

ABSOLUTE PRESSURE TRANSMITTER (DIRECT MOUNT TYPE)

DATA SHEET
FKH...6

The FKH model of FCX-A IV series of pressure transmitters direct mount type accurately measures absolute pressure and transmits a proportional 4-20 mA output signal.

The transmitter uses an unique micro-capacitive silicon sensor in combination with a state-of-the-art digital signal processing to provide exceptional performances in terms of accuracy and stability.

FCX-A IV series of pressure transmitters comply with Safety Integrity Level2 or 3 according to IEC 61508 and IEC61511 standards.



FEATURES

1. High accuracy

The Fuji Electric's micro-capacitive silicon sensor provides in standard $\pm 0.2\%$ accuracy for all elevated or suppressed calibration ranges without additional adjustments.

2. Minimum inventory and design

Electronics parts, local indicators and electronics housing are interchangeable among all FCX-A IV transmitters.

3. Minimum environmental influence

The Advanced Floating Cell technology provides a high immunity against temperature variations and overpressure commonly found in the process industry and substantially reduces the overall measurement error.

4. HART 7 communication protocol

FCX-A IV series of pressure transmitters can communicate using the universal HART communication protocol.

By the use of the HART Device Description files, HART compatible devices can communicate with any FCX-A IV transmitter.

5. Application flexibility

Various options are available to address most of the process industry applications, including:

- Full range of hazardous area approvals
- Built-in RFI filter and lightning arrester
- 5 digits local display with engineering units
- Stainless steel electronics housing
- Wide selection of wetted part materials

6. Programmable output Linearization Function

The output signal can be linearized using up to 14 pair-points.

7. Burnout current flexibility

The burnout current value can be adjusted in the ranges of [3.4 ; 3.8] and [20.8 ; 22.5] mA and can be compliant with NAMUR NE43 recommendations.

8. Contactless local adjustment

An optional local configurator with 3 magnetic switches allows to configure the transmitter without opening the indicator cover (flameproof approvals for hazardous locations).

The Magnetic pen is required to enable the 3 magnetic switches (Please refer to ACCESSORIES).

FUNCTIONAL SPECIFICATIONS

Type:

FKH : Smart, 4-20mA with HART communication protocol

Service:

Liquid, gas, or vapour

Span, range, and overrange limit:

Model	Span limits kPa abs {bar abs}		Range limits kPa abs {bar abs}	Overrange limit MPa {bar}
	Min.	Max.		
FKH□02	8.125 {0.08125}	130 {1.3}	0 to 130 {0 to 1.3}	0.5 {5}
FKH□03	31.25 {0.3125}	500 {5}	0 to 500 {0 to 5}	1.5 {15}
FKH□04	187.5 {1.875}	3000 {30}	0 to 3000 {0 to 30}	9 {90}

Note: Span higher than 1/10 of the URL is recommended for optimal accuracy.

Output signal:

4-20 mA with HART communication protocol.

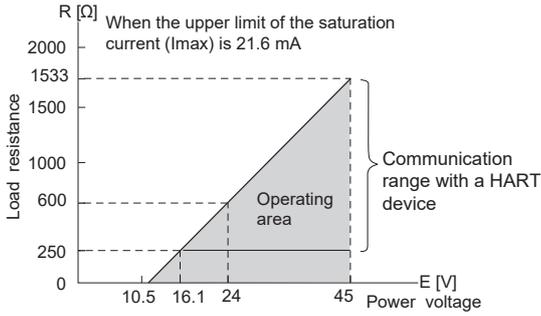
Power supply:

10.5 to 45 V DC at transmitter terminals.

10.5 to 32 V DC with the optional arrester.

Refer to hazardous location table for specific limitations

Load limitations: see figure below



Note 1 : The load resistance varies with the upper limit of the saturation current [I max]

$$R [\Omega] = \frac{E [V] - 10.5}{(I \text{ max} [\text{mA}] + 0.9) \times 10^{-3}}$$

Note 2 : For communication with a HART device, a minimum load of 250Ω is required.

