Split-Air Low noise (SAL)

Unit type

The Split-Air units are divided in two parts:

- the motor-condensing installed outside the room to be conditioned
- the evaporating unit installed inside the room to be conditioned and can be positioned horizontally (fixed to the ceiling) or vertically (fixed to the wall).
- The A/C unit meets the current technical regulations, standards and the European guidelines for machines CE certification.
- Manufactured in a company certified according to DIN ISO 9001/ EN 29001.
- Functional test before delivery.

Power Supply

400V/3Ph+N/50Hz

Standard function:

- Compressor cooling

Frame, housing

- Self-supporting panels made of painted galvanised sheet metal to guarantee good corrosion resistance (not suitable for corrosive and saline environments).
- External panels are internally lined with a 3 mm layer of sound-absorbing material. The compressor box, in the external unit, is internally lined with a 10 mm layer of sound-absorbing material.
- Colour RAL 7035

cooling circuit

- Direct expansion
- Refrigerant R407C
- One refrigerant circuit
- High pressure safety switch as safety device
- Low pressure safety switch as protection component
- Refrigerant filter-dryer as protection component
- Sight glass as protection component

Internal Unit (SSI)

Evaporator air circuit (DX cooling mode)

- Air suction from the rear side
- Air delivery through the opening on the front side or from the opening in the bottom of the unit near the frontal panel

Evaporator fan

- 3-phase fan drive with high degree of running smoothness, 48 VDC

- DC radial fans, with impeller of fibreglass-reinforced plastic
- Fully integrated electronic communication (EC)
- Tachimetric signal and speed control with signal 0-10 VDC
- F insulation class and class I protection
- The motor protection is IP54

Evaporator
- Copper-aluminium type
- Suitable only for non-corrosive and non-salty environments
- The sloping positioning of the evaporator coil compared to the air flow maximizes its dimensions to have lower pressure drops
- Aluminum condensate tray for 100% condensate collection

Air filter
- Located between the evaporator coil and the fan(s)
- Frame and network in galvanized sheet
- It prevents large dirt particles present in the environment from obstructing airflow
- Long service life
- Filter class: ePM10 50%

External unit (SAO)

Condenser air circuit

Air of condenser circuit is taken in from an opening on the rear side of the unit. Then, it crosses condenser coil just in front of the intake opening and it's expelled from the frontal grille.

Condenser fan
- Axial fan(s) with press-fitted sheet steel blank blades, sprayed with PP plastic
- Power supply range: 230 V ± 10% / single-phase / 50÷60 Hz
- Statically and dynamically balanced
- Long wearing
- F insulation class and class I protection
- The motor protection is IP54

Condenser
- Microchannel type
- Made of aluminium with copper connections
- Suitable only for non-corrosive and non-salty environments

Compressor
- On-off compressor.
- scroll compressor, including auto-resetting motor protection sensible for high

temperature and current.

Expansion valve

- Equipped with a pressure compensation line, it assures a perfect adaptation to variable temperature conditions.
- Factory-set.

Liquid receiver

- positioned between the condenser and the condenser fan.
- volume 2,8 L

Refrigerant connections

For connecting of the indoor and outdoor unit. The required piping is not included in the delivery.
Connectors on the condensing unit:
Refrigerant tap 1/2", connection 1/4"
Refrigerant tap 3/4", connection 1/4"

Connectors on the evaporating unit:
Refrigerant joint - 1/2" SAE / ODS 12 mm
Refrigerant joint - 3/4 SAE / ODS 18 mm

Electric box

There are two electronic boards: one in the internal unit and the other in the external one.

The electric box of the external unit is accessible from the frontal upper panel

- The electric box of the internal evaporating unit can be accessed removing its panel located in the bottom side near the rear of the unit. The electric box of the condensing unit can be accessed removing its front upper panel (SAL A0/A2/A4).
- Accommodation of high voltage and control components. It contains fuses, contactors, relays, terminals, thermo-magnetic switches to protect individual components against short circuits, a device for dirty filter alarm and finally the electronic I/O controller.
- Complete wiring of electric and electronic control components with multipolar cables.
- Main AC power supply and connection cables between the external and internal unit are provided by customer.
- Voltage: 400 V / 3ph+N / 50 Hz.
- PE protective conductor.
- Voltage to feed control components (except the I/O controller) is 24 VAC for safety reasons and is provided by a single phase transformer which is protected separately on primary and secondary sides.

Control and safety components inside the e-box - Internal unit

- Contactors.
- Automatic protection switches of fans and heaters (if present).
- 4 PTC temperature probes: internal air temperature, supply air temperature, superheating and evaporator surface temperature (antifreeze).
- Differential pressure switch for dirty filter alarm (maintenance request).
- Mechanical safety thermostat of heating elements (if present).
- C2020 I/O controller.

