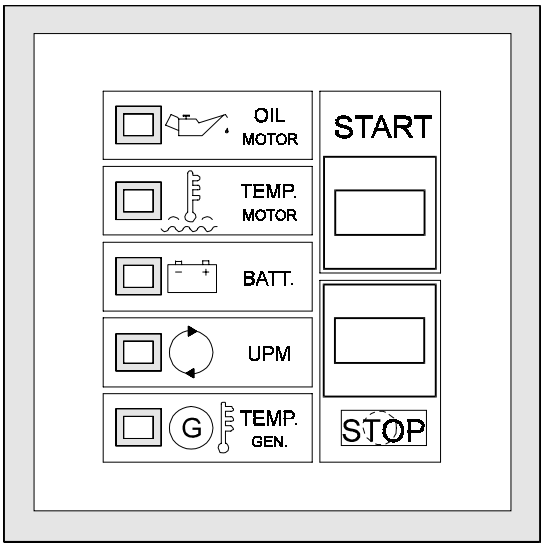
WOODWARD

DW1 **-** Diesel controller



1.Application

The *DW1* is used for small and compact Diesel gen.-sets up to 250 kVA like for example gen.-sets on building sites. It is applied only in isolated systems where a manual start and stop function with automatic gen.-set supervision and automatic stop in case of failure or malfunction is required.

The *DW1* is available in the versions *DW1-1* and *DW1-2*.

DW1-1 is equipped with a start and stop function and six supervision circuits with LED indicators for:

- oil pressure
- motor temperature
- battery charge control
- external stop (e.g. EMERGENCY-OFF)
- 2 free shut-down alarms

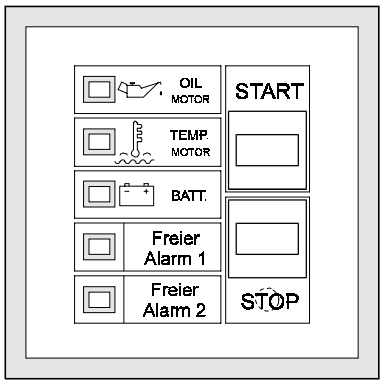


Fig. 1: *DW1-1*

The *DW1-2* as well has a start and stop function and six supervision circuits with LED indication for:

- oil pressure
- motor temperature
- battery charge control
- external stop (e.g. EMERGENCY-OFF)
- overspeed protection
- generator overtemperature

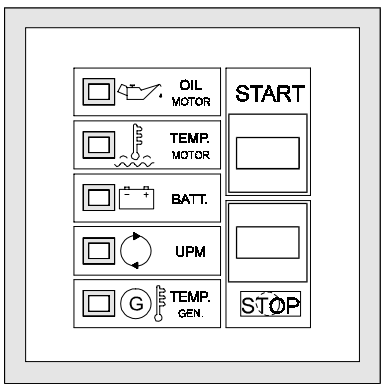


Fig. 2: *DW1-2*

2. Operation

All important control and indication elements for the operation of the *DW1* are located on the front plate.

2.1 Pushbuttons

Pushbutton START:
After pressing the pushbutton START the *DW1* switches on, the release magnet and the starter relay are energized. To start the gen.-set, this button has to be pressed until the ignition speed of the motor is reached. After the dynamo voltage has arised the starter relay releases. If the pushbutton START is released before the start is completed, the starter relay releases likewise. The release magnet however still remains energized until the pushbutton STOP is actuated or a fault occurs.

Pushbutton STOP:
Pushbutton STOP has the following functions:
With running gen.-set this pushbutton starts the stopping procedure. Pressing this pushbutton for approx. 2 s leads to the simultaneous storing-up of the stop command. The LED "STOP" lights up. To ensure the save release of the cutoff magnet the *DW1* has a stop delay of 15 s which is activated if the dynamo voltage drops out.
If the gen.-set is not running, it is possible to switch the *DW1* off by means of this pushbutton (power saving mode, see 2.2.1).
It furthermore serves to acknowledge fault signals (press pushbutton STOP for approx. 1 second). Only after removal and acknowledgement of still pending fault signals it is possible to to switch off the *DW1*.

