

TECHNICAL MANUAL SQUARE 940-2

You can find the current version of our manual on our website under «Downloads»:

<https://en.dictator.de/products/door-drives-gate-drives/control-systems/>

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1. General information

The SQUARE 940-2 control system has been developed for the DICTAMAT AC-21 door operators (sliding door operator DICTAMAT 900-21 and hinged door operator DICTAMAT 310-21). It meets the demands of the EN 12453 concerning the safety of powered doors.

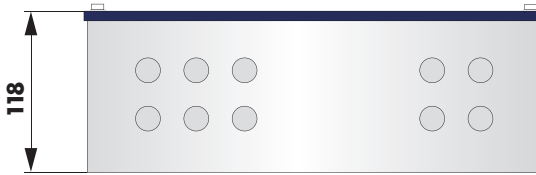
Its main advantages are:

- Autocontrol, i.e. it shuts itself down automatically upon detecting an error that might lead to a dangerous situation.
- Direct connection of safety equipment according to the EN 13849-1 without additional evaluation device.
- Different „Stops“ of the door adjustable. This protects door and door operator during normal operation from unnecessary wear and tear due to an abrupt Stop. In case of danger the maximum stopping distance according to the EN 12453 is observed.
- Connection possibility for a mechanical braking device.
- The SQUARE 940-2 allows for a position control by an encoder and thus a very exact positioning.
- Graphic display on the casing lid with status and error indication.
- The membrane keys on the lid of the casing serve for operating the door.

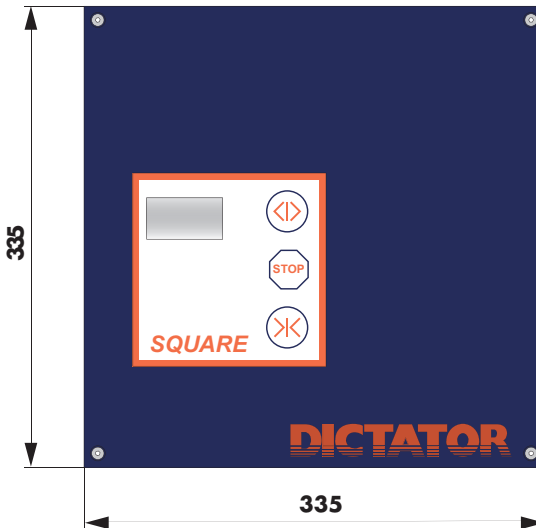
The casing of the SQUARE control systems has been designed with as small as possible outer dimensions, in order to fit also into limited space. The interior of the casing, however, offers sufficient space to house - if necessary - additional devices or batteries.

The carrier board is provided with threaded holes for standard top hat rails. This saves the expenses for additional casings, their installation and connection.

1.1 DIMENSIONS OF THE CASING



Marked holes for 10 screw cable inlets M20



Dimensions in mm

1.2 INSTALLATION / ELECTRICAL CONNECTION OF DOOR OPERATORS

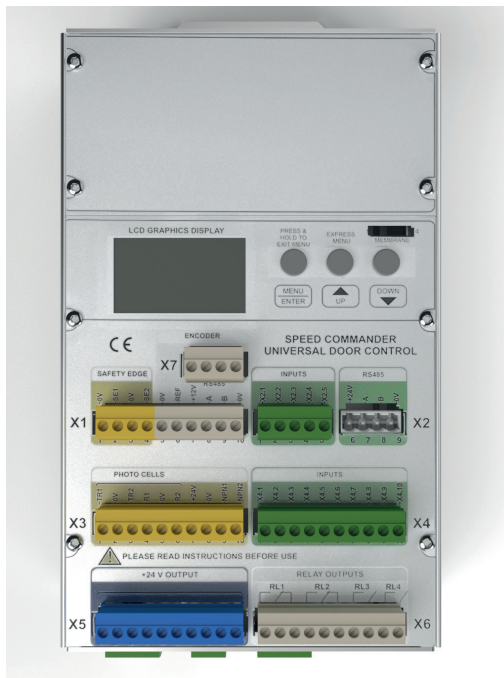
The installation of the control system is very easy, as the electronics are fixed on a board that can be removed completely from the casing. The lid of the casing can also be taken off, as the flat cable connection to the display in the lid just has to be unplugged. The now very light casing can be fixed to the wall, without the danger of damaging the electronics by chance with e.g. a screw driver.

The control system should be placed not farther than 30 m from the door operator.

Door operator, operating elements and safety equipments are connected to the removable binders. The blocks of binders are coded and therefore cannot be plugged into a wrong position.

The SQUARE 940-2 control system permits to adjust the DICTATOR DICTAMAT door operator exactly to each door. This is a vital condition for the safety at powered doors.

The increased demands concerning the safety of the “machine door” due to the EN 12453 standard require a control and putting into operation by a trained and authorized technician. Therefore all safety relevant parameters are only accessible through a password. The below mentioned functions and parameters only give a general idea as the SQUARE 940-2 offers a much larger range of adjustments/functions.



1.3 TECHNICAL DATA

Voltage	230 VAC, 50 - 60 Hz
Power consumption	8 A
Output voltage (secondary)	24 VDC
Power supply (secondary)	max. 500 mA
Output voltage motor	230 / 400 VAC (three phase)
Motor rating	max. 0,75 kW
Dimensions	H x W x D = 335 x 335 x 118 mm
IP rating	IP 54
Recommended fuse protection	16 A
Operating temperature	-10 °C to +40 °C

1.4 FUNCTIONS

Programming

All adjustments are done with the three adjustment keys on the control module.

Operating Options / Safety Features

- Dead Man or Impulse Function for the keys OPEN and CLOSE (can be chosen separately for both directions, e.g. impulse OPEN, dead man CLOSE)
- Automatic Closing: As soon as the position OPEN has been reached the door closes automatically after a preset time (adjustable between 1 - 999 seconds)
- Alternating Impulse OPEN/CLOSE, also in combination with automatic closing
- Partial Opening: The door opens only partially after pressing a separate push button (additional Open position for persons) (separately adjustable hold-open-time for this position)
- STOP (Normal Stop when opening, Fast Stop when closing).
- EMERGENCY STOP: This works the same way as the safety equipment on the closing edge. Stopping distance according to EN 12453.
- Safety Equipment (SHE): Different safety equipment can be connected to meet the EN 12453. The function of the safety equipment is canceled in the final positions.
- After the safety equipment has been activated a new operating command is necessary to get the door moving again.
 - Securing the closing edge (direction CLOSE): When this SHE is activated, the door stops within the required distance and then reverses until it is again completely open. This SHE is in function only during closing.
 - Securing the opening edge (separate connection): When activated, the door reverses until it is again completely closed. SHE in function only during opening. The functional sequence described above is only possible in the configuration "Edge Type -> Contact strip NO with 8K2 and LZR flatscan". Please refer to section "Safety devices".
 - Additional safety type D, e.g. by a light barrier in closing direction: Door stops with a Fast Stop (see below). If the safety equipment should fail, an emergency service for the door can be adjusted (dead man operation). The door moves at creep speed only. As long as the emergency service has not been adjusted, the door can no longer be operated by motor.

Motor parameters

In order to achieve an optimum adjustment of the door drive to the door different motor parameters can be adjusted. Amongst them are e.g.:

- Motor Rating (adaption to the connected motor)
- OPENING Speed / CLOSING Speed (separately adjustable)
- Creep Speed before reaching the positions OPEN and CLOSED (speed is reduced before reaching the final position, so that no separate final dampers are required, separately adjustable)
- Acceleration & Deceleration Ramps: Depending on the door weight and its easy movement
- Fast Stop: Adjustment of the Stop in closing and opening direction (separately adjustable)
- EMERGENCY STOP: Adjustment of the STOP characteristics upon activation of the safety equipment or by the Emergency Stop push button

The SQUARE 940-2 control system permits a great deal of different operating functions. When choosing the operating mode the required safety equipment has to be provided. See also the summary on the requirements of the EN 12453. A change to a "more dangerous" operating mode (e.g. from dead man to impulse operation) is only permitted when providing the required safety equipment.

The control system offers a high operating standard due to additional adjustment and connection possibilities

Position control

The SQUARE 940-2 control system is designed for a position control via encoder, integrated in the door operator. This permits a very precise positioning of the door (depending on the travel and the power transmission: max. 2 mm). However it is also possible to use separate limit switches (4 pcs. required).

Relay contacts

The SQUARE 940-2 disposes of 5 relay contacts for controlling signalling and warning devices. There exists a large variety of adjusting possibilities. This permits e.g. the connection of signals, warning sirens, the connection to a building surveying central, a floor conveyor system etc.

Diagnostics

The display on the lid of the casing indicates error codes or different diagnostic codes for the input and output terminals. This helps also to locate a problem, even by telephone.

Application range SQUARE 940-2

The SQUARE 940-2 control system with integrated frequency converter is designed for door drives for sliding doors and for hinged doors with a three phase current motor. It can control motors up to 0.75 kW.

AC-21 series	DICTAMAT 900-21
	DICTAMAT 310-21
Move AC series	DICTAMAT Move AC

1.5 ORDER INFORMATION

Components included	Control system in casing IP 54 with membrane keys and display on the casing
Order information	SQUARE 940-2 control system for the AC-21 door operators part no. 706094-2

1.6 BASIC SAFETY INSTRUCTIONS

Installation

- The main switch must be switched off during installation.
- The mains connection may only be carried out by an authorised electrician.
- During configuration, all personnel must be outside the direction of travel.
- The door controller must not be mounted on moving or vibrating parts.
- The door controller must not be installed in a place where it blocks escape routes.

Cleaning & maintenance

- Before maintenance, cleaning and repair of the installation, the power supply must be interrupted for at least 5 minutes.
- Do not expose the door control unit to steam or moisture during cleaning. If necessary, use a cloth moistened with soapy water or cleaning alcohol.

Inspection & repair

- Repairs should only be carried out by qualified and trained technicians who have a sound knowledge of the system.
- A complete maintenance/safety check must be carried out at intervals of 12 months by an authorised specialist.
- Only use original spare parts for repairs.
- During the repair, the main switch must be switched off and securely locked in this position, i.e. the key must be removed.

Environment & storage

- The door controller must not be installed in a housing that complies with protection class IP 65 or higher.
- The door controller must not be installed outdoors.
- The door controller must not be installed in hazardous areas.
- Installation and operation may only be carried out in rooms with less than 90 % humidity.
- The device must be stored under the same conditions as during operation.

1.7 OVERVIEW CONTROL SYSTEM

1.7.1 Factory settings

User parameters (profile «Std. 50 Hz»)	
Revolutions: 1330 r/min V/F open: 50 Hz V/F close: 50 Hz Boost open: 15 % Boost close: 15 % High boost: 0 Switch Frequenz open: 8,0 kHz Switch Frequenz close: 8,0 kHz Positions Tol: 2 pos. Relay Tol: 10 pos. DC Brake Cur: 0 % DC Brake Time: 0,1 s, program with 1,0 s Motor Heat: 0 % Force close: 0,0 s Force open: 0,0 s Door speed open: 35 Hz Door speed close: 25 Hz	Door speed pre open: 15 Hz Door speed pre close: 15 Hz Minimum: 10 Hz Run Timer: 40 Sek. Position Sensor: Type 2ph sensor Pulse count: 16 Position per meter: 2000 Scale: 0 Referenz: mec. Close Ramp Acc open: 20 Hz/s Ramp Acc close: 20 Hz/s Dec open: 20 Hz/s Dec close: 20 Hz/s Dec Stop open: 30 Hz/s Dec Stop close: 30 Hz/s Dec emergency: 150 Hz/s

Input configuration beginning with SN 51XXX

- NO Fully open (Input X2/1)
- NO Close (Input X2/2)
- NO Stop (Input X2/3)
- NO Open fully out (Input X4/1) -> Timer 0,0 s
- NC Stop (Input X4/2)
- NO Close (Input X4/3)
- NO Open Part 1 out (Input X4/4)
- NO Open/Stop/Close (Input X4/5)
- NC Not-Stop (Input X4/6)

All unused NC inputs must be bridged to X5!

