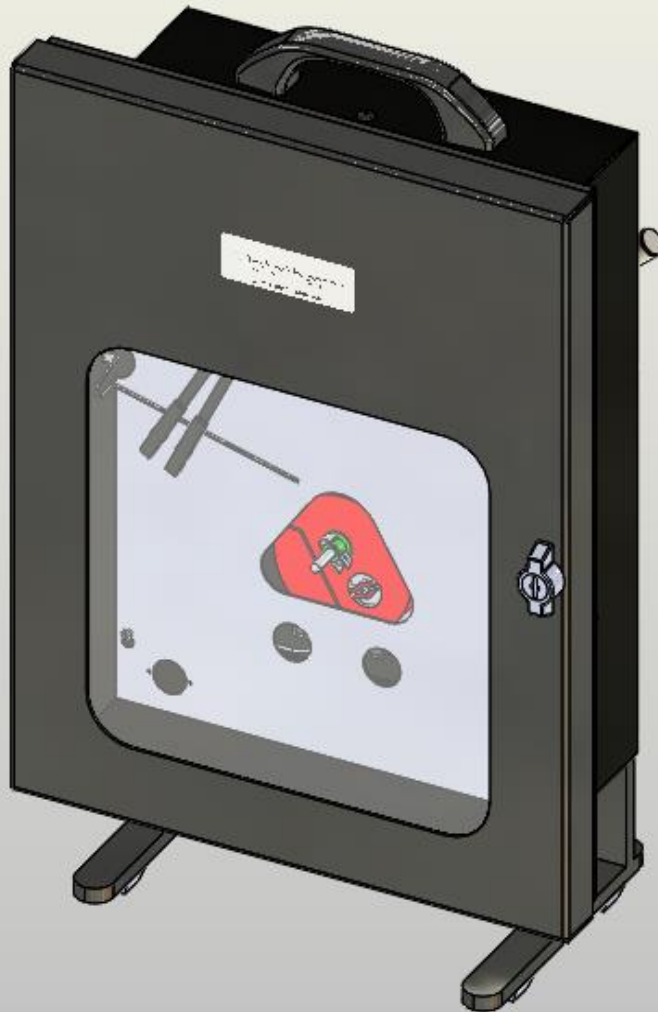


CLEARSCAN 12
12 INCH CHART RECORDER
INSTALLATION & OPERATION MANUAL



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SPECIFICATIONS

Enclosure

Case	Zintec Steel or 316 Stainless Steel
Finish	Electrostatic Black Powder Coating or Brushed Natural
Hinge	304 Stainless Steel
Gaskets	EPDM 55 Shore
Window	Acrylic

<u>Mechanism</u>	304 Stainless Steel
------------------------	---------------------

<u>Linkage System</u>	304 Stainless Steel
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Static Pressure Element

Material	316 Stainless Steel
Range	50 to 30,000 PSI / 3 to 2000 bar
Accuracy	±1% full scale deflection

Temperature Element

Type	SAMA Class 3b Nitrogen gas filled, Case Compensated
Thermal Bulb Material	316 Stainless Steel
Capillary	3 metre (10ft) armoured
Range	0 to 100°C Standard

Accuracy ±1% full scale deflection

INTRODUCTION

The Clearscan™ series of circular chart recorders is designed to measure and record static pressure and temperature process variables.

A gas expansion system is used for temperature measurement and a bourdon tube for pressure measurement.

A pen mechanism and associated linkages are adjusted to accurately transmit the measured variables to be continuously recorded on a calibrated circular chart which is rotated at a constant speed by a geared drive mechanism.

Pressure is applied to the recorder connection through capillary tubing to a spiral wound bourdon tube.

An increase in pressure partially uncoils the bourdon tube the open end of which carries a drive pin.

A central post fixed to the drive pin is fitted with a span adjust screw to enable the amount of leverage to be adjusted accurately.

A drive link is attached by a trunnion pivot to the end of the span adjust screw and similarly to a lever arm attached to the shaft of a mechanism, the whole being free moving and friction-less.

The lever arm is so arranged to provide a series of holes into which the drive link is fitted depending on the amount of deflection output generated by the measuring system employed.

The pen shaft itself is mounted between two plates separated by pillars to form a rigid structure for attachment for the pen arms.

The pen arm mounting incorporates an adjustable zero plate to provide fine pen adjustment during calibration.

The pen arm is fitted with an ink capsule to record permanently upon a circular chart paper.

The paper chart is fitted to a chart drive mechanism and clamped using the central hub.

Chart drive mechanisms are mechanical spring wound or battery driven of fixed rotation.

The various mechanisms and elements are mounted upon a baseplate which itself is attached within a weatherproof enclosure.

The enclosure is can be mounted to a wall or surface, within a panel, attached to a 2" Pipe or be portable.

Entries for temperature system and pressure connections can be made from the lower or rear sides of the enclosure.

Details of each unit manufactured are described upon a serial number label attached to the inside of the enclosure door.

GENERAL WARNING / ADVICE

The warranty will be voided if the following precautions are ignored:

Handle and transport the unit with care and do not subject the instrument to shock loads.

Mount the recorder where the unit will not be subject to vibration which will cause premature wear of mechanism and link bearings.

Install accessories to prevent pressure pulsation and overload protection when required.

DO NOT exceed the pressure or temperature range of the unit.

The thermal measuring system within the case is ambient compensated between -20 to +50°C.

Pressure measuring systems are constructed from 316 stainless steel material; ensure that the process media is compatible with known corrosion resistance values for the material before installation.

Recorder linkages are delicate so exercise caution if making adjustments inside the unit to avoid accidental damage.

Any faults or missing parts must be noted to the manufacturer or their agent prior to installation.

After carrying out the basic fault finding if the problem is still evident, refer to the detailed maintenance procedures or contact British Rototherm or your local authorised British Rototherm distributor for spares, information and technical advice and support.

Use only spare parts as listed, available ex-stock from the manufacturer to guarantee correct function.

In keeping with British Rototherm policy for continual product development and improvement, we reserve the right to amend specifications without notice.

PROCESS CONNECTIONS

The recorder is typically fitted with NPT threaded connection(s) and all pipelines attached to it must be secure and leak proof. PTFE sealing tape must be used to make a pressure tight join to the recorder connections.

Use pressure tubing of sufficient size and rating to make a connection from the measuring point in the flow pipe or vessel to the fitting(s) on the recorder.

Slope the run of the pipe-work in such a way that any condensate is drained away from the recorder, and fit an appropriate shut-off valve. For measurement of steam pressure and other hot vapours, form a condensate trap below the recorder.

It is recommended that a needle valve be installed in the pressure line close to the instrument to enable pressure to be admitted gradually. It can also dampen any pressure pulsation and/or fluctuation.

For higher pressures typically above 10,000 PSI, a 1/4" HP (9/16" UNF) autoclave connection is used. Pipework must be high pressure tubing with coned nipple end to form a metal to metal seal incorporating a left hand thread collar and 9/16" UNF gland nut.

