

## HT-DST4602 Evolution

### Parallel Applications

- 7" color TFT display (800 x 480 pixel)
- Split and Compact Version
- PLC functions included with PID blocks
- True RMS measure for both sources current & voltage
- Active power and power factor measurement
- Measure of both sources frequency and power
- 20 insulated digital inputs
- 16 insulated digital outputs
- RS232 & RS485 interface port with Modbus RTU protocol
- USB port & Ethernet port
- CAN interface (J1939 and MTU MDEC CAN)
- Real Time Clock with battery
- Multi Language (switchable)
- Events and data logging
- Graphic display (128 x 64 pixels)



## AMF and PARALLEL genset controller

HT-DST4602 Evolution is a highly configurable genset controller designed to handle a broad range of critical and complex parallel applications, including multiple Mains and CHP systems.

It is able to communicate directly, via J1939 CAN interface, with a wide range of electronic engines (Volvo Penta, Scania, Perkins, MTU, Deutz, Cummins, John Deere, Caterpillar etc.) but it can also be used with conventional engines / sensors thanks to its embedded analogue interfaces.

HT-DST4602 Evolution includes an internal load sharing unit that allows simple implementation of Multiple Prime Mover applications.

Increased computation capability offers more flexibility to the user.

- Two analogue, insulated and active current loop options (both bipolar and unipolar) are available in order to directly interface practically any kind of speed regulator and AVR.
- Three insulated independent and specialized CAN interface.
- Second communication port is configurable as RS232 or RS485. Moreover it is insulated allowing for long distance remoting without additional converter.
- Two embedded analogue inputs allow to directly manage the most common requirement for analogue inputs.

A splitted version is also available. It consists of two units: a display unit, to be mounted on the front panel and a control unit to be mounted inside the panel. They are interconnected by differential transmission line in order to obtain great immunity and communication safety.

## Technical Specification

### Measured Values

#### Generator Voltages:

L1-N, L2-N, L3-N, L1-L2, L2-L3, L3-L1  
True RMS measurement  
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 measurement  
Nominal max. current: 5Aac, 1Aac  
Overload measurable current : 4 x 5Aac (sinusoidal)  
Internal current transformer  
Max. nominal current = 6000A (by external TA)  
(\*) Neutral generator current measure (64) or, in alternative used for the measure of the power shared with the mains.

#### Mains Voltage:

L1-N, L2-N, L3-N, L1-L2, L2-L3, L3-L1  
True RMS measurement  
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 =  $\pm 50$ ppm,  $\pm 35$ ppm/ $^{\circ}$ C (typical)

#### Battery Voltmeter:

Resolution = 0.1V

#### Oil Pressure Sensor:

Settable curve based on sensors available

#### Water Temperature Sensor:

Settable curve based on sensors available

#### Fuel Level Sensor:

Settable curve based on sensors available  
Up to 400 ohm

#### Engine speed:

By pick-up. Programmable teeth number  
Same input can be used by W signal

### Derived Values

Active power  
Reactive power  
Apparent power  
Power factor: Total and phase by phase  
Active and reactive energy counter  
Hour counter for maintenance/rental  
Start Counter

### Engine Protections

Overspeed (12)  
Incomplete sequence (48)  
Belt-break  
Engine temperature warning and alarm  
Oil pressure warning and alarm  
Water level warning and alarm  
Max. power  
Fuel level

### Generator Protections

Underfrequency (81U)  
Overfrequency (81O)  
Undervoltage (27)  
Overvoltage (59)  
Power direction (32)  
Loss of excitation (Reverse reactive 32RQ)  
Time dependent overcurrent (51) IDMT  
Instantaneous overcurrent (50)  
Synchro-check (25)  
Phase sequence (47)  
Current and Voltage unbalance (46/47)  
Ground Fault Protection (51N or 51GN) as alternative to neutral measure (64).  
Negative sequence (12)  
Phase overcurrent with voltage restraint/control (51V)

### Mains Protections

For Mains parallel applications, there are the following protections:  
Rate of Change of Frequency (81R ROCOF)  
Vector shift  
Undervoltage (27)  
Overvoltage (59)  
Underfrequency (81U)  
Overfrequency (81O)

Compliant with **BDEW** German rules which regulates energy plants connection with the MV and HV.  
In conformity to the German technical guidance, the calculation for the current "positive sequence I1" has been introduced, adding it to the calculation of the current "negative sequence I2", already included.  
Real time calculation of active and reactive power and the power factor of the generator for the singles phases.  
27T - Low voltage protection time-dependent (BDEW)  
27Q - Low Voltage Protection with Directional reactive (BDEW)  
**KEMA Certification**

## Technical Specification

### General Functions

#### Real time clock calendar:

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

Rechargeable Lithium battery available as standard.

