V / 450V) Wide range : -35% / +25% (260V / 500V) *Option
Operation Frequency	45 Hz – 65 Hz, automatic adapted
OUTPUT	
Voltage * ²	380/400V ±3% 400V ±2% *Option
Efficiency	> 97 %
Correction speed	500V / seconds

*¹ Consult your dealer for wider regulation ranges.

*² Consult your dealer for 200V, 380V, 440V, 480V operation voltages.



2. SETUP

2.1 OPENING PACKAGE

When the equipment is delivered to you, first to be examined is a possible damage during transport. Therefore, examine the equipment carefully. For a possible future use, save the packet and wooden pad of the SVR after unpacking.

2.2 CHOOSING PROPER PLACE

1. For a proper ventilation, minimum distance between the rear of the SVR and any nearby object should be minimum 20 cm.
2. Choose a place with proper temperature and humidity.
3. Do not choose any place which can cause dust and corrosion.
4. The place chosen should not have direct sunshine and shouldn't be near any heating source.
5. Operating the equipment in proper conditions will increase its lifetime.

2.3 ELECTRICAL CONNECTION

All electrical connections of the SVR exist on the back of the front door of the enclosure. All required connections to connection panel of SVR should be made by DATATURK service personnel or by the approval of DATATURK service personnel.

Before making the connections all power switches, isolators and circuit breakers must be in OFF position.

CAUTION

Your device may have different connections and terminals, depending on your project and specifications. Please refer to the drawings and terminal labels before proceeding.

1. Input AC supply should be connected to X1 terminal.
2. Load (output) should be connected to X2 terminal.
3. Ground must be connected.

CAUTION

Connect and control ground (PE) connection. Definitely, the equipment shouldn't be operated without ground connection.



3. FRONT PANEL

3.1 STRUCTURE OF FRONT PANEL

The front panel of the SVR contains a 2x16 character LCD (Liquid Crystal Display), control buttons and leds. Via LCD, measurements and status / alarm messages are displayed in a format, which can be easily understood. Parts in front panel and their functions are given below.



Figure 3.1 SVR Front Panel

1	LCD Display	Measured values, status and alarm messages of the equipment are displayed in this 2x16 character LCD display.
2	PRG Button	This button is used to get back from a submenu or to escape from adjustment without validating.
3	Up Button	In menus, this button is used to see the previous item (up). In adjustments, this button is used to increase the adjusted quantity.
4	Down Button	In menus, this button is used to see the next item (down). In adjustments, this button is used to decrease the adjusted quantity.
5	Ui and Uo	Ui ; Unregulated input Voltage, Uo ; Regulated output Voltage
6	L and I	L; The percentage of the load fed from the regulator I; Indicates the current drawn from the regulator.
7	S	Indicates the load proportionality in kVA of the current drawn from the regulator.
8	Type Indicator	The area has the information about the device model, nominal voltage and nominal current.



3.1.3 MUTING ANY AUDIBLE ALARM PERMANENTLY

If no audible alarm is requested at all, JP1 jumper on the LCD display board should be removed.

