INTRODUCTION

1. Introduction

The Electronic Interface aims to provide the user with the main information regarding compressor control, monitoring of measured values, protection of several components of the compressor, and maintenance information. The existing parameters in the Electronic Interface may be modified according to the real usage needs of the compressor, in a simple and secure way.

Before performing any modification in the interface parameters, read the whole manual. In case of doubt, consult the nearest SCHULZ Costumer Service Center.

2. Electronic Interface

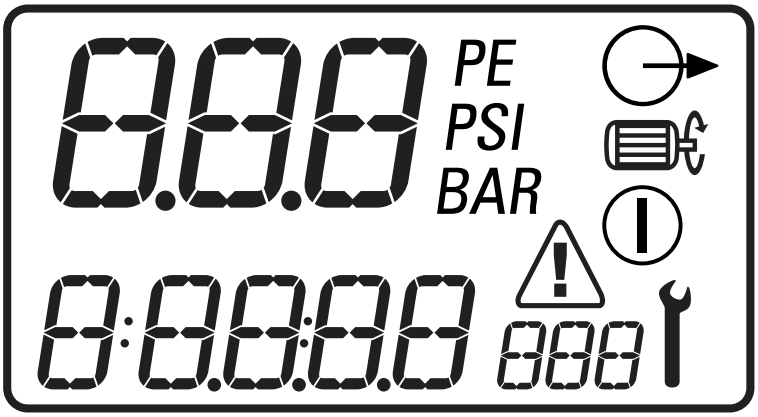
The interface has an illuminated display at the front panel, with six keys and an emergency button, as shown in the picture below:

KEYS	FUNCTIONS
	Start
	Stop
	Up or increase value
	Down or decrease value
	Reset
	Enter

FRONT PANEL

3. Front Panel

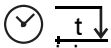
Each symbol on the display has a specific function, as described below:



1 - Main Value 0.1 a 999
2 - Main Value Unit BAR, PSI, °C, °F
3 - User Menu, item value 0.1 a 99999
4 - User Menu, item unit BAR, PSI, °C, °F, Hr, LHr
5 - Operation on, motor running, in load.
6 - Errors and maintenance symbols: maintenance, faults: alarms /errors.

3.1 Down or decrease value
Each led has a specific function, as shown in the table below:

LED	MEANING
7.0 BAR 102 PSI	Main Value: compressor output pressure (configurable: bar/psi)
85.6 °C 186 °F	Standard Value in User Menu: temperature (configurable: °C/°F)
	To see other values in user menu, press UP or DOWN
23456 Hr	Working hours
16420 LHr	Load hours
420 Hr	Hours until maintenance H1 to H4 (countdown based on working hours)
1 Add	RS 485 communication network address (*will be shown only if RS 485 module is installed)

 If one of the timers is activated (relief time, stop, standby or auto restart in case of power shortage), user menu will show the remaining time, always in seconds. While the time is displayed, the normal user menu values may be seen pressing the DOWN key.

The display will show again the current temperature in case no key is pressed for a short period or if no timer is on.

3.2 Operation Display
The compressor operation mode is continuously shown using the operation symbols:

 Standby: The compressor is in standby. The motor is not running, but the compressor may start automatically at any moment when pressure decreases to a value lower than minimum pressure (PL) or when it receives a remote load command.

 Running: The compressor is running offload (run-on-time active).

 Loaded: The compressor is working onload

3.3 Fault Conditionsh
 If a fault condition happens, a triangle will be shown on screen. If the fault is an alarm condition, the triangle will be shown uninterruptedly. If it is an error leading to compressor shutting down, the triangle will blink. The user menu will display a fault code, indicating which fault happened.

3.4 Maintenance hour meters
 If one of the maintenance hour meters (H1, H2, H3,H4 and H5) reaches 0 (zero), a maintenance symbol will blink and a maintenance code will be shown on user menu. The maintenance code may be reset but the maintenance symbol will still be displayed until the hour meter is reset. The maintenance hours will continue to decrease in negative hours. The maintenance hour meters may be reset, using the "operation menu", after the maintenance has been performed.

