ESPA
Efficient
Engineering

Speedrive

More control, performance and efficiency

ESPA
Innovative Solutions

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Engineering

Speedrive
ESPA Efficient Engineering

Performance. Energy efficiency. Durability. Reliability.

ESPA now provides a competitive, versatile and cost-effective response to the increasing demands of the market.

ESPA Speedrive (ESD) is an innovative variable-frequency drive system which offers high hydraulic performance for pumping and pressurisation operations; constant pressure without flow fluctuations; savings in energy consumption; smooth, quiet operation; increased service life for the pumps; reduced life cycle costs **(LCC)**.

In other words: convenience, sustainability, performance and cost-effectiveness, thanks to an innovative device that greatly outstrips traditional fixed-speed hydropneumatic groups.

ESPA Speedrive's VFD (variable-frequency drive) technology is the fruit of our **E^3 (ESPA Efficient Engineering)** innovation programme, a guide for developing integrated quality, based on our culture of permanent improvement in R&D&I.

ESPA Speedrive: a new dimension in pumping

ESPA
Innovative Solutions

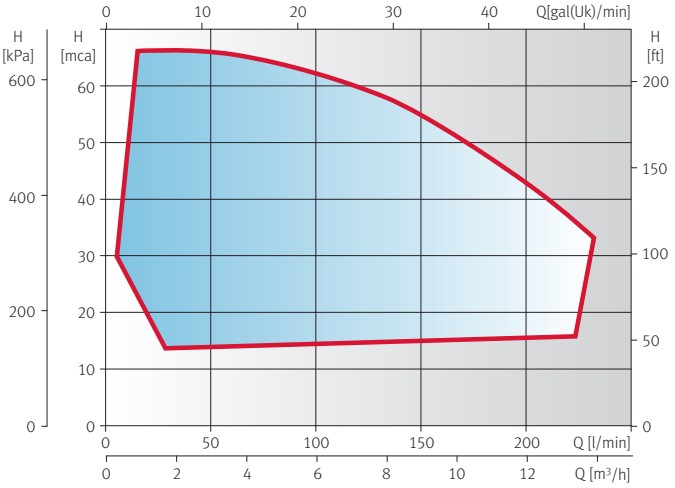
Improved quality in water supply: constant pressure

The most efficient system for adjusting a pump's hydraulic performance to the pressure and flow requirements of supplying water is through the use of **variable-speed** technology. In the case of supplying water to a building that requires a constant pressure regardless of the water flow requested, with a variable-speed system, in addition to improved efficiency, a high-quality, oscillation-free service is obtained, guaranteeing greater durability of the equipment and the installation.

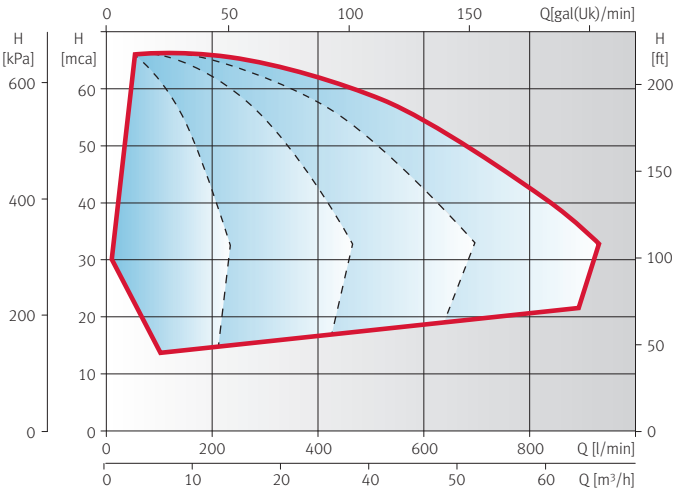
The ESD unit receives a proportional signal from a pressure transducer fitted on the discharge pipeline. The ESD processes this signal and regulates the motor speed in order to keep the pressure constant at the established level, regardless of the variations in flow demand.

With this pump set the pump's operation can be adapted to the different flow demands, constantly setting the consumption that is strictly necessary for the demand at any given moment. The energy consumption will be proportional to the water consumption. In comparison to the same system running at a fixed speed, this translates directly into energy savings.

Performance area with one pump



Performance area with sets of 4 pumps in parallel



Operating modes

The ESD has a backlit display and a 5-button keypad for displaying the user parameters. The installer can easily regulate and modify the basic operational parameters through the same interface. It also includes a reset option to recover the default factory parameters.