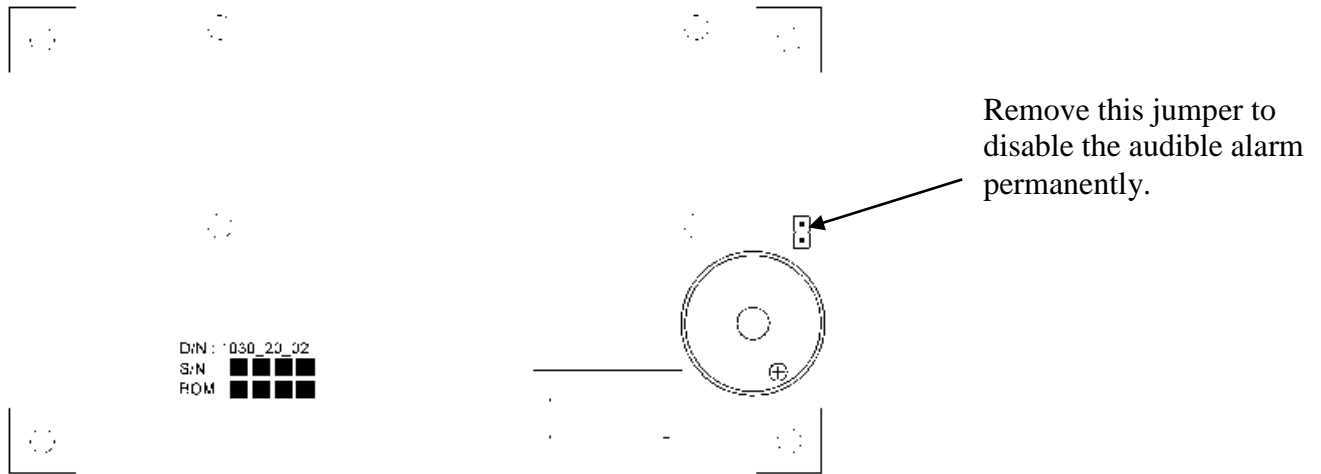


Figure 3.4 SVR Front Panel Audible Alarm Cancellation

NOT

Removing JP1 jumper can be performed only by a qualified and trained technical personnel. All circuit breaker of the SVR should be switch to 0 position and all boards power on lights should be observed as OFF, before performing this operation.

3.1.4 DISABLING PASSWORD PROTECTION

There is a password protection to avoid any unauthorised access to any parameters or adjustment. All parameters can be monitored, but can not modified, until the correct password is entered. A KEY symbol on the right bottom of the LCD display indicates the status of the password protection. The protection is active as long as the key sign is there.

To disable the password protection, correct passord should be entered to **PGM > up arrow > Password**. Any parameter modification can be done afterwards.

Password protection is automaticly reactivated, if no key is pressed for 5 minutes.

NOTE

Default password is 005.

NOTE

For service purposes, there is a backdoor access gained by pressing some buttons in a special sequence.



3.2 MEASUREMENTS MENU

LCD display waits in MEASUREMENTS MENU, after the SVR has started its operation. UP and DOWN buttons can be used to move ahead this menu.

Some measured values of the SVR are displayed on the LCD display.

1 PHASE DEVICES			
#	LCD Text		Description
1	Output	[V] [A] [%]	Output Voltage Value (True RMS) Output Current Value (True RMS) Output Load Level
2	Power & PF	[VA]	Output Apparent Power Value Load Power Factor
3	Input	[V]	Input Voltage Value (True RMS)
4	Frequency	[Hz]	Input / Output Frequency
5	Temperature	[°C]	Heatsink Temperature Value
6	Date & Time	[-]	Actual Date and Time

3 PHASE DEVICES			
#	LCD Text		Description
1	Output Voltage	[V]	Output Voltage Value (True RMS)
2	Output Current	[A]	Output Current Value (True RMS)
3	Output Load	[%]	Output Load Level (True RMS)
4	Out.Power(kVA)	[kVA]	Output Apparent Power Value
5	Out.Power(kW)	[kW]	Output Active Power Value
6	Power Factor	[-]	Load Power Factor
7	Input Voltage	[V]	Input Voltage Value (True RMS)
8	Input Current	[A]	Input Current Value (True RMS)
9	Frequency	[Hz]	Input / Output Frequency
10	Temperature	[°C]	Heatsink Temperature Value
11	Date & Time	[-]	Actual Date and Time



3.3 ALARM MESSAGES

Alarm and warning messages are displayed timely on the LCD display. Audible alarm is also provided at the mean time.

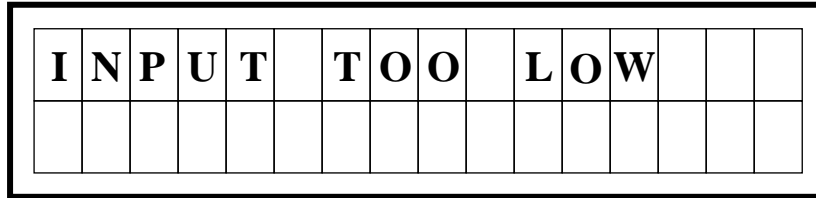


Figure 3.5 Alarm Message Example (Three Phase Device)

Possible alarm and warning messages are listed below.

