Motion
SYSTEMS LTD

SPEED MASTER v2

INSTALLATION MANUAL

ISSUE 03

NOTES

Before installing this control ensure that you understand the requirements of installing the door or gate safely in accordance with the relevant safety standards.

- Connect the Mains supply, Motor and Motor brake **Page 7**
- Connect the Encoder **Pages 8 & 9**
- Move the door in 'Deadman Move' mode, using the Express Menu **Page 17**
- Use the Quick Setup to set the end of travel limits **Page 13**
- Connect the Safety Edge **Page 10**
- Connect and configure any additional control inputs **Page 7**
- Test the operation of the door and all it's associated controls.

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INTRODUCTION

DESCRIPTION

The Speed Master control panel has been specifically designed for high speed doors and gates. The panel provides inverter speed adjustment and control as well as monitoring and responding to external inputs. The Speed Master has a comprehensive range of parameters which allow the door/gate manufacturer and installer to obtain the optimum performance. In addition fault diagnosis is provided for the installer and end user allowing the door or gate to be returned to its optimum performance with the minimum of delay.

IMPORTANT

Whilst every effort has been made to ensure that the details in this manual are correct. Motion Systems Ltd cannot be held liable for damage or injury due to any error or omission. Motion Systems specifically do not test or approve components they have not supplied. It is the responsibility of the door manufacturer/ installer to determine the suitability of the product for its intended use with reference to the relevant standards and the information provided.

WHO IS THIS INSTRUCTION MANUAL FOR?

This manual is intended for installers and door and gate manufacturers. It is not intended for the end user. A separate document should be supplied for the end user explaining how the door should be used.

SAFETY STANDARDS

It is essential that the installer understands the requirements of standards and is able to commission the door so that it operates in a safe manner.

Supply of Machinery (Safety) Regulations *2006 Machinery Directive 2008/42/EC*

The manufacturer of the finished powered door is responsible for compliance with the standard.

If the door is created, or automated on site then the installer becomes the manufacturer.

BS-EN13241-1 Industrial, commercial and garage doors and gates-Product Standard

The Speed Master is designed to comply with the relevant requirements of the standard. The manufacturer must ensure compliance of the complete powered door.

BS-EN12978 Industrial, commercial and garage doors and gates-Safety devices for power operated doors and gates-Requirements and test methods.

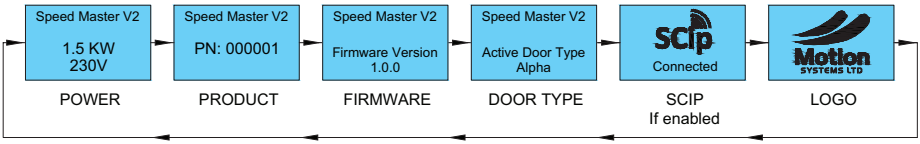
Only the dedicated safety edge inputs which are provided within the Speed Master, should be used for the connection of approved safety edges.

SAFETY WARNINGS

- **DO NOT** mount the controller in direct sunlight; this might cause internal overheating of the controller.
- **DO NOT** make changes or modifications to the controller.
- **DO NOT** work on the door or gate without disconnecting the mains supply first.
- Terminals might contain high voltages up to 5 minutes after disconnecting the mains supply.
- The door/gate might start without warning therefore a light or siren could be required.

MODEL IDENTIFICATION

The Motion Systems Speed Master is extremely versatile in its application and therefore it is important that you can identify which model you are working with and what parts of the manual are applicable. Settings can be checked in the System Diagnostic menu. When power is switched on, the control will show the model information i.e. power, product and Firmware version. For example:



The Speed Master has been pre-programmed to the values shown in the table. This should save time for installation on site.

NOTES:

SERIAL NUMBER
Firmware Version
Date of Original Supply
Product Number

POWER SIZE

MS1.5, 230v, 1ph, 1.5kw (max 10 amp) ☐

DOOR/GATE TYPE

Alpha ☐
Bravo ☐
Charlie ☐
Delta ☐
Other (please specify) ☐

SAFETY EDGE TYPE

8K2 ☐
Type F OSE ☐
SG15 OSE ☐

ENCODER/LIMIT TYPE

AWG Absolute ☐
2ph Incremental ☐
Limit Switch ☐
SCE - R ☐

NOTES:

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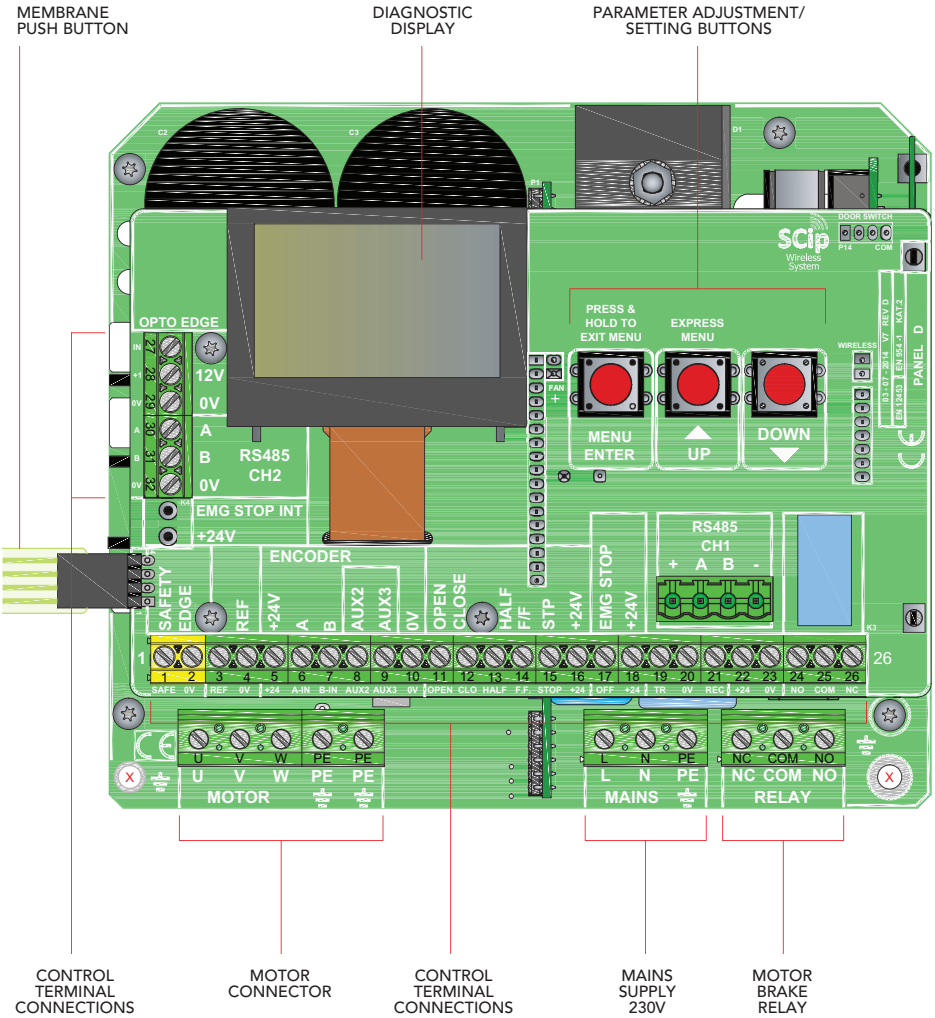
INTERNAL PANEL LAYOUT



POWER SUPPLY

A suitable power supply is essential for reliable operation of the control. The supply voltage must not dip under the load of driving the door or gate. Connect the supply as shown. Ensure the supply is protected with C16 circuit breaker.

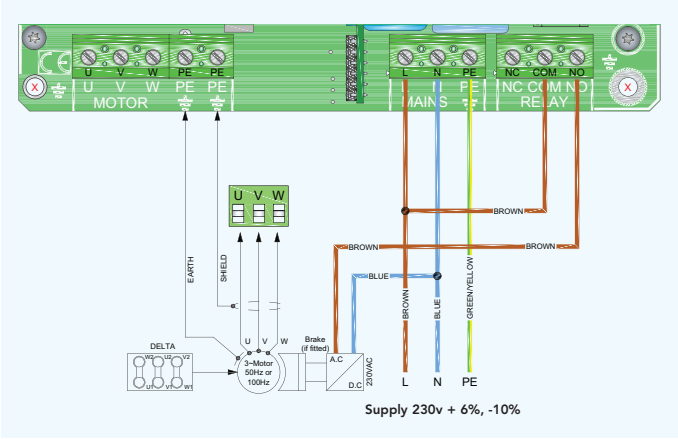
BRAKE

Most door drives are fitted with an electromechanical brake. A 230v supply is provided within the control for the brake.

MOTOR

Connect the motor to the motor connector block on the Speed Master.

Note: A shielded cable must be used. Connect the shield to the earth connector.



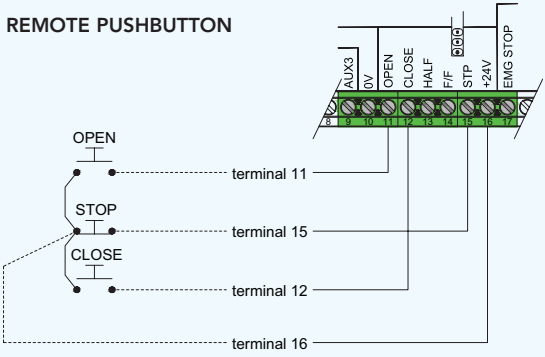
Supply 230v + 6%, -10%

CONTROL INPUT CONNECTIONS

The function, name and logic for individual inputs can be configured to suit each application. Some inputs are locked to prevent a function being removed.

The control panel will not operate if the internal +24V power supply is short-circuited. The display shows an error message and an alarm will sound.

Note: After the PNL STOP has been activated it must be reset with the membrane stop pushbutton.



CONTROL INPUTS ARE SET IN THE ADVANCED SET UP MENU - 1.

