



BRISBANE CITY COUNCIL BRISBANE WATER OPERATION AND MAINTENANCE MANUAL

VOLUME 2

PART 5: APPENDICES APPENDIX (2 – 18)

For

PATRICK LANE PUMP STATION
MECHANICAL & ELECTRICAL FITOUT & COMMISSIONING

CONTRACT NO. BW.30079-02/03



Principal Contractor

HVAC Queensland Pty Ltd 101 Cobalt Street, Carole Park QLD 4300 Phone: 07 3712 3400, Fax: 07 3712 3444

Website: www.hvacqld.com HVAC Job No 3251Q BRISBANE CITY COUNCIL Brisbane Water PATRICK LANE PUMP

STATION

SP 306 OPERATING AND MAINTENANCE MANUAL

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

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PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 2: Operating Instructions Indicating & Adjustment Module PLICSCOM

Supplier/Manufacturer:

Vega

Model Number:

PLICSCOM.X

Manufacturer Contact Detail:

398 The Boulevarde,

Kirrawee, NSW – 2232 (02) 9542 6662

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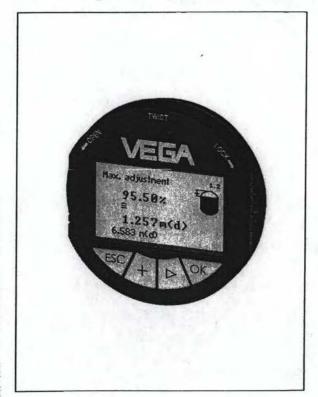
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OrderNo: 1212305_1

Operating Instructions Indicating and adjustment module PLICSCOM.*





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VEGA



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1 About this document

1.1 Function

This operating instructions manual has all the information you need for quick setup and safe operation of PLICSCOM. Please read this manual before you start setup.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used



Information, tip, note

This symbol indicates helpful additional information.



Caution, warning, danger

This symbol informs you of a dangerous situation that could occur. Ignoring this cautionary note can impair the person and/or the instrument.



Ex applications

This symbol indicates special instructions for Ex applications.

List

The dot set in front indicates a list with no implied sequence.

→ Action

This arrow indicates a single action.

1 Sequence

Numbers set in front indicate successive steps in a procedure.





2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained and specialist personnel authorised by the operator. For safety and warranty reasons, any internal work on the instruments must be carried out only by personnel authorised by the manufacturer.

2.2 Appropriate use

PLICSCOM is a pluggable indicating and adjustment module for VEGA level and pressure sensors.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

PLICSCOM is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

2.5 CE conformity

The indicating and adjustment module is in CE C (89/336/EWG) and NSR (73/23/ conformity to EMC (89/336/EWG) and NSR (73/23/ EWG).

Conformity has been judged acc. to the following standards:

- EMC:
 - Emission EN 61326: 1997
 - Susceptibility EN 61326: 1997 + A1:1998
- NSR: EN 61010-1: 2001

2.6 Compatibility acc. to NAMUR NE 53

PLICSCOM meets NAMUR recommendation NE 53.

The parameter adjustment of the basic sensor functions is independent of the software version. The available functions depend on the appropriate software version of the single components.

On our website www.vega.com you will find all software histories. Use the possibility and get registered for update information via e-mail.

Safety information for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.



Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- Indicating and adjustment module PLICSCOM
- Documentation
 - this operating instructions manual

Configuration

PLICSCOM is provided with a display with full dot matrix as well as four keys for adjustment.

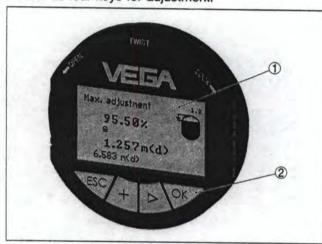
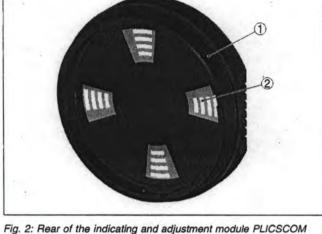


Fig. 1: Indicating and adjustment module PLICSCOM

- Display
- 2 Keys



- integrated seal ring
- gold-plated contact path

3.2 Principle of operation

The indicating and adjustment module PLICSCOM is used for measured value indication, adjustment and diagnosis for the following VEGA plics sensors:

- VEGAPULS series 60
- **VEGAFLEX** series 60
- **VEGASON** series 60
- VEGABAR series 50 and 60
- VEGACAL series 60.

PLICSCOM is mounted into the respective sensor housing or the external indicating and adjustment unit VEGADIS 61. After mounting, sensor and PLICSCOM are splash-proof also without housing cover.

The operation of two PLICSCOM parallel in the sensor and in VEGADIS 61 is not supported.

Power supply directly by the respective sensor or VEGADIS 61. An additional connection is not necessary.

Area of application

Power supply



3.3 Adjustment

Adjustment is carried out via the integrated keys. The entered parameters are generally saved in the respective sensor. With a copy function, parameters can be loaded into the indicating and adjustment module.

3.4 Storage and transport

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test acc. to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Storage and transport temperature

- Storage and transport temperature see "Supplement
 Technical data Ambient conditions"
- Relative humidity 20 ... 85 %

4 Mounting

4.1 Mounting procedure

Insert/remove PLICSCOM

PLICSCOM can be mounted or dismounted at any time. An interruption of the power supply is not necessary.

Proceed as follows:

- 1 Unscrew the housing cover
- 2 Place PLICSCOM in the required position to the electronics

i

Information:

Four different positions are possible, each displaced by 90°.

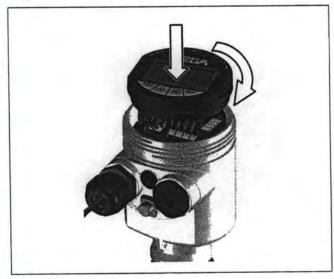


Fig. 3: Installation of PLICSCOM

- 3 Press PLICSCOM lightly onto the electronics and turn it to the right until it snaps in
- 4 Screw housing cover with inspection window tightly back on

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Note:

If you intend to retrofit PLICSCOM with PLICSCOM for continuous measured value indication, a higher cover with an inspection glass is required.

Dismounting is carried out in reverse order.

5 Set up

5.1 Adjustment system

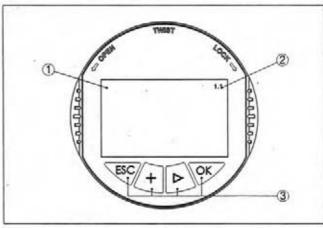


Fig. 4: Indicating and adjustment elements

- 1 LC display
- 2 Indication of the menu item number
- 3 Adjustment keys

Key functions

[OK] key:

- move to the menu overview
- confirm selected menu
- edit parameter
- save value

[->] key to select:

- menu change
- list entry
- editing position
- [+] key:
 - modify value of a parameter
- · [ESC] key:
 - interrupt input
 - jump to the next higher menu

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual

Adjustment system

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Set up

keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with [OK] will not be saved.

Damping

To damp process-dependent measured value fluctuations, you have to set an integration time of 0 ... 999 s in this menu item.



5.2 General functions

Introduction

Continuously measuring sensors for level and pressure have various functions. Therefore they can be adapted perfectly to the respective application. These functions are structured in menu form. Some of the functions are sensor-specific. These are described in the operating instructions manual of the respective sensor. Other functions, however, have general character, i.e. they are available in sensors with different measuring principles.

The general functions are described in this paragraph. The functions of PLICSCOM are determined by the sensor and correspond to the respective software version of the sensor.

Linearization curve

In this menu item you select the linearization curve:

- linear
- Cylindrical tank
- Spherical tank
- User programmable

User programmable means: Switching on a linearization curve programmed via PC and PACTware™

The linearization curve relates height and volume. It takes the vessel geometry for the measured value display and the current output into account.



Information:

The respective menu item number differs depending on the sensor type and signal output.

Edit senor TAG

In the menu item "Sensor TAG" you edit a 12-digit measurement loop character. The character set comprises:

- Letters from A ... Z
- Numbers from 0 ... 9
- Special characters +, -, /, -



Measured value indication

The following presentations are available in the measured value display:

- · Level as digital value, sensor TAG
- · Level as digital value and bar graph, sensor TAG

With [->] you select the different presentations of the measured value. From all presentations you reach the menu overview with [OK]. With [ESC] you return from the menu overview to the measured value display.

Menu overview

In the menu overview you select the respective menu with [->] and finally reach it with [OK]. Then the individual menu items are available.

Peak values

Min. and max, measured values are saved in the sensor. The values are displayed in the menu item "Peak values".

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 Min. and max. distance in m(d): radar, ultrasonic, guided microwave sensors

Q-Pulse Id TMS1091

- Min. and max. pressure: pressure transmitter¹⁾
- · Min. and max. temperature: ultrasonic sensors, pressure transmitters

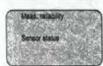


Meas. reliability

When using sensors working acc. to the non-contact measuring principle, the measurement can be influenced by the respective process conditions. In this menu item, the reliability of the level echo is displayed in dB. The reliability is signal strength minus noise. The higher the value, the more reliable the measurement.

Sensor status

Indication "OK" or flashing error message, e.g. "E013". In addition, the error appears in clear text in the measured value display.



Choose curve

The following curves are available for radar, guided microwave and ultrasonic sensors:

- Echo curve
- False echo curve²⁾
- Trend curve.

The echo curve represents the echoes with signal strength in "dB" (radar) or in "V" (guided microwave) over the distance. This allows a first rough evaluation of the measurement.

The false echo curve shows the saved false echoes (see menu "Service") of the empty vessel with signal strength in "dB" over the measuring range.



With a comparison of echo and false echo curve a more detailed statement of the reliability can be made. The selected curve is updated permanently. With the [OK] key, a submenu with zoom functions is opened.

Available with the echo and false echo curve:

- "X-Zoom": Zoom function for the meas. distance
- "Y-Zoom": 2, 5 and 10-times magnification of the signal in "dB"
- "Unzoom": Resetting the presentation to the nominal measuring range with single magnification

Available with the trend curve:

- "X-Zoom": Splitting in minutes, hours or days
- "Stop/Start": Interruption of a recording or start of a new recording
- "Unzoom": Resetting the splitting to minutes



Simulation of measured values

In this menu item you simulate individual level and pressure values via the current output. Then the signal path can be tested, e.g. via connected indicating instruments or the input card of the processing system.

The following simulation factors are available:

- Percent
- Current
- Pressure (with pressure transmitters)
- · Distance (with radar and guided microwave).

With Profibus PA sensors, the selection of the simulated value is made via the "Channel" in the menu "Basic adjustments".

How to start the simulation:

1 Push [OK]

to distallar and adjustment medide DLICCOAS

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Pressure: -50 ... +150 % of the nominal pressure range; temperature: -50 ... +150 °C.

Not with guided microwave.

Reset







Set up

- 2 Select the requested simulation factor with [->] and confirm with [OK]
- 3 Set the requested value with [+] and [->].
- 4 Push [OK]

The simulation is now running, with 4 ... 20 mA HART a current is outputted and with Profibus PA or Foundation Fieldbus a digital value.

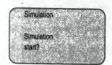
How to interrupt the simulation:

→ Push [ESC]



Information:

The simulation is interrupted automatically 10 minutes after the last key has been pushed.



With the reset function, modified values are reset. Three subfunctions are available:

- Basic adjustment
 - Reset of the values modified with the indicating and adjustment module to the sensor-specific basic setting (see chart)
- Factory setting
 - Like basic setting, but also reset of special parameters modified with PACTware[™] to delivery status
- Peak values measured value and temperature³⁾
 - Reset of the min./max. values of pressure, level and temperature to the current values

Reset values basic setting

Menu	Menu item	Radar, ultrasonic	Guided microwave	Pressure
Basic adjust- ment	Units of measure- ment	deleted	deleted	Density unit kg/dm3
		deleted	deleted	Density 1,0000 kg/ dm ³
	zero, min. adjustment	upper dead zone de- pending on instru- ment	50, 150, 300 mm (upper dead zone depending on the in- strument)	Begin nominal mea- suring range
	span, max. adjust- ment	end nominal measu- ring range	30 m(d)	end nominal measu- ring range
	Linearization curve	linear	linear '	linear
	Sensor-TAG	Sensor	Sensor	Sensor
Display	Displayed value 1	Distance	Height	depending on the adjustment unit pressure or height
	Scaling	0% = 0.0, 100% = 100.0	0% = 0.0, 100% = 100.0	0% = 0.0, 100% = 100.0
Service	Current output	Output mode: 420mA Failure mode: <3.6mA min. current: 3.8mA	Output mode: 420mA Failure mode: <3.6mA min. current: 3.8mA	Output mode: 420mA Failure mode: <3.6mA min. current: 3.8mA

Reset
Reset
select?

Units of measurement

In this menu item you select the internal arithmetic unit of the sensor.

With radar, guided microwave and ultrasonic sensors this is m(d) or ft(d).

For pressure transmitters more comprehensive units are available. They are described in the operating instructions manual of the respective sensor in the menu "Basic adjustments".

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³⁾ Temperature only with pressure transmitters and ultrasonic sensors.

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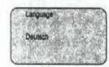




Language

The sensor is already set to the ordered national language. In this menu item you can change the language. The following languages are available:

- Deutsch
- English
- Français
- Espanől
- Pycckuu.



Copy sensor data

With this function

- data are read from the sensor
- data are written into the sensor.

The data are permanently saved in an EEPROM memory in PLICSCOM and remain there even in case of voltage failure. From PLICSCOM they can be written in one or several sensors and kept as a backup for a possible sensor exchange. When writing the data into the sensor, the instrument type from which the data originate as well as the TAG no. of that sensor are displayed.



Information:

Before writing the data into the sensor, it is checked if the data sets fit to the measuring principle of the sensor. Loading of useless data is hence prevented.



PIN

Info

27835-EN-0504

In this menu item, the PIN is activated/deactivated permanently. Entering a 4-digit PIN protects the sensor data against unauthorized access and unintentional modifications. If the PIN is activated permanently, it can be deactivated temporarily (i.e. for approx. 60 min.) in any menu item. The instrument is delivered with the PIN set to 0000.

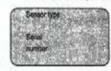


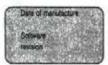
Only the following functions are permitted with activated PIN:

- Select menu items and show data
- · Read data from the sensor into the indicating/ adjustment module.

In this menu item the most important sensor information can be displayed:

- Sensor type
- Serial number: 8-digit number, e.g. 12345678
- Date of manufacture: Date of the factory calibration, e.g. 26. September 2004
- · Software version: Edition of the sensor software, e.g.
- . Date of last change using PC: Date of the last change of sensor parameters via PC, e.g. 26. September 2004
- · Sensor details, e.g. approval, process fitting, seal, meas. cell, meas. range, electronics, housing, cable entry, plug, cable length etc.









Set up

Date of last rhance using PC

5.3 Special functions - 4 ... 20 mA/HART

Introduction

The 4 ... 20 mA/HART special functions are briefly described in this paragraph. The respective range of functions of the indicating and adjustment module is determined by the sensor and the sensor software revision.

Display

In the menu item "Display" you can define how the measured value should be presented on the display.

The following indication values are available:

- Height
- Pressure (only with pressure transmitters)
- Distance (only with radar, guided microwave, ultrasonics)
- Current
- scaled
- Percent
- Lin. percent
- Temperature (only with pressure transmitters).

The selection "scaled" opens the menu items "Display unit" and "Scaling". In "Display unit" there are the following options:

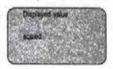
- Height
- Mass
- Flow
- Volume
- · Without unit.

Depending on the selection, the different units will be available.

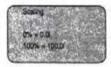
In the menu item "Scaling", the requested numerical value with decimal point is entered for 0 % and 100 % of the measured value.

There is the following relation between the indication value in the menu "Display" and the adjustment unit in the menu "Basic adjustment":

- · With radar, guided microwave and ultrasonics, displayed value "Distance" means: presentation of the measured value in the selected adjustment unit, e.g. m(d)
- With pressure, displayed value "Pressure" or "Height" means: presentation of the measured value in the selected adjustment unit, e.g. bar or m.







In the menu item "Current output" you determine the behaviour of the current output during operation and in case of failure. The following options are available:

Current output





Current output

Juli Com	14 20 mA	
Output mode	4 20 mA 20 4 mA	2
Failure modeli	Hold value 20.5 mA 22.0 mA <3.6 mA	
Min. current ⁵⁾	3.8 mA 4 mA	

The values in bolt font represent the data of the factory setting.

In HART multidrop mode, the current is constantly 4 mA. This value does not change even in case of failure.



HART offers standard and multidrop mode⁶⁾. In multidrop mode up to 15 sensors can be operated on one two-wire cable.

In this menu item you determine the HART mode and enter the address with multidrop.



Introduction

Sensor address

Channel

Display

5.4 Special functions - Profibus PA

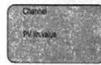
The Profibus PA special functions are briefly described in this paragraph. The respective range of functions of the indicating and adjustment module is determined by the sensor and the sensor software revision.

Level and pressure sensors operate as slaves on the Profibus PA. To be identified as a bus participant, each sensor must have a unique address. Each instrument is delivered with address 126. With this address, it can at first be connected to an existing bus. However, the address must be changed. This can be done in this menu item.



The channel is the input selector switch for function block (FB) of the sensor. Within the function block, additional scalings (Out-Scale) are carried out. In this menu item, the value fir the function block is selected:

- SV1 (Secondary Value 1):
 - Percent with radar, guided microwave and ultrasonic sensors
 - Pressure or height with pressure transmitters
- SV2 (Secondary Value 2):
 - Distance with radar, guided microwave and ultrasonic sensors
 - Percent with pressure transmitters
- PV (Primary Value):
 - Linearised percentage value



Radar, guided microwave and ultrasonic sensors deliver the following measured values:

Value of the current output in case of failure, e.g. if no valid

measured value is delivered.

The current never falls below this value during operation.

In multidrop mode, the 4 ... 20 mA signal of the HART sensor is switched off. The sensor consumes a constant current of 4 mA. The meas, signal is only transmitted as digital HART signal.

HART mode

Set up





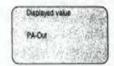
Set up

- SV1 (Secondary Value 1): Percentage value after the adjustment
- · SV2 (Secondary Value 2): Distance value before the adjustment
- · PV (Primary Value): Linearised percentage value
- · PA-Out (value after passing the function block): PA

A pressure transmitter delivers the following measured values:

- SV1 (Secondary Value 1): Pressure or height value before the adjustment
- SV2 (Secondary Value 2): Percentage value after the adjustment
- PV (Primary Value): Linearised percentage value
- · PA-Out (value after passing the function block): PA output
- Temperature.

In the menu item "Display" you can define which measured value should be presented on the display.



Additional PA value

Profibus transmits two values cyclically. The first value is determined in the menu item "Channel". The selection of the additional cyclical value is made in the menu item "Additional PA value".

With radar, guided microwave and ultrasonic sensors the following values are available:

- SV1 (Secondary Value 1): Percentage value after the adjustment
- SV2 (Secondary Value 2): Distance value before the adjustment
- PV (Primary Value): Linearised percentage value.

With pressure transmitters the following values are available:

 SV1 (Secondary Value 1): Pressure and height value before the adjustment

- SV2 (Secondary Value 2): Percentage value after the adjustment
- PV (Primary Value): Linearised percentage value.



Determine Out-Scale

Here, you determine the unit and scaling for PA-Out. These settings also apply to the value displayed on PLICSCOM if in the menu item "Displayed value" PA-Out was selected.

The following displayed values are available in "Out-Scale unit":

- Pressure (only with pressure transmitters)
- Height
- Mass
- Flow
- Volume
- Others (no unit, %, mA).

In the menu item "PV-Out-Scale", the requested numerical value with decimal point is entered for 0 % and 100 % of the measured value.





Indicating and adjustment module PLICSCOM

Indicating and adjustment module PLICSCOM



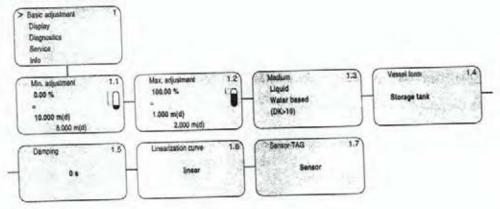




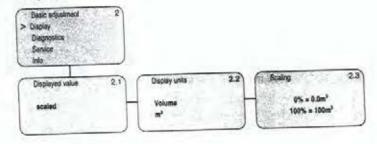
Set up

5.5 Menu schematic for a 4 ... 20 mA/HART sensor (example: VEGAPULS 61)

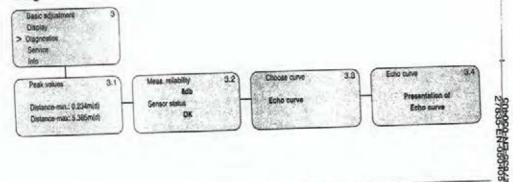
Basic adjustment



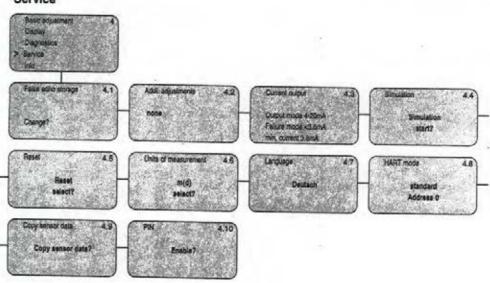
Display



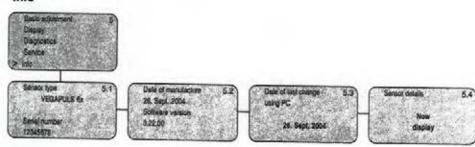
Diagnostics



Service



Info

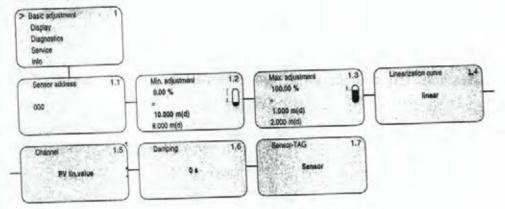




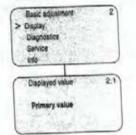
Set up

5.6 Menu schematic for a Profibus PA sensor (example: VEGAFLEX 61)

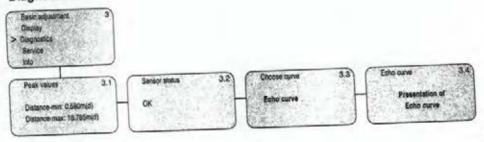
Basic adjustment



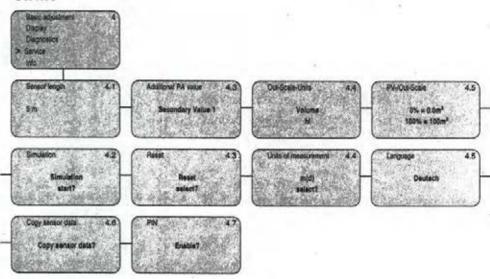
Display



Diagnostics



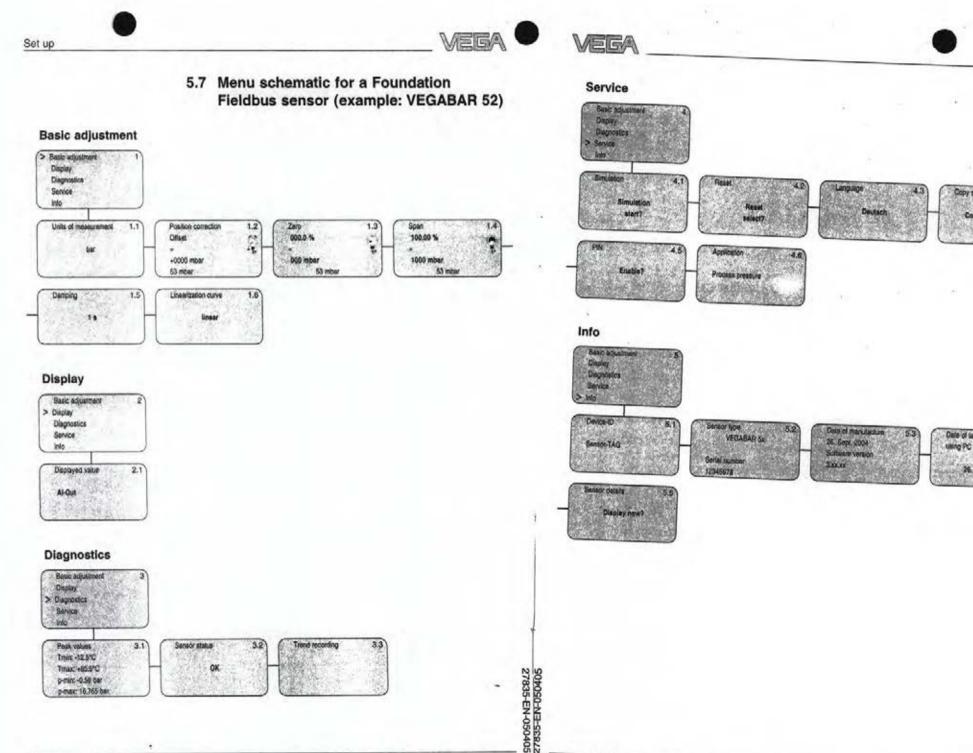
Service



Info



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Set up

Copy sensor data?







Dismounting

6 Maintenance and fault rectification

6.1 Maintenance

When used appropriately under normal condition, the indicating and adjustment module is maintenance-free.

6.2 Instrument repair

If it is necessary to repair PLICSCOM please proceed as follows:

You can download a return form (23 KB) from our homepage www.vega.com under: "Services - Downloads - Forms and Certificates - Repair form".

By doing this you help us carry out the repair quickly and without having to call for additional information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and possibly also a safety data sheet to the instrument.
- Send the instrument to the respective address of your agency. In Germany to the VEGA headquarters in Schiltach.

7 Dismounting

7.1 Dismounting procedure



Warning:

Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "Mounting" and "Connecting to power supply" and carry out the listed steps in reverse order.

7.2 Disposal

The indicating and adjustment module consists of materials which can be recycled by specialised recycling companies. We have purposely designed the components to be easily separable. Mark the instrument as scrap and dispose of it according to government regulations (electronic scrap ordinance, ...).

Materials: see "Technical data"

If you cannot dispose of the instrument properly, please contact us about disposal methods or return.

27835EN-050405-19/12/20 Adjusting and adjustment and all 1000000



8 Supplement

8.1 Technical data

General data	Carrie and the same of the sam	
Weight	150 g	-
Ambient conditions		
Ambient temperature	-20 +70°C	
Storage and transport temperature	-40 +80°C	

Indicating and adjustment module

Power supply and data transmission	through sensor via gold-plated sliding contacts (I ² C bus)
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection	
 unassembled 	IP 20
 mounted into the sensor without cover 	IP 40
Materiale	

Materials

-	housing	ABS
-	inspection window	Polyester foil



8.2 Dimensions

PLICSCOM

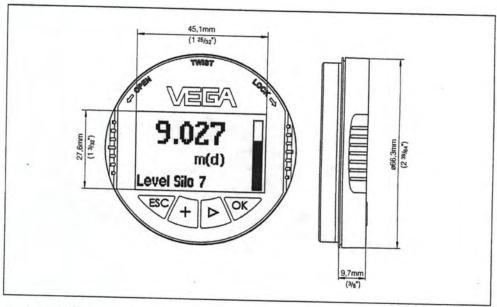


Fig. 5: PLICSCOM

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BRISBANE CITY COUNCIL Brisbane Water PATRICK

LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 3: Operating Instructions VEGABAR 64 4....20mA/HART

Supplier/Manufacturer:

Vega

Model/Part Number:

BR64.XXGG1RHTMAX

Manufacturer Contact Detail:

398 The Boulevarde,

Kirrawee, NSW - 2232(02) 9542 6662

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 4 of 31



VEGA Grieshaber KG Am Hohenstein 113 77761 Schiltach Germany Phone +49 7836 50-0 Fax +49 7836 50-201 E-mail: info@de.vega.com www.vega.com OrderNo: 1212305_1

Operating Instructions VEGABAR 64 4 ... 20 mA/HART











All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Technical data subject to alterations

27525-EN-050421









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In the menu item "Units of measurement" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi...

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

In the menu items "zero" and "span" you determine the span of the sensor, the span corresponds to the end value.

Information:

These steps are not necessary for instruments which are already preset acc. to customer specifications!

You can find these data on the type label on the instrument and in the menu items of the zero/span adjustment.

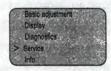
PLICSCOM enables the adjustment without filling or pressure. You can carry out the settings in the workshop without the instrument having to be installed.

In the menu items for zero/span adjustment, the actual measured value is also displayed.

Select application "Process pressure measurement"

VEGABAR 64 is preset to application "Level measurement". Proceed as follows when switching over to application "Process pressure measurement":

- 1 Push [OK] in the measured value display, the menu overview will be displayed.
- 2 Select the menu Service with "[->]" and confirm with [OK].



3 Select the menu item "Application" with [->] and edit with [OK].

Warning:



VEGABAR 64 - 4 ... 20 mA/HART

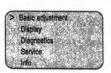
Note the warning: "Output can change".

- 4 Select "OK" with [->] "OK" and confirm with [OK].
- Select "Process pressure" from the list and confirm with [OK].

Select the adjustment unit

To switch over to another adjustment unit (in the example from bar to mbar), proceed as follows:7)

1 Push [OK] in the measured value display, the menu overview will be displayed.



Confirm the menu "Basic adjustment" with [OK], the menu item "Units of measurement" will be displayed.



- 3 Activate the selection with [OK] and select the requested unit with [->] (in the example mbar).
- 4 Confirm with [OK] and move to position correction with [->].

The adjustment unit is now changed from bar to mbar.

Carry out position correction

Proceed as follows:

1 Edit the offset value in the menu item "Position correction" with [OK].



Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH2O, mmH2O.





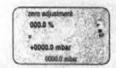
Setup with the indicating and adjustment module PLICSCOM

- 2 Set the requested offset value, e.g. the actual measured value with reciprocal sign with I->1 and [+].
- 3 Confirm with [OK] and move to min. (zero) adjustment with [->].

Carry out zero adjustment

Proceed as follows:

1 Edit the mbar value in the menu item "zero" with IOKI.



- 2 Set the requested mbar value with [+] and [->].
- 3 Confirm with [OK] and move to span adjustment with [->].

The zero adjustment is finished.



Information:

The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.



Information:

To adjust with pressure, you simply enter the indicated actual measured value. If the adjustment ranges are exceeded, the message is displayed "Outside parameter limits". The editing procedure can be interrupted with [ESC] or the displayed limit value can be accepted with [OK].

Carry out span adjustment

Proceed as follows:

1 Edit the mbar value in the menu item "span" with [OK].





Parameter adjustment "Process

pressure measure-

ment"

Information:

The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1.0 bar = 1000 mbar).

- 2 Set the requested % value with [->] and [OK].
- Edit the requested mbar value with [OK].
- Set the requested mbar value with [+] and [->].
- Confirm with [OK] and move to the menu overview with [ESC].

The max, adjustment is finished.



Information:

To adjust with a filling, you simply enter the indicated actual measured value. If the adjustment ranges are exceeded, the message is displayed "Outside parameter limits". The editing procedure can be interrupted with [ESC] or the displayed limit value can be accepted with [OK].

The setup of VEGABAR 64 is finished. All other menu items are described in the separate operating instructions manual of the indicating and adjustment module PLICSCOM.

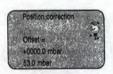
Process pressure measurement

Set up VEGABAR 64 in the following sequence:

- Select application "Process pressure measurement"
- 2 Select the adjustment unit
- Carry out position correction
- Carry out zero adjustment
- Carry out span adjustment



Active 10/12/2014



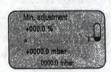
- 2 Set the requested offset value, e.g. the actual measured value with reciprocal sign with [->] and [+].
- 3 Confirm with [OK] and move to min. (zero) adjustment with [->].

Carrying out min. adjustment

Setup with the

Proceed as follows:

1 Edit in the menu item "Min. adjustment" the % value with [OK].



- 2 Set the requested % value with [+] and [->].
- Edit the requested mbar value with [OK].
- Set the requested mbar value with [+] and [->].
- Confirm with [+] and move to max. adjustment with [->].

The min. adjustment is finished.

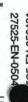
Information:

To adjust with a filling, you simply enter the indicated actual measured value. If the adjustment ranges are exceeded, the message is displayed "Outside parameter limits". The editing procedure can be interrupted with [ESC] or the displayed limit value can be accepted with [OK].

Carrying out max. adjustment

Proceed as follows:

Edit the % value in the menu item "Max. adjustment" with [OK].



Information:

The displayed pressure for 100 % corresponds e.g. to the nominal range of the sensor (in the above example 1.0 bar = 1000 mbar).

- 2 Set the requested mbar value with [->] and [OK].
- 3 Confirm with [OK] and move to the menu overview with [ESC].

The span adjustment is finished.

Information:

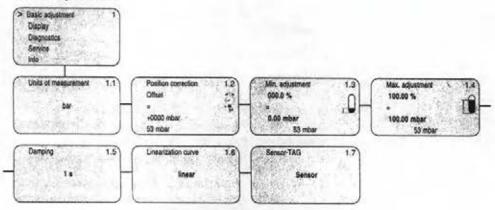
To adjust with pressure, you simply enter the indicated actual measured value. If the adjustment ranges are exceeded, the message is displayed "Outside parameter limits". The editing procedure can be interrupted with [ESC] or the displayed limit value can be accepted with [OK].

The setup of VEGABAR 64 for process pressure measurement is finished. All other menu items are described in the separate operating instructions manual of the indicating and adjustment module PLICSCOM.

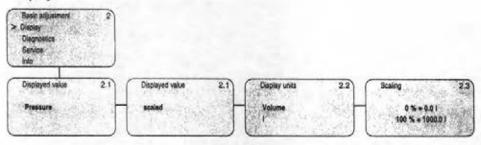


6.5 Menu schematic

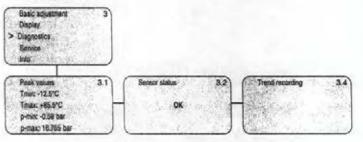
Basic adjustment



Display



Diagnostics



4 Confirm with [OK] and move to position correction with [->].

The adjustment unit is now changed from bar to mbar.

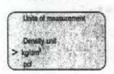
i

Information:

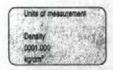
When changing over to a height unit (in the example from bar to m), also the density has to be entered.

Proceed as follows:

- 1 Push [OK] in the measured value display, the menu overview will be displayed.
- 2 Confirm the menu "Basic adjustment" with [OK], the menu item "Units of measurement" will be displayed.
- 3 Activate the selection with [OK] and select the requested unit with [->] (in the example m).
- 4 Confirm with [OK], the submenu "Density unit" appears.



5 Select the requested unit, e.g. kg/dm³ with [->] and confirm with [OK], the submenu "Density" appears.



6 Enter the requested density value with [->] and [+], confirm with [OK] and move to position correction with [->].

The adjustment unit is now changed from bar to m.

Carry out position correction

Proceed as follows:

1 Edit the offset value in the menu item "Position correction" with [OK].



In the menu item "Units of measurement" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi...

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

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Information:

These steps are not necessary for instruments which are already preset acc. to customer specifications!

You can find these data on the type label on the instrument and in the menu items of the min./max. adjustment.

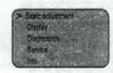
PLICSCOM enables the adjustment without filling or pressure. You can carry out the settings in the workshop without the instrument having to be installed.

In the menu items for min./max. adjustment, the actual measured value is also displayed.

Selecting adjustment unit/ density unit

To switch over to another adjustment unit (in the example from bar to mbar), proceed as follows:6)

1 Push [OK] in the measured value display, the menu overview will be displayed.

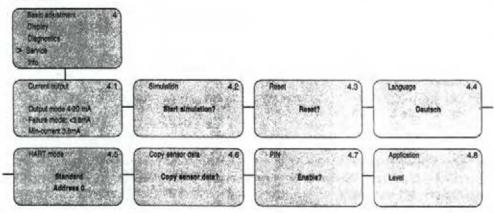


2 Confirm the menu "Basic adjustment" with [OK], the menu item "Units of measurement" will be displayed.

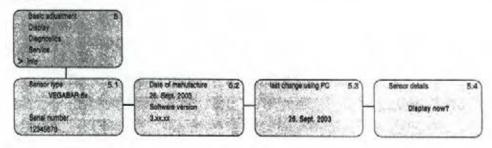


- 3 Activate the selection with [OK] and select the requested unit with [->] (in the example mbar).
- Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH₂O, mmH₂O, mm, cm, m, in, ft.

Service



Info



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reset to measured value indication is triggered. Any

values not confirmed with [OK] will not be saved.

7 Setup with PACTware™

7.1 Connecting the PC

Connecting the PC directly to the sensor

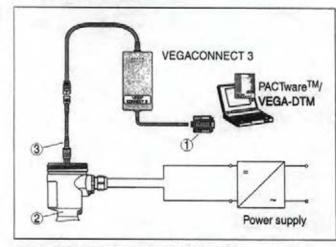


Fig. 23: PC connected directly to the sensor

- 1 RS232 connection
- 2 VEGABAR 64
- 3 I2C adapter cable for VEGACONNECT 3

Necessary components:

- VEGABAR 64
- PC with PACTware™ and suitable VEGA-DTM
- VEGACONNECT 3 with I²C adapter cable (article no. 2.27323)
- power supply unit

6.4 Setup procedure

Address setting HART-Multidrop In HART-Multidrop mode (several sensors on one input) the address must be set before continuing with the parameter adjustment. You will find a detailed description in the operating instructions manual of PLICSCOM or in the online help of PACTware™ or DTM.



Level or process pressure measurement VEGABAR 64 can be used for level as well as for process pressure measurement. Default setting is level measurement. The mode can be changed in the adjustment menu.

Depending on your application, only the respective subchapter "Level measurement" or "Process pressure measurement" will apply. There you will find the individual adjustment steps.

Optional settings

Additional adjustment and diagnosis options such as e. g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual of the indicating and adjustment module PLICSCOM.

Level measurement

Parameter adjustment "Level measurement" Set up VEGABAR 64 in the following sequence:

- Selecting adjustment unit/density unit
- 2 Carry out position correction
- 3 Carrying out min. adjustment
- 4 Carrying out max. adjustment



6.3 Adjustment system

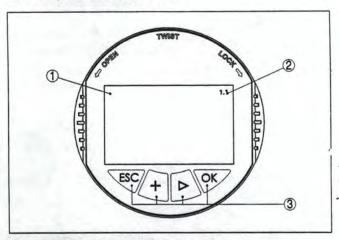


Fig. 22: Indicating and adjustment elements

- 1 LC display
- 2 Indication of the menu item number
- 3 Adjustment keys

Key functions

- [OK] key:
 - move to the menu overview
 - confirm selected menu
 - edit parameter
 - save value
- · [->] key to select:
 - menu change
 - list entry
 - editing position
- [+] key:
 - modify value of a parameter
- [ESC] key:
 - interrupt input
 - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic

Connecting the PC to the signal cable

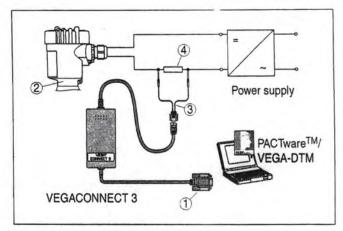


Fig. 24: Connecting the PC to the signal cable

- 1 RS232 connection
- 2 VEGABAR 64
- 3 HART adapter cable for VEGACONNECT 3
- 4 HART resistance 250 Ohm

Necessary components:

- VEGABAR 64
- PC with PACTware[™] and suitable VEGA-DTM
- VEGACONNECT 3 with HART adapter cable (art. no. 2.25397)
- · HART resistance approx. 250 Ohm
- · power supply unit

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Note:

With power supply units with integrated HART resistance (internal resistance approx. 250 Ohm), an additional external resistance is not necessary (e.g. VE-GATRENN 149A, VEGADIS 371, VEGAMET 381). In such cases, VEGACONNECT 3 can be connected parallel to the 4 ... 20 mA cable.

7.2 Parameter adjustment with PACTware™

Further setup steps are described in the operating instructions manual *DTM Collection/PACTware™* attached to each CD and which can also be downloaded

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VEGABAR 64 - 4 ... 20 mA/HART

VEGABAR 64 - 4 ... 20 mA/HART

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from our homepage. A detailed description is available in the online help of PACTware™ and the VEGA-DTMs.



Note:

Keep in mind that for setup of VEGABAR 64, DTM-Collection 11/2002 or a newer version must be used.

All currently available VEGA-DTMs are provided in the DTM Collection on CD and can be obtained from the responsible VEGA agency for a token fee. This CD includes also the up-to-date PACTware™ version. The basic version of this DTM Collection incl. PACTware™ is also available as a free-of-charge download from the Internet.

PLICSCOM is powered by the sensor, an additional connection is not necessary.

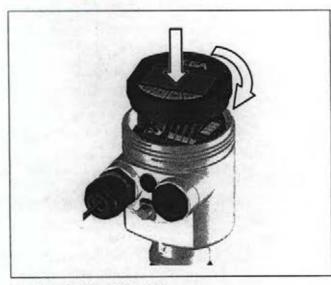


Fig. 21: Installation of PLICSCOM



Note:

If you intend to retrofit VEGABAR 64 with PLICSCOM for continuous measured value indication, a higher cover with an inspection glass is required.

6 Setup with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating and adjustment module PLICSCOM is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the plics[®] instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit VEGADIS 61.

i

Note:

You will find detailed information on the adjustment in the operating instructions manual of the indicating and adjustment module PLICSCOM.

6.2 Installing the indicating and adjustment module PLICSCOM

Insert/remove PLICSCOM

PLICSCOM can be inserted or removed at any time. It is not necessary to interrupt the power supply.

Proceed as follows:

- 1 Unscrew the housing cover
- 2 Place PLICSCOM in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
- 3 Press PLICSCOM lightly onto the electronics and turn it to the right until it snaps in.
- 4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

8 Maintenance and fault rectification

8.1 Maintenance

When used as directed in normal operation, VEGABAR 64 is completely maintenance-free.

8.2 Fault rectification

Causes of malfunction

VEGABAR 64 offers maximum reliability. Nevertheless faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Power supply
- Signal processing.

Fault rectification

The first measures are to check the output signal as well as to evaluate the fault messages via the adjustment module PLICSCOM. The procedure is described below. Further comprehensive diagnostics can be carried out with a laptop with the software PACTware™ and the suitable DTM. In many cases, the causes can be determined in this way and faults can be rectified.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone number +49 1805 858550.

The hotline is available to you 7 days a week round-theclock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking the 4 ... 20 mA signal

Connect a hand-held multimeter with a suitable measuring range acc. to the wiring plan.

- ? 4 ... 20 mA signal not stable
 - level fluctuations
 - → set integration time via PLICSCOM or PACTwareTM

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VEGABAR 64 - 4 ... 20 mA/HART

VEGABAR 64 - 4 ... 20 mA/HART

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o /2 of 2



- no atmospheric pressure compensation
- → check the pressure compensation in the housing and clean the filter element, if necessary
- ? 4 ... 20 mA signal missing
 - incorrect connection to power supply
 - → Check connection acc. to chapter "Connection procedure" and correct, if necessary, acc. to chapter "Wiring plans"
 - no power supply
 - → check cables for line break, repair, if necessary
 - supply voltage too low or load resistance too high
 - -> check and adapt, if necessary
- ? Current signal greater than 22 mA or less than 3.6 mA
 - · electronics module or measuring cell defective
 - → exchange instrument or return it for repair
 - Fault messages via PLICSCOM
 - > see below



In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages via PLICSCOM

- ? E013
 - no measured value available⁸⁾
 - > return instrument for repair
- ? E017
 - adjustment span too small
 - > repeat with modified values
- Fault message can come up if the pressure is higher than the nominal range

Then the actual measured value is displayed and the corresponding current is transmitted to the cable.⁵⁾

5) The values correspond to the actual level as already carried out, e.g. default setting.







Wiring plan plug connector, remote electronics

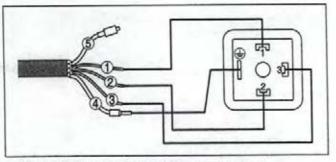


Fig. 19: Wiring plan plug connector, remote electronics

- 1 brown
- 2 blue
- 3 yellow
- 4 Screen
- 5 Breather capillaries

Wiring plan, remote electronics

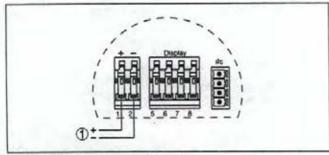


Fig. 20: Wiring plan, remote electronics

1 Power supply

5.7 Switch on phase

Switch on phase

After VEGABAR 64 is connected to power supply, the instrument carries out a self-test for approx. 30 seconds. The following steps are carried out:

- · internal check of the electronics
- indication of the instrument type, the firmware version as well as the sensor TAGs (sensor name)
- output signal jumps briefly (approx. 10 seconds) to the set fault current.

? E036

- · no operable sensor software
- → carry out a software update or return instrument for repair

? E041

- hardware error
- → exchange instrument or return it for repair

8.3 Exchanging the electronics

The electronics of VEGABAR 64 consists of the measuring cell electronics and the processing electronics. The measuring cell electronics in the process fitting is not accessible to the user. The processing electronics is in the form of a module in the housing. If this electronics is defective, it can be exchanged by the user.

The electronics modules differ only in their signal output and are suitable for all VEGABAR series 50 and 60 sensors. The following types are available:

- BR-E.60H (4 ... 20 mA/HART)
- BR-E.60P (Profibus PA)
- BR-E.60F (Foundation Fieldbus)

An exchange of the same type is thus possible. If there is no electronics module available on site, it can be ordered from the responsible VEGA agency. It can be ordered with or without serial number.

The electronics with serial number includes orderspecific data such as housing, process fitting, seal etc. The electronics without serial number includes no order-specific data. The serial number can be found on the type label of VEGABAR 64 or on the delivery note.

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VEGABAR 64 - 4 ... 20 mA/HART

VEGABAR 64 - 4 ... 20 mA/HART

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8.4 Instrument repair

If it is necessary to repair VEGABAR 64 please proceed as follows:

You can download a return form (23 KB) from our homepage www.vega.com under: "Services – Downloads – Forms and Certificates – Repair form".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- · Print and fill out one form per instrument
- · Clean the instrument and pack it damage-proof
- Attach the completed form and possibly also a safety data sheet to the instrument.
- Send the instrument to the respective address of your agency. In Germany to the VEGA headquarters in Schiltach.

Overview

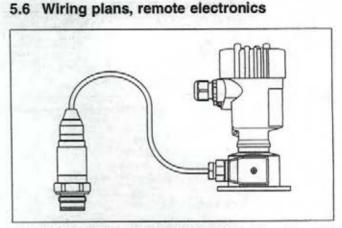


Fig. 17: VEGABAR 64 in IP 68 version and direct cable outlet, remote electronics

Electronics and connection compartment

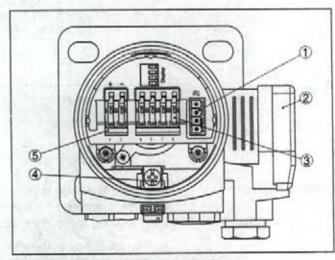


Fig. 18: Electronics and connection compartment

- Plug connector for VEGACONNECT (I²C interface)
- 2 Plug connector to VEGABAR
- 3 Spring-loaded terminals for connection of the external indication VEGADIS 61
- Ground terminal for connection of the cable screen
- 5 Spring-loaded terminals for power supply



Connection compartment

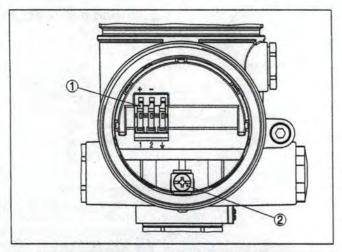


Fig. 15: Connection compartment, double chamber housing Exd

- 1 Spring-loaded terminals for power supply and cable screen
- 2 Ground terminal for connection of the cable screen

Wiring plan

Q-Pulse Id TMS1091

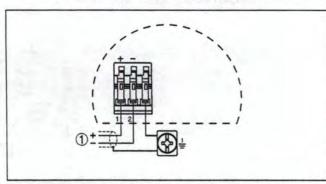


Fig. 16: Wiring plan, double chamber housing Exd

1 Power supply/Signal output

9 Dismounting

9.1 Dismounting procedure



Warning:

Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "Mounting" and "Connecting to power supply" and carry out the listed steps in reverse order.

9.2 Disposal

VEGABAR 64 consists of materials which can be recycled by specialised recycling companies. We have purposely designed the electronic modules to be easily separable. Mark the instrument as scrap and dispose of it according to government regulations (electronic scrap ordinance, ...).

Materials: see "Technical data"

If you cannot dispose of the instrument properly, please contact us about disposal methods or return.



10 Supplement

10.1 Technical data

General data

Materials, wetted parts

Process fitting

Diaphragm

- Seal, measuring cell

Materials, non-wetted parts

Housing

 Seal ring between housing and housing cover

 Inspection window in housing cover for PLICSCOM

Ground terminal

 Connection cable between IP 68 housing and remote electronics

Plug connector

- Cover screw plug connector

 Type plate support with IP 68 version on cable

Weight

316L (1.4435 or 1.4404), PVDF, PVDF

plated, Hastelloy C4 plated

sapphire ceramic® (99.9 % oxide ceramic)

Viton, Kalrez 6375, EPDM

plastic PBT (Polyester), Alu-die casting

powder-coated, 316L (1.4435)
NBR (stainless steel housing), silicone

(Alu/plastic housing)

Polycarbonate (UL746-C listed)

316Ti/316L (1.4571/1.4435)

PUR, FEP, PE

PA

StSt

PE hard

0.8 ... 8 kg (1.8 ... 17.6 lbs), depending on the process fitting

5.5 Wiring plans, double chamber housing Exd

Housing overview

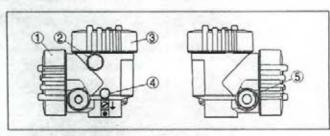


Fig. 13: Double chamber housing

- 1 Housing cover, connection compartment
- 2 Blind stopper or plug M12x1 for VEGADIS 61 (option)
- 3 Housing cover, electronics compartment
- 4 Filter element for pressure compensation or blind stopper with version IP 66/IP 68 1 bar*
- 5 Cable entry or plug

Electronics compartment

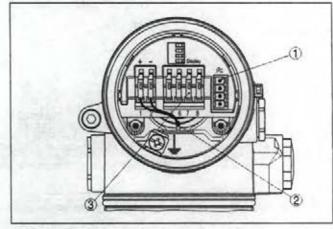


Fig. 14: Electronics compartment, double chamber housing

- 1 Plug connector for VEGACONNECT (I²C interface)
- 2 Internal connection cable to the connection compartment
- 3 Terminals for VEGADIS 61

49 Version IP 66/IP 68 1 bar not with four-wire instruments



Connection compartment

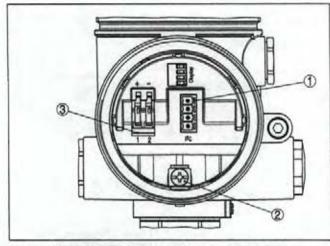


Fig. 11: Connection compartment, double chamber housing

- 1 Plug connector for VEGACONNECT (I²C interface)
- 2 Ground terminal for connection of the cable screen
- 3 Spring-loaded terminals for power supply

Wiring plan

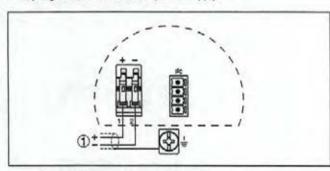


Fig. 12: Wiring plan, double chamber housing

1 Power supply/Signal output

Output variable

Output signal	4 20 mA/HART

Resolution 1.6 µA

Fault signal current output unchanged; 20.5 mA;

22 mA; <3.6 mA (adjustable)

Current limitation

Load

see load diagram in Power supply

Integration time (63 % of the input

0 ... 999 s, adjustable

variable) Rise time

150 ms (ti: 0 s, 0 ... 100 %)

Fulfilled NAMUR recommendation

NE 43

22 mA

Additional output variable - temperature

Processing is made via HART multidrop, Profibus PA and Foundation Fieldbus

Range Resolution -50 ... +150°C (-58 ... +302°F)

1°C (1.8°F)

Input variable

Adjustment range of the zero/span adjustment:

- zero

-50 ... +95 % of the nominal measuring

range

- span

-120 ... +120 % of the nominal measuring

range9)

Adjustment range of the min. adjustment:

percentage value

from -10 ... 110 % of the nominal range

pressure value

from -50 ... 150 % of the nominal range

Adjustment range of the max. adjustment:

percentage value

from -10 ... 110 % of the nominal range

pressure value

from -50 ... 150 % of the nominal measu-

ring range

Recommended max. turn down

1:30 (no limitation)

Nominal range		
Gauge pressure		
00.1 bar/010 kPa		

Overload resistance

15 bar/1,500 kPa

-0.2 bar/-20 kPa

Vacuum resistance

-120: Values less than -1.0 bar cannot be adjusted.

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VEGABAR 64 - 4 ... 20 mA/HART

VEGABAR 64 - 4 ... 20 mA/HART

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Nominal range	Overload resistance	Vacuum resistance
00.2 bar/020 kPa	20 bar/2.000 kPa	-0.4 bar/-40 kPa
00.4 bar/040 kPa	30 bar/3.000 kPa	-0.8 bar/-80 kPa
01.0 bar/0100 kPa	35 bar/3.500 kPa	-1.0 bar/-100 kPa
02.5 bar/0250 kPa	50 bar/5.000 kPa	-1.0 bar/-100 kPa
05 bar/0500 kPa	65 bar/6.500 kPa	-1.0 bar/-100 kPa
010 bar/01.000 kPa	90 bar/9.000 kPa	-1.0 bar/-100 kPa
025 bar/02.500 kPa	130 bar/13.000 kPa	-1.0 bar/-100 kPa
060 bar/06.000 kPa	200 bar/20.000 kPa	-1.0 bar/-100 kPa
-1.0+0.0 bar/-1000 kPa	35 bar/3.500 kPa	-1.0 bar/-100 kPa
-1.0+1.5 bar/-100+150 kPa	50 bar/5.000 kPa	-1.0 bar/-100 kPa
-1.0+5.0 bar/-100+500 kPa	65 bar/6.500 kPa	-1.0 bar/-100 kPa
-1.0+10 bar/-100+1.000 kPa	90 bar/9.000 kPa	-1.0 bar/-100 kPa
-1.0+25 bar/-100+2.500 kPa	130 bar/13.000 kPa	-1.0 bar/-100 kPa
-1.0+60 bar/-100+6.000 kPa	300 bar/30.000 kPa	-1.0 bar/-100 kPa
-0.05+0.05 bar/-5+5 kPa	15 bar/1.500 kPa	-0.2 bar/-20 kPa
-0.1+0.1 bar/-10+10 kPa	20 bar/2.000 kPa	-0.4 bar/-40 kPa
-0.2+0.2 bar/-20+20 kPa	30 bar/3.000 kPa	-0.8 bar/-80 kPa
-0,5+0.5 bar/-50+50 kPa	35 bar/3.500 kPa	-1.0 bar/-100 kPa
Absolute pressure	Marky Land	
01.0 bar/0100 kPa	35 bar/3.500 kPa	72-7
02.5 bar/0250 kPa	50 bar/5.000 kPa	
05 bar/0500 kPa	65 bar/6.500 kPa	
010 bar/01000 kPa	90 bar/9.000 kPa	
025 bar/02.500 kPa	130 bar/13.000 kPa	
060 bar/06.000 kPa	200 bar/20.000 kPa	



Connecting to power supply

Housing overview

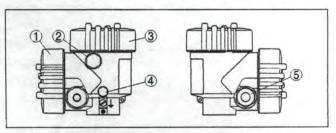


Fig. 9: Double chamber housing

- 1 Housing cover, connection compartment
- Blind stopper or plug M12x1 for VEGADIS 61 (option) Housing cover, electronics compartment
- Filter element for pressure compensation or blind stopper with version IP 66/IP 68 1 bare)
- 5 Cable entry or plug

Electronics compartment

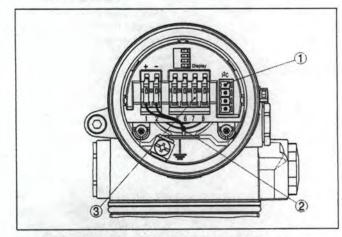


Fig. 10: Electronics compartment, double chamber housing

- Plug connector for VEGACONNECT (I²C interface) Internal connection cable to the connection compartment
- Terminals for VEGADIS 61

VEGA

Supplement

Electronics and connection compartment

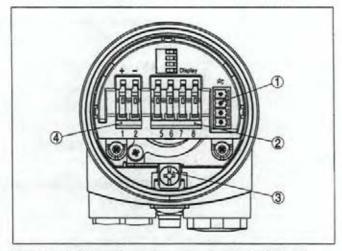


Fig. 7: Electronics and connection compartment, single chamber housing

- 1 Plug connector for VEGACONNECT (I²C interface)
- 2 Spring-loaded terminals for connection of the external indication VEGADIS 61
- 3 Ground terminal for connection of the cable screen
- Spring-loaded terminals for power supply

Wiring plan

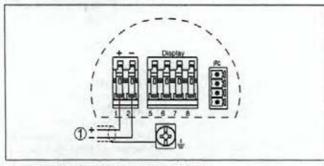


Fig. 8: Wiring plan, single chamber housing

1 Power supply/Signal output

5.4 Wiring plans, double chamber housing



The following illustrations apply to the non-Ex as well as to the Ex ia version. The Exd version is described in the next subchapter.



Characteristics

Accuracy (similar to DIN EN 60770-1)

Reference conditions acc. to DIN EN 61298-1

- Temperature 18 ... 30°C (64.4 ... 86°F)

Relative humidity 45 ... 75 %

- Pressure 860 ... 1060 mbar (86 ... 106kPa/

12.5 ... 15.4 psi)

Determination of characteristics

limit point adjustment acc. to DIN 16086

lir

Deviation in characteristics10)

Deviation in characteristics		
- Turn down 1:1	<0.075 %	
- Turn down up to 1:5	<0.075 %	
- Turn down up to 1:10	<0.1 %	
Deviation in characteristics ¹¹⁾		
- Turn down 1:1	<0.05 %	
- Turn down up to 1:5	<0.05 %	
- Turn down up to 1:10	<0.075 %	

Influence of the ambient temperature

Average temperature coefficient of the zero signal¹²

- Turn down 1:1 0.05 %/10 K

- Turn down up to 1:5 0.1 %/10 K

Turn down up to 1:5 0.1 %/10 K
Turn down up to 1:10 0.15 %/10 K

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Long-term drift of the zero signal¹³⁾ <0.1 %/2 years

Relating to the nominal range, incl. hysteresis and repeatability, determined acc, to the limit point method.

Only with process fitting EV, FT.

In the compensated temperature range of 0 ... 100°C (212°F), reference temperature 20°C (68°F).

13) Acc. to IEC 60770-1, relating to the nominaling

Supplement





g to power supply

Ambient conditions

Ambient, storage and transport temperature

without PLICSCOM

-40 ... +80°C (-40 ... +176°F)

with PLICSCOM

-20 ... +70°C (-4 ... +158°F)

Process conditions

Product temperature standard version, depending on the meas. cell seal¹⁴⁾

Viton

-20 ... +120°C (-4 ... +248°F)

EPDM

-40 ... +120°C (-40 ... +248°F) (1 h: 140°C/284°F cleaning temperature)

Kalrez 6375

-10 ... +120°C (14 ... +248°F)

Product temperature version with extended temperature range, depending on the meas, cell seal as well as order specification

Viton

-20 ... +150°C (-4 ... +302°F)

EPDM

-20 ... +150°C (-4 ... +302°F)

Kalrez 6375

-10 ... +150°C (14 ... 302°F)

Calibration position Influence of the installation position Vibration resistance

upright, diaphragm points downward <0.2 mbar/20 Pa (0.003 psi) mechanical vibrations with 4 g and 5 ... 100 Hz15)



7 Insert the plug insert into the plug housing

Information:

Note correct alignment, see figure "Plug connector with open cover"!

- 8 Tighten the screws on the strain relief and cable entry
- 9 Hook in the cover and press it onto the plug connector
- 10 Attach the plug seal, tighten the plug connector with the screw

5.3 Wiring plans, single chamber housing



The following illustrations apply to the non-Ex as well as to the Ex ia version.

Housing overview

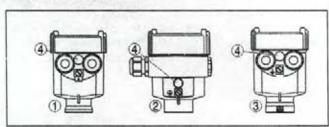


Fig. 6: Material versions, single chamber housing

- Plastic
- Aluminium
- Stainless steel
- Filter element for pressure compensation or blind stopper with version IP 66/IP 68 1 bar

With process fitting PVDF max. +100°C (212°F).

Tested acc. to the regulations of German Lloyd, GL directive 2

MEIGA

Electronics and connection compartment

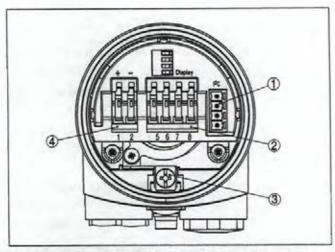


Fig. 7: Electronics and connection compartment, single chamber housing

- 1 Plug connector for VEGACONNECT (I²C interface)
- Spring-loaded terminals for connection of the external indication VEGADIS 61
- 3 Ground terminal for connection of the cable screen
- 4 Spring-loaded terminals for power supply

Wiring plan

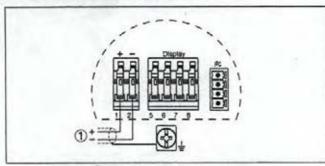


Fig. 8: Wiring plan, single chamber housing

1 Power supply/Signal output

5.4 Wiring plans, double chamber housing



The following illustrations apply to the non-Ex as well as to the Ex ia version. The Exd version is described in the next subchapter.

Accuracy (similar to DIN EN 60770-1)

Reference conditions acc. to DIN EN 61298-1

- Temperature 18 ... 30°C (64.4 ... 86°F)

Relative humidity 45 ... 75 %

Pressure 860 ... 1060 mbar (86 ... 106kPa/

12.5 ... 15.4 psi)

Determination of characteristics

Characteristics

MEGA

limit point adjustment acc. to DIN 16086

linea

Deviation in characteristics10)

Deviation in characteristics

-	Turn down 1:1	<0.075 %
-	Turn down up to 1:5	<0.075 %
_	Turn down up to 1:10	<0.1 %

Deviation in characteristics11)

o richitori ili orichi cio ilono	
Turn down 1:1	<0.05 %
Turn down up to 1:5	<0.05 %
Turn down up to 1:10	<0.075 %
	Turn down up to 1:5

Influence of the ambient temperature

Average temperature coefficient of the zero signal 12)

-	Turn down 1:1	0.05 %/10 K
-	Turn down up to 1:5	0.1 %/10 K
-	Turn down up to 1:10	0.15 %/10 K

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Long-term drift of the zero signal¹³⁾

<0.1 %/2 years

Relating to the nominal range, incl. hysteresis and repeatability, determined acc, to the limit point method.

11) Only with process fitting EV, FT.

12) In the compensated temperature range of 0 ... 100°C (212°F), reference temperature 20°C (68°F).

13) Acc. to IEC 60770-1, relating to the nominal range.



VEGABAR 64 - 4 ... 20 mA/HART

VEGABAR 64 - 4 ... 20 mA/HART

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Supplement

Connecting to power supply

Indicating and adjustment module

Power supply and data transmission

through sensor via gold-plated sliding contacts (I2C bus)

LC display in dot matrix

Adjustment elements 4 keys

Protection

Indication

unassembled IP 20 IP 40

mounted into the sensor without

cover

Materials

Housing

ABS

Inspection window

Polyester foil

Power supply

Power supply

Load

non-Ex instrument 12 ... 36 V DC EEx ia instrument 12 ... 30 V DC Exd instrument 18 ... 36 V DC

Permissible residual ripple

- <100 Hz 100 Hz ... 10 kHz

Uss <1 V

Uss <10 mV

see diagram

- 8 Press down the opening levers of the terminals, you will hear the terminal spring closing
- 9 Check the hold of the wires in the terminals by lightly pulling on them
- 10 Connect the screen to the internal ground terminal and the external ground terminal to potential equalisation
- 11 Tighten the compression nut of the cable entry, the seal ring must completely encircle the cable
- 12 Screw the housing cover back on

The electrical connection is finished.

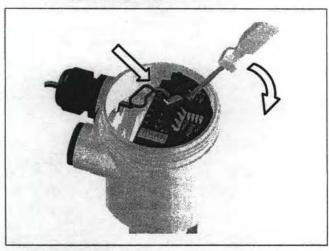


Fig. 3: Connection steps 6 and 7

IP 68 version

Proceed as follows:

- 1 Loosen the screw in the cover of the plug connector and remove it
- 2 Open the cover and remove it
- 3 Press the plug insert downwards
- 4 Loosen the screws of the strain relief and cable entry



Cable screening and grounding

Connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the evaluation side must be made via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Select connection cable for Ex applications



Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection procedure

Single/Double chamber housing

Proceed as follows:

- 1 Unscrew the housing cover
- 2 If a PLICSCOM indicating and adjustment module is installed, remove it by turning it slightly to the left.
- 3 Loosen compression nut of the cable entry
- 4 Remove approx. 10 cm of the cable mantle, strip approx. 1 cm insulation from the ends of the individual wires
- 5 Insert the cable into the sensor through the cable entry
- 6 Lift the opening levers of the terminals with a screwdriver (see following illustration)
- 7 Insert the wire ends into the open terminals according to the wiring plan

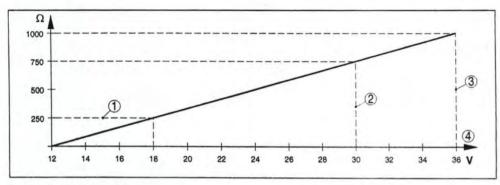


Fig. 25: Voltage diagram

1 HART load

- 2 Voltage limit EEx ia instrument
- Voltage limit non-Ex instrument/Exd instrument
- 4 Power supply

Electrical protective measures

Protection

Housing¹⁷

IP 66/IP 67 or IP 68

 Housing for remote electronics (with IP 68 version)

IP 65

Overvoltage category Protection class

111

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17) IP 66/IP 67: Instruments with gauge measuring ranges can no longer detect the ambient pressure when being submerged, e.g. in water. This can falsify the measured value. Supplement



Connecting to power supply

Available approvals or approvals applied for 18)19)

ATEX ATEX II 1G, 1/2G, 2G EEx ia IIC T6:

ATEX II 1/2G, 2G EEx d ia IIC T6: ATEX II 1/2D, 2D IP6X T; ATEX II 1/2 G. 2G EEx m e ia IIC T6; ATEX II 1/2D, 2D

IP6X T

IEC IEC Ex ia IIC T6

FM FM Cl.I, Div2 (NI)+Cl.II, III, Div1 (DIP); FM

CI.I-II, Div1 (IS)

Ship approvals GL, LRS, ABS, CCS, RINA, DNV Others

WHG

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always observe the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltages are expected, overvoltage arresters should be installed



Tip:

We recommend VEGA overvoltage arresters ÜS-F-LB-I and USB 62-36G.X.

Take note of safety Instructions for Ex applications

Select power supply



In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Power supply and current signal are transmitted via the same two-wire connection cable. The power supply range can differ depending on the instrument version. The exact range is stated in the Technical data in the Supplement.