An unassigned emergency stop must be bridged to X5.6 - X5.10.

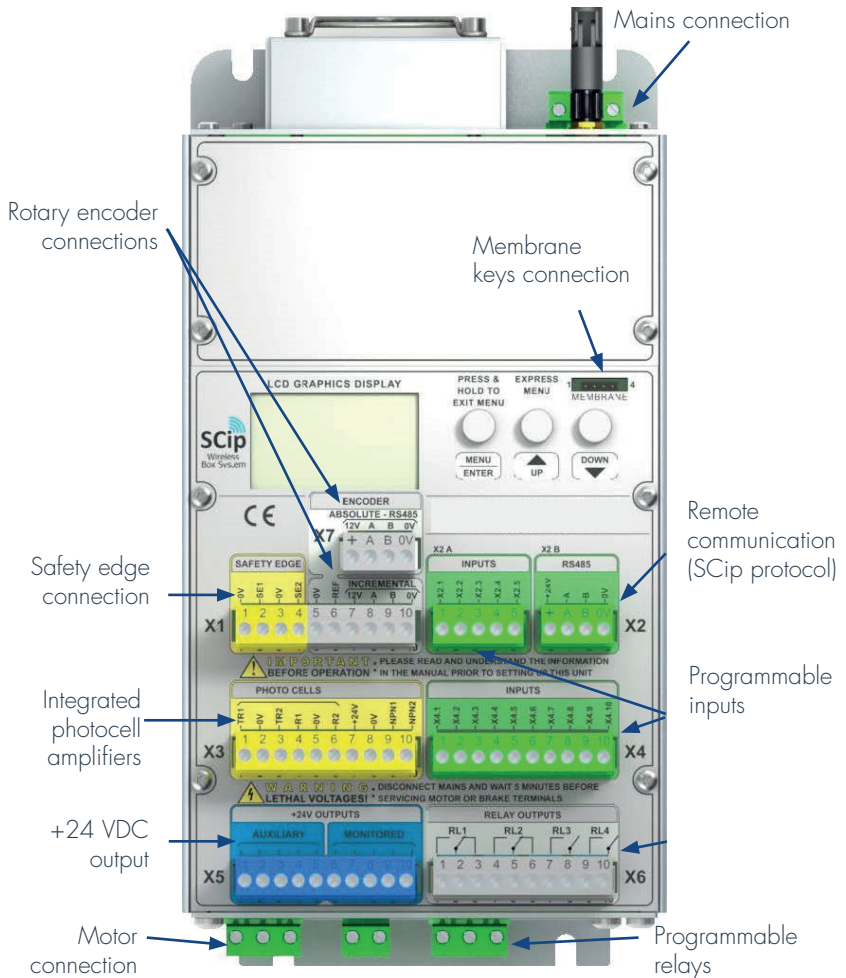
Output functions beginning with SN 51XXX

- Power Relay: Door moving
- Relay 4: Door closed
- Relay 3: Door opened
- Relay 2: Door moving
- Relay 1: Door idle

Safety equipment

- SE1 Operating Mode = Closing
- SE2 Operating Mode = Off
- Edge Type = NO bei 8K2 Ω

1.7.2 Overview control system

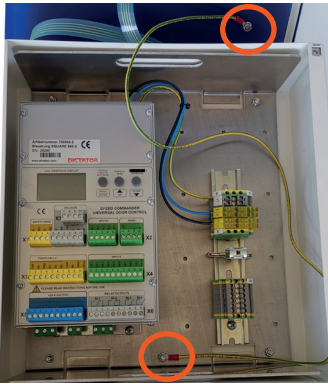


ATTENTION

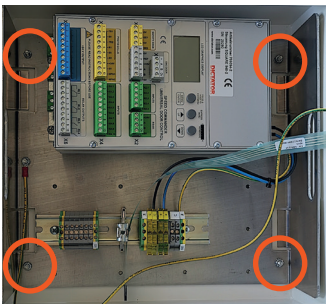


It is recommended to use a main switch or CEE plug within reach of the controller. Connectors and cables must be able to meet the performance requirements of the control mode.

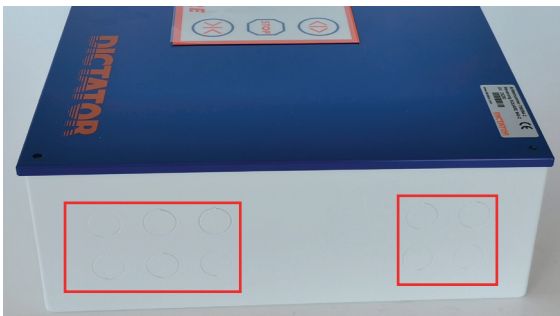
2. Mechanical installation



1. Loosen the 4 cover screws and carefully lift the housing cover. Disconnect the protective conductor connection on the carrier. Never pull the cable itself! The flat cable to the display is sufficient to place the cover directly next to the controller housing and therefore does not usually have to be disconnected.
2. Loosen the four nuts with which the carrier is fastened in the housing and then lift it completely out of the housing.



3. Fix the now empty housing to the wall (4 holes in the bottom of the housing). If necessary, use additional sealing washers.



4. Make the required openings for screw connections or strangulation nipples by breaking out the pre-stamps in the side surface of the housing with a light blow. A total of 10 M20 screw connections are available.
5. Now insert the carrier back into the housing and fasten it with the two nuts to the bottom of the housing. Reconnect the protective conductor of the carrier!

6. There are threaded holes on the right side of the carrier for mounting top-hat rails. This makes it easy to install additional components such as relays etc. in the control housing and connect them directly. However, please pay attention to possible heat generation and the EMC compatibility.

3. Controller functions

The most important functions that can be executed with the SQUARE 940-2 are described below.

Basically, the door can be operated in automatic mode (a short press on the respective operating element triggers the operation command) or deadman mode (door moves only as long as the respective button is pressed). In addition, it is also possible to mix both operation modes (automatic/deadman) (e.g. automatic OPEN/deadman CLOSE). If changes occur to certain functions in deadman mode, these are expressly mentioned.

OPEN: Door moves to the stored OPEN position or until the OPEN limit switch is reached and automatically stops there.

Person OPEN: Door moves to the end position stored for person opening and stops there automatically:

CLOSE: : Door moves to the stored CLOSED position or until the CLOSED limit switch is reached and automatically stops there.

Automatic closing: Different times can be stored for the positions OPEN and PERSON OPEN. The programmed time starts to run as soon as the door has reached the respective position. When the time has elapsed, the door closes automatically.

Stop: The stop command can be programmed to stop at different speeds in the OPEN and CLOSE directions. With a stop command, the door stops with a corresponding stopping distance.

Emergency STOP: When the EMERGENCY STOP button is pressed, the door stops immediately (set max. permissible slowing-down path in accordance with EN 12453).

Flip Flop: Alternating impulse OPEN/CLOSED. Door can only be closed when completely open (see reversal of movement).

Safety device(s) (SHE): Stopping distance see EMERGENCY STOP. The SHE can be parameterized for the closing direction, the opening direction and the opening and closing directions. The activation of the SHE can be hidden shortly before reaching the end position.

If the safety device is defective, the control unit displays an error code. Emergency operation of the door can be achieved by setting the emergency operation in the control unit.

Motion reversal: As an additional safety function, the direction of a door movement in progress can only be changed in the OPEN direction (closing command can be overwritten with opening command). An opening command CANNOT be overwritten with a closing command.

Reference run: After each power failure, the controller first requests a reference run. In this case it searches for the reference point (normally the mechanical stop in position OPEN or CLOSED). The door must be moved to the reference point by continuously pressing the respective direction key (stop CLOSED = CLOSE key, stop OPEN = OPEN key) at the jog frequency speed. Normal door operation is then possible again.

If limit switches are used instead of an encoder, a reference run after power failure is only required if the door is between the end positions OPEN and CLOSED. In limit switch operation, the pre-close limit switch is automatically defined as the reference point. This is always approached by constantly pressing the CLOSE key (even if the Pre close limit switch has already been actuated and overrun).

4. Electrical connection

4.1 FUSE PROTECTION/MAIN SWITCH

The control unit must be fused with 16 A on the mains side. In addition, a switch or a socket for a pluggable connection cable should be installed in the immediate vicinity of the control unit, since some error messages require the control unit to be completely switched off and on again.

4.2 CONNECTION OF EXTERNAL DEVICES

Connect all supply lines of your external devices (door operator, operating buttons, SHE safety devices, limit switches... if necessary) to the pluggable terminal blocks.

Maximum cable length 30 m.

4.3 CABLES

Please make sure that you use a separate screened cable for the cable to the motor and to the encoder in the motor.

When inserting all screened connecting cables into the control housing, use a metal EMC cable gland.

- Motor connection: 4 x 1.5 mm² incl. protective conductor (screened). Connect the screen both to the motor and to the controller. Connect the motor in delta connection. Cable marking: red
- Motor temperature sensor connection: 2 x 0.5 mm². Cable marking: yellow
- Encoder connection: 4 x 0.25 mm² (screened). Only connect the screen in the control system. Cable marking: white
- Connection brake DICTAMAT 900-21: 3 x 1.5 mm². Cable marking: blue
- Connection brake DICTAMAT Move AC: 2 x 0.5 mm². Cable marking: blue
- Connection electromagnetic clutch (optional): 2 x 1.0 mm². Cable marking: green
- Connection limit switch release clutch (optional): 2 x 0.5 mm². Cable marking: violet
- Connection of operating elements in controller: 0,5 mm²

A lockable main switch must be connected upstream to the control unit, which switches off the mains voltage to the control unit at all poles. In addition, a fuse must be provided on site in the supply circuit to protect the supply line and terminals.

4.4 CARRYING OUT OF THE TEACH-IN RUN

After connecting the external devices, the teach-in run is carried out while the housing cover is still open.

4.5 TERMINATION OF WIRING

After completion of the teach-in run, the protective conductor connection to the housing cover must be re-established.

Before closing the cover, check again whether all protective conductor connections have been made reliably!

Now screw on the housing cover again. Make sure that the screws are tightened only slightly in order not to damage the seal.

