# Solo Plus units with Power Split Controller

# Service Manual

# Contents

# Temperature controller

**It is strongly advised that before adjusting any Service Parameters a thorough understanding of the following instructions should be obtained.**

## Printed Circuit Board Connections.

Power Supply:
Live: 250Vac max. 30A max.
Neutral: 250Vac max. 30A max.
Earth: 30A max.
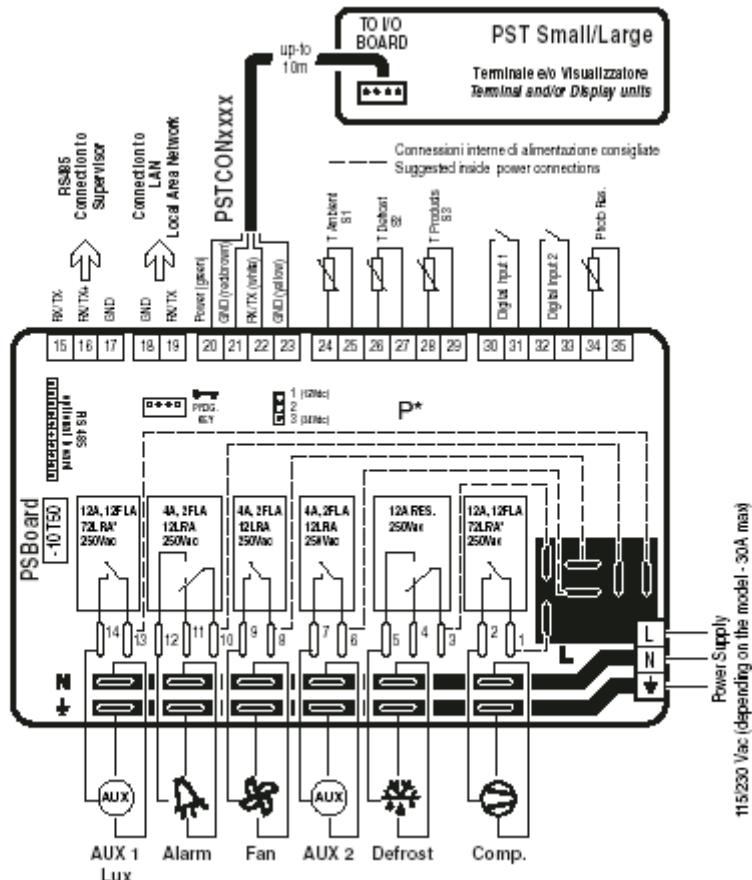


## Relay Outputs.

| | |
|---|---|
| Compressor relay: | 250Vac16A 2HP max |
| Defrost relay: | 250Vac 16A resistive max. |
| Fan relay: | 250Vac 10A resistive (2A) max. |
| Auxiliary 1/ Light relay: | 250Vac resistive 500W – 1000VA max. |
| Auxiliary 2/ Demist relay. | 250Vac 10A resistive (2A) max. |
| Alarm relay: | 250Vac 10A resistive (2A) max. |

## Probes.
Standard Carel NTC 10K 25C - +/- 1°C
Range of measurement: -50T90 (-50 +90°C. –58 +195°F) 0.1°C resolution
Maximum length of 30metres.

# Controller Button Function.
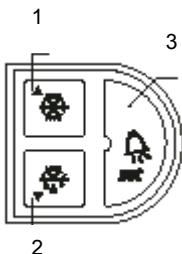




**Button 1 (green LED)**

Normal Operation
Pressed for 1 second to switch interior light ON or OFF.
Pressed together with button 2 for 5 seconds starts continuos cycle.

LED.
On Constant = Compressor ON.
Flashing = Compressor activation request.

Parameter modification.
Press once to move from one parameter to the next.
Press once to increase the value of the displayed parameter.

 **Button 2 (yellow LED)**

Normal Operation
Press for 5 seconds to start a manual defrost.

LED.
On constant = Defrost ON.
Flashing = Defrost in progress.

Parameter modification.
Press once to move from one parameter to the previous.
Press once to decrease the value of the displayed parameter.

 **Button 3 (red LED).**

Normal Operation
Press once to silence the audible alarm.
Press for 1 second to display and/or set the set point.
Press and hold for 5 seconds to access the menu for the type 'F' (frequent) parameters.
Press together with button 2, with the controller switched ON, to reset the default parameters.