LCD Text	Message Description	Action
OUTPUT FAILURE	Indicates that the SVR output voltage is not within the desired limits.	TRIP Output shutdown
INPUT LOW	This alarm indicates that the input network voltage value is low and needs regulation. The output will be regulated as required.	Alarm message only
INPUT HIGH	This alarm indicates that the input network voltage value is high and needs regulation. The output will be regulated as required.	Alarm message only
INPUT TOO LOW	This alarm indicates that the input network voltage value is below the regulation limit.	TRIP Output shutdown
OVERCURRENT	Indicates that the output load (current value) is above the limit values. Depending on the overload tolerance of the device, following a certain timeout, the output will be interrupted and the device will thus protect itself.	Alarm message only



	temperature measurement is broken or faulty.	
EMERGENCY STOP	It indicates that the device has been stopped by means of the emergency stop switch (normally short contact connected to the communication board X14 connector).	TRIP Output shutdown
STATIC BYPASS	Indicates that the device has been bypassed to the input of the output via the semiconductor thyristor switch.	Alarm message Connecting output to bypass line (to input)
MANUAL BYPASS	Indicates that the device has been bypassed to the input of the output via the PK1 Mains Regulator selector switch.	Alarm message only
OVERCURRENT TRIP	It indicates that the device detects excessive momentary current at the output of the device (on load) and that the output is stopped to protect itself.	TRIP Output shutdown Requires reset



3.4 CONTROL AND SETTINGS MENUS

Control and Settings Menus can be reached by a push to Enter button, when the screen is in Measurements Menu.

The structure and hierarchy of these menus are given below.

Functional

Password

This item is the password required to modify other adjustable parameters.

The equipment is shipped with default password 005.

Control Source

Input voltage lower level

The factory setting is **135 VAC**. Adjustable. When the input voltage is below **135VAC** The LOW alarm appears on the display and interrupts the output.

Input voltage top level

The factory setting is **275 VAC**. Adjustable. When the input voltage is above **275VAC** The ENTRY HIGH alarm appears on the display and interrupts the output.

Output Voltage lower level

The factory setting is **160 VAC**. Adjustable. Output voltage below **160VAC** The LOW alarm appears on the display and interrupts the output.

Output Voltage top level

The factory setting is **245 VAC**. Adjustable. Output voltage above **245VAC** The ENTRY HIGH alarm appears on the display and interrupts the output.

Permissions / Permission / Protection Functions

Protection Mode 10

Low Voltage Protection has been removed.

Protection Mode 11

High Voltage Protection has been removed.

Protection Mode 12

Low and high voltage protection is active.

Lower level of regulation

Determines the regulated output voltage lower level. Regulator in a special voltage range

The factory setting is **215 VAC**, unless selected. Adjustable.

However, the lower level and upper level are controlled by a specific hysteresis tolerance. Otherwise, the device oscillates.



Top level of regulation

The regulated output voltage determines the upper level. Regulator in a special voltage range factory setting is **230 VAC** unless selected. Adjustable.

However, the lower level and upper level are controlled by a specific hysteresis tolerance. Otherwise, the device oscillates.

Output Voltage Calibration

The output voltage value on the display is calibrated.

Output Voltage Polarization

It provides negative or positive adjustment during calibration.

Phase Protection:

In 3-phase systems, when a phase or protection execution occurs in one of the phases, allows you to close together or move independently. YES or NO is selected.

Current Protection - Trip

Current Protection Sets the number of trips. 1, 2 and 3 options

In option 1; System tries again 1 time after turning off the system due to overload. If the overload condition persists, it turns it off completely.

In the 2 option, it tries 3 times in 3 options. then completely shuts down.

Event Records / Log Records

View Records / PGM Key with the Up Arrow Key held together when the error records can be seen.