2.2 LED - indications

The supervision circuits' function is to stop the gen.-set in case of faults. These functions are indicated by appropriate LED inscriptions at the unit's front plate. A failure is indicated by a red flashing LED that cannot be reset until the fault had been removed and acknowledged with the aid of pushbutton "STOP" is done. If a fault comes up when the *DW1* ist switched off (power saving mode), the LED of the corresponding supervision circuit lights up. The fault is stored. A stop command will be given only after a new start attempt (press pushbutton START)

LED OIL:
The oil pressure supervision circuit has a delayed activation. During start when the dynamo voltage (motor running) comes up, a time delay of 15 seconds is activated. Flashing of this LED after expiry of the delay time means that the oil pressure could not be built up (e.g. oil level was too low or the oil pump is defective).

LED TEMP MOTOR (cooling water):
The cooling water temperature is supervised by means of a temperature controller with a potential free N.O. contact to be externally connected. The supervision circuit is permanently active. If the preset maximum temperature of cooling water is exceed, the gen.-set stops immediately.

LED BATT:
The *DW1* has an input for the detection of the dynamo voltage. An arising dynamo voltage during motor start indicates the attainment of ignition speed. The appropriate threshold voltage amounts to 7 V. Via this input a connected dynamo is supplied with excitation support.
The excitation support is activated when the *DW1* is switched on and it is deactivated with arising dynamo voltage (motor running) or when the device is switched off. With failing dynamo voltage the LED "BATT" lights up after expiry of 15 s and a shut-down procedure is initiated.

LED UPM (*DW1-2* only)
This unit type provides an overspeed supervision circuit. The speed is calculated from the connected generator voltage. On the rear of the *DW1* there is an externally disonnectable bridge which is used to encode the unit's nominal frequency (50 or 60 Hz). The overspeed switching points are at 58 Hz or at 70 Hz. The speed is supervised in a generator voltage range from 4 - 440 V. If the overspeed switching-point is exceeded, the gen.-set will be stopped without delay.

LED TEMP GEN (*DW1-2* only)
In the version *DW1-2* the diesel controller has a supervision circuit for the generator winding temperature. A prerequisite for the supervision of the winding temperature are integrated PTC sensors in the generator's winding. These sensors are to be connected as shown in the example (wiring diagram). The tripping threshold (overtemperture) is at 4 kΩ approx. At generator overtemperature the gen.-set will be stopped without delay. If the resistance value falls below approx. 2.1 kΩ the temperature is again in the admissible range and the fault can be acknowledged. Inputs 13 and 18 must be bridged when the winding temperature supervision remains unused or the generator has no PTC - sensors. In case of the winding temperature supervision is not used or the generator has no PTC-sensors, the input terminals 13 and 18 have to be bridged. If during the gen.-set`s standstill a fault occurs (i. e. through a heat accumulation or overheating after a load operation) this indication will be activated and a stop command is given after a new switching on of the *DW1*.

LED STOP:
This red LED is located behind the inscription STOP. It lights up when a stop command was stored which is done by pressing the pushbutton "STOP" for approximately 2 seconds. This function is activated without delay when the *DW1* receives an external stop signal through connection of L- (battery) to terminal 1, e.g. at EMERGENCY-OFF

LED Alarm 1 / Alarm 2 (*DW1-1* only)
In the version *DW1-1* the *DW1* has two free supervision circuits with shut-down function. Connection of L-(battery) to terminal 15 (alarm 2) or terminal 16 (alarm 1) results in a shut-down of the gen.-set and the LED of the appropriate supervision circuit lights up.

2.2.1 External Fault Signal

The *DW1* is equipped with a supervision circuit for an external fault signal. This supervision circuit is assigned to the LED "BATT". By connecting L-(battery) to terminal 7, a stopping procedure of the gen.-set is initiated with lighting up of the LED "BATT". It is possible to connect e.g. an external voltage supervision relay to this circuit.

2.2.2 Power save automatic

If the *DW1* receives no dynamo voltage within 15 s after switching on and start of the dynamo voltage or if this voltage drops during operation, the gen.-set stops and the LED "BATT" flashes. After expiry of the switching off delay (15 s) the *DW1* changes over to the standby mode. In this operating mode, the *DW1* only takes 20 mA from the battery with indication of the LED "BATT". It is possible to switch the *DW1* off by means of the pushbutton STOP if the gen.-set is in standstill, the supervision circuit for the external fault signal, however, remains activated (power saving mode). During this operating mode the *DW1* does not take energy from the battery as long as there is no external fault signal.