Provide a reliable separation between the supply circuit and the mains circuits acc. to DIN VDE 0106 part 101. The VEGA power supply units VEGATRENN 149AEx. VEGASTAB 690, VEGADIS 371 as well as all VEGA-METs meet this requirement.

Bear in mind the following factors regarding supply voltage:

- · the reduction of the output voltage of the power supply unit under nominal load (with a sensor current of 20.5 mA or 22 mA in case of fault signal)
- · the influence of additional instruments in the circuit (see load values in Technical data)

Select connection cable

VEGABAR 64 is connected with standard two-wire cable without screen. An outer cable diameter of 5 ... 9 mm ensures the seal effect of the cable entry. If electromagnetic interference is expected, we recommend the use of screened cable.



Deviating data with Ex applications: see separate safety instru-

Depending on order specification.

- Tri-Clamp 2": EPDM, article no. 2.10975
- hygienic fitting with slotted round nut: EPDM 40x5, article no. 2.28074
- Bolting DIN 11851 DN 40: NBR, article no. 2.10956
- dto. DIN 11851 DN 50: NBR, article no. 2.4178
- dto. DIN 11864 DN 50: EPDM, article no. 2.17682
- DRD PN 40: PTFE, article no. 2.10360
- Cone 2.1, nut 64x2; EDPM, article no. 2.19094.

10.2 Dimensions

Housing

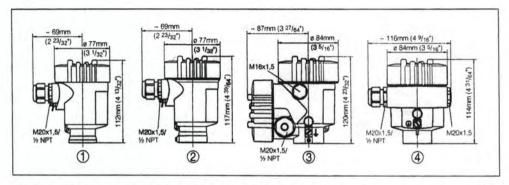


Fig. 26: Housing versions (with integrated PLICSCOM the height of the housing increases by 9 mm/0.35 in)

- 1 Plastic housing
- 2 Stainless steel housing
- 3 Aluminium double chamber housing
- Aluminium housing

IP 68 version with cable outlet

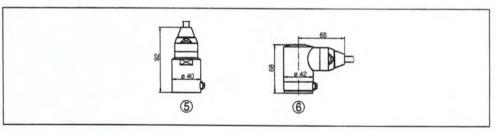


Fig. 27: IP 68 version with cable outlet

- 5 axial
- 6 lateral

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Remote electronics with IP 68 version

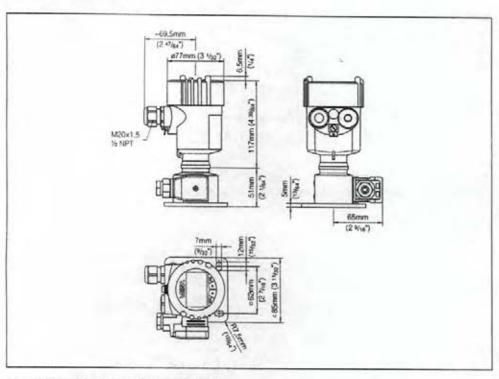


Fig. 28: Remote electronics with IP 68 version

4.2 Mounting procedure

Welding the socket

To mount VEGABAR 64, a welded socket is necessary. Use components from the line of VEGA mounting accessories:

- Welded socket G1A, article no. 2.27867
- dto. G1½A, article no. 2.21993
- dto. Tri-Clamp 1", article no. 2.24711
- dto. Tri-Clamp 1½", article no. 2.14140
- dto. Tri-Clamp 2", article no. 2.10974
- dto., hygienic fitting with slotted round nut F40, article no. 2.23898
- dto. DN 40 DIN 11851, article no. 2.10955
- dto. DN 50 DIN 11851, article no. 2.4177
- dto. DN 50 DIN 11864, article no. 2.25290
- dto. DRD, article no. 2.10500
- dto. M44x1.25, article no. 2.15986
- dto. cone 2.1, nut M64x2, article no. 2.9875
- dto. cone 2.1, nut M52x2, article no. 2.8760
- → Note the applicable welding standards (segment welding procedure) when welding the socket.

Sealing/Screwing in threaded versions

Seal the thread with teflon, hemp or a similar resistant seal material on the process fitting thread 1½ NPT.

→ Screw VEGABAR 64 into the welded socket. Tighten the hexagon screw on the process fitting. Wrench size see dimensional drawings.



Warning:

The housing must not be screwed in! Tightening can damage the rotary mechanism of the housing.

Sealing/Screwing in flange versions

Seal the flange connections acc. to DIN/ANSI with a suitable, resistant seal and mount VEGABAR 64 with suitable screws.

Sealing/Screwing in hyglenic fittings

Use the appropriate seal. You will find the seal material and the VEGA article no. in the following list:

- Tri-Clamp1": EPDM, article no. 2.24710
- Tri-Clamp 1½": EPDM, article no 14141

4 Mounting

4.1 General instructions

Wetted materials

Check if the wetted materials such as seal, process fitting etc. are suitable for the existing process conditions, such as product, temperature etc.

Installation position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Moisture

Use the recommended cable (see chapter "Connecting to power supply") and tighten the cable entry.

You can give your VEGABAR 64 additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to mounting outdoors, in areas where moisture is expected (e.g. by cleaning processes) or on cooled or heated vessels.

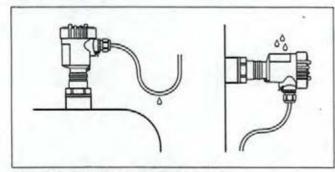


Fig. 2: Measures against moisture penetration

VEGABAR 64, threaded and hygienic fitting - part 1

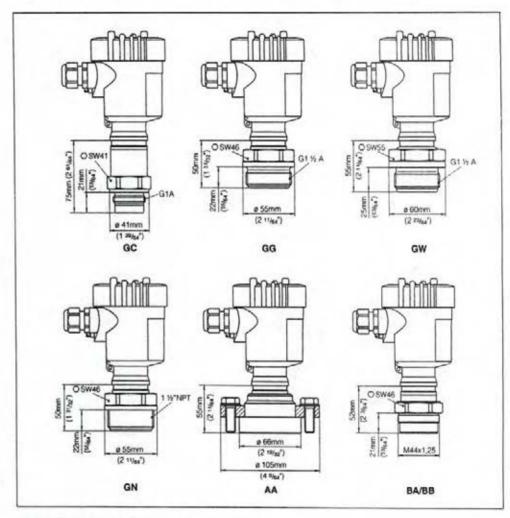


Fig. 29: VEGABAR 64, threaded and hygienic fitting

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VEGABAR 64, threaded and hygienic fitting - part 2

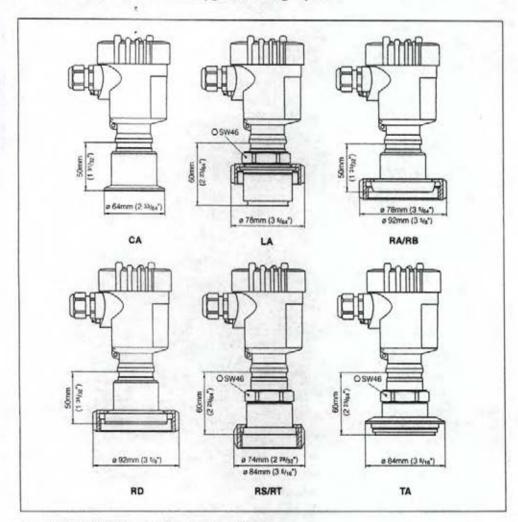


Fig. 30: VEGABAR 64, threaded and hygienic fitting

3.4 Storage and transport

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test acc. to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Storage and transport temperature

- Storage and transport temperature see "Supplement
 Technical data Ambient conditions"
- Relative humidity 20 ... 85 %



3.2 Principle of operation

Area of application

VEGABAR 64 is a pressure transmitter for use in the paper, food processing and pharmaceutical industries as well as in water/sewage water plants. Depending on the version, it is used for level, gauge, absolute pressure or vacuum measurement. Measured products are gases, vapours and liquids, also those containing abrasive substances.

Physical principle

The sensor element is the CERTEC[®] measuring cell with flush, abrasion resistant ceramic diaphragm. The hydrostatic pressure of the medium or the process pressure causes a capacitance change in the measuring cell via the diaphragm. This change is converted into an appropriate output signal and outputted as measured value.

The CERTEC® measuring cell is also equipped with a temperature sensor. The temperature value can be displayed via PLICSCOM or processed via the signal output.

Power supply

Two-wire electronics 4 ... 20 mA/HART for power supply and measured value transmission on the same cable.

The power supply range can differ depending on the instrument version. The exact range is stated in the "Technical data" in the "Supplement".

3.3 Adjustment

VEGABAR 64 can be adjusted with three different adjustment media:

- the indicating and adjustment module PLICSCOM
- an adjustment software acc. to FDT/DTM standard, e.g. PACTware™ and PC
- · a HART handheld

The entered parameters are generally saved in VEGA-BAR 64, optionally also in PLICSCOM or in PACTware™.

VEGABAR 64, flange connection

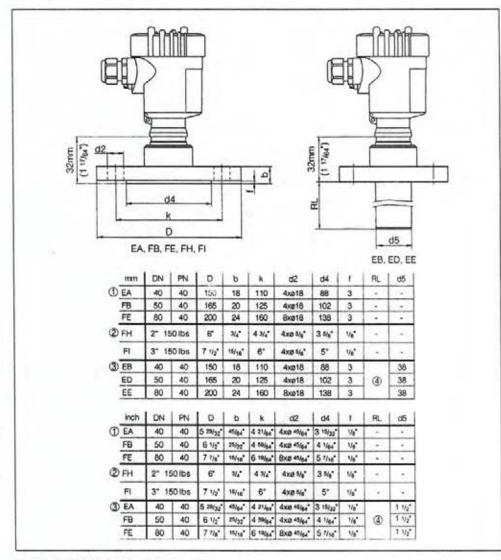


Fig. 31: VEGABAR 64, flange connection

- 1 Flange connection acc. to DIN 2501
 2 Flange connection acc. to ANSI 8.16
- 2 Flange connection acc. to ANSI B 16.5 3 Flange with extension
- 4 Order-specific

EN-0

27525-EN-05042

VEGABAR 64, threaded fitting for paper industry

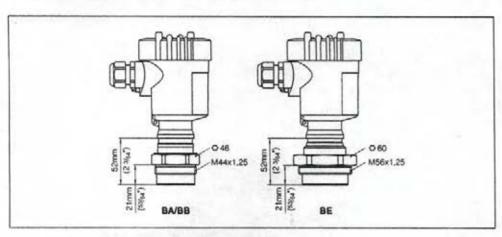


Fig. 32: VEGABAR 64, threaded fitting for paper industry

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGABAR 64 pressure transmitter
- Documentation
 - this operating instructions manual
 - test certificate
 - Ex-specific safety instructions (with Ex versions) and, if necessary, further certificates

Components

VEGABAR 64 consists of the following components:

- · Process fitting with measuring cell
- Housing with electronics, optionally available with plug connector
- Housing cover, optionally available with indicating/ adjustment module PLICSCOM

The components are available in different versions.

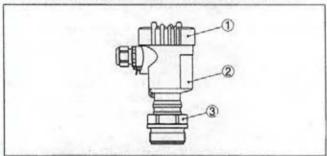
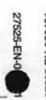


Fig. 1: Example of a VEGABAR 64 with process fitting G11/2A and plastic housing

- 1 Housing cover with integrated PLICSCOM (optional)
- 2 Housing with electronics
- 3 Process fitting with measuring cell



2.7 Safety information for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified acc. to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- · Chapter "Storage and transport"
- · Chapter "Disposal"

VEGABAR 64, extension fitting for paper industry

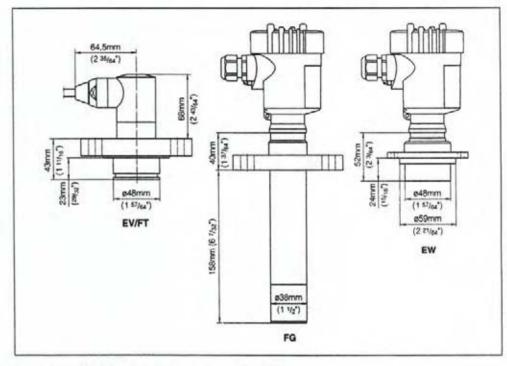


Fig. 33: VEGABAR 64, extension fitting for paper industry

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Q-Pulse Id TMS1091

10.3 Certificate

CE declaration of conformity



Konformitätserklärung

Declaration of conformity Déclaration de conformité



Am Hohenstein 113

erktärt in alleiniger Verantwortung, dese das Produkt / declare under our sole responsibility that our product / déclare sous sa seule

VEGABAR 52, VEGABAR 53, VEGABAR 54 VEGABAR 61, VEGABAR 64, VEGABAR 65. **VEGABAR 66, VEGABAR 67** mit Netzteilprint NTP2-2LH und Digitalplatine BARP2-DH

auf das sich diese Erklärung bezieht, mit den folgenden Normen Obereinstimmt / to which this declaration relates is in conformity with the following standards / auguel se réfère cette déclaration est conforme aux normes

> DIN/EN 61326 : 2004 (Klasse B) DIN/EN 61326 : 2004 einschließlich Anhang A EN 61010 - 1: 2001

gemäß den Bestimmungen der Richtlinien / following the provision of Directives / conformément aux dispositions des Directives

> 73/23 EWG 89/336 EWG

Schiltach, 24.09.2004

Entwicklungsleitung

Fig. 34: CE declaration of conformity

Conformity has been judged acc, to the following standards:

- · FMC:
 - Emission EN 61326: 2004 (class B)
 - Susceptibility EN 61326: 2004 incl. supplement A
- NSR: EN 61010-1: 2001

VEGABAR 64 is not subject to the pressure device quideline.1)

2.6 Compatibility acc. to NAMUR NE 53

VEGABAR 64 meets NAMUR recommendation NE 53. VEGA instruments are generally upward and downward compatible:

- sensor software for DTM VEGABAR 64 HART, PA or
- DTM VEGABAR 64 for adjustment software PACTware™
- · adjustment module PLICSCOM for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The scope of available functions depends on the respective software version of the individual components.

The software version of VEGABAR 64 can be determined as follows:

- via PACTwareTM
- · on the type label of the electronics
- via the adjustment module PLICSCOM

On our website www.vega.com you will find all software histories. Make use of this convenience and get registered for update information via e-mail.

Due to the flush diaphragm, no own pressure compartment is

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2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained, specialised personnel authorised by the operator. For safety and warranty reasons, any internal work on the instruments must be carried out only by personnel authorised by the manufacturer.

2.2 Appropriate use

VEGABAR 64 is a pressure transmitter for measurement of gauge pressure, absolute pressure and vacuum.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

VEGABAR 64 is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

2.5 CE conformity

VEGABAR 64 is in CE conformity with EMC (89/336/ EWG), fulfils the Namur recommendation NE 21 and is in CE conformity with NSR (73/23/EWG).

Manufacturer declaration

Manufacturer declaration no. 2463

Messrs

VEGA Grieshaber KG Am Hohenstein 113 77761 Schiltach

declares that the

Pressure Transmitter type VEGABAR 52, 53, 61, 64, 65, 66, 67 with electronics H (4...20mA HART)

in accordance with DIN/EN 60079-14/1998 paragraph .5.2.3 item c 1

and when used correctly under the condition that the operator follows the instructions in the documents listed:

- Mounting and operating instructions in the Operating Instructions manual
- Data and instructions of this manufacturer declaration
- Installation regulations

are suitable for use in Zone 2

The max, surface temperature increase' during operation is 43K.

With an ambient temperature of 70°C on the housing and a product temperature of 70°C, the max. surface temperature* is 113°C during operation.

Measures to maintain the explosion protection during operation:

- Permissible operating voltage: Umin. = 14V; Umax. = 36V.
- The instrument must be installed and operated in such a way that ignition due to electrostatic charge is not
 expected (depending on the version, the process fitting or the housing are made of electrically non-conductive
 plastic).
- The availability, the perfect quality and the correct position of the seal between the lower part of the housing and the cover must be ensured; the cover must be screwed on tightly.
- If the instrument is operated with opened cover, the adjustment module PLICSCOM is mounted or its keys are pushed, it must be ensured that no explosive atmosphere is present.
- Make sure that the cable entry is tight and strain-relieved; the outer diameter of the connection cable must be adapted to the cable entry; the pressure screw of the cable entry must be tightened carefully.
- Free openings for cable and cable entries must be covered tightly.
- The surface temperature must not exceed the ignition temperature of the concerned explosive atmosphere.
- VEGABAR66, 67 must be mounted in such a way that contact of the sensor to the vessel wall can be excluded by taking vessel installations and flow conditions in the vessel into account.

*Single component in the instrument

This instrument was judged by a person meeting the requirements acc. to DIN/EN 60079-14.

VEGA Grieshaber KG Schiltach, den 01.07.04

i.V. Fruhauf

Fig. 35: Manufacturer declaration

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1 About this document

1.1 Function

This operating instructions manual has all the information you need for quick setup and safe operation of VEGABAR 64. Please read this manual before you start setup.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used



Information, tip, note

This symbol indicates helpful additional information.



Caution, warning, danger

This symbol informs you of a dangerous situation that could occur. Ignoring this cautionary note can impair the person and/or the instrument.



Ex applications

This symbol indicates special instructions for Ex applications.

List

The dot set in front indicates a list with no implied sequence.

→ Action

This arrow indicates a single action.



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Contents

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OrderNo: 1212305_1

Operating Instructions VEGABAR 64 4 ... 20 mA/HART







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BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 4: Operating Instructions VEGADIS 12

Supplier/Manufacturer:

Vega

Model/Part Number:

DIS12.XBXX

Manufacturer Contact Detail:

398 The Boulevarde,

Kirrawee, NSW – 2232 (02) 9542 6662

SP306-O&M MANUAL

Rev: A

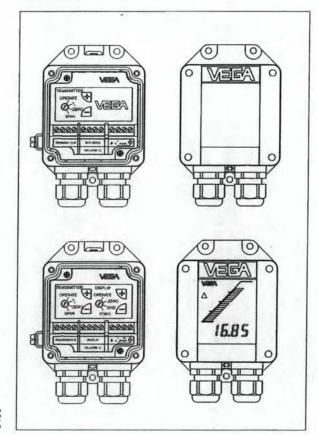
Date: 29 Nov 05

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OrderNo: 1156693_3

Operating Instructions VEGADIS 12



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Safety information, Note Ex area





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Safety information

Please read this manual carefully, and also take note of country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and acci-dent prevention rules.

For safety and warranty reasons, any internal work on the instruments, apart from that involved in normal installation and electrical connection, must be carried out by qualified VEGA personnel.

Note Ex area

Please note the approval documents (yellow binder), and especially the included safety data sheet.

SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual



Product description



1 Product description

1.1 Function and configuration

VEGADIS 12 is an external connection housing with integrated adjustment elements. It is connected via the VEGA special cable with breather capillaries or a three-wire standard cable to the hydrostatic pressure transmitter VEGAWELL 72 - 4 ... 20 mA/HART*. VEGABAR 74 or VEGABAR 75. VEGADIS 12 is connected to the supply and signal circuit of the pressure transmitter and does not require a separate external energy source.

VEGADIS 12 has the following functions:

- adjustment of zero, span and ti

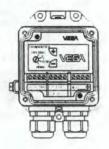
Q-Pulse Id TMS1091

- atmospheric pressure compensation for the pressure transmitter
- measured value display (optional).

As a standard feature, VEGADIS 12 is equipped with an adjustment module for the pressure transmitter. The optional display is located in the housing cover and is equipped with a bar graph and a digital display indication. In this version, additional adjustment elements for indication scaling are integrated.

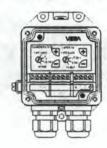
1.2 Types and versions

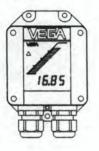
VEGADIS 12 without display





VEGADIS 12 with display





Product description

1.3 Technical data

Standard data

Weight

Materials and weight

Housing Ground terminal Display window Breather facility

Lexan PTFE filter element 1) approx. 0.5 kg

stainless steel 1.4305

Adjustment and indicating elements

Adjustment elements

Adjustment elements with display Display (option)

2 keys, 1 rotary switch 2 x 2 keys, 2 x 1 rotary switch

LC multifunctional display with - bar graph (20 segments)

- digital value (4 digits)

- tendency indicator for rising or falling values

Connection

Cable entry Screw terminals M20 x 1.5 (for cable ø 5 ... 9 mm) for wire cross-section up to 2.5 mm2

high-resistance plastic PBT (Polyester)

Adjustment circuit

Connection to

Cable length

connection cable

VEGAWELL 72 - 4 ... 20 mA/HART®, VEGABAR 74 or VEGABAR 75

VEGA special cable with breather capillaries

or 3-wire standard cable

max. 200 m

ii air permeable and humidity blocking

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Product description

Product description

.6

Supply and signal circuit (analogue transmission, 4 ... 20 mA)

Supply voltage via pressure transmitter

in conjunction with VEGADIS 12 - without display

- with display

Max. input current Range of the current signal

Max, permissible load

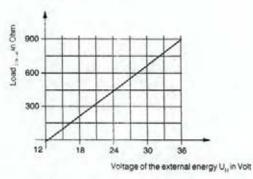
12 ... 36 V DC 17 ... 36 V DC

150 mA 3.5 ... 22 mA

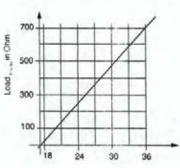
depending on the supply voltage

(see load diagrams)

Load diagram without display



Load diagram with display



Voltage of the external energy U,, in Volt

Protective measures

IP 65		
- 111		
111		

Ambient conditions

Ambient temperature - VEGADIS 12 -40°C ... +85°C -20°C ... +70°C - VEGADIS 12 with display Storage and transport temperature -40°C ... +85°C

Maintaining the housing protection IP 65 requires the use of a seal in the cable entry fitting to the cable. If the supplied seal does not fit, the customer has to provide a suitable one.

1.4 Approvals

If a pressure transmitter or the external housing is used in hazardous areas, approved versions should be used.

The respective official documents (test reports, test certificates and conformity certificates) must be noted for these applications. These are supplied with the respective instrument.

General approvals

VEGADIS 12

CENELEC EEX IS IIC

CE conformity C€

The external housings VEGADIS 12 or VEGADIS 12 Ex meet the protective regulations of EMC (89/336/EWG) and NSR (73/23/EWG). The conformity has been judged acc. to the

following standards: EN 50 081 Emission EMC EN 50 082 Susceptibility EN 61 010 NSR

NAMUR regulations

Full compliance with NAMUR regulations NE21, May 1993.

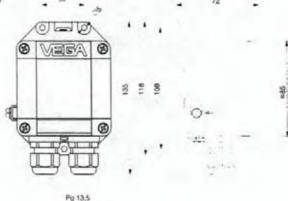
VEGADIS 12

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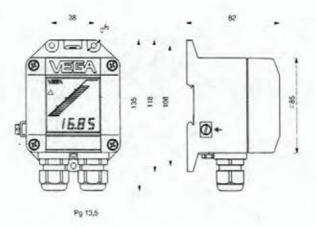
VEGA

1.5 Dimensic

without display



with display



2 Mounting

VEGADIS 12 can be mounted in the following ways:

- on carrier rail 35 x 7.5 acc. to EN 50 022
- on mounting sheet or to the wall.

In case of vertical wall mounting, the cable entry must point downwards to avoid moisture ingress.

If VEGADIS 12 is additionally used for atmospheric pressure compensation for the pressure transmitter, the following must be noted:

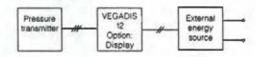
- there must be the same atmospheric pressure on the breather facility as on the vessel
- the breather facility must not be clogged or dirty.

3 Electrical connection

3.1 Connection instructions

VEGADIS 12 is connected to the supply and signal circuit of the pressure transmitter and does not require a separate external energy source.

Block diagram



The electronics in the pressure transmitter is designed in two-wire technology and requires a supply voltage of 12 ... 36 V DC, with display 17 ... 36 V DC. Supply voltage and current signal are led via the same two-wire connection cable to the connection terminals. The third cable between pressure transmitter and VEGADIS 12 is used for transmission of the adjustment data.

The external energy is provided via a separate power supply unit:

- power supply unit, e.g. VEGASTAB 690
- processing unit with integrated DC current source (e.g. active DCS input)

Make sure that the external energy source is reliably separated from the mains circuits acc. to DIN VDE 0106, part 101. The above mentioned VEGA instruments meet this requirement and protection class III is therefore ensured.

'The external energy source must deliver a terminal voltage of at least 12 V or 17 V to the transmitter. The actual terminal voltage on the transmitter depends on the following factors:

- output voltage U_H of the external energy source under nominal load.
- load resistances of the instruments in the current circuit.

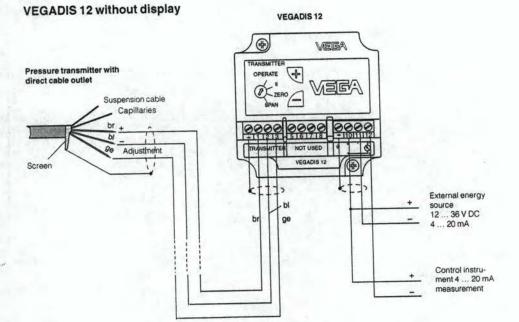
For electrical connection in general, the following points should be given attention:

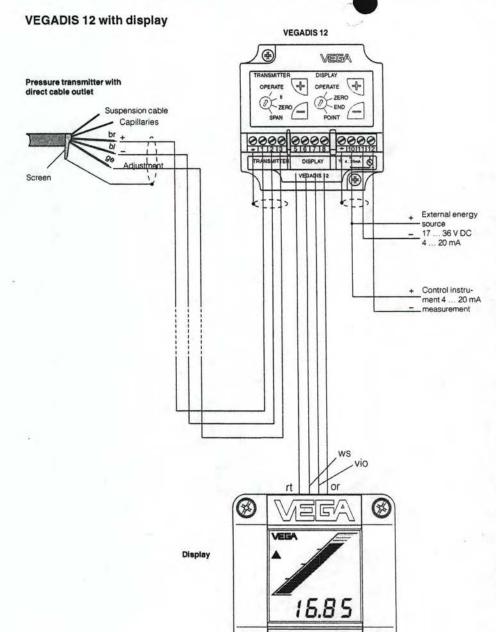
- The connection must be made according to the national installation standards (e.g. in Germany acc. to the VDE regulations).
- To avoid damage of the electronics, the terminal voltage must not exceed 36 V.
- The connection elements have built-in protection against polarity reversal.
- The wiring between pressure transmitter and VEGADIS 12 or between VEGADIS 12 and the power supply can be made with standard three or two-wire cable.
- If strong electromagnetic interferences are expected, screened cable is recommended. The screening must be made on both ends. For use in Ex areas, the installation regulations must be noted.
- If overvoltages are expected, we recommend the installation of VEGA overvoltage arresters.
- A seal fitting the cable must be used in the cable entry.

description of the property



3.2 Wiring plan



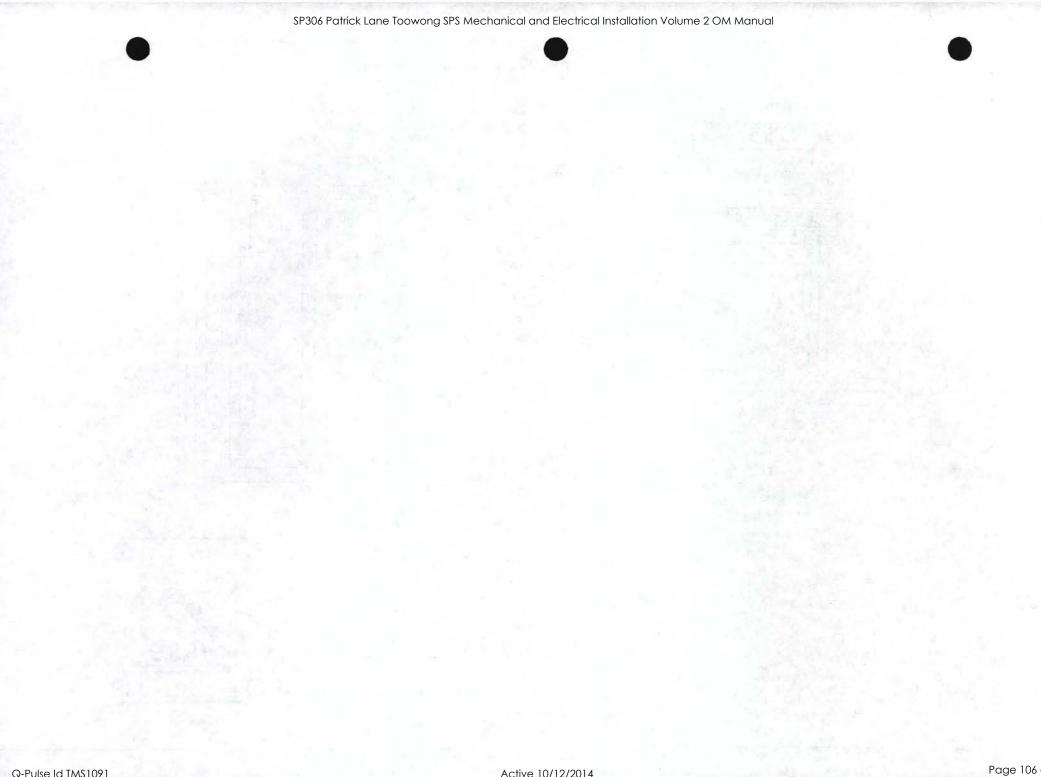


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VEGADIS 12

VEGADIS 12

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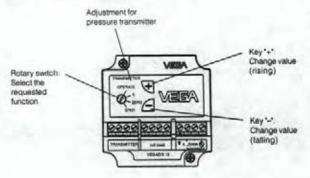


Setup

Setup

4 Setup

4.1 Adjustment elements



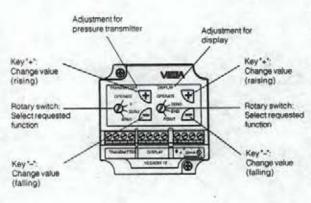
Adjustment system (transmitter)

- · Choose the requested function with the rotary switch.
- · With the '+' and '-' keys you modify the signal current to the requested values or set the suitable integration time.
- · Set the rotary switch to position 'OPERATE'. The set values are transferred to the EEPROM memory and remain there even in case of voltage

4.2 Adjustment and indicating elements (version with display)

Digital value:

4 digits as well as sign and decimal point individual scale from -9999 ... +9999



Tendency indication

Ber graph

Q-Pulse 1d TMS1091

Adjustment system (transmitter)

(see section 4.1)

Adjustment system (display)

- · With the rotary switch you choose the requested func-
- . With the '+' and '-' keys you change the display indication to the requested values or set the suitable decimal point.
- . Then set the rotary switch to position "OPERATE". The set values are transferred to the EEPROM memory and remain there even in case of voltage loss.



· Set the rotary switch to zero.

Set a current of 4 mA by pushing the "+" and '-' key.

4.3 Adjustment of the transmitter

To adjust the beginning of the measuring

range and end value of the measuring range,

The measured value is identical to the output

connect an ammeter to terminals 10 and 12.

2 Adjust span

1 Adjust zero

(vessel empty)

Adjustment

current.

(max. vessel level)

- · Set the rotary switch to span.
- . Set a current of 20 mA by pushing the "+" and '-' key.

Adjustment range of the measuring range final value:

3.3 % ... 120 % of nominal range

Adjustment instructions:

- A modification of the beginning of the measuring range does not influence the adjusted span.
- It is also possible to adjust currents for partial fillings, e.g. 8 mA for 25 % and 16 mA for 75 %. The electronics then calculates automatically the current values for 0 % and 100 % (only possible with a delta 23%).
- The current value first changes in steps of 6 µA steps, then after approx. 10 sec. of pressing, in steps of about 300 µA.
- If the current values react to the key pressing with a time delay, this can have two reasons:
 - the last adjustment was carried out with a level considerably deviating from the actual level.

Integration time

An integration time t of 0 ... 10 sec can be set for damping level fluctuations.

Procedure:

- . Set rotary switch to t.
- . By pushing the "-" key 10 times, make sure that the integration time is set to 0 sec.
- · For every 1 sec requested integration time, push the "+" key once.

The integration time is the time required by the current output signal to reach 90 % of the actual level after a sudden level change.

4.4 Scaling of the indication

The display provides the current values 4 ... 20 mA as bar graph and as digital value.

Bar graph

At 4 mA no segment of the bar graph appears, at 20 mA all segments appear. This assignment is fixed.

Digital value

The digital value can be scaled individually between -9999 ... +9999 via the adjustment module.

1 Adjust zero

- · Set the rotary switch to zero.
- . Set the requested value, e.g. 0 by pushing the '+' and '-' key.

2 Adjust end

- · Set the rotary switch to end.
- . Set the requested value, e.g. 1000 by pushing the "+" and "-" key.

3 Adjust the decimal point (point)

- · Set the rotary switch to point.
- · Set the requested values, e.g. 8888 (no decimal point) by pushing the "+" and "-"

VEGADIS 12

20591-BN





Diagnostics

Notes

5 Diagnostics

5.1 Maintenance

VEGADIS 12 is maintenance-free.

5.2 Failure rectification

In case of an instrument failure, please check the following:

- the atmospheric pressure compensation
- the electrical connections and components.

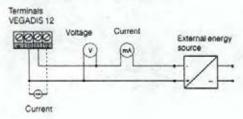
Check atmospheric pressure compensation

First of all open the housing cover. The indicated measured value must not change. However, if the indicated value changes nevertheless, the compensation of the atmospheric pressure is not ensured. Please therefore check:

- the breather facility on the housing
- the capillaries in the special cable.

There must be always the same atmospheric pressure on the breather facility as on the open vessel.

Check electrical components



Instruction for Ex applications

Deviating from the previous assignment, the terminals 10 and 12 are here used for brief connection to a certified, active, floating (max. value: 470 mW) or to an individual passive, floating measuring instrument. For connection, the regulations for wiring of intrinsically safe circuits (measuring instrument, supply and signal circuit) must be noted.

Voltage

- Check the terminal voltage on VEGADIS 12 (must be at least 12 V DC or 17 V DC with display).

Current

Current value	Condition			
3.8 20.5 mA	standard range for output current			
0 mA	signal cable interrupted			
< 3.6 mA	electronics or pressure sensor element defective			
22 mA	electronics or pressure sensor element defective			



Q-Pulse Id TM\$1091 Active 10/12/2014 Page 110 of 380

APPENDIX 5 Page 111 of 38

BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 5: GRUNDFOS Instructions s1, s2, s3, SA. SV 7.5 – 65kW

Supplier/Manufacturer:

GRUNDFOS

Manufacturer Details:

68 Murdoch Cct, Acacia Ridge, QLD – 4110

(07) 3272 1980

Model/Type:

S2654BM2A513ZB49

No. Supplied: Serial Nos:

182491

182492

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 6 of 31

GRUNDFOS INSTRUCTIONS

\$1, \$2, \$3, \$A, \$V

7.5 - 155 kW

- **GB** Installation and operating instructions
- D Montage- und Betriebsanleitung
- (F) Notice d'installation et d'entretien
- Istruzioni di installazione e funzionamento
- E Instrucciones de instalación y funcionamiento
- P Instruções de instalação e funcionamento
- GR Οδηγίες εγκατάστασης και λειτουργίας
- NL Installatie- en bedieningsinstructies
- S Monterings- och driftsinstruktion
- SF) Asennus- ja käyttöohjeet
- OK Monterings- og driftsinstruktion



BE > THINK > INNOVATE >

GRUNDFOS X

Declaration of Conformity

nder our sole responsibility that the products \$1, \$2, \$3, and this declaration relates are in conformity with the oclaration relates, are in conformity with the

ofic compatibility (89/336/EEC). and EN 81 000-8-2 and EN 81 000-8-3.

asigned for use within certain voltage limits (73/23/EEC)

ndards used: EN 60 335-1 and EN 60 335-2-41.

ATEX 94/9/EC.

Standards used: EN 50 014, EN 50 018, EN 13 463-1 and pr EN 13 463-5.

Konformitätserklärung

Wir GRUNDFOS erklären in alleiniger Verantwortung, daß die Produkte S1, S2, S3, SA, SV, 7.5 - 155 kW, auf die sich diese Erklärung bezieht, mit den folgenden Richt-linien des Rates zur Angleichung der Rechtsvorschriften der EG-Mitgliedstaaten

Maschinen (98/37/EG).

Norm, die verwendet wurde: EN 292. Elektromagnetische Verträglichkeit (89/336/EWG). Normen, die verwendet wurden: EN 61 000-6-2 und EN 61 000-6-3.

Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (73/23/EWG) [95]. verwendet wurden: EN 60 335-1 und EN 60 335-2-41.

ATEX 94/9/EG.

Normen, die verv pr EN 13 463-5. rendet wurden: EN 50 014, EN 50 018, EN 13 463-1 und

Déclaration de Conformité

Nous GRUNDFOS déclarons sous notre seule responsabilité que les produits S1, S2, S3, SA, SV, 7,5 - 155 kW auxquels se réfère cette déclaration sont conformes aux Directives du Conseil concernant le rapprochement des législations des Etats membres CE relatives à

Machines (98/37/CE). Standard utilisé: EN 292.

Compatibilité électromagnétique (89/336/CEE). Standards utilisés: EN 61 000-6-2 et EN 61 000-6-3.

Matériel électrique destiné à employer dans certaines limites de tension (73/23/CEE) [95].

sés: EN 60 335-1 et EN 60 335-2-41 Standards utilis ATEX 94/9/EC.

Standards utilisés: EN 50 014, EN 50 018, EN 13 463-1 et pr EN 13 463-5.

Dichiarazione di Conformità

Noi GRUNDFOS dichiariamo sotto la nostra esclusiva responsabilità che i prodotti \$1, \$2, \$3, \$A, \$V, 7,5 - 155 kW, ai quali questa dichiarazione si riferisce, sono conformi alle Direttive del consiglio concernenti il ravvicinamento delle legislazioni degli Stati membri CE relative a

Macchine (98/37/CE).

Norme di riferimento: EN 292.

Compatibilità elettromagnetica (69/336/CEE).

Norme di riferimento: EN 61 000-6-2 e EN 61 000-6-3.

Materiale elettrico destinato ad essere utilizzato entro certi limiti di tensione (73/23/CEE) [95].

Norme di riferimento: EN 60 335-1 e EN 60 335-2-41 ATEX 94/9/EC.

Norme di riferimento: EN 50 014, EN 50 018, EN 13 463-1 e pr EN 13 463-5.

Declaración de Conformidad

Nosotros GRUNDFOS declaramos bajo nuestra única responsabilidad que los productos S1, S2, S3, SA, SV, 7,5 - 155 kW a los cuales se refiere esta declarac son conformes con las Directivas del Consejo relativas a la aproximación de las legislaciones de los Estados Miembros de la CE sobre

Máquinas (98/37/CE).

Norma aplicada: EN 292.

Compatibilidad electromagnética (89/336/CEE).

Normas aplicadas: EN 61 000-6-2 y EN 61 000-6-3. Material eléctrico destinado a utilizarse con determinados limites de tensión (73/23/CEE) [95].

Normas aplicadas: EN 60 335-1 y EN 60 335-2-41.

ATEX 94/9/EC.

Normas aplicadas: EN 50 014, EN 50 018, EN 13 463-1 y pr EN 13 463-5.

Declaração de Conformidade

Nós GRUNDFOS declaramos sob nossa única responsabilidade que os produtos S1, S2, S3, SA, SV, 7,5 - 155 kW aos quais se refere esta declaração estão em conformidade com as Directivas do Conselho das Comunidades Europeias relativas à aproximação das legislações dos Estados Membros respeitantes à

Máquinas (98/37/CE).

Norma utilizada: EN 292.

Compatibilidade electromagnética (89/336/CEE).

Normas utilizadas: EN 61 000-6-2 e EN 61 000-6-3. Material eléctrico destinado a ser utilizado dentro de certos limites de tensão (73/23/CEE) [95].

Normas utilizadas: EN 60 335-1 e EN 60 335-2-41.

ATEX 94/9/EC.

Normas utilizadas: EN 50 014, EN 50 018, EN 13 463-1 e pr EN 13 463-5.

Δήλωση Συμμόρφωσης

; η GRUNDFOS δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προιόντα , S2, S3, SA, SV, 7,5 - 155 kW συμμορφώνονται με την Οδηγία του Συμβουλίου επί της σύγκλισης των νόμων των Κρατών Μελών της Ευρωπαικής Ενωσης σε σχέση με τα

Μηχανήματα (98/37/ΕΚ).

Πρότυπο που χρησιμοποιήθηκε: EN 292. Ηλεκτρομαγνητική συμβατότητα (89/336/EOK)

Πρότυπα που χρησιμοποιήθηκαν: ΕΝ 61 000-6-2 και ΕΝ 61 000-6-3. Ηλεκτρικές συσκευές σχεδιασμένες για χρήση εντός ορισμένων ορίων ηλεκτρικής τάσης (73/23/ΕΟΚ) [95]. Πρότυπα που χρησιμοποιήθηκαν: ΕΝ 60 335-1 και ΕΝ 60 335-2-41.

ΑΤΕΧ 94/9/ΕΚ. Πρότυπα που χρησιμοποιήθηκαν: EN 50 014, EN 50 018, EN 13 463-1 και pr EN 13 463-5

Overeenkomstigheidsverklaring

Wij GRUNDFOS verklaren geheel onder eigen verantwoordelijkheid dat de produkten S1, S2, S3, SA, SV, 7,5 - 155 kW waarop deze verklaring betrekking heeft in overeenstemming zijn met de Richtlijnen van de Raad inzake de onderlinge aanpassing van de wetgevingen van de Lid-Staten betreffende

Machines (98/37/EG).

Norm: EN 292.

Elektromagnetische compatibiliteit (89/336/EEG). Normen: EN 61 000-6-2 en EN 61 000-6-3.

Elektrisch materiaal besternd voor gebruik binnen bepaalde spanningsgrenzen (73/23/EEG) [95]. Normen: EN 60 335-1 en EN 60 335-2-41.

ATEX 94/9/EC.

Normen: EN 50 014, EN 50 018, EN 13 463-1 en pr EN 13 463-5.

Försäkran om överensstämmelse

Vi GRUNDFOS försåkrar under ansvar, att produkterna S1, S2, S3, SA, SV, 7,5 - 155 kW, som omfattas av denna försäkran, är i överensstämmelse med Rådets Direktiv om inbördes närmande till EU-medlemsstaternas lagstiftning, avseende

Maskinell utrustning (98/37/EC). Anvånd standard: EN 292.

Elektromagnetisk kompatibilitet (89/336/EC). Använda standarder: EN 61 000-6-2 och EN 61 000-6-3.

Elektrisk material avsedd för användning inom vissa spänningsgränser (73/23/EC) [95].

wända standarder: EN 60 335-1 och EN 60 335-2-41.

ATEX 94/9/EC

Anvånda standarder: EN 50 014, EN 50 018, EN 13 463-1 och pr EN 13 463-5.

Vastaavuusvakuutus

Me GRUNDFOS vakuutamme yksin vastuullisesti, että tuotteet S1, S2, S3, SA, SV, 7,5 - 155 kW, jota tämä vakuutus koskee, noudattavat direktiivejä jotka käsittelevä! EY:n jäsenvaltioiden korieellisia laitteita koskevien lakien yhdenmukaisuutta seur.:

Koneet (98/37/EY).

Käytetty standardi: EN 292.

Elektromagneettinen vastaavuus (89/336/EY). Käytetyt standardit: EN 61 000-6-2 ja EN 61 000-6-3.

Määrättyjen jänniterajoit sa käytettävät sähköiset laitteet (73/23/EY) [95].

Käytetyt standardit: EN 60 335-1 ja EN 60 335-2-41.

ATEX 94/9/EC.

Käytetyt standardit: EN 50 014, EN 50 018, EN 13 463-1 ja pr EN 13 463-5.

Overensstemmelseserklæring

Vi GRUNDFOS erklærer under ansvar, at produkterne S1, S2, S3, SA, SV, 7,5 - 155 kW, som denne erklæring omhandler, er i overensstemmelse med Rådets direktiver om indbyrdes tilnærmelse til EF medlemsstaternes lovgivning om

Maskiner (98/37/EF)

Anvendt standard: EN 292.

Elektromagnetisk kompatibilitet (89/336/EØF). Anvendte standarder: EN 61 000-6-2 og EN 61 000-6-3.

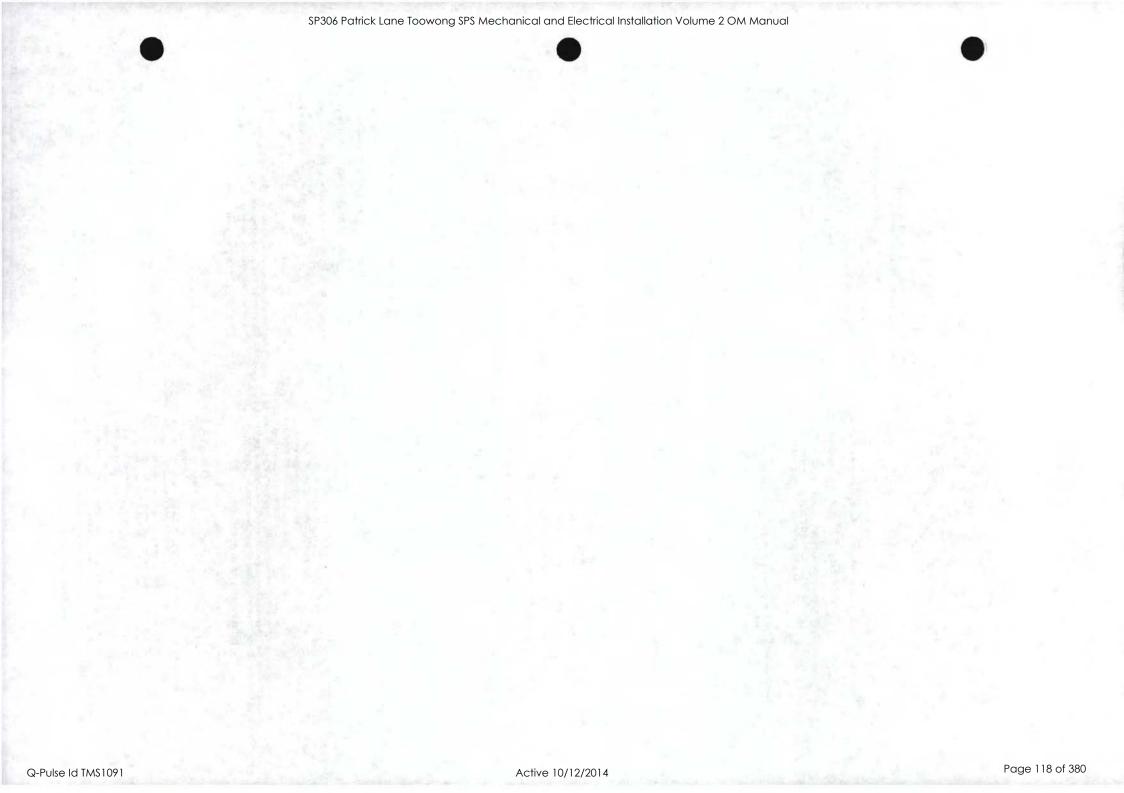
Elektrisk materiel bestemt til anvendelse inden for visse spændingsgrænser

23/EØF) [95] andte standarder: EN 60 335-1 og EN 60 335-2-41.

XIEX 94/9/EC. -Anvendte standarder: EN 50 014, EN 50 018, EN 13 463-1 og pr EN 13 463-5.

Bjerringbro, 1st June 2003

Kenth Hvid Nielsen



S1, S2, S3, SA, SV 7.5 - 155 kW

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Instruções de inetalação	Pág.	65	C
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Before beginning installation procedures, these installation and operating instructions should be studied carefully. The installation and operation should also be in accordance with local regulations and accepted codes of good practice.

1. General description

This booklet includes instructions for installation, operation and maintenance of GRUNDFOS submersible wastewater pumps, types S1, S2, S3, SA and SV, fitted with motors of 7.5 to 155 kW.

The booklet also includes specific instructions for the explosionproof pumps.

1.1 Applications

The S1, S2, S3, SA and SV pumps are designed for the pumping of wastewater in a wide range of municipal, private and industrial applications.

Depending on version, the pumps can be used for submerged or dry installation.

Maximum solids size: 145 mm.

1.1.1 Potentially explosive environments

In potentially explosive environments, the explosion-proof S1, S2, S3 and SV pumps must be used, see sections 1.5.1 Ex certification and classification and 7.3 Explosion-proof S1, S2, S3 and SV pumps.

Note: The explosion classification of the pump is EEx dIIB T3 or EEx dIIB T4. The installation must in each individual case be approved by the local fire-fighting authorities.

1.2 Operating conditions

1.2.1 pH value

All pumps can be used for pumping liquids with a pH value between 4 and 10.

1.2.2 Liquid temperature

0°C to +40°C.

1.2.3 Ambient temperature

-20°C to +40°C.

1.2.4 Density and viscosity of pumped liquid

Maximum density: 1000 kg/m3,

Maximum kinematic viscosity: 1 mm²/s (1 cSt).

Note: When pumping liquids with a density and/or a kinematic viscosity higher than the values stated above, motors with correspondingly higher outputs must be used.

1.2.5 Level of pumped liquid

In the case of submerged pump installation, the lowest stop level must always be above the pump housing.



The pump must always be filled with the liquid to be pumped.

An additional level switch must be installed to ensure that the pump is stopped in case the stop level switch is not operating.

To ensure adequate cooling of the motor during operation, the following minimum requirements must be met:

Versions 1 and 4:

The pump must always be covered by the pumped liquid to the middle of the motor.

Versions 2 and 5:

The pump housing must always be covered by the pumped liquid.

Versions 3 and 6:

No special requirements.

· Version 7:

The liquid level must be at least 350 mm above the pump inlet, see fig. 7.

1.2.6 Operating mode

The pumps are designed for continuous operation or for intermittent operation with the maximum number of starts per hour stated in the table below:

Motor size	Starts per hour
7.5 - 21.0 kW, 2- and 4-pole	20
15.0 kW, 12-pole 16.0 kW, 6-pole 22.0 - 155 kW	15

1.2.7 Enclosure class

IEC IP 68.

1.3 Sound pressure level

The sound pressure level of the pump is lower than the limiting values stated in the EC Council Directive 98/37/EC relating to machinery.

1.4 Type key

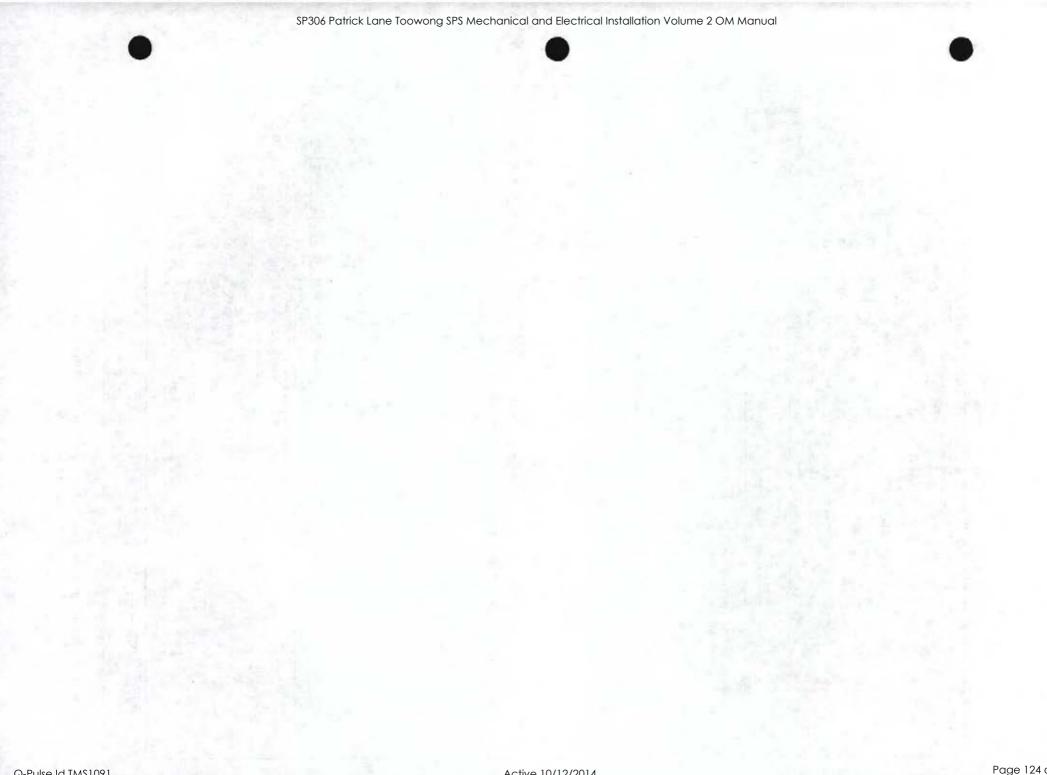
All S1, S2, S3, SA and SV pumps described in this booklet are identified by the type code stated in the confirmation of order and other documentation supplied with the pump. The code consists of 14 items as shown in the table below.

Please note that the pump types described in this booklet are not necessarily available in all variants. The shaded code items are stated on the pump nameplate.

S	1	X	17	4		M	12.5	A	778700	5	11		Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Code item				Description	n				
1. Pump type	S	GRUNDFOS submer	rsible waste	water pumps, ty	pe S				
2. Impeller type	1	Single-channel							
7/ /48	2	Two-channel							
	3	Three-channel							
	V	SuperVortex							
	A	Axial							
3. Motor specification	[]	Standard, not certifie	ed						
	X	Explosion-proof moto	or						
	A	In conformity with the	e ATEX dire	ective					
4. Motor power		Motor power in kW							
5. Motor pole number		Motor speed at	5 3 3 4 0 0						
			50 Hz	60 H	z				
			min ⁻¹	min*	1				
	2	2-pole	3000	3600)				
	4	4-pole	1500	1800)				
	6	6-pole	1000	1200)				
	8	8-pole	750	900					
	10	10-pole	600	720					
	12	12-pole	500	600					
6. Pump generation	[]	1st generation							
	A	2nd generation							
	В	3rd generation, etc.							
	-	The generation code	distinguish	es between stru	cturally diffe	erent num	ns which	have the	same
		power rating	Giotingaion	oo ootwoon oud	otorany ann	orom poin	po minon	navo inc	Junio
7. Head	[]	No classification							
	E	Extra-low							
	L	Low							
	м	Medium							
	н	High							
	S	Super-high							
8. Installation version	1		on on auto-	counting					
o. modulation version	2								
	3	Submerged installation on auto-coupling. Pump with cooling jacket.							
	4	Vertical dry installation with base stand. Pump with cooling jacket.							
	5	Submerged installation, portable Submerged installation, portable. Pump with cooling jacket.							
	6	Horizontal dry installation with base stand and bracket. Pump with cooling jacket.							
	7	Vertical column installation with base stand and bracket. Pump with cooling jacket.							
9. Interchangeability	-	The letter (A, B, C)	CONTROL OF THE	no interebangee	allity of part	c hotwoor	othonuic	o identic	al numne
3. Interchangeability		Pumps with no or the							
		parts catalogue.	dame rette	, mayo man muoro	nangeaum.	y or paris	dila doc i	no same	opara
10. Number of phases	[]	Three-phase							
11. Frequency	5	50 Hz							
	6	60 Hz							
12. Voltage and starting		50 Hz		60 Hz					-
iz. Foliago and oldring	01	400 V, DOL	01	460 V, DOL					
	11	400 V, star-delta	11	460 V, star-o	lelta				
	02	230 V, DOL	03	500 V, DOL	rena				
	12	230 V, Star-delta	13	500 V, DOL	lelta				
	03	415 V, DOL	05	380 V, DOL	renta				
	13	415 V, Star-delta	15		lalta				
	04			380 V, star-d	ena				
		500 V, DOL	07	220 V, DOL	lalta				
	14	500 V, star-delta	17	220 V, star-c	renta				
		COON DOL							
13. Special equipment	06 U	690 V, DOL Flanges sized accord	line to ANO	Langeitlanting					

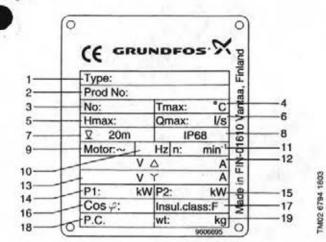
Q-Pulse Id TMS1091



1.5 Nameplates

All pumps can be identified by means of the nameplate on the motor top cover, see fig. 1. If the nameplate is missing or damaged, the pump can be identified by the serial number stamped under the nameplate.

Fig. 1



Pos.	Description
1	Type designation
2	SAP code
3	Serial number
4	Maximum liquid temperature
5	Maximum head
6	Maximum flow
7	Maximum installation depth
8	Enclosure class
9	Number of phases
10	Frequency
11	Rated speed
12	Voltage/current, delta connection
13	Voltage/current, star connection
14	Power input
15	Shaft power
16	Power factor
17	Insulation class
18	Production code, year/week
19	Weight of the pump

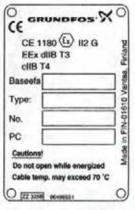
1.5.1 Ex certification and classification

Explosion-proof pumps have been approved by Baseefa (2001) Ltd. in conformity with the essential health and safety requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Council Directive 94/9/EC (ATEX).

The certified pumps (Ex-pumps) are supplied with an approval plate fixed in the visible place close to the nameplate.

Fig. 2 shows the approval plates for the pumps equipped optionally with the motors classified to T3 or T4 temperature class.

Fig. :





The approval plate gives the following details:

CE CE mark.

1180 Number of Quality Assurance notified body.

EU ex-symbol.

II Equipment group (II = non-mining).

2 Equipment category (high protection).

G Type of explosive atmosphere.

EEx Motor explosion-proof according to European stand-

ard.

d Motor withstands explosion pressure.

IIB Gas Group.

T3 Maximum surface temperature of the motor is 200°C.

T4 Maximum surface temperature of the motor is 135°C.

c Constructional safety.

Baseefa Certificate number.

No. HA

PC Production code.

2. Safety



Pump installation in pits must be carried out by specially trained persons.



Persons should not enter the installation area when an explosive atmosphere is present.

For safety reasons, all work in pits must be supervised by a person outside the pump pit.

Pits for submersible wastewater pumps contain wastewater with toxic and/or disease-causing substances. Therefore, all persons involved must wear appropriate personal protective equipment and clothing and all work on and near the pump must be carried out under strict observance of the hygiene regulations in force.

Make sure that the pump cannot roll or fall over.

All lifting equipment must be rated for the purpose and checked for damages before any attempts are made to lift the pump. The lifting equipment rating must under no circumstances be exceeded. The pump weight is stated on the pump nameplate.



Always lift the pump by its lifting bracket or by means of a fork-lift truck, **never** by means of the motor cable or the hose/pipe.

Note: Do not remove the protection from the free end of the supply cable until the electrical connections are to be made. The free cable end must never be exposed to moisture or water, whether it is protected or not. Non-compliance may involve the risk of damage to the motor.

For long periods of storage, the pump must be protected against moisture and heat.

Storage temperature: -30°C to +60°C.

After a long period of storage, the pump should be inspected before it is put into operation. Make sure that the impeller can rotate freely. Pay special attention to the condition of the shaft seals and the cable entry.

4. Installation

The loose nameplate supplied with the pump should be fixed at the installation site.

All safety regulations must be observed at the installation site, e.g. the use of blowers for fresh-air supply to the pit.



Do not put your hands or any tool into the pump suction or discharge port after the pump has been connected to the electricity supply, unless the pump has been switched off by removing the fuses or switching off the mains switch. It must be ensured that the electricity supply cannot be accidentally switched on.

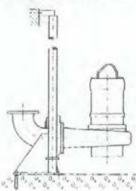
Prior to installation, check the oil level in the oil chamber, see section 7.1 Oil check and oil change.

The S1, S2, S3, SA and SV pumps are designed for various installation versions.

Figures 3 to 7 show the possible installation versions.

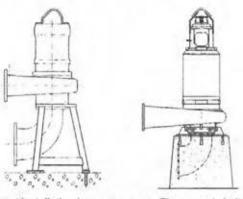
Fig. 3

Versions 1 and 2: Submerged installation on auto-coupling



Permanent installation in pit. The pump can easily be pulled out and lowered into the pit by means of the guide rails. The liquid level can be set lower for version 2 than for version 1. Fig. 4

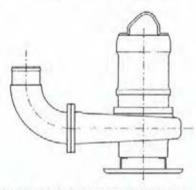
Version 3: Vertical dry installation with base stand



Permanent installation in a pump room. The pump is bolted to the suction and discharge pipes by means of flange connections. Pumps with DN 500 or DN 600 flange are to be installed on a concrete foundation (see the above figure to the right).

Fig. 5

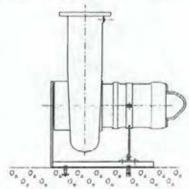
Versions 4 and 5: Submerged installation, portable



For portable use in pit or temporary installation. The liquid level can be set lower for version 5 than for version 4.

Fig. 6

Version 6: Horizontal dry installation with base stand and bracket



Permanent installation in a pump room. The pump is bolted to the suction and discharge pipes by means of flange connections.

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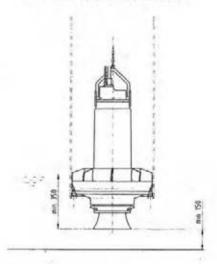
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Version 7: Vertical column installation





Vertical column installation in steel pipe or concrete shaft.

4.1 Submerged installation on auto-coupling

Pumps for permanent installation can be installed on a stationary auto-coupling and operated completely or partially submerged in the pumped liquid.

- Drill mounting holes for the guide rail bracket on the inside of the pit and fasten the guide rail bracket provisionally with two screws.
- Place the auto-coupling base unit on the bottom of the pit.
 Use a plumb line to establish the correct positioning. Fasten the auto-coupling with expansion bolts. If the bottom of the pit is uneven, the auto-coupling base unit must be supported so that it is level when being fastened.

Assemble the discharge pipe in accordance with the generally accepted procedures and without exposing the pipe to distortion or tension.

- Insert the guide rails into the rings of the auto-coupling base unit and adjust the length of the rails accurately to the guide rail bracket at the top of the pit.
- Unscrew the provisionally fastened guide rail bracket. Insert the expansion dowels into the guide rails. Fasten the guide rail bracket on the inside of the pit. Tighten the bolts in the expansion dowels.
- Clean out debris from the pit before lowering the pump into the pit.
- 7. Fit the guide claw to the pump.
- Slide the guide claw of the pump between the guide rails and lower the pump into the pit by means of a chain secured to the lifting bracket of the pump. When the pump reaches the auto-coupling base unit, the pump will automatically connect tightly.
- Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
- 10. Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook at the top of the pit. Make sure that the cables are not sharply bent or pinched.
- 11. Connect the motor cable and the monitoring cable, if any.

Note: The end of the cable must not be submerged, as water may penetrate through the cable into the motor.

4.2 Dry installation

Pumps in dry installation are installed permanently in a pump room.

The pump motor is enclosed and watertight and will not be damaged if the installation site is flooded with water.

- Mark and drill mounting holes in the concrete floor/concrete foundation.
- 2. Fit the bracket or base stand to the pump.
- 3. Fasten the pump with expansion bolts.
- 4. Check that the pump is vertical/horizontal.

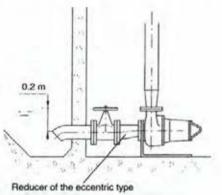
In order to facilitate service on the pump, isolating valves should be fitted on either side of the pump.

- Fit the suction and discharge pipes and isolating valves, if used, and ensure that the pump is not stressed by the pipework.
- Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook. Make sure that the cables are not sharply bent or pinched.
- 7. Connect the motor cable and the monitoring cable, if any.

Note: It is recommended to use a reducer between the suction pipe and the pump in horizontal installations. The reducer must be of the eccentric type and must be installed so that the straight edge is pointing upwards. In this way, the accumulation of air in the suction pipe is avoided and the risk of disturbance of operation is eliminated, see fig. 8.

Fig. 8

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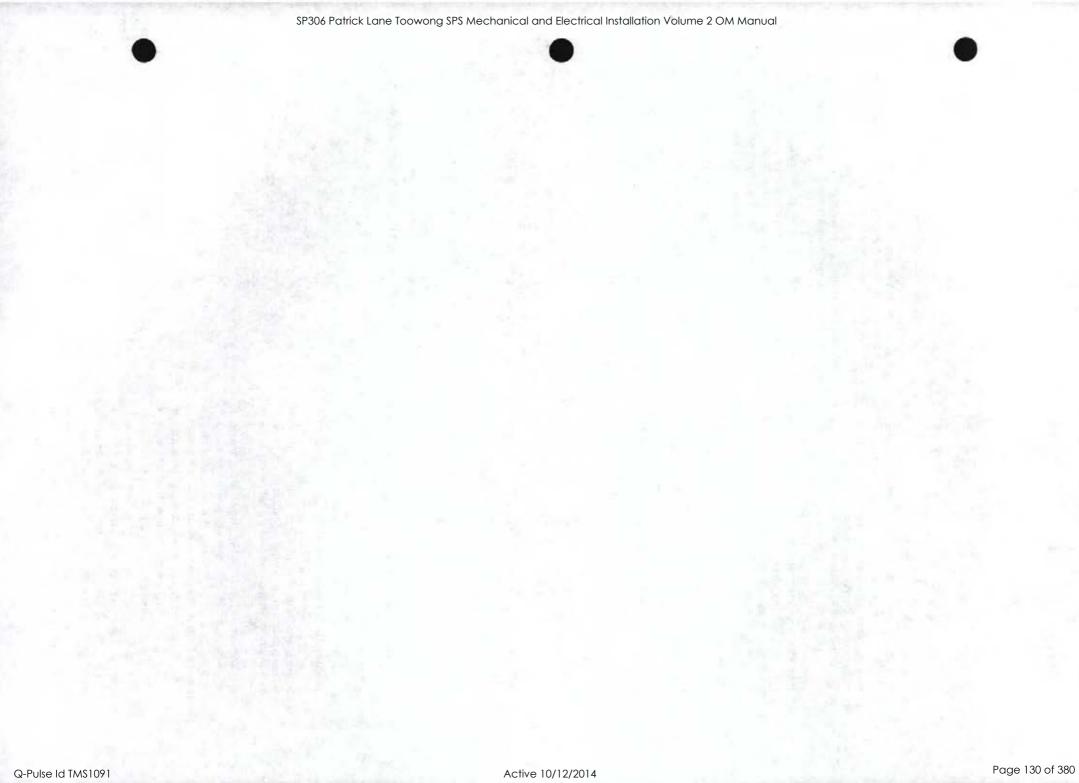
4.3 Submerged installation, portable

- 1. Fit the ring stand to the pump suction flange.
- Fit a 90° elbow to the pump discharge port and connect the discharge pipe/hose.

If a hose is used, make sure that the hose does not buckle and that the inside diameter matches that of the discharge port.

- Lower the pump into the liquid by means of a chain secured to the lifting bracket of the pump. It is recommended to place the pump on a plane, solid foundation. Make sure that the pump is hanging from the chain and not the cable.
- Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
- Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook. Make sure that the cables are not sharply bent or pinched.
- 6. Connect the motor cable and the monitoring cable, if any.

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4.4 Vertical column installation

- Weld the ring stand supplied with the pump onto the lower opening of the riser pipe or concrete it into place at the lower opening of the concrete shaft.
- Fasten a chain to the lifting bracket and uncoil the supply cable.
- 3. When the ring stand has been positioned in the right place, lower the pump into place in the pump shaft. Make sure that the O-ring seal is positioned correctly in the groove on the outside of the pump housing. Three guide pins on the ring stand will guide the pump into the right position and prevent it from turning in the seat when running.
- Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
- Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook. Make sure that the cables are not sharply bent or pinched.
- 6. Connect the motor cable and the monitoring cable, if any.