LED
On constant = Alarm active.

Parameter modification.
Press once to display the value of the selected parameter, press again to exit the display.
Press and hold for 5 seconds to exit the parameters and save the changes.

## Setting the set point.

To display the set point proceed as follows:

1.  Press  for more than 1 second to display the set point.

2.  To increase the set point press  or to decrease the set point  press until the desired value is reached.
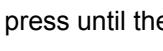
3.  To confirm and save the value press

## Accessing the parameters

**Modification of the type 'F' (frequent) parameters**

Press and hold [symbol] for 5 seconds to access the menu.

Scroll through the parameters using the [symbol] or [symbol] buttons until the desired parameters is reached.

On reaching the desired parameter press [symbol] to display the value.

To increase the value press, [symbol] to decrease press [symbol] until the new value is achieved.

To confirm the value press [symbol]

To modify further parameters repeat the operation.

To save the changes made press and hold [symbol] for 5 seconds.

**Modification of the type 'C' parameters.**

Press and hold [symbol] for 5 seconds to access the menu.

Press [symbol] once, 00 will be displayed.

Press and hold [symbol] until 22 (passcode) is displayed.

Confirm by pressing, [symbol] the code or the first modifiable parameter will be displayed. See Parameter list on pages 5 to 7.

Scroll through the parameters using the [symbol] or [symbol] buttons until the desired parameters is reached.

On reaching the desired parameter press [symbol] to display the value.

To increase the value [symbol] press, to decrease [symbol] press until the new value is achieved.

To confirm the value press [symbol]

To modify further parameters repeat the operation.

Once all of the changes have been completed press [symbol] for 5 seconds to save the changes made, failure to carry out this procedure will result in the changes made not being saved.

## Non Standard Settings for the High and Low Temperature Solo Units

| Code | Description | Electric Defrost High Temp | Electric Defrost Low Temp | Hot Gas Defrost High Temp | Hot Gas Defrost Low Temp |
|---|---|---|---|---|---|
| /t | Terminal probe | 1 | 1 | 1 | 1 |
| A0 | Alarm and fan differential | 2 | 2 | 2 | 2 |
| A4 | Configure digital input 1 | 1 | 1 | 1 | 1 |
| A5 | Configure digital input 2 | 4 | 4 | 4 | 4 |
| Ad | Temperature alarm delay | 199 | 199 | 199 | 199 |
| AH | High temperature alarm (delta) | 3 | 3 | 3 | 3 |
| AL | Low temperature alarm (delta) | 3 | 3 | 3 | 3 |
| c1 | Minimum time between 2 compressor starts | 3 | 3 | 3 | 3 |
| c2 | Minimum compressor OFF time | 2 | 2 | 2 | 2 |
| c4 | Safety function Duty setting | 8 | 8 | 8 | 8 |
| d0 | Type of defrost. 0= Electric defrost. 1= Hot gas defrost | 0 | 0 | 1 | 1 |
| dl | Interval between defrosts | 4 | 4 | 4 | 4 |
| dp | Maximum/ effective defrost duration | 30 | 30 | 20 | 20 |
| dt | End defrost temperature | 8 | 8 | 15 | 15 |
| Lo | Enable local ON/OFF | 1 | 1 | 1 | 1 |
| r1 | Minimum set allowed to user | -5 | -25 | -5 | -25 |
| r2 | Maximum set allowed to user | 10 | -15 | 10 | -15 |