TOOLS REQUIRED

The following tools are required to perform general calibration, rebuild operations and maintenance of the instrument:

- Metric Allen Keys (2.5mm A/F & 3mm A/F required)
- 3mm A/F small nut spinner or straight blade screwdriver for pen zero adjustment screw
- 4mm A/F open end miniature Wrench for the adjustment of the Pen Shaft Lever Drive Arms
- 7mm A/F open end Wrench for the adjustment of the Range Span Adjust Screw
- 10mm A/F open end Wrench for the removal and refitting of Portable Leg Stands / Element Outlet Plate
- 11mm A/F open end Wrench for the pressure capillary nut connection to the static PRESSURE ELEMENT
- No.1 Pozidrive® Screw driver for Chart Plate removal and refitting
- No. 2 Pozidrive® Screw driver for Element removal and fitting / fitting of Portable Carry Handle /Chart Drive removal and refitting
- 2.5mm A/F Allen Keys for the adjustment of Centre Take-off Post
- Large flat blade screw driver for the removal / refitting / adjustment of the mechanism stand.
- Small flat blade screw driver for the removal / fitting / adjustment of pen arm
- Medium gripping pliers for the adjustment of the Screwed Drive Link.
- Straight edge rule for measurement of drive link / lever arm / span adjust screw heights
- Compact mirror for the accurate viewing of pen to chart paper

ACCESS TO THE RECORDER

To open the door, unlock the door lock by inserting the key and turning anticlockwise a half turn.

To open the door, rotate the wing handle of the door lock a quarter turn anticlockwise.

FITTING A CHART

Clearscan charts are 12" nominal diameter printed onto temperature and humidity stable 7-point paper.

Mechanical Clock (Note: clocks up to 24 hour rotation have combined chart clamp winder, rotations above 24 hour have a separate clamp and winder, dual rotation mechanical drives are key wound).

Release the chart clamp as follows:

- a) Operate the pen lifter to raise the pen arm(s)
- b) Unscrew to remove the winder clamp from the clock hub or push the clip upwards on battery chart drives.
- c) Slide the chart under the pen lifter and pen arm(s) and locate the chart centre hole over the clock hub
- d) Place the outside diameter of the chart beneath the four chart guides formed in the chart plate
- e) Align the chart paper the correct timeline on the chart aligned near to the time label. On a two-pen instrument the red pen will be approx. 2.5mm from the blue pen which equates to 15 minutes difference on a standard 24 hour rotation chart.
- f) Refit the winder clamp and wind the chart drive by winder or key or slip the clip back to retain the chart paper.

INKING SYSTEM

The writing system uses fibre tip pen capsules.

The fibre tip is protected by a rubber cap, which should be removed prior to use.

The pen arm accepts the moulded body of the pen capsule and a clamp provided on the capsule secures it to the pen arm.

The primary pen must be tracked to the timeline of the chart paper for accuracy.

REPLACEMENT OF INK PEN

Ink capsules can be easily replaced when the ink is exhausted.

To fit a new pen capsule:

Operate the pen lifter by hand by removing it from under the catch post attached to the case wall on the inner left-hand side. This will raise all pens away from the chart paper.

- a) Unclip the moulded clamp on the pen capsule; remove the existing capsule by pulling carefully upwards and outwards from pen arm.
- b) Place a new capsule onto the pen arm ensuring the end of the pen arm is correctly position to the pen arm stop; secure the capsule in place with the clamp provided.
- c) Remove the pen nib cover, position the pens onto the chart paper by lowering the pen lifter and retain it under the catch post attached to the case wall on the inner left-hand side.

PEN FRICTION AND ZERO ADJUSTMENT

Each recording pen is fitted with screws for friction and zero adjustment.

These adjustments are factory set to optimal setting; however various plant conditions and usage may result in the need to make minor changes for correct operation.

The pen trace can be altered to optimum by turning the pen arm friction adjust screw provided bearing onto the pen arm as shown in figure 3.

To make the trace bolder gently turn the screw clockwise, to lighten the trace gently turn the screw counter-clockwise.

To position the pen to read accurately at zero when pressure is vented or any desired known pressure value on the chart, turn the fine zero adjust screw in the direction required to move the pen the desired amount.

If for any reason, the required pen zero adjustment is more than a small increment refer to detailed maintenance notes especially if the calibration accuracy of the recorder is suspected of inaccuracy or is impaired.

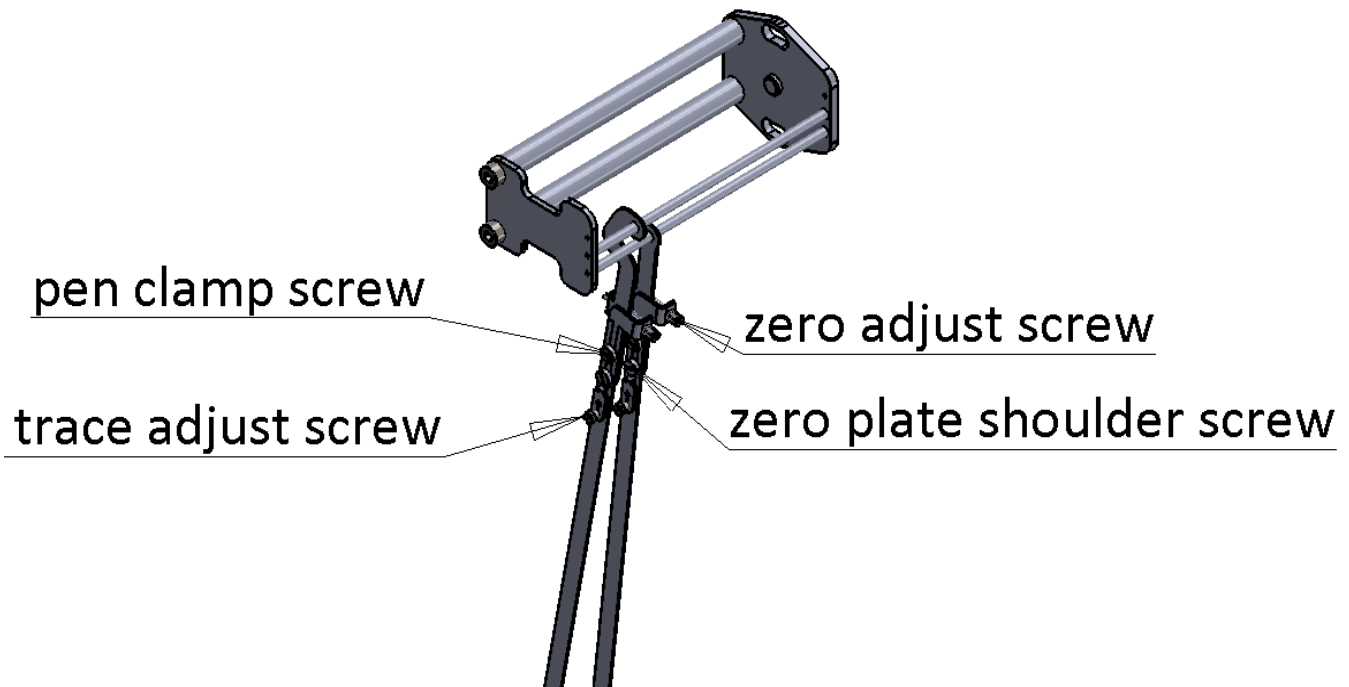


Figure 1

RECORDER START UP CHECK

Before putting the recorder into operation make the following checks to ascertain that it is correctly installed and operational.

1. Remove any transit packing or bands used to hold the pens to the steel pen lifter arm for despatch purposes.
2. The pen(s) operate freely, write clearly on the chart and pass each other without touching.
3. Measuring elements are correctly installed and not leaking.
4. Measuring elements are indicating correctly. If not, refer to zero adjustment.
5. Ensure that, in case of instruments fitted with mechanical chart drive, it is wound and running. For battery operated chart drives insert the correct battery size and ensure correct polarity.
6. Fit a new chart with its edge under the plate guides, set it to the correct time line and clamp the chart paper at the central hub.