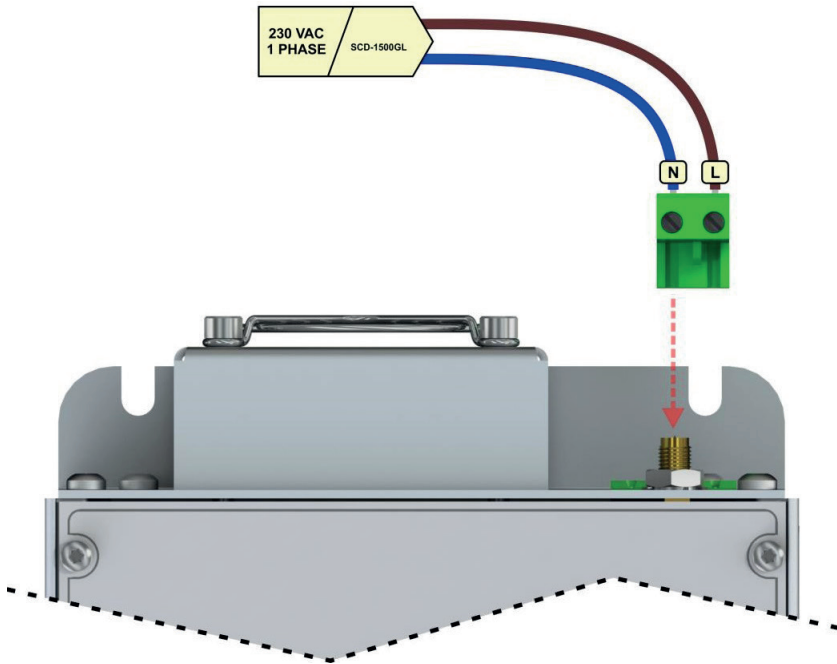
The assembly of the device is now completed.



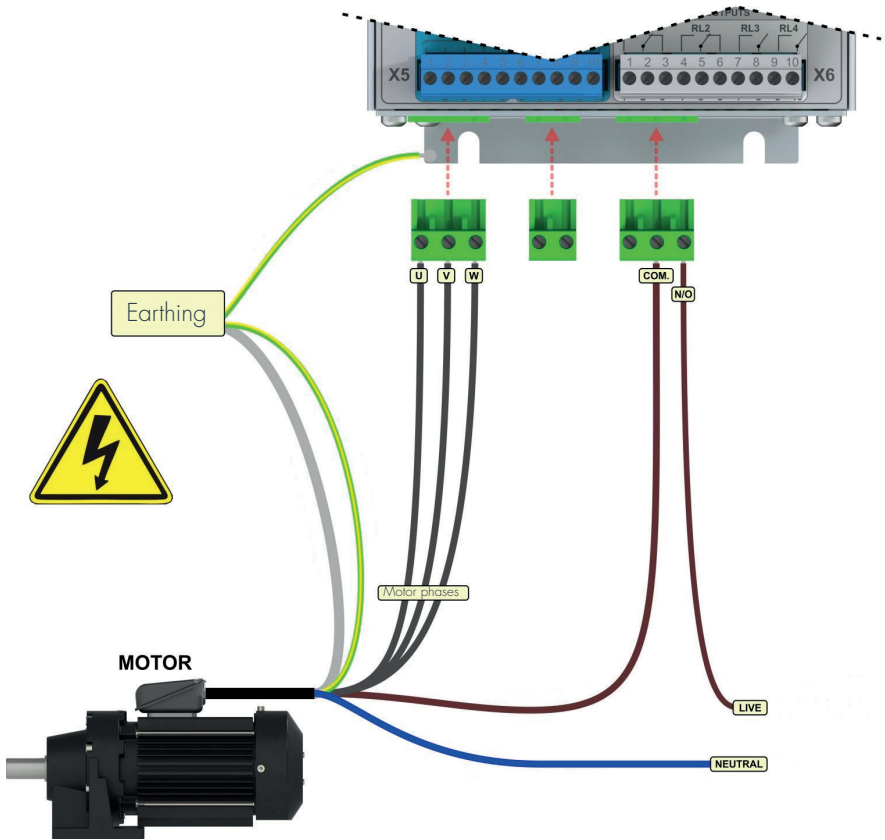
WARNING! ELECTRIC HAZARD!

The mains supply has to be disconnected before the start of electrical work.

4.6 MAINS CONNECTION



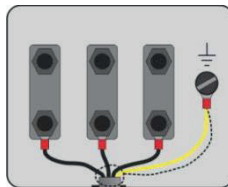
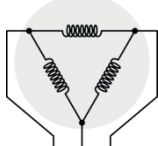
4.7 MOTOR CONNECTION



NOTE

By default, the lines are already installed at the factory.

Delta connection
230 VAC



IMPORTANT



Proper earthing/grounding is required when installing frequency converter drives. Not only for personal safety, but also to ensure reliable operation.

- Always connect the motor ground and the motor housing to a common ground point with the lowest possible impedance.
- Never lay the motor cable parallel to the rotary encoder cable.
- Do not separate or damage the cable. The cable must be one-piece and uninterrupted over its entire length.

4.8 CONNECTION MOTOR BRAKE

Some door applications require the motor to be equipped with an electromechanical brake that keeps the motor at standstill.

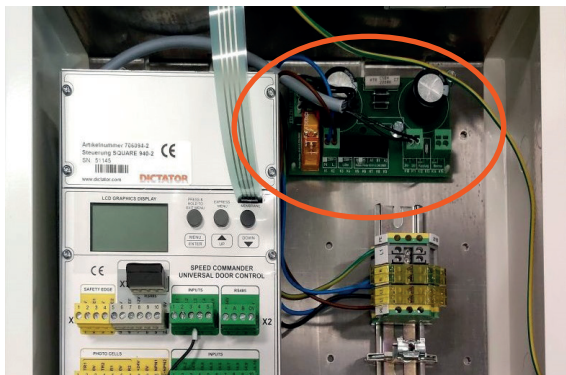
The wiring example on page 18 shows the application with an integrated power relay and a 230 VAC motor brake.

Set System Setup > Outputs > Power Relay = 1

Thus the power relay is active if the output frequency is > 0.

If a 24 VDC motor brake is used, the control unit SQUARE 940-2 must also be equipped with an adapter board (part no. 706095). This is located in the housing on the upper right-hand side next to the control unit.

The adapter board in the housing is already wired at the factory on the control side, so that only the motor brake has to be connected at the appropriate place.



4.9 CONNECTION TEMPERATURE SENSOR

All DICTATOR AC drives are supplied as standard with a temperature sensor in the motor. The temperature sensor (NC) should always be connected to a stop input in the controller (input freely configurable) to prevent any motor movement when triggered (protection against overheating).

4.10 ROTARY ENCODER

The encoder MIG is used for the SQUARE 940-2. This is connected to terminal strip X1 as shown below:

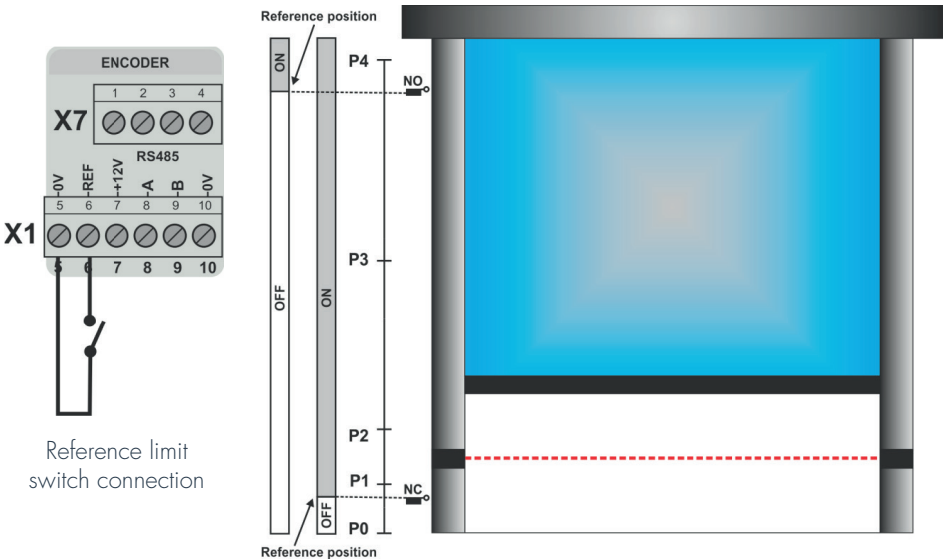
Name:	Type:	7 (+12 V)	8 (A)	9 (B)	10 (0 V)
MIG	Incremental	BROWN	YELLOW	GREEN	WHITE

4.11 REFERENCE LIMIT

When using an incremental rotary encoder, it is necessary to use a reference switch/mechanical limit stop, as the door controller cannot detect where the door is when it is switched on. Therefore, the controller first searches for the reference position (position value 0). This reference run is performed at slow speed until the door activates the reference position.

If a reference switch is used, please note that the reference switch contact may only change once during the entire travel of the door. If the reference switch is mounted in the open position, a normally open contact must be used. If the reference switch is mounted in the closed position of the door, a normally closed contact must be used. This means that the controller always detects the direction in which it must move in order to reach the reference point.

You set up the correct function for the desired reference under **Set System Setup > Reference**.



4.12 LIMIT SWITCH

The SQUARE 940-2 supports mechanical limit switches. The minimum requirement is three switches, but four are preferable.

When using three switches, they must be used for "Open", "Close" and "Pre close". Here the "Pre close" position is the reference.

The "Pre close" limit should be set so that it is activated before the "Close" position and remains active the whole distance until the "Close" position. All limit switches must be normally closed (NC).

To set up the controller with mechanical limit switches, go to **Set Menu › System Setup › Position Sensor › Type = Limit Switches**.

Function	Terminal
Pre open limit switch	X2.2
Open limit switch	X1.9
Unused	
Unused	
Close limit switch	X1.8
Pre close limit switch (reference)	X2.1

The limit switches marked in **green** are mandatory.

IMPORTANT



Unused inputs must be bridged to X5!

X1.8 + X1.9 must always be connected to tested inputs (X5.6 - X5.10).

Always ensure that the mains supply is disconnected when working on the controller (p.18).

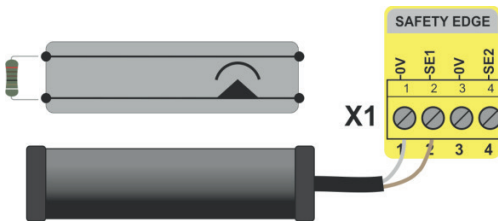
4.13 SAFETY EDGE



IMPORTANT

Safety edges must be used in conjunction with the SQUARE 940-2. These should comply with EN 12978. The inputs at terminals X1.1/ X1.2 and X1.3/X1.4 are provided for this purpose.

Connect the front edge to terminals X1.1/X1.2 and the rear edge to terminals X1.3/X1.4. The terminating resistor must be 8K2Ω. If no safety edge is connected, the door can only be operated in "Dead man" mode.



Front edge			
Terminal	Wire colour	Signal	
X1.2	Brown	Input	N/C
X1.1	White	0 V	Ground

Rear edge			
Terminal	Wire colour	Signal	
X1.4	Brown	Input	N/C
X1.3	White	0 V	Ground

4.14 LIGHT BARRIERS / LIGHT CURTAIN

The light barrier input of the controller can communicate with different types of photocells or light barriers.

The alignment can be adjusted in the Safety devices menu. The received signal strength is displayed as a number. Move the transmitter until the highest possible value is reached. The minimum value for the system to function is 3. Now try to trigger the light barrier while the door is closing to ensure proper operation.

