KEYSTONE FIGURE 784 MASTERMIND HYGIENIC PRODUCTS

The F784 control head is a plug-in Automated Valve Interface Device (AVID), allowing direct connection to both digital hard wired and networked PLC control systems.
For DIGITAL hard wired and BUS control interfaces.

FEATURES

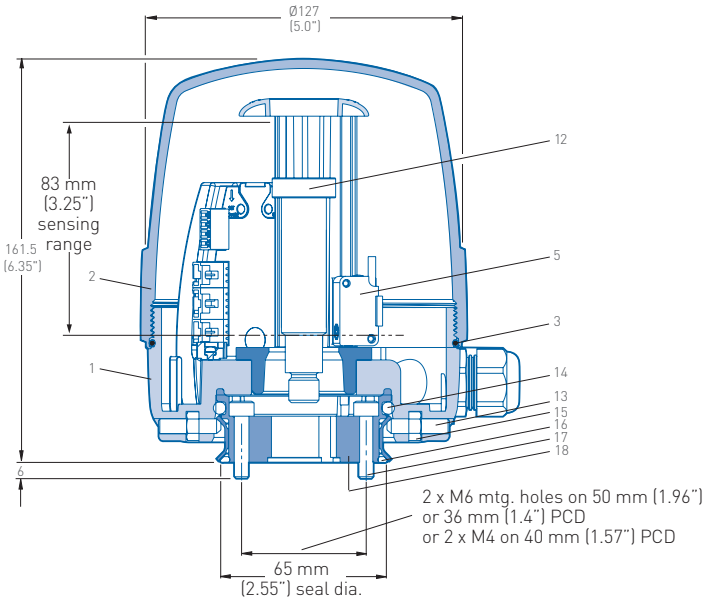
- 12-30 V DC or BUS specific voltages.
- World recognized BUS protocols.
- Keystone technology.
- Modular design.
- 5/2 solenoid or 3 x 3/2 solenoids.
- Up to 4 limit switches/sensor inputs depending on version.
- 2 wire auxiliary switch input also available.
- Quick snap on fit switch mounting.
- Fully adjustable limit switches through 10-100 mm stroke.
- Plug-in control module, switches and solenoids.
- Linear and rotary configuration.
- Robust IP67 enclosure.
- Enclosure safety vent.
- High visibility external valve status LED indicators.
- Indication configurable for extend or retract operation.
- Low power consumption.
- Built in short circuit protection.

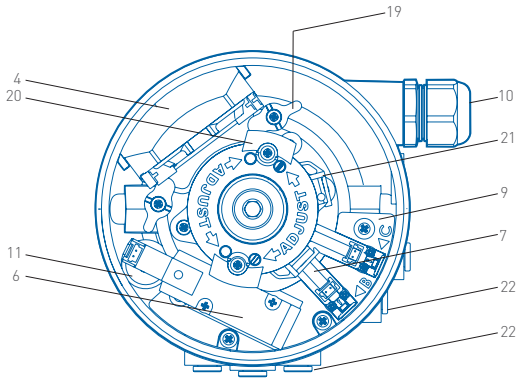
GENERAL APPLICATIONS

- Breweries
- Dairy industry
- Wineries
- Canneries
- Food processing
- Pharmaceuticals
- Chemical industries
- Beverages
- Any industry where direct valve control is desired

TECHNICAL DATA

Body material:	GF nylon
Air connection:	6 mm or ¼"
Pressure range:	100 to 700 kPa (14 to 100 psi)
C_v rate:	up to 700 l/min
Operating temperature:	-10°C to +50°C (14°F to 122°F)
Storage temperature:	-10 to +65°C (14°F to 149°F)
Area classification:	IP67
Operating voltage:	24 V DC or BUS powered
Electrical connection:	various