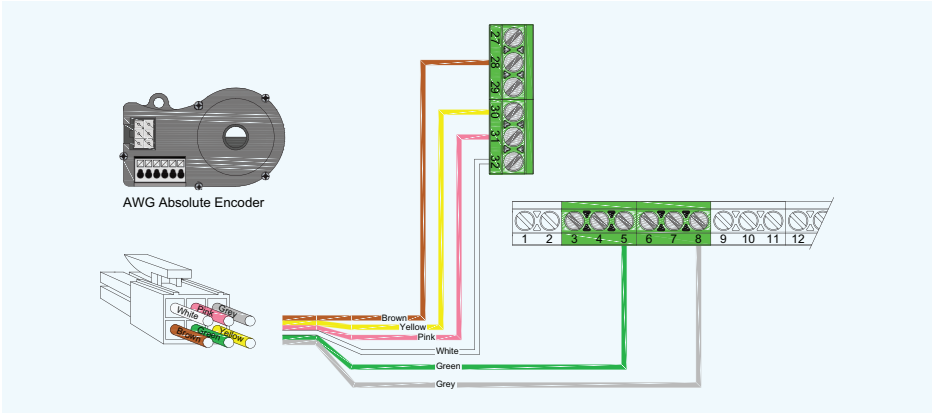
SEE PAGES 22 & 23

CONNECTIONS FOR ENCODERS & LIMIT SWITCHES

The encoder type has normally been selected and set prior to installation and can be checked in the system diagnostic menu.

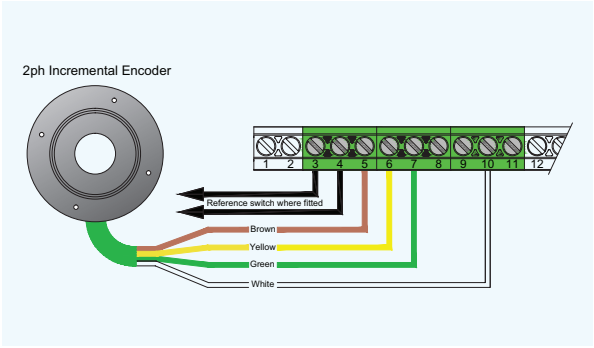
1-AWG ABSOLUTE ENCODER

The Absolute Encoder uses an RS485 connection from the control. This system retains it's limit position in the event of mains failure. The Motion / AWG absolute resistor is shown here. Other systems can be used with this control.



2 - 2PH INCREMENTAL ENCODER

The Incremental Encoder provides the best system for speed control and position accuracy. It uses a count directly from the motor shaft.



Reference position or switch

When using 2ph Incremental Encoder, a reference position or switch is required. The control uses the counts from the encoder from the fixed position or 'reference' to determine the normal open and closed end of travel positions.

REFERENCE IS SETUP IN THE ADVANCED SET UP MENU – B.

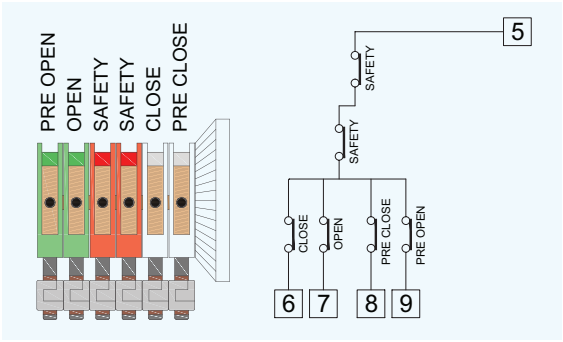
SEE PAGE 35

CONNECTIONS FOR ENCODERS & LIMIT SWITCHES

3 - LIMIT SWITCHES

The Speed Master will function with Limit Switches. The minimum requirement is two switches although four is preferable. If two switches are used then they should be fully open and pre-close.

The pre-close limit should be set so that it operates before the fully closed position, but remains operated when the door/gate is fully closed.

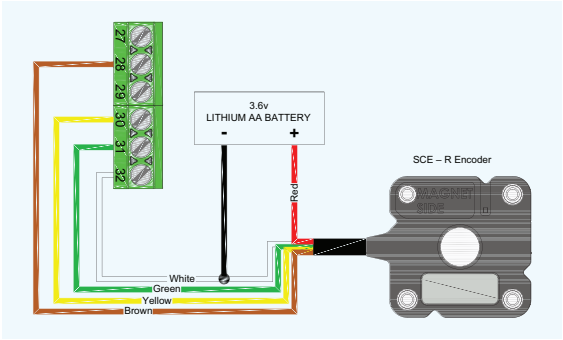


ENCODERS ARE SETUP IN THE ADVANCED SET UP MENU – 7.

SEE PAGES 29 - 31

4 - SCR – R ENCODER

This is an Absolute Encoder for special applications. The encoder is connected to the Absolute Encoder input as shown.



The encoder must be connected to a 3.6v lithium battery to ensure that the position of the door is retained in the event of power failure.

The SCE battery box is used for this purpose.

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SAFETY EDGE CONNECTIONS

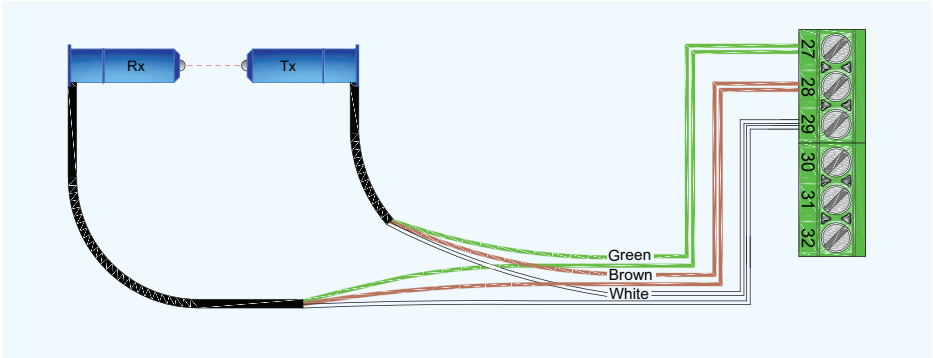
All doors need to be evaluated in terms of safety in use of power operated doors. The hazards and risks are outlined in BS EN 12453.The Speed Master provides for inputs for PSPE Pressure Sensitive Protective Equipment i.e Safety edge and ESPE electro-sensitive protection equipment.

The door can only be operated in 'Hold to Run' mode if the safety edge is not connected.

OPTICAL SAFETY EDGE OSE

The OSE system uses light sent from the transmitter to the receiver enclosed in the rubber profile.

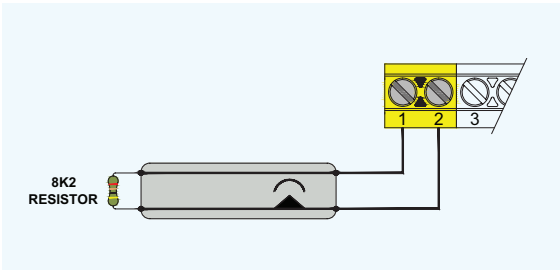
When the rubber profile is pressed the light signal is interrupted and the control recognises this and operates the safety edge circuit.



Connect the receiver and transmitter wires of the same colour into the same terminal (Parallel).

CONDUCTIVE SAFETY EDGE 8K2

The rubber edge has two conductive cores and an insulating section of non-conductive rubber. One end is connected to the Speed Master, the other is connected to an 8K2 end of line monitoring resistor. When the edge is activated, the circuit between the conductors is made and the control responds to this signal. If the connection to the safety edge was broken the control would sense this and respond.



THE SAFETY EDGE IS SET IN THE ADVANCED SETUP MENU - 2

SEE PAGE 24

LIGHT CURTAIN CONNECTIONS

The SG15 OSE light curtain can be used for safeguarding the leading edge of a power operated door as described in BS EN 12453 when it is used as a type E device according to Clause 5.5.1.

The SG15 OSE is an optical device and may not be suitable for all environments, in particular where moisture may form on the transmitter or receiver. Tests must be made by the door manufacturer to ensure the suitability of the application. Please refer to the manufacturer's full installation instructions.

DYNAMIC BLANKING FUNCTION

This function allows the light curtain to be mounted in the track of the vertically moving door. As the door closes the individual LED's of the light curtain will be broken in sequence. This sequential breaking of the LED's is recognised as being the door leaf and this will not cause the output of the light curtain to operate. The Dynamic Blanking Function is on as standard. If the light curtain is not mounted in the door track of a vertically moving door, then it should be switched OFF.

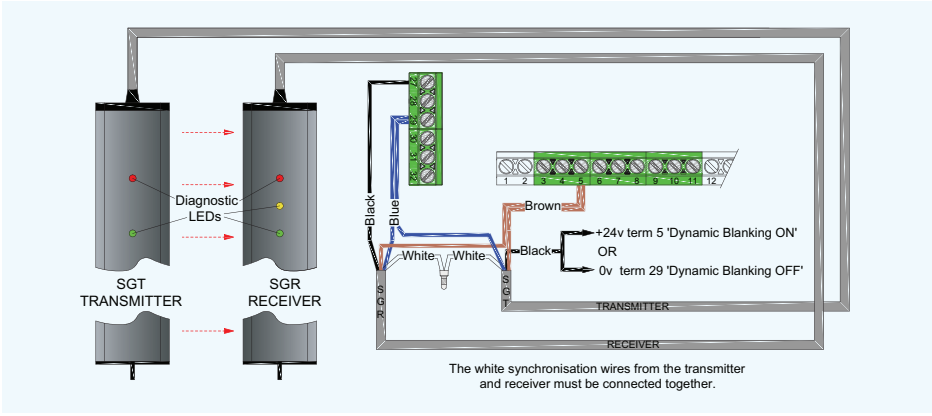
Dynamic blanking ON = Black transmitter wire to +ve or not connected.

Dynamic blanking OFF = Black transmitter wire to 0v.

INSTALLATION

1) Mount the light curtain transmitter and receiver so that the rubber pin at the bottom of the light curtain is resting on the floor.
2) Use the brackets provided for mounting and ensure that the transmitter and receiver will be mechanically stable during operation.
3) The transmitter and receiver should be physically aligned and within the operating range 1-12m.
4) Check the wiring and switch on the power. The transmitter and receiver automatically connect to each other during this power up sequence. The receiver should not be moved after power up.