4.5 Pump controller

The S1, S2, S3, SA and SV pumps can be connected to a separate GRUNDFOS pump controller for level control, which is available as an accessory:

- · type LC for one-pump installations and
- type LCD for two-pump installations.

Depending on application, different types of level control equipment can be used.

The LC controller is fitted with two or three level switches: Two for start and stop of pump. The third level switch, which is optional, is for high-level alarm.

The LCD controller is fitted with three or four level switches: One for common stop and two for start of the pumps. The fourth level switch, which is optional, is for high-level alarm.

When installing the level switches, the following points should be observed:

- To prevent air intake and vibrations in submerged pumps, the stop level switch must be fitted in such a way that the pump is stopped before the liquid level is lowered below the top of the pump housing.
 - As a principal rule for pumps in dry installation, the lowest stop level must be at least 20 cm above the opening of the suction pipe, see fig. 8.
- The start level switch should be installed in such a way that the pump is started at the required level; however, the pump must always be started before the liquid level reaches the bottom inlet pipe to the pit.
- The high-level alarm switch, if installed, should always be installed about 10 cm above the start level switch; however, alarm must always be given before the liquid level reaches the inlet pipe to the pit.

Note: The pump controller must not be installed in potentially explosive environments.



Q-Pulse Id TMS1091

Pumps installed in potentially explosive atmosphere must always be filled with the liquid to be pumped.

An additional level switch must be installed to ensure that the pump is stopped in case the stop level switch is not operating.

4.6 Thermal switches

Three bimetallic thermal switches are built into the stator windings, and a contact will open in case of overtemperature, i.e. 150°C.

The supply voltage to the thermal switches must be 12-230 VAC. The thermal switches are connected to the monitoring cable, see section 5. Electrical connection, and must be connected to the safety circuit of the separate pump controller.

Note: The motor starter of the pump controller must include a circuit which automatically disconnects the electricity supply in case the protective circuit for the pump is opened.



The installer/user should provide an automatic device which disconnets the electricity supply in case the thermal switches or the moisture switches are not operating.

4.7 Moisture switches

Non-explosion-proof pumps have one moisture switch, which is fitted in the chamber below the motor top cover.

Explosion-proof pumps have two moisture switches connected in series, which are fitted in the chamber below the motor top cover.

The moisture switch is non-reversing and must be replaced after use.

The moisture switches are connected in series with the thermal switches and connected to the monitoring cable, see section 5. Electrical connection, and must be connected to the safety circuit of the separate pump controller.

Note: The motor starter of the pump controller must include a circuit which automatically disconnects the electricity supply in case the protective circuit for the pump is opened.

4.8 Thermistors

Thermistors are available as accessories.

The thermistors are used for the monitoring of bearing and stator temperatures instead of thermal switches and must be connected to the thermistor relay in the control cabinet.

The following limit temperatures are used:

- · 90°C alarm for bearing temperature.
- 130°C pump stop caused by high bearing temperature.
- 150°C pump stop caused by high stator temperature.

At room temperature, the thermistor resistance is approx. 100 Ω .



The bearing temperature monitoring is not available in explosion-proof pumps.

4.8.1 Checking after installation of pump

- Using a multimeter, check whether the circuit resistance is < 150 Ω / thermistor.
- Using a multimeter, check whether the insulation between circuit and stator housing within the highest range is outside the scale (not measurable ∞).
- Carry out similar measurements at the end of the supply cable.

4.9 Pt100 temperature sensor

The Pt100 temperature sensor is available as an accessory.

The Pt100 sensor is primarily used for the monitoring of bearing temperature, but it can also be used in the stator.

The sensor resistance is

- . 100 Ω at 0°C.
- 138.5 Ω at 100°C and
- approx. 108 Ω at room temperature.



The Pt100 is not available for explosion-proof pumps.

4.9.1 Checking after installation of pump

- Using a multimeter, check whether the resistance at room temperature is approx. 108 Ω.
- Using a multimeter, check whether the insulation between circuit and stator housing within the highest range is outside the scale (not measurable

).
- Carry out similar measurements at the end of the supply cable.
- During pump check, the Pt100 sensor must be connected to a recording device.



4.10 OCT1 water-in-oil sensor

The OCT1 water-in-oil sensor is available as an accessory.

The sensor measures the water content in the oil chamber.

The sensor consists of a plate capacitor which is immersed in the oil and measures the electronic circuit, emitting a 4-20 mA proportional current signal. Connect the OCT1 sensor as shown in fig. 9.

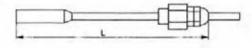
0.1 Fitting the OCT1 sensor

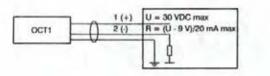
The OCT1 sensor is to be fitted in the filling hole of the oil chamber instead of the oil screw.

- 1. Remove the oil screw.
- 2. Push the sensor into the oil filling hole.
- Push the sensor to a suitable depth in the oil chamber without letting it touch the rotating parts, but so deep that the sensor is completely covered by the oil. Recommended inserting depths for different pump types appear from the table below.
- 4. Screw the bush into the thread for the oil screw.

Note: Before refitting after oil change, the OCT1 sensor must be cleaned with white spirit (mineral turpentine).

Fig. 9





Motor size	Inserting depths L [mm]		
7 5 - 12.5 kW	80		
.5 - 21 kW 22 - 29 kW, 2-, 4- and 6-pole	90		
15 kW, 12-pole 20 - 28 kW, 8-pole 20 - 50 kW, 4-pole	110		
22 - 35 kW, 10-pole 35 - 50 kW, 8-pole 58 - 155 kW	140		

Technical specifications

Measuring range	20-100 pF.
Sensor capacitance in air	9 pF.
Measuring range for water content	0-60% corresponding to 4-20 mA.
Temperature range	0-70°C.
Supply voltage	0-30 VDC max. 23 mA.
Material, supply cable	Polyurethane.
Ex approval	EEx ia IIB T4, Ui = 34 V, Ii = 100 m, Ci = 220 nF, Li < 1 uH. In potentially explosive environments, the sensor must be connected via an approved Exi separator.

Electrical connection

The electrical connection should be carried out in accordance with local regulations.

The supply vollage and frequency are marked on the pump nameplate.

The voltage tolerance must be within ±5% of the rated voltage.

Make sure that the motor is suitable for the electricity supply available at the installation site.



The pump must be connected to an external mains switch with a contact separation of at least 3 mm in each pole.

The pump must be connected to a motor starter.

The wiring diagrams for direct-on-line starting and star-delta starting are shown in fig. 10 and fig. 11, respectively.

P1 and P2 are connected in series with the thermal switches and the moisture switches.

Fig. 10

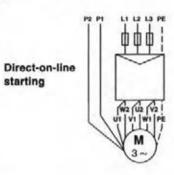
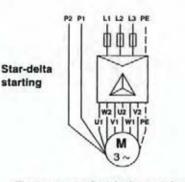


Fig. 11

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The top cover of explosion-proof pumps is provided with an external earth terminal to ensure the connection to earth. The electrical installation must include an external connection from this terminal to earth. The earth wire must fulfil all electrical safety regulations in force.

Cross section of phase wire (S) of the installation [mm²]	Minimum cross section of earth wire [mm²]
S ≤ 16	S
16 < S ≤ 35	16
S > 35	0.5 *S, max. 70



Before installation and the first start-up of the pump, the cable condition should be checked visually to avoid short circuits.

6. Start-up



Before manual starting or changeover to automatic control, make sure that no persons are working on or near the pump.

Proceed as follows:

- 1. Remove the fuses or switch off the mains switch.
- Check the oil level in the oil chamber. See section 7.1 Oil check and oil change.
- 3. Check whether the impeller can rotate freely.
- Check whether the monitoring units, if used, are operating satisfactorily.

Make sure that the pump is submerged in the liquid. For pumps in dry installation, it must be ensured that there is liquid in the pit.



Make sure that the pump has been filled with the liquid to be pumped.

Pumps in dry installation must be vented by means of the vent plug in the pump housing.

- 6. Open the isolating valves, if fitted.
- Check whether the system has been filled with liquid and vented.
- Check the setting of the level switches.
- Start the pump and check the pump operation for abnormal noise or vibrations.

Note: In case of abnormal noise or vibrations from the pump or other pump or supply failures, stop the pump immediately. Do not attempt to restart the pump before the cause of the fault has been found and the fault corrected.

10. After start-up, the actual pump duty point must be established as accurately as possible so that it can be checked whether the operating conditions are as desired.

Note: The pump may be started for a very short period without being submerged for checking of direction of rotation.

The operation of the pump should always take place in accordance with established routines with scheduled checks of pump monitoring equipment and accessories (valves, etc.). Make sure that the pump and equipment settings cannot be changed by unauthorized persons.

6.1 Checking the direction of rotation

An arrow cast in the pump housing indicates the correct direction of rotation. The pump must rotate clockwise when seen from the drive end. Observe the movement of the pump (jerk) when started. If the pump moves counter-clockwise, the direction of rotation is correct.

As an alternative, the direction of rotation can be checked as follows:

- 1. Start the pump and check the quantity of liquid or the discharge pressure.
- 2. Stop the pump and interchange two of the phases to the mo-
- 3. Restart the pump and check the quantity of liquid or the discharge pressure.
- 4. Stop the pump.
- 5. Compare the results taken under points 1 and 3. The connection which gives the larger quantity of liquid or the higher pressure is the correct direction of rotation.

Note: The pump must only run for a short period when suspended from a chain.

7. Maintenance and service



Before starting work on the pump, make sure that the fuses have been removed or the mains switch has been switched off. It must be ensured that the electricity supply cannot be accidentally switched on. All rotating parts must have stopped moving.

Maintenance and service must be carried out by specially trained persons



The maintenance and service work on explosionproof pumps must be carried out by GRUNDFOS or a service workshop authorized by GRUNDFOS.

Before carrying out maintenance and service, it must be ensured that the pump has been thoroughly flushed with clean water. Rinse the pump parts in water after dismantling.

Pumps running normal operation should be inspected every 2000 operating hours or at least once a year. If the pumped liquid is very muddy or sandy, the pump should be inspected every 1000 operating hours or every six months.

The following points should be checked:

Power consumption

Oil level and oil condition

When the pump is new or after replacement of the shaft seals, check the oil level after one week of operation.

The oil becomes greyish white like milk if it contains water. This may be the result of a defective shaft seal. The oil should be changed if it contains water. See section 7.1 Oil check and oil change.

Note: Used oil must be disposed of in accordance with local regulations.

The oil chamber contains 1.9 to 12.4 litres of SAE 10 W 30 motor oil depending on pump size.

Cable entry

Make sure that the cable entry is watertight and that the cables are not sharply bent or pinched.

Impeller clearance

Check the impeller clearance. See section 7.2 Inspection and adjustment of impeller clearance.

Pump parts

Check the pump housing, etc. for possible wear. Replace defective parts.

Ball bearings

Check the shaft for noisy or heavy operation (turn the shaft by hand). Replace defective ball bearings.

A general overhaul of the pump is usually required in case of defective ball bearings or poor motor function. This work must be carried out by an authorized service workshop.



The ball bearings must be replaced at least every 25,000 operating hours.

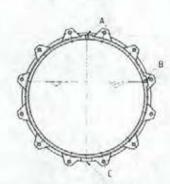
Note: Out of consideration for the heat-conducting ability, the pump should be cleaned on the outside at regular intervals.

7.1 Oil check and oil change

The oil chamber has two screws, A and B, for oil drainage, oil filling and level control. Horizontally installed pumps (version 6) have a third screw, C, for oil drainage.

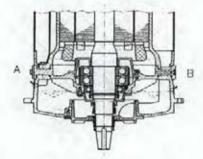
On horizontally installed pumps (version 6), the oil screws are always positioned as shown in fig. 12.

Fig. 12



In the case of pumps with 8- or 10-pole motors of 22-50 kW and pumps with motors larger than 50 kW, the oil can be changed while the pump is standing upright. The screw B is used for the indication of the oil level in the oil chamber, see fig. 13.

Fig. 13



Proceed as follows:

 Place the pump in such a position that the screw A is pointing upwards.



When slackening the screw A of the oil chamber, note that pressure may have built up in the chamber. Do not remove the screw until the pressure has been fully relieved.

Place a clean container under the pump to collect all the drained-off oil. Slacken the screw B pointing to the side and observe the oil level. The drained-off quantity of oil indicates whether the lower mechanical shaft seal is leaking, which may be normal.

Turn the pump or remove the screw C and allow all the oil to drain from the chamber into the container. Pour an oil sample into a glass container and observe the condition of the oil. Clear oil can be reused.

Emulsified oil must be changed and disposed of.

Note: Used oil must be disposed of in accordance with local regulations.

Low oil level may indicate that the upper mechanical shaft seal is defective. Contact an authorized service workshop for further overhaul of the pump and repair, if required.

 Fill the oil chamber with oil through the top hole A until the oil level reaches the hole B. Replace the O-rings by new rings, insert the screws and tighten securely.



Use viscosity grade SAE 10 W 30.

ONDINA 917 can be used in temperature class T4 applications only.

7.2 Inspection and adjustment of impeller clearance

Adjustment of the impeller clearance is only relevant for pumps with channel impellers (S1, S2 and S3 pumps).

The correct impeller clearance is 0.7 mm ±0.2 mm. The clearance should be adjusted if it is worn to 1.2 mm or more.

The procedures for adjustment of the impeller clearance are difant for pumps in submerged installation (versions 1, 2, 4 and and pumps in dry installation (versions 3, 6 and 7).

he various procedures are described in the following sections:

7.2.2 Adjustment of impeller clearance for pumps without inlet funnel in submerged installation,

7.2.3 Adjustment of impeller clearance for pumps with inlet funnel in submerged installation,

7.2.4 Adjustment of impeller clearance for pumps without slide ring in dry installation,

7.2.5 Adjustment of impeller clearance for pumps with slide ring in dry installation,

7.2.6 Adjustment of impeller clearance of axial pumps.

7.2.1 Inspection of impeller clearance for pumps in submerged installation

- 1. Lay the pump flat on a work bench.
- Locate the six fixing screws securing the pump housing to the motor and the three adjusting screws, see fig. 14.
- Check the clearance between impeller and pump housing all the way round using a feeler gauge.
- Turn the impeller by hand and check at several points, see fig. 15.

Fig. 14



Fig. 15



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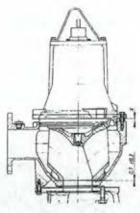
If the impeller clearance needs adjustment, follow one of the procedures described below.

7.2.2 Adjustment of impeller clearance for pumps without inlet funnel in submerged installation

Procedure:

- Slacken all fixing screws and adjusting screws between pump housing and motor.
- Tap on the pump housing at several points using a rubber mallet to loosen the pump housing from the motor.
- Close the impeller clearance by tightening three of the fixing screws until the impeller touches the pump housing. Do not use unnecessary force.
- Slacken the fixing screws and open the clearance to 0.7 mm ±0.2 mm by tightening the three adjusting screws, see fig. 16.
 Check that the clearance is equal all around the suction opening.

Fig. 16



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Tighten all fixing screws and check that the clearance is still equal all around the suction opening.

7.2.3 Adjustment of impeller clearance for pumps with inlet funnel in submerged installation

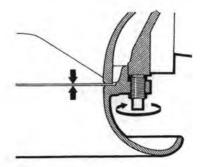
Procedure:

- Slacken all fixing screws and adjusting screws between pump housing and motor.
- Tap on the pump housing at several points using a rubber mallet to loosen the pump housing from the motor.
- Close the impeller clearance by tightening three of the fixing screws until the impeller touches the inlet funnel. Do not use unnecessary force.
- Slacken the fixing screws and open the clearance to 0.7 mm ±0.2 mm by tightening the three adjusting screws, see fig. 17.
 Check that the clearance is equal all around the suction opening.

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Tighten all fixing screws and check that the clearance is still equal all around the suction opening.

7.2.4 Adjustment of impeller clearance for pumps without slide ring in dry installation

The impeller clearance can be adjusted while the pump is mounted on the base stand and connected to the pipework, see fig. 16.

Procedure:

- Slacken all fixing screws and adjusting screws between pump housing and motor.
- Tap on the pump housing at several points using a rubber mallet to loosen the pump housing from the motor.
- Close the impeller clearance by tightening three of the fixing screws until the impeller touches the pump housing. Do not use unnecessary force.
- Measure the distance X between the shaft seal housing and the pump housing at three points using a slide caliper, see fig. 16.
- Slacken the fixing screws and pull the motor 0.7 mm ±0.2 mm out by tightening the three adjusting screws and using the distance X as reference.
- Tighten all fixing screws and check that the distance X at the three reference points is equal.

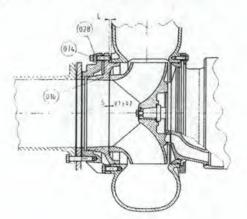
7.2.5 Adjustment of impeller clearance for pumps with slide ring in dry installation

The impeller clearance can be adjusted while the pump is mounted on the base stand and connected to the pipework, see fig. 18.

Procedure:

- 1. Slacken all fixing screws (028).
- Close the impeller clearance S by tightening the adjusting screws (074) evenly. Do not use unnecessary force.
- Measure and note the distance "L" between pump housing and suction cover at the adjusting screws. Use a slide caliper.
- Slacken the adjusting screws (074).
- Tighten the fixing screws (028) evenly so that the distance "L" measured at the adjusting screws is increased by 0.7 mm ±0.2 mm.
- 6. Tighten the adjusting screws and retighten the fixing screws.
- 7. Check the distance "L" and readjust, if necessary.

Fig. 18



7.2.6 Adjustment of impeller clearance of axial pumps

The impeller clearance of a new pump is 0.8 mm and it cannot be adjusted. If the impeller clearance is worn to 3 mm or more, the propeller and the suction part must be replaced in order to ensure the original duty point and efficiency.

7.3 Explosion-proof S1, S2, S3 and SV pumps

Overhauled and repaired explosion-proof motors are marked with a repair plate giving the following information:

- The repair symbol R.
- · Name or registered trade mark of the repairing workshop.
- · Workshop reference number relating to the repair.
- · Date of overhaul or repair.

In the event of subsequent repairs, the existing plate should be replaced by a new updated plate and earlier markings are recorded.

The repairing workshop must keep records of performed overhauls and repairs together with records of all previous overhauls, repairs and possible modifications. Copies of the repairing workshop's detailed records should be filed by the owner or operator together with the original type certificate of the explosion-proof motor in question.

7.3.1 Motor cable

Only cables which are approved by the manufacturer and suitable for the cable entry as to diameter, number of leads, conductor cross section and sheath material may be used for the motor.

7.3.2 Cable entry

Only EExd cable entry parts corresponding to the cable diameter may be used. The corresponding cable dimension marking is stamped on the inlet or the cable entry.

Secure the cable entry to the motor top cover by tightening the screws evenly one by one until the cable entry is lying flat against the top cover.

7.3.3 Spare parts

Damaged motor parts, such as top cover and cable entry, should always be replaced by new and approved parts. Motor parts must not be reconditioned by machining, re-tapping, welding, etc.

7.4 Contaminated pumps

Note: If a pump has been used for a liquid which is injurious to health or toxic, the pump will be classified as contaminated.

If GRUNDFOS is requested to service the pump, GRUNDFOS must be contacted with details about the pumped liquid, etc. before the pump is returned for service. Otherwise GRUNDFOS can refuse to accept the pump for service.

Possible costs of returning the pump are paid by the customer. However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are injurious to health or toxic.

8. Disposal

Disposal of this product or parts of it must be carried out according to the following guidelines:

- Use the local public or private waste collection service.
- In case such waste collection service does not exist or cannot handle the materials used in the product, please deliver the product or any hazardous materials from it to your nearest GRUNDFOS company or service workshop.

9. Fault finding chart



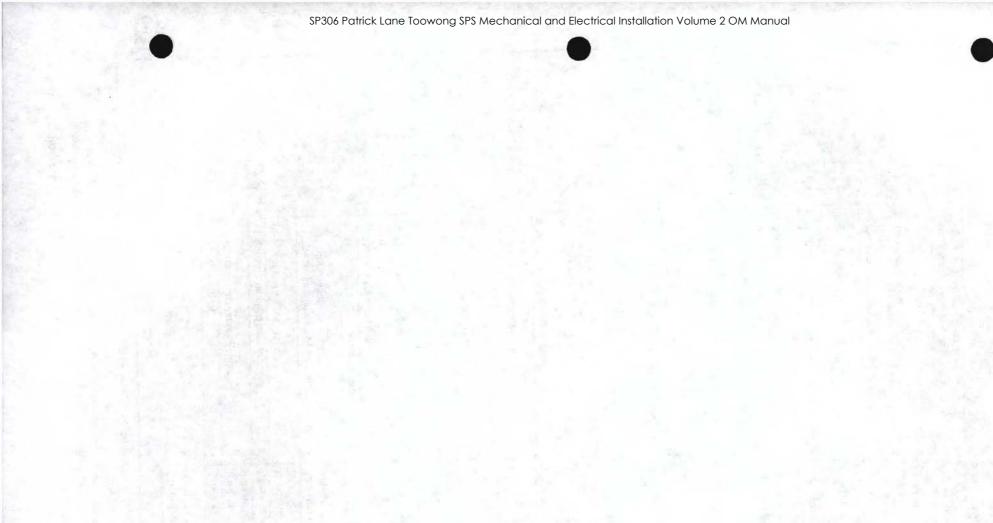
Before attempting to diagnose any fault, make sure that the fuses have been removed or the mains switch has been switched off. It must be ensured that the electricity supply cannot be accidentally switched on. All rotating parts must have stopped moving.

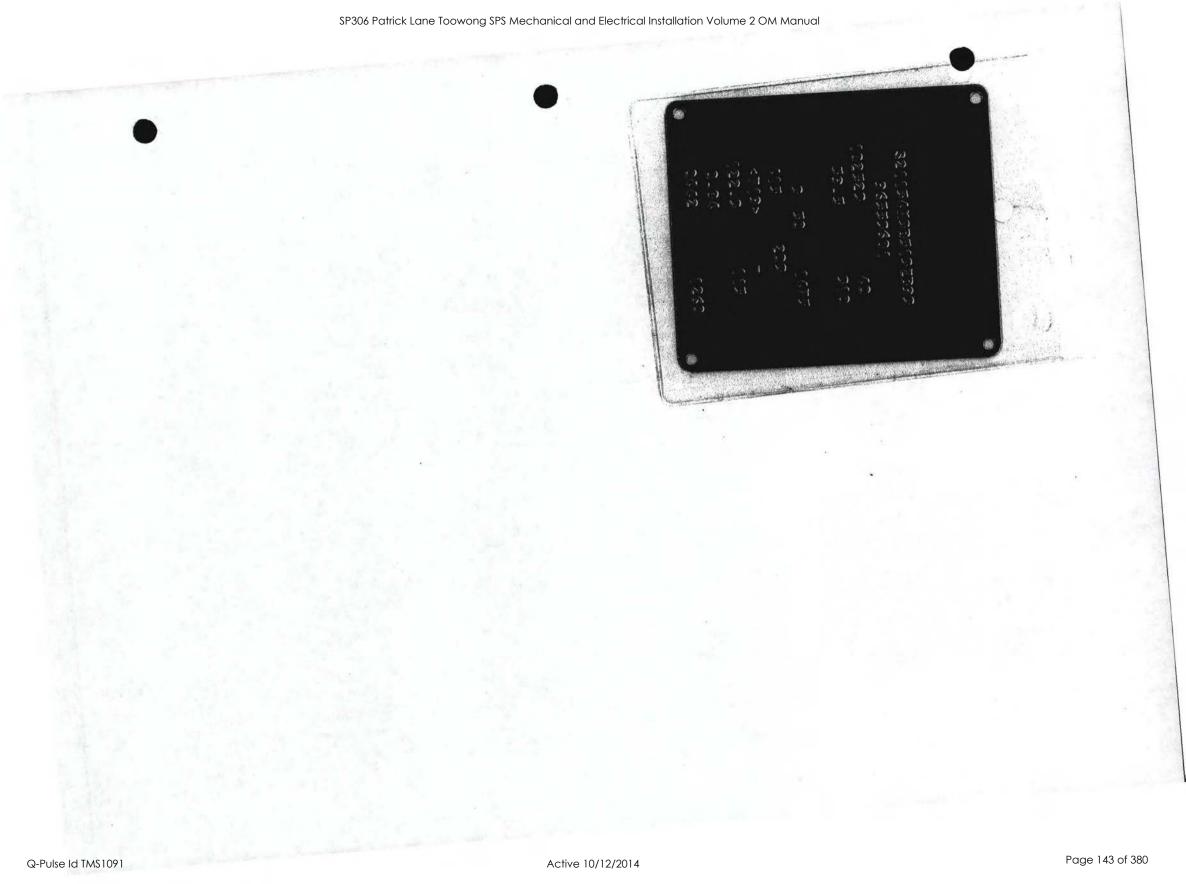
The safety instructions in section 2. Safety must be read and observed.



Fault	Cause	Remedy		
Pump does not start or stops without visible cause.	a) No electricity supply.	Check electricity supply and fuses. Start the pump manually and check contactor operation.		
2. Pump does not start or	a) Missing phase.	Check electricity supply and fuses.		
stops. The control panel of the controller indicates	b) Pump momentarily overloaded.	If the fault does not disappear automatically, find the cause.		
that the motor starter or protection equipment has	c) Impeller blocked by impurities.	Check impeller and clean as required.		
tripped out.	d) Motor starter not set correctly.	Check and set as required according to rated current.		
	e) Thermal switches tripped out. Insufficient motor cooling.	Allow the motor to cool. Ensure adequate cooling by lowering the pump into the liquid, versions 1 and 4.		
	f) Moisture switch in motor tripped out.	Contact authorized service workshop.		
	g) Motor cable defective.	Check for visual damages. Contact authorized service workshop.		
	h) Fluctuating voltage.	Check voltage. Permissible deviation is ±5%.		
Pump runs but does not deliver the rated flow.	a) Wrong direction of rotation.	Check the direction of rotation and possibly inter- change two phases to the motor.		
	b) Impeller loose or worn.	Check impeller and adjust as required.		
	c) Pump or pipework blocked by impurities.	Check pump and pipework and clean as required.		
	d) Pump head too high.	Check by measuring the pressure and reinstall discharge pipe or install new pump.		
	e) Valves closed or blocked. Non-return valve not operating.	Check valve position and clean as required.		
	f) Air in pump or suction pipe.	Vent the pump and suction pipe. Increase the stop level in the pit or reinstall suction pipe.		
	g) Pumped liquid too dense.	Dilute the liquid or change the process.		
	h) Pump not properly connected to auto-coupling.	Pump down the liquid level in pit. Lift out the pump and relocate the pump on the auto-coupling.		
	i) Leakage in pipework.	Check pipework for leaks and make tight as required.		
	 j) Pump pit flushing system inadvertently activated. 	Check function and repair as required.		
 Pump starts, but stops immediately. 	a) Clogged pump causes motor starter to trip out.	Check pump and clean as required.		
	b) Overheated motor causes thermal switches to trip out.	Allow pump to cool. Check for cause as above.		
	c) Level switch out of adjustment or defective.	Clean or set level switch or replace as required.		
5. Pump vibrating or emitting	a) Pump partly choked by impurities.	Check pump and clean as required.		
excessive noise.	b) Wrong direction of rotation.	Check the direction of rotation and possibly inter- change two phases to the motor.		
	 c) Pump operates outside specified operating range. 	Check operating conditions.		
	d) Pump defective.	Check pump for damages. Repair the pump or contact an authorized workshop, if necessary.		
	Pump not properly connected to auto-cou- pling.	Pump down the liquid level in pit. Lift out the pump and relocate the pump on the auto-coupling.		
	f) Pump cavitates.	Check pump for partial suction blockage and clean as required. Check duty point and adjust as required.		
	 g) Base stand, auto-coupling, ring stand or guide rails not installed correctly. 	Check installation and tighten bolts where necessary.		
6 Oil watery or emulsified.	a) Lower mechanical seal leaking.	Contact authorized service workshop.		
.ow oil level	a) Upper mechanical seal leaking.	Contact authorized service workshop.		

Q-Pulse Id TMS1091





BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 6: OCT1 Oil Condition Transmitter

Supplier/Manufacturer:

GRUNDFOS

Model Number:

OCT1

Product Number:

96 06 16 02

Manufacturer Details:

68 Murdoch Cct, Acacia Ridge, QLD – 4110 (07) 3272 1980

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

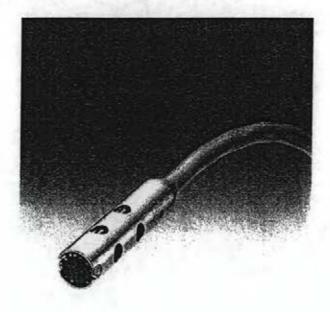
Page: 7 of 31



5 September 2003

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OCT 1 Oil Condition Transmitter



The OCT 1 Oil Condition Transmitter is a new probe for seal oil water content monitoring in sewage water pumps. This advanced instrument provides more reliable information of the amount of water in the oil chamber.

The OCT 1 Oil Condition Transmitter can be used in explosive environments, because the new design is intrinsically safe complying with EN50020.

Modern submersible pumps normally use a shaft sealing arrangement with double mechanical seals separated by an oil-filled chamber. This construction protects the motor from water intrusion. As some minor water leakage through the primary seal is inevitable, it is very important to detect any increase in the water content. The change indicates wearing of the seal and should be notified well before the alarm level.

Oy Grundfos Environment Finland Ab

Visit address Kaivokselantie 3-5 01610 Vantaa, Finland Trade Reg. No. 738.707 Postal address P.O.BOX 1036 00101 Helsinki, Finland

Tel. +358-9-561 420 Fax +358-9-566 8289



5 September 2003

2/4

Such an early warning is valuable information for maintenance and enables prediction of the required actions. The improved sensitivity of the OCT 1 makes the monitoring more accurate than ever before.

Operation

The operation of the OCT 1 is based on capacitive measurement of the dielectricity factor of water/oil emulsion. The factor is strongly dependent on the water content in the emulsion.

The probe is located below the oil level. The stainless steel guard tube of the probe is perforated allowing free flow of the emulsion. The integrated electronics is embedded and sealed into the probe providing the standard analog output of 4 ... 20 mA.

Interfaces

As an independent probe with standard analog output, the OCT 1 Oil Condition Transmitter can be connected to various control systems. Grundfos provides both a local stand-alone monitoring device, SARI 2 Monitor, and the more powerful PumpManager 2000 for remote monitoring.

The SARI 2 is a monitoring device for motor insulation resistance and seal oil water content for sewage water pumps. It clearly exceeds the capacity of the standard safety devices, but can also be used for local and automatic stopping of the pump. Separate information of the Monitor is available.

The OCT 1 Oil Condition Transmitter can also be used with the PumpManager 2000 or other suitable telemetry system. The connection can be built via the SARI 2 (digital pulse width modulated input) or directly (analog input).

The PumpManager 2000 continuously receives the measured data, compares them to the pre-set alarm limits and stores to the local memory.

The stored data can be further relayed to the Remote Monitoring system for the trend analysis by the respective software. The values are daily averages of the measurements.

Measurement Range and Calibration

The operation range of the OCT 1 Oil Condition Transmitter is 5...60 % H₂O. A recommended alarm limit is 20...40 %.

The Transmitter is factory calibrated and there is no need for regular recalibration.

Oy Grundfos Environment Finland Ab

Visit address Kaivokselantie 3-5 01610 Vantaa, Finland Trade Reg. No. 738.707 Postal address P.O.BOX 1036 00101 Helsinki, Finland

Tel. +358-9-561 420 Fax +358-9-566 8289



5 September 2003

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Explosive Environment

OCT 1 Oil Condition Transmitter is an intrinsically safe apparatus complying with EN50020 and the following input specifications:

EEx ia IIB T4

U_i: 34 V I_i: 100 mA L_i: 10 μH C_i: 220 nF

When the signal cable and other possible connection components are in the explosive interior the OCT 1 cable shall be connected to a safety barrier complying with EN50020 and the same or better output specifications as shown above. The barrier is installed outside the hazardous environment, normally into the control panel.

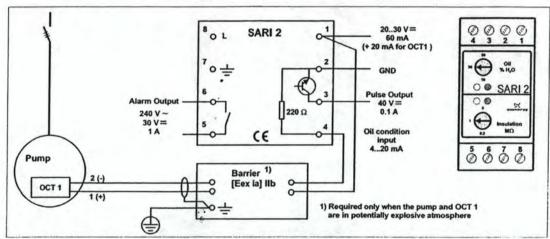


Figure 1. Electrical connections of OCT 1 and SARI 2

Installation

The OCT 1 is normally installed into the oil chamber of the pump through the oil plug. The minimum size of the plug is 3/8 ". See Figure 2.

In Grundfos pumps the OCT 1 can replace the UH-40 probe especially in the above mentioned external installations. In large pumps, where the UH-40 may have been installed internally into the motor flange, see Figure 3, the replacement is individually checked.

Oy Grundfos Environment Finland Ab

Visit address Kaivokselantie 3-5 01610 Vantaa, Finland Trade Reg. No. 738.707 Postal address P.O.BOX 1036 00101 Helsinki, Finland Tel. +358-9-561 420 Fax +358-9-566 8289



5 September 2003

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Specifications

Dimensions Cable

Output: Operating temperature Enclosure

Electromagnetic interference

length 60 mm x diameter 14 mm 10 m, longer lengths on request

4 to 20 mA 0 ... 70 °C IP 68

CE approved

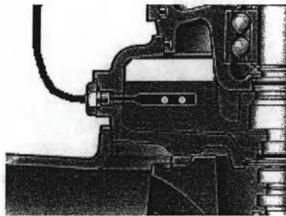


Figure 2. External installation through oil plug

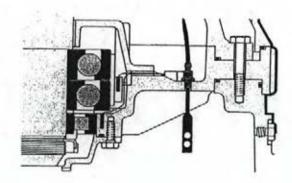


Figure 3. Internal installation (not available for explosive environments)

Oy Grundfos Environment Finland Ab

Visit address Kaivokselantie 3-5 01610 Vantaa, Finland Trade Reg. No. 738.707 Postal address P.O.BOX 1036 00101 Helsinki, Finland Tel. +358-9-561 420 Fax +358-9-566 8289

BRISBANE CITY COUNCIL Brisbane Water SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Brisbane Water
PATRICK LANE
STATION

NE PUMP

Appendix 7: Knife Gate Valve Data Sheets

Manufacturer:

Expert

Model/Series Number:

EXPERT 600 KGV

Supplier Contact:

ITW Tech Flow

3/29 Collinsvale Street, Rocklea QLD - 4108

(07) 3277 0111

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 8 of 31

SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual

HVAC
0 4 0 CT 2005

ITW TECHFLOW

ANSWERED:

A Division of ITW Australia Pty Ltd - ABN 63 004 235 063

Corporate & Brisbane Sales Office: 3/29 Collinsvale Street, Rocklea Qld 4106
All Correspondence to: PO Box 104, Archerfield, Qld 4108
Phone: 07 3277 0111 Corporate Fax: 07 3274 4906 Sales Fax: 07 3875 1372

27th Sept, 2005.

Att: Mr. Gordon Waddell. HVAC/HPS (Qld) P/L 101 Cobalt Street, Carole Park. Old. 4300.

Re: Test Certificates.

Dear Sir,

Please find attached test certificates for 'Expert Valves' on your order No:Q53138/3251Q.

Regards, Gary Schwarzrock.

APPENDIX 9



ALLOY CASTINGS PRIVATE LIMITED

Factory: 36-A, Shimoga Bhadravathi Industrial Area, Machenahalli - 577 227, Shimoga Grams: CASTINGS

Phone: 08182-46141, 46143 Fax: 0091-8182-46142 F mail: macpl/manchamet.in Web Site: www.malnadeastings.com

TEST CERTIFICATE

F:QC:14/R02

CUSTOMER:

ORDER REF. :

M/S EXPERT ENGINEERING ENTERPRISES

KARNATAKA

T.C. No.: 03221

DATE: 25-SEP-04

MATERIAL SPECIFICATION: ASTN A 351M-03 Grade CF8M

HEAT No.: H2291

CUSTOMER SPECIFICATION:

HEAT DATE: 04/09/2004

HEAT TREATMENTSOLUTION ANNEALED AT 1080 DEG.C. SOAKED FOR SHOURS AND THEN WATER QUENCHED. ACID PICKLED.

CHEMICAL COMPOSITION %

Element	C.	Hn	Si	ρ	8	Ni	Cr	Mo		-	
.imum						9.000	18.000	2.000			
Maximum	.080	1.500	1.500	-040	.040	12.000	21.000	3.000			
Actual	.066	.948	.990	.017	.014	9.570	18.550	2.260	1		

MECHANICAL PROPERTIES

	YS KG-F/SO MM	UTS KG F/SQ MM	FI ONGATION GL:S0 MM	GREDUCTION IN AREA	HARDNESS	10 ND YEST	IMPACT TEST RESULTS		
Minimum	20.98	49.45	30.00						
Maximum								0 - 1	
Actual	31.960	56.860	54.000		166.000				

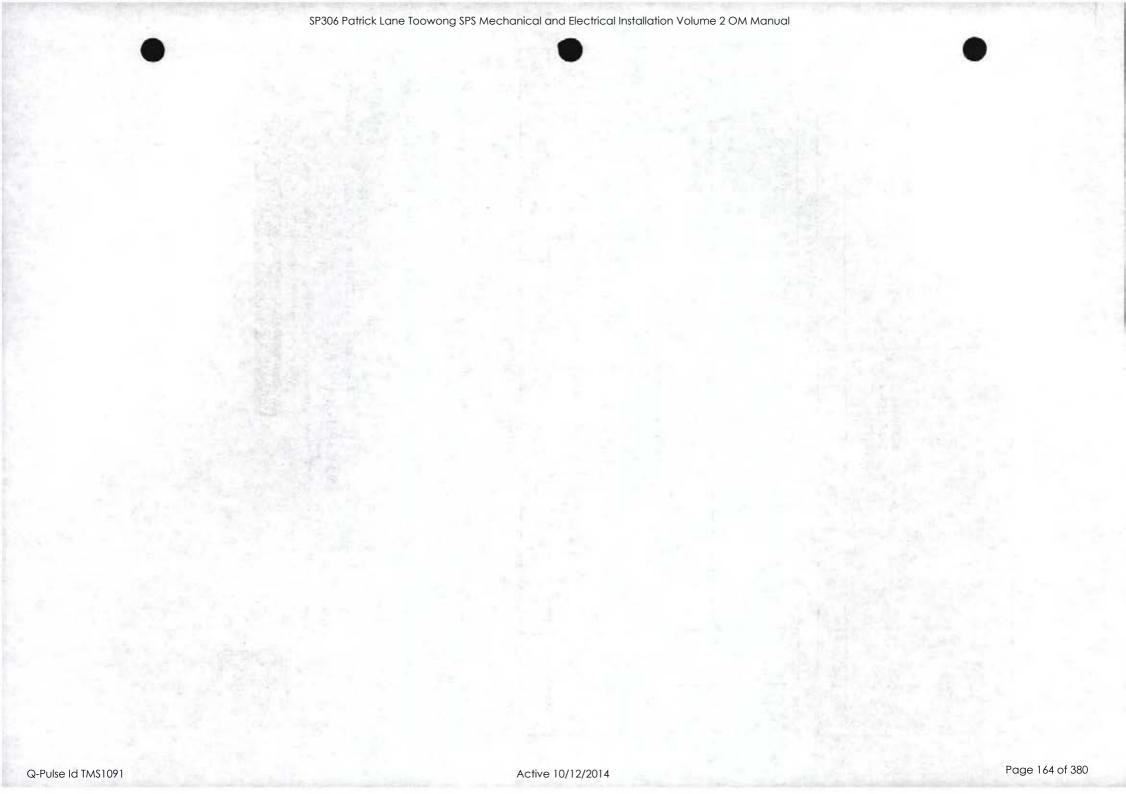
DETAILS OF CASTINGS POURED (Pomed quantity may not match with supply quantity)

CODE	DESCRI	TION	DRAWING NO		QUANTITY		
910042 910043 910045 910063	150MM NRV BODY 150MM NRV CONE 500MM KGV DOOR 200MM KGV DOOR		12150/20001020 12150/20002020 1130006020 C		1 1 1 5		
		*		- 1/4			

REMARKS:

IGCT CARRIED OUT AS PER ASTM A262 PRACTICE "A" FOUND SATISFACTORY.

Q-Pulse Id TM\$1091 Active 10/12/2014 Page 163 of 380



SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual 14.14/KUZ

CUSTOMER:

M/S EXPERT ENGINEERING ENTERPRISES

KARNATAKA

MATERIAL SPECIFICATION ASTH A 351M-03 Brade CF8M

T.C. No. : 03550

DATE: 25-SEP-04

11

ORDER REF. :

· HEAT No. : H2524

CUSTOMER SPECIFICATION:

HEAT DATE: 21/09/2004

HEAT TREATMENTSOLUTION ANNEALED AT 1080 DEG.C. SOAKED FOR SHOURS AND THEN WATER QUENCHED. ACID PICKLED.

CHEMICAL COMPOSITION %

Element	c ;	Hn	Si	Р	8	Ni	Cr	Мо	`	
Minimum						9.000	18.000	2.000		
Maximum	-080	1.508	1.500	.849	-040	12.000	21.000	3.000		
Actual	.071	.930	.969	.019	.013	9.370	18.769	2.195	-	

MECHANICAL PROPERTIES

• :::	KG.F/SQ.MM	KG EAZÓ WW	ELONGATION GL:50 MM	AREDUCTION IN AREA	HARDNESS BIIN	BENDTEST 90	IMPACT TEST RESULTS	1	
Minimum	29.98	49.45	30.00						
Maximum									
Actual	32.220	57.090	44.600	^	156.000				

DETAILS OF CASTINGS POURED (Poured quantity may not match with supply quantity)

CODE	DESCRIPTION	DRAWING NO.	QUANTITY
	SOO KOV BODY		1 1
		,	
	*		

REMARKS:

Page 1 Of 1

Certified that the material of construction confirms to above material specification and customer requirements in all aspects and the requirements of Indian Boiler Regulations For MAKERS REPRESENTATIVE

Foundry Iduntification M

159 dt.19.09.2003

For MAKERS

CBB Certificate No.

30.03.2006

Manager Quality Assurance

Tipage 165 of 380

Active 10/12/2014

SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual Page 166 of 380 Q-Pulse Id TMS1091 Active 10/12/2014

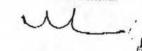
SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual

Certified that the material of construction confirms to above material specification and customer requirements in all aspects and the requirements of Indian Builer Repolations Foundry Identification M 159 46.19.09.2003 For MAKERS REPRESENTATIVE POI MAREKS CBB Certificate No.

Valid up to

30.03.2006

Manager Quality Assurance





ALLOY_CASTINGS PRIVATE LIMITED

Factory: 36-A, Shimoga Bhadravathi Industrial Area. Machenahalli - 577 222. Shimoga Grams : CASTINGS Phone: 08182-46141, 46143 Fax: 0091-8182-46142 F-mail: macplepanchamet.in. Web Site . www.mohiadcasting EN 150 97%

TEST CERTIFICATE

CUSTOMER:

M/S EXPERT ENGINEERING ENTERPRISES

KARNATAKA

17419 T.C. No. ;

F:0C:14/R02

DATE:

24-NOV-03

ORDER REF. :

MATERIAL SPECIFICATION: ASTM A 351M-2000 Grade

HEAT No. :

G2621

CUSTOMER SPECIFICATION:

HEAT DATE :

05/11/2003

HEAT TREATMENT: SOLUTION ANNEALED AT 1880 DEG.C. SOAKED FOR SHOURS AND THEN WATER QUENCHED. ACID PICKLED.

CHEMICAL COMPOSITION %

ent	С	Mn	Si	Р	5 .	Ni	Cr	Ма	
Minimum						9.000	18.000	2.000	
Maximum	.080	1.500	1.500	-849	.040	12.000	21.000	3.000	
Actual	-068	.925	.984	.022	.014	9,878	19.340	2.228	

MECHANICAL PROPERTIES

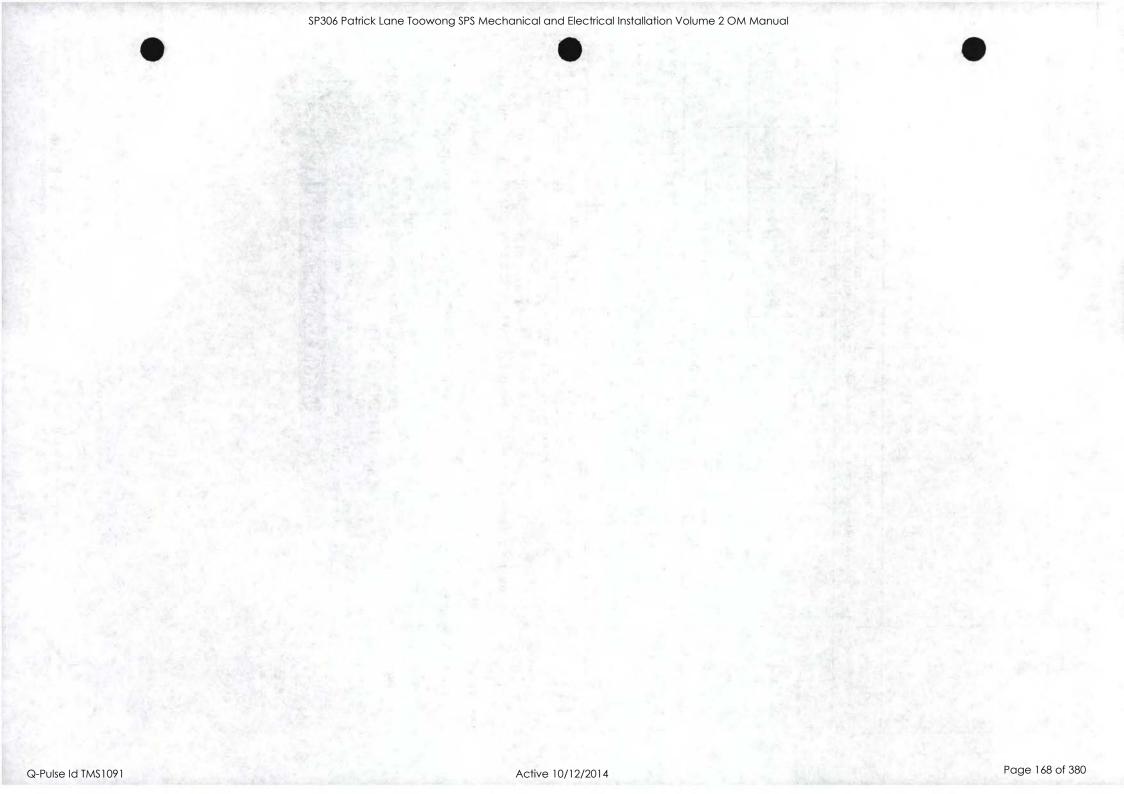
•	YS KG.F/SQ.MM	UTS KG.F/SQ MM	ELONGATION GL:50 MM	GREDUCTION IN AREA	HARDNESS BHN	BEND TEST	IMPACT TEST RESULTS	
Minimum	20.90	49.45	30.00				1	
Maximum							33 8	
Actual	32.580	54.248	47.600		167.000		1	

DÉTAILS OF CASTINGS POURED (Poured quantity may not match with supply quantity)

DESCRIPTION	DRAWING NO.	QUANTITY
388MM KGV BODY(FULL LUGGED BODY)	1130001020 C	2
	3.1	
1		- 1 Jan 198

REMARKS:

Q-Pulse Id TMS1091



JINDAL STAINLESS

TEST CERTIFICATE

Customar's N	arme and Address
17	· D. Steel
,),	
* NUMBAI	corp

MAHARASTHRA

JINDAL STAINLESS LIMITED

AN 180 9001 - 2000, ISO 14001 AND OHSAS 18001 CERTIFIED COMPANY Regd. Office & Works:

POST BOX NO. 6, DELHI ROAD, HISAR - 125005 INDIA PHONE: 01662-222-171-83, FAX: 01662-220475-76

> TELEX: 0345-201&209 JSL IN e-mail: hsr.rishipal@jsthsr.com

T.C. No .: Page : 8495798 1 DF 1 Date: 2884/84/21 Truck No. 9J266-8AA6 Wt. (mt.): 8.9je

Kulu/20170/02;07.19.06.2004

Customer's Order No. & dt

Material Specification STAINLESS STEEL ASTR A 240, FD. 2002, TYPE 314

Condition of Supply

NOT ROLLED PLATE SECOND ANHEALED & PICKLED

S	Heat No.	Grade	Plate/	No.	Sizo in mm		_		Cnem	ical An	alysis V	V: %					Met	dianis	al Prop	erties
No.		/Type		of Pcs	TXWXL	.с	Mn	S	P	Si	Ni	Cr	Мо	Cu	70	(ppm)	Y.SOLTHYS (Mga)		0.27	Herdnes BHILL
1	8 5J563	316 .	752E	1 y	121125016000	9.814	1.64	8.224	8.838	8.54	13.88	14.33	2.82	****	*****	356	298	531	18	160
2	853563	316	755E	1,	121125016000	8.816	1.64	8.964	A.838	8.54	18.68	16.33	2.82	11111	titit	356	292	581	44	165
3	953181	316	1364E 0 1367E)	2	131125014775	8.029	1.17	8.001	8,833	8.47	18.86	16.49	2,19	11111	1:111	342	271	341	48	125
4	853161 .	316	1379E.	11	131125014775	0.929	1.17	8.989	2.833	6.47	18.96	16.49	2.18	11111	11:11	342	271	541		156
5	R5J181	216	13888	را	131125814775	8.829	1.17	8.889	8.833	2.47	18.86	16.49	7.12	11111	****	342	2710	\$41	10	156
4	853181	316	1398E	1	31/x1250X4775	8.029	1 17	2.250	3,233	8.47	18.86	14.17	7,10	****		342	271	511	44	156
4	853181	218 .	1391E	U	2§1125@148@0	8.829	1.17	8.889	2.233	4,47	18,84	16.49	7.18	mi	ittit	342	511	541	68	15è
8	95J181	316	1392E	1	3X1258X4880	8.829	1,17	9,889	a.833	8,47	18.86	14.49	.2.18	*****	*****	342	271	54:	60	156

REHARKS :

- (1) SURFACE FINISH AS PER ASTN A 488 : NO 1.
- HANUFACTURING PROCESS: EAF-ASM--LRF-CONCAST. (2)
- SAMPLE DIRECTION TRANSVERSE (3)

ALT LE !

- MATERIAL SOLUTION ANNEALED AT TEMPERATURE 1958-1100 DEGREE CENTISRADE AND FOLLOWED BY WATER OULNCHING.
- 15) TOL. FOR MIDTH AND LENGTH AS PER JINDAL STANDALD. C MIDTH . GOHN, ONN, LENGTH . LENGTH . LENGTH .
- CERTIFICATION ON CHENICAL AND MECHANICAL TESTING BASIS.

Rajest Buthak For Jindal Sainhan and Millery

Form No. : QAD/35F W.E.F.: 01-10-2003

417

(a) We hereby certify that the material was manufactured, sampled, tested & inspected in accordance with requirements of the material specification and has been found to meet these requirements.

Testing and Cartification in accordance with requirements of EN-10204 clause 3.1b

Page 169 of 380

MALNAD

ALLOY CASTINGS PRIVATE LIMITED



Factory: 36-A, Shimoga Bhadravathi Industrial Area, Machenahalli - 577 222, Shimoga Grams: CASTINGS

Phone: 08182-46141, 46143 Fax: 0091-8182-46142 E-mail: macpl@sunchamet.in Web Site: www.malnadcastings.com

TEST CERTIFICATE

F:0C:14/R02

CUSTOMER:

M/S EXPERT ENGINEERING ENTERPRISES

T.C. No. :

KARNATAKA

DATE :

28-JUN-03

ER REF. :

ASTM A494M-00 Grade CW-12MW

HEAT No. :

00659

14281

CUSTOMER SPECIFICATION:

MATERIAL SPECIFICATION

HEAT DATE :

28/95/2003

HEATTREATMENT : SOLUTION ANNEALED AT 1185 DEG.C. SOAKED FOR ZHOURS AND THEN RAPID AIRCOOLED.

CHEMICAL COMPOSITION %

Element	С	Mn	Si	P	S	Ni	Cr	Mn	V	Fa	W.	
imum							15.500	16.000	.200	4.500	3.750	
Maximum	.120	1.000	1.000	.040	.030		17.500	18.000	.40	7.500	5.250	
Actual	.841	.447	.569	.006	.008	BAL	16.640	17.640	.277	5.650	4.339	/

MECHANICAL PROPERTIES

	YS KG.P/SQ.MM	KG.F/SQ MM	ELONGATION GL:50 MM	*REDUCTION IN AREA	HARDNESS BHN	BEND TEST	IMPACT TEST RESULTS		
Minimum	28.84	50.47	4.91						
Maximum								1.	
Acust	39.840	58.870	4.200		246.000	,			

DETAILS OF CASTINGS POURED (Poured quantity may not match with supply quantity)

.DE	DESCRIPTION	DRAWING NO.	QUANTITY
10030	350 MM PV KGV RODY	1135001000	1
10034	350 MM KGV DOOR(PLATE)	113500600	1
10050	300 KGV GLAND		1
			/
		Acept Modifice Warter	
		Pale: 05.07.03	

REMARKS:

Fage 1 Of 1

ial specification and customer requirements in all aspects and the requirements of Indian Boiler Regulations. Certified that the material of constru truction confirms to above ma 135 dt.10.04.2001

Foundry Identification M

For MAKERS REPRESENTATIVE

For MAKERS

CBB Certificate No.

30.86.2003

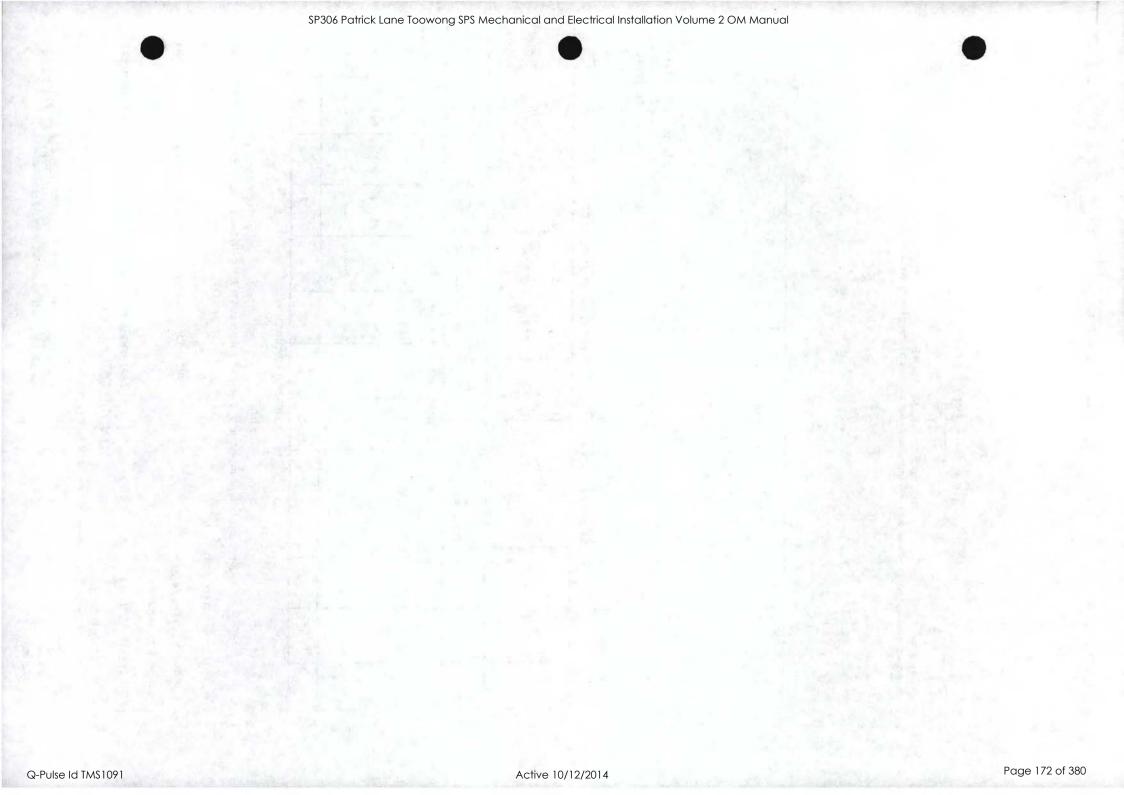
up to

Manager Quality Assurance N. Subbannia

P: 02

160214 445001 Active 10/12/2014 EXPERT ENGG ENTP BGM Page 171 of 380

Q-Pulse Id TMS1091



G.A.Drawing of

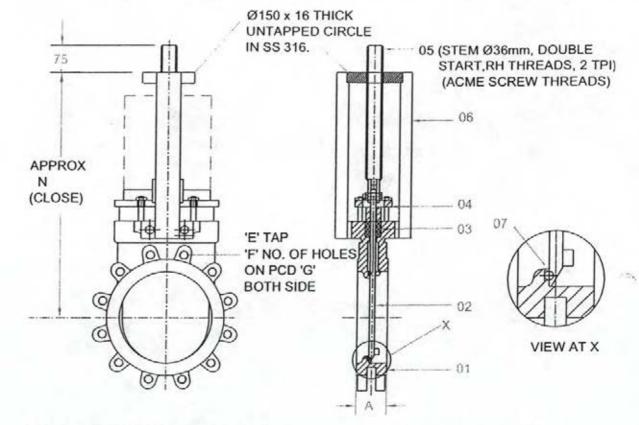
KNIFE EDGE GATE VALVE





APPROVED BY

CHECKED, B1



DESIGN FEATURES AND MATERIALS

NO	DESCRIPTION	MATERIAL
01	BODY	CF8M
02	DOOR (GATE)	CF8M / SS 316
03	GLAND PACKING	PTFE
04	GLAND	CF8M
05	SPINDLE	SS 316
06	YOKE	SS 316
07	SEALING RING	PTFE

DIMENSIONS sizes in mm

NOMINAL SIZES	300
Α	76
E	20
F	12
G	406
N	731

#VALVE TO OPEN CLOCKWISE.

DRAWN BY:

NOTE:

 AS CONTINUOUS IMPROVEMENT IN DESIGN PROCESS THE DIMENSIONS MENTIONED HERE ARE SUBJECTED TO CHANGE.

2. TESTING STANDARDS AS PER MSS SP-81.

3. FLANGE DRILLING AS PER AS2129 TABLE 'D'.

CUSTOMER NAME: ITW TECHFLOW, 3/29 COLLINSVALE ST, ROCKLEA OLD.

REF.:

PO. NO - 15749 DT 19.07.2004.

Mfd by : EXPERT ENGINEERING ENTERPRISES C-13,UDYAMBAG,BELGAUM - 590 008.

KARNTAKA,INDIA.

Ph.:91-0831-2442090/2440377 Fax: 91-0831-2442091

www.expertvalves.com expert@sanchameLin

Drawing No.

Revision No.

01G30001E

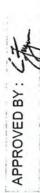
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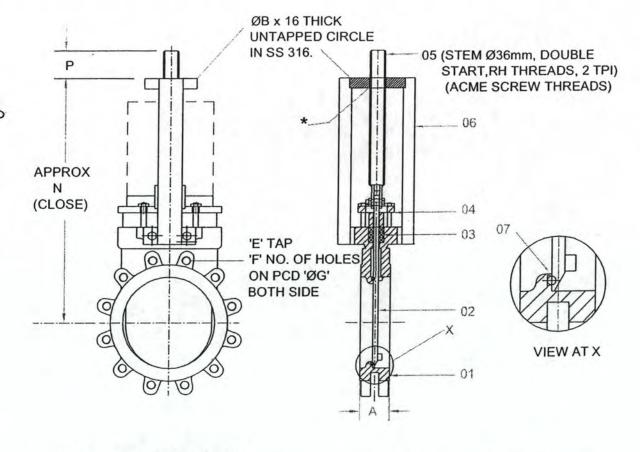
Page 173 of 380

G.A.Drawing of KNIFE EDGE GATE VALVE

(Suitable For Actuator Mounting)







DESIGN FEATURES AND MATERIALS

NO	DESCRIPTION	MATERIAL	
01	BODY	CF8M	
02	DOOR (GATE)	CF8M / SS 316	1
03	GLAND PACKING	PTFE	
04	GLAND	CF8M	
05	SPINDLE	SS 316	
06	YOKE	SS 316	
07	SEALING RING	PTFE	

DIMENSIONS sizes in mm

NOMINAL SIZES	300	600
Α	76	114
В	150	175
E	20	27
F	12	16
G	406	756
N	731	1372
Р	75	125

NOTE:

 AS CONTINUOUS IMPROVEMENT IN DESIGN PROCESS THE DIMENSIONS MENTIONED HERE ARE SUBJECTED TO CHANGE.

2. TESTING STANDARDS AS PER MSS SP-81.

3. FLANGE DRILLING AS PER AS2129 TABLE 'D'.

#VALVE TO OPEN CLOCKWISE.

*
TOP PLATE WILL HAVE CENTRE
BORE OF Ø38mm.

CUSTOMER NAME: ITW TECHFLOW, 3/29 COLLINSVALE ST, ROCKLEA OLD.

REF.

DRAWN BY

PO. NO - 15749 DT 19.07.2004.

Mfd by: EXPERT ENGINEERING ENTERPRISES C-13,UDYAMBAG,BELGAUM - 590 008.

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www.expertvalves.com

expert@sancharnet.in

Drawing No.

Revision No.

01G300/60001E

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G.A.Drawing of

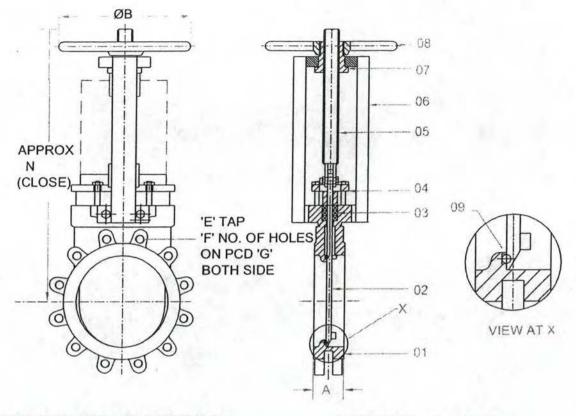
KNIFE EDGE GATE VALVE

(Manualy operated)



APPROVED BY

CHECKED, BY



DESIGN FEATURES AND MATERIALS

NO	DESCRIPTION	MATERIAL	
01	BODY	CF8M	
02	DOOR (GATE)	CF8M / SS 316	
03	GLAND PACKING	PTFE	
04	GLAND	CF8M	
05	SPINDLE	SS 316	
06	YOKE	SS 316	
07	YOKE SLEEVE	GUN METAL	
08	HAND WHEEL	MILD STEEL	
09	SEALING RING	PTFE	

DIMENSIONS sizes in mm

NOMINAL SIZES	600
Α	114
В	508
ey E	27
F	16
G	756
N	1425

#VALVE TO OPEN CLOCKWISE.

DRAWN BY

1. AS CONTINUOUS IMPROVEMENT IN DESIGN PROCESS THE DIMENSIONS MENTIONED HERE ARE SUBJECTED

TO CHANGE.
2. TESTING STANDARDS AS PER MSS SP-81.

3. FLANGE DRILLING AS PER AS2129 TABLE 'D'.

CUSTOMER NAME: ITW TECHFLOW, 3/29 COLLINSVALE ST, ROCKLEA OLD.

REF .:

PO. NO - 15749 DT 19.07.2004.

Mfd by: EXPERT ENGINEERING ENTERPRISES C-13,UDYAMBAG,BELGAUM - 590 008. KARNTAKA,INDIA.

Ph.:91-0831-2442090/2440377

Fax: 91-0831-2442091 expert@sancharnet.in www.expertvalves.com

Drawing No.

Revision No.