2.3 Settings

With the aid of a coding plug it is possible to set the *DW1* to the generator's nominal frequency. This coding plug is on the rear of the device.

With plug = Setting 50 Hz
Without plug = Setting 60 Hz

Further settings are not required.

2.4 Connections

All connection facilities are located at the rear of the device. Each according to connection, the max. conductor cross-section is 1.5 mm^2 or 2.5 mm^2.

The fuse (15 A) protects the *DW1* against external faults or destruction in case of wrong polarity of the auxiliary voltage

Table 1: Connection terminals of *DW1-1*

Terminal	Function	Potential / contact rating
1	External stop command, e.g. "Emergency-Off", Indication via LED "STOP"	L-(Battery)
2	Input dynamo voltage (terminal 61)	L+ 12V/24V DC
3	Input oil pressure	L-(Battery)
4	Output for the connection of the starter relay	L+(Battery) 30V DC/16A
5	Input cooling water temperature	L-(Battery)
6	Output for the connection of the release magnet	L+(Battery) 30V DC/16A
7	Input for external fault signal at LED "BATT", - e.g. battery voltage supervision	L-(Battery)
8	Output cut-off magnet	L+(Battery) 30V DC/16A
9	Auxiliary voltage	L- 12V/24V DC
10	Auxiliary voltage	L+ 12V/24V DC
15	Free alarm 2	L-(Battery)
16	Free alarm 1	L-(Battery)

Fig. 3: Rear of *DW1*

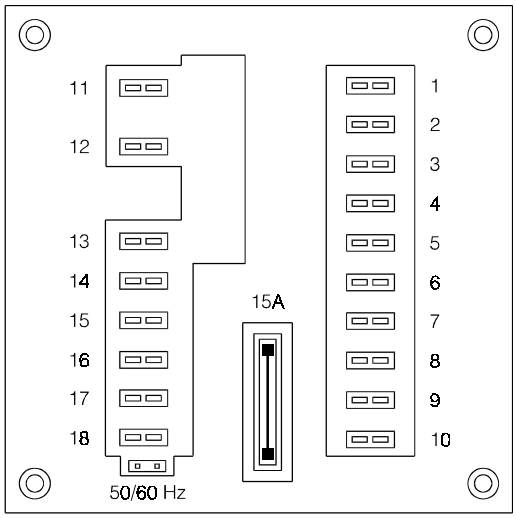


Table 2: Connection terminals of *DW1-2*

Terminal	Function	Potential / contact rating
1	External stop command, e.g. "Emergency-Off", Indication via LED "STOP"	L-(Battery)
2	Input dynamo voltage (terminal 61)	L+ 12V/24V DC
3	Input oil pressure	L-(Battery)
4	Output for the connection of the starter relay	L+(Battery) 30V DC/16A
5	Input cooling water temperature	L-(Battery)
6	Output for the connection of the release magnet	L+(Battery) 30V DC/16A
7	Input for external fault signal at LED "BATT", e.g. battery voltage supervision	L-(Battery)
8	Output cut-off magnet	L+(Battery) 30V DC/16A
9	Auxiliary voltage	L- 12V/24V DC
10	Auxiliary voltage	L+ 12V/24V DC
11 + 12	Measuring input Overspeed	4 - 440V AC 50Hz/60Hz
13 + 18	Input Winding temperature	3 PTC-sensor acc. to DIN 44081
14 - 17	Terminals for the appropriate connection of PTCs	