SG15 OSE



The white synchronisation wires from the transmitter and receiver must be connected together.

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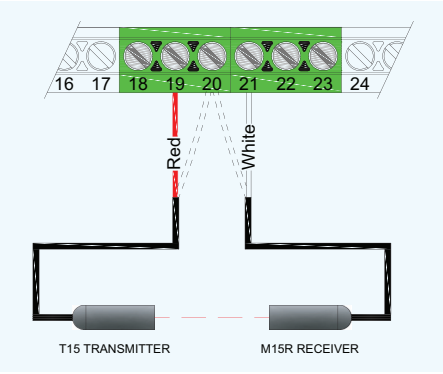
PHOTOCELL

A photocell forms a secondary method of protection for the door. A photocell should be used in combination with safety edge devices to meet the requirements of safe forces.

As standard there is facility for one set of photocells. The photocell is set and adjusted in the Advance Setup menu.

DOT PHOTOCELL

Mounting
Always mount the receiver (white cable) on the side closest to the control panel. This provides the best noise immunity. Switch off the control panel and connect as shown below:



Installation
Mount the receiver on the side of the door closest to the control panel. The exact position can be adjusted for the best alignment using the control panel.

Alignment
The strength of the photocell signals can be checked in the System Diagnostic menu (see page 18).

Programme
Set the photocell type to DOT

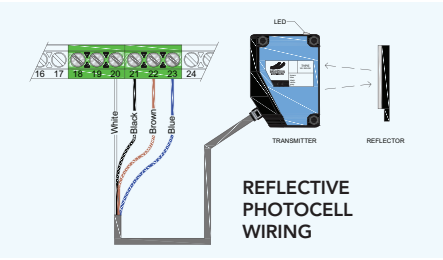
Photocell Disable
On some installations, the closing door can break the photocell when it is closing. In order to overcome this problem the photocell can be disabled at this point.

Move the door to the position where it should be disabled. Read and record the door position from the display. Enter the disable position in the Basic Setup menu.

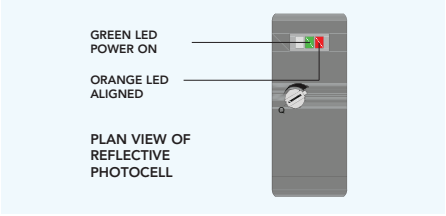
REFLECTIVE PHOTOCELL

Mounting
Mount the transmitter and align with the reflector so that the LED on the top of the transmitter is illuminated.

Check that when the beam is broken that the contacts switch.



Programme
Set the photocell type to NPN NC.



THE PHOTOCELL IS SET IN THE ADVANCED SETUP MENU-8

SEE PAGE 32

QUICK SETUP - SETTING THE LIMITS

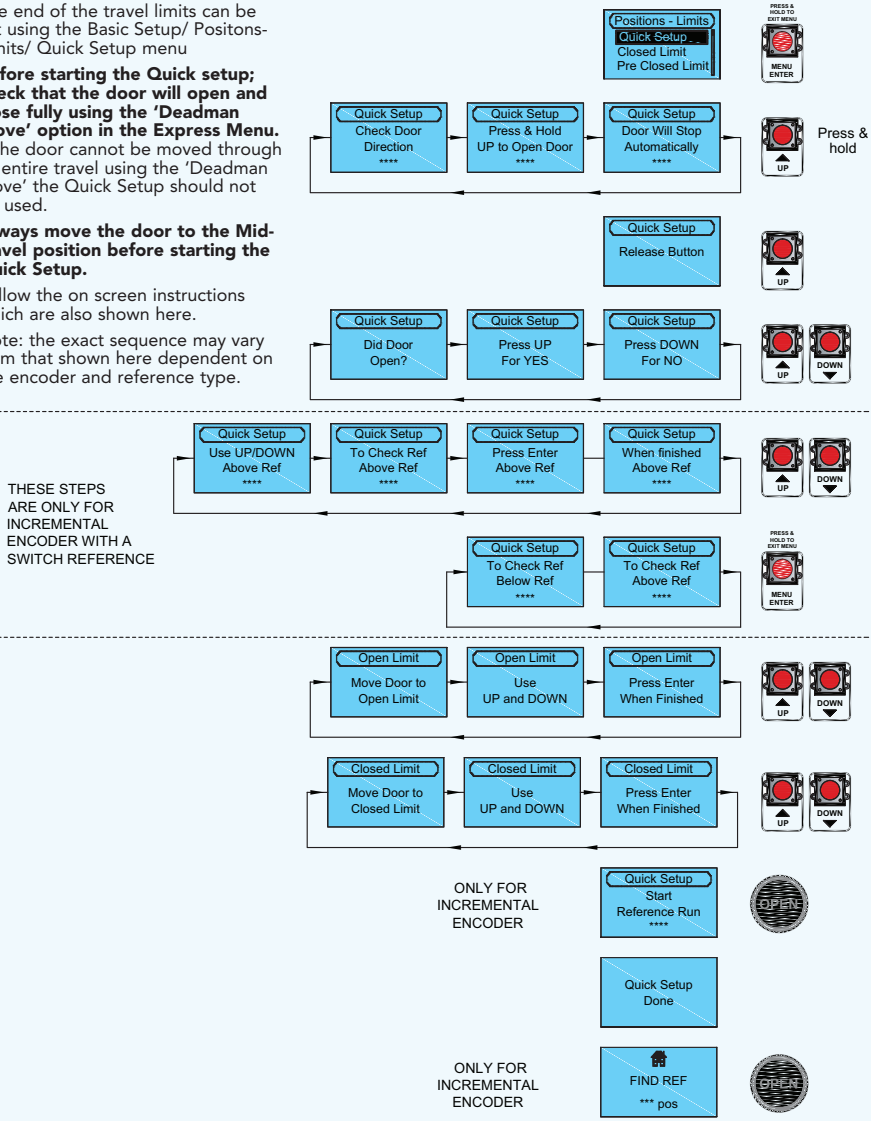
The end of the travel limits can be set using the Basic Setup/ Positons-Limits/ Quick Setup menu

Before starting the Quick setup; check that the door will open and close fully using the 'Deadman Move' option in the Express Menu. If the door cannot be moved through its entire travel using the 'Deadman move' the Quick Setup should not be used.

Always move the door to the Mid-travel position before starting the Quick Setup.

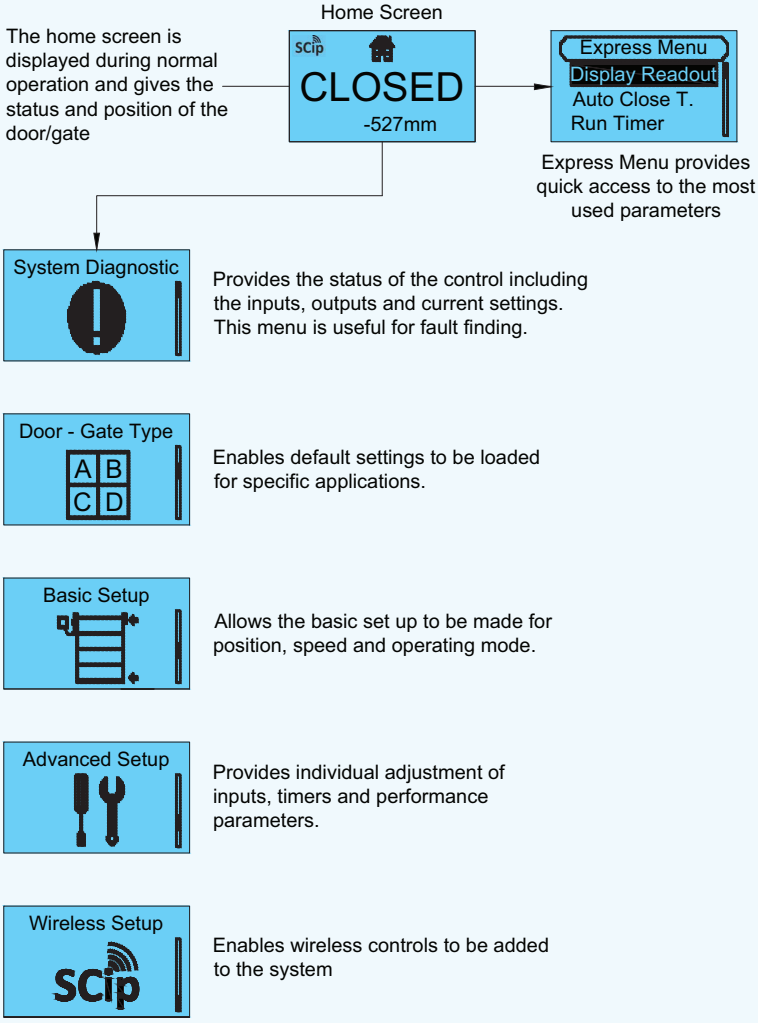
Follow the on screen instructions which are also shown here.

Note: the exact sequence may vary from that shown here dependent on the encoder and reference type.

