

Technical Data

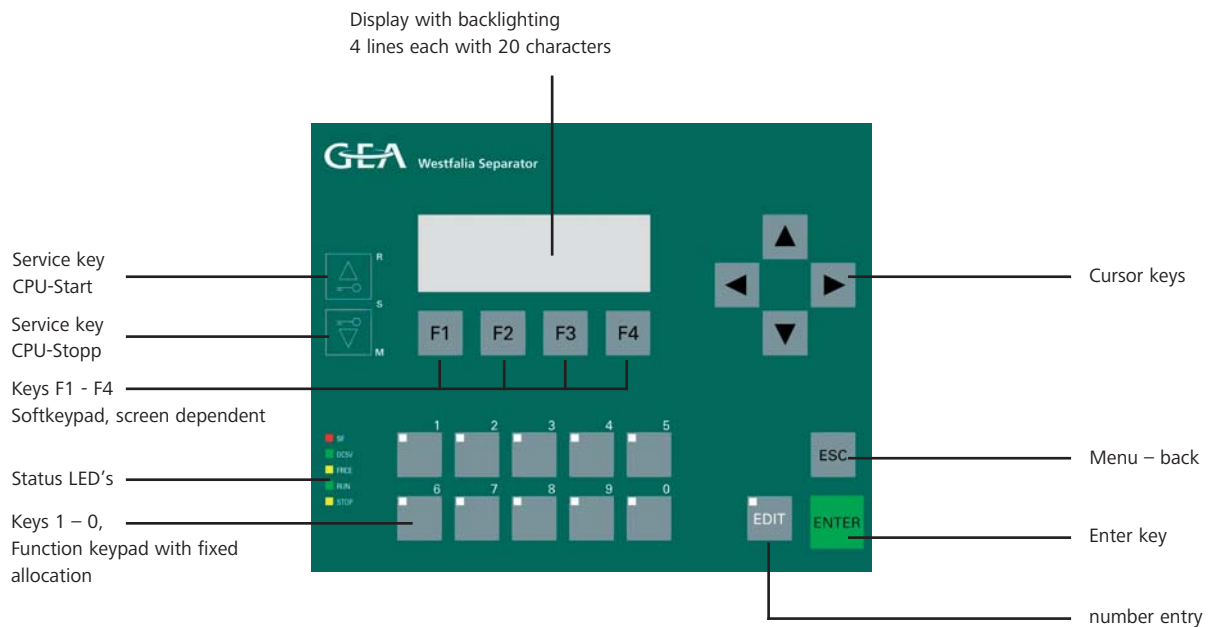
Control unit

D10 with text display

D20 with graphic display and

Profibus DP interface

Operating principles and constructional features



Overview

The D10 can be used to indicate operating statuses, current process values and faults. In addition, process or machine optimising data can be entered via the keypad. Machine diagnostic functions are also available (implemented). Service-friendly program and data storage on micro memory card (MMC).

The D10 is a line display machine. A diagram is illustrated in the display with text elements which can be combined from static text and/or current status values.

Operating and observation

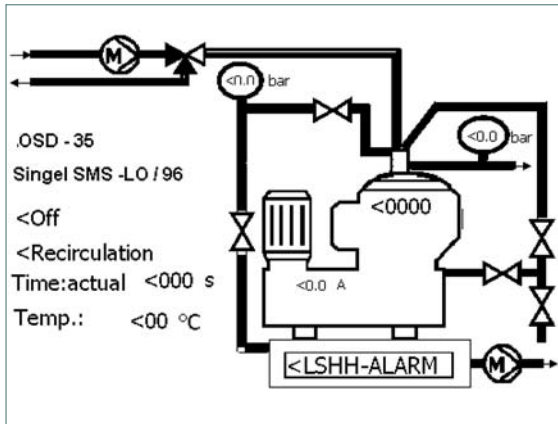
The basic function is to display machine and process statuses and permit corresponding operation. The downloaded software defines the user guidance procedure. The following display and operating functions are programmed (or possible):

- Diagrams
- Operating messages
- Fault messages with hints on fault elimination
- Recipes (machine types)
- Info text
- Protocols
- Multi-lingual user guidance

Typical text display on the D10 Separator information

- Separator type: OSD 60
- OP data: 36 A/4200 rpm
- Starting time: 300 s
- Mode: WMS, single

Typical graphic display on the D20 Separator information



The softkeys F1 – F4 can be used for obtaining the various display information. Fault messages have the highest priority, and automatically overwrite the current display.