01G60001D

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Q-Pulse Id TMS1091

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BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 8: Gate Valve Data Sheet

Manufacturer:

AVK

Model/Serial Number:

100 FBE 57/40

Model/Serial Number:

150 FBE 57/40

Model/Serial Number:

300 FBE 57/40

Model/Serial Number:

375 FBE 57/40

Supplier Contact:

ITW Tech Flow

3/29 Collinsvale Street,

Rocklea QLD - 4108

(07) 3277 0111

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 9 of 31

AVK RESILIENT SEAT SLUICE GATE VALVE PN 16

57/40

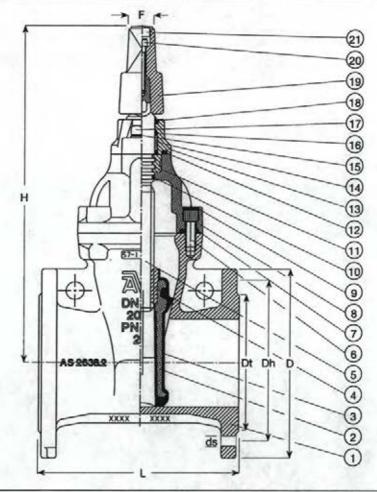
To AS 2638.2 Stem sealing exchangeable under pressure Face to face dimension to AS 2638.2 Flange and drilling to AS 4087 Figure B5 (AS 2129 Table D)

Component list

- Valve body
 Wedge casting
 Wedge rubber
 Stem nut
 Stem
 Bonnet bolts

- 7. Bonnet gasket
- 8. Bonnet 9. Hot melt seal 10. O-ring seal 11. Stem collar
- 12. O-ring seal
- 13. Gland flange 14. Bushing 15. Washer

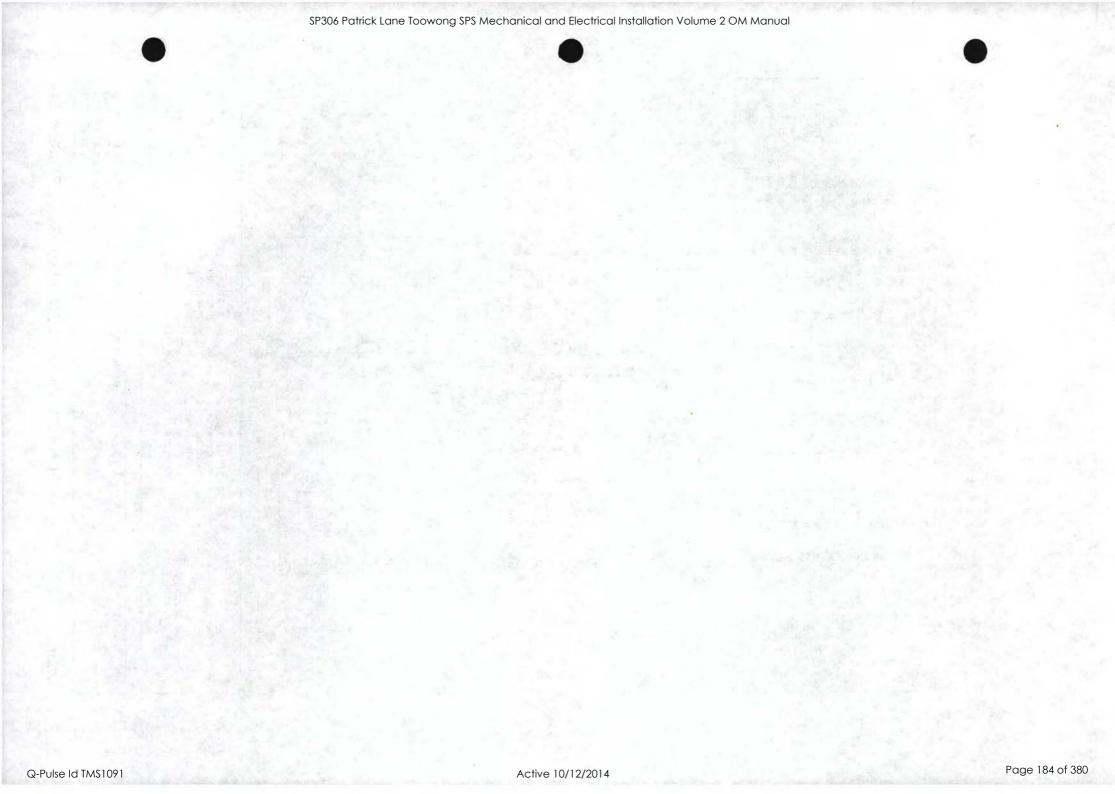
- 16. O-ring seal 17. Gland bolts 18. Wiper ring
- 19. Stem cap 20. Stem cap bolt 21. Insert



Ref. nos. CTC	Ref. nos. CTO	DN	mm	mm	DI	mm	Dh	ds mm	Holes	mm	Weight kilos
57-050-402	57-050-403	50 *	178	335	98	165	114	18,5	4	35	17
57-065-402	57-065-403	65 *	190	344	103	185	127	18,5	4	35	18
57-080-402	57-080-403	80	203	350	122	185	146	18.5	4	35	19
57-100-402	57-100-403	100	229	380	154	215	178	18.5	4	35	27
57-150-402	57-150-403	150	267	485	209	280	235	18.5	8	35	49
57-200-402	57-200-403	200	292	595	264	335	292	18.5	8	35	74
57-225-402	57-225-403	225	305	595	296	370	324	18.5	8	35	98
57-250-402	57-250-403	250	330	680	328	405	356	22.5	8	35	102
57-300-402	57-300-403	300	356	755	376	455	406	22.5	12	35	147
57-375-402	57-375-403	375	381	905	463	550	495	26.5	12	35	240
57-400-402	57-400-403	400	406	930	503	620	521	26.5	12	35	285

"Not specified in AS 2638.2





AVK RESILIENT SEAT SLUICE GATE VALVE PN 16

57/40

Stem sealing exchangeable under pressure Face to face dimension to AS 2638.2 Flange and drilling to AS 4087 Figure B5 (AS 2129 Table D)

For water, sewage and neutral liquids to max. 40°C

Tests:

Hydraulic test to AS 2638.2:

Seat: 16 bar Body: 24 bar

Operating torque test

Optional extras:

Handwheel Flange gasket kits ISO flanging for actuation Gearbox

User specified flange drilling

Materials:

Coating

Wedge

Gland flange, body and bonnet

Ductile iron, 500-7 to AS 1831

Stem cap

Ductile iron, 400-12 to AS 1831

Fusion bonded epoxy resin - Internally and externally to

AS 4158

Stem

Stem sealing

Stainless steel, 316 S 11 NBR wiper ring, 2 NBR O-rings

Ductile iron, 500-7 to AS 1831, core fully vulcanised with EPDM rubber, with integral wedge nut of dezincification resistant brass, CZ 132 to AS 2345

Polyamid Bushing

Thrust collar and stem seal box

Dezincification resistant brass, CZ 132 to AS 2345

Stainless steel 316

Bonnet bolts Stainless steel 304, sealed with

hot melt

Gland flange bolts

Bonnet gasket **EPDM** rubber







The designs, materials and specifications shown are subject to change without notice due to our continuing program of product develop

AVK Australia Pty Ltd 7 Rosberg Road, Wingfield, SA 5013 Australia Tel: +61 8 8359 6166 Fax: +61 8 8359 6417

AVK RESILIENT SEAT SLUICE GATE VALVE PN 16

57/40

Stem sealing exchangeable under pressure Face to face dimension to AS 2638.2 Flange and drilling to AS 4087 Figure B5 (AS 2129 Table D)

For water, sewage and neutral liquids to max. 40°C

Tests:

Hydraulic test to AS 2638.2:

Seat: 16 bar Body: 24 bar

Operating torque test

Optional extras:

Handwheel Flange gasket kits ISO flanging for actuation Gearbox

User specified flange drilling

Materials:

Gland flange, body and bonnet

Ductile iron, 500-7 to AS 1831

Ductile iron, 400-12 to AS 1831

Stem cap Coating

Fusion bonded epoxy resin Internally and externally to

AS 4158

Stem

Stainless steel, 316 S 11

Stem sealing Wedge

NBR wiper ring, 2 NBR O-rings

Ductile iron, 500-7 to AS 1831, core fully vulcanised with EPDM rubber, with integral wedge nut of dezincification resistant brass,

CZ 132 to AS 2345

Bushing

Polyamid

Thrust collar and stem seal box

Dezincification resistant brass, CZ 132 to AS 2345

Bonnet bolts

Stainless steel 304, sealed with

hot melt

Gland flange

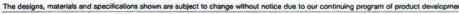
Bonnet gasket

Stainless steel 316

EPDM rubber







Australia Pty Ltd osberg Road, Wingt +61 8 8359 6166 d, SA 5013 Australia

3N5740EQ





AVK Australia Pty Ltd 7 Rosberg Road

7 Rosberg Road Wingfield SA 5013 Australia p: +61 8 8359 6166 f: +61 8 8359 6417 e: info@avkvalves.com.au w: www.avkvalves.com.au

Tender Specification Series 57/40



Resilient seated gate valve.

Body and bonnet of Ductile Iron to AS1831 Grade 500-7,DN 80-400.

Flanges and drilling to AS4087 Figure B5, PN 16.

Face-to-Face and general dimensions to AS2638.2

Wedge of ductile iron with fixed wedge nut, fully encapsulated with EPDM rubber.

Stem of stainless steel 316.

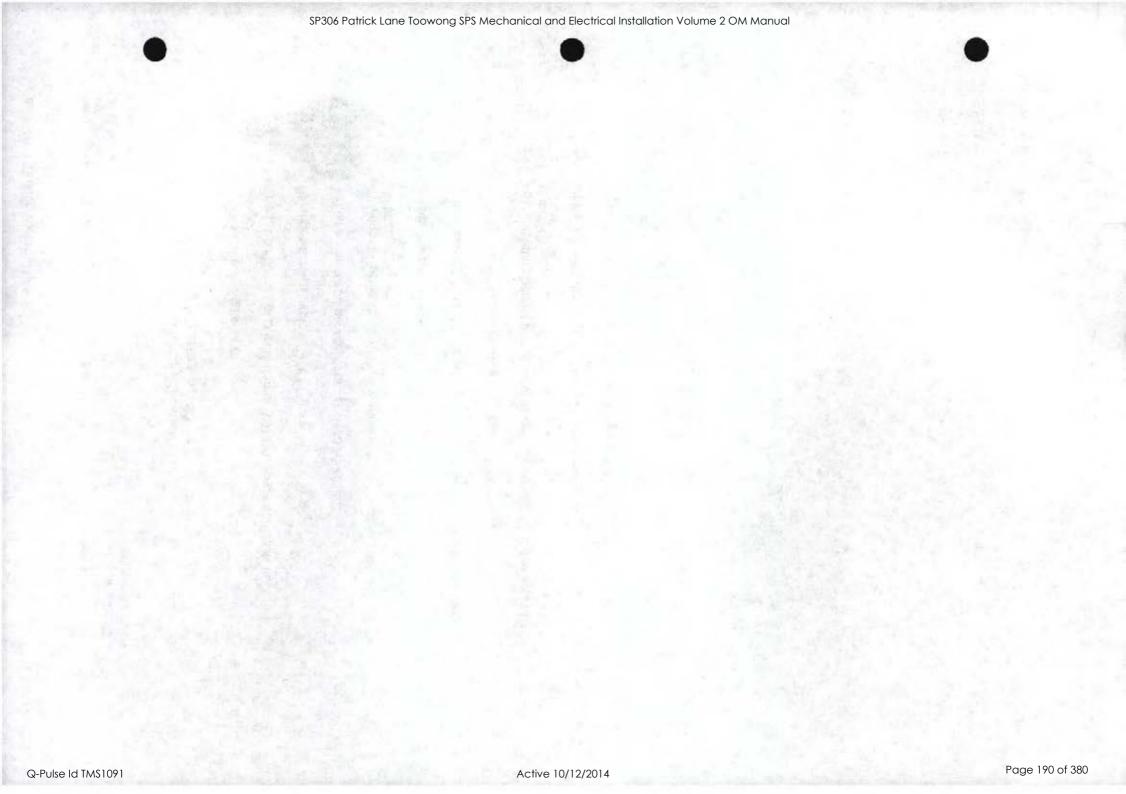
Stem sealing consists of 3 O-rings in a nylon bearing and a wiper ring.

Bonnet gasket in groove between body and bonnet.

Countersunk bonnet bolts encircled by the bonnet gasket and sealed with hot melt.

Epoxy coating to AS4158 - internally and externally.

Like AVK series 57/40 or approved equivalent.



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BRISBANE CITY COUNCIL

LANE PATRICK

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Brisbane Water

STATION

PUMP

Appendix 9: Reflux Valve Data Sheets

Manufacturer:

Dobbie Dicco

Model/Serial Number: Model/Serial Number: Dobbie Dico 300 Reflux Valves Dobbie Dico 375 Reflux Valves

Supplier Contact:

ITW Tech Flow

3/29 Collinsvale Street, Rocklea QLD - 4108

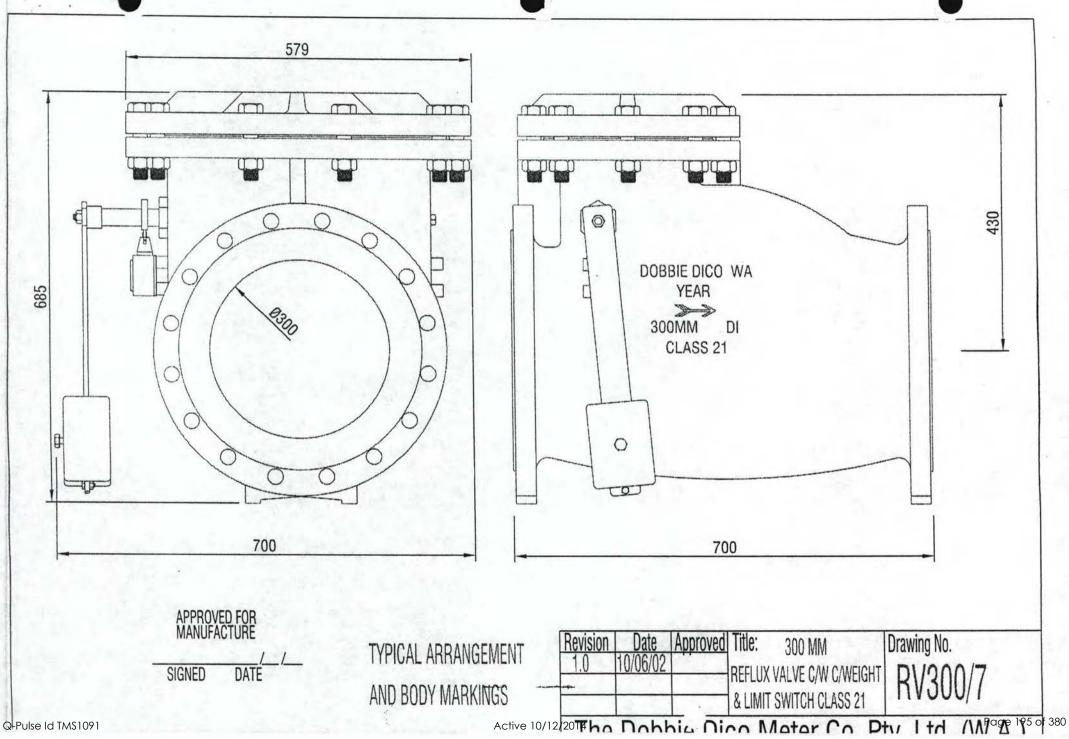
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SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

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300mm REFLUX VALVE SPECIFICATIONS

No	PART	MATERIAL	STANDARD	GRADE
1	BODY	DUCTILE IRON	AS1831	AS 500-7
2	COVER	DUCTILE IRON	AS1831	AS 500-7
3	BOLTS	GALV. CARBON STEEL	AS1252	HIGH STRENGTH STRUCTURAL
3	BOLT ALTERNATIVE	STAINLESS STEEL	AS2837	304 OR 316
4	BLANKING PLUG	DR BRASS	BS1256	352
5	FLAP SPINDLE	STAINLESS STEEL	AS2837	316 OR 416
6	SEATING RING	GUNMETAL	AS1565	C83600
7	FLAP	GUNMETAL	AS1565	C83600
8	HINGE	GUNMETAL	AS1565	C83600
9	HINGE SPINDLE	STAINLESS STEEL	A\$2837	316 OR 416
10	GASKET	RUBBER	AS4020	XB3683
11	SPINDLE BUSH	GUNMETAL OR DR BRASS	AS1565	C83600
12	WASHER	STAINLESS STEEL	AS2837	316 OR 304
13	SPLIT PIN	STAINLESS STEEL	AS2837	316 OR 304
14	GLAND NUT	GUNMETAL	AS1565	C83600
15	BLEED PLUG	DR BRASS	AS3688	352
16	LEVER ARM (IF REQ'D)	STRUCTURAL STEEL	AS3679	250
17	COUNTERWEIGHT (IF REQ'D)	GREY CAST IRON	AS1830	T220
18	LIMIT SWITCH (IF REQ'D)	AS SPECIFIED		
19	CAM (IF REQ'D)	STAINLESS STEEL	AS2837	316 OR 304

A.S. FLANGE SPECIFICATIONS

VALVE	FLANGE	FLANGE	FACE/FACE	LENGTH	MIN WALL	No. BOLT	BOLT HOLE	BOLT HOLE
CLASS	DIAM.	THICKNESS	LENGTH	TOL.+/-	THICKNESS	HOLES	DIAM.	P.C.D.
16	455	30	700	2	23	12	22	406
35.	490	38	700	2	23	16	26	438

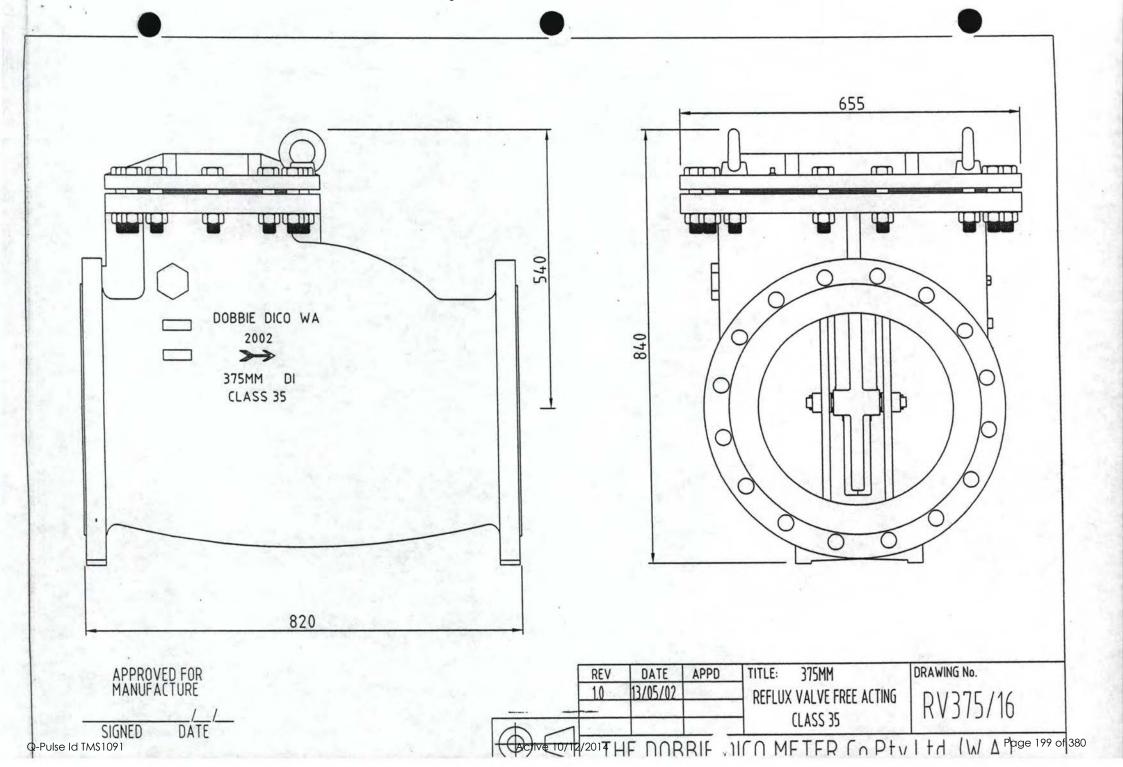
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4	1	1.0	21.01.04	MIKE H	7

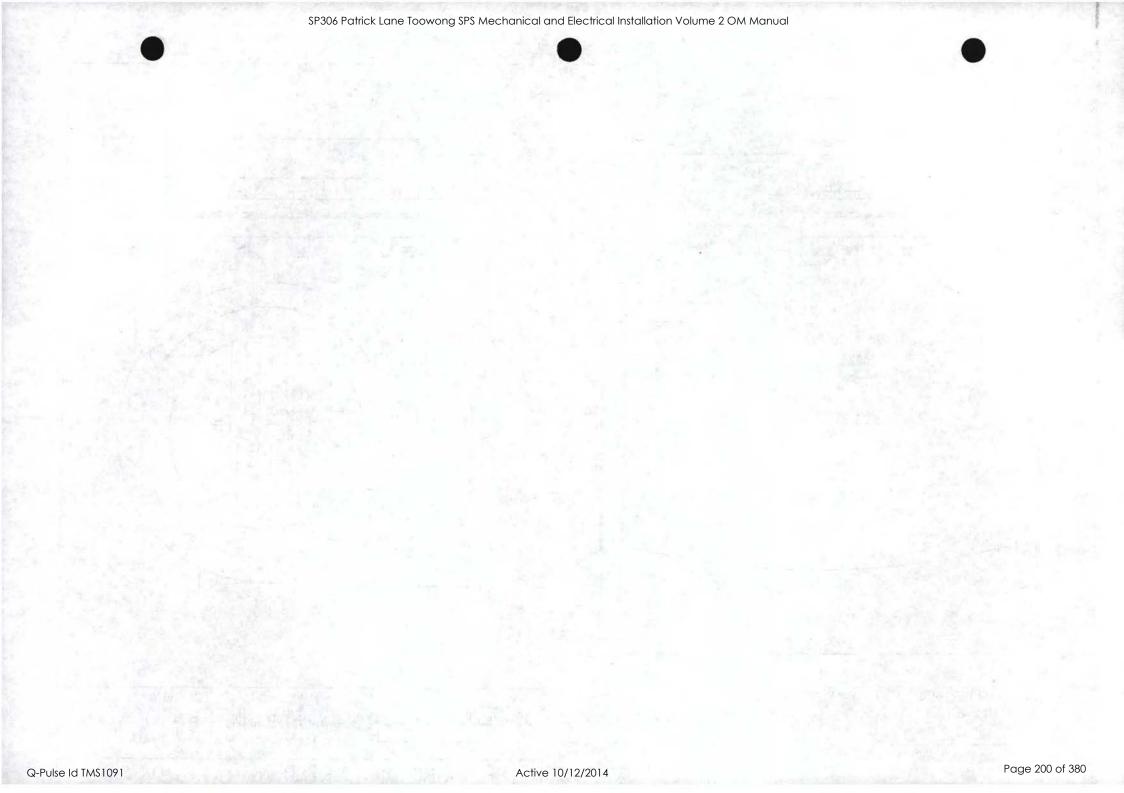
DRAWING No. RV300/1

300MM REFLUX VALVE SPECIFICATIONS

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REV. 1.0 Page 197 of 380





375mm REFLUX VALVE SPECIFICATIONS

No	PART	MATERIAL	STANDARD	GRADE
1	BODY	DUCTILE IRON	AS1831	AS 500-7
2	COVER	DUCTILE IRON	AS1831	AS 500-7
3	BOLTS	GALV. CARBON STEEL	AS1252	HIGH STRENGTH STRUCTURAL
3	BOLT ALTERNATIVE	STAINLESS STEEL	AS2837	304 OR 316
4	BLANKING PLUG	DR BRASS	AS3688	352
5	FLAP SPINDLE	STAINLESS STEEL	AS2837	316 OR 416
6	SEATING RING	GUNMETAL	AS1565	C83600
7	FLAP	GUNMETAL	AS1565	C83600
8	HINGE	GUNMETAL	AS1565	C83600
9	HINGE SPINDLE	STAINLESS STEEL	ÀS2837	316 OR 416
10	GASKET	RUBBER	AS4020	XB 3683
11	SPINDLE BUSH	GUNMETAL OR DR BRASS	AS1565	C83600
12	WASHER	STAINLESS STEEL	AS2837	316 OR 304
13	SPLIT PIN	STAINLESS STEEL	AS2837	316 OR 304
14	GLAND NUT	GUNMETAL	AS1565	C83600
15	BLEED PLUG	DR BRASS	AS3688	352
16	LEVER ARM (IF REQ'D)	STRUCTURAL STEEL	AS3679	250
17	COUNTERWEIGHT (IF REQ'D)	GREY CAST IRON	AS1830	T220
18	LIMIT SWITCH (IF REQ'D)	AS SPECIFIED		
19	CAM (IF REQ'D)	STAINLESS STEEL	AS2837	316 OR 304

A.S. FLANGE SPECIFICATIONS

VALVE	FLANGE	FLANGE	FACE/FACE	LENGTH	MIN WALL	No. BOLT	BOLT HOLE	BOLT HOLE
CLASS	DIAM.	THICKNESS	LENGTH	TOL.+/-	THICKNESS	HOLES	DIAM.	P.C.D.
16	550	33	820	2	X	12	26	495
35	580	42	820	2	X	16	30	521

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	-0.1	04/05/02		KELLON	ALVE SPECIFICATIONS	1 RV3/5/1 1
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APPENDIX 10

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BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 10: Ductile Pipe and Fittings Data Sheets

Supplier/Manufacturer:

Contact:

Tyco Water

88 Fredrick Street,

Northgate, QLD – 4013 (07) 3266 2255

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Date: 29 Nov 05

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SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual

Flanged Fittings

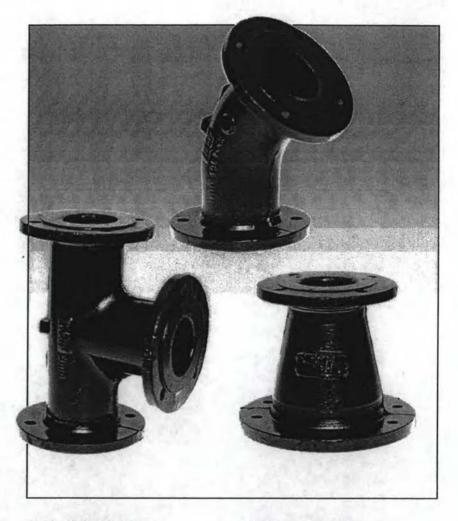
tyco Flow Control

Flanged fittings are manufactured to AS/NZS 2280. Flange dimensions comply with AS 4087.

Tyco Water

Features

- Ductile Iron fittings for high strength and impact resistance
- Suitable for 'in ground' or 'above ground' applications
- Fittings can be encapsulated with a thermal bonded polymeric coating or cement lined and bitumen coated to suit local utility specifications.
- Self anchoring joints. No need for external anchorages.
- Integrally cast flanges on fittings.
- All flange dimensions comply with AS4087.
- Alternate flange dimensions available on request.





A.B.N. 75 087 415 745

General Application

Flanged Fittings provide restrained non flexible joints in pipelines or within pipework arrangements and are commonly used in above ground applications such as pump stations and treatment plants.

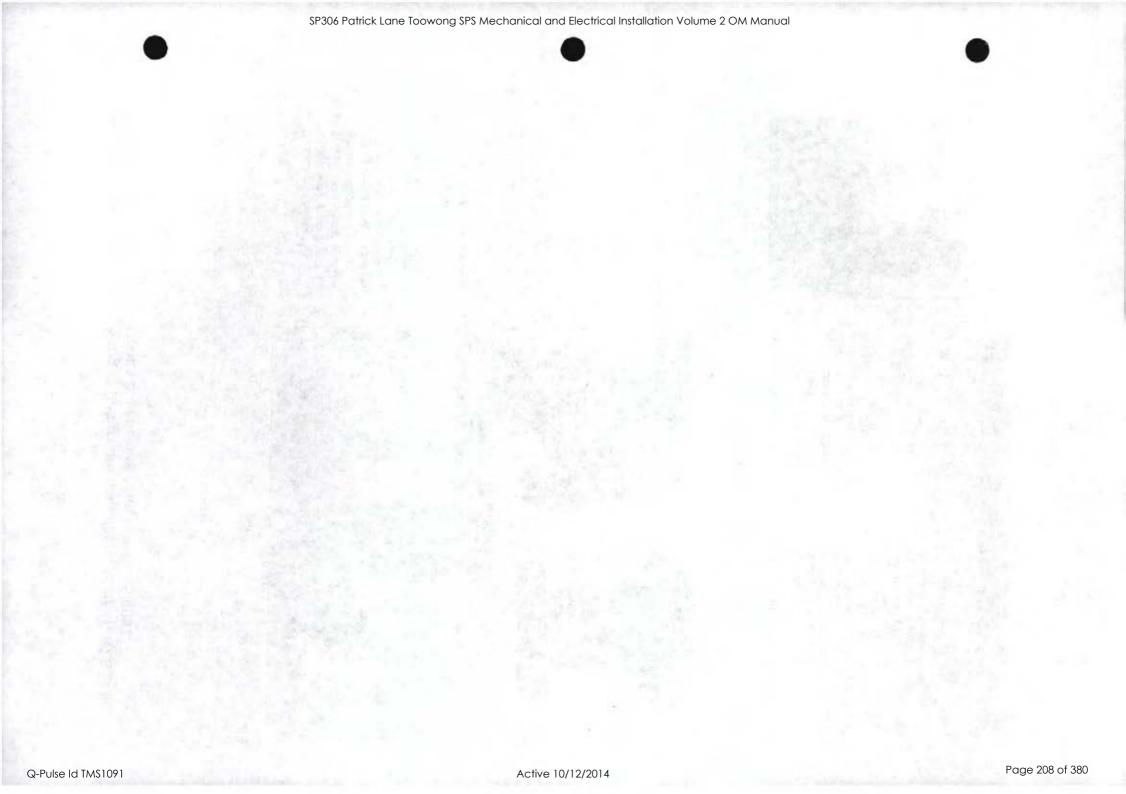
Technical Data

Size Range: DN80 - DN750
Allowable Operating Pressure:
1600 or 3500 kPa
Standards:
AS/NZS 2280 - Ductile iron pressure
pipes and fittings
Certification:
ProductMark Licence
PRD/R61/0412/1
Certified to AS 4020 - Suitable for
contact with drinking water.

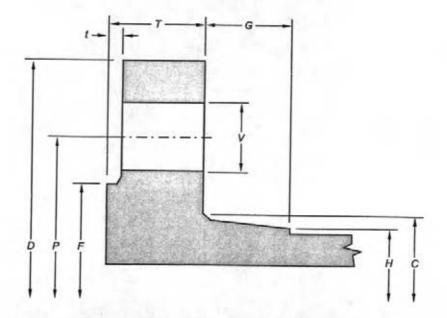
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Flanged Fittings DN100 - DN750



Nominal Size	Flange Di	mensions -		Number	Details —	Fastener	- Ne	ock Dimensio	ons —	Thick	mess -
DN	D	F	P	of Holes	٧	Size	C	н	G	T	t
80	185	18	146	4	18	M16	106	100	8	18	3
100	215	20	178	40.4	18	M16	136	120	11	20	3
150	280	23	235	8	18	M16	188	181	11	23	3
200	335	23	292	8	18	M16	243	236	12	23	3
225	370	24	324	8	18	M16	275	263	19	24	3
250	405	24	356	8	22	M20	307	290	26	24	3
300	455	30	406	12	22	M20	354	349	28	30	4
375	550	33	495	12	26	M24	439	430	30	33	4
450	640	33	584	12	26	M24	528	511	33	33	4
500	705	35	641	16	26	M24	581	564	34	35	4
600	825	42	756	16	30	M27	689	671	38	42	5
750	995	47	927	20	33	M30	855	830	53	47	5

lominal Size	Flange Di	mensions-		Number	Details —	Fastener	- Ne	ck Dimensio	ons —	Thick	kness -
DN	D	F	Р	of Holes	٧	Size	C	н	G	т	1
80	205	141	165	8	18	M16	110	100	11	22	3
100	230	167	191	8	18	M16	137	126	13	22	3
150	305	232	260	12	22	M20	198	181	20	27	3
200	370	296	324	12	22	M20	257	236	27	31	3
225	405	324	356	12	26	M24	290	263	33	34	3
250	430	349	381	12	26	M24	315	290	33	34	3
300	490	406	438	16	26	M24	376	349	38	38	4
375	580	485	521	16	30	M27	459	430	42	42	4
450	675	571	610	20	33	M30	542	511	48	46	4
500	735	634	673	24	33	M30	602	564	60	49	4
600	850	739	781	24	36	M33	710	671	66	54	5
750	1015	898	940	28	36	M33	870	830	73	59	5

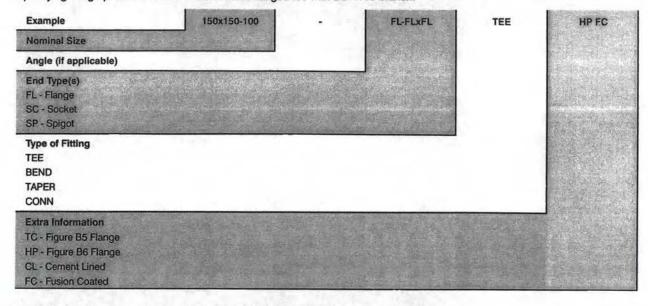
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Flanged Fittings DN100 - DN750

Typical Specifying Sequence

Specifying a high pressure DN150 fusion coated flanged tee with a DN100 branch.



Specifying a 22.5 degree standard pressure DN100 cement lined, bitumen coated bend.

Example	100	221/2	FL-FL	BEND	TCCL
Nominal Size					
Angle (if applicable)					
End Type(s) FL - Flange SC - Socket SP - Spigot					
Type of Fitting TEE BEND TAPER CONN					
Extra Information TC - Figure B5 Flange HP - Figure B6 Flange CL - Cement Lined FC - Fusion Coated					

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TWPCFF/11/04

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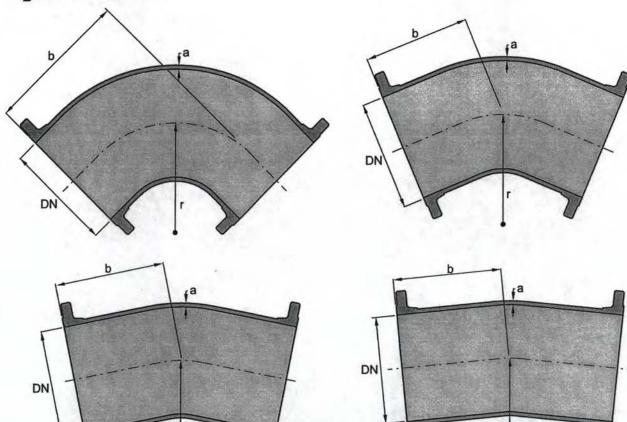
Flanged Bends DN100 - DN750

tyco

Flanged bends are manufactured to AS/NZS 2280. Flange dimensions comply with AS 4087.

Flow Control

Tyco Water



Nominal Size			100	— Dimer	nsion b	
DN	а		90°	45°	22½°	111/4°
80	8	140	229	140	140	125
100	8	152	241	152	152	152
150	9	190	279	190	190	190
200	10	203	305	203	203	203
225	10	229	330	229	229	229
250	10	254	356	254	254	254
300	11	305	406	305	305	305
375	12	381	495	381	381	381
450	13	457	572	457	457	457
500	14	508	622	508	508	508
600	15	610	737	610	610	610
750	18	765	905	460	295	230

All dimensions stated are in mm A.B.N. 75 087 415 745 © Copyright by Tyco International Ltd.

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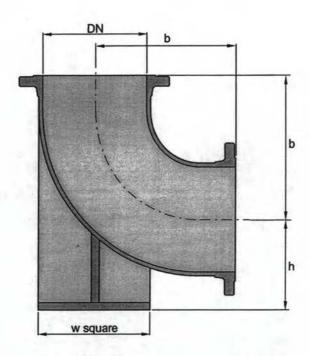
SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual

Flanged Duckfoot Bends DN100 - DN150



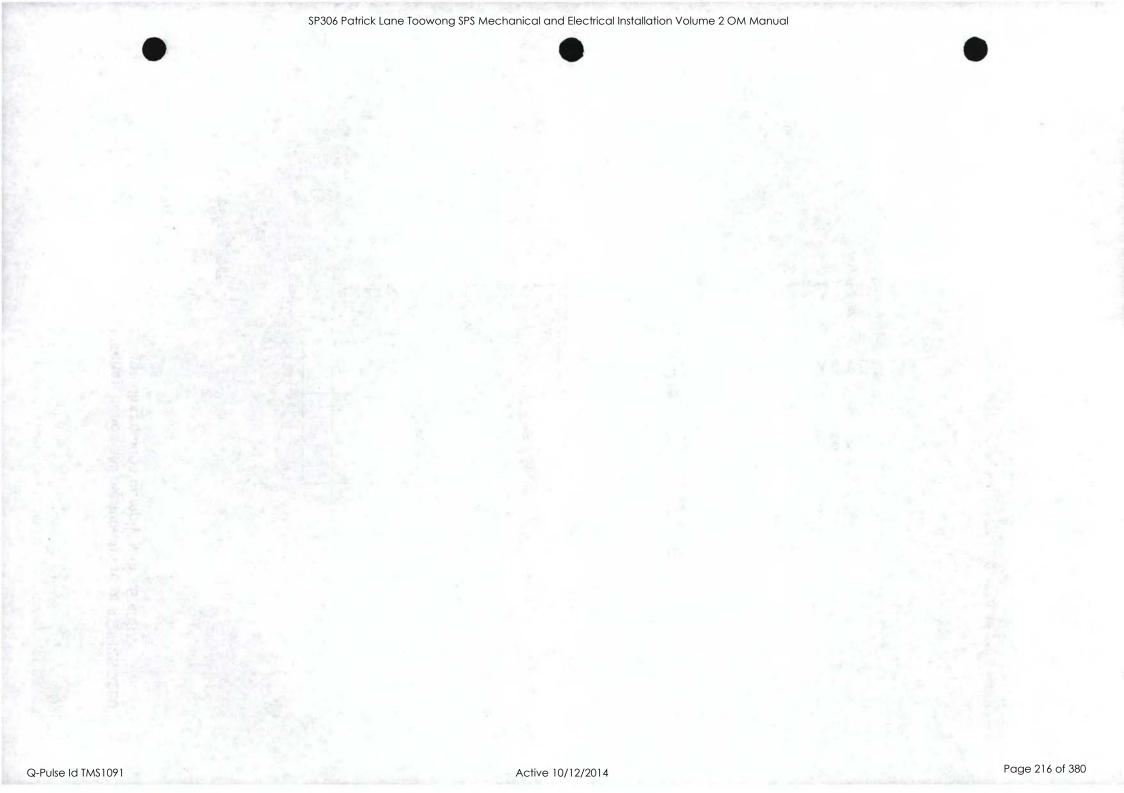
Flanged bends are manufactured to AS/NZS 2280. Flange dimensions comply with AS 4087.

Tyco Water



lominal Size		— Dimensions –	
DN	b	w	h
80	229	165	114
100	241	185	133
150	279	190	165
200	305	235	197
225	330	260	216
250	356	290	229
300	406	345	260
375	495	425	311
450	572	500	356
500	622	560	394
600	737	665	457

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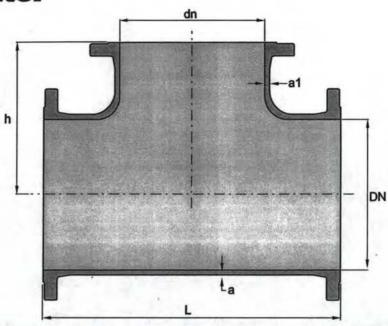
Flanged Tees DN100 - DN750

tyco

Flanged tees are manufactured to AS/NZS 2280. Flange dimensions comply with AS 4087.

Flow Control

Tyco Water

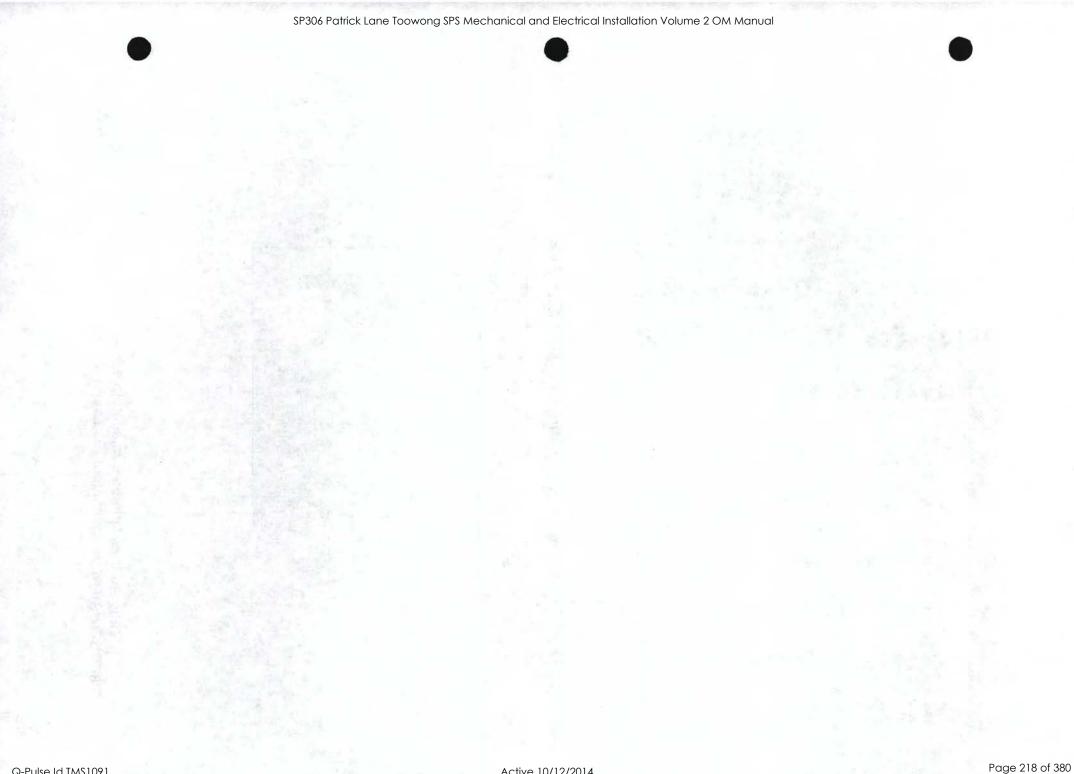


- Nomir	nal Size -		Dime	nsions -		- Nomin	nal Size —		Dime	nsions -	
Body	Branch				7	Body	Branch				
DN	dn	a	a1	h	L	DN	dn	а	a1	h	L
100	100	8	8	178	356	375	250	12	10	356	738
150	100	9	8	203	406	375	300	12	11	356	738
150	150	9	9	203	406	375	375	12	12	368	738
200	100	10	8	241	484	450	250	13	10	394	814
200	150	10	9	241	484	450	300	13	11	394	814
200	200	10	10	241	484	450	375	13	12	406	814
225	100	10	8	254	508	450	450	13	13	406	814
225	150	10	9	254	508	500	250	14	10	432	890
225	200	10	10	254	508	500	300	14	11	432	890
225	225	10	10	254	508	500	375	14	12	444	890
250	100	10	8	267	534	500	450	14	13	444	890
250	150	10	9	267	534	500	500	14	14	444	890
250	200	10	10	267	534	600	300	15	11	483	101
250	225	10	10	267	534	600	375	15	12	495	101
250	250	10	10	267	534	600	450	15	13	495	101
300	100	11	8	305	610	600	500	15	14	495	101
300	150	11	9	305	610	600	600	15	15	508	101
300	200	11	10	305	610	750	300	18	11	615	890
300	225	- 11	10	305	610	750	375	18	12	645	100
300	250	11	10	305	610	750	450	18	13	655	108
300	300	11	11	305	610	750	500	18	14	680	116
375	200	12	10	356	738	750	600	18	15	695	126
375	225	12	10	356	738	750	750	18	18	725	145

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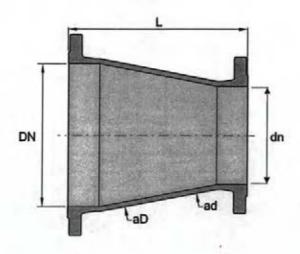


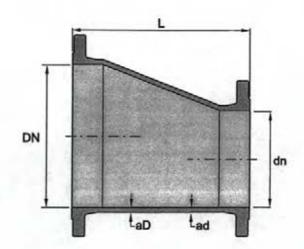
Flanged Tapers DN100 - DN750

tycoFlow Control

Flanged tapers are manufactured to AS/NZS 2280. Flange dimensions comply with AS 4087.

Tyco Water

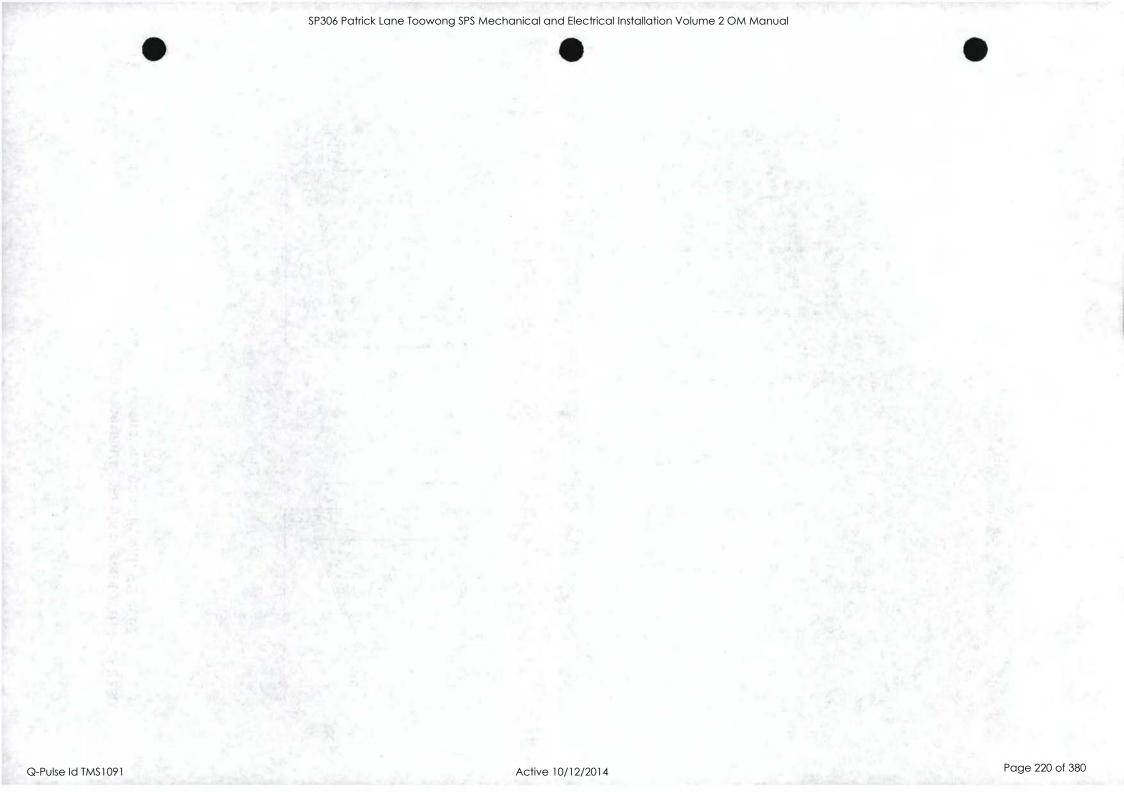




- Nomin	al Size —		- Dimensions -		- Nomir	nal Size — _		- Dimensions	
Large DN	Small	aD	ad	L	Body	Branch II	aD	ad	L
17/25/5	80	8		1000	1 6275-375		-		
100	change in the latest transfer and the statest	9.00	8	165	375	225	12	10	521
150	80		8.24	298	375	250	12	10	457
150	100	9	8	235	375	300	12	11	337
200	100	10	8	368	450	250	13	10	660
200	150	10	9	248	450	300	13	11	540
225	100	10	8	432	450	375	13	12	356
225	150	10	9	311	500	250	14	10	787
225	200	10	10	190	500	300	14	and the same	667
250	100	10	8	495	500	375	14	12	483
250	150	10	9	375	500	450	14	13	305
250	200	10	10	254	600	300	15	11	934
250	225	10	10	190	600	375	15	12	749
300	100	11	8	629	600	450	15	13	572
300	150	11	9	508	600	500	15	14	444
300	200	11	10	387	750	375	18	12	1180
300	225	11	10	324	750	450	18	13	1000
300	250	11	10	260	750	500	18	14	885
375	200	12	10	584	750	600	18	15	645

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tyco

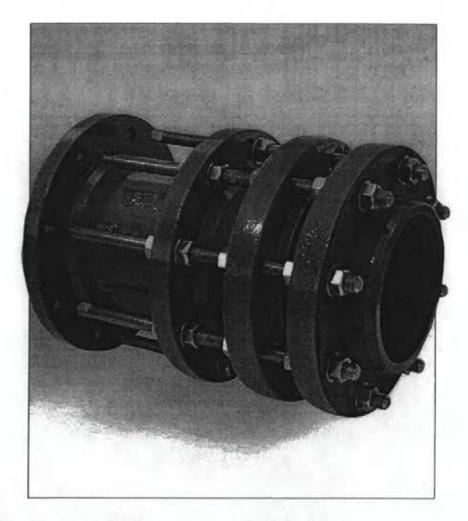
Flow Control

Dismantling joints are designed to facilitate the removal of flanged valves from pipelines.

Tyco Water

Features

- Ductile Iron components for high strength and impact resistance.
- Fasteners are grade 316 Stainless Steel for long life operation.
- Thrust type available to provide longitudinal restraint.
- Non-Thrust type available where restraint is separately provided.
- Cement lined and bitumen coated or fusion coated with Rilsan Nylon 11 for long life corrosion protection.
- · Studs are fully threaded.





A.B.N. 75 087 415 745

General Application

Dismantling Joints are used in pipelines where valves may need to be removed for future maintenance or replacement.

Technical Data

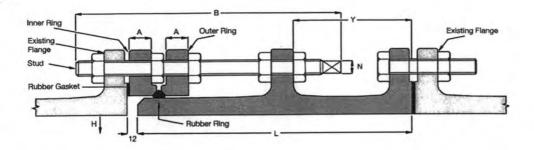
Size Range: DN100-DN750 Allowable Operating Pressure: 1600 kPa or 3500 kPa End Connections: Flanged to AS 4087 Figure B5 Flanged to AS 4087 Figure B6

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Thrust Type



Nominal		- Joint Dim	nensions —		-Rubber-	No.		Stud Details		No.
Size DN	A	н	L	Y	ID x d	of Studs	Stud Size	В	z	of Nuts
100	30	126	400	175	104 x 16	4	M16	340	10	5
150	30	181	400	175	155 x 16	8	M16	340	10	5
200	30	236	400	175	206 x 16	8	M16	340	10	5
225	30	263	400	175	232 x 19	8	M16	340	10	5
250	30	290	400	175	268 x 19	8	M20	340	13	5
300	30	349	400	175	298 x 13	12	M20	340	13	5
375	35	430	600	260	410 x 13	12	M24	495	16	5
450	35	511	600	260	500 x 20	12	M24	495	16	5
500	40	564	600	260	555 x 20	16	M24	495	16	5
600	45	671	600	260	660 x 20	16	M27	495	16	5
750	47	831	600	260	780 x 25	20	M30	495	18	5

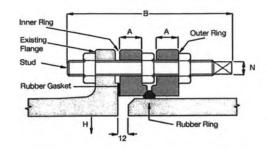
Nominal		- Joint Din	nensions —		Rubber	No.		Stud Details		No.
Size DN	A	н	L	Y	ID x d	of Studs	Stud Size	В	z	of Nuts
100	30	126	400	175	104 x 16	8	M16	340	10	5
150	30	181	400	175	155 x 16	12	M20	340	13	5
200	31	236	400	175	206 x 16	12	M20	340	13	5
225	34	263	500	220	232 x 19	12	M24	425	16	5
250	34	290	500	220	268 x 19	12	M24	425	16	5
300	38	349	500	220	298 x 19	16	M24	425	16	5
375	42	430	600	260	410 x 24	16	M27	495	16	5
450	46	511	600	260	500 x 20	20	M30	495	18	5
500	49	564	600	260	555 x 20	24	M30	495	18	5
600	54	671	700	300	660 x 20	24	M33	595	20	5
750	59	831	700	300	780 x 25	28	M33	595	20	5

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Non-thrust Type



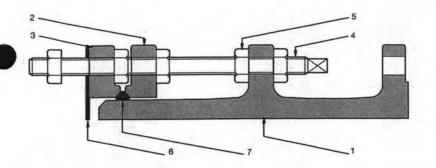
Nominal	Joint D	imensions —	-Rubber	No.		— Stud Details –		No.
Size DN	A	н	ID x d	of Studs	Stud Size	С	z	of Nuts
100	30	126	104 x 16	4	M16	195	10	3
150	30	181	155 x 16	8	M16	195	10	3
200	30	236	206 x 16	8	M16	195	10	3
225	30	263	232 x 19	8	M16	195	10	3
250	30	290	268 x 19	8	M20	195	13	3
300	30	349	298 x 13	12	M20	195	13	3
375	35	430	410 x 13	12	M24	275	16	3
450	35	511	500 x 20	12	M24	275	16	3
500	40	564	555 x 20	16	M24	275	16	3
500	45	671	660 x 20	16	M27	275	16	3
750	47	831	780 x 25	20	M30	275	18	3

Nominal	Joint Di	mensions —	- Rubber-	No.		 Stud Details - 		No.
Size				of	Stud			of
DN	A	н	ID x d	Studs	Size	С	Z	Nuts
100	30	126	104 x 16	8	M16	195	10	3
150	30	181	155 x 16	12	M20	195	13	3
200	31	236	206 x 16	12	M20	195	13	3
225	34	263	232 x 19	12	M24	275	16	3
250	34	290	268 x 19	12	M24	275	16	3
300	38	349	298 x 19	16	M24	275	16	3
375	42	430	410 x 24	16	M27	275	16	3
450	46	511	500 x 20	20	M30	275	18	3
500	49	564	555 x 20	24	M30	275	18	3
600	54	671	660 x 20	24	M33	330	20	3
750	59	831	780 x 25	28	M33	330	20	3

Note: When non-thrust dismantling joints are used on non machined DI pipe spigots, the allowable operating pressure is 2100kPa

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Parts L	ist		
No.	Description	Material	Standard
1	Body (Thrust type only)	Ductile Iron	AS 1831-400/15
2	Thrust Ring Inner	Ductile Iron	AS 1831-400/15
3	Thrust Ring Outer	Ductile Iron	AS 1831-400/15
4	Stud	Stainless steel	ASTM A276 316
5	Nut	Stainless steel	ASTM A276 316
6	Gasket	EPDM Rubber (Class 16)	AS 1646
		Teadit NA1000 (Class 35)	
7	Rubber Ring	EPDM Rubber	AS 1646

Specifying Sequence

Specifying a non-thrust type DN300 Class 16 dismantling joint.

Example 300	DISJNT	N-IHHUSI	5/5	16	FC	1
Nominal Size 100 - 750						
Name						
Type Thrust Non-thrust						
Fastener Type SS - Stainless Steel				THE SALES		
End Type TC - Flanged AS 4087 Figure B5 HP - Flanged AS 4087 Figure B6						
Extra Information FC - Fusion Coated						
DI - Ductile Iron DICL - Ductile Iron Cement Lines	1					
						-1

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TWDJ/6/04

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Active 10/12/2014

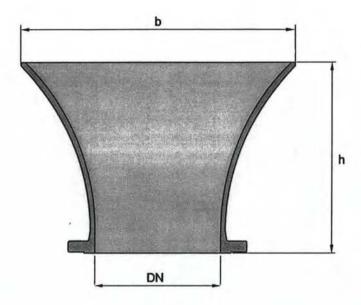
Q-Pulse Id TM\$1091

Flanged Bellmouths DN100 - DN750



Flanged belimouths are manufactured to AS/NZS 2280 requirements. Flange dimensions comply with AS 4087.

Tyco Water



Nominal Size	Dime	nsions —
DN	b	h
100	200	152
150	245	152
200	374	305
225	425	305
250	445	380
300	650	470
375	755	525
450	765	590
500	770	650
600	840	725
750	1250	845

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Q-PUSAIDITMS109

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BRISBANE CITY COUNCIL Brisbane Water **PUMP**

LANE **PATRICK** STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Uniflange Data Sheets Appendix 11:

Manufacturer: Supplier Contact: Uniflange Tyco Water

88 Fredrick Street,

Northgate, QLD - 4013 (07) 3266 2255

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 12 of 31

UNI-FLANGE®

International Adapter Flange Series

NEW COATING!

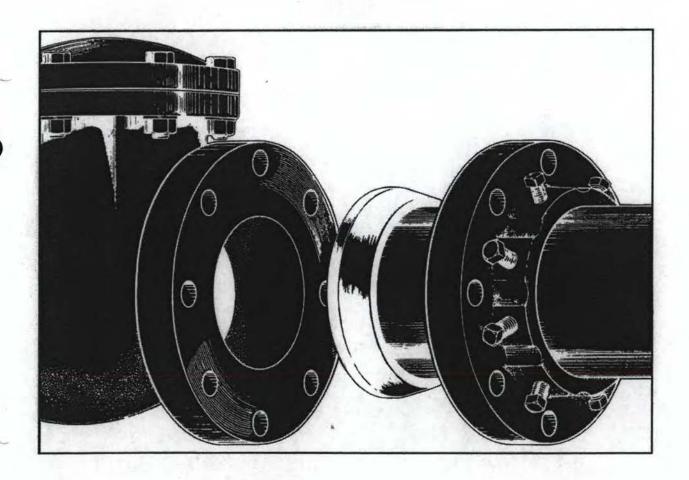
NEW COATING!

Uni-flanges are now supplied with
Eusion Bonded Epoxy Coating

as standard.

Fusion as standard.

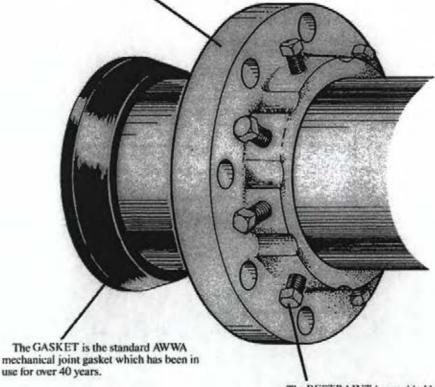
AUSTRALIAN CATALOGUE



UNI-FLANGE DESIGN ELEMENTS

The design of the Uni-Flange Adapter is really quite simple. We took the best features of three different products and combined them into one fitting.

The FLANGE is made of ductile iron; tougher and stronger than the conventional grey iron threaded flange. Impact resistant, the flange also resists breakage when bolts are over-tightened.



The RESTRAINT is provided by a set screw locking device similar to that used in mechanical joint restrainer glands. This principle has been in use throughout the world, in lieu of concrete thrust blocks and other restraining devices, for more than 40 years.

AUSTRALIAN STANDARD AS 2129 / AS 4087

Technical Data and Availability

FLANGE

Manufactured from ductile iron in accordance with ASTM A536. Drilling and O.D. in accordance with AS 2129/AS4087

Pipe O.D's shown in tables are to the following standards.

Steel 50 mm to 150 mm Steel 200 mm and above Iron all sizes - AS 1074 - B 36.10

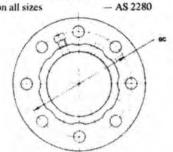




Table E Series 474

SET SCREW

Manufactured from AISI 4140 steel. Tensile 1310 MPa. Heat treated and zinc plated. Stainless steel (AISI 410) and "Unitorque" set screws also available.

GASKET

Standard gasket supplied with the Uni-Flange Adapter Flange is SBR (Buna-S). Suitable for water and wastewater, and most moderate chemicals. Temperature range -54° to 100°C.

Other gaskets available include: EPDM, CR, NBR, FPM.

RECOMMENDED SET SCREW TORQUE

50 - 100 mm 95 Nm 150 - 375 mm 125 Nm 400 - 600 mm 160 Nm

RECOMMENDED MAXIMUM WORKING & TEST PRESSURES AS4087 Class 16 / AS2129 Table C. E.

Size	Working Pressure	Test Pressure (Hydrostatic)
Restraining		
50 - 300 mm	1.600 kPa	3.000 kPa
350 - 600 mm	1,000 kPa	1,400 kPa
Non-Restraining		
50 - 600 mm	1.600 kPa	3.000 kPa

Note: Restraining - where Uni-flange is used to restrain pipe or fitting.

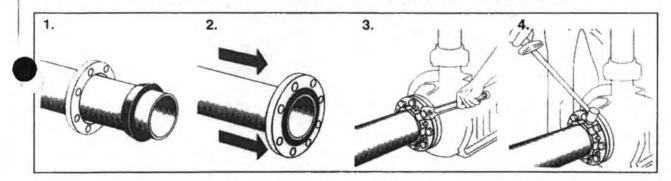
Nom. Pipe Size	Steel Pipe O.D.	Cast Iron Pipe O.D.	A	В	BC	D	Bolt Hole Dia	No. Bolts	Set Screw Size	Wgt. Approx. (Kgs.)	Part No. Steel Pipe	Part No. Iron Pipe
50	60.3	. sense	150	51	114	25	18	4	4, × 1	2	470-S-050	-
65	76.1	- 1	165	51	127	27	18	4	4, × 1	3	470-S-065	-
80	88.9	96.5	185	51	146	27	18	4	1/2 × 1	3	470-S-080	470-C-086
100	114.3	121.9	215	54	178	27	18	4	1/2 × 1	4	470-S-100	470-C-100
150	165.1	177.3	280	60	235	27	18	8	1/4 × 11/4	6	470-S-150	470-C-150
200	219.1	232.2	335	64	292	27	18	8	Ma × 11/4	9	470-S-200	470-C-200
225	-	259.1	370	64	324	27	18	8	1/4 × 11/4	11	-	470-C-225
250	273.0	286.0	405	64	356	27	22	8	4, × 14,	13	470-S-250	470-C-250
300	323.9	345.4	455	67	406	30	22	12	11 × 11/4	15	470-S-300	470-C-300
350	355.6	-	525	70	470	35	26	12	1/4 × 11/4	24	470-5-350	-
375	-	426.2	550	70	495	35	26	12	1/4 × 11/4	24	-	470-C-375
400	406.5	-	580	83	521	40	26	15	74 × 2	30	470-S-400	-
450	457.0	507.0	640	86	584	40	26	:2	14 × 2	30	470-S-450	470-C-450
500	508.0	560.0	705	89	641	45	25	16	V4 × 2	40	470-S-500	470-C-500
600	610.0	667.0	825	92	756	48	30	16	1/4 × 2	50	470-\$-600	470-C-600

ALSO AVAILABLE (IN BOTH 'C' & 'E') TO SUIT THE FOLLOWING PIPE OD'S: 150mm NB - 168.3mm 300mm NB - 337.0mm 375mm NB - 419.0mm

Nom. Pipe Size	Steel Pipe O.D.	Cast Iron Pipe O.D.	A	В	BC	D	Bolt Hole Dia.	No. Bolts	Set Screw Size	Wgt. Approx. (Kgs.)	Part No. Steel Pipe	Part No. Iron Pipe
50	60.3	_	150	51	1[4	25	18	4	1/2 × 1	2	474-S-050	-
65	76.1	-	165	51	127	27	18	4	1/2 × 1	3	474-S-065	-
80	88.9	96.5	185	51	146	27	18	4	1/2 × 1	3	474-S-080	474-C-080
100	114.3	121.9	215	54	178	27	18	8	1/2 × 1	4	474-S-100	474-C-100
150	165.1	177.3	280	60	235	27	22	8	1/8 × 11/4	6	474-S-150	474-C-150
200	219.1	232.2	335	64	292	27	22	8	1/4 × 11/4	9	474-S-200	474-C-200
225	-	259.1	370	64	324	27	22	12	1/8 × 11/4	11	-	474-C-225
250	273.0	286.0	405	64	356	27	22	12	1/4 × 11/4	13	474-S-250	474-C-250
300	323.9	345.4	455	67	406	30	26	12	Mx X 10/4	15	474-S-300	474-C-300
350	355.6	-	525	70	470	35	26	12	1/4 × 11/4	24	474-S-350	-
375	-	426.2	550	70	495	35	26	12	3/4 × 11/4	24	-	474-C-375
400	406.5	-	580	83	521	40	26	12	1/4 × 2	30	474-S-400	-
450	457.0	507.0	640	86	584	40	26	16	4, × 2	30	474-5-450	474-C-450
500	508.0	560.0	705	89	641	45	26	16	14. x 2	40	474-S-500	474-C-500
600	610.0	667.0	825	92	756	48	33	16	1/4 × 2	50	474-S-600	474-C-600

Dimensions in millimeters (except set screw size)

UNI-FLANGE ASSEMBLY INSTRUCTIONS



- Pipe end should be cut square and be free of burrs. Clean the plain end of the pipe. Thoroughly lubricate the pipe and
 gasket with a soap based pipe lubricant. Slide the flange onto the pipe with the gasket cavity facing the end of the
 pipe. Slide the lubricated gasket over the pipe end, with the tapered end facing the gasket cavity in the flange. (No
 gasket is necessary or should be used to seal the flange faces).
- Slide the flange forward until the gasket is evenly sealed in the flange cavity, with the leading edge of the gasket flush with the end of the pipe. (The end of the pipe should butt against the facing flange, it cannot be more than 6mm from the facing flange). Hand tighten the set screws against the pipe surface.
- 3. Using conventional flange bolts, mate the Uni-flange to the standard flange. Be sure to evenly tighten the bolts alternately on opposite sides. (Use the star method like tightening the lug nuts on a car wheel). Do not over-tighten the flange bolts. It is not necessary to bring the Uni-flange Adapter to a face to face contact with the standard flange. A gap of approximately 3mm between the flanges is normal.
- Snug down all the set screws evenly. Tighten in an alternating manner (star method) to the torque values specified.
 Use of a torque wrench is required.

DEFLECTION

Nom. Pipe Size (mm)	Maximum Angle Deflection	Deflection MM/ Length
50	4° -02'	387
65	3° -56'	377
80	3° -50°	368
100	3° -44'	358
150	3° -36'	345
200	3° -20°	320
225	3° -15'	312
250	3° -13'	308
300	2° -35'	232
350	2° -20'	224
375	2° -10°	208
400	2° -05'	200
450	2° -00'	192
500	1° -56'	185
600	1° -37'	155

THRUST RESTRAINT

Nom. Pipe Size (mm)	Set Screw Torque (Nm)	Working Pressure Max. (kPa)	Thrust at Working Pressure (Kgs)	Uni-flange Thrust Restraint (Kgs)
50	95	1.600	354	6.000
65	95	1.600	554	6.000
80	95	1.600	630	6.000
100	95	1.600	1.184	6.000
150	125	1.600	2.853	16,000
200	125	1,600	5.140	16,000
225	125	1.600	6.505	16,000
250	125	1,600	8,160	16,000
300	125	1,600	12.111	24,000
350	125	1.000	9.096	24.000
375	125	1,000	12,090	24,000
400	160	1.000	12.049	33.000
450	160	1,000	17.216	33,000
500	160	1.000	21.218	44,000
600	160	1.000	30.376	44,000

UNI-FLANGE ADVANTAGES

· Job site fabrication using plain end pipe.

Uni-Flange eliminates the problems of pre-engineered, prefabricated piping systems. Pipe sizing need not be so precise, because lengths can be cut and made up to suit site requirements. Mistakes in fabrication or drawings can be easily rectified on-site, instead of relying on off-site suppliers, machinists and fabricators. DOWN TIME SAVINGS are considerable.

 Plain end pipe is considerably less expensive to use than threaded or flanged pipe.

With the Uni-Flange Adapter Flange Series, plain end pipe is all you need. And because pipe lengths can be cut and made up to suit site requirements, cut-offs may be utilized to cut down on waste.

Unt-Flange has built-in end restraint.

Built-in, so no ne rods, anchoring, or fixing is necessary.

 Uni-Flange allows a deflection/flexibility setting and an improved cutting tolerance.

When installing the pipe, misalignment can often be allowed for by using the deflection setting incorporated in the design of the Uni-Flange Adapter. There is an allowance of ¼ in. between pipe and mating flange, which allows for a lower degree of accuracy than would be necessary with rigid flanged systems.

· Uni-Flange needs no special equipment for installation.

No threading or welding equipment is needed.

· Fast and easy installation without skilled labor.

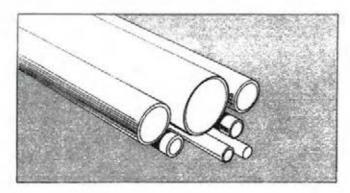
If you can use a wrench, you can use Uni-Flange,

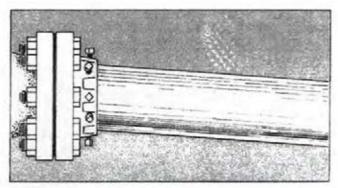
Eliminates bolt hole alignment problems.

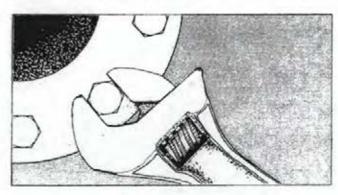
Uni-Flange can be freely rotated before bolt tightening; enabling easy bolt hole alignment.

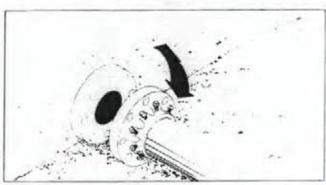
Eliminates additional restraining connections.

Installations of water, wastewater and sewage piping systems are made easier, on site, when the Uni-Flange method is applied. It's an all-in-one connection.









UNI-FLANGE ADAPTER SERIES

The Uni-Flange Adapter Flange Series joins valves, fittings and equipment with integral flanged ends to plain end pipe, without the need of pipe end preparation. Absolutely no threading, welding, or growing is necessary.

Designed out of necessity, the Uni-Flange Adapter Flange

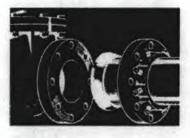
Designed out of necessity, the Uni-Flange Adapter Flange Series virtually eliminates the problems inherent with pre-fabricated, pre-engineered pipe. Numerous delays caused by inaccurate dimensional details and the dependence on off-site suppliers is no longer a major concern when the Uni-Flange Adapter Series is utilized with water, wastewater and sewage nining systems.

piping systems.