Fig. 5: Connection example *DW1-1*

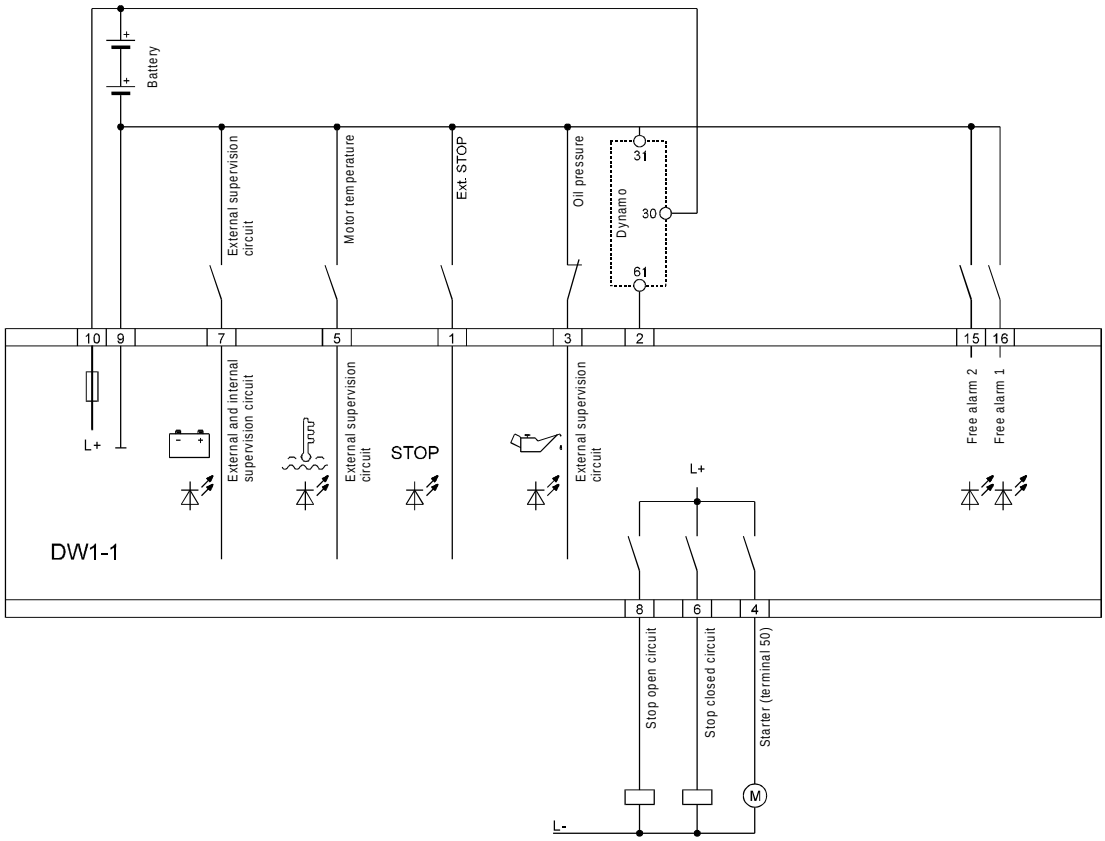
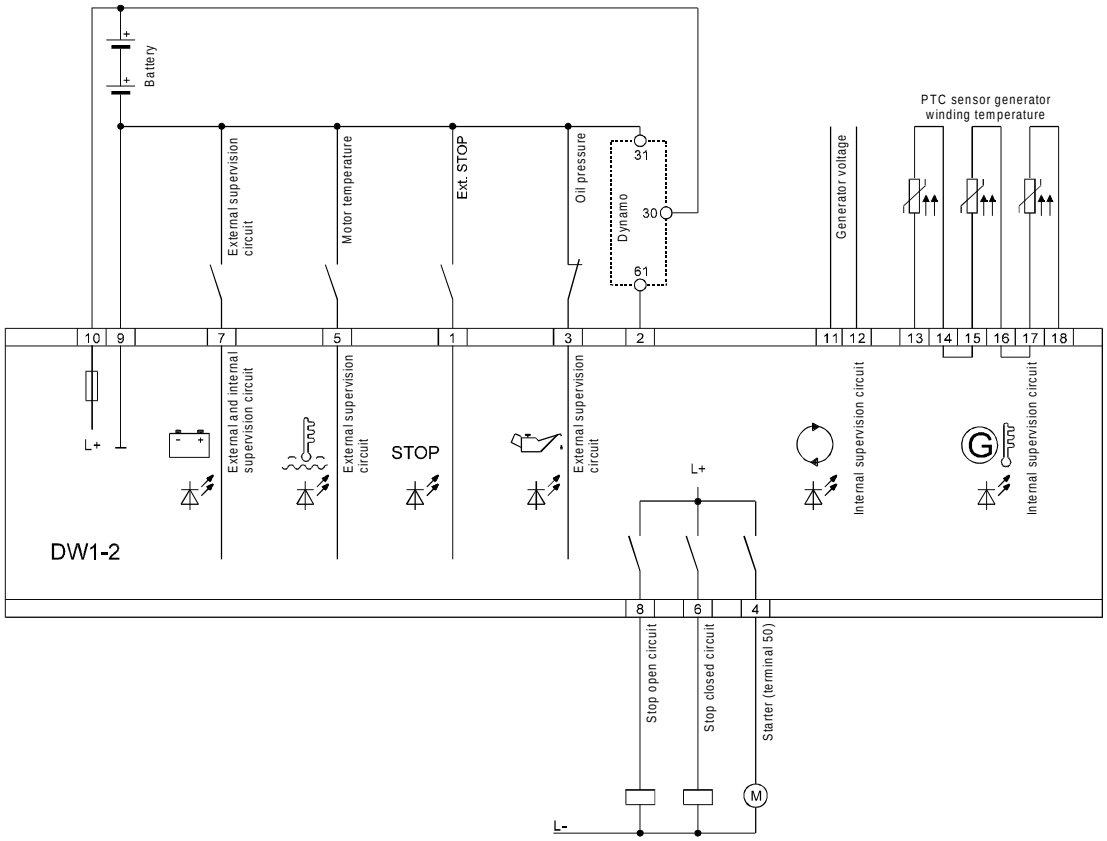