The maintenance hour meters may be set to any value, depending on the needed maintenance interval. The maintenance hour meters are based on the compressor working hours.

H1: Hours for air filter exchange
H2: Hours for oil filter exchange
H3: Hours for separation element verification
H4: Hours for oil exchange
H5: Hours to grease for engine

4. Navigation through the menus

Parameters, values and options may be adjusted in “operation” and “configuration” menus.

1) Operation menu: access code: “0009”.

2) Configuration menu: access code: “0121”.

To access the menus, first turn the compressor off, and then press the UP and DOWN keys at the same time. The display will show four zeros; the first zero will blink. Press UP or DOWN to adjust the first digit of the required access code. Press ENTER to change the second digit.

When the four digits are adjusted, and the last one is blinking, press ENTER. If the access code is correct for one of both menus, the first item of the menu will be displayed. If the access code is wrong, the display will return to the standard operational screen.

To select a menu item to be adjusted, press UP or DOWN until the item is on the display. To adjust the item, press ENTER; the item value will blink. Press UP or DOWN to adjust the value as desired. Press ENTER to store the information in memory.

To exit the menu and return to the standard operational menu, at any time, press RESET. Any configuration not stored in memory will be lost and the old value will be kept.

4.1 Operation menu

ITEM		DESCRIPTION	RANGE	STANDARD(*)
1	1.H1	Hours for air filter exchange	-999 to 9999 hours	1000 hours
2	1.H2	Hours for oil filter exchange	-999 to 9999 hours	1000 hours
3	1.H3	Hours for separation element verification	-999 to 9999 hours	3000 hours
4	1.H4	Hours for oil exchange	-999 to 9999 hours	1000 hours
5	1.H5	Hours to grease for engine	-999 to 9999 hours	2000 hours
6	1.Pu	Unload pressure	1 to 68bar	7.0bar
7	1.PL	Load pressure	0.8 to 67.8bar	6.8bar
8	1.rt	Run-on-time	0 to 600 seconds	300 seconds (5 Min.)
9	1.bt	Blowdown time	0 to 120 seconds	30 seconds
10	1.St	Stop time	0 to 30 seconds	10 seconds
11	1.P-	Pressure unit	bar/psi	bar
12	1.t-	Temperature unit	°C/°F	°C
13	1.At	Auto restart time	0 to 120 seconds	10 seconds

(*) These values may vary according to the compressor model.

Pressure control:

The compressor will keep pressure between the Pu (Relief Pressure) and PL (Load Pressure) values. When pressure reaches Pu value, the compressor will enter relief mode. When pressure falls to PL value, compressor will enter load mode.

Run-on-time:

When the compressor is in relief, the relief timer will be activated. If the compressor is in relief during the relief time, the main motor will stop and the compressor will enter standby. When pressure reaches the PL value, the main motor will start automatically.

Blowdown time:

When the main motor stops, it will only start again after the standby time. Motor startup is not allowed during this period. This time is necessary in order for the compressor’s internal pressure to decrease, making the next compressor startup easier.

Stop time:
When the stop key ○ is pressed, the compressor will enter relief and the main motor will keep running during the stop time. This time is necessary in order for the compressor's internal pressure to decrease before the compressor's full stop, avoiding possible oil backflow through the compression unit and air filter. The stop time starts at the moment the compressor enters relief. If the compressor is already in relief at the moment the stop key is pressed, the stop time will be reduced. If the compressor is already in standby mode, the stop time is not applicable.

Auto restart time:
The Control I interface is equipped with a low voltage (< 19.8V) and power drop (> 40ms) detector . If a voltage drop or shortage happens when the equipment is working, the compressor will restart automatically when voltage is restored. Control I will show a tension drop alarm to indicate that the fault happened.
To enable this function, select an auto restart time greater than zero. When the energy is reestablished, the interface will wait for the auto restart time before it starts the motor. This time is necessary in order for the simultaneous starts of several different devices to be avoided, when power is restored.
To disable the auto restart function, just set the auto restart time to zero.