The working principle of the Uni-Flange Adapter Flange is relatively simple. Slide the flange over plain end pipe and follow it with a standard mechanical joint gasket. When the Uni-Flange Adapter is brought to mate against an existing flange and the flange bolts are tightened, a compression type seal is created against the mating flange and pipe surface. End restraint is provided when the set screws are tightened.

Our confidence in its performance has helped make the Uni-Flange Adapter one of the fastest growing ideas in the piping industry today. It is currently being used by most major Water Authorities and specified by many Consulting Engineers throughout Australia, and has proven, through numerous field trials that it can exceed the capabilities of threaded flanges, welded flanges and flanged coupling adapters.

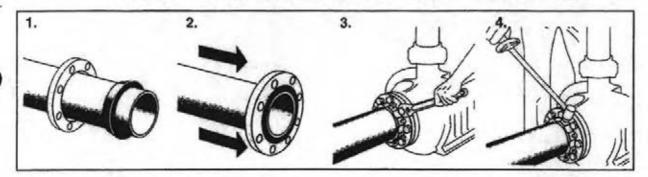
MMBW and Insurance Council of Australia approved, Underwriters Laboratory Listed and Factory Mutual System Approved, the Uni-Flange Adapter Flange is simply the best idea in piping since the flange.



M.L.K. Industries - 33 Forge Road, Mount Evelyn 3796, Victoria, Australia

For further information - Contact:

UNI-FLANGE INSTALLATION INSTRUCTIONS



- Pipe end should be cut square and be free of burrs. Clean the plain end of the pipe. Thoroughly lubricate the pipe and
 gasket with a soap based pipe lubricant. Slide the flange onto the pipe with the gasket cavity facing the end of the pipe.
 Slide the lubricated gasket over the pipe end, with the tapered end facing the gasket cavity in the flange. (No other gasket
 is necessary or should be used to seal the flange faces.)
- Slide the flange forward until the gasket is evenly seated in the flange cavity, and the Uni-flange face is flush with the end of the pipe. (The end of the pipe should butt against the facing flange, it cannot be more than 6mm from the facing flange). Hand tighten the set screws against the pipe surface.
- 3. Using conventional flange bolts, mate the Uni-flange to the standard flange. Be sure to evenly tighten the bolts alternately on opposite sides. (Use the star method like tightening the lug nuts on a car wheel). Do not over-tighten the flange bolts. It is not necessary to bring the Uni-flange Adapter to a face to face contact with the standard flange. A gap of approximately 3mm between the flanges is normal.
- Snug down all the set screws evenly. Tighten in an alternating manner (star method) to the torque values specified. Use of a torque wrench is recommended.

Note: In installations where rapid or excessive surges may occur, or extreme thrusts encountered (e.g. near pumps or 90° bends), Uni-flange engineers recommend the use of tie rods for additional thrust restraint.

THRUST RESTRAINT

DEFLECTION

Nom. Pipe Size (mm)	Set Screw Torque (Nm) K9 Pipe	Set Screw Torque (Nm) K12 /Steel Pipe	Working Pressure Max. (kPa)	Thrust at Working Pressure (Kgs)	Uni-flange Thrust Restraint (Kgs)
50		90	1,600	354	6,000
65		90	1,600	554	6,000
80	70	90	1,600	630	6,000
100	70	90	1,600	1,181	6,000
150	80	110	1,600	2,845	16,000
200	80	110	1,600	5,126	16,000
225	80	120	1,600	6,487	16,000
250	90	120	1,600	8,137	16.000
300	90	120	1,600	12,077	24,000
350		120	1,000	9,071	24,000
375	90	120	1,000	12,057	24,000
400		120	1,000	12,016	33,000
450	120	160	1,000	17,168	33,000
500	120	160	1,000	21,159	44,000
600	120	160	1,000	30,291	44,000

Nom. Pipe Size (mm)	Maximum Angle Deflection	Deflection mm/ Length
50	4° -02°	387
65	3° -56'	377
80	3° -50'	368
100	3° -44'	358
150	3° -36'	345
200	3° -20'	320
225	3° -15'	312
250	3° -13'	308
300	2° -35'	232
350	2° -20'	224
375	2° -10'	208
400	2° -05'	200
450	2° -00'	192
500	1° -56'	185
600	1° -37'	155

Note: Uni-flange thrust restraint figures are based on K12 /Steel Pipe set screw torques.

MANILLA WHITE DIVIDERS 10 TAB A4



Ref No: 37400 Made in China www.accobrands.com.au BRISBANE CITY COUNCIL Brisbane Water

PATRICK STATION LANE PUMP

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 12: Transfer and Load Break Switches

Manufacturer:

NHP

Supplier Contact:

MPA Engineering

3/22-24 Strathwyn Street Brendale QLD 4500 07 3881 0722

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 13 of 31

Transfer switches

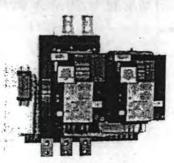


SLine horizontal uneven transfer switches

Rod interlock/horizontal mounting 3/3 pole type, 3/4 pole and 4/4 pole

The versatility and flexibility of the rod interlock mechanism used in uneven transfer switch range enables us to provide the widest array of transfer switches available on the Australian market.

Uneven transfer switches are mounted on a white painted steel base plate, fully wired to terminals and feature two auxiliary contacts as standard per MCCB, a total of four are provided (1 per MCCB is available for customer use). For details refer to NHP.



Interlock 3 pole type

TemPower ACB transfer switches

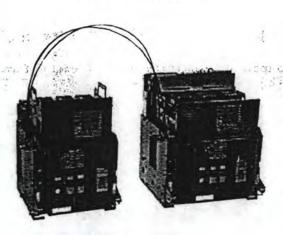
TemPower transfer switches are available in almost any combination of ACB's between AT06A and AH60C (6300 amp) 3 pole and 3 pole/4 pole are possible.

TemPower transfer switches are available in fixed or withdrawable models.

TemPower ACB's are assembled with all mechanical interlock fittings. The interconnecting mechanical interlock rod or wire is assembled and fitted by the customer. Specify length.

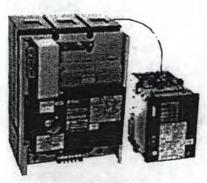
Special models

Featuring 3 way interlocks are available. Please refer to NHP for detailed information.



Moulded case interlocked pairs

The versatility of the cable mechanical interlock fitting allows us to offer almost any combination of MCCB's from 400 ampere to 2500 ampere as an interlock pair.



Interlock 3 pole type

Enclosed transfer switches

Standard features include:

- ☐ IP 55 rated enclosure
- ☐ Common load side busbars
- ☐ Standard 240V control or other voltage on application
- Earth and neutral bars

Optional features:

- Busbar flags for large cable termination
- ☐ Logic Panel



Enclosed BTS

Transfer switches



Standard basic transfer switches

Walking beam interlock 3 pole and 4 pole combination
The standard basic transfer switch comprises two motor operated
circuit breakers mechanically and electrically interlocked for safety.

An additional auxiliary switch for customer use is supplied as standard on each circuit breaker. The complete assembly is mounted on a white painted steel base plate and wired to terminals for simple 3 wire customer connection.

new SE types for selectivity applications

Adj. amp			
rating (A)	415VI/C	мссв	Cat. No.
63-100	18kA	XS125CJ100	BS1C133
80-125	18kA	XS125CJ125	BS1C233
63-100	30kA	XS125NJ100	BS1N133
80-125	30kA	XS125NJ125	BS1N233
63-100	50kA	XH125NJ100	BH1N133
80-125	50kA	XH125NJ125	BH1N233
100-160	35kA	XS250NJ160	BS2N133
160-250	35kA	XS250NJ250	BS2N233
100-160	50kA	XH250NJ160	BH2N133
160-250	50kA	XH250NJ250	BH2N233
160-250	35kA	XS400CJ250	BS4C233
250-400	35kA	XS400CJ400	BS4C433
160-250	50kA	XS400NJ250	BS4N233
250-400	50kA	XS400NJ400	BS4N433
125-250	50kA	XS400SE250	BS4S233
200-400	50kA	XS400SE400	BS4S433
125-250	65kA	XH400SE250	BH4S233
200-400	65kA	XH400SE400	BH4S433
250-400	45kA	XS630CJ400	BS6C433
400-630	45kA	XS630CJ630	BS6C633
250-400	65kA	XS630NJ400	BS6N433
400-630	65kA	XS630NJ630	BS6N633
315-630	50kA	XS630SE630	BS6S633
315-630	65kA	XH630NJ630	BH6N633
500-800	65kA	XS800NJ800	BS8N833
400-800	50kA	XS800SE800	BS8S833
400-800	65kA	XH800SE800	BH8S833
500-1000	65kA	XS1250SE1000	BS12S1033
630-1250	65kA	XS1250SE1250	BS12S1233
800-1600	85kA	XS1600SE1600	BS16S1633
1000-2000	100kA	XS2000NE2000	BS20N2033
1250-2000	100kA	XS2500NE2500	BS25N2533

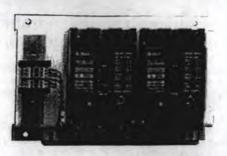
Available combinations: 3P/3P, 3P/4P, 4P/4P and 4P/3P 2)

Notes: Some 4 pole circuit breakers available on indent only.

') For detailed dimensions refer to NHP drawings.

2) Specify combination when ordering.

Manual transfer switches are available on application to NHP.



Manual transfer switch (no motors) 3P/3P combination shown



XMB motor operating mechanism. Motors are standard on basic transfer switches.

Note: All Terasaki MCCB's can be configured into transfer switches. For combinations not listed refer NHP.

MCCB selection

Cascading

Selectivity/discrimination

Product extensions

OCR checker

OCR adjustments

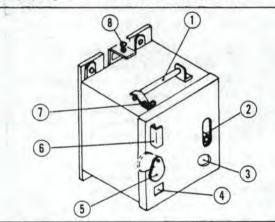
TemCurve

Air circuit breakers

INSTRUCTION OF TYPE XMC SPRING CHARGING MOTOR OPERATOR

he Type XMC Spring Charging Motor Operator uses a combination of an electric motor and a losing spring as mechanical operating power for electrical ON-OFF(RESET) control of a circuit reaker. The ON operation is achieved by a release of the energy stored in the compressed closing pring and transmitting this energy to the breaker handle via the operating mechanism.

he OFF operation is achieved by rotation of the motor, which operates the breaker handle via the tichet mechanism and operating mechanism. Operation of the motor also charges (compresses) the osing spring to make it ready for next operation.



- Manual handle
- (2) Manual handle socket
- (3) Trip button(Red-coloured)
- ④ ON-OFF indicator
- (5) ON button(PUSH TO ON)
- 6 Lock plate
- Wing screw to hold manual handle in place
- ® position adjust screw

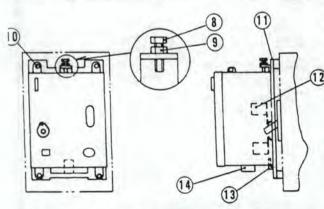
Fig. 1. General view of motor operator.

. MOUNTING AND REMOVAL OF TYPE XMC MOTOR OPERATOR

MC is mounted on breaker in the shipment made.

For applicable 800A and smaller frame breakers, remove the XMC from breaker once (see The Removal Procedure), and install the breaker in a swithboard, then mount the XMC on it (see Mounting Procedure), because it is unable to install the breaker with XMC.

For applicable 1000A and larger frame breakers, install the breaker with XMC.



The screws associat

- (8) Position adjust screw
- (9) Locknut
- Mounting screw, hex head, M5, 4 pcs
- Mounting base
- 12 Handle catch

frame)

- Guide
 (Provided only for applicable breakers of 400A frame and 250A
- (3) Control circuit terminals
- Fig. 2. Mounting (The sketch shows the case of applicable breakers of 400A frame and 250A frame)
- with motor-operator mounting and removal are color-coded RED for pt loosen any other screws.
- DWhen holdin e type xMC motor operator (hereafter referred to e ")

 Q-Pulse Id JM\$1091
 - XMC"), keep Active 10/12/2014

- 2) When the external wiring is connected to the control circuit terminal, remove the external wiring (4).
 For auto reset option, separate the connectors (one from the breaker inside and the other from the XMC control circuit terminals).
- 3) Remove the four mounting serews @ which are color-coded RED.
- 4) Loosen the locknut (9), and turn the position adjust screws (8) counter-clockwise until there develops a gap between the screw end and XMC.
- Pull the XMC straightly toward you. Keep away your fingers from the XMC rear handle catch area, or an accidental release of the charged closing spring may injure your hand.
- 6) Place the XMC with its front surface up on a firm surface, such as on a work bench, hold the XMC firm by one hand, then push the ON button to release the charged closing spring.
- 2 Mounting Procedure (see Fig. 2)
- Put both XMC and breaker to OFF position.
 NOTE: When the breaker cannot be turned OFF due to a built-in undervoltage trip, adjust the position of the XMC handle catch
 as follows:
- Place the XMC so that its rear (which faces the breaker) is visible, and make OFF operation per 1-2 of it II. Operating instructions until the handle catch gap center agrees with the red-arrow marked on the rear (see Fig. 3). Do not forget to complete the OFF operation after XMC has been installed.
- 2) Place the XMC over the breaker so that the handle catch holds the breaker handle between its fingers, and tighten the position adjust screw (a) until the four corner mounting holes agree with the counterpart holes. In the case of applicable breakers of 400A frame and 225A frame, ensure that the guide (a) enters into the slot in the XMC to hold the XMC.
- 3) With the XMC properly positioned as above, secure the XMC in position by the four mounting screws (i), and tighten the locknut (i) to lock the position adjust screw (ii).
- 4) There are connector-terminated leads coming out from the side of the breaker and from the XMC control terminals for auto reset option, and couple them together.
- 5) With the XMC mounted and secured, perform ON-OFF operations and tripping operation 2 or 3 times respectively to insure normal functioning. When the breaker has an undervoltage trip (UVT) built in, apply the rated voltage to the UVT before attempting ON-OFF operations and tripping operations.

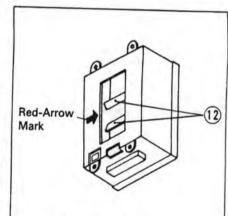
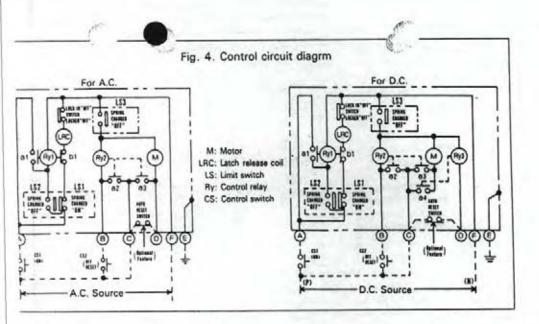


Fig. 3. Back view (The sketch shows the case of applicable breakers of 400A frame and 250A frame)



ock-in-OFF Feature

C may be padlocked in OFF position. Put XMC in OFF position, pull out the lock plate(6), pass shackle of a padlock through the slot in the lock plate, and lock the padlock. Under this idition, no ON operation is possible either manually or electrically.

o push the lock plate back into home, lift it a little nd disengage it from the XMC front cover.

he lock plate cannot be pulled out when XMC is in IN position.

he lock plate can accept up to three padlocks. See ig. 5 for acceptable shackle diameter.

Cautionary Information

Supply the control power voltage within an acceptable operating voltage range for electrical operations. The acceptable operating voltage range is 85 to 110% of the nameplate voltage if AC, and 75 to 110% if DC.

The dielectric withstand voltage of XMC is 1500V AC for one minute between the control circuit terminals together terminal E. (500V AC for one

Fig. 5. Padlocking XMC in OFF position minute for 24V DC use) The ON-OFF indicator shows the ON and OFF positions of XMC, and does not directly indicate the ON or OFF condition of the breaker. For example, the indicator will continue to show ON

even if the breaker is tripped When the breaker is tripped by its long time delay element, it takes several minutes for the element(thermal-magnetic trip) to return to its normal position. (This time length varies dependng on the breaker rated current and the magnitude of overcurrent.) Allow 5 to 10 minutes when

attempting an ON operation after tripping.



Manual Operations (see Fig. 1)

1-1 ON Operation

The closing spring is charged when the XMC is in OFF position (XMC ON-OFF indicator shows

Pushing the ON button (PUSH TO ON) mechanically releases the charged closing spring, which, in turn, closes the breaker.

NOTE: The ON button is provided with a clear cover to prevent the accidental operation. To push it, loosen the fixing screw and open the cover.

1-2 OFF Operation (Spring Charging)

The manual handle for OFF operation is stored on top of the XMC and held in place by the wing screw. Loosen the wing screw (2) and remove the manual handle (1), then set it into the manual handle socket (2). Pumping this handle (up and down strokes) about 30 cycles turns OFF the breaker and, at the same time, charges the closing spring.

NOTE: Be sure to return the manual handle to its storage position and secure it in place by the wing screw after use.

Completion of Spring Charging and OFF indication

An additional manual-handle pumping of several cycles is necessary to completely charge the closing spring after the breaker is actually turned OFF.

By handle pumping for OFF operation, the lettering "OFF" in the ON-OFF indicator window moves up past its normal position and then returns to the normal position. After confirming this, give additional pumping of 2 or 3 cycles to completely charge the closing spring.

XMC, when in OFF position, keeps the breaker handle in its RESET position.

1-3 RESET Operation

Perform the OFF operation to reset the tripped breaker.

1-4 Emergency OFF (TRIP) Operation

To manually turn OFF the breaker in urgency or emergency, press the trip button (red-coloured)

[2] Electrical Operations (see Control circuit For A.C. in Fig. 4)

2-1 ON Operation

In OFF position (ON-OFF indicator shows OFF), the closing spring is charged. Closing the ON control switch (CS1) energizes the latch release coil (LRC), which, in turn, release the closing spring.

This turns ON the breaker via the breaker-handle operating mechanism.

When the spring is released, the limit switch (LS1) opens to de-energize the LRC.

2-2 OFF Operation (Spring Charging)

Closing the OFF/RESET control switch (CS2) energizes the control relay (Ry2), which self-seals and energizes the motor (M). The motor turns OFF the breaker as well as charging the closing spring. When the spring is completely charged, the limit switch (LS3) opens to de-energize both M and Ry2.

2-3 RESET Operations

To reset the tripped breaker, close the OFF/RESET control switch (CS2).

Operation is the same as in OFF operation



FOMER: M.P.A ELGRIU PROJECT:
WC K ORDER No: 711278 SECTION: Date: 17914 Date: 17914
 VERIFICATION OF OPTIONS AND SETTINGS. Tick or Fill In Rating and/or Setting of Option fitted.
LEFT HAND MCCB MCCB SERIAL No:
RIGHT HAND MCCB MOTOR OPERATOR SERIAL No: C4109 o. of POLES: 3 SETTINGS:- THERMAL 630 MAGNETIC SUD ELECTRONIC Settings:- In II T1 Iz T2 Izt Off/On IP TP IG TG I3 MCCB CATALOGUE TYPE:- XS 630NT 630 30
MANUAL TRANSFER SWITCH OPTIONS 1. Alarm Switches 2. Auxiliary Contacts 3. Common Load Side Bus bars 4. Variable Depth Handles (XFHA Type) 5. Breaker Mounted Handles (XFG Type) 6. Other Tick Item Checked Oty/MCCB □ Oty/MCCB □ Oty/MCCB □ Oty/MCCB □ Other
(BASIC TRANSFER SWITCH) OPTIONS 1. Alarm Switches 2. Additional Auxiliary Contacts (1 Standard) 3. Common Load Side Bus bars (4) Special Control Voltage 5. Status Indicator Lights (supplied loose) 6. Other Tick Item Checked Oty/MCCB Oty/MCCB Oty/MCCB DECV SO Hz.
ENCLOSED TRANSFER SWITCH Equipment mounted in Enclosure Type: Confirm any Special Requirements:
2. FUNCTIONAL TESTS
MANUAL TRANSFER SWITCH
Check manual operation of each Circuit Breaker. Check operation of each accessory fitted to Circuit Breaker. Check Mechanical Interlock by attempting to close Circuit Breaker while opposite is closed.

FUNCTIONAL TESTS cont;		- 40
Check Electric operation of each Circuit Breaker. Check operation of each accessory fitted to Circuit Check Electrical Interlocking by attempting to eloc Check Mechanical Interlock by attempting to eloc	se Circuit Breaker while opposite is closed.	
3. DIELECTRIC TEST		marin dina
Test Voltage - 2000V AC between all Terminals	as follows for 1 second: Terminal to Terminal. Terminal to Earth. Left MCCB to Right MCCB.	D C C C C C C C C C C C C C C C C C C C
TESTED BY:-	DATE: 17/	9,4

Form No. 10001 Issue 04\04

Strömberg

Switchline load-break switches Type OETL



Refer Catalogue SG

FLEXIBLE OPTIONS -INBOARD OR OUTBOARD SHAFT LOACATIONS

OETL					
400 A	630 A	800 A			

OETL 400...800: Includes handle OHB125N12 and shaft OXP12X166



OETL 400 D1 OETL 630 K3 OETL 800 K3 (Outboard model)



OETL 400 KV12 OETL 630 KV12 OETL 800 KV12 (Inboard model)



OETL 400 KV22 OETL 630 KV22 OETL 800 KV22 (Inboard model)

3 Pole Inboard shaft	Cat. No.	OETL 400 KV12	OETL 630 KV12	OETL 800 KV12
3 Pole Outboard shaft	Cat. No.	OETL 400 D1	OETL 630 K3	OETL 800 K3
4 Pole Inboard shaft	Cat. No.	OETL 400 KV22	OETL 630KV22	OETL 800 KV22
4 Pole Outboard shaft	Cat. No.	OETL 400 D4	OETL 630 K4	OETL 800 K4

Technical information

Rated thermal c	urrent and	In ope	n air A	500	630	800
rated oper. curre	ent AC 20/DO	20 In enc	losure A	500	630	720
Rated operationa	current/pow	er for typical	kW	200	315	355
motor loads-	415 V, AC	23	A	500	630	720
Rated operation	al 415 V, AC	22	Α	500	630	800
currents	415 V, AC	21	Α	500	630	800
Rated short circu	uit current, 50	00 V	kA	100	100	100
with back-up fus	es of size: 2)		Α	500	800	800
Short circuit make	ing capacity,	peak value	kA	65	80	80
Short time withst	and 0.2 s	ec	kA	31 ³)	38	38
current, r.m.s	1.0 s	ec	kA	17	17	17
	DC23, up	to 48 V	kA	400/1	630/1	800/1
	(Inductive	110 V	A	400/2	630/2	800/2
Later of	loads)	220 V	A	400/2	630/2	630/2
Rated	DC22, up	to 48 V	A	400/1	630/1	800/1
operational	(Mixed	110 V	Α	400/2	630/2	800/2
current/poles in	loads)	220 V	A	400/2	630/2	800/2
series	DC21, up	to 48 V	A	400/1	630/1	800/1
	(Resistive	110 V	A	400/2	630/2	800/2
	loads)	220 V	A	400/2	630/2	800/2
Outline dims	Н	1-1	mm	205/205	223/223	223/223
3P/4P	W ')	1 1 1-3	mm	216/262 (228/274)	248/310 (260/330)	264/334 (260/330)
(Outboard shaft)	D		mm	130/130	130/130	130/130
Max. with longer	shaft D		mm	580	580	580

Notes: ') Width dimensions in () relate to "Inboard shaft" styles eg. OETL 400 KV12.

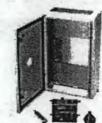
- ²) IEC 269.
- 3) kA/0.25s.



Standard steel enclosed 'self assembly' version



Midline steel enclosed 'custom made' version

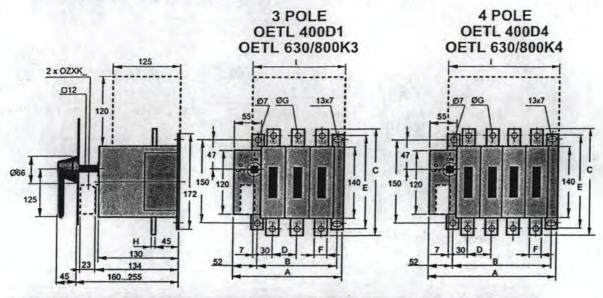


Eclipse 'self assembly' steel enclosed version

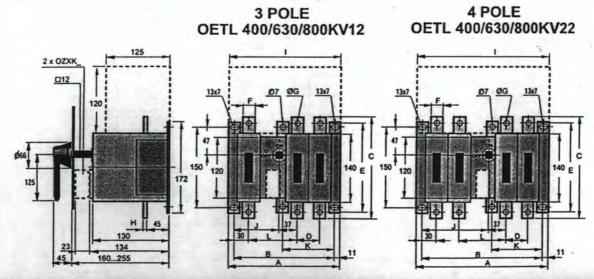
Strömberg Switchline

NHP

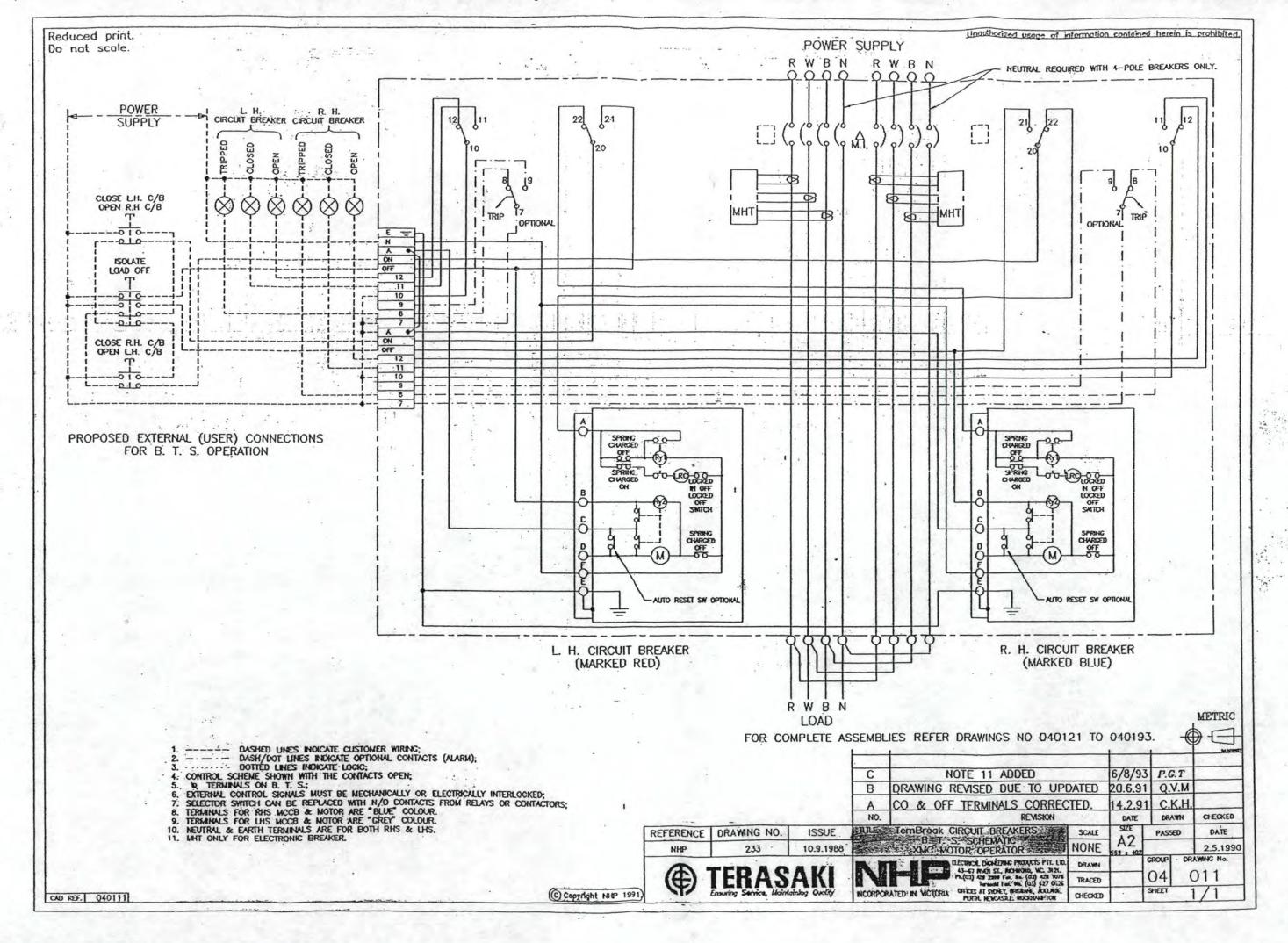
Load-break switches OETL 400...800A – Front operated Dimensional drawings (mm)



Switch type	No. of poles	A	В	C	D	E	F	G	H	1
OETL 400D1	3	216	153	205	216	180	25	11	4	175
OETL 400D4	4	262	199	205	262	180	25	11	4	175
OETL 630K3	3	248	185	223	248	185	40	13.5	5	20
OETL 630K4	4	310	247	223	310	185	40	13.5	5	269
OETL 800K3	3	264	201	223	264	185	40	13.5	5	223
OETL 800K4	4	334	271	223	334	185	40	13.5	5	293



Switch type	No. of poles	A	В	C	D	E	F	G	H	1	J	K	L
OETL 400KV12	3 .	228	206	205	46	180	25	11	4	228	94	104	101
OETL 400KV22	4	274	252	205	46	180	. 25	11	4	274	140	104	101
OETL 630KV12	3	260	238	223	70	185	40	13.5	5	260	102	128	109
OETL 630KV22	4	330	308	223	70	185	40	13.5	5	330	172	128	109
OETL 800KV12	3	260	238	223	70	185	40	13.5	5	260	102	128	109
OETL 800KV22	4	330	308	223	70	185	40	13.5	5	330	172	128	109



APPENDIX 13 Pg ge 263 of 38

Q-Pulse Id TM\$1091

BRISBANE CITY COUNCIL Brisbane Water PATRICK LANE PUMP

STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 13: MCCB's

Manufacturer: Supplier Contact:

NHP

MPA Engineering

3/22-24 Strathwyn Street Brendale QLD 4500

07 3881 0722

SP306-O&M MANUAL

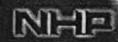
Rev: A

Date: 29 Nov 05

Page: 14 of 31



TemBreak MCCB's



XS125 series

- ☐ Adjustment range 63 100% of nominal current rating.
- □ Standards AS 2184/AS 3947-2.
- Adjustable thermal and fixed magnetic trip.
- ☐ Max. voltage (INSUL) 690V.



XS125CJ (18kA) 3 pole

Ampere rating	Min	Max	Cat. No.
20	12.5	20	XS125CJ 20 3
32	20	32	XS125CJ 32 3
50	32	50	XS125CJ 50 3
63	40	63	XS125CJ 63 3
100	63	100	XS125CJ 100 3
125	80	125	XS125CJ 125 3
125	Non-Auto (1.8	kA for 1sec)	XS125NN 3 ²) ⁴) -

XS125NJ (30kA) 2 pole

Ampere rating	Min	Max	Cat. No.
20	12.5	20	XS125NJ 20 2
32	20	32	XS125NJ 32 2
50	32	50	XS125NJ 50 2
63	40	63	XS125NJ 63 2
100	63	100	XS125NJ 100 2
125	80	125	XS125NJ 125 2

XS125NJ (30kA) 3 pole

	to the same of the		
20	12.5	20	XS125NJ 20 3
32	20	32	XS125NJ 32 3
50	32	50	XS125NJ 50 3
63	40	63	XS125NJ 63 3
100	63	100	XS125NJ 100 3
125	80	125	XS125NJ 125 3

XS125NJ (30kA) 4 pole

			at the second se
20	12.5	20	XS125NJ 20 4
32	20	32	XS125NJ 32 4
50	32	50 .	XS125NJ 50 4
63	40	63	XS125NJ 63 4
100	63	100	XS125NJ 100 4
125	80	125	XS125NJ 125 4

Notes: 1)

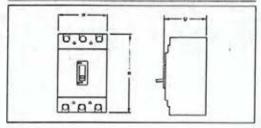
- MCCB's only.

 Load-break isolating switch only-no overload or short circuit protection.
- Poles in series.
- Short time rating. Refer rating chart for technical details.

2 pole models use a 3 pole body with centre pole disabled. Special generator protection MCCB's available – low instantaneous magnetic setting.

Dimensions (mm)

Description		Height	Width	Depth	kg
XS125CJ	3 pole	155	90	86	1.3
XS125NJ	2 pole	155	90	86	1.3
XS125NJ	3 pole	155	90	86	1.3
XS125NJ	4 pole	155	120	86	1.58



Short circuit capacity

I/C	Voltage
18 kA (AS2184)	415V 50Hz
30 kA (AS2184)	415V 50Hz
I/C ³)	Voltage
10 kA	250V DC
15 kA	250V DC
	18 kA (AS2184) 30 kA (AS2184) I/C ³) 10 kA

Refer this section for ratings to AS 3947-2 and AS 2184, and lcs/lcu.

Chassis (TemWay, MHC, UHC)	
Panelboards (TPX)	SUF
TemCurve	

Base standards
IEC 947-2
BS EN 60947 Part 2
VDE 0660 Part 1
AS 3947-2/Australia
AS 2184-1990/Australia 1)
NEMA USA
ANSI C37, 13/USA
JIS C 8372/JAPAN
JEC 160/JAPAN

Approvals
ASTA/UK, Aust. standards
Marine
NK/JAPAN
LR/UK
AB/USA
GUGERMANY
BV/FRANCE
DNV NORWAY

MCCB Technical data

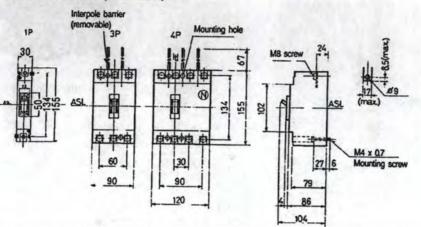


TemBreak XS125CS, CJ, NS, NJ, XH125NJ, TL30F MCCBs

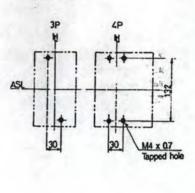
Outline dimensions (mm)

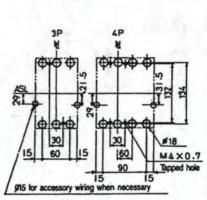
ASL: Arrangement Standard Line ել: Handle frame centre line

Front connected (standard)



Note: XS125NS 1 pole only Drilling plan



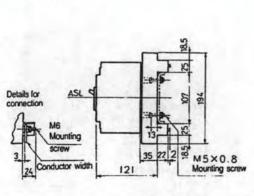


Drilling plan

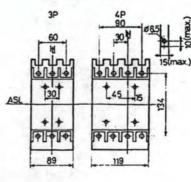
Panel mount

Panel cut out dimensions shown give an allowance of 1.0mm around the handle escutcheon.

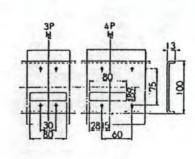
Plug-in (optional)



Mounting block



Drilling plan



MCCB Technical data

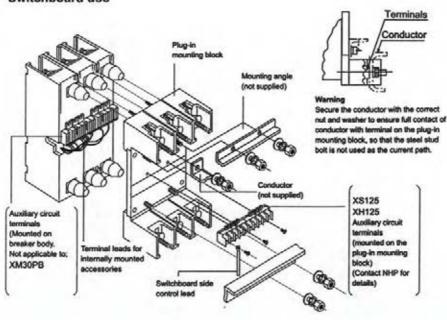


Types of connections and mountings

MCCB accessories

Plug-in Type

Switchboard use



Types of plug-in mounting blocks for switchboard use

Series	Breaker	Pole	Туре
XS	XS125CJ	2, 3, 1 4	XDM2
	XS125NJ		
	XE225NC	3, 🗓 4	XDM3
	XS250NJ		
	XS400	3, 🛮 4	XDM4
	XS630	3, 🛘 4	XDM6
	XS800	3, 🗓 4	XDM6
	XS1250	3, 14	□ XDM8
хн	XH125	3, 114	XDM2
	XH160PJ	3, 114	XDM3
	XH250PJ	3, 14	XDM4
	XH250NJ	3, 114	XDM4
	XH400	3, 🗓 4	■ XDM6
	XH630	3, 4	II XDM6
	XH800	3	TDM-1DR
ΧM	XM30PB		

XM XM30PB

IP 20 degree of protection and safety trip ') are available for plug-in type breakers, for switchboard and distribution board use.

Plug-in type

Degree of protection ☐
The degree of protection provided by the mounting blocks for plug in type TemBreak is IP 20 as defined in IEC Pub 529

Standard Safety Trip (Trip first plug-in mechanism) indent.

The breaker will trip automatically if it is withdrawn while still in the "ON" position. It is not possible to "plug-in' the breaker when it is in the "ON" position.

Application table (up to 100A frame)

Breaker	IP cover code	Pole	Qty Req.
XS125	IP 20	2, 3P	1=2
XH125			

Note: ii') Available on indent only.

MCCB Technical data

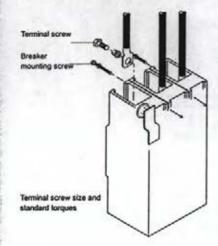


MCCB accessories

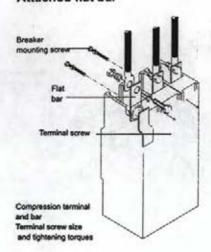
Connections and mountings

Front-connection type (FC)

Compression terminals



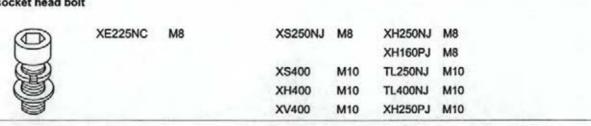
Attached flat bar



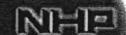
Types of terminal screws (Compression terminal and bar)

	Breakers and screw size XE series (Economical)	XS series (Standard		XH series (High-faul		XM series (Motor pr	
Pan headed screw						61.8 mm 2 m 2 m 2	
(23)		XS125CJ	M8	XH125NJ	M8	XM30PB	M5
		XS125NJ	M8	XH125PJ	M8		

Hex socket head bolt



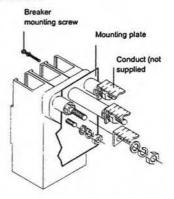
MCCB Technical data



Connections and mountings

Rear-connection type (RC)





Applicable breakers

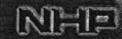
- ☐ XS series

 XS125CJ, XS125NJ

MCCB accessories

Q-Pulse Id TM\$1091 Active 10/12/2014 Page 272 of 380

TemBreak MCCB's



XS250 and XH250 series

- ☐ Adjustment range 63 100% of nominal current rating.
- ☐ Standards AS 2184/AS 3947-2.
- Adjustable thermal, fixed magnetic trip.
- ☐ Max. voltage (INSUL) 690V.

XS250NJ (35kA) 3 pole

Ampere		Y 1	
rating	Min	Max	Cat. No.
160	100	160	XS250NJ 160 3
250	160	250	XS250NJ 250 3
250	Non-Auto (3k/	A for 1sec) 4)	XS250NN 3 ')

XS250NJ (35kA) 4 pole

160	100	160	XS250NJ 160 4
250	160	250	XS250NJ 250 4
250	Non-Auto (3)	(A for 1sec) 4)	XS250NN 4 1)

XH250NJ (50kA) 3 pole

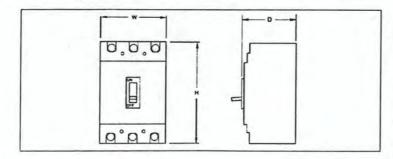
160	100	160	XH250NJ 160 3
250	160	250	XH250NJ 250 3

XH250NJ (50kA) 4 pole

160	100	160	XH250NJ 160 4
250	160	250	XH250NJ 250 4

Dimensions (mm)

Description	on (IIIII)	Height	Width	Depth	kg
XS250NJ	3 pole	165	105	86	1.85
XH250NJ	3 pole	165	105	103	2.1
XS250NJ	4 pole	165	140	86	2.4
XH250NJ	4 pole	165	140	103	2.6



Notes: ') Isolating switch only - no protection.

- 2) MCCB's only.
- 3) Poles in series.
- ') Short time rating. Refer rating chart for complete technical data. Special low instantaneous magnetic generator protection MCCB's available on request.





Bolt on earth leakage module ELB 250

Short circuit capacity

Model	I/C	Voltage		
XS250NJ	35 kA (AS 2184)	415V 50Hz		
XH250NJ	50 kA	415V 50Hz		
DC use	I/C 3)	Voltage		
XS250NJ	40 kA	250V DC		
XH250NJ	40 kA	250V DC		

Refer this section for ratings to AS 3947-2 and AS 2184, and Ics/Icu.

Product extensions

Chassis (TemWay, MHC, UHC)	
TemCurve	
Residual current relays	

Base standards

JEC 160/JAPAN

IEC 947-2
BS EN 60947 Part 2
VDE 0660 Part 1
AS 3947-2/Australia
AS 2184-1990/Australia ²
NEMA USA
ANSI C37. 13/USA
JIS C 8372/JAPAN

.......

Approvals	
ASTA/UK, AL	ıst. standards
Marine	
NK/JAPAN	
LR/UK	
AB/USA	
GL/GERMAN	1Y
BV/FRANCE	
DNV NORW	AY
DITT HOILW	

MCCB Technical data

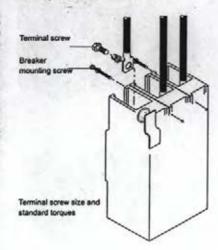


Connections and mountings

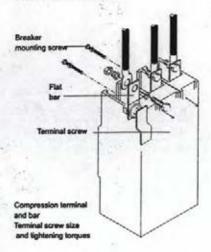
MCCB accessories

Front-connection type (FC)

Compression terminals



Attached flat bar

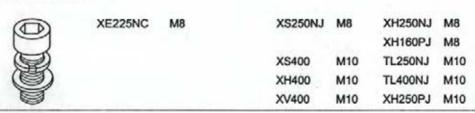


Types of terminal screws (Compression terminal and bar)

Break	cers	and	screw	size

	XE series (Economical)	XS series (Standard		XH series (High-faul		XM series (Motor pr	The arms to severe ext
Pan headed screw							
(F)		XS125CJ	M8	XH125NJ	М8	XM30PB	M5
		XS125NJ	M8	XH125PJ	М8		

Hex socket head bolt



TERASAKI

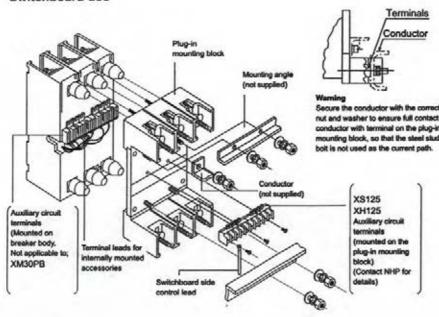
MCCB Technical data



Types of connections and mountings Plug-in Type

MCCB accessories

Switchboard use



Types of plug-in mounting blocks for switchboard use

Series	Breaker	Pole	Туре
xs	XS125CJ	2, 3, 1 4	XDM2
	XS125NJ		
	XE225NC	3, 🗓 4	XDM3
	XS250NJ		
	XS400	3, [] 4	XDM4
	XS630	3, 14	XDM6
	XS800	3, 🗓 4	XDM6
	XS1250	3, 🛮 4	II XDM8
хн	XH125	3, 114	XDM2
	XH160PJ	3, 14	XDM3
1000	XH250PJ	3, 14	XDM4
	XH250NJ	3, 114	XDM4
	XH400	3, 114	I XDM6
	XH630	3, 4	II XDM6
	XH800	3	TDM-1DR
XM	XM30PB		

IP 20 degree of protection and safety trip ') are available for plug-in type breakers, for switchboard and distribution board use.

Plug-in type

Degree of protection ☐
The degree of protection provided by the mounting blocks for plug in type TemBreak is IP 20 as defined in IEC Pub 529

Standard Safety Trip (Trip first plug-in mechanism) indent.

☐ The breaker will trip automatically if it is withdrawn while still in the "ON" position. It is not possible to "plug-in' the breaker when it is in the "ON" position.

dication table (up to 100A fr

Breaker	IP cover code	Pole	Qty Req.
XS125	IP 20	2, 3P	1=2
XH125			

1) Available on indent only. Note:

MCCB Technical data



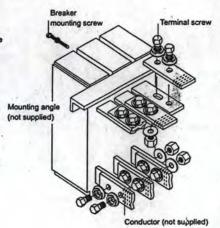
Connections and mountings A Connections and mountings Rear-connection type (RC)

Vertical

Bolt stud Horizontal (standard)

Can be changed by the use

Flat bar stud



Applicable breakers

- ☐ XE series XE225NC
- ☐ XS series XS250, XS400 XS630, XS800.

- ☐ XH series XH160, XH250, XH400, XH630, XH800.
- □ XM series XM30PB.

Applicable breakers

Horizontal ') XS1250, XV1250NE

Vertical XS1600, XS2000NE XS2500NE.

Notes: The arrangement of the flat bar can be made by the user. If not specified the horizontal arrangement will be supplied.

1) Vertical arrangement also available on request, contact NHP for details.

Page 276 of 380



MCCB Technical data

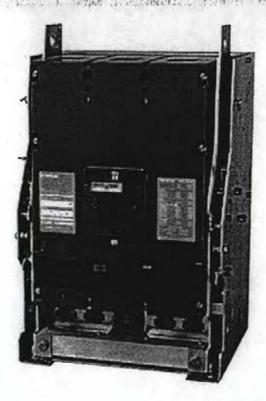


Types of connections and mountings

Draw-out type (DO indent)

Two-position type
Applicable breakers

- ☐ XS series XS400, XS630, XS800, XS1250.
- ☐ XH series XH160, XH250, XH400, XH630, XH800.
- ☐ The plug-in type breaker is housed in the draw-out cradle.
- ☐ The draw out cradle has two positions "connected" and "isolated".
- The auxiliary circuits are automatically connected or isolated by the auxiliary circuit terminals on the plug-in breaker.
- Manual connector type is available.
- Safety trip (first draw out mechanism),: The breaker will trip automatically if it is drawn out while still in the 'on' position.
- Position keylock in isolated position (optional). Available on request.
- □ IP 20 degree of protection (optional). Available on request.



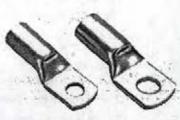
MCCB Technical data



Crimp lugs (compression type)

Nominal	wire	size ((mm²)

	Notitinal wife Size (min)										
Frame (A)	Breaker	1.5	2.5	4	6	10	16	25			
XM30 :	XM30PB	CAL1.5-5	CAL25-5	CAL4-5	CAL6-5	CAL10-5	CAL16-6	2.0			
24		MT2.5 - M5	MT2.5-M5	MT4-M5	MT6-M5	MT10-M5	MT16-M5				
125	XS125CJ		CAL2.5-8	CAL4-8	CAL6-8	CAL10-8	CAL16-8	CAL25-8			
	XS125NJ	MT2.5 - M8	MT2.5-M8	MT4-M8	MT6-M8	MT10-M8	MT16-M8	MT25-M8			
	XH125NJ										
	XH125PJ										
	TL100NJ										
	TL30F										



	1L30F		The same	The same of the same of		and secure	AMERICA TO A	190		52
Frame (A)	Breaker	35	50	70	Nomir 95	nal wire siz 120	te (mm²) 150	185	240	
160	XE225NC	CAL35-8	CAL50-8	CAL70-8	CALB95-8	CALB120-8	CALB150-8	E	CHARLE S	
225	XS250NJ	MT35 - M8	MT50 - M8	MT70 - M8			2			
250	XH250NJ									
	XH160PJ									
400	XS400CJ	CAL35-10	CAL50-10	CAL70-10	CAL95-10	CALB120-10	CALB150-10			
	XS400NJ	MT35 - M10	MT50 -M10	MT70-M10	MT95-M10		**			
	XS400NE									
	XH400NE									
	XV400NE									
	XS400SE									
	XH400SE									
	XH250PJ									
	TL250NJ									
	TL400NJ									
	XH400PJ									
	XH400PE			-1						
630	XS630CJ/NJ	CAL35-12	CAL50-12	CAL70-12	CAL95-12	CAL120-12	CAL150-12	CAL185-12	CAL240-12	CAL300-12
300	XH630NE/SE	MT35 - M12	MT50 - M12	MT70-M12	MT95-M12	MT120 - M12	MT150 - M12	MT185 - M12	MT240 - M12	
	XS630NE/SE									
	XS800NJ/PJ									
	XS800NE/SE									
	C 12-7 (00-7 (00) (00) (00) (00)									

Commercially available compression terminals available from CABAC - Cable Accessories and JST Australia.

Key: CAL = CABAC lugs

XH800NE/SE XH800PE

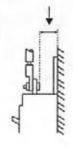
XS1250NE XV1250NE

MT = JST lugs

Connection (one electric cable)

1250

If low clearance occurs use a recommended tape or insulation.

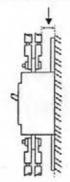


Connection (two electric cables) a recommended tape or

MT70-M12 MT95-M12 MT120-M12 MT150-M12 MT185-M12 MT240-M12

CAL70-12 CAL95-12 CAL120-12 CAL150-12 CAL185-12 CAL240-12 CAL300-12

If low clearance occurs use insulation.



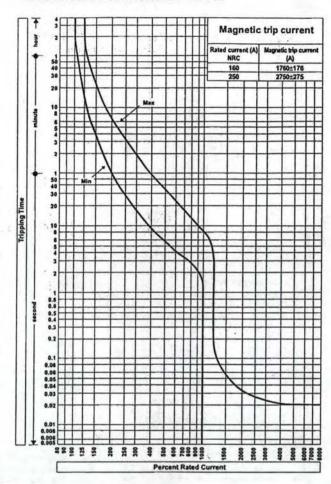
MCCB Technical data



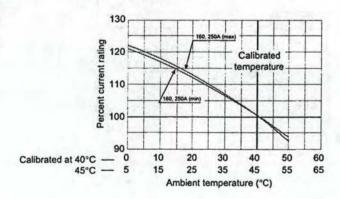
to real surrounding or the street preparation is notified, much

XS250NJ, XH250NJ

Time/current characteristic curves



Ambient compensating curves



MCCB Technical data



TemBreak XS250NJ

Outline dimensions (mm)

ASL: Arrangement Standard Line 년: Handle frame centre line

Preparation of conductor

With terminal bars

Drilling plan

Optional)

Preparation of conductor

Optional)

Preparation of conductor

Optional)

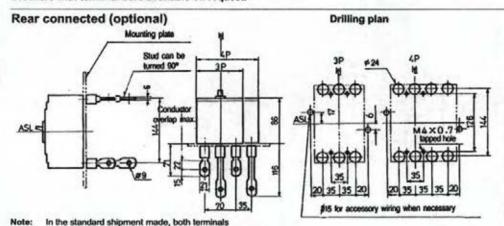
Ask

Optional

Optio

Breakers with terminal bars available on request.

on the line side and the load side are in a horizontal position.



Panel cutout dimensions shown give an allowance of 1.0mm around the handle

escutcheon.

Panel cutout

MCCB Technical data

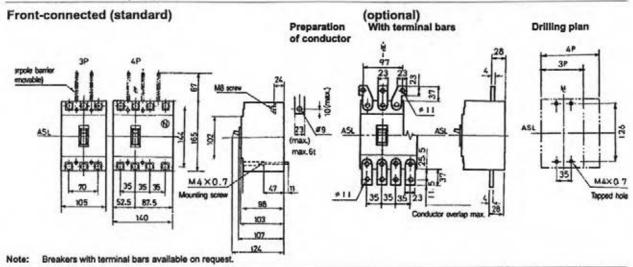


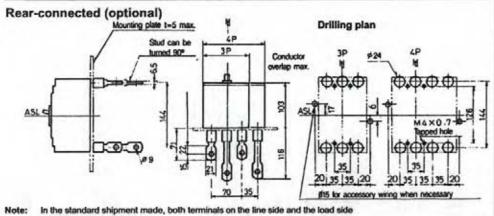
TemBreak XH250NJ

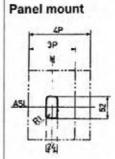
are in a horizontal direction.

Outline dimensions (mm)

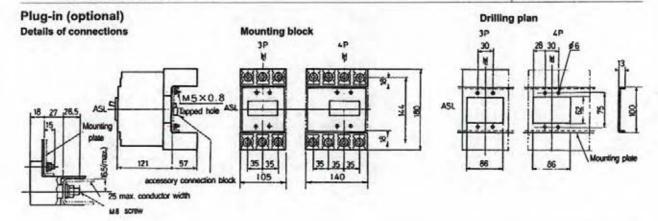
ASL: Arrangement Standard Line II: Handle frame centre line





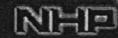


Panel cut out dimensions shown give an allowance of 1.0mm around the handle escutcheon.



Page 282 of 380

TemBreak MCCB's



XS400 series thermal magnetic type

- ☐ Adjustment range 63 100% of nominal current rating.
- ☐ Standards AS 2184/AS 3497-2.
- ☐ Max voltage (Insulation) 690V.
- Adjustable thermal and magnetic trip.



XS400CJ (35kA) 3 pole

Ampere rating	Min	Max	Cat. No.	
250	160	250	XS400CJ 250 3	
400	250	400	XS400CJ 400 3	
400	Non-Auto (5	kA for 0.3sec)	XS400NN 3 1)	

Short circuit capacity

Voltage		
415V 50Hz		
415V 50Hz		
Voltage		
250V DC		
250V DC		

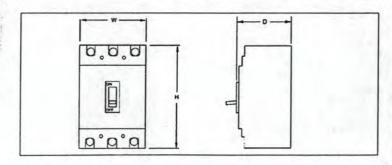
Refer to ratings chart at the front of this section. For ratings to AS 3947-2 and AS 2184, and Ics/Icu.

XS400NJ (50kA) 3 pole

250	160	250	XS400NJ 250 3
400	250	450	XS400NJ 400 3

Dimensions (mm)

Description		Height	Width	Depth	kg	
XS400CJ/NJ	3 pole	260	140	103	4.7	



Product extensions

Chassis (TemWay, MHC, UHC)	
TemCurve	
Residual current relays	

Notes: 1) Load-break isolating switch only - no protection.

2) MCCB's only.

Base standards IEC 947-2 BS EN 60947 Part 2 VDE 0660 Part 1 AS 3947-2/Australia AS 2184-1990/Australia 2) NEMA USA ANSI C37. 13/USA

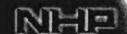
JIS C 8372/JAPAN JEC 160/JAPAN

ASTA/UK, Aust. standa	rds
Marine	
NK/JAPAN	
LR/UK	
AB/USA	
GL/GERMANY	
BV/FRANCE	
DNV NORWAY	_
	_

Approvals

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MCCB Technical data



MCCB accessories

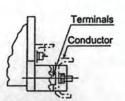
Types of connections and mountings

Plug-in Type

(Mounted on breaker body.

XM30PB

Switchboard use



Warning
Secure the conductor with the correct
nut and washer to ensure full contact of
conductor with terminal on the plug-in
mounting block, so that the steel stud

mounting block, so that the steel bolt is not used as the current part of the steel bolt is not

Types of plug-in mounting blocks for switchboard use

internally mounted

Series	Breaker	Pole	Туре
XS	XS125CJ	2, 3, 🗓 4	XDM2
	XS125NJ		
	XE225NC	3, 🗓 4	XDM3
p	XS250NJ		
	XS400	3, 🗓 4	XDM4
	XS630	3, 🗓 4	XDM6
	XS800	3, 🗓 4	XDM6
	XS1250	3, 🗓 4	i XDM8
XH	XH125	3, 🗓 4	XDM2
	XH160PJ	3, i 4	XDM3
	XH250PJ	3, 🗓 4	XDM4
	XH250NJ	3, 🗓 4	XDM4
	XH400	3, 🗓 4	i XDM6
	XH630	3, 4	ii XDM6
	XH800	3	☐ TDM-1DR
XM	XM30PB		

IP 20 degree of protection and safety trip ') are available for plug-in type breakers, for switchboard and distribution board use.

Plug-in type

Degree of protection
The degree of protection provided by the mounting blocks for plug in type TemBreak is IP 20 as defined in IEC Pub 529

Standard Safety Trip (Trip first plug-in mechanism) indent.

□ The breaker will trip automatically if it is withdrawn while still in the "ON" position. It is not possible to "plug-in' the breaker when it is in the "ON" position.

Application	on table (up to 10	0A frame	2)
Breaker	IP cover code	Pole	Qty Req.
XS125	IP 20	2, 3P	1=2
XH125			

Note: ') Available on indent only.

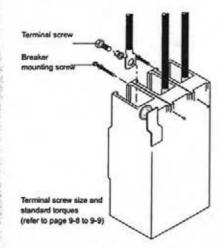
MCCB Technical data



Connections and mountings

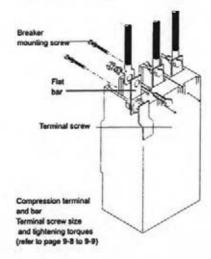
Front-connection type (FC)

Compression terminals



MCCB accessories

Attached flat bar

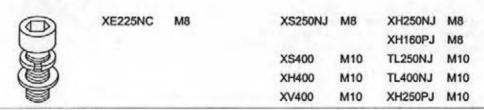


Types of terminal screws (Compression terminal and bar)

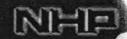
Break	cers	and	scn	ew	size	
-------	------	-----	-----	----	------	--

	XE series XS series (Economical) (Standard)			XH series (High-fault level)		XM series (Motor protection)	
Pan headed screw		17-					
(FA)		XS125CJ	M8	XH125NJ	M8	XM30PB	M5
		XS125NJ	М8	XH125PJ	M8		

Hex socket head bolt



MCCB Technical data



Connections and mountings

Rear-connection type (RC)

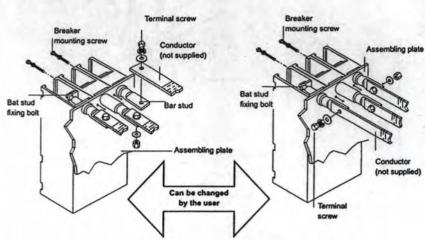
MCCB accessories

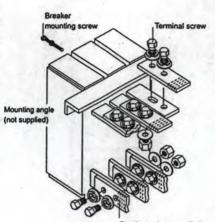
Bolt stud

Horizontal (standard)



Flat bar stud





Applicable breakers

- ☐ XE series XE225NC
- ☐ XS series XS250, XS400 XS630, XS800.

- ☐ XH series XH160, XH250, XH400, XH630, XH800.
- ☐ XM series XM30PB.

Applicable breakers

Horizontal 1) XS1250, XV1250NE

Vertical XS1600, XS2000NE XS2500NE.

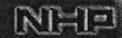
Notes: The arrangement of the flat bar can be made by the user.

If not specified the horizontal arrangement will be supplied.

1) Vertical arrangement also available on request, contact NHP for details.



Application data



Selectivity and Cascading Applications

A higher reliance on electrical supply and safety in commerce and industry has increased awareness in circuit breaker technology and applications. Additionally, while maximising system safety and reliability, efficient economy of overall costs is also of great importance.

The combination of these factors has given rise to more precise methods of circuit breaker application.

Two common terminologies relating to general power backup and system protection are: Selectivity (Discrimination) and Cascading (Back-up). In general terms, Selectivity is used to improve system reliability and to ensure a continuous supply of power to as high a degree as possible. Cascading on the other hand is where an upstream breaker is used to "back-up" a lower specification breaker installed downstream to clear a fault current, and is generally used where economics plays a significant part in system design.

Selectivity (Discrimination)

Previously known as "Discrimination", the most basic form of Selectivity is where two circuit breakers are connected in series. A higher amperage breaker is installed upstream, and a lower amperage breaker downstream. Should an overload or short circuit occur downstream, the downstream breaker will trip, but the upstream breaker will not, hence feeding parts of the system which are fault-free. This is the concept of Selectivity.

Selectivity is generally used, for example in critical applications, feeding essential loads. It is important to ensure total installation power is not lost due to a small or minor fault in a sub part of the overall electrical system, for example in a local distribution board. Total power loss could affect vital systems such as in Hospitals or Computer Centres etc.

The principle of Selectivity (Discrimination) is based upon an analysis of several types of circuit breaker characteristics. These include tripping characteristics (time-current curves), Peak Let Through Current (Ipun) and Energy Let Through (IPT).

Selectivity can be "enhanced" beyond the breaking capacity of the downstream device provided it is backed up by an appropriately selected upstream device, which should not trip (unlatch) under stated conditions.

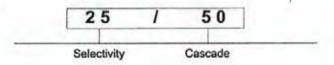
Cascading (Back-up)

Cascading is achieved by using an upstream device to assist (back-up) a downstream device in clearing a fault current that happens to be greater than the breaking capacity of the downstream device.

In Cascading applications, the upstream device may have to trip (unlatch) in order to give sufficient protection to the downstream device, thus interrupting supply of power to all devices downstream. Therefore, Cascading is generally used in applications involving the supply of non-essential loads, such as basic lighting. The main benefit of Cascading is that in certain circumstances circuit breakers with breaking capacities lower than the prospective fault level, and hence lower in cost, can be safely used downstream provided it is backed-up by the relevant upstream breaker.

Cascade / Selectivity Tables

The Selectivity and Cascade tables shown in the following pages are structured as follows.



Selectivity: The Selectivity or Enhanced Selectivity limit of the two nominated devices in series. Up to this

level of fault current the downstream device will trip (unlatch) before the upstream device. Above this level, the upstream may also trip.

Cascade: The enhanced or maximum downstream fault current that can be safely interrupted when both breakers are installed in series. Both

breakers may trip (unlatch).

The Selectivity and Cascade levels stated by NHP are fully compliant with the requirements of the applicable standards. Selection of breakers should be in accordance with the selection tables.

The figures stated in NHP tables are for nominated Terasaki devices only, and should not be used as guidance for using alternative brands of circuit breakers.



Application data



Miniature circuit breakers and fuse fault current limiters co-ordination chart For fault current levels up to 50kA at 415V

Circuit breaker			Maximum t	fuse – amp
Туре	Rating amps	Min. fuse amps ')	BS 88	DIN
Safe-T	6-10	50	160 ²)	160
	16-25	63	200°2)	200
	32	80	200°)	200
	40-50	100	200°2)	200
	63-100	160	200 ²)	200
SRCB	10	50	160	160
yala energia	16-20	63	200	200
Din-T6	2-25	20-63	160	160
	32-63	100	160	160
Din-T10 &	0.5-6	20	200	200
Din-T15	10	25	200	200
	16	35	200	200
	20-32	63	200	200
	40-63	100	200	200
DRCBH	10	25	200	200
(10kA)	16	35	200	200
建设设置的	20-32	63	200	200
Din-T10H	80	160	200	200
	100	200	200	200
	125	250	250	250
Tembreak MCCB's			The state of the s	100
XS125NJ/CJ	16-125	250	400	400

Notes:

- Minimum fuse size is based on grading under overload of one MCB with one set of fuses. Where a single set of fuses protects more than one MCB, the minimum fuse size shall be increased to allow for load biasing effects.
- 2) Maximum fuse size based on testing to AS 3439.1 clause 8.2.3.

Tables based on the following maximum pre-arching I^2t for both BS 88 and DIN fuses: $160A-0.62\times10^5$, $200A-1.2\times10^5$, $250A-2.1\times10^5$. Suitable fuses include NHP, GEC, Siemens and Bovara-Crady.

Fuses with higher current ratings may be used providing I²t values are equal to, or less than the levels above. Semi-conductor fuses have very low I²t values and may suit some applications.

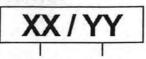
Attention is also drawn to AS 3000 clause 7.10.4.4 regarding the use of fault current limiters in installations containing fire and smoke control equipment, evacuation equipment and lifts.





TemBreak MCCB's and Safe-T/Din-T MCB's - Selectivity and Cascade tables at 415V

Guide



Selectivity C	Selectivity Cascade			Up	stream MC	СВ		XS400SE
Downstream MCB	kA (rms)	XS125CJ 18	XS125NJ 30	XH125NJ 50	XS250NJ 35	XH250NJ 50	XS400CJ 35	XS400NJ 50
Din-T6 (2-25A)	6	18/18	25/25	25/25	25/25	25/25		
Din-T6 (32-63A)	6	18/18	20/25	20/25	25/25	25/25	•	-
Din-T10 (0.5-25A)	10	18/18	25/30	30/50	35/35	35/50	35/35	35/50
Din-T10 (32-63A)	10	18/18	20/25	20/25	25/25	25/25	25/25	25/25
DRCBH (10-25A)	10	18/18	25/30	30/50	35/35	35/50	35/35	35/50
DRCBH (32A)	10	18/18	20/25	20/25	25/25	25/25	25/25	25/25
Din-T10H (80-125A)	10	4/18	4/25	4/25	15/15	15/15	10/10	10/10
Din-T15 (6-16A)	25	18/25	25/30	30/50	35/35	35/50	35/35	35/50
Din-T15 (20A)	20-25 1)	18/20	25/30	30/50	35/35	35/50	35/35	35/50
Din-T15 (32A)	15-25 ')	18/18	25/30	30/50	35/35	35/50	35/35	35/50
Din-T15 (40-63A)	10-12.5 1)	18/18	20/25	20/25	25/25	25/25	25/25	25/25
Safe-T (16-63A)	6	3/10	3/10	3/10		0-11		
SRCB (16-20A)	6	3/10	3/10	3/10		10)		

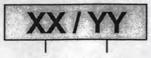
Note: 1) Dependant on the number of poles. Refer to NHP.





TemBreak Plus MCCB's - Selectivity and Cascade tables at 415V

Guid



Selectivity Cascade

Upstream MCCB

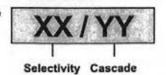
Downstream MCCB	kA (rms)	XS400SE 50	XH400SE 65	XS630SE 50	XH630SE 65	XS800SE 50	XH800SE 65	XS1250SE 65	XS1600SE 85
XS125CJ	18	15/50	15/50	18/30	18/30	18/30	18/30	18/18	18/18
XS125NJ	30	25/50	25/50	30/30	30/30	30/30	30/30	30/30	30/30
XH125NJ	50	35/50	35/65	50/50	50/65	50/50	50/65	50/50	50/50
XH125PJ	50	35/50	35/65	50/50	50/65	50/50	50/65	50/50	50/50
XH160PJ	50	25/50	25/65	50/50	50/65	50/50	50/65	50/50	50/50
XE225NC	18	15/30	15/30	18/30	18/30	18/30	18/30	18/18	18/18
XS250NJ	35	15/50	15/65	35/50	35/65	35/50	35/65	35/35	35/35
XH250NJ	50	25/50	25/65	50/50	50/65	50/50	50/65	50/50	50/50
XH250PJ	65	08.5508		10/50	10/65	25/50	25/65	50/65	50/65
XS400CJ	35	-/50	-/50	10/50	10/65	25/50	25/65	35/42	35/42
XS400NJ	50		-/65	10/50	10/50	25/50	25/65	50/65	50/65
XS400SE	50		-/65	10/50	10/65	25/50	25/65	50/65	50/65
XH400PJ	65			10/50	10/65	25/50	25/65	50/65	50/65
XH400SE	65	7. F		10/50	10/65	25/50	25/65	50/65	50/65
XH400PE	65			10/50	10/65	25/50	25/65	50/65	50/65
XS630CJ	45				-/50	7/50	7/50	30/45	30/45
XS630NJ	65		-			7/50	7/65	30/65	30/85
XS630SE	50				-/65			30/65	30/85
XH630PJ	85				C. 2. 1		dinie die	30/65	30/85
XH630SE	65			- 12-7-74-		Y/5		30/65	30/85
XH630PE	65							30/65	30/85
XS800NJ	65							15/65	20/85
XS800SE	50		- 1			-101	-/65	15/65	20/85
XH800PJ	85	12-11-		2 -				15/65	20/85
XH800SE	65				-	Marie I	5.5	15/65	20/85
XH800PE	65							15/65	20/85
XS1250SE	65		100				11-0	11300	20/65

Application data



Standard TemBreak MCCB's - Selectivity and Cascade tables at 415V

Gulde



Upstream MCCB

Downstream **	2	kA (rms)	XH125NJ 50	XS250NJ 35	XH250NJ 50	XS400CJ 35	XS400NJ 50	XS400NE 50	XH400NE 65
XS125CJ	a down	18	-/50	3/30	3/50	4/35	4/50	6/50	6/50
XS125NJ	- Carrier	30	-/50	3/30	3/50	4/35	4/50	6/50	6/50
XH125NJ		50			100		1/2	6/50	6/65
XE225NC	e-market res	18	-	-/30	-/30	-/30	-/30	6/30	6/30
XS250NJ	254	35	Ship is	1			4/50	6/50	6/65
XH250NJ		50					4/50	6/50	6/65
XS400CJ		35			2 4.		-/50	-/50	-/50
XS400NJ		50	W. C. S. S.						-/65
XS400NE		50	Sec. 2 333						-/65
XH400NE		65			5.0		See See		
XS630CJ		45	W N.	TURNE AV			A East		A 10-11
XS630NJ		65							Proc Trees
XS630NE		50		V. V.		KINE .	NAME OF THE		
XH630NE		65	*						
XS800NJ		65	2 28					TOWN THE	E152)5
XS800NE		50	- 200	Sel full					
XS1250NE	BALLS	65	TO MENTE	THE COUNTY				9113	
XS1600NE	-	100	20.27.780	77.00			m/v . 13	Will will !	