Control and safety components inside the e-box - External unit

- Contactors.
- Automatic protection switches of fans.
- 1 PTC temperature probe: external air temperature.
- Pressure transducer with signal 4÷20 mA on condenser.
- C2020 I/O controller.

Documents:

The air conditioners units are dispatched with the following documents:

- Operation and instructions manual with refrigerant diagram
- Wiring diagrams with replacement parts list, CE - declaration of conformity test certificate of final function and safety test
- User manual of controller
- Start-Up check

C2020 I/O controller

I/O microprocessor-based controller for air conditioners. This controller manages all functions and shows main working conditions and alarms.

Hardware

- 4 analogue inputs PTC
- 3 analogue inputs: 4 - 20 mA
- 13 non-insulated digital inputs for free-voltage contacts
- 12 digital outputs

- 9 DIG-OUT relays 48 V AC, 1A ;
- 3 DIG-OUT relays 230 V AC, 5A;

- 1 analogue output 230 V AC, 4 A for power control through phase-cut
- 2 analogue outputs 0/10 V
- 3 analogue outputs 0/10 V for DC engines control with DC tachometric feedback
- 3 synchronous serial ports:

- on microprocessor COM0, 1 telephone connector for user interface board (keypad);
- on microprocessor COM1 - 1 slot for ISxxx adapter boards for either tele-monitoring systems (accessory ACTSERC1010 is required) or programming (accessory ACTAST is required)
- on microprocessor COM2, 1 telephone connector for master-slave (sequencing) connection

- 1 slot connector for interface boards on SPI bus: ACTHKEY (Hardware Key for on-site microprocessor programming and application setup)
- Clock and non volatile memory on board, on I2C bus
- 512KByte FLASH Program memory, programmable on board, for easy software update and system configuration (by laptop or hardware key)
- 20KByte RAM
- EEPROM for setup and other permanent storage
- A/D converter 10 bit on board.

Firmware

- Multilevel setup menus: User, Manufacturer and I/O, protected with different passwords.
- Software configurable analogue and digital I/O.
- Counter menu with different hour counters for evaporator fan, condenser fan, compressor, free cooling operation.
- 7 languages for alarms, display and user setup.
- Operation with and without connected keypad (user interface board).
- Modulation of condenser and evaporator fan speed.

Working modes

C2020 I/O controller allows, if the unit is equipped with proper devices, to control the following working modes:

- Cooling
- Free cooling on temperature / enthalpy (it requires 2x optional probes ACTRHC1)
- Modulation of free cooling capacity with damper / with damper + fan speed control
- Mixed mode cooling (combining free cooling and compressor)
- Emergency ventilation (optional) in case of main AC power failure or serious alarms on all units in LAN. When there is a power failure, part of the unit (evaporator fans, control components and the free cooling damper motor) is powered by an emergency power supply (48V DC current). In this way, continuous circulation of air inside the shelter is always assured. This circulation of air is combined with free cooling when the conditions required to enable this mode are satisfied. NOTE: units with 48V DC emergency ventilation always require an external direct current power line even when main power supply is present.
- Heating (optional)
- Dehumidification (it requires optional probe ACTRHC1)
- Humidification (it requires external humidifier and optional probe ACTRHC1)

Sequencing

- Connection via SLAVE serial port
- Sequencing of up to 5 units
- Configurable number of stand-by units

Internal load management

- Slave units start in cooling, free cooling, heating to help master unit in keeping internal temperature near the set point
- Four steps operation with 2 units, depending on internal and external temperature:

1. Unit 1 Free cooling
2. Units 1 and 2 Free cooling
3. Unit 1 Compressor cooling
4. Units 1 and 2 Compressor cooling

Intelligent high pressure management

- Evaporator and condenser fan speed control (at unit start, with high ambient temperature) to avoid high pressure alarm
- Evaporator and condenser fan speed at excessive outdoor temperatures to avoid high pressure alarm
- 3 automatic high pressure alarm resets within 3 hours

Night mode

- Time controlled fan speed reduction (adjustable) for low noise operations, e.g. night operations
- Antifreeze and condensing pressure control are still active with priority

Energy saving

- Intelligent fan speed reduction (adjustable) for operations without need of cooling or heating (dead zone)
- In sequencing, priority to free cooling mode

<u>Alarms</u>

Available alarms on 9 voltage-free contacts (screw terminals)
Default settings:

- Common alarm (high priority)
- Common warning (low priority)
- Low temperature
- High temperature
- Clogged filter
- Fan blocked
- High pressure
- Low pressure
- High humidity (needs ACTRHC1 as internal humidity sensor)

Alternative configurations:

- Max temperature
- Low humidity (needs ACTRHC1 as internal humidity sensor)
- Antifreeze
- Overload compressor
- Overload heater

