

- Parallel applications
- Three-phases AMF automatic genset controller
- True RMS readings on generator voltages and currents
- Additional current measurement for neutral or differential protection
- Active, Reactive and apparent power measurement
- 20 fully programmable digital input
- Up to 12 programmable digital output
- Up to additional 32 INPUT and 32 OUTPUT by means DITEL DEVICE
- RS232 interface port with MODBUS RTU protocol
- J1939 and MTU MDEC CAN interface
- Real Time Clock
- Events and data logging
- Engine speed measurement by pick-up or W
- GSM and PSTN modem management
- SMS communication

DST4601/PX

AMF and PARALLEL generator set controller



DST4601/PX is the evolution of SICES control cards. it's an electronic device particularly aimed to **parallel application**, thanks to its high degree of configuration, it can easily be used in quite all standard and special gen-set applications.

Born to manage the last generation of electronic engine, it supports CAN interface toward quite all most popular engines: **J1939 protocol** for VOLVO, SCANIA, DEUTZ, PERKINS, CAT, IVECO and **MTU protocols** for MTU engines.

A **large graphic display**, with a resolution of 240x128 pixels, allowed to implement a simple to use operator interface that is able, at the same time, to report an huge number of electrical and engine measures and information. Engine troubleshooting now can be made by textual interface (for example all MTU diagnostic codes are translated in plain English text).

DST4601/PX includes an internal Load Sharing unit that allows simple implementation of Parallel to Mains and Multiple Prime Mover applications.

Load sharing is made by an additional CAN interface. This bus is also used for Load Management: **up to 24 gen-sets can be connected together** and share the load, starts and stop automatically depending on the load status.

Synchronization, VAR regulation and some parallel protections are accomplished by an additional module: **DICHRON**.

Both CAN interfaces are isolated from the board supply, allowing for high transient immunity and common mode voltages.

DST4601/PX is a full featured device; it integrates on the standard version almost all the required functionality: generator protections, engine protections and monitoring, fuel pump managing, real time clock, serial communication and direct PSTN and GSM modem managing capability (no more special kit, connect the external modem, set the communication parameter and you are ready to work). Ethernet connection is available through the external SICES MODBUS TCP/RTU GATEWAY.

The device is designed and built for excellent measures performance. Both generator voltage and current measures are true RMS measures. Fast sampling rate alongside to special calculation algorithms yield good precision, linearity and immunity. Active, reactive and apparent power measure and energy counters share the same features.



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Operation mode

RESET: engine start inhibition, load is forced to be supplied from the Mains. When the engine is running and the selector switch is turned to the 'OFF' position, the engine shutdown sequence is activated.

Reset of all alarms. Enable parameters change (programming)

PROGRAM: access to all programmable parameters. Programming access can be controlled by means a three level passwords. Some parameters can be changed even if the engine is running.

MANUAL: engine manual START and STOP controls are enabled. The Gen Set protection devices are activated. The starting command is automatically disabled when the engine is running.

MCB and GCB pushbuttons are enabled when generator is in operating range. Their function depend on selected function mode.

Manual synchronization can easily accomplished by built in function.

AUTOMATIC: function mode depends on the selected one: Single Prime Mover, Stand-by, Stand-by and Short Time Parallel, Single Parallel to Mains, Multiple Prime Mover, Multiple Parallel to Mains.

TEST: Automatic start for testing operations with safety protections enabled. Test can be made unloaded, loaded or in parallel to mains. Upon Mains failure, the load is immediately supplied by the Gen Set.

Parallel application: Parallel to mains application is allowed by the internal power regulator. Soft loading and unloading is automatically performed. Some interface protection are embedded in the board.

Multiple prime mover application is allowed by means the network setup by the optional CAN1 interface that allows load sharing. Up to 24 gen-sets can be connected to this network. Synchronization to the bus requires an external expansion module; it is possible to use the companion DICHRON module or a standard third-party synchro devices connected to one of the analogue input of the board.

Load Management: if connected by means CAN1 interface to other generators, load management can be accomplished by the DST4601/PX boards on the network: automatic start and stop of each generator is made depending on system load status. Automatic priority management is accomplished using selectable different management schemes.

Controls

Key selector switch.

Engine START and STOP pushbutton.

ACK/MODE (acoustic alarm silencing and other aux. functions).

GCB and MCB toggle command.

LCD CONTRAST DECREASE/INCREASE.

Four ARROW keys for LCD display selection mode, window selection, parameter change and other.

EXIT, ENTER keys.

Dead key SHIFT.

Measure

Generator Voltages:

L1-N, L2-N, L3-N, L1-L2, L2-L3, L3-L1

True RMS measure.

Lx-N max. voltage < 300Vac cat. IV

High voltage pulse = 6kV 1.2/50 us

Max. measurable voltage = 25.000V (by external TV).

Generator Currents:

L1, L2, L3, N

True RMS measure.

Nominal max. current: 5Aac

Overload measurable current : 4 x 5Aac (sinusoidal).

Internal current transformer.

Max. nominal current = 6000A (by external TA).