Certifications

The control unit complies with the following regulations:

Product standard	Europe	EN 61131-2 (IEC 1131-2)
EMC	Europe	EC directive 89/336/EEC
Machines	Europe	EC directive 89/392/EEC
UL listing mark	USA	Underwriters Laboratories UL 508
FM approval	USA	FM standard, class I, div. 2, group A,B,C,D

Type approval tests of the following classification societies are available for on-board operation:

- Germanischer Lloyd
- Lloyds Register of Shipping
- Det Norske Verita
- Bureau Veritas
- American Bureau of Shipping
- Registro Italiano Navale

Program control

The control unit can be programmed to carry out the following functions:

- Controlled total ejections at predetermined intervals, partial and total ejection programs are possible
- Displacement of oil with water prior to total ejections
- Flush ejections
- Operating modes 01, 02, 36, 91 and 96 can be preselected
- Series operation is possible with external control units
- Ejections via sludge space monitoring system² (Westfalia Separator UNITROL-SMS)
- Water discharge via water content monitoring system² (Westfalia Separator UNITROL-WMS)
- Feed temperature regulation¹
- Single-stage WMS/SMS mode
- Optional PID controller for feed temperature

Monitoring

The control unit is capable of monitoring:

- The motor current of the separator
- The clean oil discharge back pressure
- The water discharge from the separator
- The temperature of the dirty feed oil,
- The function of the ejection system
- Maintenance intervals of the separator
- Functioning of the control unit
- The sludge space capacity²
- The water content in the feed²
- Functioning of the sensors

If a malfunction occurs, the feed closes and an alarm is set off. Oil losses are thus avoided. The malfunction is visualised in the display and acknowledged with the enter button. The help button can be used to obtain information for remedying an alarm in the event of a malfunction.

Potential-free contacts are provided for:

- Electric heater interlocking
- Steam shut-off valve
- Feed pump
- Sludge pump

Corresponding outputs are available. The control unit is programmed at the factory to suit the specific operation.

Standard components of the control unit

- Control unit
- Set of accessories for each centrifuge consisting of:
 - 1 pneumatic 3/2-way valve with manual override (to be installed in the dirty oil feed line)
 - 1 R¹/₄in solenoid valve with R¹/₄in throttle valve for control air (to be installed in the compressed-air line)
 - 2 solenoid valves, ball-type cock and strainer (to be installed in the water lines)
 - 1 pressure switch installed on the separator (for monitoring clean oil discharge)
 - 1 current transformer to be built into the motor control (for monitoring ejection process)

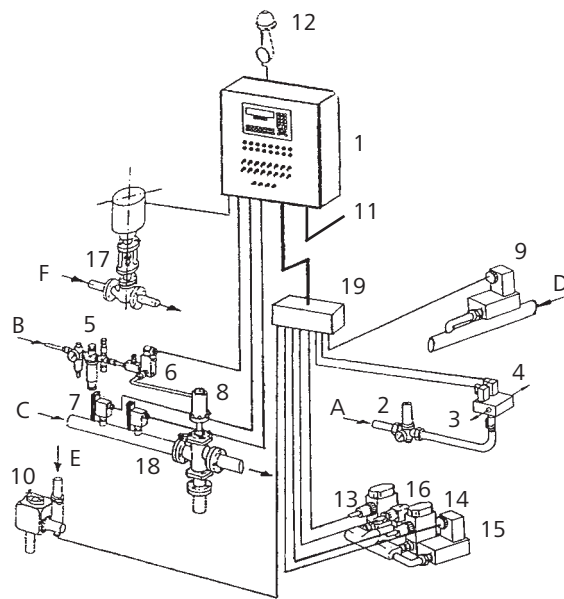
Additional components (at extra cost)*

- Compressed-air control assembly consisting of: pressure reducer with pressure gauge (¹/₄in, 3 to 50/2 bar), filter and safety valve (2.5 bar)
- Pressure reducer with pressure gauge for water (16 bar/1.5 to 6 bar)
- Pneumatically operated steam shut-off valve with R¹/₄in solenoid control valve
- Vibration monitoring unit
- Klaxon
- Flow detector for water discharge
- Min./max. temperature guard for dirty oil feed
- PT 100 feeler two-wire switching¹
- Motor regulating valve with position indicator feedback¹

General layout diagram

- A Water
- B Compressed air
- C Dirty oil feed
- D Clean oil discharge
- E Water discharge from the separator
- F Saturated steam

- 1 Control unit
- 2 Water pressure reducer
- 3 Filling and displacement water valve
- 4 Operating water valve
- 5 Operating water control unit
- 6 Solenoid valve with throttle valve for control air
- 7 Min./max. temperature guard in PT 100 design
- 8 3/2-way valve for dirty oil feed
- 9 Pressure switch for control water
- 10 Flow switch for water discharge
- 11 Connections for feed line, motor and electric heater interlocking, alarm indication etc.
- 12 Klaxon
- 13 Connection for water discharge valve³
- 14 Connection for circuit valve³
- 15 Connection for pressure switch sludge space monitoring³
- 16 Connection for water sensor³
- 17 Motor control valve in the steam line³
- 18 PT 100 for feed temperature regulation
- 19 Terminal box



¹ Closed-loop version
² Part of separator
³ Westfalia Separator UNITROL version
⁴ Dimensions of control unit with temperature regulator