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. Date and time can be remotely adjusted by software.

#### Fast and Slow trend history log:

Up to 860 record based on the setup

#### Event history log:

Up to 860 record

#### 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.

#### Communication:

N.1 Serial port RS232 with MODBUS RTU protocol

N.1 Serial port RS232 or RS485 insulated with MODBUS RTU protocol

N.1 Serial port USB for firmware upgrade

N.1 Setting for Ethernet interface

Available as option:

- IEC 61850 Converter (**NEW**)
- Serial converter RS232/485/USB.
- Modem GSM.
- REWIND - Module interface for Si.MO.NE using GPRS/SM and GPS technology.
- DANCE - Module interface for Si.MO.NE using Ethernet technology.
- Ethernet interface with MODBUS TCP/RTU protocol
- Supervision software and SI.MO.NE

### CAN Interface with J1939 SAE Protocol and with MTU specifications.

#### Load management

In case of multiple plants with several Gen-Sets connected in synchro/parallel on the same bus, it's possible to set different automatic logics for start/stop Gen-Sets based on the load request. In detail:

- Manual setting of the master Gen-Set by means selector switch on the control panel
- Automatic rotation of the Master Gen-Set after a fixed time per day.
- Automatic rotation of the Master Gen-Set after an elapsed time.
- Automatic selection of working Gen-Sets having a matching power with the request on load (**NEW**) (\*)
- Automatic start/stop of Gen-Sets in order to maintain "ON" the minimum quantity of Gen-Sets able to supply the load (**NEW**) (\*).

(\*) Functions available for a max of 5 Gen-Sets

#### Load sharing:

Load sharing is accomplished in parallel operations by means CAN interface or analogue interface. DST4602 controls the speed regulation in order to have the same percentage power among generator sets.

#### Power modulation:

Power regulation is allowed through internal power regulator.

For electronic engines a CAN line is available for speed regulation, for traditional engines is however available a proper analogical interface.

#### Reactive power regulation:

HT-DST4602 controls AVR directly in order to manage the reactive power.

The HT-DST4602 is a **MULTILINGUAL DEVICE**. The display languages available are: **English, Italian, French, German, Spanish and Russian**.



Direct GSM and PSTN Modem management  
Automatic call in case of event

## Technical Specification

### Input and Output available

- 20 Digital input (settable)
- 3 Analogical input for engine instruments
- 3 Additional analogical input
- 8 Settable and protected output
- 6 Settable output with relay
- 2 Switch relay for MCB and GCB

### Expansion modules for additional I/O

- Up to 10 DITEL with CPU or 20 DITEL without CPU for a max. of 160 Binary and settable Input and 160 Binary and settable Output, all of the insulated.
- Up to 16 DITHERM/DIGRIN aimed for getting analogical measures from thermocouples e/o thermoresistance (PT100)
- Up to 16 DIVIT aimed for getting analogical measures of current and/or voltage (0...10mA, 0...20mA, 0...5V, 0...10V)
- Up to 8 DANOUT for max. 32 additional analogue output (insulated) 0...10mA, 0...20mA, 0...5V, 0...10V

### Fast paralleling system



Innovative and automatic sequence built-in the HT-DST4602 Gen-Set controller allowing a **fast synchronization and paralleling of many Gen-Sets comprising in an emergency power station in a maximum time of 9 - 15 sec.** (based on the alternator and engine features).

The advanced system called **"Fast Paralleling"** is an effective solution for those sensitive realities where any mains failure, even for a few seconds, could cause huge problems for the security of people and data and create damages for the production processes (banks, hospitals, data centers, etc...) Using the Fast Paralleling system, Gen-Sets are switched on, synchronized and ready to supply the loads in a few seconds from the mains failure signal.

#### How?

- In case of a mains failure, the HT Gen-Set controller gets a signal from the existing ATS in order to start to run the stand-by Gen-Sets.
- The new operation logic implemented in DST4602 controls the status of Gen-Sets, checking which of them are ready and available to start and to take the load.