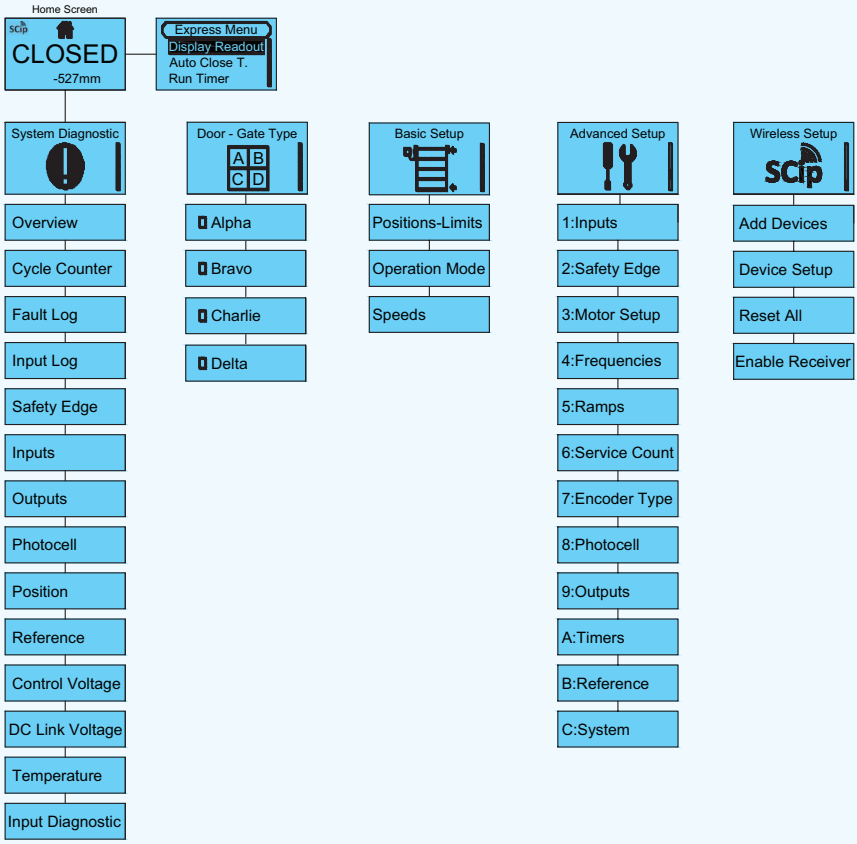


CONTROL OVERVIEW

The parameters and settings for the V2 Speed Master are adjusted and displayed via an interactive menu and display. They are separated into sub sections. The sub menus allow the installer to adjust the control for optimum performance.

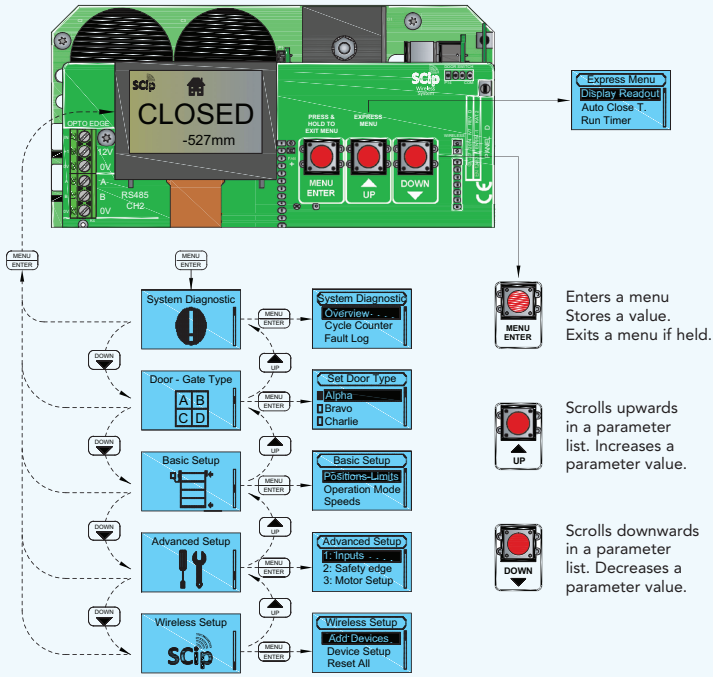


MENU OVERVIEW



NAVIGATING THE MENUS

The door controller has a graphic display and three buttons for setting up the controller to the desired functions. The menus and sub menus are accessed and parameters adjusted using the three menu operation buttons.



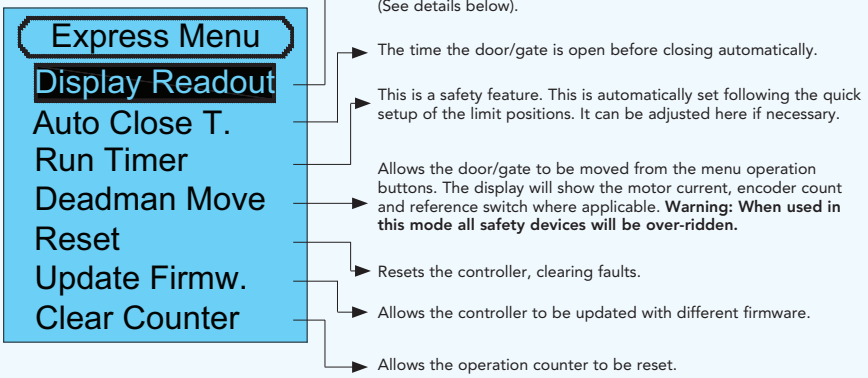
Access Level
Please note that some menus require a pass code to be entered in order to gain access to it. This is done to prevent unauthorised persons from making changes to the controller that could be dangerous.

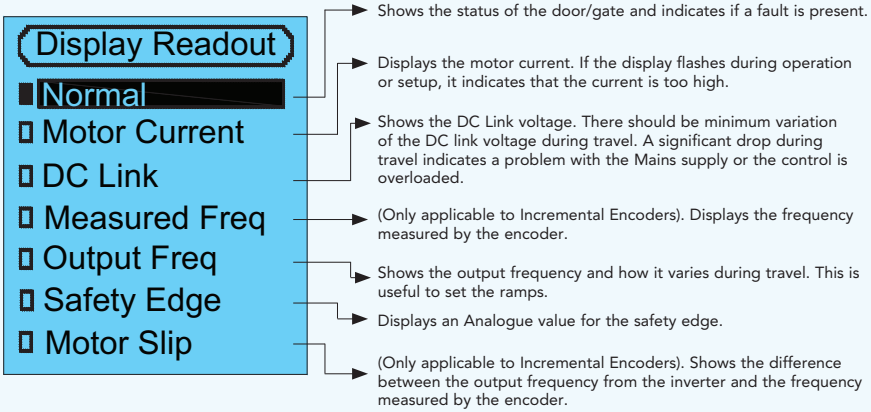
When a menu is protected by an access code, the screen shows 'Enter Code'. Enter applicable code to get access to menu.

CODE:	DESCRIPTION:
10	END USER
110	INSTALLER

EXPRESS MENU

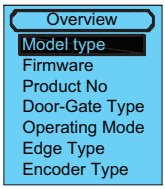
The Express Menu provides access to some of the most used parameters on the controller. Press the UP button to enter the Express Menu.





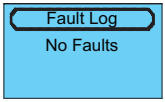
SYSTEM DIAGNOSTIC

The System Diagnostic provides the status of the control including the inputs, outputs and current settings. This menu is useful for fault finding.

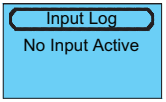


A general summary of the current settings on the Speed Master.

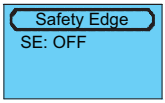
The number of Open and Close cycles completed.



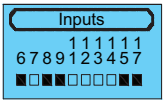
Logs the last 10 faults and the cycle when the fault occurred.



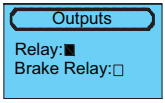
Stores the last 10 inputs and the cycle when the input was active. This log is cleared when power is removed from the control.



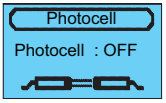
A view of the Safety Edge inputs.



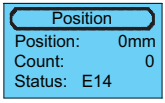
This shows which control inputs are active.



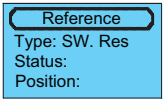
An overview of which outputs are active. The box is solid when the output is active.



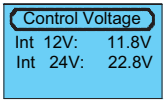
This shows the status of the photocell.



This shows the position count used by the controller. If an Incremental Encoder is used then details of the references are also shown.

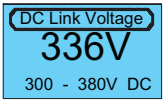


If an Incremental Encoder is used, diagnostic information about the reference is shown.

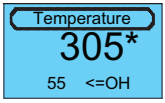


This shows the control voltages. Normal values are:

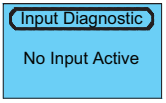
For 12v 11-13v
For 24v 20-24v



This shows the DC Link voltage and it's normal range. Note: A low DC voltage can cause serious problems for the performance of the door or gate.



This shows the internal temperature of the control panel. This is NOT a °C/°F value.

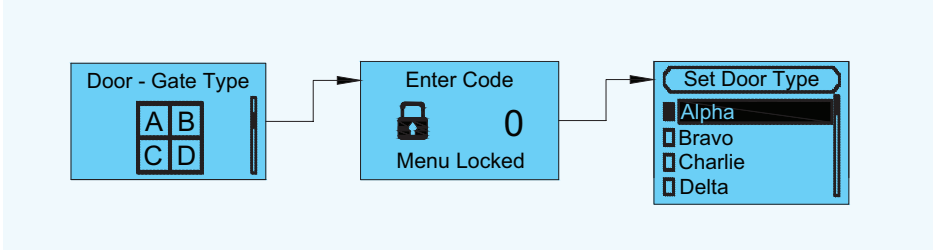


The input is displayed and a tone is sounded when the input is activated.

DOOR – GATE TYPE

This sub menu enables default settings/parameters for specific applications or motor types to be loaded.

Details of the Motion Systems types are shown in the table below:

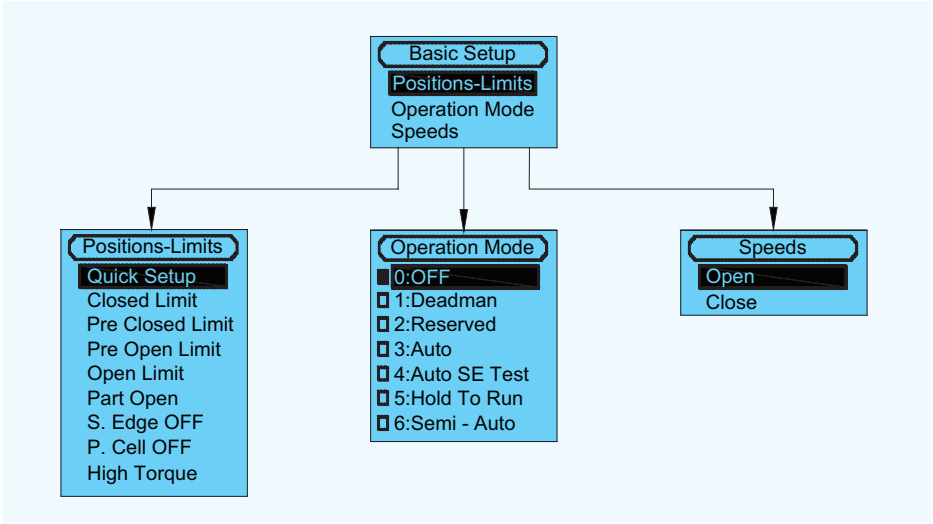


NAME	MOTOR HZ	ENCODER TYPE	REFERENCE	SAFETY EDGE TYPE	NOTES
Alpha	50	AWG	N/A	OPTO	
Bravo	50	2ph	SW NO RES	NO/8K2	
Charlie	100	2ph	SW NO RES	NO/8K2	
Delta	100	AWG	N/A	SG15 OSE	

Selection of one of these door/ gate types does not prevent the settings being changed to suit other applications.