Hazardous locations:

Marking (Digit 10 th)	Protection type			
ATEX	K	Intrinsic Safety "i"		
		Ex II1 G/D		
		Ex ia IIC T4 Ga (Ta: -40°C to +60°C)		
		Ex ia IIC T5 Ga (Ta: -40°C to +50°C)		
		Ex ia IIIC T ₂₀₀ 135°C Da (Ta: -40°C to +60°C)		
		Ex ia IIIC T ₂₀₀ 100°C Da (Ta: -40°C to +50°C)		
		Ui = 28Vdc, li = 110mA, Pi = 0.77W		
		Ci = 14.9nF (without optional Arrester)		
		Ci = 26.0nF (with optional Arrester)		
		Li = 0.181mH		
	IP66/67			
	X	Flameproof Enclosure "d"		
		Ex II2 G		
		Ex db IIC T6...T4 Gb		
		Temperature class	Ambient temperature	Process temperature
		T6	-40°C to +65°C	-40°C to +85°C
		T5	-40°C to +85°C	-40°C to +85°C
IP66/67				
M	Combination (K) + (X) pending			
IECEX	T	Intrinsic Safety "i"		
		Ex ia IIC T4 Ga (Ta: -40°C to +60°C)		
		Ex ia IIC T5 Ga (Ta: -40°C to +50°C)		
		Ex ia IIIC T ₂₀₀ 135°C Da (Ta: -40°C to +60°C)		
		Ex ia IIIC T ₂₀₀ 100°C Da (Ta: -40°C to +50°C)		
		Ui = 28Vdc, li = 110mA, Pi = 0.77W		
		Ci = 14.9nF (without optional Arrester)		
		Ci = 26.0nF (with optional Arrester)		
		Li = 0.181mH		
		IP66/67		
	R	Flameproof Enclosure "d"		
		Ex db IIC T6...T4 Gb		
		Temperature class	Ambient temperature	Process temperature
		T6	-40°C to +65°C	-40°C to +85°C
		T5	-40°C to +85°C	-40°C to +85°C
		IP66/67		
	N	Combination (T) + (R) pending		

cCSAus pending	Intrinsic Safety/Non-Incendive
J	IS Class I Division 1 Groups ABCD Ex ia
	Class II Groups EFG, Class III
	NI Class I Division 2 Groups ABCD
	T4 (-40°C ≤ Ta ≤ +60°C)
	T5 (-40°C ≤ Ta ≤ +50°C)
	Ui = 28Vdc, li = 110mA, Pi = 0.77W
	Ci = 14.9nF (without optional Arrester)
Ci = 26.0nF (with optional Arrester)	
Li = 0.181mH	
E	Flameproof Enclosure
	XP Class I Division 1 Groups CD
	Class II Groups EFG, Class III
	T6 (-40°C ≤ Ta ≤ +65°C)
	T5 (-40°C ≤ Ta ≤ +85°C)
	T4 (-40°C ≤ Ta ≤ +60°C)
Vmax = 45Vdc	
L	Combination (J) + (E)

Configuration:

Configuration of the FCX-A IV series of pressure transmitters can be carried out by either using a HART device or the optional local configurator.

A third party HART device can be used in combination with Fuji Electric FCX-A IV HART Device Description files. (<https://fieldcommgroup.org>).

Functions	HART Protocol		Local configurator	
	Display	Set	Display	Set
Tag Nb	✓	✓	✓	✓
Model Nb	✓	✓	✓	✓
Serial Nb & Software revision	✓	—	✓	—
Engineering units	✓	✓	✓	✓
Upper Range Value	✓	—	✓	—
Measuring Range	✓	✓	✓	✓
Damping	✓	✓	✓	✓
Output signal type	Linear	✓	✓	✓
	Square Root	✓	✓	✓
Burnout current	✓	✓	✓	✓
Calibration	✓	✓	✓	✓
Output Adjust	—	✓	—	✓
Measuring Value	✓	—	✓	—
Self Diagnosis	✓	—	✓	—
External Adj Screw Lock	✓	✓	✓	✓
Transmitter Display	✓	✓	✓	✓
Linearization	✓	✓	✓	✓
Rerange	✓	✓	✓	✓
Saturation Current	✓	✓	✓	✓
Write Protect	✓	✓	✓	✓
History				
– Calibration History	✓	✓	✓	✓
– Ambient T° History	✓	—	✓	—

Zero and span adjustment:

Zero and span are remotely adjustable by a HART device or locally by the local configurator or the external adjustment screw.