## Standard Parameters and Default values.

| Code | Description | Type | Min | Max | Unit of Measure | Default | Notes |
|---|---|---|---|---|---|---|---|
| PS | Password | F | 0 | 199 |  | 22 | Password for access to type C parameters (value 22) |
| /2 | Overall measurement stability | C | 1 | 15 | flag | 4 | 1= medium low filter value, fast measurement<br>15= medium high filter value, slow measurement |
| /4 | Virtual probe | C | 0 | 100 | % | 0 | Virtual probe on control probe and product probe<br>0= control probe S1 only, 1…99 = weighted average S1 – S3. 100 = product probe S3 only |
| /7 | Display probe | C | 0 | 4 | flag | 0 | Display: settings as for the terminal (/ t) |
| /t | Terminal probe | C | 0 | 4 | flag | 4 | Terminal: 0= Not present: 1= ambient probe (S1)<br>2= defrost probe (S2): 3= product probe (S3)<br>4= control probe (virtual) (weighted S1 S3) |
| /5 | Centigrade/Fahrenheit selector | C | 0 | 1 | flag | 0 | 0= degrees Centigrade, 1= degrees Fahrenheit |
| /6 | Scale | C | 0 | 1 | flag | 0 | 0= display to the tenth, 1= display to the degree<br>NB this parameter only affects the display, and not the Modification of the data. |
| /8 | Calibration probe 3 | C | -19.9 | 19.9 | °C/°F | 0 | 0.1 resolution between –19.9 + 19.9°C |
| /9 | Defrost with probe S3 | C | 0 | 1 | flag | 0 | 0= with defrost probe<br>1= with defrost probe + 2nd evaporator |
| /A | Presence of defrost probe/ product probe | C | 0 | 3 | flag | 0.2 | 0= defrost absent product probe absent<br>1= defrost absent product probe present<br>2= defrost present product probe absent<br>3= defrost present product probe present |
| /C | Ambient probe calibration S1 | C | -19.9 | 19.9 | °C/°F | 0 | 0.1 resolution between –19.9 + 19.9°C |
| /d | Defrost probe calibration | C | -19.9 | 19.9 | °C/°F | 0 | 0.1 resolution between –19.9 + 19.9°C |
| A0 | Alarm and fan differential | C | 0 | 19.9 | °C/°F | 2 | Default 0.2°C, 0.1 resolution between –19.9 + 19.9 |
| A4 | Configure digital input 1 | C | 0 | 9 | flag | 0 | See non standard settings |
| A5 | Configure digital input 2 | C | 0 | 9 | flag | 0 | See non standard settings |
| A7 | Delayed alarm input delay | C | 0 | 199 | mins | 0 | If A4 or A5= 2: 0= immediate |
| Ad | Temperature alarm delay | C | 0 | 199 | mins | 120 | 0= immediate |
| AH | High temperature alarm (delta) | F | 0 | 199 | °C/°F | 0 | NB Deviation from the Set Point (normal or night time)<br>The alarms also shift as a consequence.<br>0.1°C resolution, always positive |
| AL | Low temperature alarm (delta) | F | 0 | 199 | °C/F° | 0 | NB: As for parameter AH |
| c0 | Compressor fan start delay instrument ON | C | 0 | 15 | mins | 0 |  |
| c1 | Minimum time between 2 compressor starts | C | 0 | 15 | mins | 0 |  |
| c2 | Minimum compressor OFF time | C | 0 | 15 | mins | 0 |  |
| c3 | Minimum compressor ON time | C | 0 | 15 | mins | 0 |  |
| c4 | Safety function Duty setting | C | 0 | 100 | mins | 0 | O= always OFF: 1…99= min: 100= always ON |
| c6 | Alarm bypass time after cc | C | 0 | 15 | hours | 2 |  |
| cc | Continuous cycle | c | 0 | 15 | hours | 4 |  |
| d0 | Type of defrost | C | 0 | 3 | flag | 0 | 0= electric defrost: end by temperature and/or time out<br>1= hot gas: end by temperature and/or time out<br>2= electric heaters: end by time<br>3= hot gas: end by time out |