BASIC SETUP MENU

This menu allows the basic setup to be made for position, operating mode and speeds.



Quick Set up
This allows the end of travel positions to be taught in.

(See full description page 13)

Closed limit, Pre Closed Limit, Pre Open Limit, Open Limit, Part Open, P Cell Off

Selecting these options displays the current value and allows adjustment from the menu operation buttons.

Note: The Pre Open Limit is normally = 0, Off for rolling door applications, as a different speed is not usually required prior to reaching the full open position.

S.Edge OFF
This sets the distance from the closed position that the safety edge is disabled. It must be ensured that this closing gap is less than 50mm on a vertically moving door and 25mm on a horizontally moving door.

High Torque
This function is for sliding doors or gates where a higher torque may be required to break or make a seal. The value set is an offset or distance from the closed position.

1. Deadman
It is possible to move the motor in Deadman speed, ignoring the end of travel positions and any control inputs.

2. Reserved
This menu is used internally by the control during set up.

Do not select this option

3. Auto
The door runs in automatic operation, impulse open and impulse close.

4. Auto SE Test
As for Auto but the safety edge must be activated during each closing of the door.

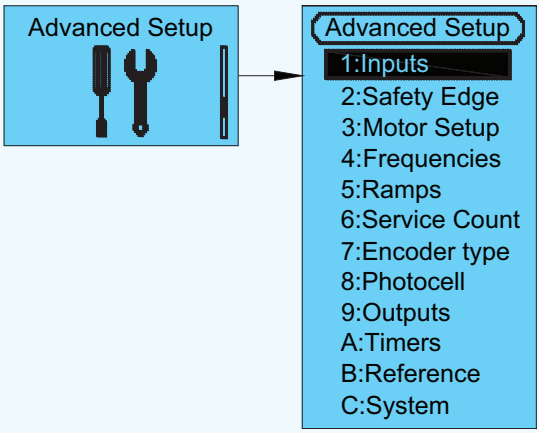
5. Hold to Run
The door runs at full speed but the open and close signals must be maintained for the door to continue to move.

6. Semi – Auto
The door operates in Impulse in the open direction and Hold to Run in the close direction.

Speeds
Selecting these options displays the current value and allows adjustment from the menu operation buttons.

ADVANCED SETUP MENU OVERVIEW

This menu provides access to the advanced parameters that control the operation and performance of the control.



1. Inputs
This menu allows the control inputs be programmed for the specific requirements of the application.

2. Safety Edge
This menu enables the safety edge type and operation to be set.

3. Motor Setup
This menu is used to set the performance of the motor/ drive.

4. Frequencies
This menu sets the frequencies or speeds at which the door operates in different stages of its travel.

5. Ramps
This menu sets the ramps or rate of change of speed, when the door is moving from one state to another e.g from fully closed to opening at the defined opening speed.

6. Service Count
This menu allows a service level to be set, providing an on-screen visual indication that the door should be serviced.

7. Encoder type
Displays the current type of limit switch or encoder and allows adjustment and setting.

8. Photocell
This menu enables the photocell to be switched on or off and the switching type to be set for the control.

9. Outputs
This menu sets the function of the Brake relay and Relay 1. Relay 1 can be used to provide indications of the door or control status.

A. Timers
The Speed Master control has 6 timers; Run Timer, Auto close and 4 programmable timers. The value of all timers and the function of the programmable timers can be set within this menu.

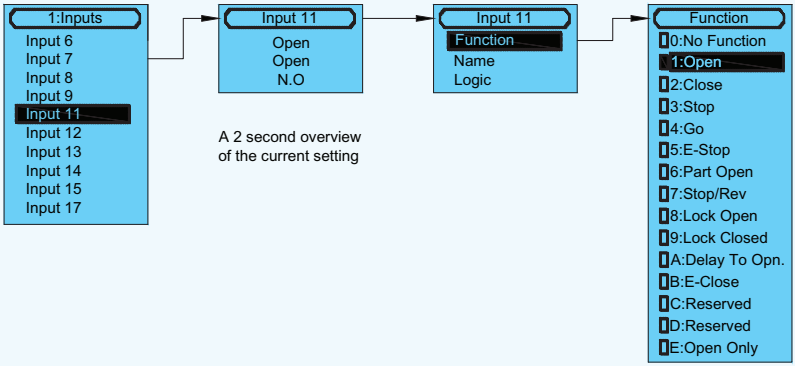
B. Reference
When a 2ph Incremental Encoder is used, a reference switch or position is required to determine the point from which the encoder counts to establish the end of travel positions.

C. System
This menu allows some of the operating criteria of the Speed Master control to be set and adjusted.

ADVANCED SETUP MENU 1 - INPUTS

1. INPUTS

This menu allows the control inputs to be programmed for the specific requirements of the application. Some inputs may be locked to prevent a function being removed. Where an input is not being used its function should be set = 0 ie No function.



FUNCTION
The function describes how the door or gate will operate when the input is activated.

0. No Function
Nothing happens when the input is activated.

1. Open
The door/gate opens from a closed or stationary position, and re-opens from a closing condition. This function also holds open an opened door and inhibits the auto close timer.

2. Close
The door/gate closes from an opened or stationary position.

3. Stop
The door/gate stops quickly with a ramp setting that is appropriate for the application and direction of travel, i.e 'Dec Stop Open' or 'Dec Stop Close'

4. Go
This function opens a closed door, closes an opened door and reverses a closing door. It has no function when the door is opening.

5. E-Stop
The door/gate stops in an emergency with the ramp setting 'Dec Stop Emergency'. This can be adjusted to a value that is appropriate for the application.

6. Part Open
This function allows the door/gate to be opened to a part open position, or a closing door which is below the part open position to be reversed to that position. The part open position can be set and adjusted in the Basic Setup menu for Position Limits. If the part open input is active it inhibits the part open timer.

If automatic closing is required from the part open position then a programmable timer should be set for this function.

7. Stop/Rev
This function stops and reverses a closing door/gate, holds open an opened door/gate and inhibits the auto close timer. This function should not be used to replace the safety edge inputs which have dedicated inputs. See Pages 10&11.

8. Lock Open
When this input is active it prevents an opened door or gate from being closed. When the input is cleared the Auto close timer will not restart unless the control receives an open input.

9. Lock Closed
When this input is active it prevents a closed door or gate from being opened.

A. Delay To Open
The input must be active for a time. This would prevent nuisance operation for example crossing a loop or motion sensor.

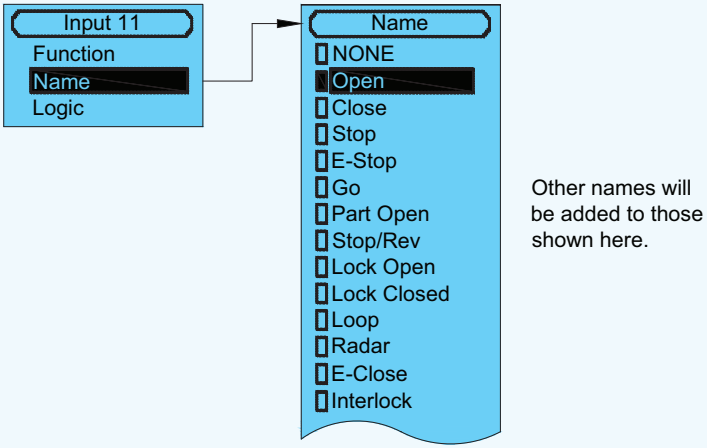
B. E-Close
When this input is active the door is closed in 'Hold to run' mode, over-riding any safety edge or photocell.

E. Open Only
When this input is active the door will open but the Auto close timer will not be activated.

ADVANCED SETUP MENU 1 - INPUTS

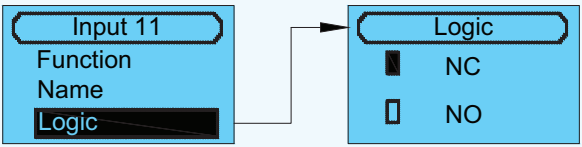
NAME

This part of the menu allows a name to be assigned to an input for ease of identification and fault finding. Changing the name of an input does not change its function or the way in which it operates.



LOGIC

This menu allows the switch connected to the input to be set as a 'Normally Open' or 'Normally Closed' device.