Technical data

Control unit

Designation	Technical data D10	Technical data D20
Ordering number	6ES7613 – 1CA00 – 0AE3	6ES7635 – 2SB00 – 0AC0
WSM Part-No.	0005-4050-410	0005-4050-600
Dimensions (H x W x D)	215 x 165 x 88 mm	260 x 274 x 79 mm
Fitting dimensions/ cutout dimensions	202 x 152 mm (tolerance +1 mm)	231 x 256 mm (tolerance +1 mm)
Weight	1350 g	1450 g
Display LED backlighting	LC display, LED backlitged / 4 lines of 20 characters, 5 mm character height	LC display, CCFL backlitged, 320 x 240 pixel
Keypad	Keypad 23 keys with 11 integrated LEDs	Keypad 59 keys, image area 116 x 87; (5,7")
Interfaces	Standard MPI interface for PG and networking P-Bus for S7 expansion modules	Standard MPI interface for PG and networking P-Bus for S7 expansion modules Profibus DP; Printer port RS 232
Power supply Polarity reversal protection	DC 24 V, range DC 20.4 DC 28.8 V yes	DC 24 V, range DC 20.4 DC 28.8 V yes
Voltage cutoff	> 20 ms	> 20 ms
Current consumption (In)	2.4 A	2.4 A
RAM	48 kByte	64 kByte
Chargeable memory	Plug-in micro memory card (MMC) 512 KB	Plug-in micro memory card (MMC) 128 KB
Buffering	Ensured through MMC, no battery	Ensured through MMC, no battery OP on compact flash
Project software	Step 7 Version 5.1 and higher; service pack 4	Step 7 Version 5.1 and higher; service pack 4
HMI software	Integrated in Step 7	ProTool, Version 6.0 and higher; service pack 1
Inputs	24 digital, DC 24 V 4 analog, 4-20 mA / 0-10 V 1 PT 100	24 digital, DC 24 V 4 analog, 4-20 mA / 0-10 V 1 PT 100
Outputs	16 Digital, each 0,5 A, total current 4 A 2 analog, 4-20 mA	16 Digital, each 0,5 A, total current 4 A 2 analog, 4-20 mA
Safety standard	DIN EN 61131-2 / IEC 61131-2	DIN EN 61131-2 / IEC 61131-2
Enclosure	Unit front: IP 65 as per IEC 60529, NEMA 4X Unit housing: IP 20 as per IEC 60529	Unit front: IP 65 as per IEC 60529, NEMA 4X Unit housing: IP 20 as per IEC 60529
Electromagnetic compatibility	A as per EN 55011	A as per EN 55011
Climate conditions	Tested as per IEC 60068-2-1, IEC 60068-2.2	Tested as per IEC 60068-2-1, IEC 60068-2.2
Operation	0 °C – 55 °C, vertical installation	0 °C – 55 °C, vertical installation
Storage	-20 °C to +70 °C	-20 °C to + 70 °C
Humidity	5 % to 95 % at 25 °C	5 % to 95 % at 25 °C
Mech. environment conditions	Tested as per IEC 60068-2-6, IEC 60068-2.6	Tested as per IEC 60068-2-6, IEC 60068-2.6
Vibration – Operation	10 to 58 Hz, amplitude 0.075	10 to 58 Hz, amplitude 0.075
Vibration – Storage/Transport	5 to 9 Hz	5 to 9 Hz
Shock Operation	Semi-sinusoidal: 150m/s ² (15 g), 11 ms, 18 Shocks	Semi-sinusoidal: 150m/s ² (15 g), 11 ms, 18 Shocks
Shock – Storage/Transport	250 m/s ² (25 g), 6 ms, 1000 Shocks	250 m/s ² (25 g), 6 ms, 1000 Shocks
Fire resistance	Multiway connectors FV2 as per IEC 60707 Base connectors FV0 as per IEC 60707	Multiway connectors FV2 as per IEC 60707 Base connectors FV0 as per IEC 60707

Designation	Technical data D10	Technical data D20
Approvals	CE/EC Directive EMV 89/336/EWG UL /Underwriters Laboratories as per UL 508 CSA /Canadian Standard Association as per C22.2 No.142	CE/EC Directive EMV 89/336/EWG UL /Underwriters Laboratories as per UL 508 CSA /Canadian Standard Association as per C22.2 No.142
Design check/ Classification societies	GL /Germanischer Lloyd LRS /Lloyd's Register of Shipping DNV /Det Norske Veritas BV /Bureau Veritas ABS /American Bureau of Shipping RINA /Registro Italiano Navale	GL /Germanischer Lloyd LRS /Lloyd's Register of Shipping DNV /Det Norske Veritas BV /Bureau Veritas ABS /American Bureau of Shipping RINA /Registro Italiano Navale
Auxiliaries: Mounting frame, replacement for C7 Service package Micro memory card Compact flash card for OP	0005-4278-040 0005-4050-420 0005-3668-010 N.A.	N.A. 0005-4050-420 0005-3668-010 0005-3668-020

Application

Automatic control and monitoring of mineral oil centrifuges of types OSA/OSB/OSC/OSD

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