| Code | Description | Type | Min | Max | Unit of Measure | Default | Notes |
|------|-------------|------|-----|-----|-----------------|---------|-------|
| d2 | Type of defrost control | C | 0 | 1 | flag | 0 | 0= start only, generic slave:<br>1= start + stop via network, PowerSplit slave |
| d4 | Defrost at power up | C | 0 | 1 | flag | 0 | 0= no. 1= yes |
| d5 | Defrost delay at ON or from digital input | C | 0 | 199 | mins | 0 | |
| d6 | Display during defrost | C | 0 | 1 | flag | 1 | 0= display temperature alternating with 'dF'<br>1= display OFF, displays last temperature read |
| d8 | Alarm bypass time after defrost or door open | F | 0 | 15 | hours | 1 | Relates to configuration of digital inputs<br>NB: If the delay is set to zero and the door is left open indefinitely, no alarm is signalled |
| d9 | Defrost priority over Compressor protection | C | 0 | 1 | flag | 0 | 0= no. 1= yes |
| dd | Dripping time after defrost | F | 0 | 15 | mins | 2 | |
| dl | Interval between defrosts | F | 0 | 199 | hours | 8 | 0= disabled |
| dp | Maximum/ effective defrost duration | F | 1 | 199 | mins | 30 | Effective if d0= 2 or 3 or LAN defrost |
| dt | End defrost temperature | F | -50.0 | 199 | °C/°F | 4.0 | 0.1°C resolution |
| F0 | Fan management | C | 0 | 1 | flag | 0 | 0= always on, exept specific phases F2, F3, Fd<br>1= temperature control with evaporator temperature |
| F1 | Fan ON temperature | F | -40.0 | 50.0 | °C/°F | 5.0 | 0.1°C temperature resolution, valid if F0= 1 |
| F2 | Fans OFF with compressor OFF | C | 0 | 1 | flag | 1 | 0= no: 1= yes only when F0= 0 |
| F3 | Fans OFF in defrost | C | 0 | 1 | flag | 1 | 0= no: 1= yes when F0 = 0 and F0 = 1 |
| Fd | Fans OFF in post dripping | F | 0 | 15 | mins | 1 | |
| H0 | Serial Address | C | 1 | 199 | | 1 | 0= master. 1…199= slave |
| H1 | AUX 1 function relay no. 4 | C | 0 | 7 | | 5 | Not used on Solo Units |
| H2 | AUX 2 function relay no. 5 | C | 0 | 7 | | 6 | Not used on Solo Units |
| H3 | Disable keypad | C | 0 | 1 | | 0 | 0= enabled. 1= disabled |
| In | Unit Master/ Slave configuration | C | 0 | 1 | Flag | 0 | 0= Slave<br>1= Master – for stand alone units leave the default (0) |
| L1 | Photocell sensitivity | C | 0 | 2 | flag | 0 | 0= disabled: 1= low sensitivity: 2= high sensitivity |
| Lt | Light on time from sensor | C | 1 | 15 | mins | 10 | |
| Lo | Enable local ON/OFF | C | 0 | 1 | flag | 0 | 1= local on/off enabled. 0= local on/off disabled. |
| LL | Enable network ON/OFF | C | 0 | 1 | flag | 0 | 1= network on/off enabled. 0=network on/off disabled. |
| Ld | Propagation of DIN 2 on LAN | C | 0 | 1 | flag | 0 | If Master: 0= do not propagate status of DIN2<br>1= propagate status of DIN 2<br>If Salve: 0= do not usr propagated status of DIN2<br>1= use the propagated status of DIN 2 |
| r1 | Minimum set allowed to user | C | -50.0 | r2 | °C/°F | -50.0 | 0.1°C resolution |
| r2 | Maximum set allowed to user | C | r1 | 19.99 | °C/°F | 90.0 | 0.1°C resolution |
| r3 | Signal enabling Ed (defrost time-out) | C | 0 | 1 | flag | 0 | |
| r4 | Night time Set Point | C | -20 | 20 | °C/°F | 3.0 | 0.1°C resolution |
| r5 | Enable minimum maximum temperature monitoring | C | 0 | 1 | flag | 0 | 0= no. 1= yes<br>Note: switching OFF/ON resets the reading |
| r6 | Night-time control with product probe | C | 0 | 1 | flag | 0 | 0= disabled. 1= enabled |
| rd | Control differential (hysteresis) | F | 0 | 19.9 | °C/°F | 2.0 | |
| rH | Maximum temperature measured during 'rt' | F | 0 | 0 | °C/°F | 0 | 0.1°C resolution |
| rL | Minimum temperature measured during 'rt' | F | 0 | 0 | °C/°F | 0 | 0.1°C resolution |
| rt | Effective temperature measurement interval | F | 0 | 0 | hours | 0 | |
| S8 | RS485 serial communication speed | C | 0 | 1 | flag | 1 | 0= 9600 Baud. 1= 19200 Baud. |
| Sn | Number of slaves | C | 0 | 5 | flag | 1 | Only on Master unit 0= no slave connected on Slave or stand-alone unit leave Default (=1) |
| St | Temperature Set Point | C | rt | r2 | °C/F° | -10.0 | 0.1°C resolution |
| to | Reset HACCP alarms – HA-HF | C | 0 | 1 | flag | 0 | 0= HACCP alarm not reset<br>1= HACCP alarm present, can be reset.<br>Variable only for HACCP alarms, and reset either explicitly or from HACCP button on LARGE terminal. |
| *tu | Weekday HA event | C | 1 | 7 | days | 0 | Display only (range 1…7, Monday…Sunday) |
| *th | Hours HA event | C | 0 | 23 | hours | 0 | |
| *t* | Minutes HA event | C | 0 | 59 | mins | 0 | |
| /tu | Weekdays HF event | C | 1 | 7 | days | 0 | Display only (range 1…7, Monday…Sunday) |
| /th | Hours HF event | C | 0 | 23 | hours | 0 | |
| /t* | Minutes HF event | C | 0 | 59 | mins | 0 | |
| tr | HACCP alarm delay | C | 0 | 199 | mins | 0 | 0= disabled |
| ¯T1 | Defrost event No. 1st day | C | 0 | 10 | | 0 | Date day for defrost event (see Table 3) |
| -T1 | Defrost event No. 1st hours | C | 0 | 23 | hours | 0 | Date hours for defrost event |
| _T1 | Defrost event No. 1st minutes | C | 0 | 59 | mins | 0 | Date minutes for defrost event |
| … | | | | | | | |