PARTS LIST

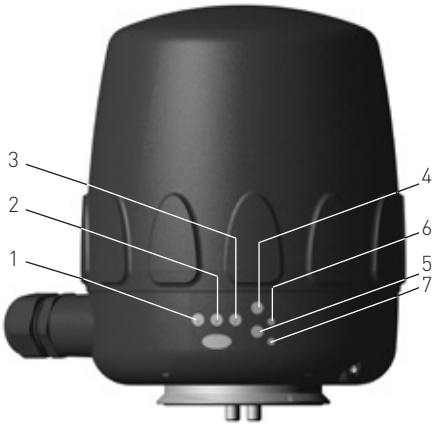
No.	Description	Material
1	Control head base	GF nylon
2	Control head cap	GF nylon
3	Control head cap O-ring seal	EPDM
4	Control module	Various
5	Position sensor (proximity type)	Various
6	Main solenoid valve (std. 3/2)	Various
7	Seat lift aux. solenoid valve (std. 3/2)	Various
8	Main solenoid valve (option 5/2)	Various
9	Solenoid manifold	GF nylon
10	M20 cable gland	Polymer
11	Pressure relief valve - not shown	W. nr. 1.4404 / Santoprene®
12	Sensor target	W. nr. 1.4404
13	Grub screw M6 x 20	A2
14	Adaptor O-ring seal	EPDM
15	Hex nut M6	A2
16	Adaptor gasket seal	Santoprene®
17	M6 or M4 cap screw	A2
18	Mounting adaptor	GF nylon
19	Module retaining latches	Polymer
20	Switch tower	Polymer
21	Switch holder	Polymer
22	Air fittings	SS/NPB

TECHNICAL SPECIFICATIONS

LED indication functions	
1 Green	Power ON
2 Red	BUS status or auxillary input is made (See module specific tech sheet)
3 Amber	Main solenoid energized
4 Upper bi-color (configurable to display green or red)	Upper limit switch made
5 Lower bi-color (configurable to display green or red)	Lower limit switch made
6 Upper small amber	Upper seat lift solenoid energized
7 Lower small amber	Lower seat lift solenoid energized

Control head housing	
Type	For linear and rotary actuators
Enclosure rating	IP67
Visual status indication	Yes
Impact/drop test	IEC 28-2-32
Chemical resistant	Yes
Safety vented	Yes
Module	(See module specific tech sheet)
Proximity sensor std.	
Model	IS5092
Type	Inductive
Sensing range	2 mm

Solenoid	**Main (std.)**	**Main (option)**	**Seat lift (aux.)**
Model	SYJ714	SYJ5153	V114A
Type	3/2	5/2 with speed controls	3/2
Supply voltage	24 V DC	24 V DC	24 V DC
Power consumption	0.4 W	0.4 W	1.1 W
Flow rate	C_v = 0.69 - 0.71	C_v = 0.19 - 0.21	C_v = 0.016
Ambient temperature	Max 50°C (122°F)		
Air pressure	100/700 kPa (14.5/101.5 psi)		
Allowable voltage	±10% rated voltage		



NOTES

- When a 5/2 main solenoid is selected no auxiliary solenoids are possible.
- Keystone actuators are factory lubricated and do not need lubricated air. The use of synthetic oils and some mineral oils are known to be damaging to polymer components. Keystone therefore recommends that clean dry air be used.

KEYSTONE FIGURE 784 MASTERMIND HYGIENIC PRODUCTS
DIGITAL CONTROL MODULE

The F784 Digital control module is for use in the F784 Mastermind AVID control head and is connected via hard-wired I/O to a PLC.

FEATURES

- Easy fit, with simple toggle latch retainers.
- Hard-wired I/O control system.
- Compatible with most common PLC's.
- Plug-in switches and solenoids.
- Fully adjustable limit switches.
- Electronics (conformal coated).
- High visibility power and valve status LED indicators.
- 4 limit switch/sensor inputs.
- 3 solenoid outputs.
- Low power consumption, under 70 mA in normal operational mode (main solenoid energized, 1 input sensor on).
- Built-in short circuit protection to 250 mA on any output.
- External LED indication of valve position, power and solenoid status.
- Switcheable valve mode NC (Down) or NC (Up).
- Customers preference for field connections.
  - Flying lead with connector.
  - Bulkhead fitted socket.
  - Open wiring system using standard cable gland.

APPLICATION AREA
This device has been designed for use in any industry where hard-wired digital control is desired, such as the food, beverage and pharmaceutical industries.

I/O DESCRIPTIONS

NOTE: Also see wiring and connectors

Hard-wired inputs

Input 1: Upper limit switch, LED indication at front of module (3 wire connection)
Input 2: Lower limit switch, LED indication at front of module (3 wire connection)
Input 3: Auxiliary limit switch, LED indication at front of module (3 wire connection)
Input 4: Auxiliary input, Ideal for an external sensor, such as seat lift confirmation/ flow indication, no external indication (2 wire connection)

Hard-wired outputs

Output 1: Main cylinder solenoid
Output 2: Lower seat lift solenoid
Output 3: Upper seat lift solenoid

VALVE MODE SELECTION

There are two possible 'valve modes' NC and NO for the F784 Digital module, see the installation instruction for details on how to set these.