Upstream MCCB

Downstream MCCB	kA (rms)	XS630CJ 45	XS630NJ 65	XS630NE 50	XH630NE 65	XS800NJ 65	XS800NE 50	XH800NE 65
XS125CJ	18	6/30	6/30	14/30	18/30	10/30	14/30	14/30
XS125NJ	30	6/30	6/30	18/30	18/30	10/30	18/30	18/30
XH125NJ	50				P. F. 100	12/65	30/50	
XE225NC	18	6/25	6/30	10/30	10/30	8/30	12/30	12/30
XS250NJ	35	6/45	6/50	10/50	10/65	8/50	12/50	12/65
XH250NJ	50	4.00	- I Park	10/50		10/65	22/50	
XS400CJ	35	6/35	6/50	7.5/50	7.5/65	6/50	10/50	10/65
XS400NJ	50			7,5/50	7.5/65	6/50	10/50	10/65
XS400NE	50			10/50	10/65	6/50	10/50	10/65
XH400NE	65						eva-vis	10/65
XS630CJ	45							
XS630NJ	65	MIN.			- 10			
XS630NE	50	10000		213-37		40	100 A	-100
XH630NE	65		10 to 17			1		-
XS800NJ	65					-	1/4-	No service
XS800NE	50				13/18/11	-		100
XS1250NE	65	200						NO SEC.
XS1600NE	100		6/A 5/2011					

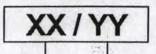
Application data



Standard TemBreak MCCB's - Selectivity and Cascade tables at 415V







Selectivity Cascade

Upstream	

Downstream MCCB	kA (rms)	XH800PJ 85	XS1250NE 65	XS1600NE 100	XS2000NE100	XS2500NE 100
XS125CJ	18	10/30	18/18	18/18	18/18	18/18
XS125NJ	30	10/30	30/30	30/30	30/30	30/30
XH125NJ	÷ 50	12/65	50/50	50/50	50/50	50/50
XE225NC	:å: 18	8/30	18/18	18/18	18/18	18/18
XS250NJ	35	8/65	25/35	35/35	35/35	35/35
XH250NJ	50	10/65	35/50	50/50	50/50	50/50
XS400CJ	35	6/65	20/42	35/42	35/42	35/42
XS400NJ	50	6/65	20/65	35/65	35/65	50/65
XS400NE	50	6/65	20/65	35/65	35/65	50/65
XH400NE	65	A 1 - 1	20/65	35/65	35/65	50/65
XS630CJ	45	-/50	15/45	20/45	35/45	35/45
XS630NJ	65	-/85	15/65	20/85	35/85	35/85
XS630NE	50	-/85	15/65	20/85	35/85	35/85
XH630NE	65	-/85	15/65	20/85	35/85	35/85
XS800NJ	65	-/85	15/65	20/85	35/85	35/85
XS800NE	50	-/85	15/65	20/85	35/85	35/85
XS1250NE	65			20/65	35/65	35/65
XS1600NE	100	-	-	-	-	35/65

Application data



Motor Starting - Introduction

Generally, an item of switchgear is selected on the basis of one or more performance criteria, be it current/power carrying or interrupting capabilities.

Additional consideration is often necessary when several different pieces of switchgear are connected in series, none more so than in motor starting applications. As motors play a significant part in most modern day electrical systems it is important to ensure that the components of switchgear controlling and protecting the motor will interact with each other, or in other words, they are "co-ordinated".

In order to protect and operate a motor several components may be used, each with a different function. A typical set-up is as follows:

Short Circuit

Protective Device (SCPD) is to give protection against short circuits.

Protective Device (SCPD) is to give protection against short circuits.

Commonly used devices are circuit breakers or fuses. Each offer particular benefits and both configurations are commonly used.

The function of the contactor is for circuit control, or in other words for the on-off operations of the motor. As contactors are capable of thousands or even millions of operations they are the most commonly used control devices.

A thermal overload relay will give ideal protection against overloads on the motor, as well as phase-loss protection. Although the SCPD will give overload overload protection, the thermal overload is more closely related to the characteristics of the motor. If a fault is detected the thermal overload relay will open the contactor or control device, thereby isolation supply to the motor.

What problems can occur?

At the instant the motor is supplied with power it draws an "in-rush current" to its terminals, before gradually decaying to a normal operating current.

Should the in-rush current be high, it could be detected by the SCPD and classed as a fault current. If a high in-rush current should occur or even after repeated stop-start (inching) operations of the motor the SCPD may trip, albeit without a fault in the system. This is commonly known as "nuisance tripping" of the SCPD.

Special care must be taken when selecting a SCPD for motor-starting applications to prevent nuisance tripping, and at the same time ensuring adequate protection to the motor and associated cabling.

Another function of the SCPD is to protect the control device (e.g. contactor) from high-current, high-energy faults. Therefore, attention must also be paid when selecting an SCPD-Starter (contactor + thermal overload relay) combination.

When clearing a fault every SCPD has a finite opening time, which will result in an amount of fault current and energy being "let-through" to the downstream system and other devices. At the same time, a control device, such as a contactor can only withstand a finite level of fault current and energy, otherwise internal damage could occur.

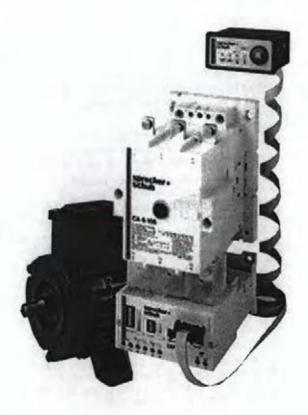
Even at relatively low fault levels the electromagnetic forces created by the fault current can cause the contacts of a contactor to lift. This can cause heating or even mild arcing which in turn can damage or weld the contacts of the

Furthermore, the let-through current of the SCPD can distort the bi-metal strip in the overload relay. This can prevent the restoration of the bi-metal strip to its original configuration on cooling, altering the relay's protection characteristics and resulting in under or over protection of the motor.

What solutions are available to me?

Good component design in association with correct component co-ordination is the only way to ensure reliable protection and operation under abnormal condition.

Terasaki circuit breakers and Sprecher + Schuh starter combinations are tested to provide full and safe co-ordination for most motor starting applications.





Indicate distribution and



Est indianteers : "z

Motor Starting What is co-ordination

The motor starter consists of a combination of contactor, overload relay and Short Circuit Protection Device (SCPD) being either fuses or circuit breakers.

During motor starting and at normal loading, the overload relay protects both the motor and cables by tripping the contactor in a time inversely proportional to the current. However, under short circuit conditions, the response time would be too long and the fuses or circuit breakers must takeover to interrupt the fault current therefore limiting energy passed through the starter components. When this is successfully achieved, the combination is said to be co-ordinated.

It is a requirement of the Australian Standard AS 3947.4.1 that combination motor starters are capable of withstanding the effects of load side short circuits. Some damage to the combination is permitted, but this must be confined and not present a risk to the operator, or damage equipment adjacent to the starter.

Contactors and thermal overload relays only have limited ability to withstand the high current associated with a fault such as an internal motor short. Their design is optimised for performance at much lower currents and to design in the ability to control or withstand high fault levels would add to costs and possibly reduce its performance at normal levels.

The standards

The requirements of several standards can be applied to these combination units. The Wiring Rules, AS 3000, are concerned mainly with setting standards for the fixed wiring. In this regard the concern is the wiring between the protection device and the motor.

As motors can experience short term overloading the current rating of a fuse can be up 4 times and a circuit breaker 2.5 times the full load rating of the motor. The Wiring Rules allow the overload protection and the short circuit protection to be provided by different devices. This allows magnetic only circuit breakers, or back-up type fuses, to be used in conjunction with a contactor/thermal overload relay configuration.

Isolating switches must also be provided in the motor or control circuit. These are to be in clear view of any person working on the motor, or provided with a locking device.

AS 3947.4.1 specifies testing requirements for the combination of components required to perform the motor control and protection functions. If the equipment has been mounted in a switchboard it is possible to meet the testing requirements of AS 3947.2 short circuit withstand of the outgoing circuit at the same time as the tests to AS 3947.4.1 are performed.

Both standards look at the performance of the equipment when a fault occurs on the outgoing circuit. It is accepted in these standards that some damage may be sustained by the components of the starter when subjected to short circuit conditions.

AS 3947.2 requires that during the tests the equipment installed in the switchboard performs in accordance to its own standard. A selection by the customer of the performance required needs to be made, as AS 3947.4.1 allows for Type '1' and Type '2' performance.

Type '1'

Under short circuit conditions the starter shall not cause danger to persons or the installation. The starter itself may need repair.

- Worth the exercise

Type '2'

1204

After a short circuit the starter is suitable for further service. A contact weld is permitted, but it must be easily separated - for example, by a screwdriver, without significant deformation.

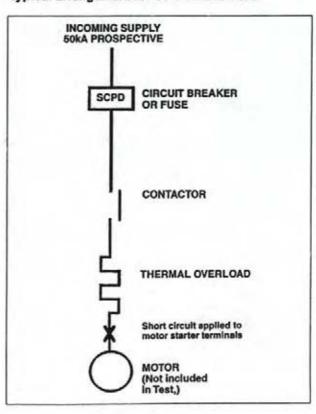
Type '2' co-ordination does not mean the starter is suitable for normal operation without inspection/repair of the contacts. So, in both cases it is important that the condition of the starter is checked, to ensure that the SCPD has operated and that no damage has taken place.

Praconier d

Notes: IEC Standards are the basis of many Australian Standards. AS 3947.4.1 is equivalent to IEC 947.4.1 and AS 3947.2 is equivalent to IEC 947.2.

Both Australian standards list some amendments to the IEC versions.

Typical arrangement for co-ordination test







Motor Starting Protective devices selection

In most cases very little difference will be noticed in the service performance of a system using fuses as against circuit breakers.

The circuit breaker is easier when it comes to restoring power, but as tripping should only be the result of a system fault it is unwise to reclose the circuit breaker without finding the cause. In this regard it is normal for only a "skilled person" to attend to fuse replacement and they are more likely to check for other problems.

As the circuit breaker or fuse is operating in conjunction with separate motor overload protection, it is the contactor which responds to overload problems. This is different to a protective device on a distribution circuit. For this application the advantages of the circuit breakers easy return to service has caused a general trend towards using circuit breakers.

Consideration should be given to preventing unskilled people from reclosing a tripped circuit breaker in a motor control application. This can be done by making the switchboard only accessible to the correct people, or by requiring the switchboard to be opened to reset the circuit breaker.

It must be assumed with both Type '1' and Type '2' co-ordination that if the short circuit protective device has operated there is a fault in the motor, or wiring to it and that the starter itself needs attention.

It is the let-through energy of the protective device which determines the damage to the starter. As this varies greatly between different models, it is essential that only proven combinations are used.

NHP, Sprecher + Schuh and Terasaki have now conducted many tests on different combinations and these are detailed in the co-ordination tables.

Terasaki circuit breakers for short circuit protection

Terasaki circuit breakers have been tested in combination with Sprecher + Schuh contactors and overloads and can be used for Type '1' and Type '2' co-ordination requirements. (Refer to following tables for actual combinations).

TemBreak

A new generation of MCCB's offering a choice of 3 series (economical, standard and high fault) and two types, ie, adjustable thermal magnetic or microprocessor based solid state OCR are available from Terasaki. Both types have common construction features and interchangeable plug-in accessories. TemBreak thermal-magnetic MCCB's offer a wide adjustment range, with 63% to 100% of rated current. Each MCCB is individually calibrated to ensure precision tripping on overcurrent.

TemBreak electronic type

The rated current of the electronic type TemBreak is adjustable in 15 steps from 50% to 100% of the nominal rated current, using the base current (Io) select switch and the pickup current (I1) setting dial.

This is one of the essential features for precise protection co-ordination and for low voltage distribution systems.

TemBreak motor protection circuit breaker

The XM30PB circuit breaker will protect contactor starters with direct connected overcurrent relays with ratings 1 amp to 12 amp in systems with up to 50kA rms prospective short circuit. The protection is due to the special current limiting effect of the XM30PB.

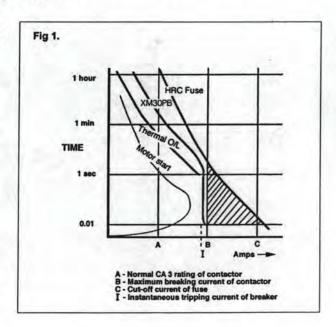
Motor starter protection

The XM30PB circuit breaker has been developed for motor starter protection and is suitable as the Short Circuit Protection Device (SCPD) for motor starters equipped with either direct connected or CT connected overcurrent relays.

XM30PB compared to HRC fuse

The circuit breaker tripping characteristic is more suitable for protection of starters than the HRC fuse. Unlike the HRC fuse, the breaker can be selected to trip instantaneously at a predetermined current level just lower than the maximum breaking current of the starter contactor, thus always protecting the contactor against opening fault currents higher than its capability. This can be seen from the typical breaker and fuse tripping characteristics compared to the contactor breaking capacity in figure 1.

No protection is provided by the fuse when the overcurrent is of value B to C amps should the contactor open by earth fault relay. If the breaker is used as a SCPD then protection is provided for all currents in excess of the instantaneous trip current of the breaker. Also, the circuit breaker can be tripped by earth fault relay and so prevent the risk of contactor damage due to the long delay of the HRC fuse interruption if the fault current is of a value between B and C.



Application data



Type '1' short circuit co-ordination Motor starter co-ordination table for DOL starting 50kA at 415V to AS 3947-41

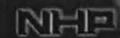


Motor size kW	Approx.	Terasaki circuit breaker	Sprecher + Schuh	Sprecher + Schuh thermal overload relay type ²)	Settings range amps
0.37	1.1	XM30PB/1.4	CA 7-9	CT 7-24	0.16-10
0.55	1.5	XM30PB/2	CA 7-9	CT 7-24	0.16-10
0.75	1.8	XM30PB/2.6	CA 7-9	CT 7-24	0.16-10
1.1	2.6	XM30PB/4.0	CA 7-9	CT 7-24	0.16-10
1.5	3.4	XM30PB/5	CA 7-9	CT 7-24	0.16-10
2.2	4.8 XM30PB/8 CA 7		CA 7-9	CT 7-24	0.16-10
3.0	6.5	XM30PB/10	CA 7-9	CT 7-24	0.16-10
4.0	8.2	XM30PB/12	CA 7-9	CT 7-24	0.16-10
5.5	11	XH125NJ/20	CA 7-12	CT 7-24	0.16-16
7.5	. 14	XH125NJ/20	CA 7-16	CT 7-24	0.16-16
10	19	XH125NJ/32	CA 7-23	CT 7-24	0.16-24
11	21	XH125NJ/32	CA 7-23	CT 7-24	0.16-24
15	28	XH125NJ/50	CA 7-30	CT 7-45	18-30
18.5	34	XH125NJ/50	CA 7-37	CT 7-45	30-45
22	40	XH125NJ/63	CA 7-43	CT 7-45	30-45
30	55	XH125NJ/100	CA 7-60	CT 7-75	18-60
37	66	XH125NJ/100	CA 7-72	CT 7-75	18-75
45	80	XH125NJ/125 ')	CA 7-85	CT 7-100	70-90
55	100	XH125NJ/125 1)	CA 6-105-(EI)	CT 6-110	85-110
75	130	XH250NJ/250	CA 6-140-(EI)	CT 6-150	105-150
90	155	XH250NJ/250 ¹)	CA 6-170-EI	CT 6-200	140-200
110	200	XH250NJ/250 ¹)	CA 6-210-EI	CEF 1-41/42	160-400
132	225	XS400SE/400	CA 6-250-EI	CEF 1-41/42	160-400
160	270	XS400SE/400	CA 6-300-EI	CEF 1-41/42	160-400
200	361	XS400SE/400	CA 6-420-EI/ CA 5-450	CEF 1-41/42	160-400
250	425	XS630SE/630	CA 6-420-EI/ CA 5-450	CEF 1-52	160-630
315	530	XS630SE/630	CA 5-550	CEF 1-52	160-630

Notes: ') Use 'magnetic only' breaker. Refer NHP for details.

²⁾ Thermal or electronic overload relays may be used. Some combinations also achieve Type '2' performance. CA 7 contactor can be replaced with equivalent CA 3 size.

Application data



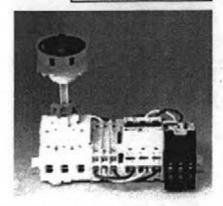
Type '2' short circuit co-ordination Terasaki Din-T at 50kA

The 10kA Din-T miniature circuit breaker gives an amazing 50kA performance when used in the combinations shown in the co-ordination tables. For the low current ratings, the resistance of the thermal overloads assists in reducing the current to a level that the Din-T can handle with ease. For the higher ratings a Sprecher + Schuh limiter block lifts the combined performance to the 50kA level.

All the listed Din-T combinations include a rotary isolator which allows external control. To reset the starter after a short circuit, access to the breaker is required. This can be used to prevent unskilled operators from reclosing the motor starter after a fault.

It should also be remembered that whenever the circuit breaker trips under high fault currents, the contactor must be checked for welded contacts.





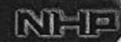
KTA 3 Motor starter combination

Type '2' co-ordination table for Din-T circuit breakers with rotary isolator DOL starting 50kA @ 415V to AS 3947.4.1

Motor size kW	Approx. amps @ 415V	Sprecher + Schuh isolator	Terasaki circuit breaker	Sprecher + Schuh current limiter	Sprecher + Schuh contactor	Schuh thermal overload relay	Thermal overload range
0.37	1.1	LA 3-80	Din-T 10 / 4		CA 7-9	CT 7-24	1-1.6
0.55	1.5	LA 3-80	Din-T 10 / 4		CA 7-9	CT 7-24	1-1.6
0.75	1.8	LA 3-80	Din-T 10 / 4		CA 7-9	CT 7-24	1.6-2.4
1.1	2.6	LA 3-80	Din-T 10 / 6		CA 7-23	CT 7-24	2.4-4
1.5	3.4	LA 3-80	Din-T 10 / 6		CA 7-23	CT 7-24	2.4-4
2.2	4.8	LA 3-80	Din-T 10 / 10	KTL 3-65	CA 7-23	CT 7-24	4-6
3.0	6.5	LA 3-80	Din-T 10 / 16	KTL 3-65	CA 7-23	CT 7-24	6-10
4.0	8.2	LA 3-80	Din-T 10 / 16	KTL 3-65	CA 7-23	CT 7-24	6-10
5.5	11.0	LA 3-80	Din-T 10 / 20	KTL 3-65	CA 7-23	CT 7-24	10-16
7.5	14.0	LA 3-80	Din-T 10 / 32	KTL 3-65	CA 7-30	CT 7-45	10-16
11.0	21.0	LA 3-80	Din-T 10 / 40	KTL 3-65	CA 7-30	CT 7-45	16-24
15.0	28.0	LA 3-100	Din-T 10 / 63	KTL 3-65	CA 7-37	CT 7-45	18-30
18.5	34.0	LA 3-100	Din-T 10 / 63	KTL 3-65	CA 7-37	CT 7-45	30-45

Note: Isolator provides rotary operation for external control. May be deleted if not required.

Application data



Type '2' short circuit co-ordination Motor starter co-ordination table for DOL starting 50kA at 415V to AS 3947-4-1

TYPE 2 50kA

Motor size kW	Approx.	Terasaki circuit breaker	Sprecher + Schuh contactor type	Sprecher + Schuh thermal overload relay type ³)	Settings range amps
0.37	1.1	XM30PB/1.4	CA 7-9	CT 7-24-1.6	1-1.6
0.55	1.5	XM30PB/2	CA 7-9	CT 7-24-1.6	1-1.6
0.75	1.8	XM30PB/2.6	CA 7-9	CT 7-24-2.4	1.6-2.4
1.1	2.6	XM30PB/4.0	CA 7-16	CT 7-24-4	2.4-4
1.5	3.4	XM30PB/5	CA 7-16	CT 7-24-4	2.4-4 =
2.2	4.8	XM30PB/8	CA 7-16	CT 7-24-6	4-6
3	6.5	XM30PB/10	CA 7-30	CT 7-24-10	6-10
4	8.2	XM30PB/12	CA 7-30	CT 7-24-10	6-10
5.5	111	XH125NJ/20	CA 7-30	CT 7-24-16	10-16
7.5	14	XH125NJ/20	CA 7-30	CT 7-24-16	10-16
11	21	XH125NJ/32	CA 7-30	CT 7-24-24	16-24
15	28	XH125NJ/50	CA 7-43	CT 7-45-30	18-30
18.5	34	XH125NJ/50	CA 7-43	CT 7-45-45	30-45
22	40	XH125NJ/63	CA 7-43	CT 7-45-45	30-45
30	55	XH125NJ/100	CA 7-85	CT 7-75 ¹)	45-60
37	66	XH125NJ/100	CA 7-85	CT 7-75 ²)	60-75
45	80	XH125NJ/125	CA 6-105-(EI)	CT 6-90	70-90
55	100	XH125NJ/125 1)	CA 6-105-(EI)	CT 6-110	85-110
75	130	XH250NJ/250	CA 6-140-(EI)	CT 6-150	105-150
90	155	XH250NJ/250	CA 6-170-EI	CT 6-200	140-200
110	200	XH250NJ/250 1)	CA 6-210-EI	CEF 1-41/42	160-400
132	225	XS400SE/400	CA 6-210-EI	CEF 1-41/42	160-400
160	270	XS400SE/400	CA 6-300-EI	CEF 1-41/42	160-400
200	361	XS400SE/400	CA 6-420-EI	CEF 1-41/42	160-400
200	361	XS400SE/400	CA 5-450	CEF 1- 22 ²)	160-400
250	425	XS630SE/630	CA 5-700	CEF 1-52 ²)	160-630
320	538	XS630SE/630	CA 5-700	CEF 1- 52 2)	160-630
		Targeta have an experience between	The state of the s		

Notes:

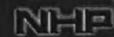
') Use 'magnetic only' breaker or next higher circuit breaker/contactor combination. Refer NHP.

Use with separate mounting bracket.

Thermal or electronic overload relays may be used.

Combinations based on the thermal overload relay tripping before the circuit breaker at overload currents up to the motor locked rotor current.





Type '2' short circuit co-ordination Motor starter co-ordination table for DOL starting 65kA, 415V to AS 3947-4-1



Motor size kW	Approx.	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh overload relay ¹)	Settings range amps
0.37	1.1	XM30PB/1.4	CA 7-9	CEP 7	1.0-2.9
0.55	1.5	XM30PB/2	CA 7-9	CEP 7	1.0-2.9
0.75	1.8	XM30PB/2.6	CA 7-9	CEP 7	1.0-2.9
1.1	2.6	XM30PB/4.0	CA 7-16	CEP 7	1.6-5
1.5	3.4	XM30PB/5	CA 7-16	CEP 7	1.6-5
2.2	4.8	XM30PB/8	CA 7-16	CEP 7	3.7-12
3	6.5	XM30PB/10	CA 7-30	CEP 7	3.7-12
4	8.2	XM30PB/12	CA 7-30	CEP 7	3.7-12
5.5	11	TL30F/20A	CA 7-30	CEP 7	3.7-12
7.5	14	TL30F/30A	CA 7-30	CEP 7	12-32
11	21	TL30F/30A	A CA 7-30 CEP 7		12-32
15	28	TL100NJ/50A	CA 7-43	CEP 7	12-32
18.5	34	TL100NJ/50A	CA 7-43	CEP 7	12-37
22	40	TL100NJ/63A	CA 7-43	CEP 7	14-45
30	55	TL100NJ/100A	CA 7-72	CEP 7	26-85
37	66	TL100NJ/100A	CA 7-72	CEP 7	26-85
45	80	TL100NJ/100A	CA 6-105-(EI)	CT 6-90	70-90
55	100	XH400SE/250	CA 6-105-(EI)	CT 6-110	85-110
75	130	XH400SE/250	CA 6-140-(EI)	CT 6-150	105-150
90	155	XH400SE/250	CA 6-170-EI	CT 6-200	140-200
110	200	XH400SE/250	CA 6-210-EI	CEF 1-41/42	160-400
132	225	XH400SE/400	CA 6-210-EI	CEF 1-41/42	160-400
150	250	XH400SE/400	CA 6-250-EI	CEF 1-41/42	160-400
160	270	XH400SE/400	CA 6-300-EI	CEF 1-41/42	160-400
200	361	XH400SE/400	CA 6-420-EI	CEF 1-41/42	160-400
200	361	XH400SE/400	CA 5-450	CEF 1- 22 2)	160-400
250	425	XH630SE/630	CA 5-700	CEF 1- 52 ²)	160-630
320	538	XH630SE/630	CA 5-700	CEF 1- 52 2)	160-630

Notes:

Combinations based on the overload relay tripping before the circuit breaker at overload currents up to the motor locked rotor current.

^{&#}x27;) Thermal or electronic overload relays may be used.

Use with separate mounting bracket.

Application data



MHE

Type '2' short circuit co-ordination Motor starter co-ordination table for DOL starting 85kA, 415V to AS 3947-4-1 TYPE 2 85kA

Motor size kW	Approx. FLC at 415V amps	Terasaki circuit breaker	Sprecher + Schuh contactor type	Sprecher + Schuh thermal overload type ¹)	Settings range amps
0.37	1.1,	XM30PB/1.4	CA 7-9	CEP 7-M32-2.9-10	1.0-2.9
0.55	1.5	XM30PB/2	CA 7-9	CEP 7-M32-2.9-10	1.0-2.9
0.75	1.8	XM30PB/2.6	CA 7-9	CEP 7-M32-2.9-10	1.0-2.9
1.1	2.6	XM30PB/4	CA 7-16	CEP 7-M32-2.9-10	1.0-2.9
1.5	3.4	XM30PB/5	CA 7-16	CEP 7-M32-5-10	1.6-5
2.2	4.8	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7-12
3	6.5	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7-12
4	8.2	XM30PB/10	CA 7-30	CEP 7-M32-12-10	3.7-12
5.5	- 11	TL100NJ/20	CA 7-30	CEP 7-M32-12-10	3.7-12
7.5	14	TL100NJ/20	CA 7-30	CEP 7-M32-32-10	12-32
9	17	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12-32
10	19	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12-32
11	21	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12-32
15	28	TL100NJ/50	CA 7-43	CEP 7-M32-32-10	12-32
18.5	34	TL100NJ/50	CA 7-43	CEP 7-M37-37-10	12-37
22	40	TL100NJ/63	CA 7-43	CEP 7-M45-45-10	14-45
30	55	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26-85
37	66	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26-85
45	80	TL250NJ/160	CA 6-105	CEP 7-M85-85-10	26-85
55	100	TL250NJ/160	CA 6-105	CEF 1-11/12	0.5-180
75	135	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5-180
90	160	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5-180
110	200	TL250NJ/250	CA 6-210-EI	CEF 1-41/42/52	160-630
132	230	TL400NE/400	CA 6-210-EI	CEF 1-41/42/52	160-630
160	270	TL400NE/400	CA 6-300-EI	CEF 1-41/42/52	160-630
200	361	TL400NE/400	CA 6-420-EI	CEF 1-41/42/52	160-630

Notes: ') Thermal or electronic overload relays may be used.

Combinations based on the overload relay tripping before the circuit breaker at overload currents up to the motor locked rotor current.





Motor circuit application table for DOL starting General applications

High fault range

Motor rating (kW)	Approx. FLC (amps)	Din-T C & D Curve	Safe-T	XS125CJ XS125NJ XH125NJ	XE225NC	XS250NJ XH250NJ	XS400SE XH400SE XS400CJ XS400NJ	XS630CJ	XS800NJ XH800SE XS800SE	
0.37	1.1	4	6		\$210) B					
0.55	1.5	4	6	20						
0.75	1.8	6	6	20						
1.1	2.6	10	6	20						Te de la Constantina
1.5	3.4	10	10	20						
2.2	4.8	16	16	20	$\mathcal{E}_{i,j} \sim \mathcal{E}_{i,j}$. T			
3.0	6.5	20	16	20						
4	8.2	25	20	20						
4.5	9	32	25	20				William.		THE PARTY
5.5	11	32	32	32		9 9	grand mer			
7.5	14	40	40	32						
10	19	50	50	50					New York	
11	21	50	50	50						
15	28	63	63	6 3						1
18.5	34	100 ')	80	100						
22	40	125 ')	100	100					1.0	4535.75
25	46	125 1)	100	100						
30	55	10.75		125		160				10.75
37	66			125 3)	125	160			an year	
45	80	4. L		125 ³)	125	160				
55	100				175	160	250			
75	130				225	250	250			
90	155				Temporities	250	250			Ball Server
110	200						400	400		of the last
132	225						400	400		
160	270						400	400		
185	320						400 ²)	630		
200	361						400 ²)	630		
220	380		10.4					630	800 ²)	
250	430							630	800	
280	480							630 ²)	800	
300	510			- Dr. 17	1. 1. 7.1			630 ²)	800	200
375	650	my Plat							800 ²)	
450	750									1000

Notes: These motor circuit application tables are to be used as a selection guide for average 3 phase, 4 pole 415V motors for standard applications only. The table is based on holding 125% of full load current (FLC) continuously and 600% of FLC for at least 10 seconds. Lower circuit breaker ratings are possible in some applications. Refer NHP.

^{1) 80, 100} and 125 amp refers to Din-T10H type.

²⁾ Type 'SE' TemBreak MCCB only.

³⁾ Use magnetic-only TemBreak MCCB. Refer NHP.

Adjustable magnetic trips set to high. Thermal magnetic TemBreak adjustable 63% – 100% of NRC (nominal rated current). Din-T MCB's are calibrated to IEC 898 Curve 'C' & 'D'. Selected sizes of 'D' Curve are available from stock. Refer NHP.



Motor circuit application table for reduced voltage starting General applications

Breaker type and current rating, star delta, auto transformer resistor or reactance starting

Motor rating (kW)	Approx. FLC (amps)		Safe-T	X8125CJ X8125NJ XH125NJ		XS250NJ	XS400SE XH400SE XS400CJ	XH630SE XS630SE XS630CJ	XS800NJ	XS1250SE 1000
0.37	1.1	4	6	1 Table 1						
0.55	1.5	4	6	20						
0.75	1.8	-4	6	20						Treat.
1.1	2.6	6	6	20				A WAR STORY		
1.5	3.4	10	6	20			ALIVOPPET Y		SECTION S	
2.2	4.8	10	10	20	luda and					100
3.0	6.5	16	16	20		Sales in				
4	8.2	20	16	20		-33-5	PARTY IN		The state of the s	10
4.5	9	20	16	20	建 国4000				Garage Contra	7
5.5	11	25	20	20						
7.5	14	32	25	20						
10	19	40	40	32		-		NAME OF TAXABLE PARTY.		And the Party of t
11	21	50	40	32						
15	28	50	50	50	THE REAL PROPERTY OF THE PERSON NAMED IN		THE REAL PROPERTY.		NOTE OF STREET	
18.5	34	63	63	50					ALC: N	
22	40	80 ')	63	63		A. Price Street, Company		Andrew Control of the		
25	46	100 ')	80	100	22.7		TO E WOULD	NE COM		
30	55	125 ')	100	100		160			THE RESERVE OF THE PARTY.	A CONTRACTOR OF THE PARTY OF TH
37	66	125 ')		100	125	160		un la		
45	80			125	125	160	250		ALL DESCRIPTION OF THE PARTY OF	2010000125V-9110180
55	100			人名西 哈·普	150	160	250	100		
75	130			5 2	175	250	250		-	Name and Address of the Control
90	155			Barrie R	225	250	250		1557	THE THE
110	200				ALC: NO.	250	250	400		
132	225	No.	TO THE R	Name of			400	400	RANGE TO SERVICE	
160	270						400	400	-	
185	320					Management and American Street	400	400	800 ²)	
200	361			- 38			400 ²)	630	800 ²)	
220	380		, No. 1	TOTAL S			The state of	630	800	
250	430							630	800	
280	480				SECURE S	Fareful S	OF STREET, STR	630	800	
300	510						The second second	630	800	
375	650			CONTRACT OF				DE CHEM	-	1000

Notes: These motor circuit application tables are to be used as a selection guide for average 3 phase, 4 pole 415V motors for standard applications only. The table is based on holding 125% FLC continuously and 350% FLC for at least 20 seconds.

1) 80, 100 and 125 amp refers to Din-T10H type.

Type 'SE' TemBreak MCCB only.
TL100NJ up to 100A only.

If co-ordination to IEC 947-4-1 is required refer to Type 1 and 2 co-ordination tables, contact NHP.

Din-T MCB's are calibrated to IEC 898 Curve 'C' & 'D'. Selected sizes of 'D' Curve are available from stock. Refer NHP.





Motor starting table for DOL starting at 1000V AC 50 Hz

Motor size kW	Full load current amperes	мссв	Voltage
0.37-10	0.4-7.5	TL100EM/15	1000V
11.0	9.0	TL100EM/20	1000V
15-18.5	12-14.5	TL100EM/30	1000V
22-33	17-23	TL100EM/40	4: 1000V
37-50	28-38	TL100EM/50	1000V
55-80	40-57	TL100EM/75	1000V
90-110	65-78	TL100EM/100	1000V
150	102	XV400NE/160	1000V
185-220	138-160	XV400NE/250	1000V
220-500	160-350	XV400NE/400	1000V



TemBreak XV400NE mining breaker



Sprecher + Schuh 1000V CA 6 contactor (Refer Part A for more information)

Note: This table should be used as a selection guide for standard applications only.





Motor circuit application table for DOL FIRE PUMP starting duty

Breaker type and current rating (A)

Motor rating (kW)			Ŧ		XS125CJ XS125NJ XH125NJ TL100NJ			XS250NJ C XH250NJ	XH400SE XS400CJ	XH630SE XS630CJ XS630NJ	XH800SE	XS1250SE
0.37	1.1	4	6	3.6						Via 2		
0.55	1.5	6	6	3.6								
0.75	1.8	6	6	5	20	15	1	No or or		A_{i}	\mathcal{F}_{i}	
1.1	2.6	10	6	7.4	20	15						
1.5	3.4	16	10	10	20	15				Selection.		
2.2	4.8	20	16	12	20	15						
3	6.5	25	20	是	20	20						
4	8.2	32	25		32	30						
4.5	9	32	32		32	30		5				
5.5	11	40	40		32	30						
7.5	14	50	50		50	40	We see					
10	19	63	50		50	50						
11	21	63	63		63	60			in the			Silver Co
15	28	100 ')	80		100	75			1 1			
18.5	34	125 ')	100		100	75				- 18c		
22	40				125	75						
25	46				125	100					4	
30	55					100	125	160				
37	66				PARK S		150	160				
45	80						175	250	250			
55	100			(重新化学			225	250	250			
75	130								400			
90	155					7			400			
110	200			1/		79	3		400	630		
132	225								400	630		
160	270					* 1			400	630		
185	320								400 ²)	630		Section 1
200	361									630	800	
220	380					No.	0.			630	800	
250	430									630	800	
280	480						/				800	
300	510									THE REAL PROPERTY.	800	
375	650				196	10					800 ²)	1000
450	750						-		11. 1025			1000

Notes: These motor circuit application tables are to be used as a selection guide for average 3 phase, 4 pole 415V motors for standard applications only. The table is based on holding 125% FLC continuously and 600% FLC for at least 20 seconds.

1) 80, 100 and 125 amp refers to Din-T10H type.

²) Type 'SE' TemBreak MCCB only. ³) TL100NJ up to 100A only.

Din-T MCB's are calibrated to IEC 898 Curve 'C' & 'D'. Selected sizes of 'D' Curve are available from stock refer NHP.

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MCCB use in high frequency (400Hz) applications

General

Terasaki TemBreak MCCB's are designed to operate primarily in 50 or 60Hz systems. However, it is possible to use the same MCCB's in high frequency (400Hz) applications provided consideration is taken to the effects high frequencies will have on the breaker.

A consequence of high frequencies is an increase in Eddy currents in conductors, including those internal to the breakers. This generally causes an increase of temperature in and around the breaker. As such, some derating allowances must be made when selecting a breaker in these 400Hz systems.

Thermal Magnetic MCCB's

In low overload (thermal) regions the current required to trip the MCCB is reduced as a result of the heat generated due to the higher Eddy currents. As a result the thermal protection must be derated to take the heating effect into account.

In short-circuit (magnetic) regions, the demagnetisingeffects of the Eddy currents mean that a larger fault will be required to trip the breaker. The rule of thumb generally used is that the Magnetic/Instantaneous Trip setting will be approximately twice that at normal 50/60 Hz operation.

Electronic MCCB's

Electronic MCCB's offer better performance at higher frequencies, although some consideration must be taken with regards to the heating effects caused by the Eddy currents. The figures in the table give the maximum Over Current Relay (OCR) rated current setting (I₆ x I₁) that should be used when in high frequency applications.

MCCB Model	MCCB Type	Rating at 50/60Hz (A)	Cable size in mm ² as specified IEC 947-1	MCCB rating at 400Hz (A)
XS125CJ	Th/Mag	20	2.5	18
XS125NJ		32	6	30
	100/53/86	50	10	45
		63	16	58
	traction of police	100	35	89
		125	50	110
XH160PJ	Th/Mag	160	70	147
XE225NC	Th/Mag	125	50	116
		150	50	135
		175	70	155
		200	95	185
	Ary - 1	225	95	195
XS250NJ	Th/Mag	160	70	147
		250	120	210
XH250NJ	Th/Mag	160	70	147
		250	120	210
XH250PJ	Th/Mag	250	120	240
XS400NJ	Th/Mag	250	120	240
XH400PJ		400	240	330
XS630CJ	Th/Mag	400	240	320
XS630NJ		630	2 x 185	475
XS800NJ	Th/Mag	800	2 x 240	600
XS400SE	Electronic	250	120	238
XH400NE/SE/PE	Electronic	400	240	360
XS630SE	Electronic	630	2 x 185	600
XH630NE/SE/PE				
XS800SE	Electronic	800	2 x 240	640
XH800NE/SE/PE				
XS1250SE	Electronic	1250	2 x (80 x 5t)	800
XS1600SE	Electronic	1600	2 x (100 x 5t)	900

Note: When used at 400Hz, the rated current setting of the OCR must not exceed the values shown in Column 4.





MCCB's for protection of Power Factor Correction (PFC) units

In circuits containing capacitor banks for Power Factor Correction (PFC) two conditions that the circuit breaker must overcome are as follows:

- Voltage surges during MCCB opening.
- 2. Nuisance tripping due to in-rush current.

Voltage surges during MCCB opening
 At the instant where the MCCB has to open, the voltage developed across its contacts can be up to twice the supply voltage, which can have damaging consequences should the breaker be slow to operate. If this worse case scenario actually occurs a potential re-arcing can take place across the contacts of the MCCB, until the breaker has fully opened and the distance between the contacts is at a maximum.

Re-arcing at each instant can be:

1st re-arcing - 3 x supply voltage
2nd re-arcing - 5 x supply voltage
3rd re-arcing - 7 x supply voltage

Internal capacitor damage will occur if the voltage level is greater than the capacitor's Dielectric Strength. With modern-day protection devices, (for example the Terasaki TemBreak MCCB's) this problem will not occur.

The numerous cases of re-arcing are mainly a result of older style "dependant manual closing" devices, which rely on the operator speed for opening or closing.

All Terasaki MCCB's are of the "manually independent closing" type, with high speed opening to prevent re-arcing between the contacts.

2. Nulsance tripping due to in-rush current When feeding a circuit containing a PFC unit the circuit breaker and the PFC unit can be exposed to a large in-rush current, equal to the instantaneous value of the power source. The end result of this is a large in-rush current, which could cause the circuit breaker to operate instantaneously due to its short-circuit protection. (The value of in-rush current will depend on the source voltage, the inductance and reactance in the circuit).

Special care should be taken to ensure that the MCCB selected will not nuisance trip due to high in-rush currents.

The table below shows typical MCCB selections for varying capacitor ratings, and the breaker selection is by a rule-of-thumb.

Capacitor Rated Current = $\frac{\text{kVAR} \times 1000}{\sqrt{3} \times \text{V}}$ (A)

kVAR: Capacitor Rating V: Source Voltage

MCCB Rating = Capacitor Rated Current x 1.5 (A)

Once the MCCB rating has been determined, the MCCB type should be selected according to the short circuit fault level of the system.

MCCB's selection for power factor capacitor application

	tage 415V (3Ø) Capacitor rated current (A)	Recommended MCCB's ') ³) Type/Rating (A)							
5	7			XS125CJ/20	XS125NJ/20	XH125NJ/20			
10	13.9		STATE OF THE STATE OF	XS125CJ/32	XS125NJ/32	XH125NJ/32			
15	20.9			XS125CJ/50	XS125NJ/50	XH125NJ/50			
20	27.8			XS125CJ/50	XS125NJ/50	XH125NJ/50			
25	34.8			XS125CJ/63	XS125NJ/63	XH125NJ/63			
30	41.7			XS125CJ/100	XS125NJ/100	XH125NJ/100			
40	55.6	3 4 4 4		XS125CJ/100	XS125NJ/100	XH125NJ/100			
50	69.6	1		XS125CJ/125	XS125NJ/125	XS125NJ/125			
75	104	XE225NC/150	XS250NJ/160	XH250NJ/160					
100	139	XE225NC/225	XS250NJ/250	XH250NJ/250	XS400SE/250	XH400SE/250			
150	209		XS400CJ/400	XS400NJ/400	XS400SE/400	XH400SE/400			
200	278		XS400CJ/400	XS400NJ/400	XS400SE/400	XH400SE/400			
300	417		XS630CJ/630	XS630NJ/630	XS630SE/630	XH630SE/630			
400	556	XS800NJ/800	XS800SE/800	XH800SE/800					
500	696	XS1250SE/1250	Time	THE REAL PROPERTY.					
600	835	XS1250SE/1250	40 Marie 18 19 M	Spirate Program					
800	1113	XS1600SE/1600							
1000	1391	XS2000SE/2000	TOPOLS PORTON			APPRINT TO THE			

Note: 1) Select applicable short circuit rating required by system specifications.

3) TemBreak Plus MCCBs can also be used.

Application data



Circuit breaker selection for DC applications

The characteristics of an MCB or MCCB for DC applications are different from AC. The main differences are as follows:

- Maximum permissible voltage is reduced in value (refer table).
- 2. Number of electrical operations is reduced (refer table).
- 3. Magnetic trip current increases by 40%.

Selecting the circuit breaker

When selecting the MCB most suitable for the protection of DC circuits the following criteria must be considered:

- Rated current.
- Rated voltage which determines the number of poles required to be involved in the interruption of the circuit.

- ☐ The type of DC system used.
- Maximum short circuit current to determine the breaking capacity.

As a general rule the Isc (short circuit current at the battery terminals) can be calculated as follows:

Where Vb - maximum discharge battery voltage

Where Ri – internal resistance (sum of all calls resistance) generally expressed in Ampere/hour capacity of the battery.

Terasaki MCB use in DC systems

мсв	Breaking capacity		No. of poles co	No. of operations	Magnetic		
type	kA ')	24/48V	110V DC	125V DC	250V DC	at In	Increase
Din-T6	6	1 pole	2 pole			4000	40%
Din-T10	10	1 pole	2 pole		Charles and	4000	40%
Din-T10H	10	1 pole	2 pole		4 pole	4000	40%
Din-T15	10	1 pole	2 pole			4000	40%
Safe-T	5	18 11 2 2		2 pole			40%

Example: For a Din-T10 to break 10kA at 110V DC it must have 2 poles connected in series.

Breaking capacities of TemBreak MCCB in DC systems

MCCB type	24/48/60V	125V	250V	350V	500V	600V
XS125NJ	25	20	15	10	7.5 2)	5 2)
XH125NJ	50	40	40	10	7.5 ²)	5 ²)
XS250NJ	25	40	40	10	7.5	5
XH250NJ	50	40	40	20	15	10
XS400NJ	50	40	40	20	15	15
XS630NJ	50	40	40	30	20	20
XS800NJ	50	40	40	30	20	20
XS1000ND ')		40	40	30	20	20
XS1250ND ')		40	40	30	20	20
XS1600ND 3)		40	40	30	20	20
XS2000ND *)		40	40	30	20	20
XS2500ND 3)		40	40	30	20	20

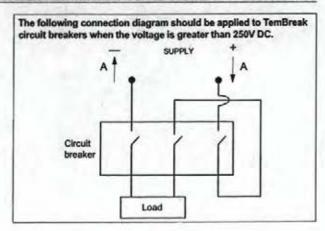
Notes:

- Time constant (L/R) <= 15ms; excludes 50/63A where the time constant (L/R) <= 4ms.
- ²) Special version of the standard AC circuit breaker. Standard circuit breakers cannot be used at these ratings. Please specify for use on 500 or 600V DC on application. Indent only.
- ²) Magnetic trip only, without overload protection. Indent only.

For voltage levels up to and including 250V DC standard 2-pole breakers maybe be used, with both poles connected in series. For voltage levels greater than 250V DC 3-pole breakers must be used, with all three poles connected in series as shown.

The time constant (L/R) of the circuit should be:

less than 2ms at rated current. less than 2.5ms for overload (2.5 x in). less than 7ms for short circuit ≤ 10kA. less than 15ms for short circuit > 10kA.



Application data

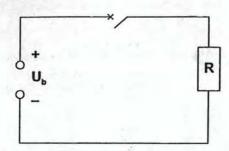


Circuit breaker selection for DC application (cont.)

Arrangement of breaking poles according to type of system.

Both poles insulated from earth

Protection only

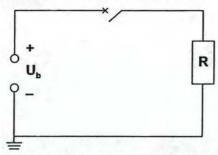


The poles required to interrupt the fault can be divided between the (+) and (-) polarities. The total number of poles connected in series should be capable of breaking the short circuit current at a voltage level of U_b.

Sharing the circuit breaker interrupting poles between both polarities also ensures isolation as well as protection of the system.

One polarity of the DC supply is earthed

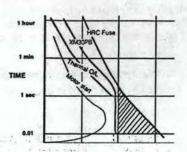
Protection only



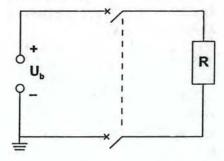
Full protection is assured if the total number of poles in series on the side not connected to earth are capable of breaking the short circuit current at a voltage level of U_b.

If full isolation is required then at least one interrupting pole is also required on the earthed polarity side.

Protection and Isolation

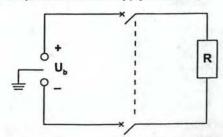


Protection and Isolation



Protection and Isolation

The centre point of the DC supply is earthed



To ensure full protection the number of poles connected in series on each polarity must be capable of breaking the maximum short circuit current, but at a reduced voltage level of $U_b/2$.

Having circuit breaker interrupting poles breaking both polarities ensures isolation as well as protection of the system.

Application data



Selection of MCCB's for use in welder circuits

1. Definitions

P = Rated capacity of welder in kVA.

V = Welder rated voltage.

I1 = Maximum primary current (PN).

T₁ = Current 'ON' period.

T2 = Current 'OFF' period.

T₁ + T₂ = One welding cycle time.

B = Duty ratio, current 'ON' period divided by one welding cycle.

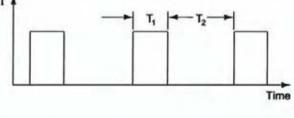
Ie = Thermally equivalent continuous current.

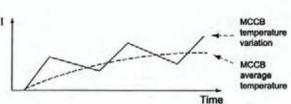
2. MCCB selection

a) Current rating

It can be seen from the diagrams below that the welder only draws current intermittently. MCCB selection should be based on the thermally equivalent continuous current, i.e. the current which would produce the MCCB average temperature shown in the diagram below.

It can further be seen that the MCCB temperature will not be constant but will vary as the load varies.



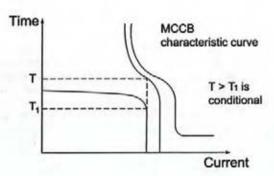


The thermally equivalent continuous current, le, may be calculated from:

$$\left(B = \frac{T_1}{T_1 + T_2}\right)$$

Note: The rated capacity of a spot welder is normally expressed in terms of its 50% duty ratio, ie. B = 0.5.

Once an MCCB has been selected, it is necessary, to compare the maximum primary current I₁ and the current 'ON' period, T₁ with the MCCB characteristic curve to ensure that it will not trip.



Note: A tolerance of 10 to 15% should be included to allow for variations in the supply voltage and equipment.

General guide lines for MCCB selection

Selection factor	MCCB rating
Resistance welders	3.00 max
Transformer arc welders	2.00 max

SAA wiring rules states that a circuit breaker protecting a circuit from which one or more welders are supplied may be greater than the rating of the protected conductor calculated as follows:

The maximum demand of the circuit excluding that of the largest welding machine plus

- Three times the primary current of the largest resistance welding.
- ii) Two times the primary ratings of the largest transformer arc welders.





Selection of MCCB's for use in welder circuits

b) Instantaneous setting

The MCCB's instantaneous trip setting should be high enough to avoid nuisance tripping due to the welding transformers excitation inrush current. When voltage is supplied to the transformers primary side, the iron core is saturated. This results in the flow of a large inrush current caused by a combination of the DC component of the voltage at the instant of closing and the residual magnetic flux of the transformer. The transformer input current value when the welder secondary is completely short-circuited is about 30% higher than the value calculated from the nominal maximum power input of the welder. So the maximum welder input current, Im, at the start of welding is given by:

$$I_m = \frac{P_m \times 1000}{V} \times 1.3 \times K$$

The value of K varies depending on the type of welder control employed. (Some form of synchronous closing is nearly always employed in order to stabilise the welding work and to prevent nuisance tripping of the MCCB).

K = 1 to 1.5 for synchronous type with peak control.

K = 1.4 to 3 for synchronous type without peak control.

K = 2 to 6 for non-synchronous soft start type.

If the protection of the thyristor stack is also required, the instantaneous trip setting must be greater than I_m, but less than the surge on-state current rating of the thyristor stack:

where:

Is = surge on-state current rating of thyristor stack, in A

Im = maximum welder input current at start of welding, in A

I MST = MCCB Instantaneous trip setting, in A

1.1 = Factor to allow for ± 10% tolerance on the instantaneous setting

c) MCCB breaking capacity

The MCCB breaking capacity should be higher than the estimated short-circuit fault level of the system.

Application data



Primary LV/LV transformer protection

When selecting an MCCB to protect the primary of an LV/LV transformer, the inrush current during initial energisation must be taken into account.

The magnitude of inrush current for any transformer is governed by several variables:

- 1. The primary winding resistance.
- 2. The supply impedance.
- 3. The excitation current.

The excitation current is, in theory at a maximum when the voltage is at a minimum, and vice versa.

Usually the level does not exceed 30 times the normal operating current.

If the inrush current is not known then a rule of thumb is that it is approximately 15 x the Primary Current.

		1 phase 240V			3 phase 415V	
Transformer (kVA)	MCCB type	MCCB rating	BC (kA) at 240V	MCCB type	MCCB rating	BC (kA) at 415V
5	XS125NS	50	25	XS125NJ	20	30
7.5	XS125NS	63	25	XS125NJ	32	30
10	XS125NS	100	25	XS125NJ	32	30
15	XE225NC	125	25	XS125NJ	50	30
	XS250NJ	160	50			
	XH250NJ	160	85			
20	XS250NJ	160	- 50	XS125NJ	63	30
	XH250NJ	160	85			
30				XS125NJ	100	30
50				XS125NJ	125	30
75			1020	XE225NC	225	18
and the same		Carte Control of the		XS250NJ	250	35
100	ELECTION STATE		110000	XS400SE	250	50
150				XS400SE	250	50
200		10年,10年,10年,10年,10年,10年,10年,10年,10年,10年,		XS400SE	400	50
300				XS630SE	630	50

The above breaker selections are based upon inrush currents calculated using the table below

	Single-pl	nase transformer	Three-ph	nase transformer
(kVA)	First peak multiplier	Decay time constant	First peak multiplier	Decay time constant
5 - 10	34	3-6	32	3-6
15 - 20	33	3-6	30	3-6
30	-		26	3-6
50		-9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -	24	4 - 7
75	TE-NO.		20	4-7
100			18	6 - 10
150	-	•	16	6 - 10
200	SUL CARREST		14	6-10
300	-		12	6 - 10

Notes: First peak multiplier is the first peak current as a multiple of the transformer rated current.

The above table/multipliers are in general larger than the practical current levels, as the current limiting by the circuit impedance is not taken into account.





MCB selection for high pressure sodium lamps

Assumption

 The maximum inrush current which the circuit will pass is a feature of the current limiting ballast and not the lamp.

Assuming these ballasts comply with the relevant IEC specification the circuit will pass currents not exceeding twice the appropriate lamp nominal current.

- Run up time 10 minutes with the current decaying exponentially.
- Based on 415/240V 3 phase or 240V single phase systems.

This table provides details for Din-T type 'C' MCB's

Power	Number	of fittings	per phas	e							
50W	2	4	7	9	12	24	36	48	60	76	108
70W 😅	. 1	3	5	6	8	17	25	34	42	54	77
150W		. 1.	2	3	4	8	12	16	20	25	36
250W	-		1	. 1	2	4	0.7	9	12	15	21
400W				1	1	3	4	6	7	9 .	13
700W	•	-			- J.	1	2	3	4	.5	7
MCB (Amps)	1	2	4	4	6	10	16	20	25	32	50

Example

Given 42 lamps each 250W installed on a 415V 3 phase system.

Which MCB must be selected?

Number of tubes per phase = $\frac{42}{3}$ =14

Therefore from the table above a 32A MCB should be selected.

A short circuit rating as appropriate must be selected.

Notes: Observe the requirements of AS 3000 for No. of lighting points on a final sub-circuit.





MCB selection for fluorescent lighting loads

Assumptions

- 1. The power rating of the ballast is 25% of power of the tubes.
- Power factor 0.6 for non compensated fittings 0.86 for compensated fittings.
- MCB's are installed in an enclosure with external ambient of 25°C.
- 4. Based on 415/240V 3 phase or 240V single phase systems.
- MCB is used for circuit protection only, not switching.For switching duties of Din-T MCBs refer NHP.

This table provides details for Din-T type 'C' MCB's

Type of fitting	Power (W)	Number	of fittings pe	r phase			
	20	45	66	79	100	116	150
Single non	40	22	33	39	50	57	75
compensated	65	14	20	24	30	36	50
	80	11	16	20	25	29	40
	20	64	94	113	143	166	200
Single	40	32	. 47	57	72	83	110
compensated	65	20	29	35	44	51	70
	80	16	23	28	36	41	55
	2 x 20	32	47	57	72	83	110
Twin	2 x 40	16	23	28	36	41	55
compensated	2 x 65	10	14	17	- 22	25	35
	2 x 80	8	11	14	17	20	30
Recommended MCB rating	Amps	10	16	20	25	32	50

MCB selection for incandescent lighting loads

Assumptions

- Tungsten lamps have theoretical inrush current of 14 times normal current, when switched from cold.
- The circuit impedance typically limits the inrush to 10 times normal running current, the inrush current peaking at 0.0007 seconds falling exponentially to normal running current within 0.1 seconds.
- Consider the worst case, if all lamps are switched on simultaneously, then nuisance tripping of MCB may result.
- Above is based on 415/240V 3 phase and neutral or 240V single phase system and 240V lamps.
- MCB is used for circuit protection only, not switching.
 For switching duties of Din-T MCB's refer NHP.

Method

In order to cope with this inrush the following formula should be used to calculate breaker size:

Breaker rating = W x 10 P x 240 x I inst

Where W = total wattage Where P = Number of phases

I inst = Minimum instantaneous tripping co-efficient.

C curve = 5 D curve = 10

Notes: Observe the requirements of AS 3000 for No. of lighting points on a final sub-circuit.

Application data



TemBreak MCCB clearance requirements at 380/415V

Clearance requirements for MCCB's (phase to phase and earth).

When MCCB's are called upon to interrupt large short circuits ionised gas and arcing material is expelled from the vents, usually at the top of the MCCB.

This ionised gas is highly conductive and is also at an elevated temperature when it exits the MCCB via the arc vents. Care must be taken therefore to avoid an arcing fault occurring due to the presence of the ionised gas.

Therefore, incoming conductors must be insulated right up to the terminal opening of the MCCB. This also applies to the attached busbars supplied as a proprietory part with the MCCB.

Proprietary type interpole barriers may be used to achieve creepage and clearance requirements.

Conductors must not impede the flow of ionised gas.

Insulating distance from Line-End for 380/415V

When earth metal is installed within the proximity of the breakers the correct insulating distance must be maintained.

WARNING:

EXPOSED CONDUCTORS INCLUDING TERMINALS AT ATTACHED BUSBARS MUST BE INSULATED TO AVOID POSSIBLE SHORT CIRCUITING OR EARTHING DUE TO FOREIGN MATTER COMING INTO CONTACT WITH THE CONDUCTORS.

Notes: When using the terminal bar (optional), the specified insulating distance must be maintained. All dimensions in mm.

> When earthed metal is installed within the proximity of the breakers the correct insulating distance must be maintained (refer to Table 1). This distance is necessary to allow the exhausted arc gases to disperse.

This distance is necessary to allow the exhausted arc gases to disperse.

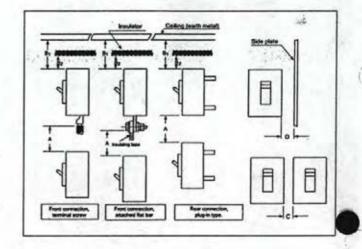


Table 1 below illustrates the min clearance that must be maintained

- A Distance from lower breaker to open charging part of terminal on upper breaker (front connection) or the distance from lower breaker to upper breaker end (rear connection and plug-in type)
- B1 Distance from breaker end to ceiling (earthed metal)
- B2 Distance from breaker end to insulator
- C Clearance between breakers
- D Distance from breaker side to side plate (earthed metal)

Table 1 This table is valid for 380/415V

A	B1	B2	C	D
30	10	10	0	25
75	45	25	0	25
50	40	40	0	50
80	60	30	0	25
100	60	30	0	25
100	70	40	0	30
120	70	40	0	30
150	80	50	0	40
150	70	40	0	30
150	150	100	0	100
	75 50 80 100 100 120 150	30 10 75 45 50 40 80 60 100 60 100 70 120 70 150 80 150 70	30 10 10 10 75 45 25 50 40 40 80 60 30 100 70 40 120 70 40 150 80 50 150 70 40	30 10 10 0 75 45 25 0 50 40 40 0 80 60 30 0 100 60 30 0 100 70 40 0 120 70 40 0 150 80 50 0 150 70 40 0

Application data



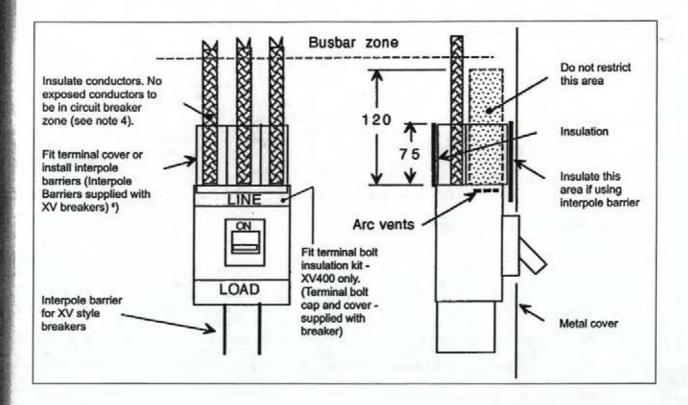
Clearance for mining MCCB's (1100 V) and incoming connections

The arc chamber in Terasaki TemBreak circuit breakers is located adjacent to the LINE side terminals. The chamber is vented through holes located just above each line terminal. The holes are covered by a flap which deflects when arc gases are being expelled. Even at low fault levels the arc gases that are released are very hot and reduce the dielectric strength of the air in the vicinity of the terminals. If care is not taken when installing the TemBreak this gas can cause arcing faults on the incoming bars or cables.

Significant voltage transients may also be produced as inductive circuits are switched and contribute to an arcing fault.

These problems affect all circuit breaker installations to varying degrees.

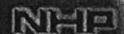
To ensure that problems are not created by the installation please observe the following recommendations.



Notes:

- 1: Always observe LINE/LOAD marking.
- Ensure insulation on incoming conductors is adequate. Do not use low grade heat shrink (some grades split at operating temperatures).
- Minimum clearance to earth metal, Above and below breaker - 120mm (XV1250NE - 150mm) To sides of breaker - 40mm.
- Switchboard construction to be a minimum form 2 to AS 3439.1 with IP3x protection between busbar and circuit break zones.
- Actual construction can vary to the above but in all cases it is the responsibility of the switchboard manufacturer to ensure compliance to the relevant standard ie. AS 3439.1.
- ") TL100EM MCCB's must use a TL100EMTLC lineside terminal cover. XV400 can use either a terminal cover or Interpole Barriers.

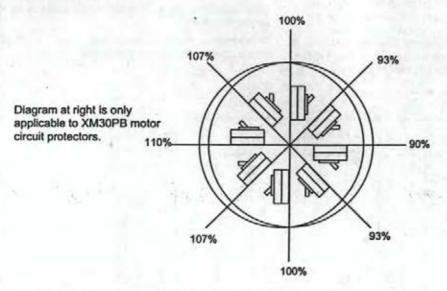
Application data

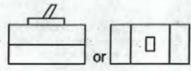


MCCB mounting angles and the matter and the second

The overcurrent tripping characteristics of TemBreak are not influenced by the mounting angles for electronic and thermal magnetic types.

The XM30PB motor circuit protectors however, use an oil filled dashpot style trip mechanism, which can be affected. Refer to the diagram below.





Note

 The above diagram applies to an XM30 MCCB mounted either way

Calculation of circuit fault level

NHP Nomogram

Fault calculation

The NHP Nomogram is a simple and easy to use aid. Developed by NHP to enable convenient and accurate calculation of circuit fault current.

When selecting circuit breakers for the use in modern distribution systems, it is important to calculate the fault level and then choose an MCCB with breaking capacity that is either higher or at least equal to the circuit fault current.

How to use the Nomogram

In the nomogram all you need to know is the size and length of the cable or cables and the size of the Transformer in kVA. The fault level at the terminals of the transformer is very dependant upon the Transformer internal impedance eg. the Australian Standard for a 2000kVA transformer is 6.5% – 7% impedance. This results in a fault level of 40-43kA.

However, many Supply Authorities are now installing low impedance transformer eg. 5% or less. Thus if the impedance is 5% then the fault level will be 56kA. If the impedance is unknown on the side of caution choose Z = 5% in your calculations.

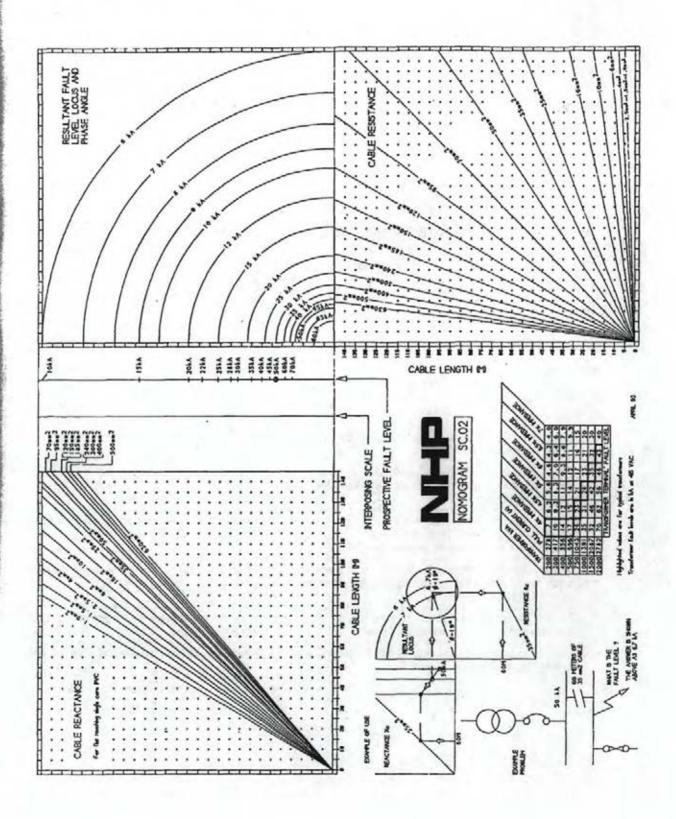
eg. From the table, the maximum fault level of a 2000kVA transformer, with Z = 5% is 56kA. Proceed then to calculate the resultant fault level by applying the cable size and length in metres to the Transformer secondary fault level and calculate the resultant. By following the example shown it can be seen that the fault level is reduced from 50kA to 6.7kA.





Short circuit calculation nomogram

Please refer to previous page for instructions on use.





5195

Application data



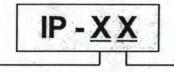
Application notes

A series of application notes are available on Terasaki breakers from your nearest NHP branch. The notes cover the following subjects.

Inspection and maintenance of earth leakage and moulded case circuit breakers.