The Limit Setup > Photocell disable position setting can be used to ignore the light barrier at a user-defined position.

The SQUARE 940-2 supports various light curtains/laser scanners with test function. As examples you find the following schemes for the connection of the laser scanners BEA LZR:

LZR-I100/-110

Terminal	Color	Signal	Description
X3.7	green	+24 V	Supply
X3.8	brown	0 V	Supply
X1.2/4*	pink	Protection	Relay 2
X1.1/3*	violet	Protection	Relay 2
X3.7/7*	red	+24 V	Test**
X3.9/10*	blue	0 V	Test
X4.10/10*	yellow	STOP NO	Relay 1**
X5.1-10/1-10*	white	+24 V	Relay 1**

*Two laser scanners can be connected and tested per controller. Please note that if two laser scanners are used, the power supply must be provided by an external, separate power supply unit. For further information, please refer to the operating manual of the laser scanner.

**Double assignment

Possible configurations with 2 laser scanners:

- SE1 X1.1 / X1.2 Safety during OPENING and/or CLOSING -> STOP
- SE2 X1.3 / X1.4 Safety during OPENING and/or CLOSING -> STOP

Or:

- SE1 X1.1 / X1.2 Safety during CLOSING -> STOP/REVERSING
- SE2 X1.3 / X1.4 Safety during OPENING and/or CLOSING -> STOP

Possible configurations with 1 laser scanner:

- SE1 X1.1 / X1.2 Safety during OPENING and/or CLOSING -> STOP

Or:

- SE1 X1.1 / X1.2 Safety during CLOSING -> STOP/REVERSING

Further information can be found under item V/12 System Setup - Safety Devices.

LZR Flatscan

Terminal	Color	Signal	Description
X3.7	green	+24 V	Supply
X3.8	brown	0 V	Supply
X1.2	pink	Protection of pull side	Relay
X1.1	grey	Protection of push side	Relay
X1.4	yellow	Protection of pull side	Relay
X1.3	white	Protection of push side	Relay
X3.7	red	+24 V	Test
X3.10	blue	0 V	Test

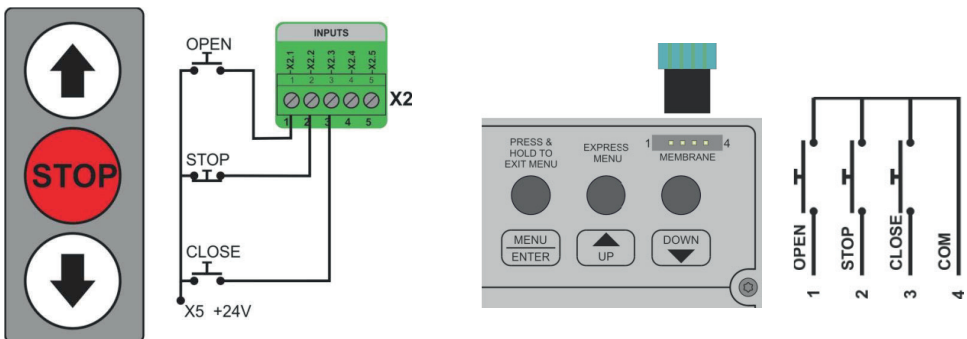
*Two laser scanners can be connected and tested per controller, whereby the LZR FlatScan are linked and operated in a masters-slave function. For further information, please refer to the operating manual of the laser scanner. When using reference switches (DICTAMAT 310-21): During a reference run, movement may be interrupted (E09/E11). The message can be ignored, the movement can be continued with a new movement command.

4.15 CONTROL SIGNALS

The function and travel speed of each input can be set via a parameter. In this way the controller can be set so that it has only the functions necessary for the application.

The parameters can be set under System Setup > Inputs. All inputs must be in 12-24 VDC.

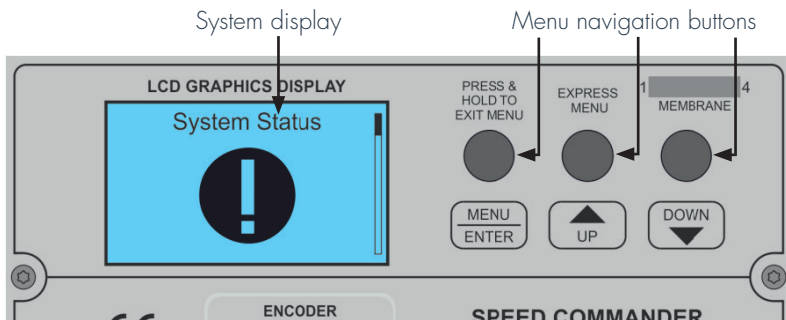
To fulfill Cat 2/P.L. d for the EMERGENCY STOP input, it must be supplied from terminals X5.6 to X5.10 so that a self-test is carried out before each closing cycle.



5. Menu system & description

5.1 NAVIGATION

The door control has a graphic display and 3 keys to set the controller to the desired functions.



A code is required to access some menus. This code was implemented to prevent unauthorized changes and potentially dangerous situations at the controller.

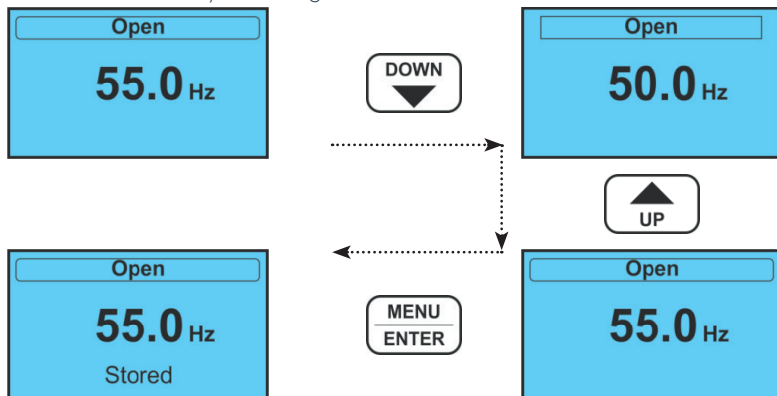


Code	Description
10	End user
110	Installer
210	Supplier
310	OEM*

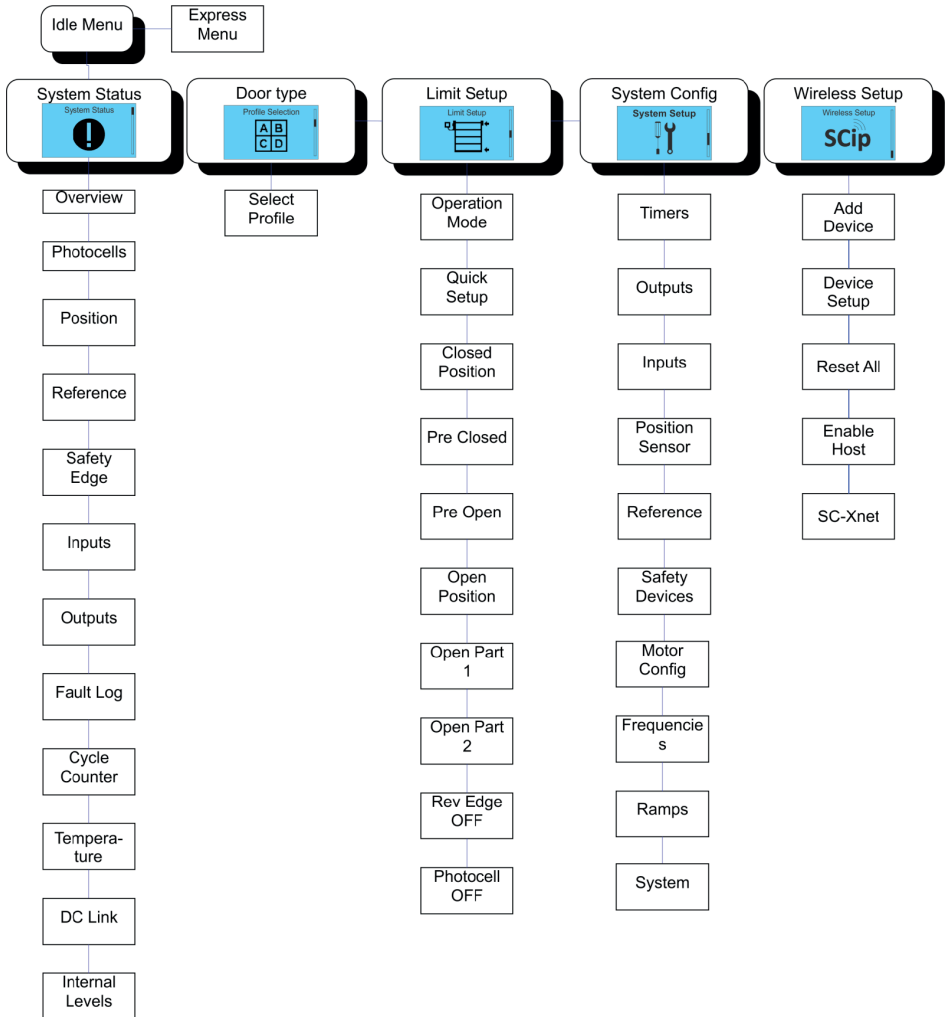
*Full access to all parameters. Required for commissioning!

For the configuration of parameters such as speed and position, values in % and Hz are displayed. The following is an example of the speed in Hz.

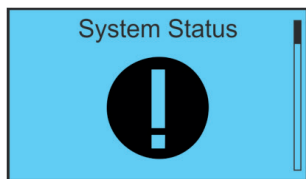
Use the UP or DOWN keys to change the value.



5.2 MENU STRUCTURE



5.3 MAIN MENU



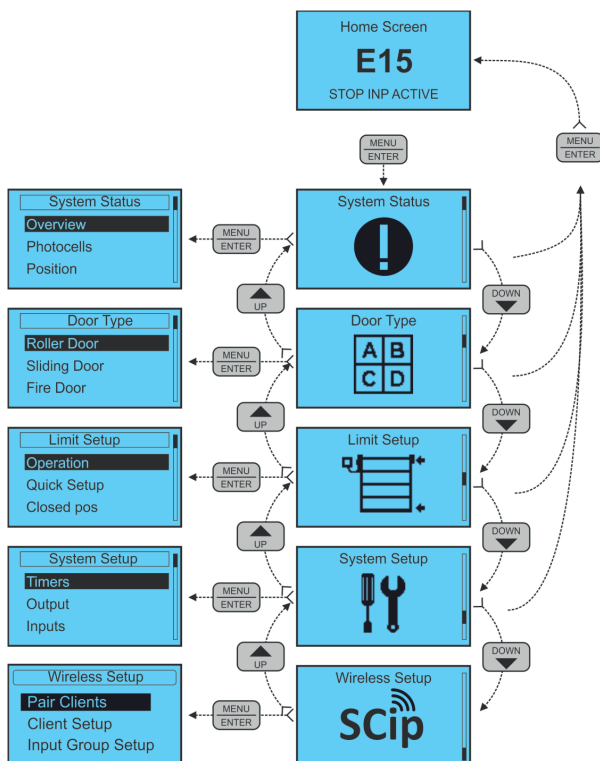
The main menu is shown as graphic symbols on the display. Call up the menu by briefly pressing the MENU/ENTER button.

Navigate the menu using the UP & DOWN buttons. Briefly press the MENU/ENTER button to enter the selected sub-menu.