PRESSURE / TEMPERATURE LAYOUT

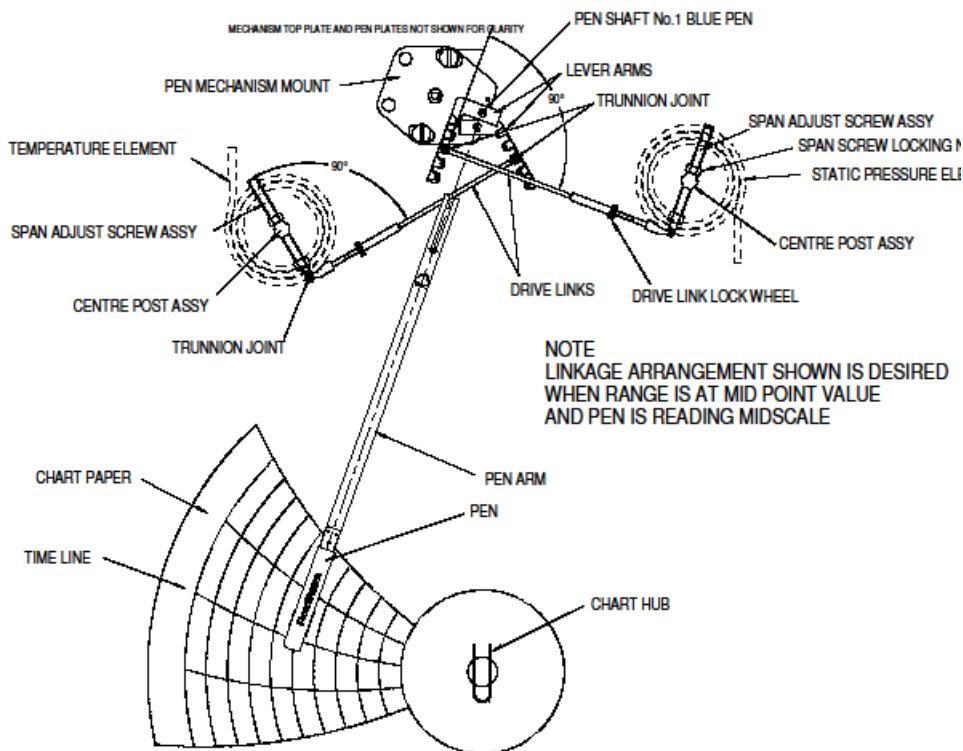


Figure 2

The illustration above details the typical design linkage arrangement for pressure temperature combination.

The design intent is to arrange the driven link to be at right angles at each end when at midscale recording position.

The following section is provided to aid the user identify the major components and sub-assemblies and their operation.

SUB ASSEMBLIES: IDENTIFICATION & DESCRIPTION

DUAL PEN MECHANISM RTB064-F

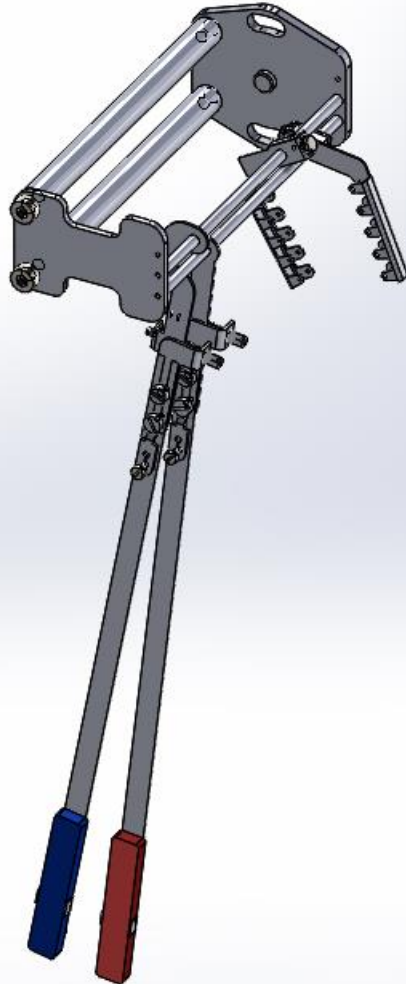


Figure 3

The mechanism consists of a bottom and top plate separated by two pillars.

A central pin is fixed to the bottom plate to allow the mechanism to be positioned into the instrument for pen arc alignment.

The pen shafts for each pen arm are accurately sized and mounted between the plates within their respective bearing holes.

Attached to the shaft is a pen plate upon which is mounted an adjustable zero plate. To allow fine tuning of the pen arm the zero plate is fitted with a spring tension zero adjust screw.

Also on each pen shaft is a lever drive arm locked in position by a clamp block locking screw for attachment of the drive link.

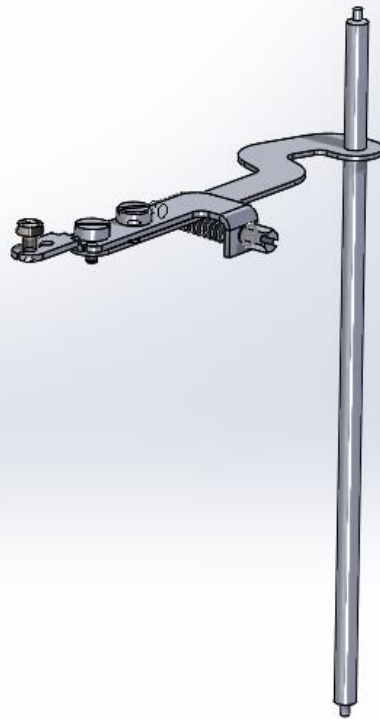


Figure 4

The Pen Shaft consists of a 1/8" diameter rod with pivots at each end.

A Pen Plate is attached permanently to the Shaft at height corresponding to the Blue Pen Capsule.

Upon the Pen Plate a pivoting Zero Adjust Plate attached by a Shouldered Screw.

The Zero Plate carries the recording pen arm.

The front of the Zero Adjust Plate has a swept feature for the pen arm friction adjust screw.

A Zero Screw and spring is fitted to adjust the Zero Plate and thereby the recording pen arm.

A Clamp Screw is fitted to set the correct length of pen arm to coincide with the arc time line of the chart paper.

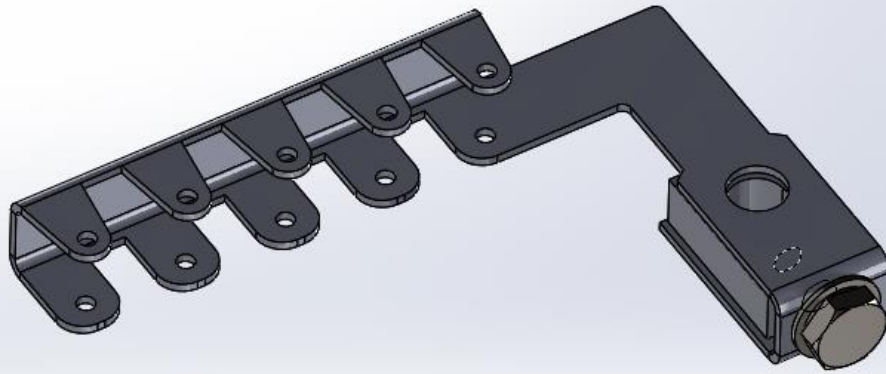


Figure 5

The Pressure Lever Drive Arm is fitted onto the Pen Shaft of the Mechanism.

It is held in position when the height of the forks coincides exactly with the height of the Span Adjust Screw thereby ensuring the Drive Link is straight.

The M2.5 Hex Head Screw acts as a lock screw by pulling the clamp block against the pen shaft. Use a 4mm A/F open end Wrench to adjust.

Only tighten sufficiently to lock in place, over tightening may shear the screw head.

The forks provide pairs of holes to set the initial span to suit the PRESSURE ELEMENT.

Set the Drive Link to the THIRD pair of holes down from the pen shaft for ranges up to 600 PSI.