- Gen-Sets start to work all together with the relevant circuit breakers already closed.
- By means of a safety and proper control of speed ramp and excitation range, Gen-Sets are simultaneously brought to the rated conditions.
- All Gen-Sets are therefore ready and in parallel in 9-15 seconds max (based on the engines and alternator types).
- The load is supplied by all Gen-Set running in parallel.
- If one or many Gen-Sets don't start to work at the first starter, the control logic opens the relevant alternator circuit breaker. The other Gen-Sets can go ahead with the fast starting operations.
- The Gen-Set which has reached the rated conditions with delay, can be inserted afterwards making the usual synchro operations.

### Technical Data

Supply voltage: 8...33 Vdc  
Power consumption: typically less than 7W (+5W for display lamp)  
Nominal Gen-Set frequency: 50 or 60 Hz  
Digital input: opto-isolated  
Static output: 500mA @ 25°C, 360mA @ 50 °C, 20 Apk  
Relay outputs: 10A nominal  
Auxiliary relays output: 1A 30V  
Weight: 1.6kg  
Overall dimension: 260(L) x 205(H) x 78,6(D) mm  
Overall dimension display: 125(L) x 72(H) mm  
Panel cut-out: 240(L) x 172(H) 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 accordance with EN61010-1  
If required, available tropicalized version for hazardous areas.

**With the dual processors the DST4602 Evolution has even more computing capacity.**

#### DISPLAY Features:

DST4602: 240x128 Pixel LCD: transfective with LED backlight  
Operating temperature: -25 °C to 70 °C  
Stock temperature: -30 °C to 80 °C  
DST4602 Evolution 800x450 Pixel TFT, 7" Colour display  
Operating temperature: -20 °C to 70 °C  
Stock temperature: -30 °C to 80 °C

## Available

**DST4602 & DST4602 Evolution - SPLIT VERSION:** Display + Control unit.

In addition it's possible to choose between the version with Key selector switch or with Push buttons for the MODE selection.



**On the left:** User interface with display unit to be mounted on the door of the control panel.

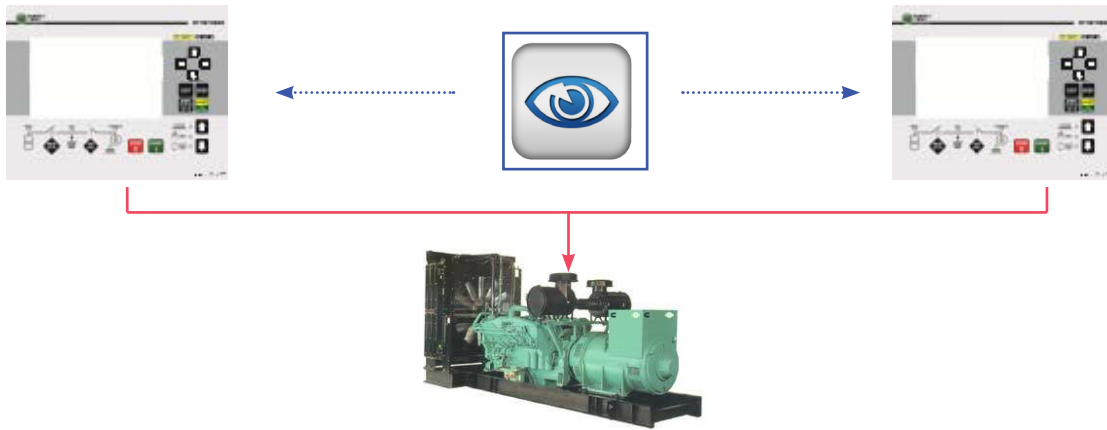
**On the right:** Box / Control unit to be mounted into the control panel.

**MODE SELECTION:** with selector key DST4602 or with Push buttons DST4602 Evolution



Redundant controller  
DST4602 (Master)

DST4602 (Back-Up)



Special sensitive applications often require exceptional safety control and operation of the gensets. An exclusive, reliable control is achieved with the use of a "Master unit" which controls the start/stop, the alarms and the engine/generator protections, combined with the "Back-up unit".

The "Master unit" is equipped with an auto diagnostic system (watch dog), and able to detect any failure of the controller. After an elapsed and settable time of communication, the "Back-up unit" automatically switches on in order to overtake the process of the gen-set.

When the "Master unit" is ON, the "Back-up unit" is OFF and viceversa. In that way there is no danger of failed command between the controllers. The redundancy available is defined "warm type", considering 6-7 seconds are required before the "Back-up unit" is activated.