Adjustable operating parameters

- **Language:** options ES, EN, DE, IT, FR.
- **Operation:** AUTOMATIC – MANUAL.
- **Set pressure:** set point.
- **Differential pressure:** hysteresis or difference in the set pressure that marks the start-up of the pump.
- **Maximum motor intensity:** to regulate motor protection.
- **Pump sleep frequency:** sleep frequency; this can be set manually or automatically.

ESD has a system for automatically calculating the pump's sleep frequency on the basis of the specific characteristics of each installation and the set pressure point.

- **Pump stop temporisation**
- **Nominal motor frequency:** 50 Hz – 60 Hz.
- **Motor rotation reversal**
- **ON–OFF auxiliary pump:** auxiliary pump in fixed-speed DOL operation.
- **Auxiliary pump in variable speed mode** by ESD at variable speed.

Configuration in auxiliary pumps

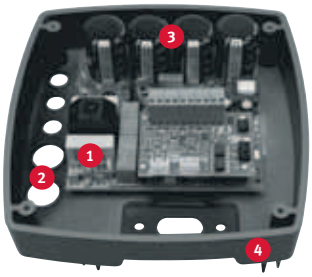
- **Activation frequency:** activation frequency of auxiliary pumps.
- Auxiliary pump activation **temporisation**.
- Auxiliary pump **maximum intensity.**

Parameters displayed

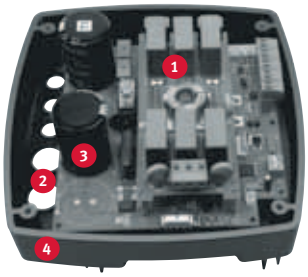
- Set pressure.
- Differential pressure.
- Maximum motor intensity
- Stoppage frequency.
- Pump stop temporisation.
- Module temperature.
- Alarm display: power surge, short-circuit, power failure and module temperature.
- Operational register: number of start-ups, hours in operation and hours online.

Access to advanced parameter settings, the deletion of the operational register and of the alarm history is password protected.

Electronic circuit



Speedrive M1



Speedrive T2

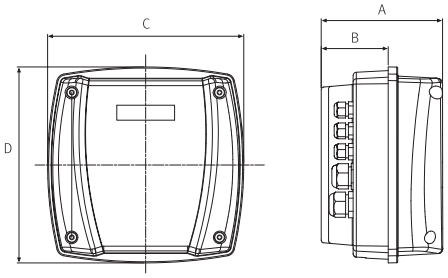
1. EMC filter
2. Input/output for cables
3. Power circuit
4. Aluminium radiator body

Pressure transducer

Device for digital pressure reading

Dimensions and weights

Model	A	B	C	D	Kg
Speedrive M1	128	71	207	207	2
Speedrive M2	128	71	207	207	2,2
Speedrive T1	142	85	207	207	2,2
Speedrive T2	142	85	207	207	2,4
Speedrive T3	142	85	207	207	2,5



Technical specifications - 50/60 Hz

Description	Single-phase	Three-phase
	M1 - M2	T1 - T2 - T3
Configuration	Built into the junction box	Built into the junction box
Power	230 V, single-phase	400 V, three-phase
Motor voltage	230 V, three-phase	400 V, three-phase
Maximum intensity	5 / 7 A	4 / 6 / 9 A
Cooling	Air-cooled	Air-cooled
Constant pressure	Yes	Yes
Constant flow	Programmable	Programmable
Second duty point	Programmable	Programmable
Dry running protection	Yes	Yes
Pressure transducer	External, 4-20 mA	External, 4-20 mA
Additional digital input	1	1
Additional analogical input	1	1
Level switch terminal	Yes	Yes
PTC	Optional	Optional
External communication port	RS 485	RS 485
Screen	Backlit	Backlit
Auxiliary relay	1 for external alarm	No
Minimum working frequency	Adjustable	Adjustable
Acceleration ramp	1 fixed	1 fixed
Deceleration ramp	1 fixed	1 fixed
Stop temporisation	Yes	Yes
Maximum No. of pumps	Up to 4	Up to 4
Maximum No. of slave pumps (fixed speed)	Up to 3	Up to 3