Set the Drive Link to the SECOND pair of holes down from the pen shaft for ranges above 750 PSI.

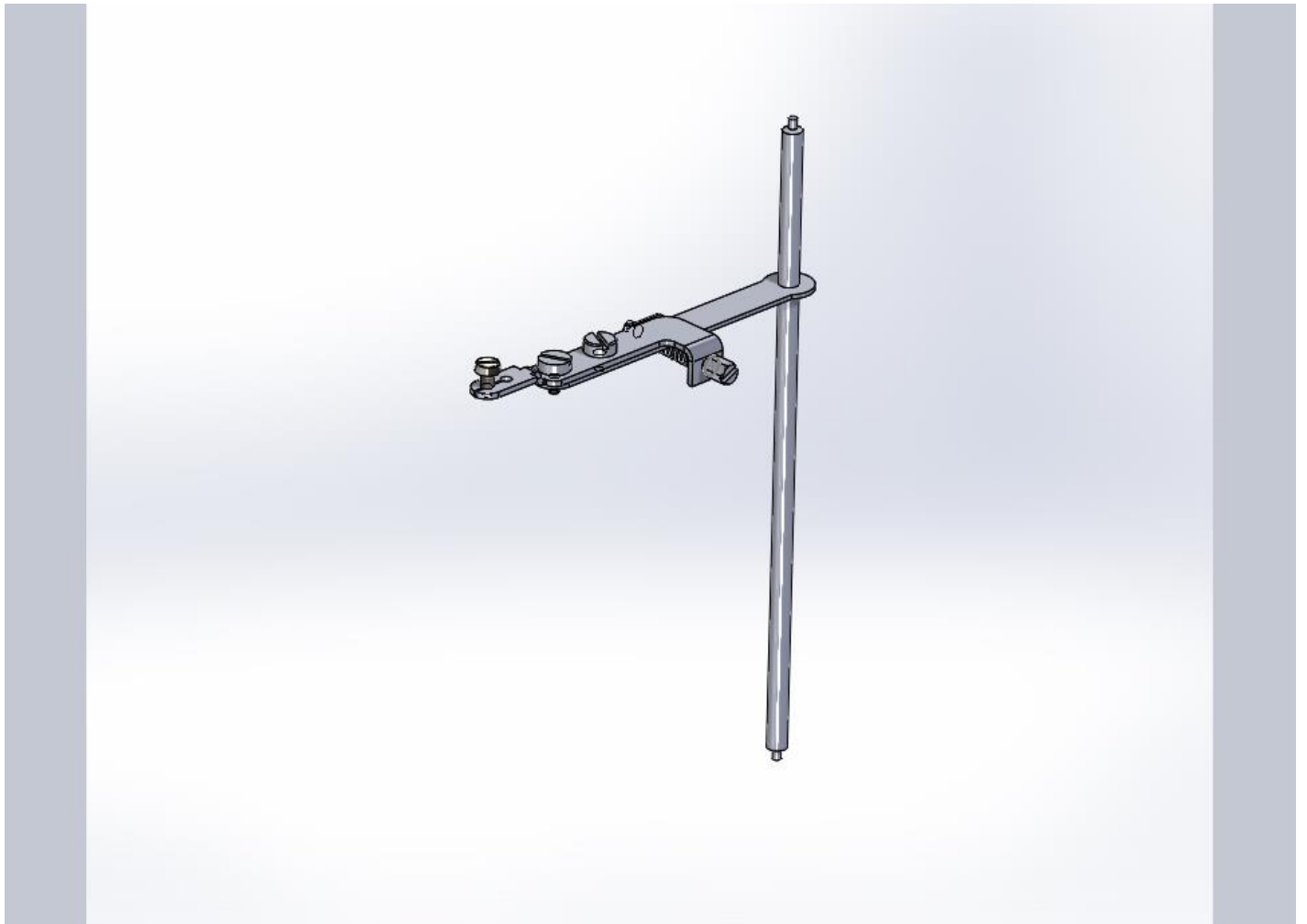


Figure 6

The Pen Shaft consists of a 1/8" diameter rod with pivots at each end.

A Pen Plate is attached permanently to the Shaft at height corresponding to the Red Pen Capsule.

Upon the Pen Plate a pivoting Zero Adjust Plate is attached by a Shouldered Screw.

The Zero Plate carries the recording pen arm.

The front of the Zero Adjust Plate has a swept feature for the pen arm friction adjust screw.

A Zero Screw and spring is fitted to adjust the Zero Plate and thereby the recording pen arm.

A Clamp Screw is fitted to set the correct length of pen arm to coincide with the arc time line of the chart paper.

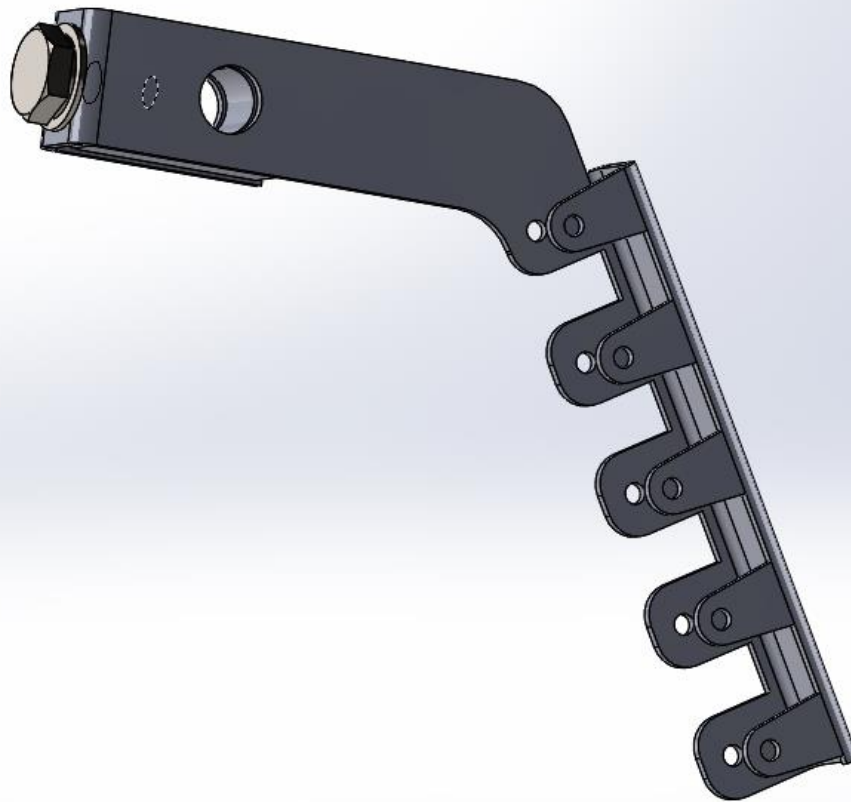


Figure 7

The Temperature Lever Drive Arm is fitted onto the Pen Shaft of the Mechanism.

It is held in position when the height of the forks coincides exactly with the height of the Span Adjust Screw thereby ensuring the Drive Link is straight.

The M2.5 Hex Head Screw acts as a lock screw by pulling the clamp block against the pen shaft. Use a 4mm A/F Wrench to adjust.

Only tighten sufficiently to lock in place, over tightening may shear the screw head.

The forks provide pairs of holes to set the initial span to suit the temperature element.

Set the Drive Link to the THIRD pair of holes down from the pen shaft.