Ref No.	Description	
5006	Specification for corrosive proofing of MCCB's	
5025	De-rated current of ACB's when enclosed	
5093	De-rated current of MCCB's when enclosed	
5088	De-rating of TemBreak electronic MCCB's when enclosed	
5067	DC applications of ACB's	
5065	Reverse connection	
5074	Thyristor protection with MCCB's	
5078	ELCB's at high frequency	
5087	ACB's and MCCB's at high altitude	
5083	Circuit breaker life mechanical and electrical	
5086	TemBreak UVT: transient response time	

IP rating protection against ingress of dust and liquids



IP	1st digit Degree of protection against contact and ingress of foreign bodies	IP	2nd digit Degree of protection against ingress of liquids
0	No protection	0	No protection
1	Protection against ingress of solid foreign bodies with diameters greater than 50mm	1	Protection against vertically falling water drops
2	Protection against contact with the fingers, protection against ingress of solid foreign bodies with diameter greater than 12mm	2	Protection against obliquely falling water, up to an angle of 15°
3	Protection against contact with wires etc., with diameters greater than 2.5mm, or ingress of solid foreign bodies with diameters greater than 2.5mm	3	Protection against obliquely sprayed water, up to an angle of 60° from the vertical
4	Protection against contact with wires etc., with diameter greater than 1mm, or ingress of solid foreign bodies with diameters greater than 1mm		Protection against sprayed low pressure water from any direction
5	Complete protection against contact with live parts, protection against harmful deposits of dust		Protection against water-jets from any direction - limited ingress permitted
6	Complete protection against contact with live parts, protection against ingress of dust	6	Protection against strong jets of water eg. ship decks
		7	Protection against temporary immersion in water
			Protection against indefinite immersion in water - under pressure

APPENDIX 14

BRISBANE CITY COUNCIL Brisbane Water

PATRICK STATION LANE PUMP

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 14: MCB's

Manufacturer:

NHP

Supplier Contact:

MPA Engineering

3/22-24 Strathwyn Street Brendale QLD 4500

07 3881 0722

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

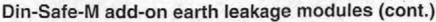
Page: 15 of 31

Q-Pulse Id TM\$1091 Active 10/12/2014 Page 322 of 380



NHP

Miniature circuit breakers



The Din-Safe-M package contains all the necessary parts to combine the earth leakage module and the Din-T MCB to form a combination MCB/RCD.

All parts required to complete this unit are supplied – including protection caps, clips and assembly instruction sheet.

Din-Safe-M module and MCB combination offer the following functions:

- □ Protection against earth leakage faults thus protecting against:
 - indirect contact
 - direct contact
 - fire
- ☐ Trip Sensitivities (I△n):
 - 30 mA
 - 100 mA
 - 300 mA
- □ Short circuit protection.
- Overload protection.

Operation

The combined Din-T MCB/Din-Safe-M earth leakage module has two operating toggles which indicate the reason for the trip:

- When an overload or short circuit occurs the Din-T MCB will operate.
 In this case the Din-Safe-M toggle will remain in the ON position.
- If an earth leakage occurs both toggles will move to the OFF position. In order to reset the MCB the Din-Safe-M unit must be reset first.
- In both instances if the cause of the trip operation has not been rectified, a trip operation will occur as soon as the MCB is turned to the ON position. The trip free mechanism of the MCB ensures that a successful trip operation takes place even when the toggle is held in the ON position.

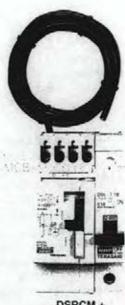
Test button

The built-in test facility simulates an earth fault ensuring correct operation of MCB + RCD components.

Testing is recommended monthly.



DSRCM



DSRCM + DTCB10 MCB

Fitting of Din-T auxiliary and alarm switches or Din-T shunt are not affected and will function as normal.

Miniature circuit breakers

Din-Safe single pole width residual current circuit breaker (RCBO)

- ☐ Standards AS/NZ 1009.
- Approval N17482.
- Mines department approval Pending.
- One module wide (18 mm).
- Short circuit, overcurrent and earth leakage protection.
- Short circuit protection 10 kA.
- Sensitivity 10 and 30 mA.
- Din rail mount.
- ☐ Suits CD chassis.

Amp rating	Modules (18mm)	Voltage AC	Short circuit	Trip Sensitivity ³)) Cat. No ¹) ²)
6	1	240	10 kA	30 mA	DSRCBH0630A
10	1	240	10 kA	30 mA	DSRCBH1030A
16	1	240	10 kA	30 mA	DSRCBH1630A
20	1	240	10 kA	30 mA	DSRCBH2030A
25	1	240	10 kA	30 mA	DSRCBH2530A
32	1	240	10 kA	30 mA	DSRCBH3230A
40	1	240	10 kA	30 mA	DSRCBH4030A
6	1	240	10 kA	10 mA	DSRCBH0610A
10	1	240	10 kA	10 mA	DSRCBH1010A
16	1	240	10 kA	10 mA	DSRCBH1610A
20	1	240	10 kA	10 mA	DSRCBH2010A
25	1	240	10 kA	10 mA	DSRCBH2510A
32	1	240	10 kA	10 mA	DSRCBH3210A
40	1	240	10 kA	10 mA	DSRCBH4010A

Note: 1) Neutral not switched

> Will not accept side mounting accessories

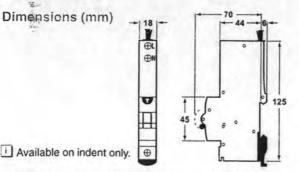
Mines Dept. approval applies to 30 mA units only.

Operation

This unit combines the overload and short circuit protection of an MCB with earth leakage protection of an RCD. The unit occupies one, subcircuit (one pole) of the distribution board and provides single phase protection against overload, short circuit and earth leakage current.

- The MCB element provides thermal and magnetic tripping protection which is rated to 10 kA prospective fault current.
- The RCD element of the device provides core-balance detection of the difference between the active and neutral currents and amplification to provide high sensitivity. The rated residual operating current (IAn) is 10 mA or 30 mA.
- The green/yellow earth reference cable in case of loss of supply neutral ensures the device will continue to provide earth leakage protection and will operate normally upon detection of an earth leakage current.

Dimensions (mm)

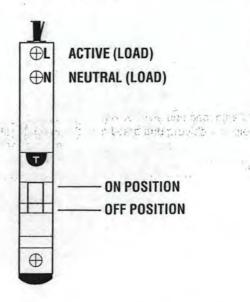




Application

The Din-Safe single pole width residual current circuit breaker will fit the standard Din-T chassis for use in NHP panelboards. The design makes it possible to provide an MCB complete with earth leakage protection in an 18 mm wide module which allows a greater number of devices to be fitted into a distribution board.

Connection diagram



Accessories	
Padlock bracket	Page 1 - 33
Link bars and terminals	Page 1 - 33, 39
Enclosures	Section 2
Technical data	
Tripping characteristics	Page 3 - 29
Technical data / wiring	Page 3 - 35

Nuisance tripping may be experienced in VFD and motor starting applications refer

-

Miniature circuit breakers

M

Din-Safe-M add-on earth leakage modules

comt

- ☐ Approval No. N11974.
- ☐ Mines Department Approval Pending.
- Offers protection against overcurrent, earth leakage and short circuit faults when added to Din-T MCB.
- ☐ Test button.
- Indication of trip position.

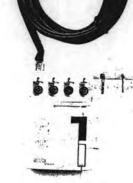
Din-Safe-M modules to suit Din-T6, 10 and 15 6)

Sensitivity mA')		Poles 2)	Width Mods 3)	Dim. 5)	Cat. No.
30mA	32A	1P+N	2	Α	DSRCM-32-30-1PN
	32A	3P+N	2	В	DSRCM-32-30-3PN
-1:100mA	32A	1P+N	2	Α	DSRCM-32-100-1PN
	32A	3P+N	2	В	DSRCM-32-100-3PN
300mA	32A	1P+N	2	Α	DSRCM-32-300-1PN
21244 mm m	32A	3P+N	2	В	DSRCM-32-300-3PN

Din-Safe-M modules to suit Din-T10 and 15 6)

					the state of the s
30mA	63A	1P+N	2	· A	DSRCM-63-30-1PN
	63A	3P+N	3	С	DSRCM-63-30-3PN
	63A	3P	3	D	DSRCM-63-30-3P
100mA	63A	1P+N	2	Α	☐ DSRCM-63-100-1PN
	63A	3P+N	3	С	DSRCM-63-100-3PN
	63A	3P	3	D	DSRCM-63-100-3P
300mA	63A	1P+N	2	Α	DSRCM-63-300-1PN
	63A	3P+N	3	С	DSRCM-63-300-3PN
	the little and the district face with				The second live and the second





DSRCM

Technical	data	177	
Model	1379	1.300	Voltage (V)
1P + N	3.24	4.575	240 V AC
3P + N	11320		415 V AC
3P			415 V AC

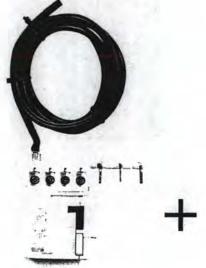
Note: Test circuit applied voltage should be between 125 - 415 V.

Terminal capacity

I _n (A)	(mm²)
up to 32	16
63	25
Technical data	
Tripping characteristics	Page 3 - 29
Dimensions	Page 3 - 45
	raye 3 - 43

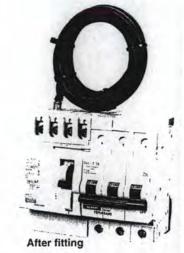
Notes: 1) Mines approval for 30 mA units only.

- 2) 1P+N and 3P+N type supply neutral is connected by 'pigtail' cable.
- ³) Dimensions of Din-Safe-M unit only; add MCB dimensions for total installed width.
- ") "MCB rating" refers to the max. MCB size the module can be fitted to.
- 5) A, B, C, D refers to dimensional diagrams refer page 3 45.
- 6) Not suitable for Din-T 10H.
- Available on indent only.



DSRCM





Note: Nuisance tripping may be experienced in VFD and motor starting applications refer NHP.

1 - 21 Page 325 of 380

1

NHP

Miniature circuit breakers

Miniature circuit breakers

The range of miniature circuit breakers stocked by NHP fall into two categories.

Safe-T range which is the NEMA style zero point extinguishing circuit breaker. This range covers 6 to 100 A in 1, 2, 3 and 4 pole configurations with a short circuit rating of 6 kA. Being a zero point extinguishing circuit breaker minimal current limiting is experienced during a short circuit. This situation in the past has been acceptable and was compensated for by designing a system to cope with the high currents.

However as systems became more detailed and sophisticated there was a need to find an alternative which would have features allowing greater control than using fuses or zero point extinguishing circuit breakers. This alternative was the Din-T range of miniature circuit breakers.

Din-T miniature circuit breakers are current limiting type device with a wide range of short circuit capacities, current ratings and curve types to choose from. Din-T circuit breakers are available in 6, 10 and 15 kA from 0.5 to 125 A in 1, 2, 3, and 4 pole configurations.

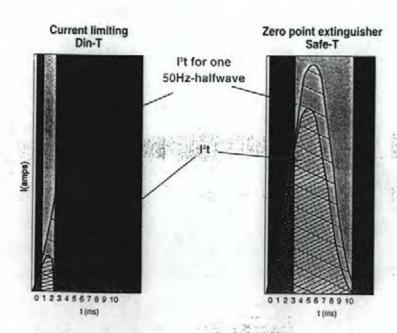
As a brief comparison of the current limiting abilities of the Safe-T and Din-T circuit breakers, consider the graphs below.

Prior to miniature circuit breakers the most common device for overcurrent and short circuit protection was a fuse. Fuses however have major disadvantages such as:

- After overcurrent or short circuit the fuse had to be replaced. In the case of a circuit breaker a reset only is required.
- Fuses could be replaced with different current ratings quite easily to overcome apparent problems.
- During overloads in three phase systems "single phasing" can occur when just one fuse blows.
 Especially for motor loads this is a great disadvantage.
- Fuses deteriorate with age.
- Fuses have higher wattage losses.

The introduction of circuit breakers brought advantages such as:

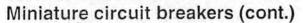
- Less downtime Quick reset.
- High circuit integrity due to different curve types and difficulty in interchanging different MCBs versus fuse cartridges.
- Increased personal safety through lower risk of contact with live parts.
- Simultaneous trip of all phases in a three phase system.
- No deterioration with age.
- Lower watts loss than a fuse.



These graphs indicate the three stages of arc formation, arc extinction and I²t let through values.

- Instantaneous trip time (yellow stage) indicates fault current levels just prior to magnetic trip mechanism response. (7-10In).
- Magnetic response time (red stage) from time of magnetic trip operation to time of arc being formed.
 Din-T style 1 x millisecond, Safe-T style 3 x milliseconds.
- Arc extinction time (orange stage) from arc formation to complete arc extinction. Din-T style 2 x milliseconds, Safe-T style 10 x milliseconds.

Because total operating time of Din-T is much faster than Safe-T style MCB, the level of let through energy in MCB is dramatically reduced. This is demonstrated by the difference in the I²t areas detailed above.



The NHP range of miniature circuit breakers features a complete range of quality products for the protection of an electrical installation against overcurrent, short circuit and earth leakage.

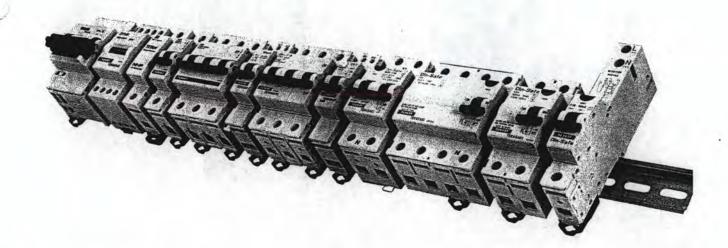
The choice of miniature circuit breakers is influenced by:

- the magnitude of the prospective short circuit current determined by
 - the size of conductors.
 - the capacity of the supply transformer.
 - the distance between the transformer and the short circuit point.
- (ii) The required selectivity or association of the upstream circuit breaker or fuses and the downstream devices:
- (iii) The earthing system and the maximum cable length.
- (iv) The maximum nominal current required by the circuit.
- (v) The expected initial current determined by the type of load.
- (vi) The application area and the specified standard.

The Din-T series of miniature circuit breakers can offer an application solution in every area.

Supporting the Din-T series of circuit breakers are an assortment of accessories which complete the range they include:

- Auxiliary and alarm switches.
- Earth leakage modules type Din-Safe-M.
- Earth leakage circuit breakers type Din-Safe-MCB.
- Earth leakage safety switches type Din-Safe.
- Earth leakage relays Din-Safe-R.
- Surge diverters.
- Time switches.
- DIN rail mountable meters
- Main switches.
- Changeover switches.
- Impulse relays.
- Hour run meters.
- DIN rail mount contactors.
- Pilot lights.
- Pushbuttons.
- Busbar combinations and lugs.
- Insulated and metal enclosures.
- Shunt trips
- Under-voltage trips



Miniature circuit breakers

Miniature circuit breakers

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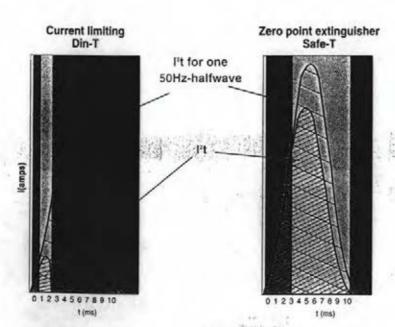
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 Especially for motor loads this is a great disadvantage.
- Fuses deteriorate with age.
- Fuses have higher wattage losses.

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- High circuit integrity due to different curve types and difficulty in interchanging different MCBs versus fuse cartridges.
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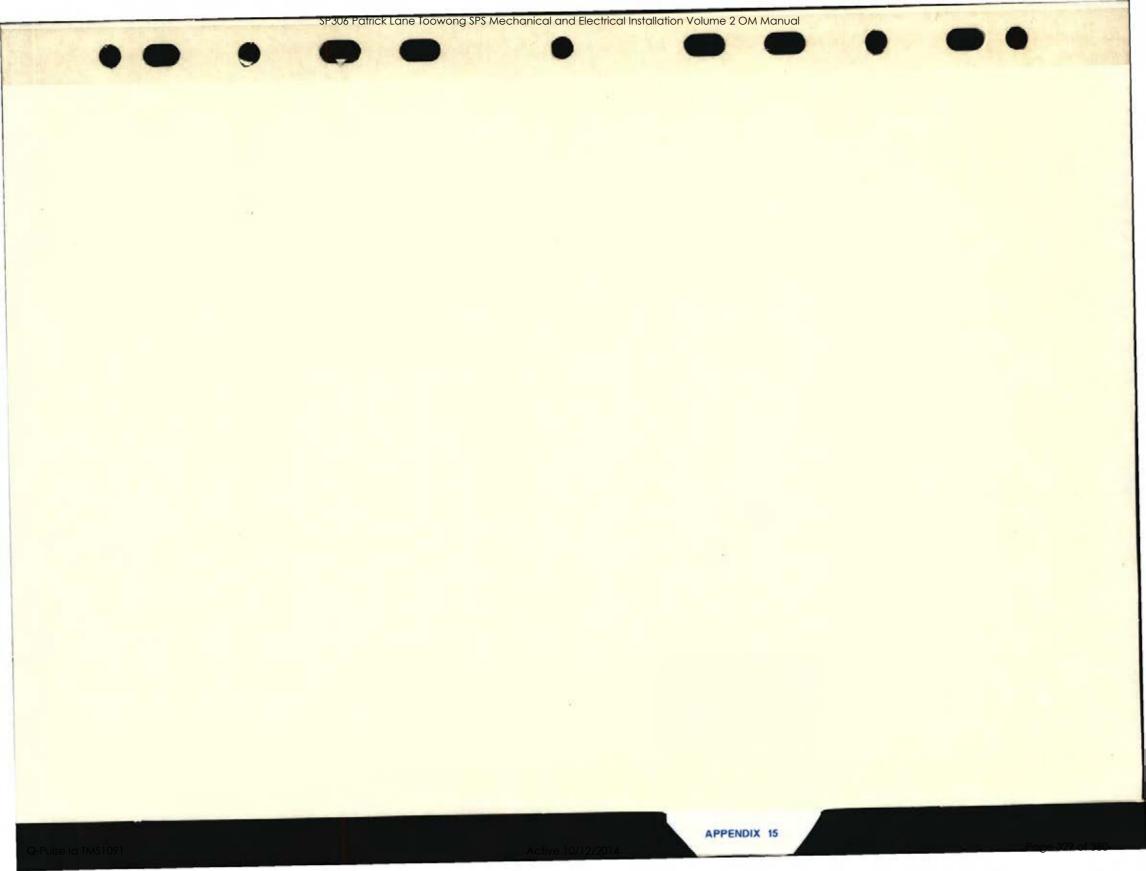


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- Magnetic response time (red stage) from time of magnetic trip operation to time of arc being formed.

 Din-T style 1 x millisecond, Safe-T style 3 x milliseconds.
- Arc extinction time (orange stage) from arc formation to complete arc extinction. Din-T style 2 x milliseconds, Safe-T style 10 x milliseconds.

Because total operating time of Din-T is much faster than Safe-T style MCB, the level of let through energy in MCB is dramatically reduced. This is demonstrated by the difference in the let areas detailed above.



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BRISBANE CITY COUNCIL Brisbane Water PATRICK

LANE **PUMP** STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 15: **Contactors**

Manufacturer:

NHP

Supplier Contact:

MPA Engineering

3/22-24 Strathwyn Street Brendale QLD 4500

07 3881 0722

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 16 of 31



AC contactors 3 pole open type with AC coil



Refer catalogue CA 6, 2212, SACS

Ratings to IEC 947 and AS 3497 400/415 V

- O For CA 7 contactors with coil terminals on line side, add ...V AC to Catalogue No. Eg - CA 7-9-10-240 V AC 3)
- O For CA 7 contactors with coil terminals on load side, add ...V AC-U to Catalogue No. Eg - CA 7-9-10-240 V AC-U



Contactor CA 7-9



Contactor CA 7-72





Contactor CA 6-105-EI



Contactor CA 6-170-EI



Contactor CA 6-250-EI



Contactor CA 6-420-EI

AC 3 400/415 V kW ')	AC 3 400/415 V Amps ')		AC 1 ') Amps 60 'C	Auxi stand		ontacts Max.	Cat. No. 2)
4	9	32	32	1	0	9	CA 7-9-10V AC
7	•	02	V.	o	1	9	CA 7-9-01V AC
5.5	12	32	32	1	0	9	CA 7-12-10V AC
0.0		02	-	0	1	9	CA 7-12-01V AC
7.5	16	32	32	1	0	9	CA 7-16-10V AC
7.0		02	02	0	1	9	CA 7-16-01V AC
11	23	32	32	1	0	9	CA 7-23-10V AC
	20	02.	0.	0	1	9	CA 7-23-01V AC
15	30	50	45	0	0	8	CA 7-30-00V AC
18.5	37	50	45	0	0	8	CA 7-37-00V AC
22	43	85	63	0	0	8	CA 7-43-00V AC
30	60 .	100	100	0	0	8	CA 7-60-00V AC
37	72	100	100	0	0	8	CA 7-72-00V AC
45	85	100	100	0	0	8	CA 7-85-00V AC
55 (45)	95 (33)	160	135	1	1	8	CA 6-85-11V AC
75 (55)	130 (40)	160	135	1	1	8	CA 6-105-11V AC
90 (75)	155 (55)	250	210	1	1	8	CA 6-140-11V AC
75 (55)	130 (40)	160	135	1	1	8	CA 6-105-EI-11V AC1)
90 (75)	155 (55)	250	210	1	1	8	CA 6-140-EI-11V AC')
100 (90)	170 (65)	250	210	1	1	8	CA 6-170-EI-11V AC')
132 (111)	225 (80)	350	300	1	1	8	CA 6-210-EI-11V AC1)
150 (133)	258 (95)	350	300	1	1	8	CA 6-250-EI-11V AC')
185 (163)	320 (115)	450	380	1	1	8	CA 6-300-EI-11V AC')
250 (225)	425 (160)	500	425	1	1	8	CA 6-420-EI-11V AC')
220 (220)	370 (155)	500	420	2	2	8	CA 5-370V AC')
265 (280)	450 (200)	600	510	2	2	8	CA 5-450V AC*)
325 (355)	550 (250)	780	645	2	2	8	CA 5-550V AC')
430 (500)	700 (340)	1000	850	2	2	8	CA 5-700V AC*)
520 (550)	860 (380)	1100	930	2	2	8	CA 5-860V AC')
600	1000	1200	1020	1	1	8	CA 5-1000V ACI)
700	1150	1350	1150	1	1	8	CA 5-1200V AC')

1000 volt ratings ().

- Add control voltage to Cat. No. when ordering: 24, 32, 110, 240, 415, 440V 50 Hz. Standard voltages for CA 6-105-El...250-El are 24, 48, 110, 240 and 415 V AC. Standard voltages for CA 6-300-El...420-El 48, 110, 240 and 415 V AC. Standard voltages for CA 5-370...1200, 110, 240 and 415 V AC.
- All CA 7 coils can be reversed for line or load side coil terminals as required. Both versions are held in NHP stock for convenience.
- Electronically controlled mechanism (ECM) with interface suffix (EI).
- 55 'C enclosed.
- Contact NHP for recommended cable size.

240/415 V rated coils are suitable for use on 230/400 V in accordance with AS 60038 : 2000.

ACS contactors CA 7

4 - 45kW



Refer catalogue SACS

Innovation and ease of use provide solutions for your control systems

Coil terminals are always in the correct position

The coil terminations on the CA 7 contactors can be supplied optionally at the top or the bottom of the contactor. It is also a simple task to change this on site should the requirements change.

When CA 7 contactors are used in combination with KTA 7 circuit motor circuit breakers the bottom coil terminations are used. For use with standard CT 7 thermal or CEP 7 electronic overloads the top coil termination should be selected.

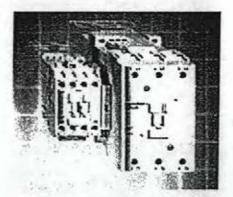




Mechanical interlocks save space

Only 9mm wide, the CM 7 mechanical interlock snaps into place between any of the CA 7 contactors. It is allowed also to interlock different sizes of the CA 7 range with the same interlock.

The basic mechanical interlock is supplemented by a variation with built in N/C auxiliary contacts for electrical interlocking. This version is also only 9mm wide and further minimises space requirements.



CA 7 contactors provide improved wiring terminals

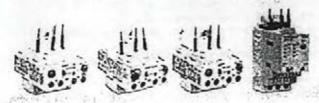
The main terminals of all CA 7 contactors are designed to accept at least two cables. At the same time they comply with safety standards regarding touch protection.

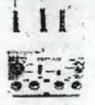
The larger contactors CA 7-30 and upwards employ a special cage terminal which allows the connection of two cables in separate chambers.

The ease of wiring with CA 7 contactors saves both time and money.



With Sprecher + Schuh you can choose the best protection for your motors.





High tech electronic protection type CEP 7 in trip class 10 or 20.



Standard thermal overloads type CT 7

sprecher+ schuh



Short circuit co-ordination Type '1' with circuit breakers or fuses



Refer Catalogue C-CO

MCCB or fuse DOL starting 50/65 kA @ 400/415 V to AS 3947.4.1

TemBreak Moulded Case Circuit Breaker or fuse

Motor size kW	Approx.	Terasaki circuit or breaker	NHP HRC fuse to BS88	Sprecher + Schuh contactor type	Sprecher + Schuh thermal O/L relay type	Setting range
0.37	1.1	XM30PB/1.4	NTIA-6	CA 7-9	CT 7-24	1 - 1.6
0.55	1.5	XM30PB/2	NTIA-6	CA 7-9	CT 7-24	1 - 1.6
0.75	1.8	XM30PB/2.6	NTIA-10	CA 7-9	CT 7-24	1.6 - 2.4
1.1	2.6	XM30PB/4.0	NTIA-10	CA 7-9	CT 7-24	2.4 - 4
1.5	3.4	XM30PB/5	NTIA-10	CA 7-9	CT 7-24	2.4 - 4
2.2	4.8	XM30PB/8	NTIA-16	CA 7-9	CT 7-24	4-6
3.0	6.5	XM30PB/10	NTIA-16	CA 7-9	CT 7-24	6 - 10
4.0	8.2	XM30PB/12	NTIA-25	CA 7-9	CT 7-24	6 - 10
5.5	11	XH125NJ/20	NTIA-32	CA 7-12	CT 7-24	10 - 16
7.5	14	XH125NJ/20	NTIS-40	CA 7-16	CT 7-24	10 - 16
11	21	XH125NJ/32	NTIS-50	CA 7-23	CT 7-24	16 - 24
15	28	XH125NJ/50	NTIS-63	CA 7-30	CT 7-45	18 - 30
18.5	34	XH125NJ/50	NTCP-80	CA 7-37	CT 7-45	30 - 45
22	40	XH125NJ/63	NTCP-80	CA 7-43	CT 7-45	30 - 45
30	55	XH125NJ/100	NTCP-100	CA 7-60	CT 7-75	45 - 60
37	66	XH125NJ/100	NTF-160	CA 7-72	CT 7-75	60 - 75
45	80	XH125NJ/125 ')	NTF-160	CA 6-85	CT 7-100	70 - 90
55	100	XH125NJ/125 ')	NTF-200	CA 6-105-EI	CT 6-110	85 - 110
75	130	XH250NJ/250	NTKF-250	CA 6-140-EI	CT 6-150	105 - 150
90	155	XH250NJ/250 1)	NTKF-250	CA 6-170-EI	CT 6-200	140 - 200
110	200	XH250NJ/250 1)	NTKF-315	CA 6-210-EI	CEF 1-41/42	160 - 400
132	225	XH400NE/400	NTMF-355	CA 6-210-EI	CEF 1-41/42	160 - 400
150	250	XH400NE/400	NTMF-355	CA 6-250-EI	CEF 1-41/42	160 - 400
160	270	XH400NE/400	NTMF-400	CA 6-300-EI	CEF 1-41/42	160 - 400
185	310	XH400NE/400	NTTF-450	CA 6-300-EI	CEF 1-41/42	160 - 400
200	361	XH400NE/400	NTTM-500	CA 6-420-EI/CA 5-450	CEF 1-41/42	160 - 400
250	425	XH630NE/630	NTTM-630	CA 6-420-EI/CA 5-450	CEF 1-52	160 - 630
315	530	XH630NE/630	NTLM-710	CA 5-550	CEF 1-52	160 - 630

Notes: Fuses 65 kA, XH125NJ circuit breaker combinations limited to 50 kA, others 65 kA.

Overloads may be changed to different types eg. thermal style to electronic.

Some combinations also gives Type '2' performance.

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038 : 2000

^{&#}x27;) Use 'magnetic only' breaker - Refer NHP.

Short circuit co-ordination Type '2' using Terasaki circuit breakers



Refer Catalogue C-CO

TemBreak circuit breakers DOL starting 50 kA @ 400/415 V to AS 3947.4.1

TemBreak MCCB

Motor size kW	Approx. amps	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh overload relay	Setting range amp
0.37	1.1	XM30PB/1.4	CA 7-9	CT 7-24-1.6	1 - 1.6
0.55	1.5	XM30PB/2	CA 7-9	CT 7-24-1.6	1 - 1.6
0.75	1.8	XM30PB/2.6	CA 7-9	CT 7-24-2.4	1.6 - 2.4
1.1	2.6	XM30PB/4.0	CA 7-16	CT 7-24-4	2.4 - 4
1.5	3.4	XM30PB/5	CA 7-16	CT 7-24-4	2.4 - 4
2.2	4.8	XM30PB/8	CA 7-16	CT 7-24-6	4-6
3	6.5	XM30PB/10	CA 7-30	CT 7-24-10	6 - 10
4	8.2	XM30PB/12	CA 7-30	CT 7-24-10	6 - 10
5.5	11	XH125NJ/20	CA 7-30	CT 7-24-16	10 - 16
7.5	14	XH125NJ/20	CA 7-30	CT 7-24-16	10 - 16
11	21	XH125NJ/32	CA 7-30	CT 7-24-24	16 - 24
15	28	XH125NJ/50	CA 7-43	CT 7-45-30	18 - 30
18.5	34	XH125NJ/50	CA 7-43	CT 7-45-45	30 - 45
22	40	XH125NJ/63	CA 7-43	CT 7-45-45	30 - 45
30	55	XH125NJ/100	CA 6-85	CT 7-75 ²)	45 - 60
37	66	XH125NJ/100	CA 6-85	CT 7-75 ²)	60 - 75
45	80	XH125NJ/125	CA 6-105-EI	CT 6-90	70 - 90
55	100	XH125NJ/125 ')	CA 6-105-EI	CT 6-110	85 - 110
75	130	XH250NJ/250	CA 6-140-EI	CT 6-150	105 - 150
90	155	XH250NJ/250	C A6-170-EI	CT 6-200	140 - 200
110	200	XH250NJ/250 ')	CA 6-210-EI	CEF 1-41/42	160 - 400
132	225	XS400SE/400	CA 6-210-EI	CEF 1-41/42	160 - 400
150	250	XS400SE/400	CA 6-250-EI	CEF 1-41/42	160 - 400
160	270	XS400SE/400	CÁ 6-300-EI	CEF 1-41/42	160 - 400
200	361	XS400SE/400	CA 6-420-EI	CEF 1-41/42	160 - 400
200	361	XS400SE/400	CA 5-450	CEF 1-22 2)	160 - 400
250	425	XS630SE/630	CA 5-700	CEF 1-52 ²)	160 - 630
320	538	XS630SE/630	CA 5-700	CEF 1-52 2)	160 - 630

Overloads may be thermal or electronic.

Combinations based on the overload tripping before the circuit breaker at overload currents up to the motor locked rotor current.

Data for 65 kA co-ordination available refer Cat. C-CO.

240/415 V rating suitable for use on 230/400 V In accordance with AS 60038: 2000

^{&#}x27;) Use 'magnetic only' breaker or next higher circuit breaker / contactor combination.

Use with separate mounting bracket.



ACS contactors CA 7 Technical data



Refer Catalogue C-CO

TemBreak circuit breakers DOL starting. 85 kA @ 400/415 V to AS 3947.4.1						
Motor size kW	Approx. FLC @ 400/415 V (A)	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh thermal O/L type	Setting range (A)	
0.37	1.1	XM30PB/1.4	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9	
0.55	1.5	XM30PB/2.0	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9	
0.75	1.8	XM30PB/2.6	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9	
1.1	2.6	XM30PB/4	CA 7-16	CEP 7-M32-2.9-10	1.0 - 2.9	
1.5	3.4	XM30PB/5	CA 7-16	CEP 7-M32-5-10	1.6 - 5	
2.2 1	4.8	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7 - 12	
3	6.5	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7 - 12	
4	8.2	XM30PB/10	CA 7-30	CEP 7-M32-12-10	3.7 - 12	
5.5	11	TL100NJ/20	CA 7-30	CEP 7-M32-12-10	3.7 - 12	
7.5	14	TL100NJ/20	CA 7-30	CEP 7-M32-32-10	12 - 32	
9	17	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32	
10	19	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32	
11	21	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32	
15	28	TL100NJ/50	CA 7-43	CEP 7-M32-32-10	12 - 32	
18.5	34	TL100NJ/50	CA 7-43	CEP 7-M37-37-10	12 - 37	
22	40	TL100NJ/63	CA 7-43	CEP 7-M45-45-10	14 - 45	
30	55	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26 - 85	
37	66	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26 - 85	
45	80	TL250NJ/160	CA 6-105	CEP 7-M85-85-10	26 - 85	
55	100	TL250NJ/160	CA 6-105	CEF 1-11/12	0.5 - 180	
75	135	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5 - 180	
90	160	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5 - 180	
110	200	TL250NJ/250	CA 6-210-EI	CEF 1-41/42/52	160 - 630	
132	230	TL400NE/400	CA 6-210-EI	CEF 1-41/42/52	160 - 630	
160	270	TL400NE/400	CA 6-300-EI	CEF 1-41/42/52	160 - 630	
200	361	TL400NE/400	CA 6-420-EI	CEF 1-41/42/52	160 - 630	

Din-T circuit breakers with rotary isolator. DOL starting. 50 kA @ 400/415 V to AS 3947.4.1

Din-T MCBs

Motor size kW	Approx. amps @ 400/415 V	Sprecher + Schuh isolator	Terasaki circuit breaker	Sprecher + Schuh current limiter	Sprecher + Schuh contactor	Sprecher + Schuh thermal O/L relay	Thermal overload range
0.37	1.1	LA 7-80	Din-T 10 / 4		CA 7-9	CT 7-24	0.6 - 1.6
0.55	1.5	LA 7-80	Din-T 10 / 4		CA 7-9	CT 7-24	1 - 1.6
0.75	1.8	LA 7-80	Din-T 10 / 4		CA 7-9	CT 7-24	1.6 - 2.4
1.1	2.6	LA 7-80	Din-T 10 / 6	B-C - THE	CA 7-23	CT 7-24	2.4 - 4
1.5	3.4	LA 7-80	Din-T 10 / 6		CA 7-23	CT 7-24	2.4 - 4
2.2	4.8	LA 7-80	Din-T 10 / 10	KTL 3-65	CA 7-23	CT 7-24	4-6
3	6.5	LA 7-80	Din-T 10 / 16	KTL 3-65	CA 7-23	CT 7-24	6 - 10
4	8.2	LA 7-80	Din-T 10 / 16	KTL 3-65	CA 7-23	CT 7-24	6 - 10
5.5	11	LA 7-80	Din-T 10 / 20	KTL 3-65	CA 7-23	CT 7-24	10 - 16
7.5	14	LA 7-80	Din-T 10 / 32	KTL 3-65	CA 7-30	CT 7-45	10 - 16
11	21	LA 7-80	Din-T 10 / 40	KTL 3-65	CA 7-30	CT 7-24	16 - 24
15	28	LA 7-100	Din-T 10 / 63	KTL 3-65	CA 7-37	CT 7-45	18 - 30
18.5	34	LA 7-100	Din-T 10 / 63	KTL 3-65	CA 7-37	CT 7-45	30 - 45

Note: 240/415 V rating suitable for use on 230/400 V in accordance with AS 60038 : 2000



Short circuit co-ordination Type '2' using Terasaki circuit breakers



Refer Catalogue C-CO

TemBreak circuit breakers DOL starting 50 kA @ 400/415 V to AS 3947.4.1

TemBreak MCCBs

Motor size kW	Approx. amps	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh overload relay	Setting range amps
0.37	1.1	XM30PB/1.4	CA 7-9	CT 7-24-1.6	1 - 1.6
0.55	1.5	XM30PB/2	CA 7-9	CT 7-24-1.6	1 - 1.6
0.75	1.8	XM30PB/2.6	CA 7-9	CT 7-24-2.4	1.6 - 2.4
1.1	2.6	XM30PB/4.0	CA 7-16	CT 7-24-4	2.4 - 4
1.5	3.4	XM30PB/5	CA 7-16	CT 7-24-4	2.4 - 4
2.2	4.8	XM30PB/8	CA 7-16	CT 7-24-6	4-6
3	6.5	XM30PB/10	CA 7-30	CT 7-24-10	6 - 10
. 4	8.2	XM30PB/12	CA 7-30	CT 7-24-10	6 - 10
5.5	y , 11	XH125NJ/20	CA 7-30	CT 7-24-16	10 - 16
7.5	14	XH125NJ/20	CA 7-30	CT 7-24-16	10 - 16
11	21	XH125NJ/32	CA 7-30	CT 7-24-24	16 - 24
15	28	XH125NJ/50	CA 7-43	CT 7-45-30	18 - 30
18.5	34	XH125NJ/50	CA 7-43	CT 7-45-45	30 - 45
22	40	XH125NJ/63	CA 7-43	CT 7-45-45	30 - 45
30	55	XH125NJ/100	CA 6-85	CT 7-75 ²)	45 - 60
37	66	XH125NJ/100	CA 6-85	CT 7-75 ²)	60 - 75
45	80	XH125NJ/125	CA 6-105-EI	CT 6-90	70 - 90
55	100	XH125NJ/125 ')	CA 6-105-EI,	CT 6-110	85 - 110
75	130	XH250NJ/250	CA 6-140-EI	CT 6-150	105 - 150
90	155	XH250NJ/250	C A6-170-EI	CT 6-200	140 - 200
110	200	XH250NJ/250 1)	CA 6-210-EI	CEF 1-41/42	160 - 400
132	225	XS400SE/400	CA 6-210-EI	CEF 1-41/42	160 - 400
150	250	XS400SE/400	CA 6-250-EI	CEF 1-41/42	160 - 400
160	270	XS400SE/400	CA 6-300-EI	CEF 1-41/42	160 - 400
200	361	XS400SE/400	CA 6-420-EI	CEF 1-41/42	160 - 400
200	361	XS400SE/400	CA 5-450	CEF 1-22 ²)	160 - 400
250	425	XS630SE/630	CA 5-700	CEF 1-52 ²)	160 - 630
320	538	XS630SE/630	CA 5-700	CEF 1-52 ²)	160 - 630

Notes: Overloads may be thermal or electronic.

Combinations based on the overload tripping before the circuit breaker at overload currents up to the motor locked rotor current.

Data for 65 kA co-ordination available refer Cat. C-CO.

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038: 2000

^{&#}x27;) Use 'magnetic only' breaker or next higher circuit breaker / contactor combination.

²⁾ Use with separate mounting bracket.



ACS contactors CA 7 4 - 45kW



Refer catalogue SACS

The highest switching capacity in the smallest space





Motor switching rating AC 3 @ 400/415 V

CA 7-9	4 kW			9 A
CA 7-12	5.5 kW	45 mm		12 A
CA 7-16	7.5 kW	45 11111		16 A
CA 7-23	11 kW			23 A
CA 7-30	15 kW	45 mm		30 A
CA 7-37	18.5 kW	45 111111		37 A
CA 7-43	22 kW	54 mm	200	43 A
CA 7-60	30 kW			60 A
CA 7-72	37 kW	72 mm		72 A
CA 7-85	45 kW			85 A

Compact without compromise

Compact without compromise is the best way to describe the CA 7 range of contactors and motor protection relays from Sprecher + Schuh. In spite of the new compact dimensions, the CA 7 range features high breaking capacity and extraordinary flexibility. Up to 18.5 kW the contactors are only 45 mm wide and even the largest 45 kW frame is only 72 mm wide. The CA 7 contactors are the main component in the new Advanced Control System (ACS).

With CA 7 you have flexibility with auxiliary contacts

Common auxiliaries from 9 to 85 amps

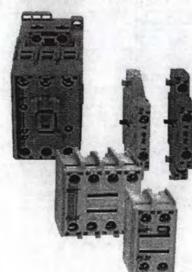
Three fitting positions

- O Front mounting
- O Side mounting left
- O Side mounting right

Alternatively you can choose to combine left, right and front mounting auxiliary contacts to fulfil your requirements.

Instead of the top mounted auxiliary contacts, on or off delay timing modules or mechanical latches can be fitted.





With CA 7 you have more clip on accessories

Common accessories from 9 to 85 amps

- O On and off delay pneumatic timers
- Coil mounted electronic timers on delay, off delay, star delta
- O Coil mounted 24 V DC interface
- O Coil mounted RC and varistor suppressor modules
- O Mechanical latch
- Mechanical interlock
- Mechanical interlock with integrated N/C interlock contacts
- Moulded wire link sets for DOL, reversing and star delta
- Large choice of front and side mounting auxiliary contacts



SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 ACS thermal overloads CT 7 Technical data



General		CT 7-24	CT 7-45	CT 7-75	CT 7-100			
Weight	[kg]	0.13	0.21	0.21	1.3			
Standards		IE	947, EN 60 947, DI	N VDE 0660, UL, LRS,	GUS, CSA			
Climatic			damp/heat, consta	ant, to DIN, IEC 68, Part	12-3			
Annual Control			damp/heat, cyclic, to DIN, IEC 68, Part 2 - 30					
Ambient temperature	open			25+60 °C				
	enclosed			25+50 °C				
Temperature compensatio	n		continuous temperature range -5+40 °C to IEC 947,					
STATE OF THE PARTY		EN 60947; PTB: -5+50 °C						
Shock resistance (sinusoid	dal 10 ms) [G]			10				
Protection		IP 00 IP 2LX						
Protection	174 74 75	touch proof (VDE 0106, Part 100)						

Contactor, timer and overload selection chart for auto transformer starters

ATS kW	Line Trans Star V contactor contactor contactor			Timer	Overload
11	CA 7-23-10	CA 7-16-10	CA 7-9-10	RZ7 FSY2D	CEP 7-M32-32-10
15	CA 7-30-00	CA 723-10	CA 7-12-10	RZ7 FSY2D	CEP 7-M37-37-10
18.5	CA 7-37-00	CA 7-30-00	CA 7-16-10	RZ7 FSY2D	CEP 7-M37-37-10
22 -	CA 7-43-00	CA 7-30-00	CA 7-23-10	RZ7 FSY2D	CEP 7-M45-45-10
30	CA 7-60-00	CA 7-37-00	CA 7-30-00	RZ7 FSY2D	CEP 7-M85-85-10
37	CA 7-72-00	CA 7-43-00	CA 7-30-00	RZ7 FSY2D	CEP 7-M85-85-10
45	CA 7-85-00	CA 7-60-00	CA 7-37-00	RZ7 FSY2D	CEP 7-M85-85-10
55	CA 6-85-11	CA 7-60-00	CA 7-43-00	RZ7 FSY2D	CT 6-110
75	CA 6-105-11	CA 7-85-00	CA 7-60-00	RZ7 FSY2D	CT 6-150
90	CA 6-140EI-11	CA 6-85-11	CA 7-72-00	RZ7 FSY2D	CT 6-200
110	CA 6-170EI-11	CA 6-105-11	CA 7-85-00	RZ7 FSY2D	CEF 1-41
132	CA 6-210EI-11	CA 6-140EI-11	CA 6-105-11	RZ7 FSY2D	CEF 1-41
150	CA 6-250EI-11	CA 6-140EI-11	CA 6-105-11	RZ7 FSY2D	CEF 1-41
185	CA 6-300EI-11	CA 6-210EI-11	CA 6-140EI-11	RZ7 FSY2D	CEF 1-41
220	CA 6-420EI-11	CA 6-210EI-11	CA 6-140-EI-11	RZ7 FSY2D	CEF 1-41

Contactor, timer and overload selection chart for star delta starters

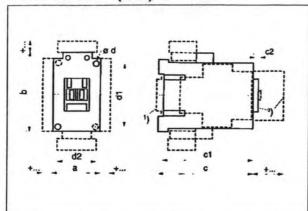
SDS kW	Line contactor	Delta contactor	Star contactor	Timer	Overload	
7.5	CA 7-9-10	CA 7-9-01	CA 7-9-01	RZ7 FSY2D	CEP 7-M32-12-10	
.11	CA 7-12-10	CA 7-12-01	CA 7-9-01	RZ7 FSY2D	CEP 7-M32-32-10	
15	CA 7-16-10	CA 7-16-01	CA 7-9-01	RZ7 FSY2D	CEP 7-M32-32-10	
18.5	CA 7-23-10	CA 7-23-01	CA 7-12-01	RZ7 FSY2D	CEP 7-M32-32-10	
22	CA 7-23-10	CA 7-23-01	CA 7-16-01	RZ7 FSY2D	CEP 7-M32-32-10	
30-37	CA 7-37-00	CA 7-37-00	CA 7-23-01	RZ7 FSY2D	CEP 7-M45-45-10	
45	CA 7-60-11	CA 7-60-11	CA 7-30-00	RZ7 FSY2D	CEP 7-M85-85-10	
55	CA 7-60-11	CA 7-60-11	CA 7-37-00	RZ7 FSY2D	CEP 7-M85-85-10	
75	CA 7-85-00	CA 7-85-00	CA 7-43-00	RZ7 FSY2D	CEP 7-M85-85-10	
90	CA 6-85-11	CA 6-85-11	CA 7-60-00	RZ7 FSY2D	CT 6-90	
110	CA 6-105-11	CA 6-105-11	CA 7-72-00	RZ7 FSY2D	CT 6-110	
132	CA 6-140EI-11	CA 6-140EI-11	CA 7-85-00	RZ7 FSY2D	CT 6-150	
150	CA 6-170EI-11	CA 6-170EI-11	CA 6-85-00	RZ7 FSY2D	CTA 6-200	
185	CA 6-210EI-11	CA 6-210EI-11	CA 6-105-11	RZ7 FSY2D	CEF 1-41	
220	CA 6-210-EI-11	CA 6-210-EI-11	CA 6-140-EI-11	RZ7 FSY2D	CEF 1-41	



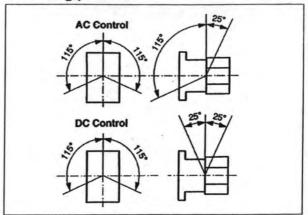
ACS contactors CA 7 **Dimensions**



Dimensions in (mm)



Mounting position



Contactor (AC control)

Туре	а	b	c	c1	c2	ød	d1	d21)
CA 7-9CA 7-23 ²)	45	81	80.5	75.5	6	4.5	60	, 35
CA 7-30CA 7-37	45	81	97.5	92.6	6.5	4.5	60	35
CA 7-43	54	81	100.5	95.6	6.5	4.5	60	45
CA 7-60CA 7-85	72	122	117	111.5	8.5	5.4	100	55

(DC control)

Туре	а	b	c	c1	c2	ød	d1	d21)
CA 7-9CCA 7-16C	45	81	106.5	101.5	6	4.5	60	35
CA 7-23C	45	81	123.5	119	6	4.5	60	35
CA 7-30CCA 7-37C	45	81	141.5	136.5	6.5	4.5	60	35
CA 7-43C	54	81	144.5	140	6.5	4.5	60	45
CA 7-60CCA 7-85C	72	122	117	111.5	8.5	5.4	100	55

Accessories

Contactor with		(AC control) (mm)	(DC control) (mm)
Front mounting auxiliary contact	2 or 4 pole	c/c1 + 39	c/c1 + 39
Side mounting auxiliary contact	1 or 2 pole	a+9	a+9
Pneumatic timing module		c/c1 + 58	-
Electronic timing module	coil mounting	b + 24	b + 24
Mechanical interlock	mounts between contactors	a+9	a+9
Mechanical latch		c/c1 + 61	-
Interface	coil mounting	b+9	-
Suppressor	coil mounting	b+3	b+3
With inscriptions 3)	labels	+0	+0
	label support system V4/V5	+5.5	+5.5

- DIN Rail mounting 35 mm to EN 50 022.
 Dimensions for 4 pole contactors same as 3 pole with auxiliary.
 Dimensions with inscriptions.



ACS Short circuit co-ordination Type '2' with KT 7 circuit breakers



Refer Catalogue C-CO

Automatic Type '2' co-ordination ') with no-oversizing of contactors

DOL starting 50/65 kA @ 400/415 V



0.18	amps @ 400/415 V	Sprecher + Schuh circuit breaker	Setting range amps	Magnetic amps	Sprecher + Schuh contactor	AC-3 amps
	0.60	KT 7-25S	0.40 - 0.63	8.2	CA 7-9	9
0.25	0.80	KT 7-25S	0.63 - 1.00	13	CA 7-9	9
0.37	1.10	KT 7-25S	1.00 - 1.60	21	CA 7-9	9
0.55	1.50	KT 7-25S	1.00 - 1.60	21	CA 7-9	9
0.75	1.80	KT 7-25S	1.60 - 2.50	33	CA 7-9	9
1.10	2.60	KT 7-25S	2.50 - 4.00	52	CA 7-9	9
1.15	3.40	KT 7-25S	2.50 - 4.00	52	CA 7-9	9
2.20	4.80	KT 7-25S	4.00 - 6.30	80	CA 7-9	9
3.00	6.50	KT 7-25S	6.30 - 10.0	130	CA 7-9	9
4.00	8.20	KT 7-25S	6.30 - 10.0	130	CA 7-9	9
5.50	11.00	KT 7-25S	10.0 - 16.0	208	CA 7-12	12
7.50	14.00	KT 7-25S	10.0 - 16.0	208	CA 7-16	16
9.00	17.00	KT 7-25H	14.5 - 20.0	260	CA 7-23	23
11.00	21.00	KT 7-25H	18.0 - 25.0	325	CA 7-23	23
15.00	28.00	KT 7-45H	23.0 - 32.0	416	CA 7-30	30
18.50	34.00	KT 7-45H	32.0 - 45.0	585	CA 7-37	37
22.00	40.00	KT 7-45H	32.0 - 45.0	585	CA 7-43	43
30.00	55.00	KT 3-100	40.0 - 63.0	882	CA 7-60	60
37.00	66.00	KT 3-100	63.0 - 90.0	1260	CA 7-72	72
45.00	80.00	KT 3-100	63.0 - 90.0	1260	CA 7-85	85

Definition Type '2' co-ordination according to IEC 947-4-1:

- · The contactor or the starter must not endanger persons or systems in the event of a short circuit
- The contactor or the starter must be suitable for further use
- No damage to the overload relay or other parts may occur with the exception of welding of the contactor or starter contacts provided that these can be easily separated without significant deformation (such as with a screwdriver)
- In the event of a short circuit, fast opening current limiting circuit breakers KT 7 make it possible to build economical, fully short circuit co-ordinated starter combinations in accordance with IEC 947-4-1, Type '2' co-ordination
- Type '2' co-ordination without oversizing of contactors means: Type '1' = Type '2'

Note:

") What is meant by Automatic Type "2" co-ordination? The high speed operation of the new KT 7 motor protection circuit breakers means that contactors need not be oversized to achieve type "2" co-ordination. Simply select the normal AC 3 rated contactor and the corresponding KT 7 circuit breaker and type "2" co-ordination is assured.

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038 : 2000



Tarty Car Provide And Arrest

sprecher+ schuh

(#) TERASAKI

Short circuit co-ordination Type '2' with NHP fuses



Refer Catalogue C-CO

Fuse protection DOL starting 1) 50/65 kA @ 400/415 V to AS 3947.4.1

Fuse

Motor size kW	Approx. amps @ 400/415 V	NHP HRC fuse to BS88	Sprecher + Schuh contactor	Sprecher + Schuh overload relay ²) ³)	Setting range amps	
0.37	1.1	NTIA-4	CA 7-9	CEP 7	1.0 - 2.9	
0.75	1.8	NTIA-6 CA 7-9		CEP 7	1.0 - 2.9	
1.5	3.4	NTIA-10	CA 7-9	CEP 7	1.6 - 5	
2.2	4.8	NTIA-16	CA 7-9	CEP 7	3.7 - 12	
4.0	8.2	NTIA-20	CA 7-9	CEP 7	3.7 - 12	
5.5	11	NTIA-25	CA 7-12	CEP 7	3.7 - 12	
7.5	14	NTIA-32	CA 7-16	CEP 7	12 - 32	
11	21	NTIS-50	CA 7-30	CEP 7	12 - 32	
15	28	NTIS-63	CA 7-30	CEP 7	12 - 37	
18.5	34	NTCP-80	CA 7-37	CEP 7	12 - 37	
22	40	NTCP-80	CA 7-43	CEP 7	14- 45	
30	55	NTCP-100	CA 7-60	CEP 7	26 - 85	
37	66	NTF-125	CA 7-72	CEP 7	26 - 85	
45	80	NTF-160	CA 7-85	CEP 7	26 - 85	
55	100	NTF-200	CA 6-105-EI	CT 6-110	85 - 110	
75	130	NTKF-250	CA 6-140-EI	CT 6-150	105 - 150	
90	155	NTKF-250	CA 6-170-EI	CT 6-200	140 - 200	
110	200	NTKF-315	CA 6-210-EI	CEF 1-41/42 *)	160 - 400	
132	225	NTMF-355	CA 6-210-EI	CEF 1-41/42 *)	160 - 400	
150	250	NTMF-355	CA 6-250-EI	CEF 1-41/42 1)	160 - 400	
185	320	NTTM-450	CA 6-300-EI	CEF 1-41/42 1)	160 - 400	
250	425	NTTM-560	CA 6-420-EI	CEF 1-52 1)	160 - 630	
320	538	NTLM-710	CA 5-550	CEF 1-52 *)	160 - 630	
380	650	NTLM-800	CA 5-700	CEF 1-11/12P 4)	300 - 1200	

Notes:

- 1) Fuses with equal or lower let through energy may also be used.
- Thermal overloads may be used instead of electronic CEP 7.
- 3) Above 37 kW overloads may also be electronic or thermal.
-) CET 4 may be used instead of CEF 1.

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038: 2000

SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume Type '2' using Terasaki circuit breakers (F) TERASAKI



Refer Catalogue C-CO

MCCBs

Motor size kW	Approx. FLC @ 400/415 V (A)	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh thermal O/L type	Setting range (A)
0.37	1.1	XM30PB/1.4	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9
0.55	1.5	XM30PB/2.0	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9
0.75	1.8	XM30PB/2.6	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9
1.1	2.6	XM30PB/4	CA 7-16	CEP 7-M32-2.9-10	1.0 - 2.9
1.5	3.4	XM30PB/5	CA 7-16	CEP 7-M32-5-10	1.6 - 5
2.2	4.8	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7 - 12
3	6.5	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7 - 12
4	8.2	XM30PB/10	CA 7-30	CEP 7-M32-12-10	3.7 - 12
5.5	11	TL100NJ/20	CA 7-30	CEP 7-M32-12-10	3.7 - 12
7.5	14	TL100NJ/20	CA 7-30	CEP 7-M32-32-10	12 - 32
9	17	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32
10	19	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32
11	21	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32
15	28	TL100NJ/50	CA 7-43	CEP 7-M32-32-10	12 - 32
18.5	34	TL100NJ/50	CA 7-43	CEP 7-M37-37-10	12 - 37
22	40	TL100NJ/63	CA 7-43	CEP 7-M45-45-10	14 - 45
30	55	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26 - 85
37	66	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26 - 85
45	80	TL250NJ/160	CA 6-105	CEP 7-M85-85-10	26 - 85
55	100	TL250NJ/160	CA 6-105	CEF 1-11/12	0.5 - 180
75	135	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5 - 180
90	160	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5 - 180
110	200	TL250NJ/250	CA 6-210-EI	CEF 1-41/42/52	160 - 630
132	230	TL400NE/400	CA 6-210-EI	CEF 1-41/42/52	160 - 630
160	270	TL400NE/400	CA 6-300-EI	CEF 1-41/42/52	160 - 630
200	361	TL400NE/400	CA 6-420-EI	CEF 1-41/42/52	160 - 630

Din-T circuit breakers with rotary isolator. DOL starting. 50 kA @ 400/415 V to AS 3947.4.1

Din-T MCBs

Motor size kW	Approx. amps @ 400/415 V	Sprecher + Schuh Isolator	Terasaki circuit breaker	Sprecher + Schuh current limiter	Sprecher + Schuh contactor	Sprecher + Schuh thermal O/L relay	Thermal overload range
0.37	1.1	LA 7-80	Din-T 10 / 4	*	CA 7-9	CT 7-24	0.6 - 1.6
0.55	1.5	LA 7-80	Din-T 10 / 4		CA 7-9	CT 7-24	1 - 1.6
0.75	1.8	LA 7-80	Din-T 10 / 4	-	CA 7-9	CT 7-24	1.6 - 2.4
1.1	2.6	LA 7-80	Din-T 10 / 6		CA 7-23	CT 7-24	2.4 - 4
1.5	3.4	LA 7-80	Din-T 10/6		CA 7-23	CT 7-24	2.4 - 4
2.2	4.8	LA 7-80	Din-T 10 / 10	KTL 3-65	CA 7-23	CT 7-24	4-6
3	6.5	LA 7-80	Din-T 10 / 16	KTL 3-65	CA 7-23	CT 7-24	6 - 10
4	8.2	LA 7-80	Din-T 10 / 16	KTL 3-65	CA 7-23	CT 7-24	6 - 10
5.5	11	LA 7-80	Din-T 10 / 20	KTL 3-65	CA 7-23	CT 7-24	10 - 16
7.5	14	LA 7-80	Din-T 10 / 32	KTL 3-65	CA 7-30	CT 7-45	10 - 16
11	21	LA 7-80	Din-T 10 / 40	KTL 3-65	CA 7-30	CT 7-24	16 - 24
15	28	LA 7-100	Din-T 10 / 63	KTL 3-65	CA 7-37	CT 7-45	18 - 30
18.5	34	LA 7-100	Din-T 10 / 63	KTL 3-65	CA 7-37	CT 7-45	30 - 45

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038 : 2000 Note:



ACS contactors CA 7 Technical data



General data					CA 7-9CA 7-85						
Rated insulation voltage	e U _i										
IEC					690 V						
UL, CSA					600 V						
Rated impulse voltage	withstand	U _{imp}			8k V						
Test voltage											
1 minute (to IEC 947-4))				2500 V						
Rated voltage U _e											
AC					110, 24	10, 400/	415, 5	00, 690	V		
DC					24, 48	3, 110,	2	20, 440	V		
Rated frequency of coil					50/60 Hz	Z					
Ambient temperature											
Storage					-55+8	C (-67.	176 °F)				
Operation at nominal current					-25+6	°C (-13.	140 °F)				
Maximum with 15 % AC 1 current reduction > 60 °C					-25+70 °C (-13158 °F)						
Climatic withstand					Cyclicly changing humid atmosphere to						
						-30 and D	IN 50 016,	56			
Maximum altitude					2000 m l	NN, to IEC	947-4			-	
Protection class											
IP 2LX (IEC 529 and DI	N 40050)				In conne	cted cond	ition				
Protection against conta	act				Touch protection to VDE 0106, Part 100						
Standards					IEC 947-1/4; VDE 0660, Part 100/104; UL 508;						
					CSA 22.2. Part 14						
Compliance					CE; UL; CSA						
Short time withstand					112						
I _{cw} , 60°	CA7-9	CA7-12	CA7-16	CA7-23	CA7-30	CA7-37	CA7-43	CA7-60	CA7-72	CA7-8	
1 s (A)	210	210	290	380	480	525	650	1100	1150	1250	
4 s (A)	140	150	220	280	360	390	480	820	860	910	
10 s (A)	100	120	175	220	290	310	375	640	680	710	
15 s (A)	90	100	150	200	250	270	325	560	600	620	
60 s (A)	60	60	90	125	170	175	200	350	370	380	
240 s (A)	40	40	50	60	100	100	120	190	190	200	
900 s (A) 30 30 38 38					54	60	76	108	108	120	
Minimum cooling time at zero current [Min]	20	20	20	20	20	20	20	20	20	20	



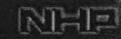
ACS contactors CA 7 Technical data



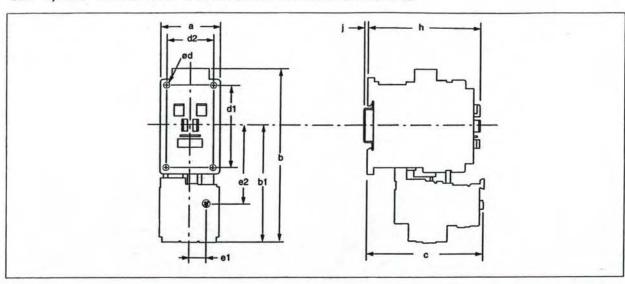
General data					CA 7-9CA 7-85						
Rated insulation voltage	ge Ui							111			
IEC					690 V					-3	
UL, CSA					600 V						
Rated impulse voltage	withstand	Uimp			8k V						
Test voltage				7							
1 minute (to IEC 947-4)				2500 V						
Rated voltage U _e			1								
AC			25		110, 2	40, 400/	415,	500, 690	V		
DC					24, 48	3, 110,	:	220, 440	٧		
Rated frequency of coil					50/60 H	Z				. 5-2 ,	
Ambient temperature	Ambient temperature					- 101				-	
Storage . h .	-				-55+8	0 'C (-67.	176 'F)			-	
/ Operation at nominal current					-25+6	0 °C (-13.	140 °F)			70	
Maximum with 15 % AC 1 current reduction > 60 °C					-25+70 °C (-13158 °F)						
Climatic withstand					Cyclicly changing humid atmosphere to						
					IEC 68-2	-30 and D	IN 50 016	56			
Maximum altitude					2000 m l	NN, to IEC	947-4				
Protection class		17									
IP 2LX (IEC 529 and DI	N 40050)				In conne	cted cond	ition				
Protection against conta	act				Touch protection to VDE 0106, Part 100						
Standards					IEC 947-1/4; VDE 0660, Part 100/104; UL 508;						
100					CSA 22.2. Part 14						
Compliance					CE; UL; CSA						
Short time withstand											
cw, 60°	CA7-9	CA7-12	CA7-16	CA7-23	CA7-30	CA7-37	CA7-43	CA7-60	CA7-72	CA7-8	
1 s (A)	210	210	290	380	480	525	650	1100	1150	1250	
s (A)	140	150	220	280	360	390	480	820	860	910	
10 s (A)	100	120	175	220	290	310	375	640	680	710	
15 s (A)	90	100	150	200	250	270	325	560	600	620	
60 s (A)	60	60	90	1125	170	175	200	350	370	380	
240 s (A)	40	40 -	50	60	100	100	120	190	190	200	
900 s (A)	30	30	38	38	54	60	76	108	108	120	
Minimum cooling time	20	20	20	20	20	20	20	20	20	20	



ACS electronic overloads CEP 7 Dimensions with and without contactors

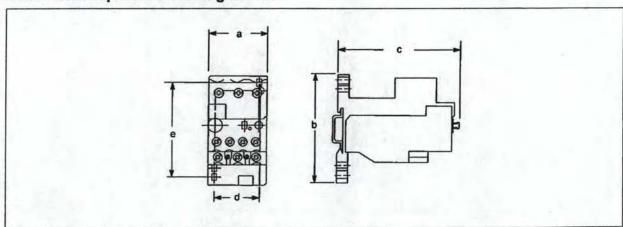


Dimensions in (mm) CEP 7, CEP 7s and CEP 7-B mounted on CA 7 contactors



Cat. No.	а	b	b1	c	e1	e2	d1	d2	h	j	ød
CA 7-9/12/16/23 with CEP 7 or CEP 7S	45	131	86	88.5	16.5	69	60	35	86.5	2	4.2
CA 7-9/12/16/23 with CEP 7-B	54	137	97	90.7	5.1	59	60	35	85.1	2	4.2
CA 7-30/37 with CEP 7 or CEP 7S	45	136.5	91.5	92	16.5	69	60	35	104	2	4.2
CA 7-30/37 with CEP 7-B	54	137	97	92.1	5.2	59	60	35	104.7	2	4.2
CA 7-43 with CEP 7, CEP 7S or CEP 7-B	54	136.5	91.5	93	22	69	60	45	107	2	4.2
CA 7-60/72/85 with CEP 7, CEP 7S or CEP 7-B	72	188.5	120	120	18	84.5	100	55	125.5	2	5.5

CEP 7 with separate mounting bracket



Туре	а	b	C	d	е
CEP 7-37-P-A	45	90	75	30	75
CEP 7-45-P-A	55	90	96.5	40	75
CEP 7-85-P-A	70	115	110	55	105

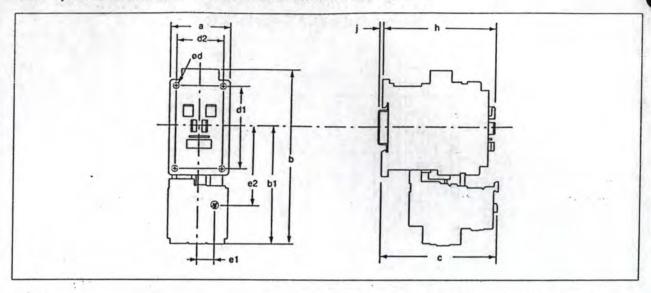


ACS electronic overloads CEP 7 Dimensions with and without contactors



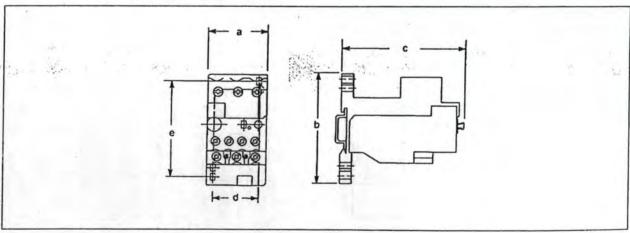
Dimensions in (mm)

CEP 7, CEP 7s and CEP 7-B mounted on CA 7 contactors



Cat. No.	а	b	b1	C	e1	e2	d1	d2	h	j	ød
CA 7-9/12/16/23 with CEP 7 or CEP 7S	45	131	86	88.5	16.5	69	60	35	86.5	2	4.2
CA 7-9/12/16/23 with CEP 7-B	54	137	97	90.7	5.1	59	60	35	85.1	2	4.2
CA 7-30/37 with CEP 7 or CEP 7S	45	136.5	91.5	92	16.5	69	60	35	104	2	4.2
CA 7-30/37 with CEP 7-B	54	137	97	92.1	5.2	59	60	35	104.7	2	4.2
CA 7-43 with CEP 7, CEP 7S or CEP 7-B	54	136.5	91.5	93	22	69	60	45	107	2	4.2
CA 7-60/72/85 with CEP 7, CEP 7S or CEP 7-B	72	188.5	120	120	18	84.5	100	55	125.5	2	5.5

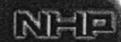
CEP 7 with separate mounting bracket



Туре	а	b	'4' C	d	е
CEP 7-37-P-A	45	90	75	30	75
CEP 7-45-P-A	55	90	96.5	40	75
CEP 7-85-P-A	70	115	110	55	105



AC contactors 3 pole open type with AC coil



Refer catalogue CA 6, 2212, SACS

400/415 V

Ratings to IEC 947 and AS 3497 400/415 V

400/415 V Amps Amps

- O For CA 7 contactors with coil terminals on line side, add Eg - CA 7-9-10-240 V AC ") ... V AC to Catalogue No.
- For CA 7 contactors with coil terminals on load side, add ...V AC-U to Catalogue No. Eg - CA 7-9-10-240 V AC-U

AC 1 ') AC 1 ') Auxiliary contacts













Contactor CA 6-105-EI



Contactor CA 6-170-EI



Contactor CA 6-250-EI



Contactor CA 6-420-EI

kW')	Amps ')	40 °C	60 .C	N/O	N/C	Max.	Cat. No. ³)
4	9	32	32	1	0	9	CA 7-9-10V AC
120				0	1	9	CA 7-9-01V AC
5.5	12	32	32	-1	0	9	CA 7-12-10V AC
i dele inico				0	1.,.	9	CA 7-12-01V AC
7.50 V A	. 16	32	32	.1	0	9	CA 7-16-10V AC
				0	1	9	CA 7-16-01V AC
11	23	32	32	1	0	9	CA 7-23-10V AC
				0	1	9	CA 7-23-01V AC
15	30	50	45	0	0	8	CA 7-30-00V AC
18.5	37	50	45	0	0	8	CA 7-37-00V AC
22	43	85	63	0	0	8	CA 7-43-00V AC
30	60	100	100	0	0	8	CA 7-60-00V AC
37	72	100	100	0	0	8	CA 7-72-00V AC
45	85	100	100	0	0	8	CA 7-85-00V AC
55 (45)	95 (33)	160	135	1	1	8	CA 6-85-11V AC
75 (55)	130 (40)	160	135	1	1	8	CA 6-105-11V AC
90 (75)	155 (55)	250	210	1	1	8	CA 6-140-11V AC
75 (55)	130 (40)	160	135	1	1	8	CA 6-105-EI-11V AC')
90 (75)	155 (55)	250	210	1	1	8	CA 6-140-EI-11V AC')
100 (90)	170 (65)	250	210	1	1	8	CA 6-170-EI-11V AC1)
132 (111)	225 (80)	350	300	1	1	8	CA 6-210-EI-11V AC')
150 (133)	258 (95)	350	300	1	1	8	CA 6-250-EI-11V AC')
185 (163)	320 (115)	450	380	1	1	8	CA 6-300-EI-11V AC')
250 (225)	425 (160)	500	425	1	1	8	CA 6-420-EI-11V AC1)
220 (220)	370 (155)	500	420	2	2	8	CA 5-370V AC')
265 (280)	450 (200)	600	510	2	2	8	CA 5-450V AC*)
325 (355)	550 (250)	780	645	2	2	8	CA 5-550V AC*)
430 (500)	700 (340)	1000	850	2	2	8	CA 5-700V AC')
520 (550)	860 (380)	1100	930	2	2	8	CA 5-860V AC*)
600	1000	1200	1020	1	1	8	CA 5-1000V AC')
700	1150	1350	1150	1	1	8	CA 5-1200V AC')

1000 volt ratings ().