Energy saving

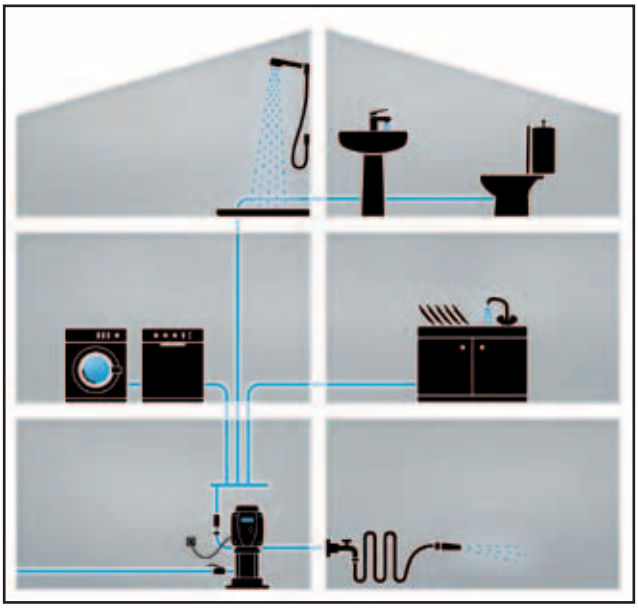
Electric motors account for 70 % of the energy used worldwide. Of these, 35 % are used to power hydraulic pumps. It could be said that 25 % of world electrical consumption is used to pump fluids. The introduction of VFD technologies has the potential to **save up to 50 %** of this energy.

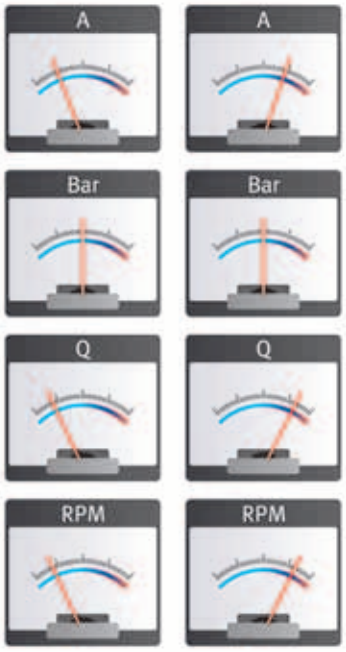
Conventional flow control methods, using fixed-speed pressurisation, involve recirculating part of the flow via a ***by-pass***, or restricting the flow with valves.
These systems waste an enormous amount of energy: fixed-speed groups operate at maximum energy consumption whenever they operate independently of the flow demand required at each instant.

Variable-speed systems **regulate energy consumption on the basis of the flow demand** (Fig. 1). They are undoubtedly the most efficient and reliable systems for adjusting the hydraulic performance of pumps to variable demand in flow. In addition, a group controlled by **Speedrive** makes installation easier, as it does away with the need for mechanical flow regulation systems and for large hydropneumatic tanks.
A **Speedrive**-controlled pressurisation system provides added convenience in water supply, **reducing the noise level and eliminating vibrations and water hammers** during the start-up a and shutdown cycles. The motor always starts up at low speed, thus **eliminating peaks of high consumption** due to the acceleration of the motor.

The reduction in speed gives rise to new efficiency curves, which run below the maximum speed curve, virtually parallel to it; nonetheless, the curves flatten out, since their height is reduced in a proportion great than that of the flow.

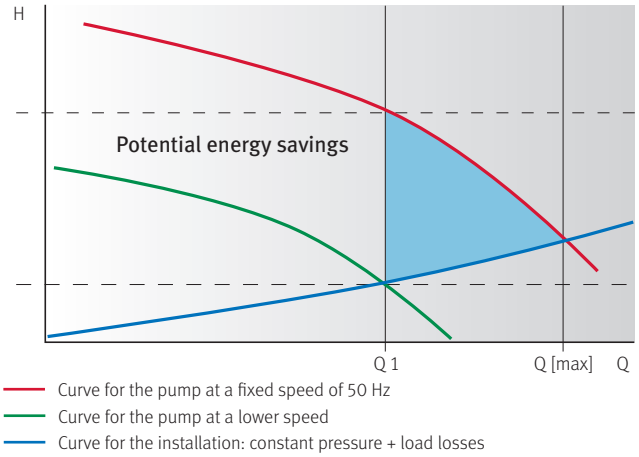
Another highly important aspect is that performance at equivalent points is maintained at different speeds (speed reductions of up to 50 % on the maximum velocity), thus achieving lower consumption while maintaining optimal efficiency.