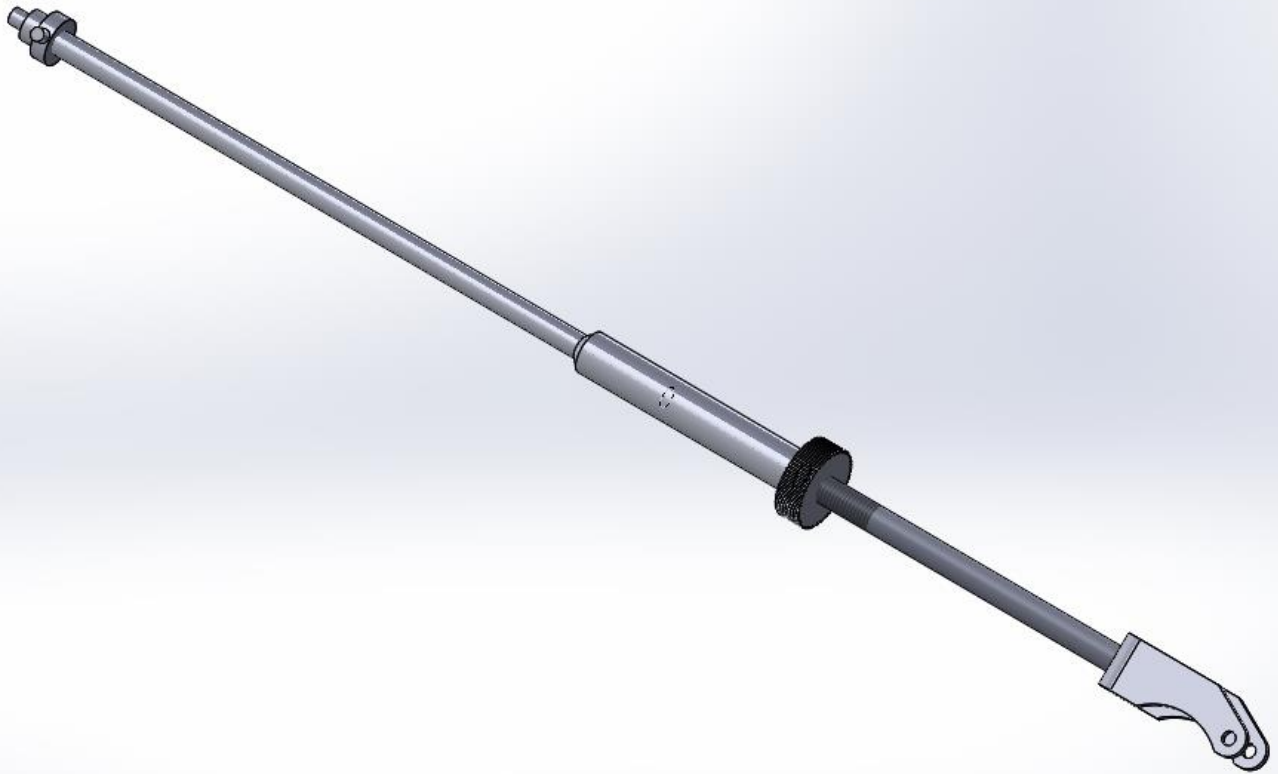


Figure 8

The Drive Link consists of a screwed fork fitted into an extended screwed sleeve with a lock wheel to allow for length adjustment.

The forked end accepts a rotating trunnion fitted to the end of the span adjust screw.

A rotating trunnion is fitted to the extended rod end to provide a friction less pivot coupling for the lever drive arm of the mechanism pen shaft.

Do not disengage the trunnion from the end of the link as it is peened on for free play but with zero end float.

If the link is damaged or is the cause of friction fit a replacement.

On each pen shaft is a lever drive arm locked in position by a clamp block locking screw.

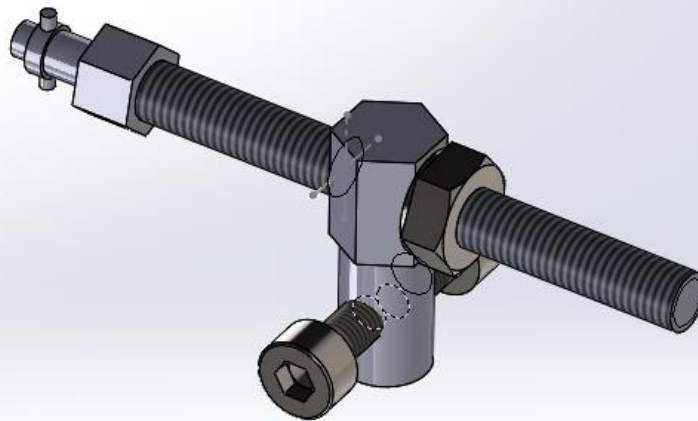


Figure 9

Each measuring element has a 1/8" diameter pin at its output.

The Centre Post fits onto the element pin and can be set to the angle required for correct linkage alignment.

Two M3 locking screws are provided to lock the Centre Post into position, use 2.5mm A/F Allen Keys for adjustment.

The Span Adjust Screw is threaded into the Centre Post and has a M4 lock nut to retain the position set during calibration.

Use a 7mm A/F Open ended Wrench to lock the nut to the Centre Post.

The end of the Span Adjust Screw is fitted with a rotating trunnion forming a friction less pivotal coupling for the Drive Link.

Do not disengage the trunnion from the end of the link as it is peened on for free play but with zero end float.

If the coupling is damaged or is the cause of friction fit a replacement.

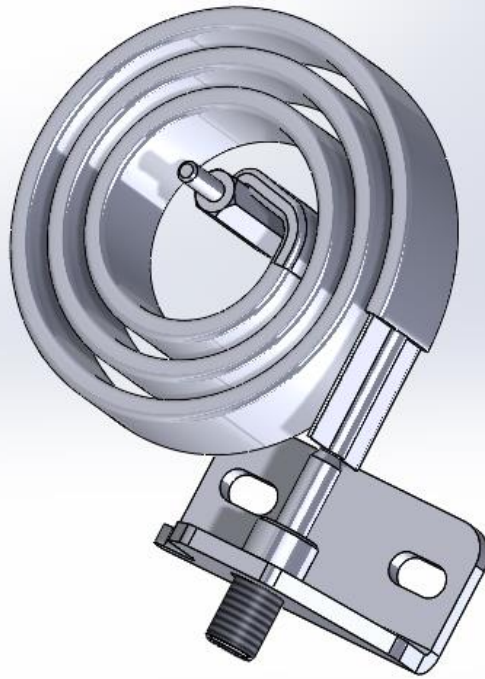


Figure 10

The Spiral PRESSURE ELEMENT is a centre wound tube forming a pressure responsive element.

All spiral elements are manufactured in 316 stainless Steel material.

The element is attached permanently to a mounting bracket upon which is stamped the pressure rating. DO NOT exceed the rating.

The 5/16" UNF screwed connection is provided to accept the pressure sealing ferrule and nut. Use an 11mm A/F Wrench to tighten until leak free.

The pressure spiral centre is permanently fitted with a 1/8" diameter pin to accept the Centre Post.

Standard deflection of the spiral element is 15° to match the middle pair of hole position of the [Pressure Lever Drive Arm](#).

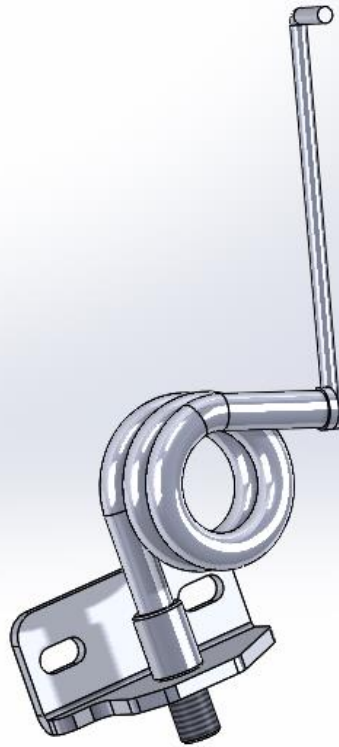


Figure 11

The Pressure Coil Element is a helically wound tube forming a pressure responsive element.