4.2 Configuration Menu

ITEM		DESCRIPTION	RANGE	STANDARD(*)
1	2.Sd	Star/delta time	0.0 to 20.0 seconds	5.0 segundos
2	2.Ad	Network address (RS 485 optional)	1 to 12	1
3	2.LS	Load source	0=local, 1=RS485	0=local
4	2.SS	Start source	0=local, 1=RS485	0=local
5	2.PA	High pressure alarm	0.8 a 67.8bar	7.6bar
6	2.PF	Overpressure	1.0 a 68.0bar	8.0bar
7	2.tA	High temperature alarm	50 a 248°C	110°C
8	2.tF	High temperature trip	52 a 250°C	120°C
9	2.d2	C2 (digital input 2) configuration	2: Eno - Error @ 24Vac (0Vac=OK) 3: Enc - Error @ 0Vac (24Vac=OK)	standard
10	2.d3	C3 (digital input 3) configuration	2: Eno - Error @ 24Vac (0Vac=OK) 3: Enc - Error @ 0Vac (24Vac=OK)	standard
11	2.d3	C4 (digital input 4) configuration	2: Eno - Error @ 24Vac (0Vac=OK) 3: Enc - Error @ 0Vac (24Vac=OK)	standard
12	2.d5	C5 (digital input 5) configuration	0: Ano - Alarm @ 24Vac (0Vac=OK) 1: Anc - Alarm @ 0Vac (24Vac=OK) 2: Eno - Error @ 24Vac (0Vac=OK) 3: Enc - Error @ 0Vac (24Vac=OK) 6: rSS - Remote start/stop (24Vac=Start)	standard
13	2.d6	C6 (digital input 6) configuration	0: Ano - Alarm @ 24Vac (0Vac=OK) 1: Anc - Alarm @ 0Vac (24Vac=OK) 2: Eno - Error @ 24Vac (0Vac=OK) 3: Enc - Error @ 0Vac (24Vac=OK) 4: rLu - oad/relief (24Vac=Load) 5: PSr - Pressure switch regulation (24Vac=Load)	standard

ITEM		DESCRIPTION	RANGE	STANDARD(*)
14	2.Po	"offset" pressure sensor calibration	-1.5 to 1.5bar	0.0bar
15	2.Pr	"range" pressure sensor calibration	0.0 to 105bar	16.0bar
16	2.tL	Minimum temperature (load)	1 to 70°0 (= function disabled)	2.0°C
17	2.tr	Minimum temperature (start)		-10.0°C
18	2.Hr	Working hours adjustment		
19	2.HL	Load hours adjustment		

(*) Values must vary according to compressor model.

4.2.1 Configuration menu items:

2. Sd – Star/delta time:
Time during which the main motor will run "in star" during the startup procedure before the transition to triangle.
- The star contactor is powered 200ms before the main contactor.
- The start-to-triangle transition time is set to 50ms.

2. Ad- Network address:
The RS 485 communication network address and the number of each compressor connected to the same network must be unique, starting at 1 up to the number of compressors connected to the network.

2. LS - Load source:
a) The compressor will work using local pressure regulation (Pu and PL).
b) The compressor will answer to the RS485 remote management system pressure control.

The local pressure control (Pu and PL) is automatically restored if the RS485 communication is interrupted. When the RS485 communication is restored, the pressure control will automatically return to the remote system.

2. SS – Start source:
a) The compressor will start using the star key.
b) The compressor will start using a remote RS485 communication. The start key will be disabled.