LED INDICATORS

Green: (far left)
On constantly while power is applied to device

Red: (2nd from left) auxiliary limit switch
On if auxiliary limit switch fitted, and contact made

Amber large: (3rd from left)
Indicates (output 1) is on and main solenoid is energized

Bi-color upper: 4th from left (top) valve status 'closed'
Indicates (input 1) upper limit switch contact made (switcheable to display green or red)

Bi-color lower: 4th from left (bottom) valve status 'open'
Indicates (input 2) lower limit switch contact made (switcheable to display green or red)

Amber small: far right (bottom) lower seat lift
Indicates (output 2) is energized

Amber small: far right (top) upper seat lift
Indicates (output 3) is energized

General characteristics	
Power supply	24 V DC
Number of devices	Limited by power supply
Typical load current situations in (mA)	
1 input, no outputs (normal valve closed situation) Main solenoid OFF with 1 proximity ON	35 mA
1 input, 1 output (normal valve open situation) Main solenoid ON with 1 proximity ON	53 mA
1 input, 1 output (normal valve cleaning situation) Main solenoid OFF, with 1 seat lift solenoid and 1 proximity ON	74 mA

ENCLOSURE ENVIRONMENT SPECIFICATIONS

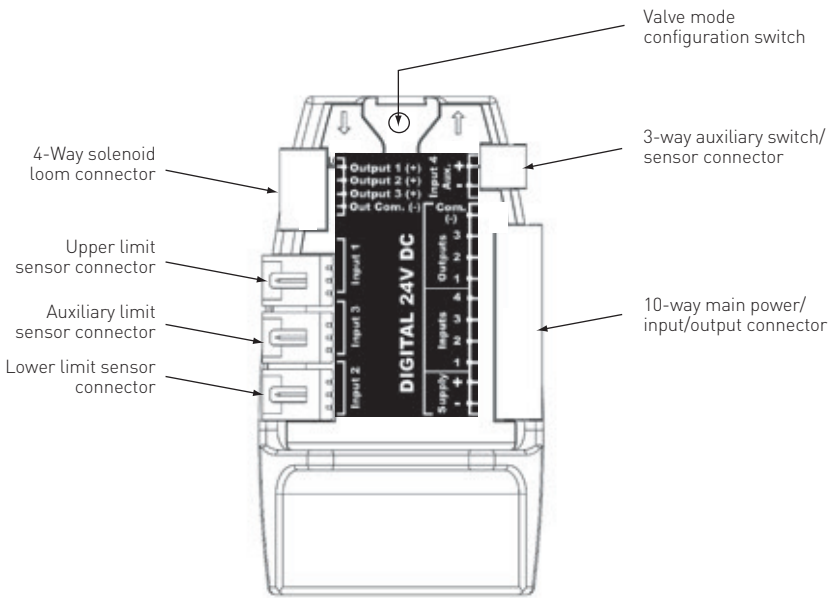
Operating temperature: -10°C to +50°C (14°F to 122°F) (non condensing)
Storage temperature: -10°C to +65°C (14°F to 149°F)
Protection class: IP67
EMC directive: 89/336/EEC (DC only)

WIRING AND CONNECTORS

Terminal	AC	DC(PNP)	DC(NPN)
1	N	-	+
2	P	+	-
3	Upper input 1 signal		
4	Lower input 2 signal		
5	Aux. input 3 signal		
6	Aux. input 4 signal		
7	Solenoid (main [+])		
8	Solenoid (lower seat lift [+])		
9	Solenoid (upper seat lift [+])		
10	Solenoid (common [-])		

NOTE

If 9 core wire control is required, the negative (-) terminal 10 of the solenoid may be connected via a suitable jumper, to the matching polarity terminal at 1 or 2 respectively. 7 core wire control can also be achieved if auxiliary inputs 3 and 4 are not connected.



KEYSTONE FIGURE 784 MASTERMIND HYGIENIC PRODUCTS
AS-INTERFACE CONTROL MODULE

The F784 AS-Interface control module is for use in the F784 Mastermind AVID control head and is connected via an AS-Interface master to a PLC.