(Fig. 1)

Differential of energy consumption in pumps with VFD

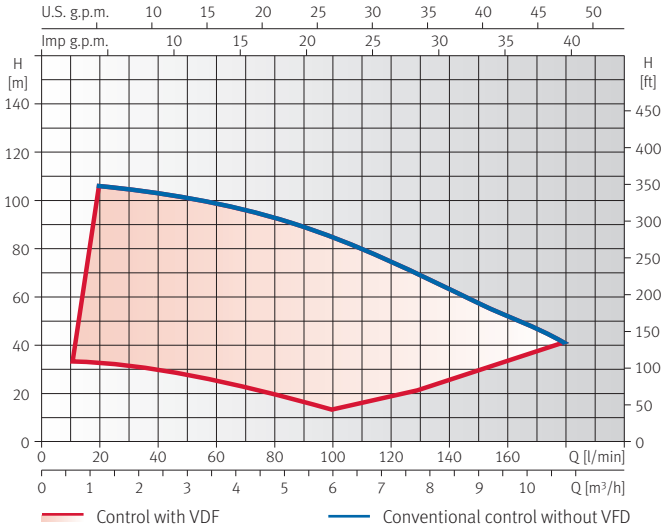


Configuration

The ESPA Speedrive (ESD) variable-frequency driver has been designed to be integrated with the following **ESPA** pumps: **MULTI-ESD, PRISMA-ESD and XVM-ESD**. With this electronic unit (employing advanced VFD technology) the pump and driver set extends the hydraulic range for each model, guaranteeing efficient service at each point in the performance area, beyond working at one point on a curve.

The ESD module can be adapted to the three-phase motors of these **ESPA** pumps, **even in existing installations**, thus improving the service quality and extending the unit's performance range. What is more, the large acumulation tank, needed for fixed speed operation, can be replaced by a small expansion vessel. The variable-speed system **does away with fluctuations in the water flow**.

Control comparison with and without VFD



CKE2 MULTI

CKE1 PRISMA 35 6

CKE1 MULTI 35 6

CKE1 XVM 4 13

Dimensions and weights

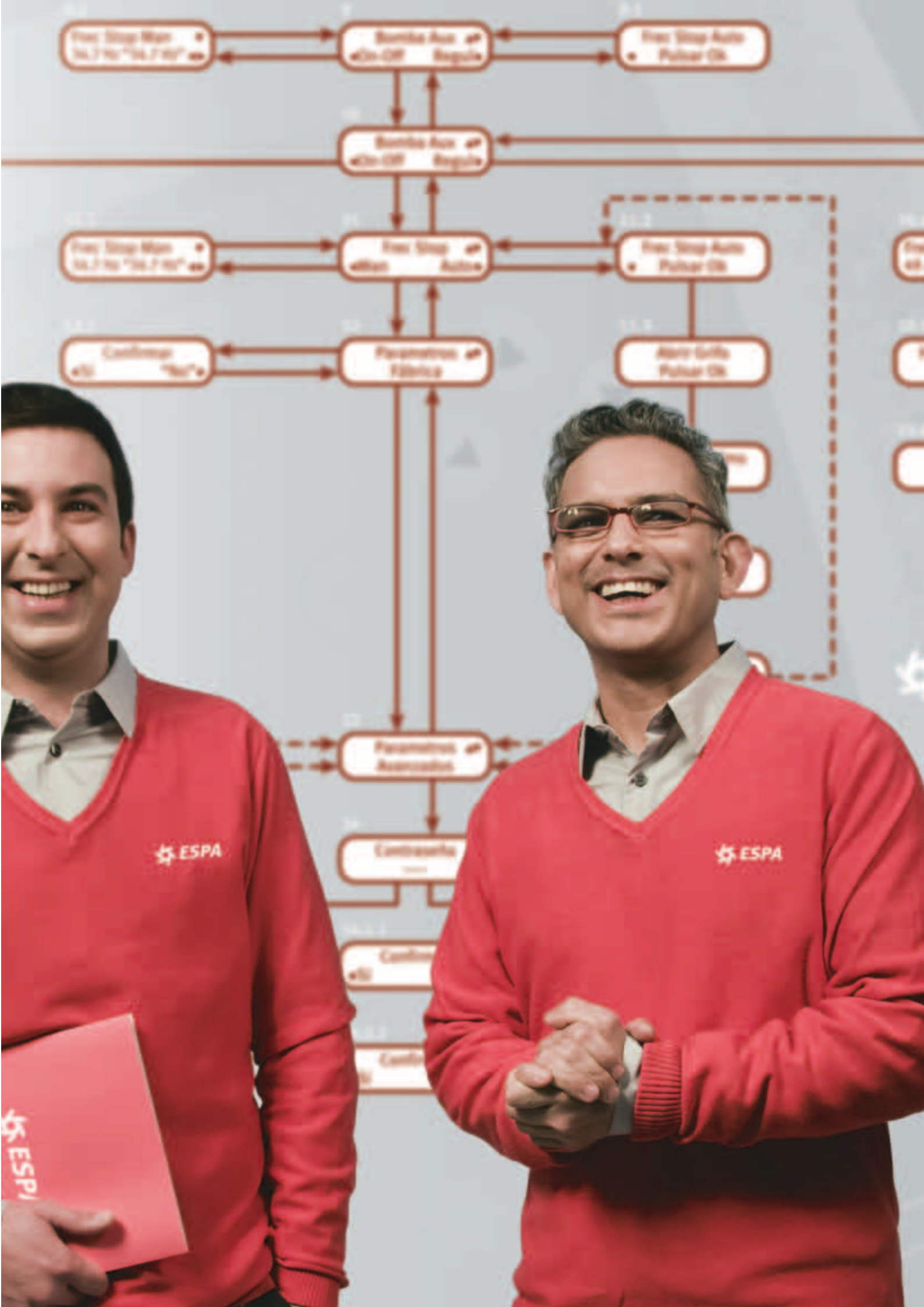
Model	Max. height	Length	Width	Kg
CKE1 PRISMA 35 6	505	207	310	27,3