Mains Voltage:

L1-L2, L2-L3, L3-L1

Average measure calibrated to RMS.

Lx-N max. voltage < 300Vac cat. IV

High voltage pulse = 6kV 1.2/50 us

Max. measurable voltage = 25.000V (by external TV).

Generator Frequency meter:

Resolution = 0.1 Hz.

Accuracy = ± 50ppm, ±35ppm/°C (typical)

Battery Voltmeter:

Resolution = 0.1V

Oil Pressure Gauge:

VDO 0-10 Bar, VDO 0-5 Bar, Veglia 0-8 Bar

(optional 0-10V input)

Water Thermometer:

VDO, Veglia

(optional 0-10V input)

Fuel Level:

Up to 390 ohm, setup by customer.

Engine revolution counter:

By pick-up. Programmable teeth number.

Same input can be used by W signal.

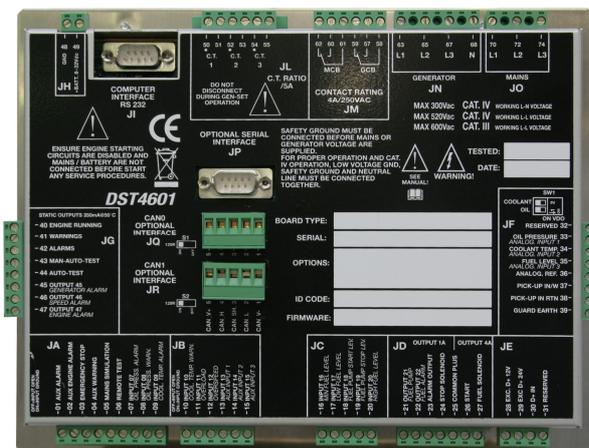
Computed Measure

Active power meter, Reactive power meter (distorted and undistorted), Apparent power meter, Power factor:

Total and phase by phase.

Active and reactive energy counter.

Hour counter, Start Counter.



Embedded functions

Real time clock calendar:

Hour, minute, second, day, month, year (leap year), day of week.

Operating without power for at least 2 days (rechargeable Lithium battery as option for greater autonomy).

Gen-set operation can be enabled based on days of the week and time.

Test operation can be enabled based on days of the week and time.

Date and time can be remotely adjusted by supervisor software.

Fast trend history log:

30 record of all measured value plus total powers measure (typical 30 last operating minutes).

Slow trend history log:

48 record of all measured value plus total powers measure (typical last operating day).

Event history log:

99 record of event. Relevant event connect to special 15 record of analogue measure.

Communication:

RS232 Serial communication, MODBUS RTU interface, PSTN and GSM direct modem management, data call on gen-set warning/alarm function (in modem operation), SMS communication in GSM modem operation mode. Complete supervisor software for Windows available.

Additional optional RS232 (or RS485) that allows I/O expansion or redundant remote communication.

CAN interface (optional):

Two CAN interfaces are available (CAN0 and CAN1). Interfaces are insulated from board supply.

Fuel pump

Board manages a fuel pump by means an external power relays and by 5 input level signals. Auto and Manual operating mode.

Maintenance warning:

Board issue a warning when the running hours before maintenance are elapsed.

Panel Temperature warning:

Board issue a warning when panel temperature are approaching a specified temperature

Gen-Set lock function

Gen-Set operation can be remotely disabled. Unlocking requires the supplied password.

Internal Alarm Horn:

Internal Alarm Horn make easier panel assembling.

Load management

In parallel application, automatic start/stop of generators is made depending on load status; also automatic priority management is accomplished. CAN1 interface is required.

Load sharing:

Load sharing is accomplished in parallel operation by means CAN interface. CAN1 interface is required. CAN0 is required for digital speed control; for analogue speed control optional analogue interface is required.

Power modulation:

Parallel to mains application is allowed by the internal power regulator. CAN0 is required for digital speed control; for analogue speed control optional analogue interface is required.

Reactive Power Regulation

Using external additional module DICHRON, DST4601/PX can drive the voltage regulator in order to minimize or share the reactive power.

Generator Protection

Underfrequency (81U), Overfrequency (81O), Undervoltage (27), Overvoltage (59), Power direction (32), Loss of excitation (Reverse reactive 32RQ), Time dependent overcurrent (51), Instantaneous overcurrent (50), Phase sequence, Current and Voltage unbalance.

Ground Fault Protection (51N or 51GN) (alternative to Neutral current measurement). df/dt and Vector Surge (optional with additional module DICHRON).

Engine protection

Max. power, Overspeed (12), Incomplete sequence (48), belt-break, engine temperature warning and alarm, oil pressure warning and alarm, water level warning and alarm, fuel level.

J1939 interface

CAN communication interface and protocol conform to SAE J1939 specification. Features depending on the connected engine: typical 20 engine measures and parameters are acquired. Diagnostic code are acquired and displayed in SPN and FMI format with explanation message (for the most common failure cause). Requires CAN0.

MTU MDEC interface

CAN communication interface and protocol conform to MTU specification. Most common measures and all diagnostic codes are supported. All engine measures are available by means device serial interface allowing remote supervising of the engine. Requires CAN0.