FEATURES

- Fully AS-Interface V3.0 compatible A/B slave device (max. 62 slaves).
- Easy fit, with simple toggle latch retainers.
- 3 limit switch/sensor inputs.
- 3 solenoid outputs.
- Low power consumption, under 70 mA in normal operational mode (main solenoid energized, 1 input sensor on).
- BUS powered with external power option.
- Built-in short circuit protection to 250 mA on any output.
- External LED indication of valve position, solenoid status and fault status.
- Internal open/closed limit fault timers.
- Double indication/error indication
- Plug-in switches and solenoids.
- Fully adjustable limit switches.
- Electronics (conformal coated).
- Configurable valve mode. NC (Down) or NC (Up)
- Customers preference for field connections.
  - Flying lead with connector.
  - Bulkhead fitted socket.
  - Open wiring system using standard cable gland.

APPLICATION AREA
This device has been designed for use in any industry where a simple BUS network control is desired, such as the food, beverage and pharmaceutical industries.

AS-INTERFACE 4 IN/3 OUT BIT-MAPPING

AS-Interface inputs

I0 (input 1)*	Upper limit switch
I1 (input 2)*	Lower limit switch
I2 (internal)	Fault indication
I3 (input 3)*	Auxiliary input switch

The fault indication bit is set in the following circumstances:
1. The main solenoid output is de-energized and the closed limit switch is not made and the FTC timer has expired.
2. The main solenoid output is energized and the open limit switch is not made and the FTO timer has expired
3. Both limit switches are made at the same time (double indication) under this condition both position indicators flash RED.

AS-Interface outputs

O0 (output 1)*	main cylinder solenoid
O1 (output 2)*	lower seat lift
O2 (output 3)*	upper seat lift

( )* Refers to the physical I/O labeling as referenced on the picture adjacent.

LED INDICATORS

Green: (far left)
On constantly while power is applied to device

Red: (2nd from left) BUS fault,
On while AS-Interface communication error or address = 0

Amber: (3rd from left)
Indicates O0 (output 1)* is energized

Bi-color upper:
4th from left (top) valve status 'closed'
Indicates upper limit switch (programmable to display green or red)

Bi-color lower:
4th from left (bottom) valve status 'open'
Indicates lower limit switch (programmable to display green or red)

Amber small: far right (bottom) lower seat lift
Indicates O1 (output 2)* is energized

Amber small: far right (top) upper seat lift
Indicates O2 (output 3)* is energized

General characteristics	
Power supply (BUS powered)	18.5 to 31.6 V DC
Optional external power supply	18.5 to 31.6 V DC
Number of slaves	62
Data cycle time for A+B slaves	10 ms (max.)
Typical load current situations in (mA)	
1 input, no outputs (normal valve closed situation)	35 mA
Main solenoid OFF with 1 proximity ON	(34 mA)*
1 input, 1 output (normal valve open situation)	63.5 mA
(Main solenoid ON with 1 proximity ON)	(55 mA)*
1 input, 1 output (normal valve cleaning situation)	93.5 mA
Main solenoid OFF, with 1 seat lift solenoid and 1 proximity ON	(83 mA)*

( )* Denotes load with auxiliary power option

AS-INTERFACE INPUT BIT ASSIGNMENT

There are two possible "device modes" for the F784 AS-Interface module, these are selected using the push buttons at the back of the module, see the installation instruction for more details on how to set these.

Mode – N/C UP	Switch state	AS-Interface bit 0	AS-Interface bit 1
Switch input 1	ON	SET	-
(Upper switch)	OFF	UNSET	-
Switch input 2	ON	-	SET
(Lower switch)	OFF	-	UNSET
Mode – N/C DOWN	**Switch state**	**AS-Interface bit 0**	**AS-Interface bit 1**
Switch input 1	ON	-	SET
(Upper switch)	OFF	-	UNSET
Switch input 2	ON	SET	-
(Lower switch)	OFF	UNSET	-