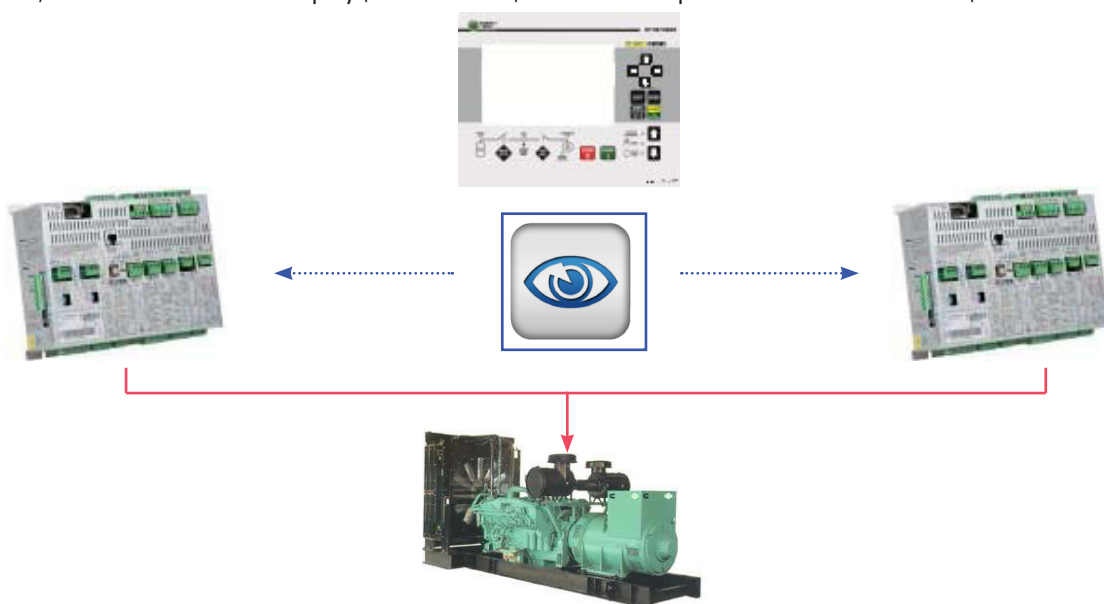
It's possible to configure the redundancy of the controllers as follow.

For each genset:

**A) 2 x DST4602 compact**

**B) 2 x DST4602 SCM + N.1 DST4602 HMI (display).**

With the case b) there is one common display (DST4602 HMI) and the backup is done on DST4602 SCM (the internal box).





For each local HT-DST4602 & HT-DST4602Evolution it's possible to add one or many remote HT-DST4602 controllers, usually called **HT-DST4602Remote**.

This solution is usually recommended in case of remote control room where it's necessary a supervision of the genset from a remote station.

Thanks to this controller it's possible to visualize the measures, parameters and status of a local HT-DST4602, as the Operator is in front of the local controller.

#### **Connection between HT-DST4602 / HT-DST4602Evolution and HT-DST4602Remote:**

- Via RS485 Modbus RTU (max 800m)
- Via Ethernet TCP/IP (max distance 100m without any hub). If via Ethernet, it's possible to connect several DST4602Remote to one local controller.

#### **Graphic display:**

HT-DST4602Remote is equipped with a powerful 7" colour graphic display TFT - 800x480 pixel