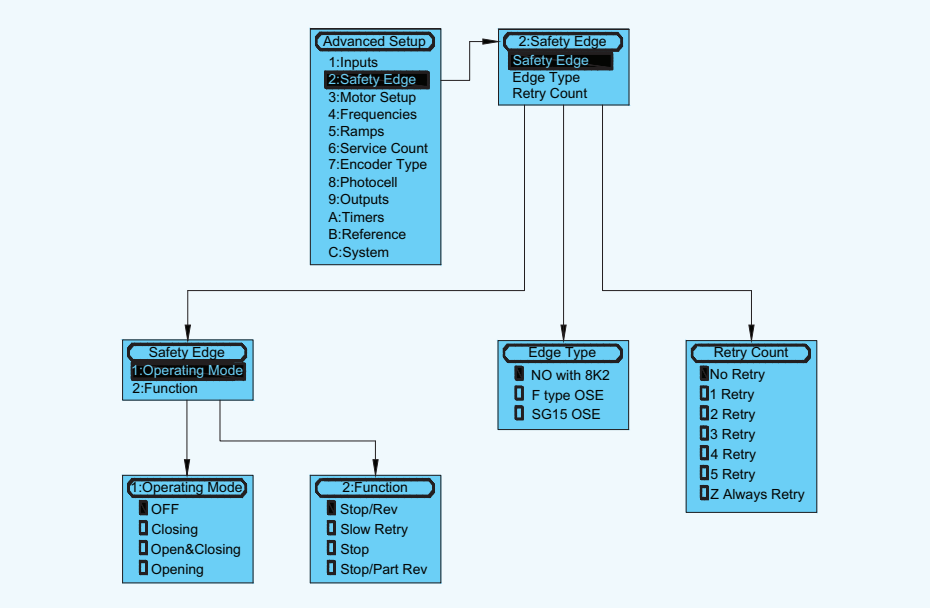
ADVANCED SETUP MENU 2 - SAFETY EDGE

2. SAFETY EDGE

This menu enables the safety edge type and operation to be set. For Automatic operation it is essential that a suitable safety edge is used. The safety edge must comply with BS EN 12978. Only one safety edge can be connected to the Speed Master. An additional safety edge can be added to the system as a wireless edge via the SCip system.

Adjusting

The safety edge settings may have been pre-set from the door/gate profile. They can be adjusted in the Advanced Setup menu.



This menu sets the direction of operation in which the safety edge operates.

For rolling doors the edge normally only operates in the closing direction.

This menu sets the way the door/gate should operate in response to activation.

Note: 'Slow retry' is only applicable with Auto-close.

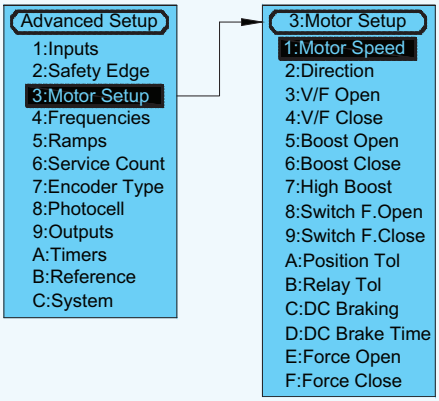
This menu sets the type of safety edge to be used on the system.

This menu sets the number of operations before the door stops and must be reset.

ADVANCED SETUP MENU 3 - MOTOR SETUP

3. MOTOR SETUP

This menu allows adjustment and setting of the characteristics for the drive motor.



1. Motor Speed
This should be set for the normal motor speed at its given frequency i.e 1350rpm at 50Hz. Normally this is stated on the rating plate of the motor.

2. Direction
This menu allows the motor direction and/or the encoder direction to be changed.

It is important that when the open button is activated the door travels in the open direction and that the encoder counts upwards.

Normal
The motor and encoder direction remain the same.

Motor Rev
The motor direction is reversed.

Enc Rev
The encoder direction is reversed.

Motor & Enc Rev
Both the Motor and encoder direction are reversed.

3. V/F Open & 4. V/F Close
This sets the output frequency at which the maximum voltage is supplied to the motor in the specified direction.

Normally this is the design frequency for the motor i.e 50Hz for most applications.

This can be adjusted independently for each direction of travel.

5. Boost Open & 6. Boost Close
The boost or Torque boost increases the DC Link voltage and therefore the Torque when the motor is accelerating or ramping up to speed.

If the boost is set too low the door/gate may not move. If it is set too high this may cause an over current.

Due to the large number of door/gate types the boost must be set for the individual installation.

7. High Boost
This feature is only suitable for motor/drives which have a 2ph Incremental Encoder.

With this feature it is possible to set a higher Torque boost during the initial and final stages of opening and closing operation.

This functions in both directions of travel. The new value of Torque boost is set in this menu. The point in the travel at which it operates is set in the Position-Limits menu.

8. Switch frequency open &

9. Switch F Close
These parameters should only be adjusted under extreme caution.

It is possible to adjust the switch frequency of the supply to the motor/drive to reduce motor noise.

The recommended value is 2.5kHz. Increasing this value reduces the noise but also increases the switch power loss and increases the heat in the motor windings.

ADVANCED SETUP MENU 3 - MOTOR SETUP

A. Position Tolerance

This sets the tolerance within which the power to the motor drive can be switched off, when it reaches its end of travel position.

Example

Open Position = 700

Position Tolerance = 5

The supply to the motor will be switched off when the position 695 is reached.

B. Relay Tolerance

This sets the tolerance within which a position relay set for position can remain energised.

Example

Open Position = 700

Position Tolerance = 5

Relay Tolerance = 30

The relay will energise when the position 695 is reached and will de-energise when the position 670 is reached.

C. DC Braking

DC braking is used to inject DC voltage into the motor windings when the door is within the position tolerance at the end of travel. This assists with the braking in the time between the drive being in its position tolerance and the electromechanical brake being applied.

This setting allows you to set a % of DC Link voltage to be used for this purpose.

D. DC Brake time.

This parameter sets the time for which the DC Braking is applied.

For installations inside freezers the DC Braking and DC Brake time can be used to prevent the motor from freezing up.

E. Force Open

F. Force Close

This function can be used on sliding doors to apply an extra force at the end of travel.

An extra force is applied at the end of travel for the time set here. This allows the door to be forced against a mechanical seal for example.

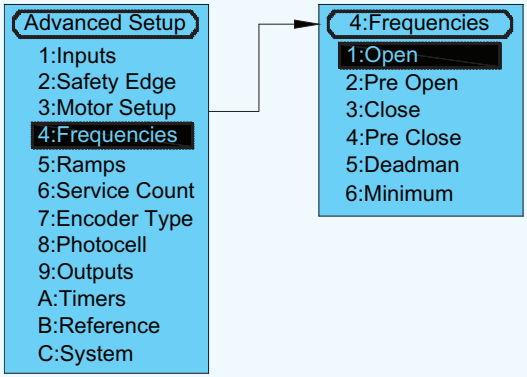
WARNING

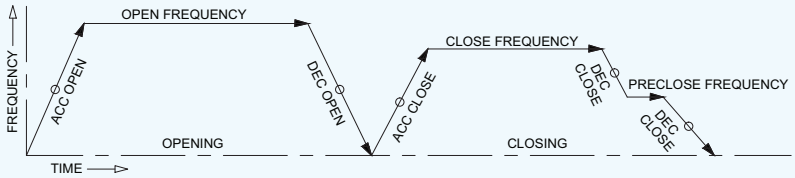
The parameters on this page should only be set by the door manufacturer after extensive testing. For this reason some of these parameters may be locked.

ADVANCED SETUP MENU 4 - FREQUENCIES

4. FREQUENCIES

This menu sets the frequencies or speeds at which the door operates in different stages of travel.





1. Open

This is the maximum opening frequency or speed.

2. Pre-open

This is an opening frequency or speed that can be set prior to the door/gate reaching its fully open position. Normally this is not used for rolling door applications, instead the deceleration open ramp is used to slow the door to an end of travel position. The pre-open limit must be set to enable this parameter to be used.

3. Close

This is the maximum closing frequency or speed.

4. Pre-close

This is a closing frequency or speed that can be set prior to the door/gate reaching its fully closed position.

The pre-closed limit sets the point at which this pre-close frequency starts.

5. Dead man

This is the frequency at which the door/travels for set up. This should be set to a low value to ensure safety. When the door/ gate is travelling in Deadman some of the safety devices are not active.

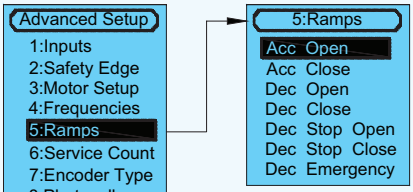
6. Minimum

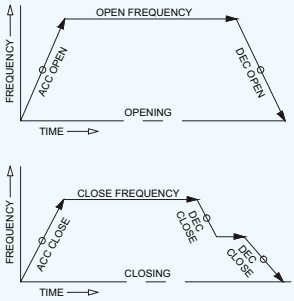
This is the slowest frequency which can be used in operation. This should be set to the slip frequency which can be measured if an Incremental Encoder is used.

ADVANCED SETUP MENU 5 - RAMPS

5. RAMPS

This menu sets the ramps or rate of change of speed at which the door operates in different stages of its travel.





Acc Open
This is the rate at which the door accelerates from a closed or stationary position to the desired opening frequency or speed.

Acc Close
This is the rate at which the door accelerates from an open or stationary position to the desired closing frequency or speed.

Dec Open
This is the rate at which the door decelerates from its opening speed to its open position.

Dec Close
This is the rate at which the door decelerates from its closing speed to its closed position or pre-close frequency.

Dec Stop Open
This is the rate at which the door decelerates from its opening speed when a stop button is activated.

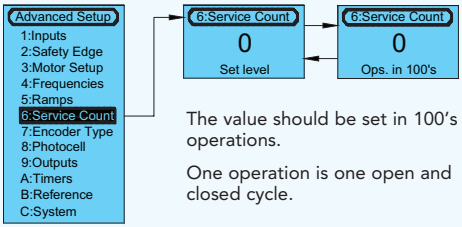
Dec Stop Close
This is the rate at which the door decelerates from its closing speed when a stop button is activated.

Dec Emergency
This is the rate at which the door decelerates in an emergency condition i.e when the Safety edge is activated.

ADVANCED SETUP MENU 6 - SERVICE COUNT

6. SERVICE COUNT

This menu allows a service level to be set, providing an on screen visual indication that the door should be serviced.



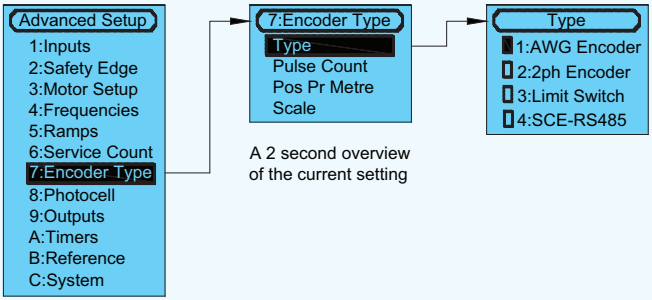
The value should be set in 100's of operations.