| Code | Description | Type | Min | Max | Unit of Measure | Default | Notes |
|---|---|---|---|---|---|---|---|
| ‾Tn | Defrost event No. $n^{nd}$ day | C | 0 | 10 | | 0 | Date day 0= disabled |
| -Tn | Defrost event No. $n^{nd}$ hours | C | 0 | 23 | hours | 0 | |
| _Tn | Defrost event No. $n^{nd}$ Minutes | C | 0 | 59 | mins | 0 | |
| ... | | | | | | | |
| ‾T6 | Defrost event No $6^{nd}$ day | C | 0 | 10 | | 0 | Date day 0= disabled |
| -T6 | Defrost event No $6^{nd}$ hours | C | 0 | 23 | hours | 0 | |
| _T6 | Defrost event No $6^{nd}$ minutes | C | 0 | 59 | mins | 0 | |
| tM | Current minutes | C | 0 | 59 | mins | 0 | |
| th | Current hours | C | 0 | 23 | hours | 0 | |
| td | Current weekday | C | 1 | 7 | days | 0 | |

## Alarms and Warnings

| Alarm Code | Buzzer/ Alarm relay | Description | Models featured |
|---|---|---|---|
| E1 | Not active | Probe 1 error | ALL |
| E2 | Not active | Probe 2 error | ALL |
| E3 | Not active | Probe 3 error | ALL |
| rE | ACTIVE | Control probe error | ALL |
| IA | ACTIVE | Immediate external alarm | ALL, if external alarm configured |
| Id | ACTIVE | Duty setting from external contact | ALL, if Duty setting configured |
| dA | ACTIVE | Delayed external alarm | ALL, if delayed alarm configured |
| EA | Not active | E2P / clock alarm | ALL NB. In units without RTC for E2P only |
| HI | ACTIVE | High temperature alarm | ALL |
| LO | ACTIVE | Low temperature alarm | ALL |
| HA | ACTIVE | HACCP alarm, time exceeded | Units with RTC configured as MASTER only |
| HF | ACTIVE | HACCP alarm power failure | Units with RTC configured as Master only |
| Ed | Not active | Defrost ended by time out | ALL |
| NX (X=1…5) | ACTIVE | Slave X alarm | Units with RTC configured as Master only |
| NX (X=1…5) | ACTIVE | Slave X not communicating | Units with RTC configured as Master only |
| tC | Not active | Reset clock | Units with RTC only |
| /- | Not active | Door open for too long | ALL, if door input configured |
| cn | …. | No compressor with PSB | ALL |
| E0 | …. | No compressor with PSB | ALL |
| dF | Not active | defrost | ALL |

## Parts List

| Item | Description | Part Number | Model |
|---|---|---|---|
| Keyboard | 3TST015 | 15344092 | SP LWPS |
| PCB | 3SCH082 | 15344093 | ALL |
| RS485 Interface | 3SCH083 | 15344097 | ALL |
| Probes | 3SNS058 | 15344058 | ALL |
| Remote control Panel | 2PRM770 | 15344095 | SP HCPS. SP LCPS |

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