All spiral elements are manufactured in 316 stainless Steel material.

The element is attached permanently to a mounting bracket upon which is stamped the pressure rating. DO NOT exceed the rating.

The 5/16" UNF screwed connection is provided to accept the pressure sealing ferrule and nut. Use an 11mm A/F Wrench to fit.

The pressure coil end is permanently fitted with a 1/8" diameter lever terminating in an upright pin to accept the Centre Post.

Standard deflection of the pressure coil element is to match the second pair of holes down from the pen shaft position of the [Pressure Lever Drive Arm](#).

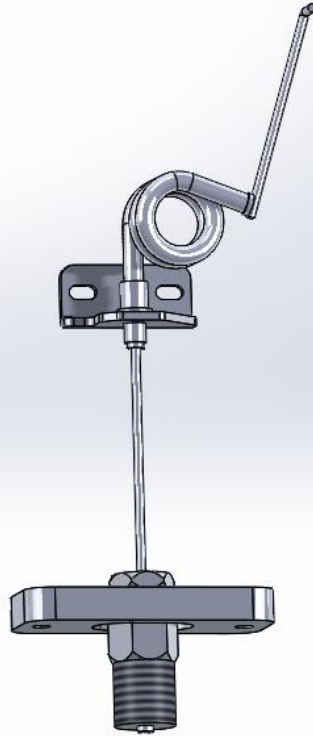


Figure 12

For static pressure ranges above 10,000 PSI / 700 bar a fully welded coil assembly is used.

Process connections threads are available as detailed in the [Pressure Connection Assembly](#) section.

It is recommended that the process connection used is 1/4" HP 9/16" UNF to suit high pressure tubing with 60° cone for metal seal.

PRESSURE CONNECTION ASSEMBLY (SEE PARTS LIST FOR VARIANTS)

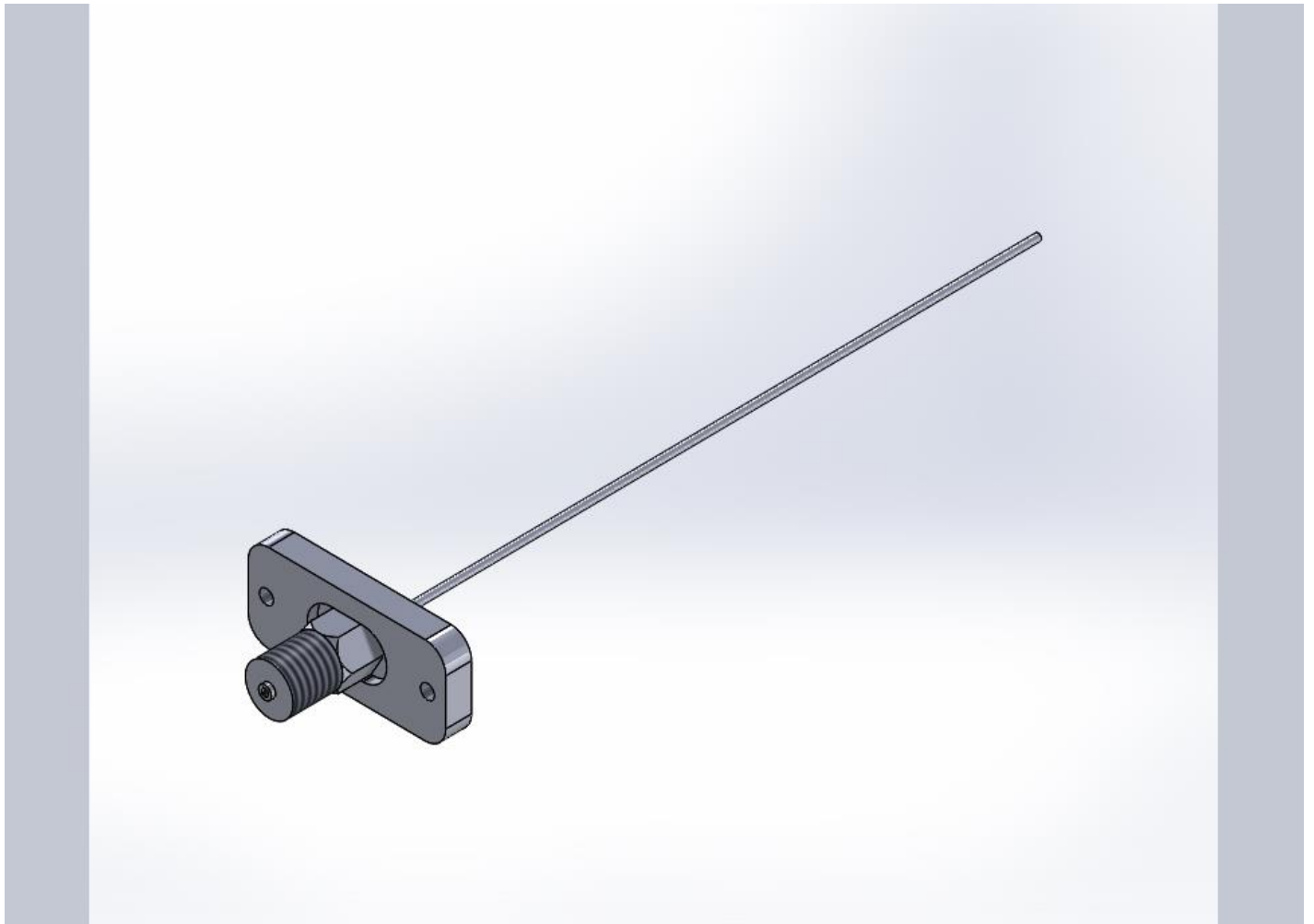


Figure 13

The Pressure Connection Assembly consists of an Outlet Plate Block and Pressure Connection threaded to suit the process.

Standard threads available are 1/4" NPT female and 1/2" NPT male.

A Distance Piece Spacer and Locknut secure the connection to the block.

A pressure capillary tube is argon welded to the pressure connection.

All wetted parts are made from 316 stainless steel material.

For pressures up to 10,000 PSI a pressure sealing cone and nut are used to connect the capillary tube to the PRESSURE ELEMENT screwed fitting.

PRESSURE ELEMENTs above 10,000 PSI are fully welded between pressure connection, capillary tube and PRESSURE ELEMENT.
DO NOT cut the capillary tubing.

Available for the higher pressure ranges is 1/4" HP 9/16" UNF process connection thread to accept high pressure tubing with 60° cone metal sealing face with left hand threaded collar and gland nut.