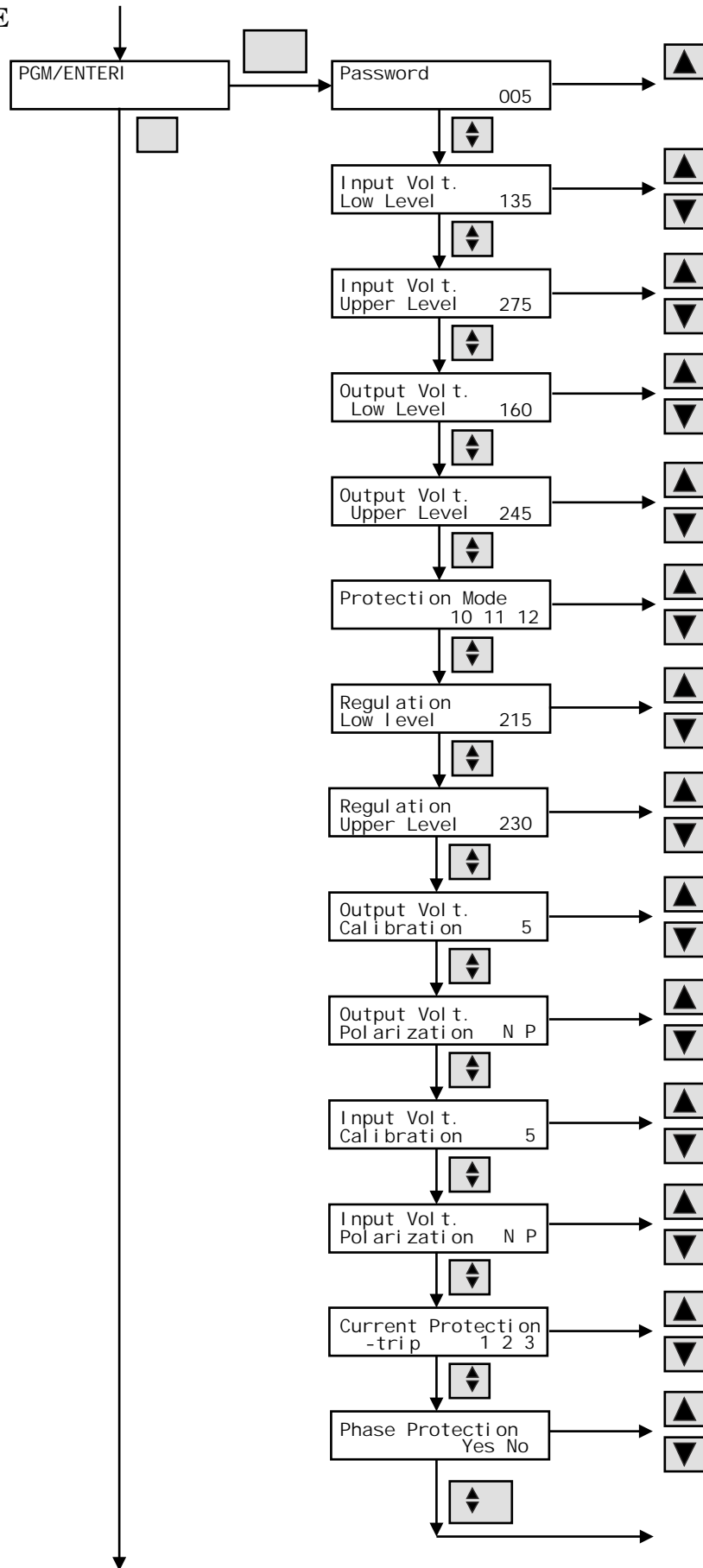
The Erase Records / PGM key and the Down Arrow key can be deleted and the error records can be deleted.

NOTE

Default (factory setting) password is 005.



3.5 MENU TRÉE





4. OPERATION

4.1 OPERATING THE DEVICE (SWITCHING ON)

4.1.1 Operating the device in bypass mode

When the SVR is operated in manual bypass mode, the input voltage is transferred to the output without any correction. For this ;

1. Check that SVR input switch K1 is in OFF position.
2. Take the Mains - Regulator selector switch PK1 to the Mains position. (Left or Up position)
3. The SVR will then feed the load via the bypass line.