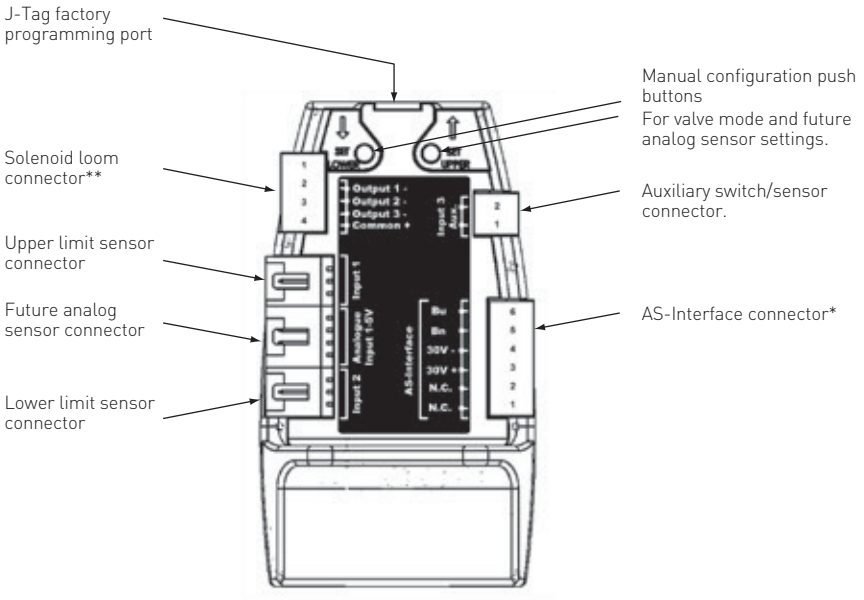
Timer (seconds)	Parameter bit P0	Parameter bit P1
20.0	×	×
15.0	×	0
10.0	0	×
7.5	0	0

PARAMETER WORD BIT-MAPPING

The Fail to Open/Close timer is set according to the following parameter bit settings, see the installation instruction for more details how to set these.

ENCLOSURE ENVIRONMENT SPECIFICATIONS

Operating temperature:	-10°C to +50°C (14°F to 122°F) (non condensing)
Storage temperature:	-10°C to +65°C (14°F to 149°F)
Protection class:	IP67
EMC Directive:	89/336/EEC



WIRING AND CONNECTORS

Term	AS-Interface
1	Not connected
2	Not connected
3	External 24 - 30 V DC +ve (in)
4	External 24 - 30 V DC –ve (in)
5	BUS +ve (brown)
6	BUS –ve (blue)

NOTES

* If 5 and 6 only are connected, then module is BUS powered.

** If external power source is connected to 3 and 4 then module auto switches to draw from external power source.

SELECTION GUIDE

Example:					F784	24	DC	P	M	1S B	2PI	CGE	M	TU
Figure number														
F784														
Module voltage/Module interface														
24	24 V (std)													
AS-I	AS-Interface													
D-NET	DeviceNet													
Voltage type:														
DC	DC (std)													
Junction type - only relevant to DC rated heads														
P	PNP (std)													
N	NPN													
Interface connection														
M	Module included (std)													
T	Terminal block included													
-	If blank space filler is used, module is not included													
Number of solenoids and type: e.g. 1S = 1 solenoid														
A	5/2													
B	3/2 (std)													
X	Blank plate fitted													
-	If blank space filler is used, no blanking plate fitted													
Number and type of sensors: e.g. 2M = 2 micro switches														
A	Air switch													
M	Micro switch													
N	Namur sensor (6-12 V DC input stated at highest input level)													
PI	Prox. IFM (std)													
PS	11 mm 'barrel' prox. c/w 2 m cable and stainless steel body													
R	Reed switch													
Electrical connection: primary														
AMP	Amphenol plug													
BH4	4 pin M12 bulk head													
BH5	5 pin M12 bulk head													
BHV	4 pin M12 bulk head c/w Vampire plug													
CG	Cable gland supplied (define size with a third letter from below list)													
	A	PG7	**F**	M25										
	B	PG9	**G**	PG16 cable gland c/w cable insert										
	C	PG16	**H**	M20 c/w 2 cable insert										
	D	M16	**K**	PG16 to PG9 reducer c/w PG9 cable gland										
	E	M20 (std)												
M20	Tapped M20 thread only													
Air connection														
M	Metric tubing 6 mm (std)													
I	Imperial tubing 1.4"													
X	Air ports blanked													
Accessories or extended definer														
Cx	x denotes length of cable in meters													
FS	Auxiliary cable gland													
TB	8701 tank bottom configuration													
TU	Turck cordset 1 m length													

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