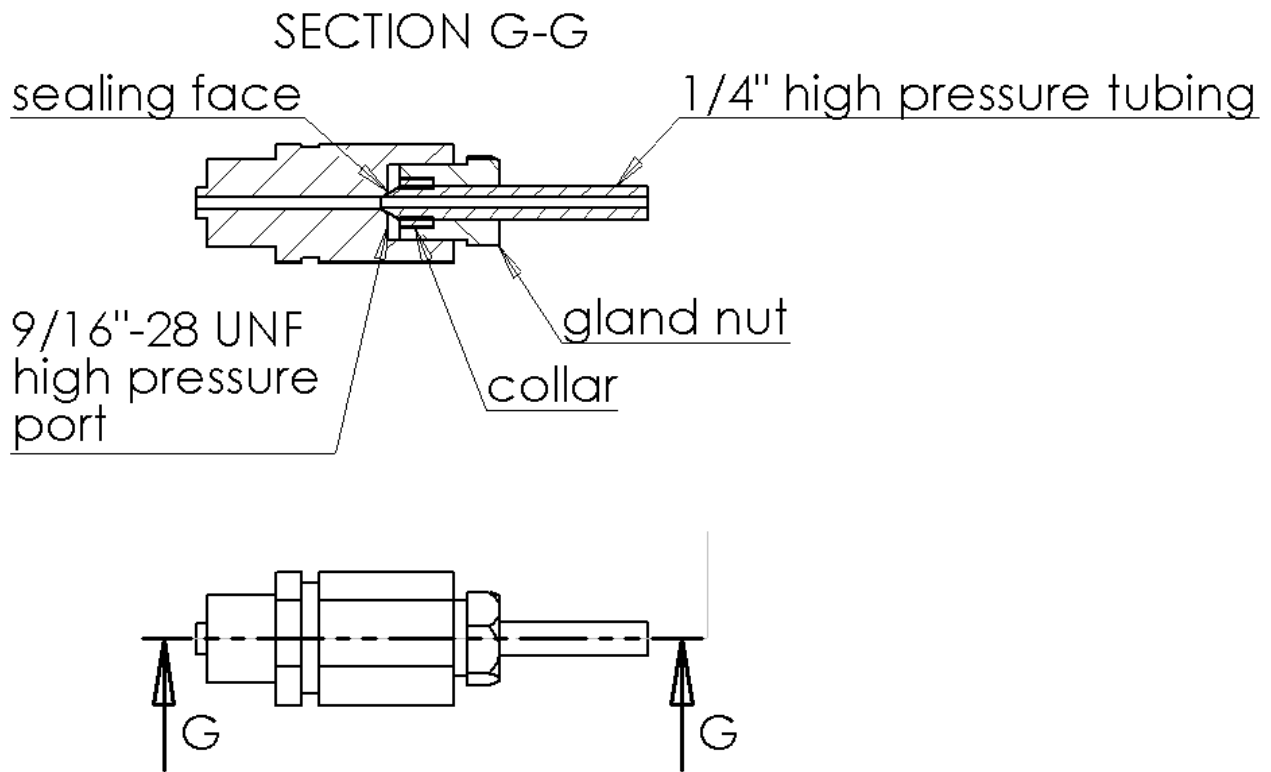


Figure 14

THERMOGRAPH COIL ELEMENT

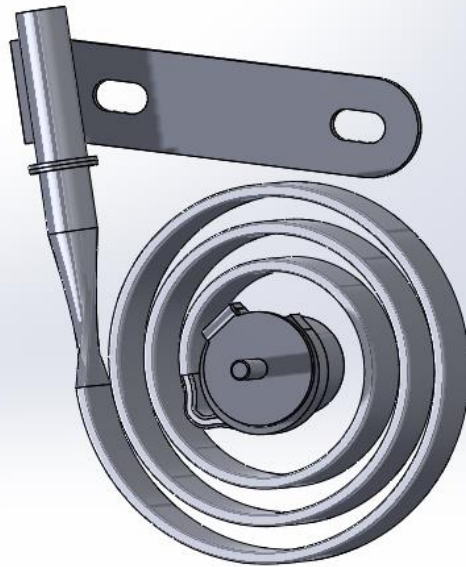


Figure 15

The temperature element consists of a centre wound thermograph bourdon tube. It is shown here only in part which is seen externally to the enclosure of the unit.

Attached to the inner end of the tube is a bimetallic compensator to provide case compensation for variation in ambient temperature in the range -20 to +50°C.

A centre disc with pin is attached to the free end of the compensator to provide coupling to the Centre Post Span Adjust Screw assembly.

A micro bore capillary is attached to the bourdon tube which extends to the sensing bulb termination of the whole system external to the case. Never cut the capillary as the complete system is gas filled under pressure and will cause complete failure to operate.

THERMOGRAPH BULB



Figure 16

The thermal bulb assembly is the termination of the temperature measuring filled system.

It is shown here only in part which is seen externally to the enclosure of the unit.

Never cut the capillary as the complete system is gas filled under pressure and will cause complete failure to operate.

The armoured capillary protects the inner micro-bore capillary which is attached to the sensitive bulb of 11/16" outside diameter.

Also attached to the bulb and covering the micro-bore capillary is a 1/4" diameter extension tube upon which is an adjustable compression gland with a 1/2" NPT thread connection to suit the process entry point.

For correct measurement the sensitive bulb portion must be fully immersed into the pipe or vessel containing the process media.

If required a standard thermowell can be provided and the thermal bulb inserted into its bore allowing removal from the process without shutting down and where process variables require a higher degree of protection i.e. flow rate, pressure etc.

CHART DRIVES

The recorder baseplate is fitted with multiple threaded studs which allow different chart drive types to be mounted with ease.

Chart drives are mounted upon pillars assembled to the baseplate studs ensuring the correct hub height.

Mechanical chart drives with clamp type hubs are available with retaining chain attached to the chart plate if required.

Battery driven types are fitted with clip type hub.

Sonceboz® multispeed battery drives are available in two versions, 82OR029 for fast speeds or 82OR001 for slow speeds. Each type is fitted with hub type G190.

Use only battery cell as recommended in the specification to ensure correct function.

For multispeed type remove the cover on the body of the chart drive and insert the battery with correct polarity into the integrated battery holder and replace the cover.

For single speed 31 day battery type drive the battery holder is attached to the lower left hand side of the chart plate. Positive and negative polarity wires from the chart drive are terminated with detachable plug housing to enable either the drive or battery holder to be replaced separately if required.

Remove the cover using a coin or flat blade, insert the AA battery with correct polarity and replace the cover by pressing down to overcome the spring pressure.

For mechanical types there are two types of arrangement for wind up, single speeds have integrated chart paper clamp and winder.

Dual speed types have a chart paper clamp and key for wind up. The key is located on the clip attached to the lower right hand side of the chart plate.

Other types of chart drive for example Sonceboz® 725 are easily fitted to the baseplate if required.

Mechanical Single Speed wind up (Standard)- 1 Rev./ 1 day
- 1 Rev./ 7 day
- Other single speeds available : 30 min. – 1 hr – 2 hr – 3 hr – 4 hr – 6 hr – 8 hr – 12 hr – 48 hr – 72 hr – 176 hr – 336 hr – 744 hr ...
- Rotation : counter-clockwise
- Manufactured according to DIN 58658
- Shock-resistant and antimagnetic Swiss anchor escapement
- Stainless steel winding spring , pinions and shaft
- Accuracy : +/- 5 sec/°C/24 hour , according to DIN 8300
- Operating temperature : - 35°C ... + 65 °C (- 31 °F ... + 149 °F) according to DIN 8300-A and DIN 8300-B

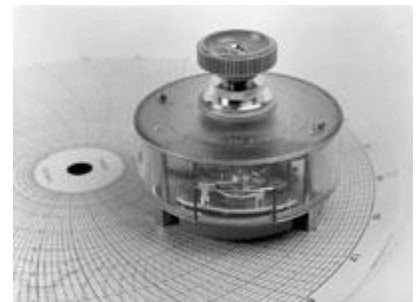


Figure 17

Mechanical Dual Speed wind up - 1 Rev / 1 day & 7 day
 -Other dual speeds available: (1hr & 15 min) – (1 hr & 4 hr) – (30 min. & 2 hr) – (2 hr & 8 hr) – (8 hr & 24 hr).
 - Rotation : counter-clockwise
 - Manufactured according to DIN 58658
 - Shock-resistant and antimagnetic Swiss anchor escapement
 - Stainless steel winding spring , pinions and shaft
 - Accuracy : +/- 5 sec/°C/24 hour , according to DIN 8300
 - Operating temperature : - 35°C ... + 50 °C (- 31 °F ... + 122 °F) according to DIN 8300-A and DIN 8300-B