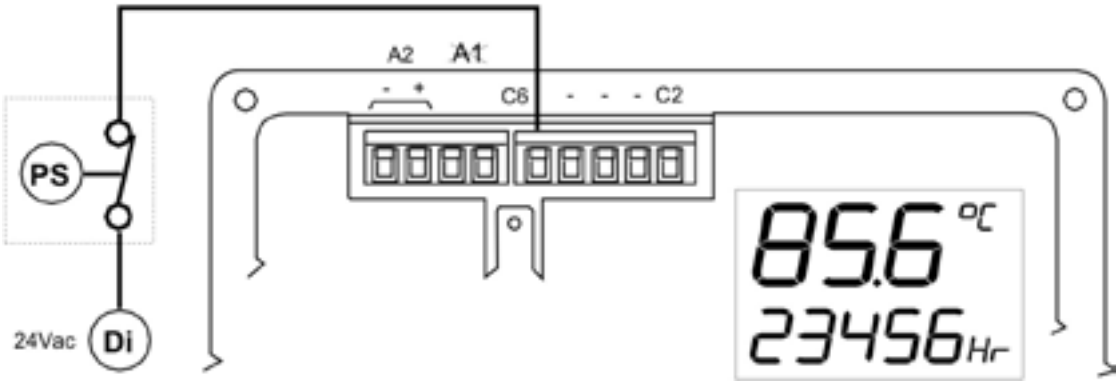
Local and remote stop will always be enabled.

2.d5:rSS - Remote start and stop:
When the remote start and stop function is enabled, the compressor will perform a controlled stop, as if the stop key was pressed, when digital input 5 (C5) is open.
The compressor will start normally when the remote start/stop input (C5) changes from open to closed state. If it is closed, the input must be opened and closed again for a new remote startup. Local startup by start key will be disabled.

2. d6: rLu – Remote load/un load:
The compressor may be made to enter load or relief in response to a 24 Vac signal (derived from the interface feeding voltage). When this option is selected, the local pressure settings (Pu and PL) are ignored. The compressor will be in load mode when the 24 Vac voltage is detected in the digital input 6 (C6) and in relief mode when voltage is removed from C6. This function may be used for a control with pressure switch or remote sequential activation.

The local pressure is still displayed; the high pressure alarm and the overpressure protection remain activated.

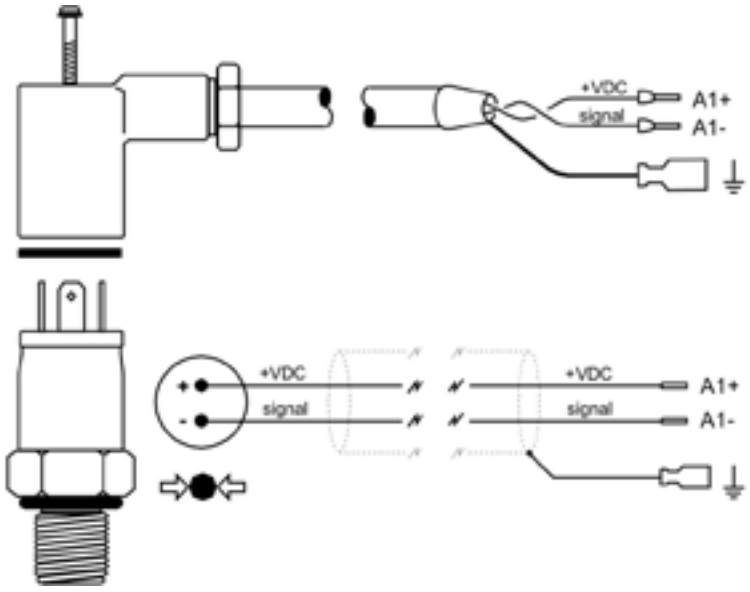
2.d6:PSr – Pressure switch mode:
In the pressure switch mode, the compressor may be made to enter load or relief in response to a 24 Vac signal (derived from the interface feeding voltage). When this option is selected, the local pressure settings (Pu and PL) are ignored. The compressor will be in load mode when the 24 Vac voltage is detected in the digital input 6 (C6) and in relief mode when voltage is removed from C6. This function may be used for a control with pressure switch (PS).