- Add control voltage to Cat, No. when ordering: 24, 32, 110, 240, 415, 440V 50 Hz. Standard voltages for CA 6-105-El...250-El are 24, 48, 110, 240 and 415 V AC. Standard voltages for CA 6-300-El...420-El 48, 110, 240 and 415 V AC. Standard voltages for CA 5-370...1200, 110, 240 and 415 V AC.
- All CA 7 coils can be reversed for line or load side coil terminals as required. Both versions are held in NHP stock for convenience.
- Electronically controlled mechanism (ECM) with interface suffix (EI).
- 55 'C enclosed.
- Contact NHP for recommended cable size.

240/415 V rated coils are suitable for use on 230/400 V in accordance with AS 60038: 2000.

sprecher+

CA 6 contactors 45 - 250kW up to 1000 volts



Refer catalogue CA 6

Contactors with electronically controlled mechanism (ECM) tested to IEC 947

CA 6 - A complete range

The CA 6 range of 1000 volt contactors is now available through to 420 amp. The range now incorporates eight sizes from 45 to 250 kW @ 400/415 volts and 225 kW at 1000 volts.

Electronically controlled mechanism (ECM)

The electronically controlled mechanism has, with the release of the larger CA 6 contactors, been further improved. As well as providing the unique advantages of electronic coil control, the ECM version now includes a built in PLC interface. These are identified with the suffix EI on the Cat. No.

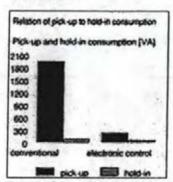
What is "ECM"

ECM stands for "Electronically Controlled Mechanism". With the version EI, an electronic circuit regulates the voltage to the contactor coil. This is achieved using an ASIC (application specific integrated circuit) which precisely controls the pick-up and drop-out levels of the contactor. This provides decisive advantages for the user.

- Very low pick-up and hold coil consumption (constant VA)
- No contact chatter because of defined pick-up and drop-out voltages
- High contact reliability due to minimised tendency to contact bounce
- O Built-in suppression circuits
- O Built-in PLC interface
- Wide voltage tolerance of coils suitable for 50/60 Hz (DC versions also available)
- EMC compatibility: (Note EMC is not to be confused with ECM. EMC means that the contactors also conform to Electromagnetic compatibility standards for noise

CA 6		
Cat. No.	400/415 V AC 3 kW	1000 V AC 3 kW
CA 6-85	55	. 45
CA 6-105-(EI)	75	55
CA 6-140-EI	90	75
CA 6-170-EI	100	90
CA 6-210-EI	132	111
CA 6-250-EI	150	133
CA 6-300-EI	185	163
CA 6-420-EI	250	225

Relation of pick-up to hold-in consumption



Extremely low pick-up and hold-in coil consumption compared with conventional contactors.

Robust and versatile

- O Rated up to 1000 volts
- Type 2 co-ordination with fuses or circuit breakers
- O High thermal capacity
- O High switching capacity
- Mechanical interlock does not increase overall width
- O Up to 8 auxiliary contacts
- Flexible busbars and mounting plates available for quick assembly of starter combinations
- Choice of electronic motor protection or CT 6 thermal overloads
- O Plug-in voltage suppressors Safety first
- Arc chamber cannot be removed with the contactor energised
- Contactor cannot be energised unless arc chambers are locked into place



CA 6-170-El is a 90 kW contactor with ECM

- Switch position indicator (manual operation of contactor not possible)
- Closed arc chambers prevent hot gases escaping. Safety distance in front of contactor not necessary
- Touch proof design using special insulated terminal blocks and terminal covers
- No cadmium or asbestos (environmentally safe)



CA 6 contactor fitted with CEF 1-12 electronic protection provides the ideal starter.

sprecher+
schuh
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Short circuit co-ordination Type '1' with circuit breakers or fuses



Refer Catalogue C-CO

MCCB or fuse DOL starting 50/65 kA @ 400/415 V to AS 3947.4.1

TemBreak Moulded Case Circuit Breaker or fuse

Motor size kW	Approx.	Terasaki circuit or breaker	NHP HRC fuse to BS88	Sprecher + Schuh contactor type	Sprecher + Schuh thermal O/L relay type	Setting range
0.37	1.1	XM30PB/1.4	NTIA-6	CA 7-9	CT 7-24	1 - 1.6 🌁
0.55	1.5	XM30PB/2	NTIA-6	CA 7-9	CT 7-24	1 - 1.6 =
0.75	1.8	XM30PB/2.6	NTIA-10	CA 7-9	CT 7-24	1.6 - 2.4
1.1	2.6	XM30PB/4.0	NTIA-10	CA 7-9	CT 7-24	2.4 - 4
1.5	3.4	XM30PB/5	NTIA-10	CA 7-9	CT 7-24	2.4 - 4
2.2	4.8	XM30PB/8	NTIA-16	CA 7-9	CT 7-24	4-6
3.0	6.5	XM30PB/10	NTIA-16	CA 7-9	CT 7-24	6 - 10
4.0	8.2	XM30PB/12	NTIA-25	CA 7-9	CT 7-24	6 - 10
5.5	11	XH125NJ/20	NTIA-32	CA 7-12	CT 7-24	10 - 16
7.5	14	XH125NJ/20	NTIS-40	CA 7-16	CT 7-24	10 - 16
11	21	XH125NJ/32	NTIS-50	CA 7-23	CT 7-24	16 - 24
15	28	XH125NJ/50	NTIS-63	CA 7-30	CT 7-45	18 - 30
18.5	34	XH125NJ/50	NTCP-80	CA 7-37	CT 7-45	30 - 45
22	40	XH125NJ/63	NTCP-80	CA 7-43	CT 7-45	30 - 45
30	55	XH125NJ/100	NTCP-100	CA 7-60	CT 7-75	45 - 60
37	66	XH125NJ/100	NTF-160	CA 7-72	CT 7-75	60 - 75
45	80	XH125NJ/125 ')	NTF-160	CA 6-85	CT 7-100	70 - 90
55	100	XH125NJ/125 ')	NTF-200	CA 6-105-EI	CT 6-110	85 - 110
75	130	XH250NJ/250	NTKF-250	CA 6-140-EI	CT 6-150	105 - 150
90	155	XH250NJ/250 ')	NTKF-250	CA 6-170-EI	CT 6-200	140 - 200
110	200	XH250NJ/250 ')	NTKF-315	CA 6-210-EI	CEF 1-41/42	160 - 400
132	225	XH400NE/400	NTMF-355	CA 6-210-EI	CEF 1-41/42	160 - 400
150	250	XH400NE/400	NTMF-355	CA 6-250-EI	CEF 1-41/42	160 - 400
160	270	XH400NE/400	NTMF-400	CA 6-300-EI	CEF 1-41/42	160 - 400
185	310	XH400NE/400	NTTF-450	CA 6-300-EI	CEF 1-41/42	160 - 400
200	361	XH400NE/400	NTTM-500	CA 6-420-EI/CA 5-450	CEF 1-41/42	160 - 400
250	425	XH630NE/630	NTTM-630	CA 6-420-EI/CA 5-450	CEF 1-52	160 - 630
315	530	XH630NE/630	NTLM-710	CA 5-550	CEF 1-52	160 - 630
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Notes: Fuses 65 kA. XH125NJ circuit breaker combinations limited to 50 kA, others 65 kA.

Overloads may be changed to different types eg. thermal style to electronic.

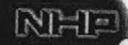
Some combinations also gives Type '2' performance.

1) Use 'magnetic only' breaker - Refer NHP.

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038 : 2000

sprecher+ schuh (F) TERASAKI

Short circuit co-ordination Type '2' with NHP fuses



Refer Catalogue C-CO

Fuse protection DOL starting ') 50/65 kA @ 400/415 V to AS 3947.4.1

Motor size kW	Approx. amps @ 400/415 V	NHP HRC fuse to BS88	Sprecher + Schuh contactor	Sprecher + Schuh overload relay ') ')	Setting range
0.37	1.1	NTIA-4	CA 7-9	CEP 7	1.0 - 2.9
0.75	1.8	NTIA-6	CA 7-9	CEP 7	1.0 - 2.9
1.5	3.4	NTIA-10	CA 7-9	CEP7	1.6-5
2.2	4.8	NTIA-16	CA 7-9	CEP 7	3.7 - 12
4.0	8.2	NTIA-20	CA 7-9	CEP 7	3.7 - 12
5.5	11	NTIA-25	CA 7-12	CEP 7	3.7 - 12
7.5	14	NTIA-32	CA 7-16	CEP 7	12 - 32
11	21	NTIS-50	CA 7-30	CEP 7	12 - 32
15	28	NTIS-63	CA 7-30	CEP 7	12 - 37
18.5	34	NTCP-80	CA 7-37	CEP 7	12 - 37
22	40	NTCP-80	CA 7-43	CEP 7	14-45
30	55	NTCP-100	CA 7-60	CEP 7	26 - 85
37	66	NTF-125	CA 7-72	CEP 7	26 - 85
45	80	NTF-160	CA 7-85	CEP 7	26 - 85
55	100	NTF-200	CA 6-105-EI	CT 6-110	85 - 110
75	130	NTKF-250	CA 6-140-EI	CT 6-150	105 - 150
90	155	NTKF-250	CA 6-170-EI	CT 6-200	140 - 200
110	200	NTKF-315	CA 6-210-EI	CEF 1-41/42 ')	160 - 400
132	225	NTMF-355	CA 6-210-EI	CEF 1-41/42 ')	160 - 400
150	250	NTMF-355	CA 6-250-EI	CEF 1-41/42 *)	160 - 400
185	320	NTTM-450	CA 6-300-EI	CEF 1-41/42 ')	160 - 400
250	425	NTTM-560	CA 6-420-EI	CEF 1-52 *)	160 - 630
320	538	NTLM-710	CA 5-550	CEF 1-52 ')	160 - 630
80	650	NTLM-800	CA 5-700	CEF 1-11/12P *)	300 - 1200

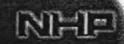
- Fuses with equal or lower let through energy may also be used.
 Thermal overloads may be used instead of electronic CEP 7.
 Above 37 kW overloads may also be electronic or thermal.
 CET 4 may be used instead of CEF 1.

240/415 V rating suitable for use on 230/400 V in accordance with AS 60038: 2000

sprecher+ schuh

(#) TERASAKI

Short circuit co-ordination Type '2' using Terasaki circuit breakers



Refer Catalogue C-CO

TemBreak circuit breakers DOL starting 50 kA @ 400/415 V to AS 3947.4.1

TemBreak MC6Bs

Motor size kW	Approx.	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh overload relay	Setting range amps
0.37	1,1	XM30PB/1.4	CA 7-9	CT 7-24-1.6	1 - 1:6
0.55	1.5	XM30PB/2	CA 7-9	CT 7-24-1.6	1 - 1.6
0.75	(1.8/ 1.1	XM30PB/2.6	CA 7-9 4 0.58 2		1.6 - 2.4
1.1	2.6	XM30PB/4.0	CA 7-16	CT 7-24-4	2.4 - 4
1.5	3.4	XM30PB/5	CA 7-16	CT 7-24-4	2.4 - 4
2.2	4.8	XM30PB/8	CA 7-16	CT 7-24-6	4-6
3	6.5	XM30PB/10	CA 7-30	CT 7-24-10	6 - 10
4	8.2	XM30PB/12	CA 7-30	CT 7-24-10	6 - 10
5.5	11	XH125NJ/20	CA 7-30	CT 7-24-16	10 - 16
7.5	14	XH125NJ/20	CA 7-30	CT 7-24-16	10 - 16
11	21	XH125NJ/32	CA 7-30	CT 7-24-24	16 - 24
15	28	XH125NJ/50	CA 7-43	CT 7-45-30	18 - 30
18.5	34	XH125NJ/50	CA 7-43	CT 7-45-45	30 - 45
22	40	XH125NJ/63	CA 7-43	CT 7-45-45	30 - 45
30	55	XH125NJ/100	CA 6-85	CT 7-75 ²)	45 - 60
37	66	XH125NJ/100	CA 6-85	CT 7-75 ')	60 - 75
45	80	XH125NJ/125	CA 6-105-EI	CT 6-90	70 - 90
55	100	XH125NJ/125 ')	CA 6-105-EI	CT 6-110	85 - 110
75	130	XH250NJ/250	CA 6-140-EI	CT 6-150	105 - 150
90	155	XH250NJ/250	C A6-170-EI	CT 6-200	140 - 200
110	200	XH250NJ/250 ')	CA 6-210-EI	CEF 1-41/42	160 - 400
132	225	XS400SE/400	CA 6-210-EI	CEF 1-41/42	160 - 400
150	250	XS400SE/400	CA 6-250-EI	CEF 1-41/42	160 - 400
160	270	XS400SE/400	CA 6-300-EI	CEF 1-41/42	160 - 400
200	361	XS400SE/400	CA 6-420-EI	CEF 1-41/42	160 - 400
200	361	XS400SE/400	CA 5-450	CEF 1-22 ²)	160 - 400
250	425	XS630SE/630	CA 5-700	CEF 1-52 ²)	160 - 630
320	538	XS630SE/630	CA 5-700	CEF 1-52 ²)	160 - 630

Notes: Overloads may be thermal or electronic.

Combinations based on the overload tripping before the circuit breaker at overload currents up to the motor locked rotor current.

Data for 65 kA co-ordination available refer Cat. C-CO.

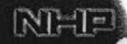
240/415 V rating suitable for use on 230/400 V in accordance with AS 60038: 2000

¹⁾ Use 'magnetic only' breaker or next higher circuit breaker / contactor combination.

²⁾ Use with separate mounting bracket.

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Short circuit co-ordination Type '2' using Terasaki circuit breakers

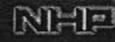


Refer Catalogue C-CO

TemBreak	circuit breakers	DOL starting. 8	5 kA @ 400/415 V to	AS 3947.4.1	MCCB:
Motor size kW	Approx. FLC @ 400/415 V (A)	Terasaki circuit breaker	Sprecher + Schuh contactor	Sprecher + Schuh thermal O/L type	Setting range (A)
0.37	1.1	XM30PB/1.4	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9
0.55	1.5	XM30PB/2.0	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9
0.75	1.8	XM30PB/2.6	CA 7-9	CEP 7-M32-2.9-10	1.0 - 2.9
1.1	2.6	XM30PB/4	CA 7-16	CEP 7-M32-2.9-10	1.0 - 2.9
1.5	3.4	XM30PB/5	CA 7-16	CEP 7-M32-5-10	1.6 - 5
2.2	4.8	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7 - 12
3	6.5	XM30PB/8	CA 7-30	CEP 7-M32-12-10	3.7 - 12
4 5000	¥8.2 14.0 42-1	XM30PB/10	CA 7-30	CEP 7-M32-12-10	3.7 - 12
5.5	11	TL100NJ/20	CA 7-30	CEP 7-M32-12-10	3.7 - 12
7.5	14	TL100NJ/20	CA 7-30	CEP 7-M32-32-10	12 - 32
9	17	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32
10	19	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32
11	21	TL100NJ/32	CA 7-30	CEP 7-M32-32-10	12 - 32
15	28	TL100NJ/50	CA 7-43	CEP 7-M32-32-10	12 - 32
18.5	34	TL100NJ/50	CA 7-43	CEP 7-M37-37-10	12 - 37
22	40	TL100NJ/63	CA 7-43	CEP 7-M45-45-10	14 - 45
30	55	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26 - 85
37	66	TL100NJ/100	CA 7-72	CEP 7-M85-85-10	26 - 85
45	80	TL250NJ/160	CA 6-105	CEP 7-M85-85-10	26 - 85
55	100	TL250NJ/160	CA 6-105	CEF 1-11/12	0.5 - 180
75	135	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5 - 180
90	160	TL250NJ/250	CA 6-210-EI	CEF 1-11/12	0.5 - 180
110	200	TL250NJ/250	CA 6-210-EI	CEF 1-41/42/52	160 - 630
132	230	TL400NE/400	CA 6-210-EI	CEF 1-41/42/52	160 - 630
160	270	TL400NE/400	CA 6-300-EI	CEF 1-41/42/52	160 - 630
200	361	TL400NE/400	CA 6-420-EI	CEF 1-41/42/52	160 - 630

sprecher-

Contactors and overloads CA 6 + CT 6 Dimensions (mm)

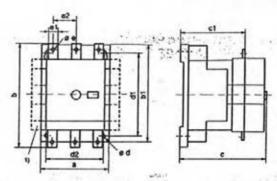


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Refer catalogue CA6

CA 6 Contactors

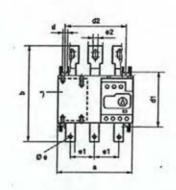


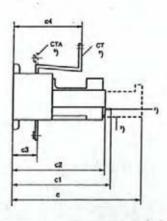


										1.000			- 3/2	St. Contract	
Туре	Hit			а	b	b1	С	c1	ød	d1	d2	øe	e1	e2	4V
CA 6-85/0	CA 6-105		Sh . z	120	182	170	156	110	5.2	145	100	M6	16	. 39	
CA 6-1058	EVCA 6-140/C/	4 6-170EI	25.6	120	182	170	156	110	5.2	145	100	M8.	20	39	2
CA 6-210	-EI.::CA 6-42	0-EI		155	222	205	180	110	6.5	180	130	M10	25	48	

CT 6 thermal overload





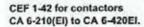


a	b	С	c1	c2	сЗ	c4	d	d1	d2	øe	e1	e2
120	148	193	161	151.5	41	114	-	85	100	M6	39	8.5
120	170	193	161	151.5	45	114	-	85	100	M8	39	8.5
120	133	193	161	151.5	41	6-1		85	100	M6	39	M6
120	176	193	161	151.5	45			85	100	M8	39	M8
	120 120	120 170 120 133	120 170 193 120 133 193	120 148 193 161 120 170 193 161 120 133 193 161	120 148 193 161 151.5 120 170 193 161 151.5 120 133 193 161 151.5	120 148 193 161 151.5 41 120 170 193 161 151.5 45 120 133 193 161 151.5 41	120 148 193 161 151.5 41 114 120 170 193 161 151.5 45 114 120 133 193 161 151.5 41 -	120 148 193 161 151.5 41 114 - 120 170 193 161 151.5 45 114 - 120 133 193 161 151.5 41	120 148 193 161 151.5 41 114 - 85 120 170 193 161 151.5 45 114 - 85 120 133 193 161 151.5 41 - 85	120 148 193 161 151.5 41 114 - 85 100 120 170 193 161 151.5 45 114 - 85 100 120 133 193 161 151.5 41 - - 85 100	120 148 193 161 151.5 41 114 - 85 100 M6 120 170 193 161 151.5 45 114 - 85 100 M8 120 133 193 161 151.5 41 - 85 100 M6	120 148 193 161 151.5 41 114 - 85 100 M6 39 120 170 193 161 151.5 45 114 - 85 100 M8 39 120 133 193 161 151.5 41 - 85 100 M6 39



Electronic motor protection for CA 6 contactor

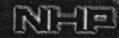
In addition to standard current transformer operated thermal overloads for CA 6 contactors upto 200 amps, the CEF 1 electronic motor protection relay can also be utilised for the whole CA 6 range. For the contactors CA 6-210(EI)...CA 6-420EI the standard overload is the CEF 1-42. The CEF relay provides adjustable trip curves, phase failure protection and thermistor protection as standard.



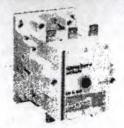
- Notes: ') No increase in base dimension when fitted with P1, P2 aux. For auxiliary contact P3, P4 plus 13.5 mm.
 - 2) Button travel 3.5 mm for "reset".6 mm for "test".
 - 3) With reset magnet CMR.
 - 1) Space for fitting CS 4 or CS 3 or RT 3 thermistor relay (M3.5 screws and nuts required).
 - CT = direct mounting on CA 6, CTA = for separate mounting.

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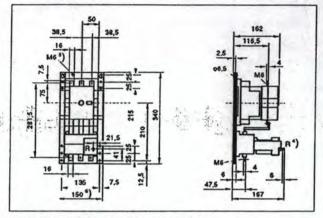
Starters CA 6 Dimensions (mm)



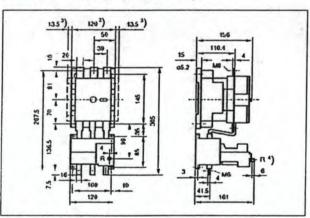
Refer catalogue CA6



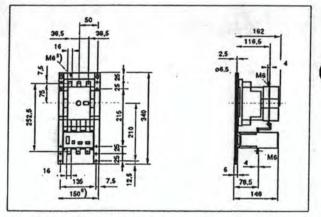
- O Complete contactor range up to 425 amps
- O 1000 volt rated
- O Available with electronic motor protection CEF 1
- O Option for electronic coil control (ECM)
- O Built in safety features
- O Tested to IEC 947



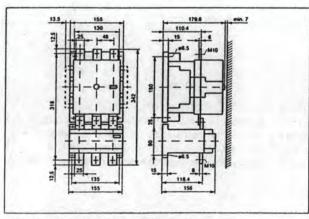
CA 6-85, CA 6-105 + CT 6-90, CT 6-110 ')



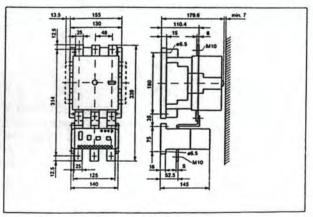
CA 6-85, CA 6-105 + CEF 1 ')



CA 6-105-EI, CA 6-140(EI), CA 6-170-EI + CT 6-150, CT 6-200



CA 6-105-EI, CA 6-140(EI), CA 6-170-EI + CEF 1



CA 6-210-EI...CA 6-420-EI + CWE 4-630

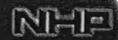
CA 6-210-El...CA 6-420-El + CEF 1-42

Notes:

- Shown mounted on optional DOL mounting plate.
 -) With one or two auxiliary contact blocks CA 6-P.
- 3) For third and fourth auxiliary contact blocks add 13.5 mm each.
- *) R= Reset button: 3.5 mm travel = Reset , 6 mm travel = test.
- Earthing terminal.
- 6) For 1...4 CA 6-P auxiliary contact blocks.

sprecher+

1000 volt contactors



Refer catalogue CA 6, 2212

CA 6 1000 volt contactor system

The latest in switching technology up to 1000 volts

The CA 6 contactors offer the latest in switching technology up to 1000 volts, from Sprecher + Schuh.

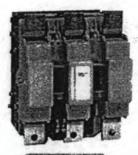
The development of the CA 6 range now covers the CA 6-85 to the CA 6-420, the complete range covering 1000 volt, AC 3 ratings up to 225 kW with 400/415 volt ratings up to 250 kW. Special design features of these contactors include a unique electronically controlled mechanism (ECM) which is standard on all sizes except the CA 6-85-11.

A choice of motor protection

Thermal overload relays CT 6 as well as the CEF 1 and CET 4 electronic motor protection relays are also rated at 1000 volts. They are ideally suited for combining with the CA 6 and CA 5 contactors providing a choice of quality motor protection solutions. For contactors CA 6-210 and above the standard protection can be CEF or CET 4 electronic motor protection.

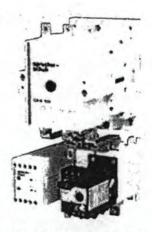


Compact 90 kW 1000 volt starter with CEF 1 electronic motor protection.





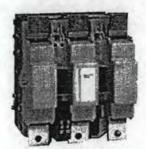
The CET 4 electronic motor protection relay can be combined with S+S 1000 volt contactors.



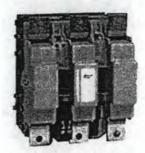
CA 6 with CT 6 thermal overload Here, the CT 6 displays innovative design concepts, with the direct mounting of the S+S RT 3 thermistor protection relay.

High current contactors CA 5

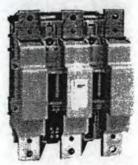
The CA 5-370 ... CA 5-860 high current contactors combine high switching currents up to 1000 volts together with low coil power consumption due to a specially designed coil and magnet system. These rugged and reliable contactors extend the 1000 volt switching capacities of Sprecher + Schuh contactors up to 550 kW as well as being suitable for AC 3 400/415 volt applications up to 500 kW.



1000 V contactor CA 5-370



1000 V contactor CA 5-550



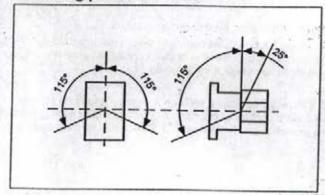
1000 V contactor CA 5-860

sprecher+ schuh

Contactors CA 6 Dimensions (mm)



Mounting positions CA 6



Active 10/12/2015/NDIX 16

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BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 16: Push buttons, Indicator Lights & Thermistors

Manufacturer:

NHP

Supplier Contact:

MPA Engineering

3/22-24 Strathwyn Street Brendale QLD 4500 07 3881 0722

SP306-O&M MANUAL

Rev: A

Date: 29 Nov 05

Page: 17 of 31

sprecher+ schuh

D5 Control and signalling unit 22.5mm **Technical information**



Refer Catalogue SD5

Control and indicating units D5



General technical information

Front elements	Plastic operators (D5P/S)	Metal operators (D5M/B)
Degree of protection according to IEC 529, DIN 40 050 Pushbuttons, Mushroom operators, Selector switch operators	IP 66 (NEMA Type 4/4X/13)	
Potentiometer operator	IP 65	all IP 66 (NEMA Type 4/13)
Multi-function operators without sealing cap	IP 40	
Multi-function operators with sealing cap	IP 66	
Joy sticks and wobble sticks	IP 66	
Mechanical design life		
Pushbuttons	10 000 000 Cycles	10 000 000 Cycles
Momentary mushroom operators,		
Selector jog, Selector switches	500 000 Cycles	500 000 Cycles
Special mushroom operators	100 000 Cycles	100 000 Cycles
Multi-function operators	3 000 000 Cycles	3 000 000 Cycles
Joysticks		100 000 Cycles (in each direction)
Vibration (assembled to panel) Frequencies 102000 Hz		
Displacement 1.52 mm (peak-peak)	max. 10 G	max. 10 G
Shock		
1/2 sine wave (no damage)	100G, 11ms	100G, 11 ms
Temperature range		
Storage	-25 °C+55 °C max. 70 °C/24h	-25 °C+55 °C max. 70 °C/24h
Operating	-25 °C+55 °C	-25 °C+55 °C
Humidity	50 %95 % RH from 25 °C60 °C	50 %95 % RH from 25 °C60 °C

Back of panel components	3-Across style		3-Across style
Standard contact block ratings	NEMA A600,Q600 600 V AC	Shock 1/2 sine wave (no damage)	100G, 11 ms
Low Voltage contact	AC 15, DC 13 to IEC 947-5	Contact block mechanical design	5 000 000 Cycles
block ratings	1724 VUC, 5 mA	Temperature range	
Thermal current	10 A max. continuous current without enclosure (40 °C)	Storage Operating	-25 °C+55 °C max. 70 °C/24h -5 °C+55 °C
	6 A with enclosure (60 °C)	Humidity	40 °C / 95 % RH / 56 days
Insulation category	Group C , 500 V to VDE 0110 600 V UL, CSA		23 °C, 83 % / 40 °C, 93 % 20 cycles
Terminal marking	Conforming to CENELEC EN 50013	Approvals	UL Listed / CSA Certified SEV, CEBEC, DEMKO, NEMKO,
Terminals	0.752.5 mm² Min. 1 x #1812 AWG	4	SEMKO, Seti, Germanischer Lloyd, Bureau Veritas, Maritime Register of shipping. Lloyds register of

Electrical shock protection IP 2X (touch protection)

Vibration (assembled to panel) Frequencies 10...2000 Hz Displacement 1.52 mm (peak-peak) max. 10 G max. 6 h

Short circuit protection

BS 4794; CEE 24; UL 486E

IEC 204-1, 337;SEV 1005, 1093; VDE 0113, 0660 part 201;

of shipping, Lloyds register of

shipping

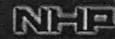
Standard conformity

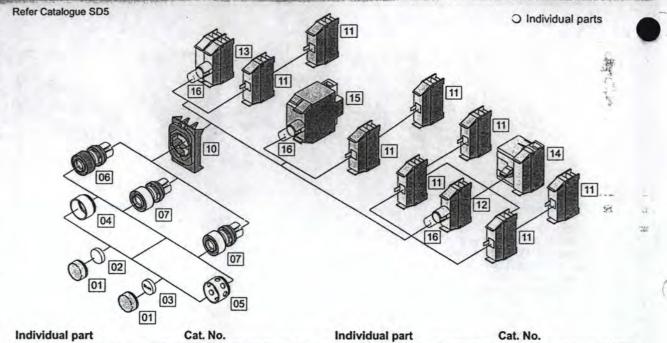
Max. 2 x #14 AWG or 1 x #12AWG

10 A slow (DT,gl)

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D5 Control and signalling units 22.5mm Illuminated pushbuttons





mairidaa	part	oat. No.	marviduai part	Cat. NO.
01 colour	Green	D5-ALF3	12 Lamp elements	D5-3D0
caps ')	Red	D5-ALF4	with diode and	
	Yellow	D5-ALF5	resistor 230/240 V AC	D5-3R7
	Blue	D5-ALF6	13 Lamp elements with central	
	Clear	D5-ALF7	lamp test	D5-3DD0
02 Diffuser	blank	D5-AD2	with diode and ♣ □ ❖	
03 Legend	diffuser		resistor 230/240 V AC	D5-3RDD7
04 Clear plastic front ring (for flush illuminated operators)		D5-ALB1	14 Transformer block 50/60 Hz for mounting on lamp elements	
(for guar	plastic front ring ded illuminated	D5-ALG1	Primary Secondary 110240 V 6 V 1.2 VA	D5-3TS5
operators	•		220240 V 6 V 1.2 VA	D5-3TS7
06 Flush illu	minated plastic		380415 V 6 V 1.2 VA	D5-3TS10
operator	- Standard	D5P-LF9	440480 V 6 V 1.2 VA	D5-3TS12
	Latched	D5P-LFA9	220240 V 24 V 1.2 VA	D5-3THS7
Control of the control	minated plastic with metal front Standard	D5S-LF9	15 Transformer 50/60 Hz with BA9s lamp holder Primary Secondary	
	Latched	D5S-LFA9	110120 V 6 V 1.2 VA	D5-3T5
10 Coupling	plate	D5-A3L	220240 V 6 V 1.2 VA	D5-3T7
11 Contact t	olocks		220240 V 24 V 1.2 VA	D5-3TH7
	1 N/O (Green)	D5-3X10	400 V 24 V 1.2 VA	D5-3TH10
	1 N/C (Red)	D5-3X01	16 Incandescent lamps	a specific
	1 N/O E.M.	D5-3X10E	1.2 W 6, 12, 24, 36, 48, 60 V	BA9S-I3V-1.2W
4	1 N/C L.B.	D5-3X01L	2 W 12, 24, 36, 48, 60 V	BA9S-I3V-2W
	The state of the s	es is also available with metal	2.4 W (long life)	BA9S-I3130V-2.4W
The second second	y D5M Additional legend colo	our caps	2.6 W	BA9S-I3130V-2.6W
,	 Additional legend colour caps. 		16 Neon lamps	Europ of

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BA9S-CN3-110V

BA9S-CN3-240V

110 V...127 V clear

220 V...240 V clear

-E10

-E10

sprecher+ schuh

D5 Control and signalling units 22.5mm **Technical information**



Refer Catalogue SD5

Contact blocks (colour coded)





Front mounting

Base mounting

Snap-on on latch 2 contact levels

up to 3 contact blocks per contact level

. 3

or secure with two screwed fixing straps 3 contact blocks in one contact level possible

Possibilities to combine (Front mounting)

There are maximum 6 contact blocks to be combined

Versions

-01

. 1



D5-3BX... for base mounting

-L01

. 5

Snap onto the inside of the enclosure base or onto a hat rail,

O Front or base mounting

- O Small overall depth
- O Simple snap-on contacts
- O Easy to wire
- O Self-cleaning contacts
- O N/O Green
- O N/C Red
- O Low voltage Blue

Rated operating cu	irrent Ie					
	24 V	48 V	110 V	220 V 230/240		
AC-1 AC-15	8 A	8 A	6 A	10 A 3 A	10 A 3 A	
	380 V	400 V	415 V	500 V	690 V	
AC-1 AC-15	2.5 A	2 A	2.2 A	1.5 A	0.75 A	
Rated operating cu	irrent le . co	ntinued				
DC-13	24 V	48 V	110 V	125 V	220 V	
-01, -10 -01, -E10	3 A 1.3 A	1.5 A 0.4 A	0.2 A 0.13 A	0.6 A 0.13 A	0.1 A 65 mA	
DC-13	250 V	400 V	440 V	500 V	600 V	
-01, -10 -01, -E10	0.3 A 65 mA	0.2 A 26 mA	0.04 A 26 mA	0.15 A	0.13 A	
Short-circuit withs without welding	tand			10 A slo	w (DT, gG	
Switching rate			6	000 opera	ations/hou	
Fuse rating	OTTO:					

fast (D, gF) 10 A slow (DT, gG)

Electrical life

permissible rated current

AC-11	0.1 A	1 A	2 A	3 A
millions of operations	10	3	1	0.5

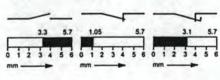
Contact duty

electronic circuit (H-type- bridges) positive opening (-) for: D5-3X01 D5-3BX01

Contact travel

800 E-...





-3BX01L -3X10E * -38X10E *



in preparation

Terminal marking

according to DIN EN 50 013

Terminals

18...12 AWG

Technical information

Rated thermal current Ith

without enclosure with enclosure

(ambient 40 °C) (ambient 60 °C)

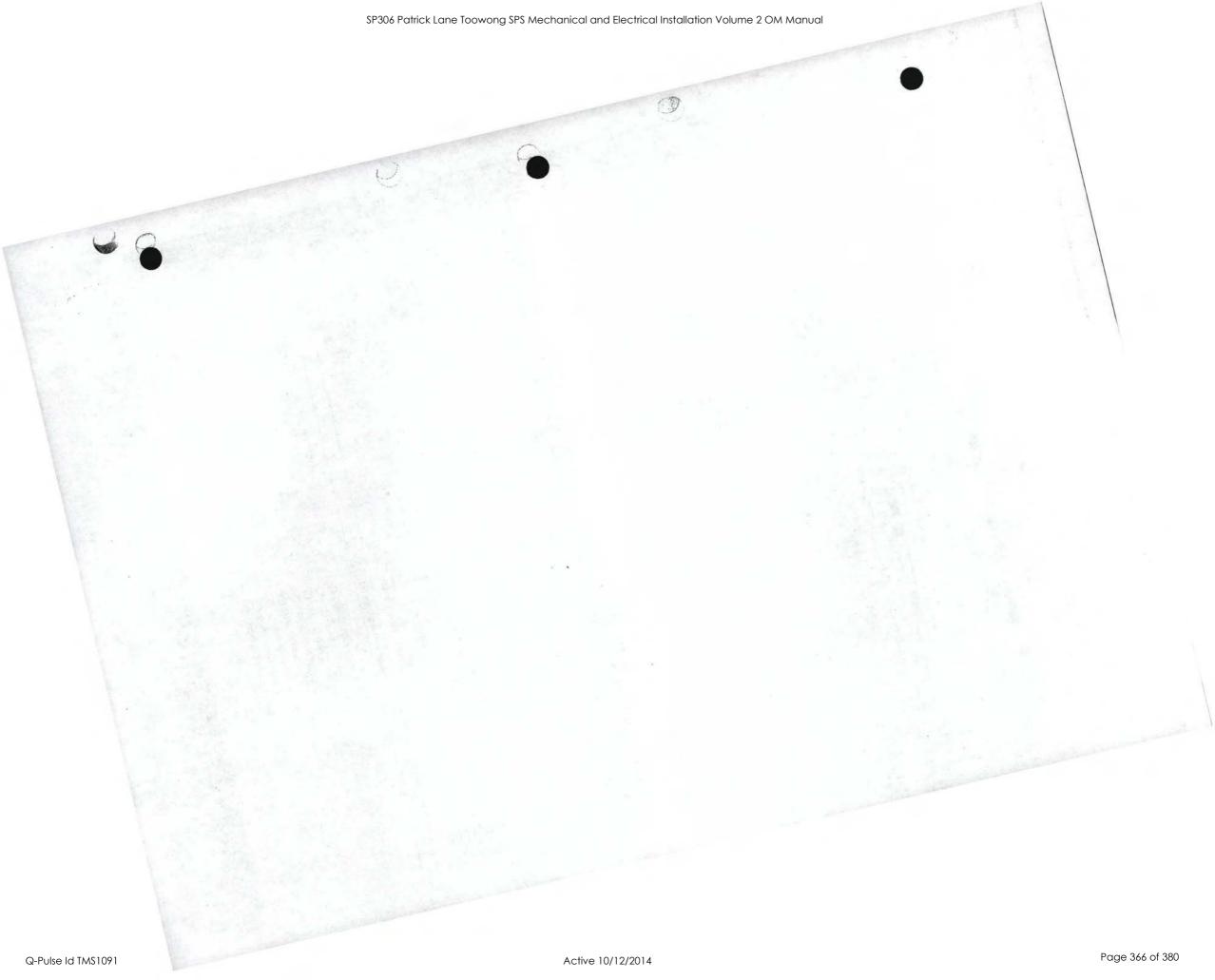
690 V AC

Rated operating voltage Ue

10 A

6 A

0.75...2.5 mm²



to NF (contato de comutação abre com temperatura em elevação) to NA (contato de comutação fecha com temperatura em elevação) ador (contato de comutação comuta com temperatura em elevação)

ara são empregados para controlar aquecedores, equipamentos de resfriamento, lores de calor. Além disso, eles podem ser usados como contatos de comutação para

Dicas de instalação: Os controladores de temperatura medem a temp na parte superior do quadro de comando o mais d

Fixação tipo engaste sobre trilho suporte de 35 As frestas de ventilação dos controladores de

nperatura do contato NF e do comutador (se usado como contato NF), sível à temperatura mínima exigida.

Exemplo para a): temperatura minima exigida no interior do quadro de comando: 5 °C (41 °F) temperatura a ser ajustada no botão giratório vermelho: 16 °C (61 °F) resultante de comando: 16 °C (61 °F

temperatura exigida de 5 °C (41 °F) + maior histerese possível 11 K (7 K + 4 K)

Bruksanvisning för mekaniska temperaturregulatorer

SVENSKA

Oppnare, NC (kontakt som öppner når temperaturen stiger)
Slutare, NO (kontakt som sluter når temperaturen stiger)
Växelkontakt (kontakt som slår om når temperaturen stiger)

(kombination av a) och b))

erna ska lakttas.

ratskåpet. De bör monteras i apparatskåpets övre del med

enligt EN50022. pningar får inte täckas. .. 80 °C (-4 °F .. 176°F)

avseende på funkt

a), b) och d);

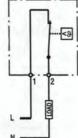
en till ca. 0,5 K.

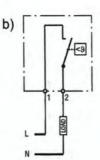
ställning för öppnare och växelkontakt (när de aren höjas med största möjliga hysteres.

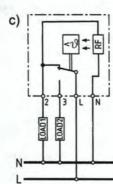
Exempel på a): nödvändig minimitemperatur inne i apparatskåpet: 5 °C (41 °F) inställd temperatur (röd vridknapp): 16 °C (61 °F) som resultat av:

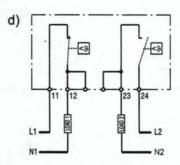
nödvändig temperatur 5 °C 41 °F) + största möjliga hysteres 11 K (7 K + 4 K





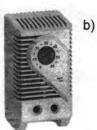


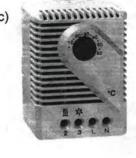


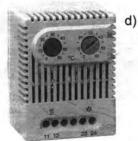


Operating instructions Betriebsanleitung Notice d'utilisation Instruzione de uso Instrucciones para el uso Bruksanvisning Manual de serviço Instrukcja obsługi

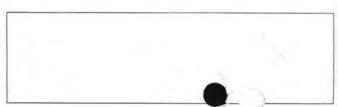








09/03





Betriebsanieltung für mechanische Temperaturregier

Austinnungen:

Offiner (Schaltkontakt bei Schließer (Schaltkontakt b.

igender Temperatur schließe nder Temperatur umsch

Kombination (Kombination a) und bio

Die Temperaturregter werden eingesetzt, um weiteren können sie als Schaftkontekt für Sig ite, Filterlüfter und Willimetauscher zu regein. Des lung von Über- oder Untwierperatur benutzt werden. ber zur M

Die installation der Temperaturregier de quelifiziertem Fachpersonal unter Einhaltung der iandesüblichen Stromversorgungsrichtlic Die Schuttmafinahmen und der Berühr Die technischen Angeben (Spannung

unshgeführt werden. Bufz eind durch den Einbeu sicherzustellen , den Typenachilis dürfen nicht überschritten werden!

Einbauhionniss: Die Temperaturregier erfassen die Temp or on Schuden Sie sollten im oberen Schaltschrankbereich ins genden Bauteilen angebracht werden.

Die Lüftungsschittre himperaturegier dürfen nicht ab ch: -20 °C ... 80 °C (-4 °F ... 179°F

eraturreglers zu überprüfen

lundifferenz) berücksichtigen

a), b) und di:

± 4 K (Kelvin). ± 1.5 K (Kelvin). Durch anschließen des RF Hatzwiderstar she Rückführung) wird fie Hysterese auf ca. 0.5 K verringert

Bei der 1 nstallung von Öffner und Wechsier (wenn als Öffner eingesetzt): a größitmögliche der geforderten Mindesttemperatur addiert werden.

geforderte Mindest-Schaftschrenkinnentemperatur. 5 °C (41 °F) einzustellende Temperatur am rosen Drehknopt. 16 °C (61 °F) resultierend aus:

geforderte Temperatur 5 °C (41 °F) + größtmögliche Hysterese 11 K (7 K + 4 K

Operating manual for mechanical temperature controls

ENGLISH

Normally closed contact (switching contact opens at rising temperature)

Hornsally open contact (switching contact closes at rising temperature)

Change-over contact (switching contact opens one and closes the other contact at rising temperatures)

Applications: The temperature controls are used to regulate heating equipment, cooling equipment, filter fairs and heat exchanges, in addition, they can also be used as switching contacts for signal devices used as two- or high-

Safety considerations:
The temperature control should only be installed by qualified technicians in accordance with the respective national electrical codes.

The safety and prolection against incidental contact is to be ensured through proper installation.

edifications (voltage and current) as stated on the product must not be exceeded

transferring protections. The temperature controls are designed to measure the temperature in enclosures. When used in heating applications, they should be installed in the upper area of the enclosure as for avery as possible from heaters or other heat-generating components. When used in cooling applications, they should be installed at the bottom of the anciosure as for many as possible from the cooling device.

Clip-mounting onto 35 mm DtN rails according to ENS0022 is standard. The verifiation openings of the isemperature control should not be covered at any time. Operating temperature range: 20° Cs a 50° Cs 178° F)

Important: as operating conditions vary widely, safe operation of the temperature control is to be checked in

Setting recommendations: The hysteresis (switching difference) of the temperature control should be taken into account: 7 K ± 4 K (Kelvin) a), b) and d);

4 K ± 1.5 K (Kelvin). Upon connection of the RF heating resistor (thermal coupling), the hysteresis

In order to determine the actual set point of the normally closed contact and change-over contact (when used as normally closed contact), the maximum reted hysteresis should be added to the required minimum operating

Example for a): required minimum temperature in enclosure: 5°C (41°F)

Hysteresis of temperature control: Set point on adjustment knob:

* 11 K (= 7 K ± 4 K)

tutruzioni di servizio per regolatori di temperatura meccanici

ITALIANO

Contatto di apertura (si apre sil'aumento della temperatura) Contatto di chiusura (si chiude all'aumento della temperatura) Contatto di Inversione (commuta all'aumento della temperatura) nazione (combinazione di a) e bi))

itura vengono implegati per regolare apparecchi di riscaldamento, tori con filtro e scambiatori di calore. Possono essere inoltre utilio ftot di segnale con funzione di segnalazione di sovrati

re di temperatura deve essere eseguita solo

g per gli implanti di slime impianti di alimentazione elettric ento contro i contetti diretti devo Le misure di protezione

ati sul cartellino del ti I dati tecnici (fenzione e co-

Norme di montaggio:

imperatura rilevano la temperaturo adro elettrico. Vanno instatiat sulla parte superiore del quadro elettrico alla massima distanza menti di riscaldemento o da attri componenti

Fissaggio a scatto su guide da 35 mm a n

Le fessure di ventilazione dei regoli ono essere coperte Campo delle temperature di esi 176°F)

Nota importante: poiché i campi di s diverse, è necessario verificare il ca

Note sulla regolazione. Per l'isteresi tenera prese

机机机机 7K±4

(Bielviro, Collegendo la resistenza di riscaldamento RF (retro-

temperatura del contatto di apertura e del contatto di Inversione (se Implegato con funcione Per la rego re), alla temperatura minima richiesta è necessario aggiungere l'isteresi mass

(41 °F) + isteresi massima possibile 11 K (7 K + 4 K).

Instrukcja obsługi mechanicznego regulatora temperatury

POLSKI

zwieracz (Kontaki rozwierający przy rosnącej temperaturze)

Zwieracz (Kontakt zwierający przy rosnącej temperaturza) Przełegznik (Kontakt przełączający przy rosnącej temperaturze) Kombinacja (Kombinacje z a) i b))

v regulacji temperatury grzejników, chłodziarek, wentylatorów z filtrami i wyr ciecia. Poza tym san ki przeleczający możne stosować jako dajnik sygnetu w czujnikach te

stury może zostać wykonana ledynie przez wyku inetalacia mosi zape elednie zabezpieczenie przed poradeni

Regulatory temperatury mierzą temperati więcą w szafie sterow deży je instaloweć w gómej części

> Zamocowanie na wcisk na szynie 35 r Szczelina dopływu powietrza na regi

de la collegat się ne berdzo różnorodne warunki, nes tel pratury. Wekazówka: Ponieważ obezar zasto należy sprawdzić niezawodność dzialania s

a), b) i dk 7K±4K(Kelvir

Przez podłączenie opomika g oo RF (termicznego sprzetenia 4 K ± 1.5 K (K wzę meżna skorygować do ok. 0,5 K

historico do zade

zadena minimalna temperatura wnętrza szały: czenecnym pokrętiem należy nastawić temperaturę.

temperatury zadanej 5 °C (41) symalnej historezy 11 K (7 K + 4 K)

act à ouverture (le contact s'ouvre en température montante)

Contact à fermeture (le contact se ferme en température montante)
Contact inverseur le contact inverseur bascule (ouverture ou fermeture) en température

Contacts double (combinations de a et b)

urs de température sont utilisés pour piloter des résistances chauffantes, ventilateur a ou climatiseurs. Ils peuvent an outre servir de signalisations et de contr

eur de température ne doit être réalisée que par un

le locaux en vigueur concernant l'alimentation éle-les respect des normes de sécurité et la protect h contre les contacts accidentels

Conseils d'installation

Les régulateurs de température relévent la température dans la partie supérieure de l'armoire, le plus loin pou produisant de la chaleur. e électrique. Il est recommandé de les placer

Utilizar la fixation par cilo sur rail DiN de 3 PENSO 022 Les fentes d'aération ne doivent pas Températures d'utilisation : -20°C à +

Remarque importants: Les con-faut contrôler son bon fonçtions être variées, il

Conseils de réglage

ératures de commutation (Thystérésia) Prendre en compte la diff

a), b) et d):

C précision de réglage ± 4 K; 7 K + 4 K + 11 K (K - Kelvin). C précision de réglage ± 1,5 K : 4 K + 1,5 K = 5,5 K c ablage indiqué (Optimisation : neutre sur la borne N) perm isation : neutre sur la borne Ni parmet de réduire l'hy

r la réglage de la température du contact à ouverture et du contact inverseur (utilisé comme ntact à curerture). Physistèrists et la précision de réglage additionnée, doivert être ajoutées à la spérature minimais de réglage.

npérature minimale nécessaire à l'intérieur de l'armoire électrique: S°C (41°F).

fempérature à régler sur le boulon rouge 16°C (61°F)

Température emiranale voulue 5°C (41°P), à la quelle il faut ajouler thystèréels plus la précision de réglage (7 K + 4 K)

fanual para regulador mecánico de temperatura

ormalmente ablerto (NC) (contacto de comutación se abre al sobrepasar temperatura) ormalmente cerrado (NO) (contacto de connutación se cierra al sobrepasar temperatura) eversor (contacto de conmutación sa invierte al sobrepasar temperatura) in (combinaciones de a) y b)(

ra son empleados, pera regular calefactores, refrigeradores, ventiladores con filtro e Los reguladores de terri nte se pueden emplear como contactos de conmutación para ing

indicaciones de seguridad

son del requision d ny se malizará solamente por personal cali cumplimiento de las directivas los de alimentación de corriente

Mediante el montaje se deben ase Les indicaciones técnicas (tensión s medidas de protección y la prote ntra contactos

Los reguladores de temperatura registran la temperatura zone superior del armario eléctrico con la mayor distancia os deben ser ubicados en la

Sujeción por medio de fijadores de resoria sobre el cai mm según EN50022. Los anticios de ventilación del regulador de temperatura Rango de temperatura de empleo: -20 °C ... 80 °C (-4 °)

Indicación importante: Dado que los diversos cas debe verificar la seguridad de funcionamiento de

Indicaciones de aiusto: Tomar en quenta histèresia (diferencia d

7 K ± 4 K (Kelvin). 4 K ± 1,5 K (Kel) ido a la conevión de la resistencia de calefacción RF (n

se reduce a aprox. 0,6 K. solo de reposo y del contacto inversor (en caso de ser empleado como

shura milnima recuertda et interior del armerio eléctrico: 5 °C 443 °F) eratuta regutada en el boton rojo roja: températura requerkte 5 °C (41 °F) + mayor histé 66.11 K (7 K + 4 K)

nar la insucr histèresia posible a la temperatura minima requerida.

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BRISBANE CITY COUNCIL Brisbane Water

PATRICK I STATION

LANE PUMP

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

Appendix 17: EMC Fans

Manufacturer:

NHP

Supplier Contact:

MPA Engineering

3/22-24 Strathwyn Street Brendale QLD 4500

07 3881 0722

SP306-O&M MANUAL

Rev: A

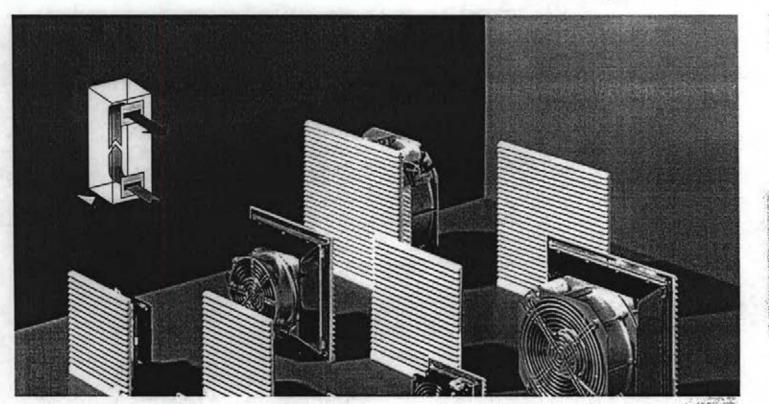
Date: 29 Nov 05

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SP306 Patrick Lane Toowong SPS Mechanical and Electrical Installation Volume 2 OM Manual

EMC FAN-AND-FILTER UNITS

Air throughput 20 - 700 m³/h



EMC-compatible solutions are required when using fan-and-filter units in enclosures with increased shielding. The base parts of our fan-and-filter units are given a metallic coating in a galvanising process. All-round conductive connection between the fan housing and the mounting surface is achieved via a special EMC seal.

Technical description:

- All-round contact on the enclosure via a special EMC seal.
- Minimal number of additional fixing holes, thanks to the contact spring solution.
- Optimised noise generation and air volume, thanks to the typical Rittal grille design.
- Service-friendly handling, thanks to quick replacement of the filter mat.
- The plastic housing is temperatureresistant from – 35 °C to +70 °C and is also self-extinguishing to UL 94-V0.

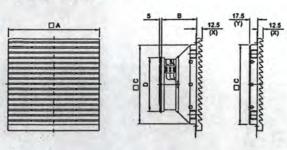
Colour:

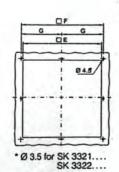
RAL 7032. To order fan-and-filter units in RAL 7035, change the final digit of the order number to a 7.

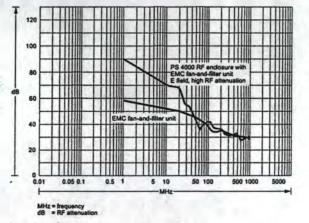
Supply includes:

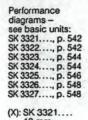
Fan-and-filter units complete and ready to install, including drilling template, filter mat and assembly parts.

EMC fan-and-filter unit









(X): SK 3322.... 10.5 mm (Y): SK 3321.... 12 mm SK 3322....

Model No. Fan-and-filter unit SK	3.78
Rated operating voltage Volt/Hz	1972
Air throughput, unimpeded air flow	
Air throughput with outlet filter including standard filter mat	
Axial fan	145
Rated current max.	1
Power	
Noise level	
Temperature range	
Protection category to EN 60 529/10.91	
Model No. EMC outlet filter SK	15/20
A (mm)	1000
B (mm)	2
C (mm)	F-3255
D (mm)	A STATE OF
E (mm)	Mary 1
F (mm)	1.25%;
G (mm)	JK.10

B (mm)	. 4	3.00
C (mm)	THE RELIEF	NZC.
D (mm)		Hall.
E (mm)	16	
F (mm)		126
G (mm)		PKC.
Special voltages available on req	uest. Technical modi	fication
Accessories	Packs of	Page
Spare filter mats	5	568
Fine filter mats	5	568
Thermostat	1	571
Temperature indicator with switching contact	1 1	570
Temperature indicator with switching contact Speed control	1	570 572

1													
3321.600	3321.615	3322.600	3322.615	3323.600	3323.615	3324.600	3324.615	3325.600	3325.615	3326.600	3326.615	3327.500	3327,515
230/50/60	115/50/60	230/50/60	115/50/60	230/50/60	115/50/60	230/50/60	115/50/60	230/50/60	115/50/60	230/50/60	115/50/60	230/50/60	115/50/60
20/25 m²/	20/25 m³/h		die i	105/120 m³/h		180/160 m³/h		230/265 m³/h		500/560 n	560 m³/h 700/720 m³/h		m ¹ /m
1 x 3321 20 15/18 m ³ /		1 x 3322 26 43/50 m ³ / 2 x 3322 26 48/55 m ³ / 1 x 3323 26 48/55 m ³ /		1 x 3323.26 71/82 m ³ / 2 x 3323.26 85/98 m ³ / 1 x 3325.26 78/90 m ³ /	h 10: 10:	1 x 3325 26 115/ 95 n 2 x 3325 26 165/140 n 1 x 3326 26 155/130 n	n³/h 50: n³/h 50:	1 x 3325 20 170/205 n 2 x 3325 20 200/230 n 1 x 3326 20 190/215 n	n³/h 50: n³/h	1x3325.260: 170/205 m³/h 2x3325.260: 200/230 m³/h 1x3326.260: 360/390 m³/h			
Self-startin	g shaded po	le motor		310			10.00		ATT	Capacitor I	motor		3
69 mA/ 58 mA	138 mA/ 115 mA	0.12 A/ 0.11 A	0.24 A/ 0.23 A	0.12 A/ 0.11 A	0.24 A/ 0.23 A	0.19 A/ 0.20 A	0.38 A/ 0.40 A	0.28 A/ 0.24 A	0.53 A/ 0.49 A	0.29 A/ 0.35 A	0,58 A/ 0.70 A	0.65 A/ 0.95 A	1.50 A/ 2.00 A
12.5 W/ 10.3 W		19.0 W/ 18.0 W	.0 W/			30.0 W/ 35.0 W		41.0 W/ 38.0 W		64.0 W/ 80.0 W		155.0 W/ 212.0 W	167.0 W/ 230.0 W
41/46 dB (A)	46/49 dB (46/49 dB (A)			52/48 dB (A)	54/56 dB (A)		59/61 dB (A)		75/76 dB (A)	
-10°C to	+ 55 °C												
IP 43 IP X5 when hose-proof	using fine f hoods	liter mats an	đ	IP 43 stand IP X5 when fine filter m hose-proof	using als and	IP 43 IP X5 when line filter m hose-proof	als and	IP 43 stand IP X5 when fine filter m hose-proof	using als and	IP 43 IP X5 when hose-proof	using fine fi hoods	iler mats and	1
3321.260		3322.260		3323.260		3325.260				3326.260			
. 116.5	2	148.5		204.0		255.0				323.0			
37.0	Sec. 10	52.0		77.5	1	100.0	513			124.0		140.0	

3321.700 3322.700		2.700 3171.		3322.700			3172.100		3172.100			3173.100		3327.700	
			3181.100	10.00	3182.100				3183.100						
3114.115	3114.100	3114.115	3114.100	3114.115	3114.100	3114.115	3114.100	3114.115	3114.100	3114.115	3114.100	3114.115			
3120.115	3120.000	3120.115	3120.000	3120.115	3120.000	3120.115	3120.000	3120.115	3120.000	3120.115	3120.000	3120.115			
		3114.115 3114.100	3114.115 3114.100 3114.115	3181.100	3181.100	3181.100 3182.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100	3181.100 3182.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100 3114.115	3181.100 3182.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100	3181.100 3182.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100 3114.115	3181.100 3182.100 3184.115 3114.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100	3181.100 3182.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100 3114.115 3114.100 3114.115				

222.0

Ø 150.0

224.0

234.0

(117.0)

□□■□□□ Rittal Catalogue 30/Enclosure climate control and machine cooling

290.0

292.0

302.0

(151.0)

225.0

280.0

90.0

92.0 - 44

100.5

(50.25)

□ 90.0

122.5

124.0

132.5

(66.25)

120.0

176.0

177.0

185.0

(92.5)

120.0

BRISBANE CITY COUNCIL Brisbane Water

PATRICK LANE PUMP STATION

SP 306 OPERATING AND MAINTENANCE MANUAL Part 5: Appendices

Contract No.: BW.30079-02/03 M & E Fitout & Commissioning

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Appendix 18: Phase Fail Relays

Manufacturer: Supplier Contact: Crompton Instruments MPA Engineering 3/22-24 Strathwyn Street Brendale QLD 4500 07 3881 0722

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Rev: A

Date: 29 Nov 05

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tyco | Electronics | Energy Division

INSTALLATION INSTRUCTIONS

Page 1 of 2

Ref: IW250PMSH - Rev 6 - Sept 02

Models Covered

252-PMM 252-PMT 252-PSG 253-PH3 252-PMM 252-PMT 252-PMT

Introduction

Thermistor Trip Relay (252-PMM & 252-PMT).

The trip inputs are monitored within settable limits. In the event of the input moving outside these limits, the unit will initiate a trip signal via a double pole changeover relay. An illuminated green LED indicates when the thermistor temperature is within normal working limits. The unit is designed such that the alarm relay is energised when normal temperatures are reached.

Model 252-PMM has the facility for manual resetting, so that the trip condition remains after normal operating temperature is reached, until manual intervention occurs.

Phase Balance Relay (252-PSF & 252-PSG)

Trip inputs are monitored within settable limits. In the event of the input moving outside these limits, the unit will initiate a trip signal via a double pole changeover relay. An illuminated red LED indicates that the supply is within limits.

Speed Sensing Relay (253-PH3)

Trip inputs are monitored within settable limits. In the event of the input moving outside these limits, the unit will initiate a trip signal. The illuminated red LED's indicates that the single pole output relays are in an energised state and at normal running speed all three relays should be energised. Units are factory adjusted for normal running speed = 0.75mA output. The meter adjust pot on the product front is used for this requirement, which also ensures the trip levels are set to the calibrated values. Terminal 8 is connected to terminal 5 internally. Terminals 15 and 16 give a 0/1mA signal proportional to speed.

No.1 Relay energises on rising speed No.2 Relay energises on rising speed No.3 Relay de-energises on rising speed

This product is designed for use only with magnetic coil inductive sensors.

Warning

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit.
 Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations. Ensure all supplies are de-energised before attempting connection or other procedures.
- It is recommended adjustments be made with the supplies de-energised, but if this is not pussible, then extreme caution should be exercised.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.

Never open circuit the secondary winding of an energised current transformer.

Protector Trip Relays DIN Rail & Wall Mounted 250 Series Thermistor Trip, Speed Sensing & Phase Angle

Installation

The Protector should be installed in a dry position, not in direct sunlight and where the ambient temperature is reasonably stable and will not be outside the range 0 to 60 degrees Celsius. Mounting will normally be on a vertical surface but other positions will not affect the operation. Vibration should be kept to a minimum. The Protectors are designed for mounting on a 35mm rail to DIN 46277. Alternatively they may be screw fixed; a special adaptor is supplied to mount 252 types.

To mount a protector on a DIN rail, the top edge of the cutout on the back is hooked over one edge of the rail and the bottom edge carrying the release clip clicked into place. Check that the unit is firmly fixed. Removal or repositioning may be achieved by levering down the release clip and lifting the unit up and off the rail.

Connection diagrams should be carefully followed to ensure correct polarity and phase rotation where applicable. External voltage transformers may be used on 252-PSF and 252-PSG to extend the range.

252-PMM, 252-PMT & 253-PH3

Pick up, input and output leads should be kept separate from any other wiring.

Setting Controls (252-PSF, 252-PSG)

These products have two calibration facilities that can be set to suit operating requirements and they are factory calibrated as follows:

- % unbalance set points
 Voltages of and below 380 volts L-L are calibrated to
 1.0% class index of rated voltage. Voltages above 380
 volts L-L are calibrated to 1.5% class index of rated
 voltage.
- Time Delay For all voltage ranges 10% maximum delay.
- Voltage Withstand Continuous overload = 1.35 x rated voltage

Setting Up (all other models)

The calibration marks around the controls are provided as a guide if the installer does not have access to accurate equipment. The maximum error of the calibration marks is typically 10% of the span of the control concerned.

Maintenance

The unit should be inspected to normal standards for this class of equipment. For example remove accumulations of dust and check all connections for tightness and corrosion. In the unlikely event of a repair being necessary it is recommended that the unit be returned to the factory or to the nearest Crompton Instruments Service Centre

Electromagnetic Compatibility

This unit has been designed to provide protection against EM (electro-magnetic) interference in line with requirements of EU and other regulations. Precautions necessary to provide proper operation of this and adjacent equipment will be installation dependent and so the following can only be general guidance:-

 Avoid routing wiring to this unit alongside cables and products that are, or could be, a source of interference.



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Ref: IW250PMSH - Rev 6 - Sept 02

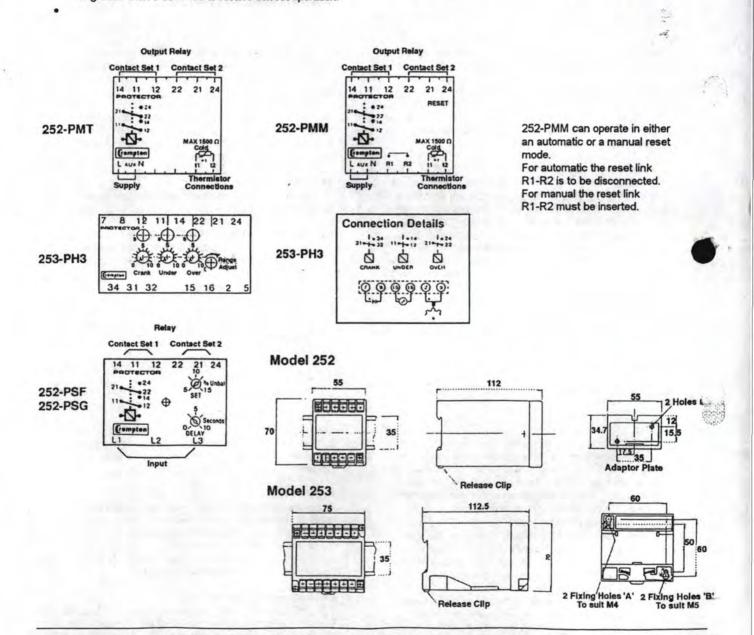
- The auxiliary supply to the unit should not be subject to excessive interference. In some cases, a supply line filter may be required.
- To protect the product against incorrect operation or permanent damage, surge transients must be controlled. It is good EMC practice to suppress differential surges to 2kV or less at the source. The unit has been designed to automatically recover from typical transients, however in extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.

INSTALLATION INSTRUCTIONS

Protector Trip Relays
DIN Rail & Wall Mounted 250 Series
Thermistor Trip, Speed Sensing &
Phase Angle

 Screened communication and small signal leads are recommended and may be required. These and other connecting leads may require the fitting of RF suppression components, such as ferrite absorbers, line filters etc., if RF fields cause problems.

It is good practice to install sensitive electronic instruments that are performing critical functions in EMC enclosures that protect against electrical interference causing a disturbance in function.



The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, Tyco Electronics has no control over the field conditions, which influence product installation. It is the user's responsibility to determine the suitability of the installation method in the user's field conditions. Tyco Electronics' only obligations are those in Tyco Electronics' standard Conditions of Sale for this product and in no case will Tyco Electronics be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products. Crompton is a trade mark.



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