One operation is one open and closed cycle.

ADVANCED SETUP MENU 7 - ENCODER TYPE

ENCODER TYPE

The type and specification of the limit switch or encoder used on the door or gate, can be set or adjusted in this menu.



1. AWG ABSOLUTE ENCODER

The Absolute Encoder is a single turn encoder that is fitted to the gearbox of the door operator. The encoder is driven from a limit drive shaft that is internal to the gearbox. The encoder position is not lost in the event of power failure. The operator will have a maximum number of turns that the output shaft can make, that equates to a single turn of the encoder, sometimes stated as 'output revolutions'. The AWG Absolute Encoder uses an RS485 communication protocol from the Speed Master.

AWG Absolute Encoder Pulse Count

The pulse count is used for position and control of the ramps.
The value should be set as accurately as possible, it can be calculated from the following formula.

$$\text{Pulse Count} = \frac{2048}{\text{Maximum number of limit turns X Gearbox ratio}}$$

Some popular types of operators are shown in the table below.

OPERATOR TYPE	MAXIMUM NUMBER OF LIMIT TURNS	PULSE COUNT TO BE SET
MTZ-FU-05-7-90	13	10
MTZ-FU-05-4-135	13	16
MTZ-FU-20-7-90	18	7.5
MTZ-FU-20-9-134	18	11
MTZ-FU-20-4-360	18	11
SA-30-32-24	18	2
MTZ-FU-30-18-60	18	5
MTZ-FU-30-32-60	18	5
MTZ-FU-30-13-90	18	7.5

ADVANCED SETUP MENU 7 - ENCODER TYPE

2. 2PH INCREMENTAL ENCODER

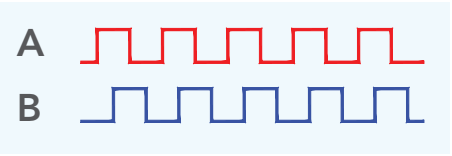
The Incremental Encoder counts positions, but does not store the value to the control when the power is lost. For this reason a 'Reference' position is always required.

See more details on Reference on Page 35.

This type of encoder is connected to the motor drive shaft and monitors the speed of the motor and compares this with the frequency being supplied, therefore providing closed loop feedback on the system. The encoder uses a standard 2 bit A and B output signal.

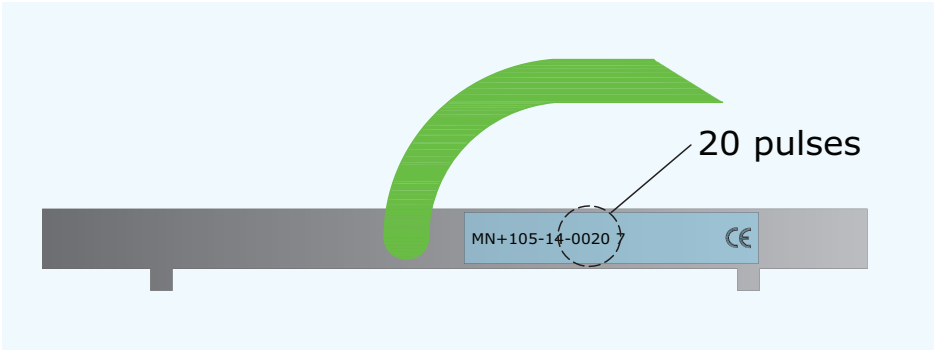
The A and B wave form signals are offset from each other by 90 degrees. This enables the control to monitor speed and direction.

The control monitors the leading and trailing edge of each of the pulses. It results in a quadrupling count which is known as measuring in 'Quadrature'.



2ph Incremental Encoder Pulse count

It is essential that the correct value of pulse count is used, otherwise the motor will not run correctly and the system will not perform at its best. The pulse count is often stated on the encoder itself.



Some popular types are shown in the table below.

OPERATOR TYPE	PULSE COUNT TO BE SET
Box 40	20
Box 90	4
SM45	11
MTZ-FU-30-13-90-ENC	20
MTZ-FU-30-32-60-ENC	20
MTZ-FU-30-27-120-ENC	20

ADVANCED SETUP MENU 7 - ENCODER TYPE

3. LIMIT SWITCH

Limit switches can be used, and are common on older designs of doors. Limit switches do not provide the same level of performance as encoders. The mechanical limits are set for; Open, Pre-open, Close and Pre- close positions. When limit switches are used the control generates a virtual count for positioning control. The virtual count works in the same manner as an Incremental Encoder and a 'Reference' limit is required. This is normally a pre-closed limit switch, which should operate before the end of travel but remain activated when the door is in the closed position.

Limit switch pulse count

As the count is only virtual and is not a signal that can be measured, the value is not critical. Normally this is set to 2 when limit switches are used.

Positions per metre

When the travel of the door is the same with every turn and an Incremental or the SCE – R Encoder is used, this feature can be set. The number of pulses per metre can be entered here and the position display will be shown in mm.

Scale

When using the SCE – R Encoder, if the pulse count is too high for the length of travel of the door, this option can be used to divide the count.

4. SCE – R ENCODER

The SCE – R Encoder is mounted on the shaft of the motor and monitors the speed of the motor in the same way as the Incremental Encoder. If power is lost the encoder position is retained as the encoder is powered from the lithium battery.

SCE – R pulse count

The pulse count is fixed at 50.

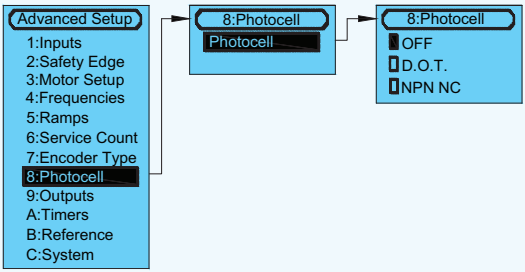
If this is too high for the length of travel of the door, then the scale option can be used to divide the count.

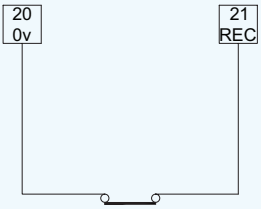
ADVANCED SETUP MENU 8 - PHOTOCELL

8. PHOTOCELL

This menu enables the photocell to be switched on or off and the switching type to be set for the control.

Safety photocells form a secondary method of protection for the door or gate. Photocells should be used in combination with safety edge devices to meet the requirements of safe forces.





Volt free relay contact set to NPN NC.

Photocells which are NPN output or use a relay contact can be connected to the Speed Master.

It is possible to test the photocells when a through beam type is used. The receiver supply wire must be connected to Terminal 20 or 21 as applicable. Note 12v DC only.

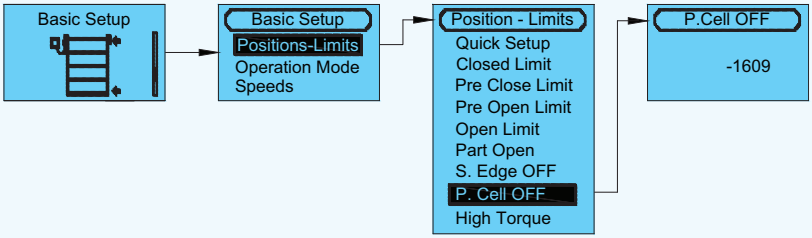
The test is made during every closing cycle.

There are many options for photocells and therefore tests should be made before selection is made.

An example of a volt free relay type is shown here.

PHOTOCELL DISABLE

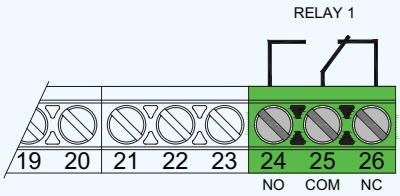
On some installations, the closing door can break the photocell when it is closing. In order to overcome this problem the photocell can be disabled at this point. Move the door to the position where it should be disabled. Read and record the door position from the display. Enter the disable position in the Basic Setup menu.

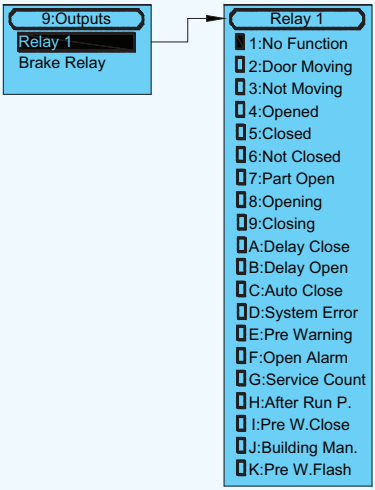


ADVANCED SETUP MENU 9 - OUTPUTS

9. OUTPUTS

This menu sets the function of the Brake relay and Relay 1. Relay 1 can be used to provide indications of the door or control status.





The function of the relay is described against its name

1. No Function
The relay will have no function.

2. Door Moving
Operates when the door is moving i.e the Frequency is above 0.5Hz

3. Not Moving
Operates when the door is stationary i.e the Frequency is less than 0.5Hz

4. Opened
Operates when the door is opened.

5. Closed
Operates when the door is closed.

6. Not Closed
Operates when the door is not closed.

7. Part Open
Operates when the door is in the part open position.

8. Opening
Operates when the door is opening.

9. Closing
Operates when the door is closing.

A. Delay Close
This function works with the timer function 5 Delay to Close (Advanced menu-A).

Operates during the time set for delay to close

B. Delay Open
This function works with the timer function 4 Delay to Open (Advanced menu-A).

Operates during the time set for delay to open.

C. Auto Close Active
Operates when the Auto close timer is active from Open or Part Open positions.

D. System Error
Operates when an error is present.

E. Pre-warning
This function works with the timer function 3 Pre-warn (Advanced menu-A).

Operates during the time set on the Pre-warning and during movement.

F. Open Alarm
This function works with the timer function 7 Open Alarm (Advanced menu-A).

Operates when the door has been left open for too long. This is dependent on the time set on the associated timer.