5.4 SUBMENUS

The submenus below the main menu are lists in text format.

Use the UP or DOWN buttons to scroll through the menus. The currently selected submenu is displayed with a black bar. Enter the submenu by pressing the MENU/ENTER button. You can exit a menu at any time by pressing and holding the MENU/ENTER button.



5.5 DISPLAY INDICATION

The home screen is displayed during normal operation if no menu is called. The display can be divided into the following three areas:

Top	Displays status information about peripherals such as battery status and wireless operation
Middle	Controller status, displays information about the current status of the controller. If there is an error, the error code is displayed here. See Error Codes section for error description. If the door is functioning normally, one of the following operation messages will be displayed.
Bottom	Event messages. If an event occurs, the source is displayed for a short period or the duration of the event, e.g. if a stop input is active, "Stop Active" is displayed here.

Operating messages	
Message	Description
OFF	Door control is off.
MID T.	Door is outside the fully open / closed position.
FIND REF	Door must perform a reference run to find the 0 position.
LOCKED	Door is locked. The door cannot move until the locking signal has been removed.
MANUAL	Door is in manual operating mode. The door can only move in deadman mode.
CLOSED	Door is fully closed.
CLOSING	Door is closing.
OPEN	Door is fully open.
OPENING	Door is opening.
PART 1	Door is open until "Part open position 1".
BREAK	Door is in pause mode. Reset the pause to return to normal operation.
E15	Limits not set - Limit Setup > Quick Setup

5.6 EXPRESS MENU






The express menu provides a quick way for the user to edit frequently used parameters. Enter the menu by pressing the UP key in standby mode. Use the UP or DOWN buttons to scroll through the menu. Press and hold the MENU/EXIT button to exit the express menu.

The submenu of the express menu contains the following settings:

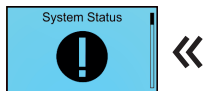
Auto Setup		Starts the automatic adjustment of the open/closed positions of the door.
Display Readout	Normal	Displays the current status of the door and any errors that have occurred
	Motor Current	Displays the present motor current measured by the controller. This can be a useful tool for troubleshooting motor configuration.
	DC Link	Displays the internal DC intermediate circuit voltage.
	Motor Slip	Indicates the difference between the frequency output by the motor and the frequency read by the rotary encoder.
	Measured Frequency	Shows the measured frequency calculated from the rotary encoder signal.
	Output Frequency	This is the frequency output from the converter to the motor.
	Safety Edge 1	The analog input value of the safety edge Input 1 (X1.2).
	Safety Edge 2	The analog input value of the safety edge Input 2 (X1.4).
	Position mm	The position presently displayed in mm.
Auto Close F.		The period of time after which the door automatically closes from the fully open position.
Auto Close P.		The period of time after which the door automatically closes from the part open position.
Auto Close O.		The period of time after which the door automatically closes from a position other than fully or partially open.
Run Timer		The maximum time a door travel can take before a timeout error is set. The time should be set to 5 seconds longer than the time required to close the door. Referencing corresponds to 3x the normal running time.
Dead man Move		In this menu the controller will work in deadman mode with the UP and DOWN keys. All connected safety inputs are ignored to allow unrestricted movement of the door.
Reset		In this menu the controller is reset. The controller behaves as if the mains voltage is switched off and on.
Update Firmw.		This puts the controller in boot mode when updating the firmware.

5.7 MAIN MENU

The main menu is accessed by pressing the MENU/ENTER button from the home screen.

Display indication	Main menu	Description
System Status 	System Status	Overview of control inputs, outputs and internal information.
Door Type 	Door Type	Select which profile is to be loaded for the active parameters. Reset to default settings.
Limit Setup 	Limit Setup	Set up the door positions. Set the already set positions.
System Setup 	System Setup	Change the door controller settings for motor, peripherals, speed, etc.
Wireless Setup 	Wireless Setup	Connect new wireless devices. Set up the wireless devices.

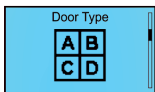
5.8 SYSTEM STATUS



System status	Submenus	Description
Overview Photocell 1: OK Safety Edge 1: OK Position: 123	Overview	Here you can see the status of the light barriers, the safety edges and the current position.
Photocells Photocell 1: 15 Photocell 2: OFF 1: <input type="text"/> <input type="text"/>	Photocells	Displays the analog value of the received signal strength and gives a graphical representation of the current status of the light barrier. Set the maximum value when aligning the photoelectric sensor.
Position Position: 123 Ref Status: Ref Found	Position	Displays the number of internal door positions. If an incremental encoder is used, additional information on the reference status is displayed.
Reference Ref Status: Ref Found Above Ref	Reference	Displays information about the current reference status, whether the position was found or not, connection errors, and if the door is above or below the reference switch.
Safety Edge SE1: Idle SE2: OFF	Safety Edge	Displays the current status of the safety edges.
Inputs X2: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> X4: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Inputs	Quick overview of the control panel inputs. The box is checked when the input is active.
Outputs Relay: <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> NPN: <input type="checkbox"/>	Outputs	Quick overview of the control panel outputs. The box is checked when the output is active.
Log 1 of 10 Error: E10 On Cycle: 045	Fault Log	Log displays the last 10 error messages. It displays the error code and the door operating cycle in which it occurred.
Log 1 of 10 Error: E10 On Cycle: 045	Input Log	Log shows the last 10 activated inputs. It shows the input and the door operating cycle. Press UP + DOWN for 3 sec to clear.

System status	Submenus	Description
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; background-color: #00a0e3; color: white; padding: 2px; font-size: 0.8em; margin-bottom: 5px;">Cycle Counter</div> <div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">85421</div> <div style="font-size: 0.8em;">Operations</div> </div>	Cycle Counter	Shows the number of operating cycles executed by the door (Open / Close = 1 cycle). The total number and the number of cycles since the last maintenance are displayed alternately.
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; background-color: #00a0e3; color: white; padding: 2px; font-size: 0.8em; margin-bottom: 5px;">Temperatures</div> <div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">330*</div> </div>	Temperature	Displays the internal temperature of the controller. Note that this is a purely analog value. It is not displayed in °C/F.
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; background-color: #00a0e3; color: white; padding: 2px; font-size: 0.8em; margin-bottom: 5px;">DC Link</div> <div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">330V</div> <div style="font-size: 0.8em;">300 - 370V DC</div> </div>	DC Link	Displays the internal DC intermediate circuit voltage and the range in which it should be.
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; background-color: #00a0e3; color: white; padding: 2px; font-size: 0.8em; margin-bottom: 5px;">Internal Levels</div> <div style="font-size: 0.8em; margin-bottom: 5px;">Int 12V: 11.5V</div> <div style="font-size: 0.8em;">Int 24V: 22.0V</div> </div>	Internal Levels	Displays the internal supply voltages of the controller. Should display 12 V +/-1 V for internal 12 V and about 20 - 24 V for internal 24 V.

5.9 DOOR TYPE



Due to the large number of adjustable parameters, the SQUARE 940-2 offers the possibility to define profiles that contain a predefined controller setup. The profiles allow the installer to select from a range of parameters suitable for a specific door type and provide a quick basis for setup.

The predefined parameters in the profiles can only be changed by the manufacturer by updating the firmware. All parameters can be changed as usual after a profile has been loaded.

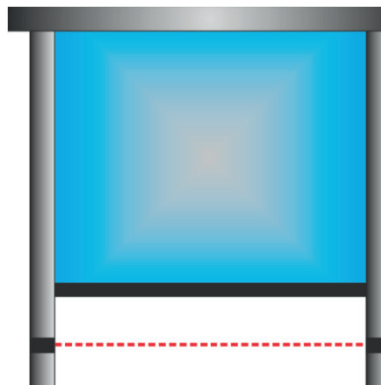
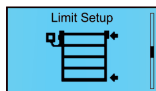
The door type "Std. 50 Hz" is intended for door systems with DICTATOR drive technology. Please note that the door type must be loaded once during the initial commissioning of the control unit (see also section Commissioning).



IMPORTANT

When loading a profile, all associated parameters are overwritten by the defaults of the loaded profile!

5.10 DOOR POSITION



- ◀ "fully open" position
- ◀ Pre open
- ◀ Part open

- ◀ Photocell OFF
- ◀ Safety edge OFF
- ◀ Pre closed
- ◀ "fully closed" position

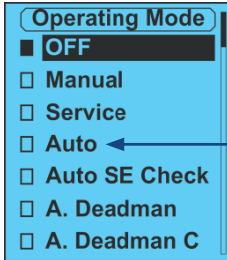
The door controller uses position counts generated by the externally connected rotary encoder. The door position is thus recognized and the door can be navigated through the various positions.

Depending on the encoder type, it may be necessary to install a reference switch/point so that the controller knows where the door is when it is switched on.

The example shows a roller shutter with the different door positions within the door travel.

5.11 LIMIT SETUP

Submenu	Description
Operation Mode	Select the operating mode. - See the descriptions under Operation Mode.
Quick Setup	Calls the quick configuration. Set limit positions. See section Commissioning.
Closed Limit	Set the position manually for the following door positions. Move the door with the UP or DOWN button and save. The position can be saved by pressing the MENU/ENTER button. The display shows "stored" and returns to the existing menu.
Pre Closed Limit	
Pre Open Limit	
Open Limit	
Part Open	
S. Device OFF	
P. Cell 1 OFF	
P. Cell 2 OFF	
High Torque	This function is intended for sliding doors where a high torque is required in the first and last part of opening and closing. This activates the value for "High boost" from the fully closed position and the set "Position distance" in this parameter and also in the fully open position minus the distance in this parameter. Set to 0 to deactivate.

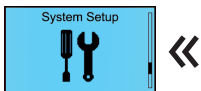


After the Quick Setup the default setting is Auto.

Important: Standard operation mode for DICTATOR systems.

Operation mode	Description
OFF	OFF - No question about the motor
Deadman	It is possible to operate the "deadman" operation without limits. This is done at "deadman" speed.
Reserved	N/A
Auto	Automatic mode - The door runs at full speed to the programmed positions. The safety edge is checked before each closing and constantly monitored for connection errors.
Auto SE Check	Like Auto, but requires the safety edge to be activated each time the run is completely closed. (Used with pneumatic safety edges).
Hold to run	N/A
Semi-Auto	N/A


5.12 SYSTEM SETUP



Submenu	Description
Timer	Setting the timer for the door controller
Outputs	Setting up the door controller outputs
Inputs	Setting up the door controller inputs
Position Sensor	Setting up the position sensor of the door control system
Reference	Selecting the references for the door position
Safety Devices	Setting up the safety edges/light barriers
Motor Config	Setting up the motor-related settings
Door Speeds	Setting the door speeds in the various states
Ramps	Setting up acceleration / deceleration
Specials	Special custom functions - Move assist/Delta Slip
System	System settings

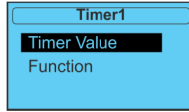
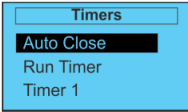


IMPORTANT

All function-relevant parameters which are already preconfigured at the factory are marked with a  symbol on the following pages and should only be changed by trained specialist personnel.


When changing the system setup - "Motor Config", "Frequencies" and "Ramps", it is essential to check the motor load. See point 6.2 or 6.3 Commissioning.