Damping:

The damping time constant can be adjusted within the range of [0.04 to 32] seconds.

Zero elevation/suppression:

Zero can be adjusted within the range of 0 kPa abs to 100% of the URL of the sensor.

Normal/reverse action:

Selectable by range setting

Local indicator:

Optional 5-digits LCD or local configurator with 3 magnetic switches and push-buttons.

A magnetic pen is required to enable this local configurator function.

(Please refer to the ACCESSORIES section.)

Saturation currents:

Lower limit: 3.6 to 4.0mA, Default value: 3.8mA

Upper limit: 20.0 to 21.6mA, Default value: 20.8mA

Burnout direction and output current:

In the self-diagnostic functions detect a transmitter failure, the burnout function will drive the output signal to either "Output Hold", "Output Overscale" or "Output Underscale" modes.

When "Output Hold":

The output signal is held as the latest value just before the failure happens.

When "Output Overscale":

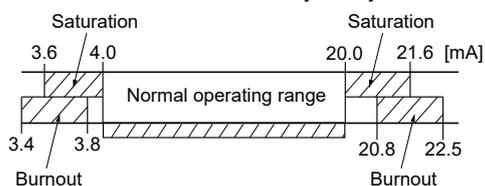
The output signal is set within the range of [20.8 to 22.5] mA, Default value: 21.6mA

When "Output Underscale":

The output signal is set within the range of [3.4 to 3.8] mA, Default value: 3.6mA

IEC 61511 considerations:

For safety applications, the "Output Hold" MUST NOT be used. Only "Output Overscale" and "Output Underscale" must be used to clearly notify a "failure" state.

**Loop-check / fixed output current:**

The transmitter can be configured to provide a constant output signal from 3.4 up to 22.5 mA.

Temperature limit:

Ambient

-40 to +85°C

-20 to +80°C (with optional LCD unit)

-40 to +60°C (with optional arrester)

Please refer to the hazardous locations table for ambient temperature limitations according to the standard and type of protection.

Process: -40 to +85°C for silicone fill sensor

Storage: -40 to +90°C

Humidity limit:

0 to 100% RH (Relative humidity)

PERFORMANCE SPECIFICATIONS

Reference conditions, silicone oil filling, SS 316L isolating diaphragms, 4-20 mA analog output in linear mode.

Accuracy rating:

(including linearity, hysteresis, and repeatability)

For spans greater than 1/10 of URL:

±0.2% of span

For spans below 1/10 of URL:

± (0.1+0.01 $\frac{\text{URL}}{\text{Span}}$) % of span

Stability:

±0.2% of Upper range limit (URL) for 10 years

(In case of 6th digit code "3", "4")

Temperature effect:

Effect per 28°C change between the limits of -40°C and +85°C

Zero shift: ±(0.4+0.2 $\frac{\text{URL}}{\text{Span}}$)% / 28°C

Total effect: ±(0.475+0.2 $\frac{\text{URL}}{\text{Span}}$)% / 28°C

Overrange effect:

Zero shift: 0.3% of URL for any overrange to maximum limit

Supply voltage effect:

Less than 0.005% of calibrated span per 1 V

Update rate:

40 msec

Turn on time:

6 sec

Response time: (63,3% of output signal without damping)

Time constant: 0.08sec (at 23°C)

Dead time: about 0.06 sec

Response time = time constant + dead time

Electromagnetic compatibility:

FCX-A IV transmitters are in accordance with the following harmonized standards:

EN 61326-1

EN 61326-2-3

EN 61326-3-1

RFI effect:

< 0.2% of the URL for the frequencies from 20 up to 1000 MHz with an electrical field strength of 10 V/m and housing covers in place. (Classification : 2-abc : 0.2% of span according SAMA PMC 33.1).

Mounting position effect:

Zero shift:

Less than 0.1kPa (1mbar) for a 10° tilt in any position.

This error can be corrected by adjusting zero.

No effect on span.