G. Service Count
Operates when the service count is exceeded.

H. After run pressure
When the force close has been activated for a mechanical lock.

I. Pre-warning Close
This function works with the timer function 3 Pre-warn (Advanced menu-A).

Operates during the time set on the Pre-warning and whilst closing.

J. Building Management
Active when no errors are present and a reference run has been completed.

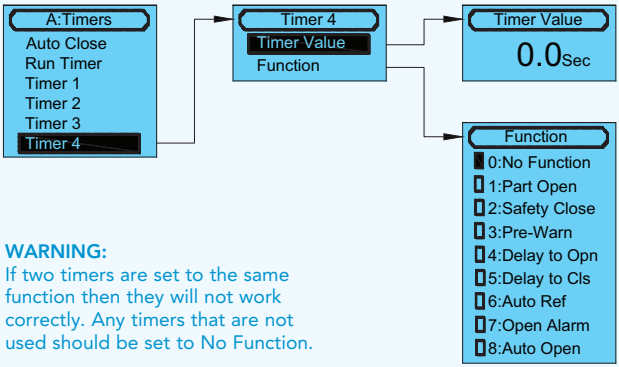
K. Pre-warning Flash
This function works with timer function 3 Pre-warn (Advanced menu-A).

This output flashes at 0.5sec during the time set on the Pre-warning timer and during movement.

ADVANCED SETUP MENU A - TIMERS

A. TIMERS

The Speed Master Control has 6 timers; Run Timer, Auto close and 4 programmable timers. The value of all timers and the function of the programmable timers can be set within this menu.



WARNING:
If two timers are set to the same function then they will not work correctly. Any timers that are not used should be set to No Function.

Timer Value
The Timers can be set within a range of 0.1 second to 999 seconds. When set equal to 0 it means timer is off.

Function
The Function of the Auto close Timer and the Run Timer are fixed. Timers 1-4 are programmable and can be set to any of the functions shown below. Some of the functions have an associated relay function which must be set in the output section of the Advanced Setup Menu.

0. No Function
The timer has no function this is the default setting for most timers.

1. Part open
This function closes the door automatically from the part open position after the time set has expired.

2. Safety Close
This function allows a different Auto close time to be set following activation of the photocell or the safety edge.

The door will close automatically using the delay set on the timer instead of the Auto - close timer.

3. Pre-warn
This timer works with output functions E Pre warning and K Pre-W Flash (Advanced menu - 9).

This timer function should be set to a value lower than the Auto Close Timer and enables a warning device to be used. The output is activated when the Auto Close Timer reaches the value set on the Pre-warning timer.

4. Delay to Open
This timer works with input function A Delay to Open. (Advanced menu - 1).

When the input function is set to Delay to Open, the input must be active for the time set here before the door opens.

5. Delay to Close
This function delays all closing inputs by the time set here.

6. Auto ref
This function is only applicable to doors that use the 2ph Incremental Encoder.

The timer starts a Reference run after the time set here has expired.

7. Open Alarm
This function works with Output function F Open Alarm (Advanced menu - 9).

If the door is open for a time longer than the time set here the relay output will operate.

This could be used to activate a warning to indicate that the door is not closed.

8. Auto Open
This function will open the door from the closed position after the delay set on the timer.

This could be used for cyclic testing in conjunction with the Auto Close Timer.

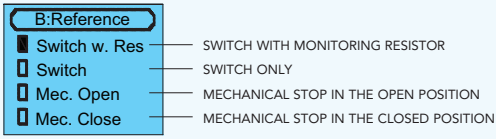
ADVANCED SETUP MENU B - REFERENCE

B. REFERENCE

2ph Incremental Encoder is a device which counts pulses from the motor shaft of the drive. It enables high levels of positioning accuracy and the best performance of the drive. However the Incremental Encoder does not retain the details of its position when power is interrupted. For this reason when an Incremental Encoder is used a reference point or switch is required. The reference point acts as the zero position or start point. During initial set up the door must travel to the Reference point in order to set up and store the open and close positions. Once set, the positions should not require further adjustment.

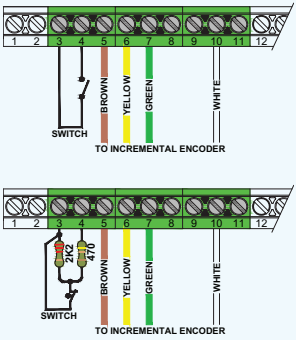
If the power is interrupted the door will travel in Deadman speed to its reference position. Once the reference point is established the door can then operate to the end of travel positions that were previously set.

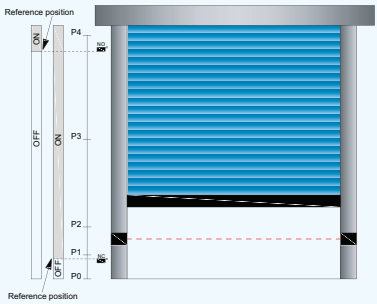
The Speed Master allows two different types of References to be used; either a switch or a mechanical stop. The type of Reference used should be selected by the door manufacturer dependent on the application.



SWITCH TYPE REFERENCE

When a switch is used as a reference it must only operate once during the travel of the door. If the switch is to be mounted close to the fully opened position a 'Normally Open' switch should be used. If the switch is to be mounted close to the fully closed position a 'Normally Closed' switch should be used. For additional security a monitoring resistor network can be connected for protection.





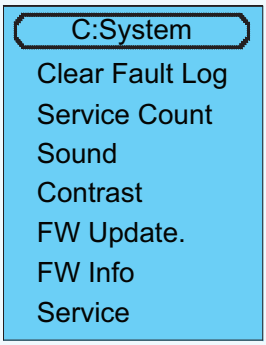
MECHANICAL STOP REFERENCE

When a mechanical stop is used as the reference position, it is a physical stop. This is set just beyond the normal travel position, so that the door will only move to the reference position during initial set up or if the power has been interrupted. When the power has been interrupted, the door will travel in Deadman speed at a lower torque to its reference point. A mechanical stop can be used in either the open or closed positions.

ADVANCED SETUP MENU C - SYSTEM

C. SYSTEM

This menu allows some of the operating criteria of the Speed Master control to be set and adjusted.



Clear Fault Log
Allows the fault log to be cleared.

Service Count
Allows a service level to be set, providing an on screen visual indication that the door should be serviced.

Sound
Internal warning sound can be switched ON or OFF.

Contrast
Allows the display contrast to be adjusted.

FW Update
Allows firmware to be updated. Same as the Express Menu.

FW Info
Shows details of the current firmware version.

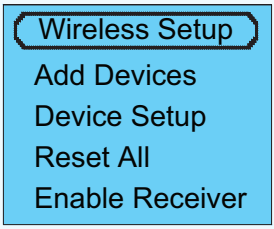
Service
This menu is for use exclusively by the manufacturer.

WIRELESS SETUP MENU

WIRELESS SETUP

The Speed Master has its own integrated radio system which works on a dedicated Speed Commander interface protocol or SCip for short.

The wireless set up menu provides all the necessary parameters for adding, removing and configuring SCip remote devices.



Add Device
This menu allows devices to be added to the receiver. Up to 16 wireless devices can be added to the SCip system.

Hand held transmitters can be cloned to enable multiple transmitters to be added to the system.

Device set up
The function of each added device can be set up in this menu.

Reset All
This menu removes all devices from the memory of the receiver.

Enable receiver
This menu is used to switch on the internal SCip receiver.

FAULT CODES

ERROR CODE	CAUSE	CHECK
UU	The Mains supply is too low.	Use the Express menu to display the DC link voltage.
OU	The supply voltage is too high or the deceleration is too fast, or the brake resistor is damaged.	Use the Express menu to display the DC link voltage. Check the brake resistor.
OH	The inverter is too hot.	Use the systems diagnostic to display the internal temperature of the inverter.
OC1	Over current > 210% current rating of the control.	Use the Express menu to display the Motor Current.
OC2	Over current > 150% current rating of the control more than 30 secs.	Use the Express menu to display the Motor Current.
OC3	Over current whilst accelerating.	Use the Express menu to display the Motor Current. Check the acceleration value and try to reduce.
OC4	Over current whilst The DC braking is operating.	Check if the time that the DC braking is ON.
OC5	Severe over current possibly fatal damage to the control.	Check the door drive and wiring.
HE1	Low voltage on the 12v Supply.	The supply is overloaded or shorted out.
HE2	Low voltage on the 24v Supply.	The supply is overloaded or shorted out.
E01	Missing or insufficient signals from the encoder.	-
E02	Direction error.	The encoder must count in a +ve direction when the door is opening.
E03	Missing signal from the encoder during Quick Setup.	-
E04	Setup fault.	-
E05	The reference switch is shorted or broken.	Check the connections to the reference switch.
E06	The reference switch operates in the wrong position.	Check the connections to the reference switch.
E07	The run time has been exceeded.	-
E08	The safety edge test has failed.	Check the connections to the safety edge.

FAULT CODES

ERROR CODE	CAUSE	CHECK
E09	Connection fault on safety edge.	Check the connections to the safety edge.
E10	Safety edge has operated.	-
E13	This fault code has not been allocated.	-
E14	Communication error with the absolute encoder.	-
E15	The limit positions have not been set. Reset the limits, see page 13 Quick Setup – Setting The Limits.	-
E17	Photocell input active.	Check alignment and wiring of the photocell.
E18	X-net Wireless, fault.	-
E19	X-net Wireless, no response.	-
E20	This fault code has not been allocated.	-
E21	Scip wireless, remote timeout.	-
E22	Scip Wireless, edge timeout.	-
E23	Scip Wireless, edge connection fault.	-
E24	Scip Wireless, host connection fault.	-
E25	Safety Device test fault Ch1.	Check the wiring to the photocell.
E27	Critical input active during power up.	-
E28	Internal self test failed RAM/ROM/ EEPROM.	-
E29	The Panel stop input has been activated.	Reset with membrane stop push button.
E30	Test of the monitored safety critical inputs failed.	-

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