Fig. 6: Connection example *DW1-2*



3 Mounting

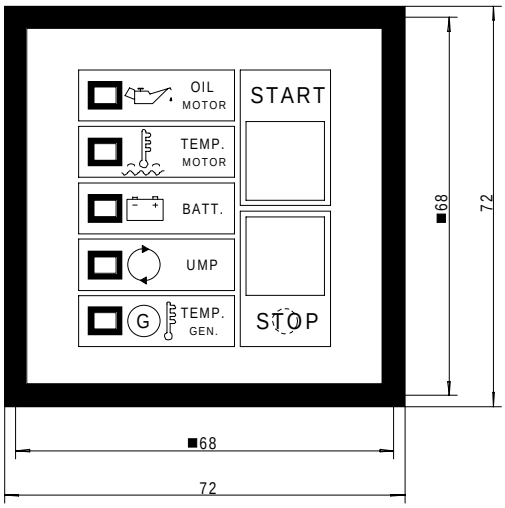


Fig. 7: Dimensions

The relay is constructed for flush mounting in a housing with the following dimensions: 72 mm x 72 mm (acc. to DIN). It is fastened by means of retaining clips which are delivered with the device.

■ Switchboard cut-out (68mm x 68 mm)

4. Technical Data

Nominal auxiliary voltage:	12 V DC or 24 V DC boost charge with 18 V DC/33 V DC in off mode possible
Power consumption:	approx. 10 W at 24 V DC (approx. 20 mA per activated alarm during standby operation; no current consumption during power saving mode)
Time circuits:	Oil pressure approx. 15 s Shut-down approx. 15 s Dynamo failure approx. 15 s
Excitation support:	270 Ω / 5 W
Overfrequency switching points:	58 Hz / 70 Hz
Alarm inputs:	4 at *DW1-1* 6 at *DW1-2*
Dimensions:	72 x 72 x 120 mm Cut-out 68 x 68 mm acc. to DIN 43700
Weight:	approx. 0,4 kg
Temperature range:	storage -25 to +75°C operation -20 to +70°C
Contact rating:	16 A / 30 V DC
Degree of protection:	IP 54 (Front) IP 00 (Rear)

5. Orderform

Diesel controller	***DW1-***		-	
4 Supervision circuits and two free alarms		**1**		
6 Supervision circuits		**2**		
Auxiliary voltage 12 V DC				**12**
24 V DC				**24**

Woodward Kempen GmbH
Krefelder Weg 47 · D – 47906 Kempen (Germany)
Postfach 10 07 55 (P.O.Box) · D – 47884 Kempen (Germany)
Phone: +49 (0) 21 52 145 1

Internet
www.woodward.com

Sales
Phone: +49 (0) 21 52 145 216 or 342 · Telefax: +49 (0) 21 52 145 354
e-mail: salesEMEA_PGD@woodward.com

Service
Phone: +49 (0) 21 52 145 614 · Telefax: +49 (0) 21 52 145 455
e-mail: SupportEMEA_PGD@woodward.com