5.12.1 Timer



Options	Description
Auto Close	Set the auto-close timer value to be used when the door is in the completely open position.
Run Timer	The maximum time a door movement may take before the "timeout" error is set. The time should be set to 5 seconds longer than the set time required to close the door. During the reference run the time is 3x the normal time.
Timer 1	Timer Value: Set the timer value for the following timers. The time base is 1/10 seconds. Timer functions: Set the function for the timer as shown in the following table.
Timer 2	
Timer 3	
Timer 4	
Timer functions	Description
No Function	Timer has no function.
Auto Close Timer Part 1	Auto close of "Part open 1".
Safety Close	If the safety edge or light barrier has been activated, the auto closing time is changed to this safety closing time instead.
Pre Warn Time	Used in combination with the output function. Timer starts when the auto close timer reaches the set warning time.
Delay To Open	The opening command is delayed by the set time before the door opens.
Delay To Close	The closing command is delayed by the set time before the door closes.
Delayed Door Closed	Starts when the door is fully closed - Activates the Delayed Door Closed output function when it expires.
Auto Open Timer	Opens the door automatically as soon as it is fully closed and the timer has expired. Used for the cycle test.




5.12.2 Outputs

Output	Description
Relay 1	Relay outputs max. 1 A @ 24 VDC 0.5 A @ 120 VAC Only ohmic loads
Relay 2	
Relay 3	
Relay 4	
Power Relay	Power relay output max. 5 A @ 240 VAC.
NPN 1	Open Collector max. 30 VDC, 50 mA non-inductive
NPN 2	
Output functions	Description
No Function	Relay not active
 Door Moving	Active if the output frequency is > 0.5 Hz.
Door Idle	Active if the output frequency is < 0.5 Hz.
Door Open	Active when the door is above the fully open position.
Door Closed	Active when the door is under the fully closed position.
Door Not Closed	Active when the door is above the fully closed position.
Open Partial	Active when the door is open at "Part Open 1".
Door Opening	Active while the door opens.
Door Closing	Active while the door closes.
Delay To Close	Active while the closing timer delay is > 0.
Delay To Open	Active while the opening timer delay is > 0.
Auto Close Active	Active while Auto Close timer is > 0.
System Error	Active if an error message exists.
Pre-Warn	Active when the warning time is > Auto Close timer.
Open Alarm	Active if the door is open longer than the Open Alarm timer.
Service Counter	The operating counter has exceeded the value of the service counter.
Brake After Run	Active at half timeout of overrun pressure - for mechanical brake (for sliding doors with seals).
Open Light	Function optimized for "door opens" light signal.
Closed Light	Function optimized for "door closes" light signal.
Part Open Light	Function optimized for door "Part Open 1" light signal.
Mechanical Brake	Active when mechanical brake is applied.
System OK	Function optimised for "door opens" light signal.

5.12.3 Inputs

Options	Submenu	Description
X2.1 bis X2.5	Input	Select the input to be configured.
	Function	Select the function for the input.
X4.1 bis X4.10	Name	Select the text linked to the input.
	Logic	Select the logic function for the NO/NC input.
Eingangsfunktion	Description	
No Function	If the input is not used, set this value.	
Flip Flop	Press the button to open or close the door. Closing only possible from complete opening. Auto close timer active.	
Open Fully	Move the door to the completely open position.	
Open Fully with auto close	Move door to the completely open position and start Auto Close Timer 1.	
Stop	The door stops with stop ramps.	
Close	The door closes.	
Emergency Stop	The door stops with emergency ramps - To comply with Cat 2/P.L. D. this input must be connected to X5.6 - X5.10.	
Safety Edge	Possibility of connecting a contact edge. Attention: Input not monitored!	
Open/Stop/Close	Press button to open, stop or close the gate. Attention: This input must be connected to X5.1 - X5.4.	
Photocell	Stops and opens the door - Deactivated by Par. 10.	
Lock Open	Locks the door in the open position.	
Lock Close	Locks the door in the closed position.	
Open Dead man	The door opens while the input is active, otherwise the door stops.	
Close Dead man	The door closes while the input is active, otherwise the door stops.	
Breakout	Stops the door and activates „Dead-man“ operation.	
Open Part 1	Door opens to “Part open 1” position.	
Part 1 AUT	Automatic closing “Part open 1” position.	
F.F. REV	Same as Flip Flop, but with the option of approaching the reference point.	
F.F. Part 1	Opens to “Part 1” position and closes.	

5.12.4 Displacement Sensor

Rotary encoder	Lineup	Description
Type 	2 Phase Encoder	Quadrature A/B signal.
	SKF Encoder	Quadrature A/B signal - Activates internal pull-up resistors.
Pulse Count		<p>Pulses: The number of pulses is the number of pulses per full motor revolution (360°).</p> <p>Positions: Since the controller evaluates each pulse on both the rising and falling edges, the A and B signals quadruple the location data, hence the name „quadrature encoder“. To determine the number of pulses at one full revolution, rotate the shaft 360° and then divide this number by four and vice versa.</p>
Pos Pr Meter		Set the number of positions per meter.
Scale 		Divide the number of pulses by 2/4/8 etc. If the counter exceeds 32000 +/-, the scale can be used to adjust the value within the operating value. 

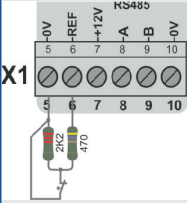
Pulse sensor types

Type	Details
2 Phasen Encoder	Requires reference, see Reference section
Limit Switches	2 to 4 limit switches - no encoder feedback. No closed-loop control.
PMC Encoder	Pulse output at terminal X1.8 for closed-loop control.
AWG Absolut-Encoder	Absolute rotary encoder, no closed-loop feedback.
Dynaco Encoder	Absolute rotary encoder, no closed-loop feedback.
GFA Absolut-Encoder	Absolute rotary encoder, no closed-loop feedback.
Feig TST Encoder	Absolute rotary encoder, no closed-loop feedback.
Dall Encoder	Absolute rotary encoder, no closed-loop feedback.
SCE-RS485*	Absolute rotary encoder.

*The following formula applies to the pulse number of the SCE-RS485:

$$\text{Pulse no.} = \frac{200/4}{\text{Gear ratio}} \quad \text{e.g. gear ratio} = 1/7; 50/7 = 7.$$

5.12.5 References

Reference type list	Description
Mec. Open	Mechanical stop in open position. The door moves to the open position until it reaches the mechanical end stop and sets it to the 0 position.
Mec. Close	Mechanical stop in closed position. The door moves to the closed position until it reaches the mechanical end stop and sets it to the 0 position.
X1.6 W. Res	 <p>Mechanical switch with resistance monitoring. The switch terminal is monitored by the resistor network for maximum safety. Use 2K2 Ω and 470 Ω resistors. Switch must be a normally open contact when mounted in open position or a normally closed contact when mounted in closed position</p>
X1.6 No Res	Mechanical switch without resistance safety. Switch must be a normally open contact when mounted in open position or a normally closed contact when mounted in closed position.

5.12.6 Safety devices

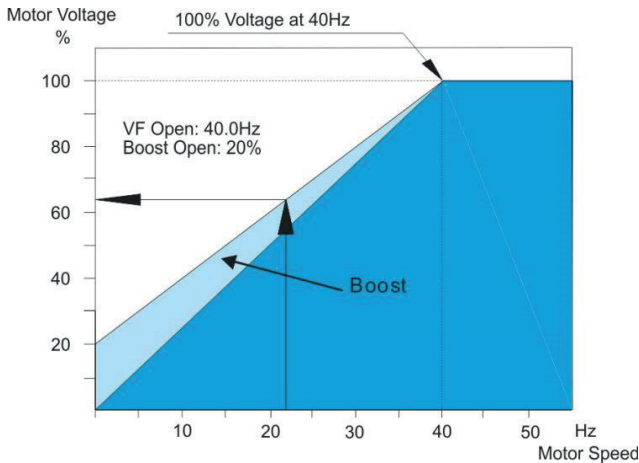
Safety devices	Description	
Safety Edge	Select the respective safety edge, the safety edge type and the number of test repetitions. See the table below	
Photocell	Selection of the connected light barrier.	
Safety Edge	Description	
SE1; SE2	Operating Mode	Selection of the direction of movement in which the respective safety edge is evaluated.
	Function	Reaction of the door after the safety edge has been actuated.
Edge Type	Selection of the connected safety edge. If "Function Stop/Rev" has been selected and the safety device is triggered in both directions within one travel cycle, only an "OPEN command" is possible.	
Retry Count	N/A	

5.12.7 Motor adjustment

Options		Description
Motor Speed		This is the normal motor speed at the given frequency, e.g. 1350 rpm at 50 Hz. See motor data for speed. This is used for internal slip measurement
		Motor / Rotary encoder direction:
Direction	Normal	No change.
	Motor Rev	Motor reversed.
	Enc Rev.:	Rotary encoder reversed.
	Motor & Enc Rev.	Motor and rotary encoder reversed.
VF Open		This is the point at which the maximum voltage is supplied to the motor. This is relevant when the door opens in automatic mode.
VF Close		This is the point at which the maximum voltage is supplied to the motor. This is relevant when the door closes.
Boost Open / Boost Close		The torque boost increases the intermediate circuit voltage and thus the torque when the motor accelerates or starts up. If the boost is set too low, the door may not move and if it is too high, an overcurrent event may occur. Due to the large number of door types, this is individual for each installation. This is relevant if the door opens/closes in automatic mode.
High Boost		Changing this value activates "High-Boost". This is used when the door is opened between the "fully closed" and "high torque" positions. If the High Boost Distance parameter is different from 0, the High Boost function is also enabled under the conditions described in High Boost Distance. Set the value to 0 to disable the High Boost Distance function.
Switch F. Open / Switch F. Close		Depending on the motor type, certain switching frequencies can lead to an unpleasant noise from the motor windings. This noise can be reduced by changing the pulse frequency in the range from 2.5 to 8.0 kHz. (Recommended value: 2.5 kHz). Note: Increasing this setting will increase power dissipation and heat the motor.