Vibration effect:

< ±0.25% of spans for spans greater than 1/10 of URL.

Frequency 10 to 150 Hz, acceleration 29.4 m/sec²

Dielectric strength:

500 V AC, 50/60Hz 1 min., between circuit and earth (except with the optional arrester)

Insulation resistance:

More than 100 MΩ at 500 V DC.

Internal resistance for external field indicator:

12Ω Max (connected to test terminal CK+ and CK-)

Pressure equipment directive (PED) 2014/68/EU:

According to Article 4.3

PHYSICAL SPECIFICATIONS

Electrical conduit entry:

1/2-14 NPT, M20 × 1.5 or Pg13.5

Process connections:

1/2-14 NPT, 1/4-18 NPT, Rc 1/2, G 1/2 A manometer fitting, M20 × 1.5.

Process-wetted parts material:

Material code (7th digit in model code)	Process cover	Diaphragm	Wetted sensor body	Vent/drain
J	SS 316L	SS 316L + gold coating	SS 316L	SS 316L
V	SS 316L	SS 316L	SS 316L	SS 316L

Non-wetted parts material:

Electronics housing:

Low copper die-cast aluminum alloy finished with polyester coating (standard), or SS 316(L) (option).

Fill fluid:

Silicone oil

Mounting bracket:

SS 316L

Environmental protection:

IEC IP66 & IP67 and Type 4X

Mounting:

DN50(2") pipe or wall mounting using the mounting bracket.

Direct to process cover connections without the mounting bracket.

Mass {weight}:

Transmitter only: 1.7 kg without options.

Add: 0.2 kg for indicator

0.5 kg for mounting bracket

2.0 kg for stainless steel housing (option)

ACCESSORIES

Magnet pen:

To be used with the 3 push-buttons optional indicators.

Order number = ZZP*TQ507742C1

Two valve Manifold:

Available in SS 316 and pressure rating 10 MPa (100bar).

OPTIONAL FEATURES

Local indicator:

An optional 5 digit indicator with engineering units is available.

A local configurator can be carried out using the 3 magnetic switches and push-buttons.

A separately ordered magnet pen is required for adjustment using the magnetic 3-push buttons.

See the accessories section.

Arrester:

A built-in arrester protects the electronics from lightning surges.

Lightning surge immunity: ± 4 kV ($1.2 \times 50 \mu\text{s}$)

Degreasing:

Process-wetted parts are cleaned and the filling fluid is standard silicone oil.

Not for use with oxygen or chlorine presence.

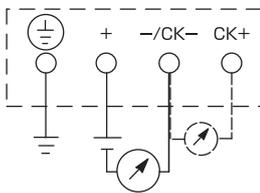
NACE specification:

Metallic materials for all pressure boundary parts comply with NACE MR 0175/ISO 15156.

Optional tag plate:

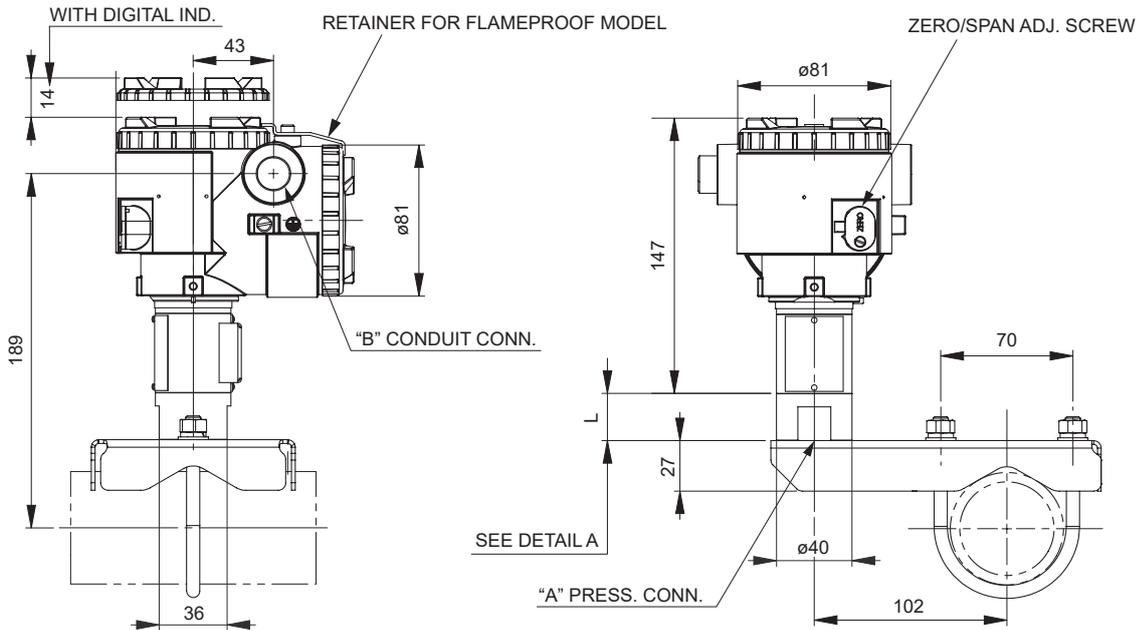
An extra stainless steel tag plate with customer tag data is wired to the transmitter.