2.SS – Start Source:
a) The compressor will start using the start key.
b) The compressor will start using a remote RS 485 communication. The start key will be disabled.

The compressors are equipped by the manufacturer with the pressure sensor mode. The pressure switch mode may be used in times when the pressure sensor needs any maintenance and the compressor cannot stop working.
Under this working mode, the high pressure alarm and the overpressure protection are ignored.

2.Po/2.Pr - Pressure sensor mode (Standard System):
The interface is designed for using a pressure sensor with a 4-20mA signal, and which may work with a feeding voltage as low as 16Vdc. The sensor "range" and settings may be adjusted using the "Po" (offset) and "Pr" (range) parameters. The standard values for Schulz compressors are 0-16 bar (0-232 psi).



The polarity of the cables is important.

Procedures for the calibration of the pressure sensor:
a) Expose the pressure sensor to atmospheric pressure (0.0 bar, relative). Set "Po" offset value until the pressure displayed is 0.0 bar.
b) Apply a known precise pressure to the sensor. The pressure may be static or dynamic (variable). Set the "Pr" range value until the pressure displayed is equal to the pressure applied. The pressure applied may have any value, but it is recommended that the pressure be at least equal to the compressor's working pressure

The pressure detected by the sensor is displayed when the "Po" and "Pr" parameters are selected to make the adjustment easier.

2.tL – Minimum temperature (load)
If the measured temperature is below the minimum temperature (load), and the compressor is ordered to enter load, the interface will not allow the compressor to do so; it will remain in relief, until the temperature increases to values above the minimum temperature (load). When this condition occurs, the interface will show the A3423 Err Alarm. The alarm will be automatically eliminated when the temperature exceeds the minimum temperature (load). This alarm cannot be manually eliminated.

To disable this function, set value to 0 (zero).

2.tr – Minimum temperature (start)
If the measured temperature is lower than the minimum temperature (start), and a start is requested from the compressor, the interface will not allow the compressor to start until the temperature increases to values above the minimum temperature (start). When this condition occurs, the interface will show the A3123 Err alarm. The alarm will be automatically eliminated when the temperature is above the minimum temperature (start). This alarm cannot be manually eliminated.

To disable this function, set the value to 0 (zero).

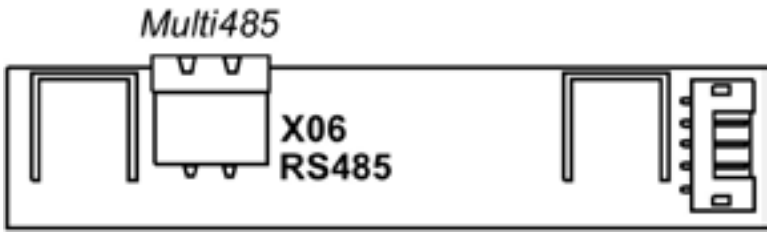
Maintenance Function:

To force the compressor to enter in unload mode, regardless of the pressure values, press and hold the RESET key for 5 seconds.
- The display will show "OFF" (press DOWN to see the temperature or other items in the user menu).
- The load symbol C will blink (without the arrow).
- The unload time will be disabled; the compressor will remain in relief mode indefinitely.