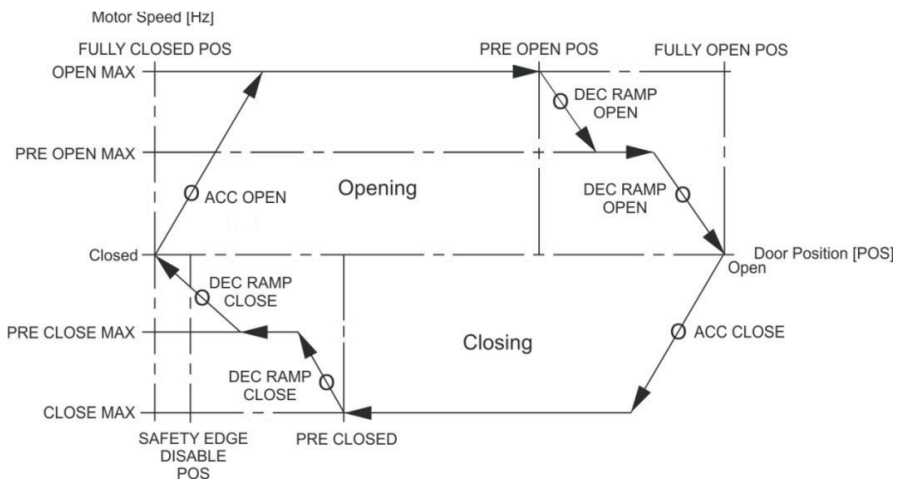


⚠	Position Tol.	The tolerance is defined here so that the supply can be switched off when the end position is reached. When the door reaches its position tolerance, the motor supply is canceled and the "Open" door position relay and "Closed" door position relay are activated. Example: When the fully open position is set to 700 and the position tolerance is set to 5, the motor voltage is switched off when 695 is reached and the door opening relay switches.
⚠	Relay Tol.	This sets the tolerance within which the door position relays remain activated. Example: If the fully open position is set to 700, the position tolerance is set to 5 and the relay tolerance is set to 30, then the "End position OPEN" relay is activated when 695 is reached. The relay drops out when the door closes and reaches position 670.
⚠	DC Brake Cur.	DC Brake is used to conduct direct current into the motor windings when the current door position is within the position tolerance at the end of the movement, i.e. fully open or fully closed. The DC brake helps to stop the door before the motor brake is activated. For freezing areas, the DC brake can be set to prevent the drive from freezing. The DC braking time should be set to 100 to maintain constant DC current to the motor. DC Brake Cur. should be selected to provide the correct temperature.
⚠	DC Brake Time	
⚠	F. Close	Time during which the door is kept closed after the fully closed position has been reached.
⚠	F. Open	Time the door is kept open after reaching the fully open position.



5.12.8 Frequencies

Options	Description
Open	Max. speed between closed and pre open position.
Pre Open	Max. speed between pre open and fully open position.
Close	Max. speed between open and pre close position.
Pre Close	Max. speed between pre close and fully closed position.
Dead man	This parameter defines the speed at which the door operates when it is in „Dead man“ mode or during a reference movement (“Dead man” speed).
Minimum	Set this value equal to the motor slip.



5.12.9 Ramps

Options	Description
Acc Open	The ramps change the speed at which the motor reaches its operating speed. The higher the value, the faster the motor changes to the intended operating speed. This parameter is used when the door is opened.
Acc Close	The ramps change the speed at which the motor reaches its operating speed. The higher the value, the faster the motor changes to the intended operating speed. This parameter is used when closing the door.
Dec Open	Ramp-down deceleration is used when the door opens and stops to reach the fully open position.
Dec Close	Ramp-down deceleration is used when the door closes and stops to reach the fully closed position.
Dec Stop Open	When the door opens and the Stop button is activated, it stops depending on the value set for this parameter. This parameter should be set to stop the door without excessive force on the drive mechanism.
Dec Stop Close	When the door closes and the Stop button is activated, it stops depending on the value set for this parameter. This parameter should be set to stop the door without exerting excessive force on the drive mechanism.
Dec Emergency	When the door closes and the safety edge is activated, it stops depending on the value set for this parameter and then reverses. This parameter should be set so that the door stops quickly and the closing force is not exceeded.

5.12.10 Special features

Special features	Description	
Move Assist	OFF	Deactivation of the "Move assist" help function.
	OPEN	"Move assist" detects the manual movement of the door and starts to open/close the door at "Dead-man" speed. Set the direction for support.
	CLOSE	
	OPEN/ CLOSE	
Move Assist Sens.	Adjusts the sensitivity of the "Move assist".	
Delta Slip	Adjusts the sensitivity of the "Delta slip" measurement. Set the percentage of "Delta slip" allowed before setting the slip error.	

5.12.11 System

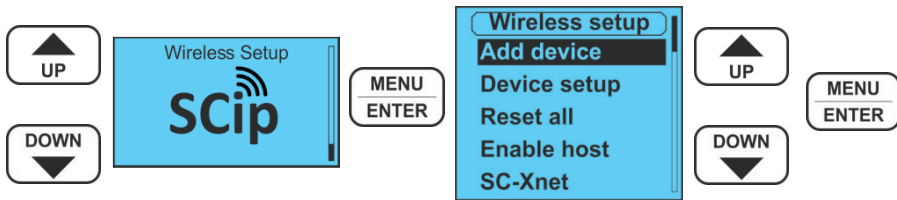
Options	Descriptions
Clear Fault Log	Delete error log. The user is prompted to confirm the deletion of the log.
Clear Counter	Delete the cycle counter. The user is prompted to confirm the deletion of the counter.
Service Limit	Set the number of cycles before setting the service flag. This value is multiplied by 100. For example, the value 250 corresponds to 25,000 cycles.
Sound	Turning the sound ON/OFF.
Backlight	Turning the backlight ON/OFF.
Contrast	Set the display contrast.
SW Update	Firmware update / Boot mode input.
System Info	Displays the system information: Type / Power / Voltage
SW Info	Specifies the software version.
Service	Special parameter for manufacturer/service.

5.13 WIRELESS SETUP



The new generation of the SQUARE 940-2 control system introduces the wireless system SCip. This system is designed for fast, reliable and cost-effective connection of peripheral devices without using physical wiring.

The Wireless Setup menu contains all necessary parameters to add, remove and configure SCip devices. This menu is accessed from the main menu tree by pressing the MENU/ENTER button after selecting the system setup icon. Note that some menus consist of additional menu levels that can be accessed and navigated in the same way as on the first level.



Use UP/DOWN to navigate in SCip. Press MENU/ENTER. Navigate to the desired menu and select again.

Options	Description
Add device	In this menu SCip devices can be added.
Device setup	In this menu you can configure additional devices.
Reset all	This menu resets all couplings.
Enable host	Enables and disables the host antenna.
SC-Xnet	In this menu you can configure SC-Xnet parameters.

To add a device select "Add Device":

Add Device Waiting For Device	1. Select this menu and the pairing mode is activated. Activate the SCip device. Note: If multiple devices are added, you must then activate them without leaving the pairing mode.
PAIRED Hand Remote Serial: XXXXXX	2. Exit the pairing mode with MENU/ENTER.

SC-Xnet		Description
Enable	Enable	Activate wireless Xnet. This option requires a special hardware module connected to X2 RS485.
	Disable	Disable wireless Xnet.
Discover		Find other Xnet devices within range.
Connect		Allow access to other Xnet devices.
X-Lock		Wireless Air lock for up to 5 controllers.
Clear all		Reset all Xnet settings to factory defaults.
Settings	Channel	
	Network ID	

6. Setup: Placing into operation with encoder

6.1 GENERAL INFORMATION

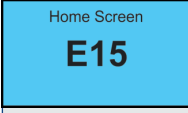

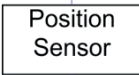

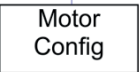
Please note that the Quick Setup is aborted if the position counter is exceeded during setup. Then use the encoder scale to reduce the number (see System Setup -> Position Sensor -> Scale).

Then select the Scale value = 2. The count value is now halved.

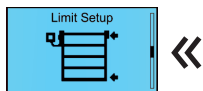
To check whether the positions are within the number range of the controller (-32000 - +32000), use System diagnostic -> Position and move the door to fully open and fully closed position in "Dead-man" with the membrane keys. Then check whether the value is within the range.

Note: At the start of the teach-in travel, the door/gate should be in the half-open position. If the operator moves against a mechanical stop in the open or closed position during the check of the direction of movement, error messages with abort of the learning travel are possible.

6.2 PREPARATION

Indication	Action
Switching on for the first time: 	After switching on the controller for the first time, the status "E15" = "Door positions missing" appears in the ready menu. These are programmed via the Quick Setup, as described below
Setting functionrelevant parameters:	Before the actual commissioning, the following function-relevant parameters must be set:
 	The number of encoder pulses to be entered can be found on the sticker on the motor gear unit. MIG - 120 - 19 - 016 7 = number of pulses 16 MIG - 120 - 19 - 005 7 = number of pulses 5 If none of the above designations can be found on the sticker, please contact the technical customer service department. The pulse number is entered in the "Pulse Count" sub-item.
	Please select the desired reference here. Recommended setting: Mechanical stop in CLOSED position (Mec. Close).
	Enter the corresponding motor speed here. This can be found on the rating plate of the motor. The speed is entered in the subitem "Motor speed".

6.3 QUICK SETUP



Step	Indication	Action	
1	<p>Check direction of motor rotation:</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> <p>Quick Setup Press & Hold UP To Open Door 0mm</p> </div>	<p>Use the UP button to move the door in the "OPEN" direction. Check that the door is moving in the "OPEN" direction.</p> <p>The door stops automatically. Release the button and when the direction is OK, press UP. If wrong, press DOWN. The controller automatically changes the direction of motor rotation.</p>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">▲ UP</div> <div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">▼ DOWN</div>
2	<p>«fully open» Position:</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> <p>Open Limit Move Door To Open Limit 0mm</p> </div>	<p>Use the UP key to move the door to the fully open position. The respective position can be corrected at any time with the DOWN key.</p> <p>Save the position by pressing MENU/ENTER.</p>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">▲ UP</div> <div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">▼ DOWN</div> <div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">MENU ENTER</div>
3	<p>«fully closed» Position:</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> <p>Closed Limit Move Door To Closed Limit 0mm</p> </div>	<p>Now move the door to the fully closed position with the DOWN key. The respective position can be corrected at any time with the UP key.</p> <p>Save the position by pressing MENU/ENTER.</p> <p>Incremental rotary encoder: If you are using an incremental encoder, please perform a reference run by pressing MENU/ENTER to calculate the position values to be stored.</p>	<div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">▲ UP</div> <div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">▼ DOWN</div> <div style="border: 1px solid black; padding: 2px; width: 40px; margin: 5px auto;">MENU ENTER</div>
4	<p>Ready:</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> <p>Quick Setup Done</p> </div>	<p>Quick Setup is ready. The calculated values are now saved.</p> <p>The operating mode is set to Auto.</p> <p>If an error occurs, the error code E17 is displayed. The limits are then reset. In this case, you must start again from step 1.</p>	
5	<p>Completion commissioning:</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> <p>FIND REF 0 pos</p> </div>	<p>The display from step 4 changes to "Find Ref" after approx. 3 seconds. To initialize the normal operating mode, the reference point must now be approached again. This is now done via the connected command generators in deadman -> If the mechanical stop OPEN was selected as reference, an OPEN command must be issued. If the mechanical stop CLOSED has been selected, a CLOSE command must be issued.</p>	

**IMPORTANT**

After the end positions have been learned during initial startup, the motor load and the power reserve of the operator must be checked.

To do this, change the value in Express menu item 5.6 to „Motor Current“. The motor current is now displayed in amperes on the home screen.

The maximum ampere value for continuous operation can be read on the motor nameplate at 230V.

Depending on local requirements and the ED of the system, the motor current shown in the controller display should not exceed the rated value of the motor.

Short-term exceeding of the nominal value during acceleration travel of the door and / or during positioning travel of the door in the area of the end positions by up to 50% is possible. It is essential to also check the current consumption of the motor during the reference run!

The following applies: The higher the ED / actuation frequency, the lower the value of an exceedance of the rated current indicated on the motor should be.

In case of discrepancies of the indicated current value (e.g. with 0.18 KW MultiMove nominal value 1.3 A, actual motor current permanently 1.7 A) consult Dictator Technik.

7. Setup: Placing into operation with limit switches

7.1 GENERAL INFORMATION


Please note that the Quick Setup is aborted if the position counter is exceeded during setup. Use the «Pulse Count» setting to reduce the number (see System Setup -> Pulse Count -> e.g. 2).