CONNECTION DIAGRAM

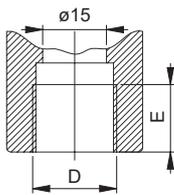


OUTLINE DIAGRAM (Unit : mm)

<L SHAPE> <4TH DIGIT CODE: T, V, W>



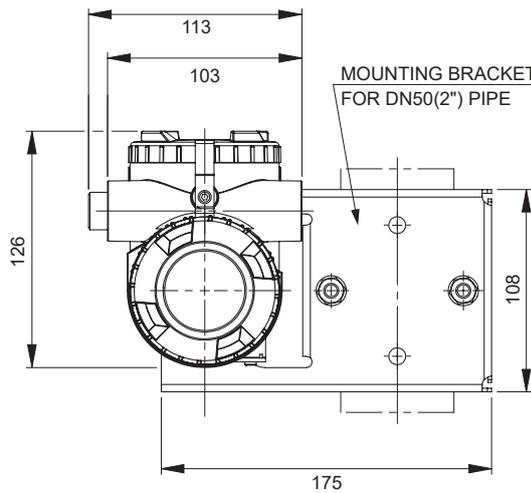
DETAIL "B"
(CONDUIT CONN.)



SEE TABLE 1

4TH MODEL CODE	CONDUIT CONNECTION	
	D	E
T	1/2-14NPT	16
V	Pg13.5	10.5
W	M20×1.5	16

TABLE 1



DETAIL "A"
(PRESS. CONN.)