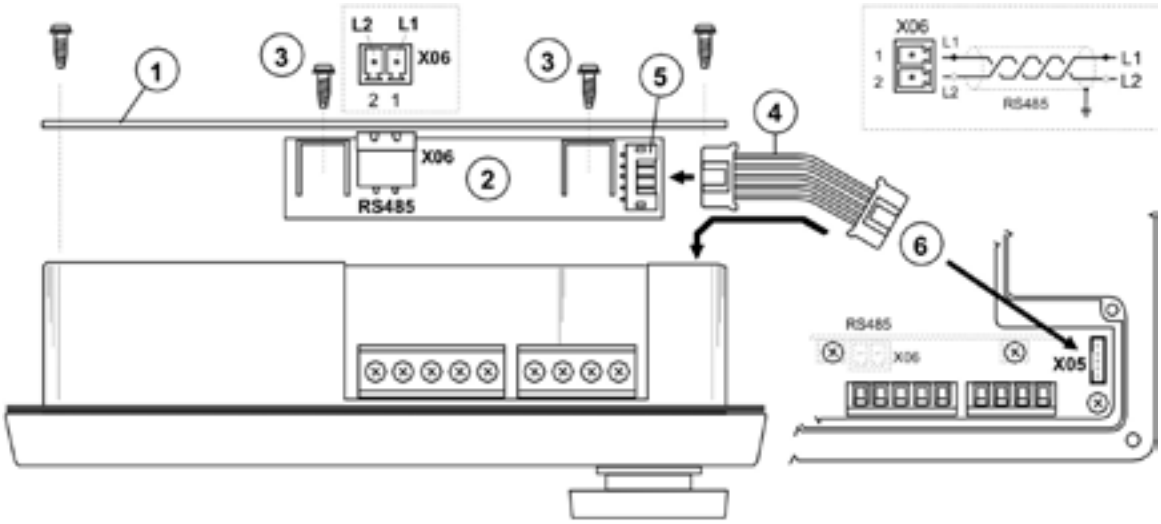
To exit the maintenance function and return to normal operation, press RESET.
The maintenance function will be disabled if the compressor is stopped. The normal operation will be restored next time the compressor starts.

Temperature Sensor:
The Control I interface was designed for using a KTY type of temperature sensor. The KTY sensor offers a calibration range of -32°C to 150°C.

RS 485 Communications (optional):



A RS 485 serial communication port may be installed in Control I interface.



A: Remove interface back cover (1).
B: Fasten the RS 485 card (2) on the interface back cover using the two screws provided (3). The interface back cover is equipped with two holes for this purpose.
C: Connect the RS 485 card cable (4) to the RS485 socket (5).
D: Connect the other RS485 cable end (4) in the X05 plug of Control I interface (6).
E: Screw the back cover to the interface again.

Make sure the RS485 cable is fastened and secure.
Handle the equipment with care.

Multi485 protocol:
The port uses a protocol named Multi485, which enables the connection to several compressor management, remote monitoring, and control option devices, or the connection to a MODBUS RTU network using a MODBUS gateway.

FAULT CODES

5. Fault Codes
The fault codes are divided into two categories:

A: Alarms – illustrated by the symbol at the left; the compressor will keep working if an alarm sounds.

A: 2050 C5 (if the input is configured for alarm).
A: 2060 C6 (if the input is configured for alarm).
A: 2118 High pressure: limit exceeded.
A: 2128 High temperature: limit exceeded.

A: 2816 Voltage drop detected.

A: 3123 Start halted: the temperature is below the minimum temperature.
(It will be automatically reset when the temperature is above the set value. It cannot be reset manually).

A: 3423 Load halted: the temperature is below the minimum temperature.
(It will be automatically reset when the temperature is above the set value. It cannot be reset manually).

A: 4804 Air filter exchange- the air filter hour meter reached zero.
A: 4814 Oil filter exchange – the oil filter hour meter reached zero.
A: 4824 Check separation element – the separation element hour meter reached zero.
A: 4834 Exchange oil – the oil exchange hour meter reached zero.
A: 4844 Grease motor bearings - hour meter indicative of greasing of the motor bearings reached zero

E: Error – The symbol will blink – the compressor will shut down.

E: 0010 Emergency stop – 24 Vac is not being detected in the R1C terminal.
E: 0020 C2 – main motor overload
E: 0030 C3 – phase lack or incorrect phase sequence
E: 0040 C4 – fan motor overload
E: 0050 C5 – drier fault
E: 0060 C6 – external error

E: 0115 Pressure sensor fault: signal outside the range (< 3.8mA or > 20.8 mA)
E: 0119 Overpressure
E: 0125 Temperature sensor fault: signal outside the range (< -50°C or > 250°C)
E: 0129 Overheat