To check whether the positions within the number range of the controller (-32000 - +32000), use System diagnostic -> Position and move the door to fully open and fully closed position in «Dead-man» with the membrane keys.

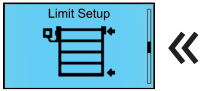
Then check if the value is within the range.












Note: At the start of the teach-in travel, the door/gate should be in the half-open position. If the operator moves against a mechanical stop in the open or closed position during the check of the direction of movement, error messages with abort of the learning travel are possible.

7.2 PREPARATION

Indication	Action
<p>Switching on for the first time:</p> <div data-bbox="90 347 278 459" style="border: 1px solid black; background-color: #00AEEF; color: white; padding: 5px; text-align: center;"> Home Screen E15 </div>	<p>After switching on the controller for the first time, the status "E15" = "Door positions missing" appears in the ready menu.</p> <p>These are programmed via the Quick Setup, as described below.</p>
<p>Setting functionrelevant parameters:</p> <div data-bbox="90 580 278 695" style="border: 1px solid black; background-color: #00AEEF; color: white; padding: 5px;"> System Setup  </div>	<p>Before the actual commissioning, the following function-relevant parameters must be set:</p>
<div data-bbox="116 735 255 807" style="border: 1px solid black; padding: 5px; text-align: center;"> Position Sensor </div>	<p>Choose here in the sub-item "Type" "Limit Switches". When using limit switches, the pulse number 5 must be entered. This is entered under "Pulse Count".</p>
<div data-bbox="116 882 255 954" style="border: 1px solid black; padding: 5px; text-align: center;"> Motor Config </div>	<p>Enter the corresponding motor speed here. This can be found on the rating plate of the motor. The speed is entered in the subitem "Motor speed".</p>

7.3 QUICK SETUP



Step	Indication	Action	
1	Check direction of motor rotation:	Use the UP button to move the door in the "OPEN" direction. Check that the door is moving in the "OPEN" direction. The door stops automatically. Release the button and when the direction is OK, press UP. If wrong, press DOWN. The controller automatically changes the direction of motor rotation.	 
2	Reference run: <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> Quick Setup Reference Run By Deadman 0 </div> <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> Quick Setup Press Menu-Enter To Continue </div>	To initialize the teach-in run, the reference point must first be approached. Note the following: Door position before Pre close limit switch = door moves in direction CLOSED. Door position behind Pre close limit switch (reference switch), i.e. limit switch is actuated = door moves in direction OPEN. If the reference point has been detected (Pre close limit switch), the display changes from "Reference Run By Deadman" to "Press Menu-Enter To Continue". Press now MENU/ENTER.	  
3	"fully open" Position: <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> Open Limit Move Door To Open Limit 0mm </div>	Use the UP key to move the door to the fully open position. The door stops automatically as soon as the limit switch in OPEN has been reached. Save the position by pressing MENU/ENTER.	  
4	"fully closed" Position: <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> Closed Limit Move Door To Closed Limit 0mm </div>	Now move the door to the fully closed position with the DOWN key. The door stops automatically as soon as the limit switch in CLOSED has been reached. Save the position by pressing MENU/ENTER.	  

5	Ready:	<p>Quick Setup is ready. The calculated values are now saved.</p> <p>The operating mode is set to Auto.</p> <p>If an error occurs, the error code E17 is displayed. The limits are then reset. In this case, you must start again from step 1.</p>
	<p>Quick Setup Done</p>	
6	Completion Commissioning:	<p>The display from step 5 changes to "Find Ref" after approx. 3 seconds. To initialize the normal operating mode, the reference point must now be approached again. This is now done via the connected command generators in deadman -> If the mechanical stop OPEN was selected as reference, an OPEN command must be issued. If the mechanical stop CLOSED has been selected, a CLOSE command must be issued.</p>
	<p>FIND REF</p> <p>0 pos</p>	

IMPORTANT



After the end positions have been learned during initial startup, the motor load and the power reserve of the operator must be checked.

To do this, change the value in Express menu item 5.6 to „Motor Current“. The motor current is now displayed in amperes on the home screen.

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The following applies: The higher the ED / actuation frequency, the lower the value of an exceedance of the rated current indicated on the motor should be.

In case of discrepancies of the indicated current value (e.g. with 0.18 KW MultiMove nominal value 1.3 A, actual motor current permanently 1.7 A) consult Dictator Technik.

8. Troubleshooting

8.1 ERROR CODES

Error code	Reason	Check
OV	Overvoltage, either the mains voltage is too high or the deceleration is too fast	
OH	Overheating, the controller is too hot. Check the ventilation. Check parameter $j^*=1$	
OC1	The drive is overloaded. The motor current exceeds the converter power by 210 %	
OC2	The motor current exceeds the inverter power by 150 % for more than 30 seconds	The controller or drive is overloaded. Check for obstacles. Check the operator selection.
OC3	Overcurrent during acceleration, the acceleration is too fast	
OC4	Overcurrent during DC braking	DC braking is too aggressive, reduce parameter h^* .
OC5	Severe overload, possibly permanent damage to the control system	Check whether there is a short circuit or the motor is blocked, the brake does not release or parameter b is set too high.
HE1	Low internal 12 V supply	Check the I/O wiring for a possible short circuit.
HE2	Low internal 24 V supply	Check the I/O wiring for a possible short circuit.
E01	Mechanical overload (slip monitoring) or missing signal from rotary encoder	Check the rotary encoder wiring and for possible mechanical obstacles.
E02	Direction of rotation error	Check the encoder wiring. Check if the number of pulses counts up when the door is opened and counts down when it is closed.
E03	No signal from rotary encoder (only during installation)	Check the wiring to the console and for mechanical obstacles.
E04	Another input than expected has been activated.	Check the position of the reference point.

E05	Reference switch - Short circuit or wire break	Check the reference switch.
E06	The reference switch operates in the wrong position.	When using a rotary encoder, the reference switch has been activated in the wrong position or when using a limit switch, the „Pre close“ limit contact is open.
E07	Running time exceeded.	Check the setting of parameter *6.
E08	The safety edge test failed.	Check the safety edge connections.
E09	Connection error on the safety edge 1.	Check the safety edge 1 connections.
E10	Safety edge 1 has been activated.	Check the door for mechanical obstacles when opening.
E11	Connection error on the safety edge 2.	Check the safety edge 2 connections.
E12	Safety edge 2 has been activated.	Check the door for mechanical obstacles when closing/opening.
E14	Communication error with the absolute limit switch.	Check the wiring to the absolute limit switch.
E15	Reset limit positions failed.	Try to repeat the Quick Setup installation or run Position Setup again.
E17	Fire signal activated.	Check the input signal on “fire” signal.
E18	Xnet-Wireless Airlock could not allow opening.	
E19	Xnet-wireless no response	
E21	SCip-Wireless - Remote timeout	
E22	SCip Wireless - Safety edge timeout	
E23	SCip Wireless - Safety edge connection error	

E24	SCip Wireless - Host connection error	
E25	Safety device test error Ch1	Check that the test signals are connected correctly.
E26	Safety device test error Ch2	Check that the test signals are connected correctly.
E27	Critical entry active when switching on.	Make sure that the inputs are not activated during switching on.
E28	Internal self-test failed - RAM/ROM/EEPROM	Reload door profile - If the problem persists, contact the supplier
E30	Critical input safety tests failed.	Make sure that the monitored inputs are connected to the monitored +24 V supply X5.6 - X5.10.

8.2 REPAIR & MAINTENANCE



WARNING! ELECTRICAL HAZARD!

Disconnect the mains voltage and wait 5 minutes before servicing the high-voltage connections of the motor or door control system

Deadly tension inside:

Do not disassemble the controller to repair it. This is a serious hazard and the job of a qualified technician.

If you need technical assistance or the product is damaged, contact your supplier.

The product should be disposed of and treated as electrical and electronic equipment (WEEE).

9. Technical data

9.1 GENERAL

Ingress Protection code rating	IP 20
Cooling	Internal fan
Installation	wall mounted - non-vibrating
Humidity	RH <90 % (non-condensing)
Ambient operating temperature	-10 °C to +40 °C
Noise level	47 dB (A)
Internal power supply ratings	+24 V/0.5 A - fused - monitored / +12 V/0.2 A - current limited - monitored
Mains input	Mains voltage: 207 to 244 VAC Frequency: 50/60 Hz Recommended fuse: 16 A

9.2 OUTPUTS

Face plate		
X2.1	24 V output for RS485 connection	
X3.7	24 V output for photocells and light curtains	
X5.1 to X5.5	24 V outputs for general purpose	
X5.6 to X5.10	24 V outputs switchable for safety check	
X6.1 to X6.10	4 x general purpose relays	Relay ratings: 1 A @ 24 VDC (non-inductive)
Bottom plate		
R and R	Brake resistor output	Recommended resistor specifications: Under 4 kW - 200 Ω/200 W Over 4 kW - 100 Ω/400 W
U, V and W	Motor output terminals	Performance level d, category 2 Motor speed is monitored by external encoder signal feedback and compared to output speed.
1 to 3	Power relay terminals	max. 5 A @ 240 VAC
Top plate		
L and N	Mains connection 230 VAC model	1 phase

9.3 INPUT

Face plate		
X1.1 to X1.4	Safety edge connection	Performance level d, category 2 X1.2 and X1.4
X1.5 to X1.10	Incremental encoder and reference connection	Performance level d, category 2 Emergency Stop input must be supplied from X5.6 to X5.10 to enable self test
X2.1 to X2.5 (X2 A)	General purpose inputs	12 to 24 V tolerable
X2.6 to X2.10 (X2 B)	RS485 communications	Terminated with 120 Ω
X3.1 to X3.10	Photocell connection	X3.4 and X3.6 Performance level d, category 2 NPN1 is used for testing light curtain. NPN output max. ratings: Open collector max. 30 VDC, 50 mA non-inductive
X4.1 to X4.10	General purpose inputs	12 to 24 V tolerable

10. Appendix

10.1 DECLARATION OF INCORPORATION



EC Assembly Instructions acc. to Directive 2006/42/EC of the European Parliament, Attachment II B

We hereby declare, the distributor

Dictator Technik GmbH
 Gutenbergstr. 9
 D - 86356 Neusäß

that the partly completed machinery

Control Unit SQUARE 940-2
 Serial-No.: 00000....99999

meet the following basic requirements of the guideline:

- EC Machinery Directive (2006/42/EG)
- EMC (DIN EN IEC 61000-6-2 version: 2019-11 and DIN EN 61000-6-3, version: 2011-09)
- DIN EN 60335-1 Household and similar electrical appliances - Safety - Part 1: General requirements
- Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods (DIN EN 61800-3, version: 2005-07)
- DIN EN 12453 Safety in use of power operated doors - requirements
- DIN EN ISO 13849-1 Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design

For this product the special technical documents were prepared in accordance with Attachment VII, part B. Upon justifiable request from an individual national location, these documents can be sent by our documentary department.

It is forbidden to put this product into operation until the machine or the equipment system in which this product is to be installed or of which it represents a component meet the provisions of all relevant directives.

Person who is authorized to assemble the technical documents:

Mr. Lang (CE-Representative)

Assembly Instruction issued:

Neusäß, 18.12.2019

Stephan Lang

(City/Date of issue)

(Name/Signature)