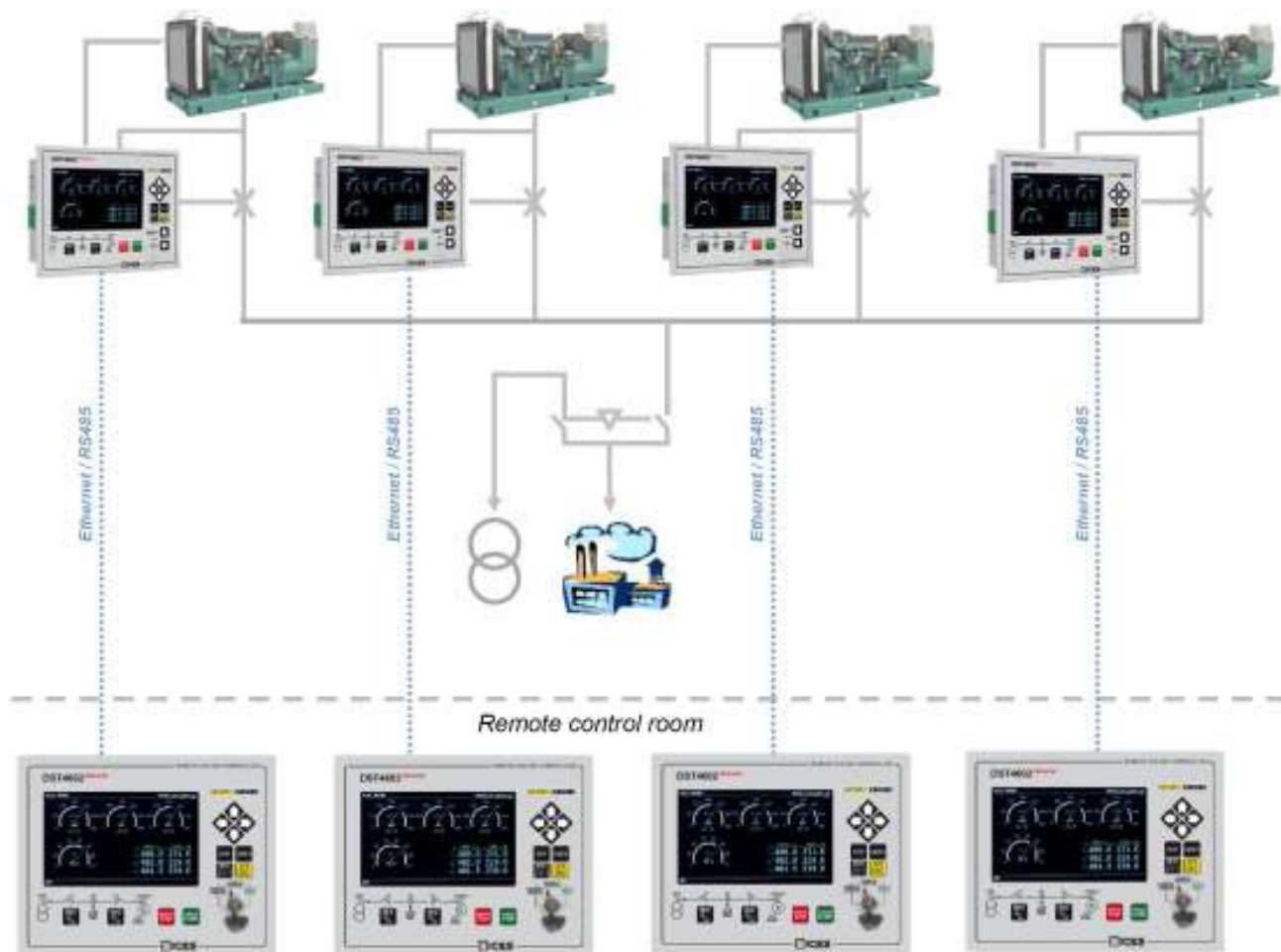
#### **Controls:**

- Selector key: COMMAND DISABLED - COMMAND ENABLED - REMOTE RESET:
- Command disabled: all the operations are not allowed
- Command enable: the operations are allowed
- Remote reset: reset of alarms/shutdown

In order to increase the safety of the system it's possible to set a password on the local controller and on the remote one. By inserting the proper password it's possible to enable the command from remote.

- REMOTE START:** Push button used to start the genset from remote.  
The starting is enabled if the selector key of the local controller is in AUTO mode.
- REMOTE STOP:** Push button used to stop the genset from remote.  
If the genset has been started by the DST4602/RC, pushing the "REMOTE STOP", the genset stops doing the cooling operations.  
If the genset has been started by the local DST4602, pushing the "REMOTE STOP", the genset immediately stops without any cooling operations.
- GCB:** Push button for the manual opening/closure of the Genset Circuit Breaker.
- MCB:** Disabled

**DST4602Remote** is equipped with a configurable output. This output can be used to connect an external horn or to set up a communication failure as watch dog.



In addition or alternatively to the display of the HT-DST4602 & HT-DST4602Evolution, it's possible to provide a colored touch panel called **HT-Display-4602**.

It allows a powerful visualization of all the measure and status of the plant.

In addition, in case of CHP Plants, it's possible to customize the graphic, showing the thermic equipment of the circuit.

HT-DST4602 & HT-DST4602Evolution are interfaced with HT-Display-4602 via RS485 or via Ethernet Modbus TCP/IP.

Available sizes: 12,1" / 15,6" (Additional sizes available after request).



Order code:	Order number:	
HT-DST-4602-E	9831	Compact Version
HT-SCM-E-DST-4602	9827	Base Box only
HT-HMI-DST-4602	8771	Human Interface only, monochrome display
HT-DST-4602-E Evolution	10410	Compact Version
HT-SCM-E-DST-4602 Evolution	10413	Base Box only
HT-HMI-DST-4602 Evolution	10409	Human Interface only, color display
HT-DST-4602 Remote	10486	Remote Display, color display

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