4.1.2 Operating the device in normal mode

1. SVR input When K1 switch is OFF, apply 1 / 3 phase mains voltage according to the model from the distribution panel to which the SVR is connected.
2. Set the input K1 switch to the ON position. The SVR will be energized and the opening message will appear on the front panel.
3. If autostart is set, the device will start to generate the output AC voltage and after a short time the output contactor will enter the conduction. The SVR will then feed the load. (Refer to Chapter 5 Display Panel)
4. If autostart is not set, the device will wait in stand by before generating the output AC voltage. In this case, press the ON buttons on the front panel. (With the two rightmost keys). The device will start to generate the output AC voltage and after a short time the output contactor will enter the conduction.
5. Take the Mains - Regulator selector switch PK1 to the Regulator position. (Right or Down position)
6. Output voltage and output current can be monitored from the LCD panel.

4.2 STOPPING THE DEVICE (SWITCHING OFF)

4.2.1 Stopping the device in bypass mode

1. Take the Mains - Regulator selector switch PK1 to position 0 (center position).
2. Set the input K1 to OFF.

4.2.2 Stopping the device in normal mode

1. Press the OFF button on the front panel of the SVR. (Two leftmost keys together). SVR will stop generating AC voltage. The output contactor will automatically switch to OFF position.
2. Set the input K1 to OFF.
3. Take the Mains - Regulator selector switch PK1 to position 0 (center position).



5. SERVICE AND MAINTENANCE

CAUTION

There are no by the user servicable parts inside the equipment, therefore DO NOT OPEN THE COVER OF THE EQUIPMENT. Because of possible external battery connection and dry contact relay outputs, THERE MAY BE HIGH VOLTAGE INSIDE THE EQUIPMENT, EVEN WHEN THE SVR IS TURNED OFF. Do not permit unauthorized persons to intervene any failure, otherwise, the warranty will be void and moreover, significant injury may occur.

Under normal operating conditions only preventative maintenance is required. The intervals between maintenance actions will vary according to the level of remote monitoring and the standard of cleanliness of the equipment room.

5.1 PERIODICAL MAINTENANCE

The SVR equipment is designed for a very minor maintenance requirement. Only fulfil conditions described below.

1. Clear the dust piled up in ventilation holes of the equipment.
2. You may clean the cover of the equipment with a moist cloth.
3. Record all abnormal occurrences in the service log.
4. Visually check electrical connections and component for signs of overheating or corrosion.
Rectify as necessary.

5.2 FAILURES

As mentioned before, only authorized personnel may perform maintenance of the equipment. In any abnormal situation, before calling service, check the points described below.

5.3 BEFORE CALLING SERVICE

The most simple failure definition for a car problem is “Car is defective.” But, this will not help to the one who must fix the problem, especially when he is not beside the car. There can be several reasons :

- No fuel
- Blown gear
- Bad battery
- No start key
- No engine
- ...

Therefore, the information provided to the service personel is very important. The information will help him to better undestand the situation.

Please, before calling the service, save your devices model and serial number and be ready to answer the following questions :



1. Did you read the users manual ?
2. Is this the first start up of the device or it was working properly before ?
3. Is there energy on the panel, which the device is connected ?
4. Which alarms are displayed on the LCD display ?
5. What are the status of the LED indicators ?
6. Did you apply START command ? Is the OPERATION led (middle of 3) on ?
7. Are the boards and front panel energized when you switch the AC input breaker on ?
8. What are the status of breakers ?
9. Is this a problem appearing rarely or is it permanently existing ?
10. What is the type of load ? (Motor, power supply, IT...)
11. Did you experience any abnormality in your utility in last times ?



6. OPTIONS

Here is a list of options provided by the DATA DIGITAL-SVR Series Static Voltage Regulator.

#	OPTION TITLE	OPTION DESCRIPTION
OPS-01	Alarm & Communication Interface Board	Alarm relay contacts and isolated RS232 communication
OPS-02	Relay Boards (Additional)	This option provides extra relay outputs up to 3 relays.
OPS-03	Input Isolation Transformer	This option is to add isolation transformer between the device input and the regulator.
OPS-04	Output Isolation Transformer	This option is to add isolation transformer between the device output and the regulator.