Dimensions and weights

Model	Max. height	Length	Width	Kg
CKE1 MULTI 35 6	505	207	310	27,3

Dimensions and weights

Model	Max. height	Length	Width	Kg
CKE2 MULTI 35 6	1040	600	440	58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Pumps with ESD in pressure groups

The ESD modules can control the operation of pressure booster sets up to 4 pumps.
The ESD modules can control the operation of pressure into two different manners:

1. Units with one single ESD module:

- **CKED** 2 pumps: variable-speed main pump + fixed-speed DOL auxiliary pump.
- **CKED** 3 pumps: variable-speed main pump + 2 fixed-speed randomly alternating DOL auxiliary pumps.
- **CKED** 4 pumps: variable-speed main pump + 3 fixed-speed randomly alternating DOL auxiliary pumps.

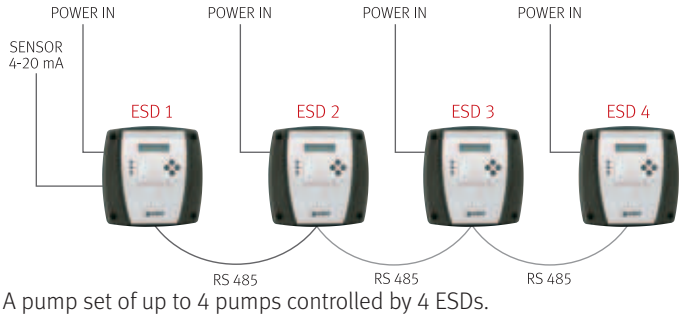
CKED MULTI

1 single ESD regulating the service pump and operating up to 3 auxiliary pumps in DOL start-up. Configuration of the master pump operating at variable speeds and 3 auxiliary pumps with in cascade opperation start-up for greater flow demands. Random alternation in the start-up of the auxiliary pumps.

2. Units with multiple ESD modules (up to 4):

- **CKE2:** 2 pumps: variable-speed main pump+variable-speed auxiliary pump, both operating in cyclical duty changeover.
- **CKE3:** 3 pumps: variable-speed main pump + 2 variable-speed auxiliary pumps, all 3 operating in cyclical duty changeover.
- **CKE4**: 4 pumps: variable-speed main pump + 3 variable-speed auxiliary pumps, all 4 operating in cyclical duty changeover.

CKE4 MULTI



A pump set of up to 4 pumps controlled by 4 ESDs.
Configuration of service pumps and back-up pumps, all regulated.
Random alternation between the 4 pumps at each system start-up.
Once the auxiliary pumps come into operation, all the regulated pumps operate in synchronisation at the same frequency.
This operational mode enhances the effectiveness of the pump set and cuts down on the start-up and shutdown cycle for pumps.

CKE2 XVM

Model ESD	Input	Output		Dimensions		Weight
	Power source voltage (V)	Max. motor current (A)	Motor voltage (V)	A (mm)	B (mm)	(kg)
M1	1~230 V AC ± 10 %	5	3~230 V AC	128	71	2,0
M2		7				2,2
T1	3~400 V AC ± 10 %	4	3~400 V AC	142	85	2,2
T2		6				2,4
T3		9				2,5

Operating conditions:

- IP 55 protection.
- Maximum ambient temperature: 40 °C.
- For M1 and M2: 1 free, maximum intensity power contact. 2 A, 1~230 V AC.
- Digital input for 4-20 mA transducer with 24-V DC power source.
- Auxiliary transducer input.
- Digital input for the external level switch, or -free volt- contact to switch the circuit on and off.
- Communication between ESD modules RS 485 serial port (up to 4 ESDs).

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and together with you...

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