Technical data

Supply voltage: 6.5...33 Vdc

Power consumption: typical less than 7W (+5W for display lamp).

Nominal Gen-Set frequency: 50 or 60 Hz

Digital input: optoisolated

Static output: 500mA @ 25 °C, 360mA @ 50 °C, 20 Apk.

Relay outputs: 10A nominal

Auxiliary relays output: 1A 30V

LCD: transfective with LED backlight.

Operating temperature: -20 °C to 60 °C

Weight: 1,6 Kg

Overall dimension: 260x205x75 mm

Display dimensions: 125x72mm

Required Panel cutting: 240x172 mm

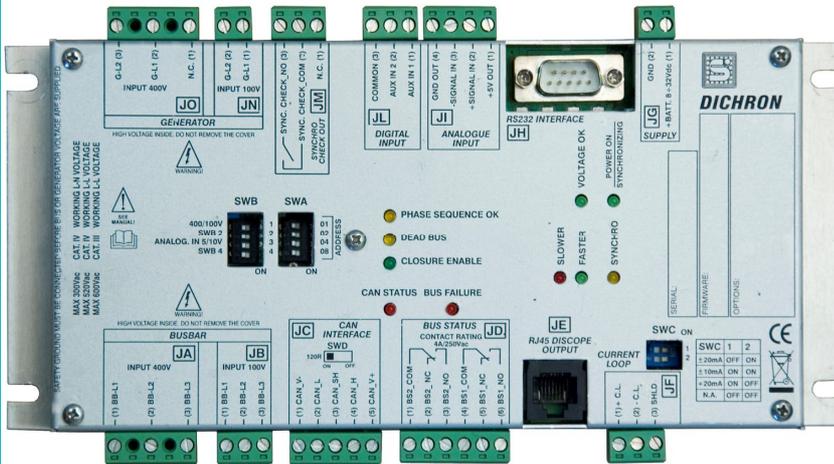
Panel mounting: by means stud-bolt.

Protection Grade: IP54 (front panel, by means additional keylock protective cap and gasket).

EMC: conform to EN61326-1.

Safety: built in conformity to EN61010-1

DICHRON Module



DiChron is a companion device of DST4601/PX Genset Controller.

Connected to DST4601/PX by means SICES proprietary PMCBus (Power Management Communication Bus), it allows, to the Controller, to expand its parallel functions, adding synchronization, voltage matching, cosfi and reactive power regulation, parallel to mains protections (27, 59, 81<, 81>, 81R -ROCOF and vector jump).

The Mains and Dead Bus detection functions of DiChron allow to DST4601/PX an advanced management of the circuit breaker, simplifying the external command circuit.

Beside, Synchro-Check function is carried out. In addition to DST4601/PX Synchronoscope function, it is possible to connect to DiChron, by means a RJ45 cable, the auxiliary DiScope device that works as Synchronoscope. It uses 24+4 LED and has a front panel of 96x96 mm in a DIN43700 house.

This solution offers cost and construction advantages over traditional solution.

Electrical characteristics

Bus Voltages:

L1-L2, L2-L3, L3-L1

True RMS measure.

Lx-N max. voltage < 300Vac cat. IV

High voltage pulse = 6kV 1.2/50 us

Max. measurable voltage = 25.000V (by external TV).

Available 0..100V input.

Generator Voltages:

L1-L2

True RMS measure.

Lx-N max. voltage < 300Vac cat. IV

High voltage pulse = 6kV 1.2/50 us

Max. measurable voltage = 25.000V (by external TV).

Available 0..100V input.

Bus frequency meter:

Resolution = 0.01 Hz.

Accuracy = ± 50 ppm, ± 35 ppm/ $^{\circ}$ C (typical)

Generator frequency meter:

Resolution = 0.01 Hz.

Accuracy = ± 50 ppm, ± 35 ppm/ $^{\circ}$ C (typical)

Auxiliary analogue input

Differential, 0..10 V. Input impedance > 100k Ω

Bus Status output:

2 SPDT relays, 10A

SYNCHRO-CHECK output:

1 SPST relay, 10A

Voltage regulator output:

Current loop, galvanic insulation.

Voltage insulation = 1500V

Parallel to mains protection delay (Td)

Individually settable for each protection starting from 0,01 seconds in 0,01 seconds steps

27 and 59 protections

Minimum trip time = <100ms + Td

81< and 81> protections

Minimum trip time = <60ms + Td

81R (ROCOF) protection

Minimum trip time = <35ms + Td

Vector Jump protection

Minimum trip time = <35ms (for 5 $^{\circ}$ jump at constant frequency), <60ms (for 5 $^{\circ}$ jump and decreasing frequency).

Mechanical characteristics

Dimension (maximum, connectors not included):

236x104x28 mm

Weight:

less than 500g

Protection grade:

IP20

Other characteristics

Operating temperature:

-25 \div +70 $^{\circ}$ C

Storage temperature:

-40 \div +80 $^{\circ}$ C

EMC: conform to EN61326-1.

Safety: built in conformity to EN61010-1