6.4 INPUT ISOLATION TRANSFORMER (OPS-04)

The input isolation transformer provides galvanic isolation between the device input and the regulator, thus providing protection against leakage from the output to the ground. This is especially preferred in industrial applications.

Furthermore, in some industrial applications it is used to reduce the input phase voltage value to the phase neutral level and thus feed the single-phase SVR.

6.5 OUTPUT ISOLATION TRANSFORMER (OPS-05)

The output isolation transformer provides galvanic isolation between the device output and the regulator, thus providing protection against leakage from the output to the ground. This option is especially preferred in industrial applications.



7. INPUT / OUTPUT CURRENTS

Phases	Device Power	Voltage	Input Range	Input Current (Max)	Output Current
1 phase	10 kVA	230V	173V / 264V	61 A	43 A
1 phase	20 kVA	230V	173V / 264V	121 A	87 A
3 phases	30 kVA	230V	173V / 264V	182 A	130 A
3 phases	40 kVA	230V	173V / 264V	243 A	174 A
3 phases	60 kVA	230V	173V / 264V	364 A	261 A
3 phases	80 kVA	230V	173V / 264V	486 A	348 A
3 phases	100 kVA	230V	173V / 264V	607 A	435 A
3 phases	120 kVA	230V	173V / 264V	728 A	522 A
3 phases	160 kVA	230V	173V / 264V	971 A	696 A
3 phases	200 kVA	230V	173V / 264V	1213 A	870 A
3 phases	30 kVA	400V	300V / 460V	61 A	43 A
3 phases	40 kVA	400V	300V / 460V	81 A	58 A
3 phases	60 kVA	400V	300V / 460V	122 A	87 A
3 phases	80 kVA	400V	300V / 460V	162 A	116 A
3 phases	100 kVA	400V	300V / 460V	202 A	145 A
3 phases	120 kVA	400V	300V / 460V	242 A	174 A
3 phases	160 kVA	400V	300V / 460V	323 A	232 A
3 phases	200 kVA	400V	300V / 460V	404 A	290 A
3 phases	300 kVA	400V	300V / 460V	606 A	435 A
3 phases	400 kVA	400V	300V / 460V	808 A	580 A
3 phases	500 kVA	400V	300V / 460V	1010 A	725 A
3 phases	600 kVA	400V	300V / 460V	1212 A	870 A
3 phases	800 kVA	400V	300V / 460V	1617 A	1159 A
3 phases	1000 kVA	400V	300V / 460V	2021 A	1449 A
3 phases	1250 kVA	400V	300V / 460V	2500 A	1800 A
3 phases	1600 kVA	400V	300V / 460V	3200 A	2300 A
3 phases	2000 kVA	400V	300V / 460V	4000 A	2900 A
3 phases	2500 kVA	400V	300V / 460V	5000 A	3600 A
3 phases	3000 kVA	400V	300V / 460V	6000 A	4300 A
3 phases	3500 kVA	400V	300V / 460V	7000 A	5000 A

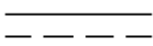






NOTE

Please contact your dealer for power, voltage and input range value not mentioned in the list above.



8. SYMBOL LIST & ACRONYMS

Symbols places on the device are listed below. Moreover, an additional list inside the electrical drawing is provided.

SYMBOL	DESCTIPTION
	Direct Current
	Alternating Current
	3 Phase Alternating Current
	3 Phase Alternating Current with Neutral
	Protective Ground
	Caution
	Dangerous Voltage

ACRONYMS	
SVR	Static Voltage Regulator
DSP	Digital Signal Processor
COMM	Communication
LCD	Liquid Crystal Display
LED	Light Emitting Diode
AC	Alternating Current
DC	Direct Current
SNMP	Simple Network Management Protocol
WEB	World Wide Web
CAN	Controller Area Network
EMC	Electro Magnetic Compability
PE	Protective Earth