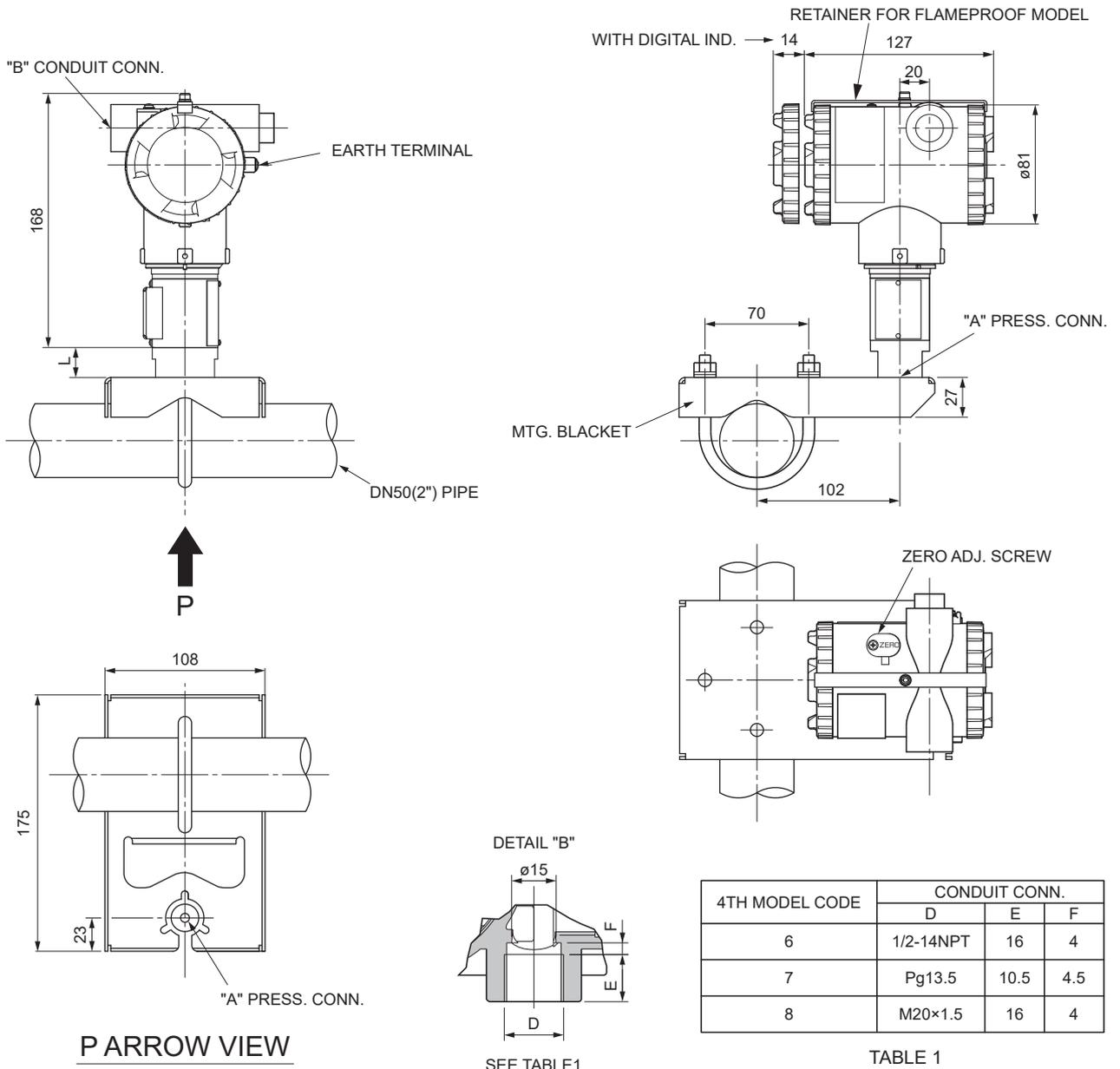
14TH MODEL CODE	Y	B	C	D	E	F
DIMENSIONS						
	J	1/2-14 NPTI	Rc 1/2	1/4-18 NPTI	1/2-14 NPTE	G1/2 A

TABLE 2

- WEIGHT : - 1.7 kg (WITHOUT OPTION)
 ADD : - 0.2 kg FOR INDICATOR
 - 0.5 kg FOR MOUNTING BRACKET
 - 2.0 kg FOR STAINLESS STEEL HOUSING OPTION

OUTLINE DIAGRAM (Unit : mm)

<T SHAPE> <4TH DIGIT CODE: 6, 7, 8>



4TH MODEL CODE	CONDUIT CONN.		
	D	E	F
6	1/2-14NPT	16	4
7	Pg13.5	10.5	4.5
8	M20×1.5	16	4

TABLE 1

P ARROW VIEW

SEE TABLE1

DETAIL "A"
(PRESS. CONN.)

14TH MODEL CODE	Y	B	C	D	E	F
DIMENSIONS						
	J	1/2-14 NPTI	Rc 1/2	1/4-18 NPTI	1/2-14 NPTE	G1/2 A

TABLE2

- WEIGHT : - 1.7 kg (WITHOUT OPTION)
 ADD : - 0.2 kg FOR INDICATOR
 - 0.5 kg FOR MOUNTING BRACKET
 - 2.0 kg FOR STAINLESS STEEL HOUSING OPTION



Fuji Electric France S.A.S.

46 rue Georges Besse - ZI du brézet - 63039 Clermont ferrand

Tél : 04 73 98 26 98 - Fax : 04 73 98 26 99

Mail : sales.dpt@fujielectric.fr - web : www.fujielectric.fr

Fuji Electric can accept no responsibility for possible errors in catalogues, brochures and other printed material. Fuji Electric reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. All rights reserved.