- Overload fans
- Temperature / humidity sensor / pressure transducer broken
- Main AC power failure
- LAN failure
- Voltage out of range (needs VCC, voltage control relay)
- Fire / smoke (needs client's device)
- Door open / vibration (needs client's device)
- External enable / remote ON-OFF (needs client's device)

- Each alarm can be routed to a voltage free contact
- The common alarm and common warning are two configurable groups of alarms
- Alarm history, with the last 50 events, with possibility of resetting after service

Available inputs
3 input contacts on screw terminals for client's devices:
- Remote ON-OFF
- Fire / smoke detector
- Door open switch or vibration sensor (earthquake)

Communication with external devices
Connection via PRG serial port (ACTSERC1010 is mandatory)
5 available protocols:
- PE protocol for communication to laptop for software update / parameter configuration (it needs laptop adapter ACTAST)
- STULZ protocol for communication with STULZ gateways (WIB / MIB / …) (it needs ACTSERC1010 adapter)
- ModBus RTU open protocol for direct communication with client's BMS (it needs ACTSERC1010 adapter)
- ModBus-Stulz open protocol for direct communication with client's BMS (it needs ACTSERC1010 adapter), compatible with data point list of other Stulz controllers (C7000,…)
- SAIA-Bus protocol for direct communication with customized BMS (it needs ACTSERC1010 adapter)

SEQC - Sequencing cable
pin-to-pin cable with RJ11 plug, used to connect two units (equipped with C1010 electronic controller) as Master/Slave for Sequencing/Standby operation.
This cable is provided in standard length of 2 m / 10 m /15 m/ 30 m

VCC- Voltage monitoring 1-ph
the voltage control relay, is an additional device which stops the power supply to prevent faults if the voltage not in rated tolerance. The relays monitors according to the respective setting an voltage whether it exceeds or falls below a specified value or is within a certain range (window monitoring)
- The relay installed in the electrical box has a display and can be parameterized with three

keys.

- The display shows the present value and a symbol that indicates whether the relay is set to monitor whether the voltage exceeds or falls below a specified value or whether it is set to window monitoring
- The setting range for the upper and lower threshold values extends from 17 V to 275 V.
- Reset function: Auto- or manual reset selectable

Note - only for WXD40-60-80 units: For reasons of space maximum three of the following four options can be installed in the same unit

RSCx

PSC and/or VCC

SOFTx

SWx

User interface ACTKPDC1010H

User interface of dimensions 175 x 70, equipped with graphic display LCD, 6 capacitive keys and two LEDs, the operating ON/OFF led, which is turned on when the system is on, and the alarm led, that it's turned on when an alarm occurs.

User interface board is connected to the controller via a 4-poles pin-to-pin telephone cable (including serial bi-directional RS485 line and power supply)
The display allows to see messages and to modify parameters.
One keypad can control up to 5 connected units. (Only for C2020)

Prepared for wall mounting with a separate plastic box to be fixed on a wall inside the room to be conditioned. This device is equipped with 4 m long connection cable.

SERC1010 - C1010 RS485 serial adapter

It's a plug (you can insert onto the C1010 electronic board) that let you connect any device via RS485 protocol (typically PLCs or a remote telecomptrol system). You can check system status, change parameters and sets, communicate with C1010 controller board.
It provides a RS485 signal.

CRA (Crankcase heater for Scroll Compressor)

Heating resistance suitable to units designed for very low external operating temperatures. Installed in compressor carter, it operates when compressor is OFF, assuring constant lubricating performances of oil at the compressor start.
Necessary only at outdoor temperatures below -20°C.

WinPlan

Unit

Unit type:	SAL A0 0	
Cooling capacity (total):	10,2	kW
Ambient temperature:	35	°C
EER:	3,29	kW/kW
Sound power level:	-	dB(A)
LpA (1m freefield):	-	dB(A)

Airflow:	2 300	mi/h
Air velocity:	1,6	m/s
Return air temperature:	24	°C
Return air humidity:	50	rel.%
Supply air temperature:	13	°C
Altitude above sea level:	100	m
Height:	410	mm
Width:	1 040	mm
Depth:	1 035	mm
Weight:	75	kg
Refrigerant:	R407C..	
Power supply:	400V/50Hz/3Ph/N/PE	

Fan (Data per unit)

Fan type:	K3G225	
Number:	2	
Max. revolutions:	2 949	U/min
Nominal power:	0,3	kW
Revolutions:	2 763	rpm
Power consumption:	0,3	kW
ESP external static pressure:	40	Pa
Total pressure drop:	75	Pa
Control voltage:	8,9	V
Motor-efficiency:	77	%

Compressor (Data per compressor)

Electrical power consumption:	2,8	kW
Heat rejection:	13,2	kW
COP:	3,60	kW/kW
Number:	1	
Evaporating temperature:	10,3	°C

The above mentioned data are determined and rated in accordance to EN 14511 and therefore are subject to measuring tolerances. Unless otherwise stated, all data refer to a product in basic version.