Figure 18

Multi-Speed Battery Operated with UL rating and 11 selectable speeds - ON OFF Function indicator

- Test: 60MIN 96 MIN
- Standard: 12HR 1D 2D 7D 8D 14D 16D 31D 32D
- Quartz controlled
- On selector Pulsating LED indicates functioning
- Rotation : Standard: counter-clockwise
- Operating temperature : -40°C ...+70°C (-40 °F to 160 °F)
- Regular Temperature 1.5 V Alkaline "C" Size Battery
- Low Temperature 3.6 v Lithium "C" Size Battery



Figure 19

31 Day Battery Operated with Battery Holder mounted in Chart Plate-1 Rev./ 31 day
 - Rotation : counter-clockwise
 - Manufactured according to 89/336/EEC and following 92/31/EEC , 93/68/EEC, EN 55022 class B , EN 50082-1 , IEC 801-2
 - Supply : DC 1.2 V ... 1.6 V
 - Operating autonomy : more than 4 years with an alkaline cell AA size , IEC LR6
 - Accuracy : +/- 1 sec/24 hr ""
 - Operating temperature : - 15 °C ... + 60 °C (5 °F ... 140 °F)



Figure 20

PRESSURE CALIBRATION

Calibration of any pen movement will require adjustments to the drive arms and linkages behind the chart plate, therefore, it is recommended that the chart and chart plate be removed and replaced with a segment cut from a circular chart and cemented to stiff cardboard to allow easy access to the adjustments. If repeated calibrations are required make up a cut away chart plate for ease of use.

- a) Check the pressure range stamped on the static PRESSURE ELEMENT and DO NOT exceed this pressure during calibration or in operation.
- b) The static element working pressure should equal or exceed the maximum process pressure anticipated and should equal the full span pressure range of the chart.

EXAMPLE: If you desire to record pressure values up to 75 psi use a 100 psi static element and a chart scaled 0 to 100. In operation the measured pressure value should not exceed 75 PSI

Connect a variable and controllable pressure source and pressure indicator to the static pressure thread connection on the case. A calibrated dead weight tester is the most accurate pressure source & indicator.

- c) If a pressure gauge is used, be sure it has been recently calibrated and its stated accuracy is four times better than $\pm 1\%$ full scale deflection of the recorder, i.e. $\pm 0.25\%$ or better. Also choose a gauge not less than 50% and not more than 75% of the recorder range.
- d) Ensure all linkages are free to pivot and pens align and pass each other.
- e) The range Span Adjust Screw and the pen shaft range Lever Arm should be equally spaced from the back of the case.
- f) Set adjustments to mid position i.e. zero adjust plate aligned with pen arm; Span Adjust Screw set to mid length.
- g) Apply 50% of pressure range.
- h) For Pressure Spiral Elements: Adjust the Centre Post so the Span Adjust Screw points approx. to the centre of the chart drive. Tighten fully.

For Pressure Coil Elements: Adjust the Centre Post and Span Adjust Screw to align exactly parallel to vertically with the lever on which the Centre Post is attached. Tighten fully.

- i) Adjust the length of the Drive Link to set 90° angle at each of its ends when sighting from the pen shaft hole to the Drive Lever Arm hole as the figure shown.
- j) Loosen the Lever Arm clamp at the pen shaft only enough to allow the pen to be slipped to 50% line on chart.

- k)** Check zero and 100% span. There are two span adjustments and zero adjustments provided:

SPAN ADJUSTMENTS

- 1.** Changing the Drive Link connection in or out on the Lever Arm is a Coarse Span adjustment but as guidance this is best achieved with the mechanism and linkage removed from the instrument and then replaced as it is less time consuming and can be done without causing damage.
- 2.** Slacken the Centre Post screws and remove the two Mechanism fixing screws. Slip the Centre Post from the Element pin and withdraw the whole assembly from the baseplate. Gently prise the Drive Lever apart so the trunnion can be slipped out of one hole and then repeat the same for the other hole.
- 3.** Reinsert the trunnion into the new hole position; gently ease one pivot of the trunnion into the lower fork hole and gently ease the opposite pivot into the upper fork hole. Ensure the trunnion is unable to come out from either hole by gentle squeeze of the fork and that there is complete free movement.
- 4.** The Drive Link should swing freely and be aligned with the Lever Arm ensuring that all is true and straight.
- 5.** Fine Span adjustments are made by moving the Span Adjust Screw in or out along its length. Loosen the locknut and to increase span, wind the screw out longer to give more leverage. Conversely, to decrease span wind the screw in to shorten the leverage. Retighten locknut.

ZERO ADJUSTMENTS

- 6.** Loosening the clamp at the pen shaft enables the Lever Arm to be set up or down to match the Span Adjust Screw height but also to slip the pen to a new position on the chart as a Coarse Zero adjustment.
 - 7.** Fine zero adjustments are made by the zero screw on the mechanism pen plate. There is a limit to how much fine adjustment is made typically $\pm 10\%$. For larger errors use the coarse adjust as described in step 6.
- l)** When calibration is complete, re-check all set screws and nuts for tightness and all pivot connections for looseness.

TEMPERATURE CALIBRATION

Calibration of any pen movement will require adjustments to the drive arms and linkages behind the chart plate, therefore, it is recommended that the chart and chart plate be removed and replaced with a segment cut from a circular chart and cemented to stiff cardboard to allow easy access to the adjustments. If repeated calibrations are required make up a cut away chart plate for ease of use.

- a. Check the temperature range on the tag attached to the capillary tubing inside the enclosure and DO NOT exceed this temperature during calibration or in operation.
- b. The temperature element working temperature should equal or exceed the maximum process temperature anticipated and should equal the full span temperature range of the chart.

EXAMPLE: If you desire to record pressure values up to 75°C use a 100°C element and a chart scaled 0 to 100. In operation the measured pressure value should not exceed 75 °C.

A known steady temperature source(s) and temperature indicator of accuracy 0.25% full scale deflection is required to perform calibration to factory standard.

- c. Ensure all linkages are free to pivot and pens align and pass each other.
- d. The range Span Adjust Screw and the pen shaft range Lever Arm should be equally spaced from the back of the case.
- e. Set adjustments to mid position i.e. zero adjust plate aligned with pen arm; Span Adjust Screw set to mid length.
- f. Apply 50% of temperature range.
- g. Adjust the Centre Post so the Span Adjust Screw points approx. to the centre of the chart drive. Tighten fully.
- h. Adjust the length of the Drive Link to set 90° angle at each of its ends when sighting from the pen shaft hole to the Drive Lever Arm hole as the figure shown.
- i. Loosen the Lever Arm clamp at the pen shaft only enough to allow the pen to be slipped to 50% line on chart.
- j. Check zero and 100% span. There are two span adjustments and zero adjustments provided:

SPAN ADJUSTMENTS

- i. Changing the Drive Link connection in or out on the Lever Arm is a Coarse Span adjustment but as guidance this is best achieved with the mechanism and linkage removed from the instrument and then replaced as it is less time consuming and can be done without causing damage.
- ii. Slacken the Centre Post screws and remove the two Mechanism fixing screws. Slip the Centre Post from the Element pin and withdraw the whole assembly from the baseplate. Gently prise the Drive Lever apart so the trunnion can be slipped out of one hole and then repeat the same for the other hole.
- iii. Reinsert the trunnion into the new hole position; gently ease one pivot of the trunnion into the lower fork hole and gently ease the opposite pivot into the upper fork hole. Ensure the trunnion is unable to come out from either hole by gentle squeeze of the fork and that there is complete free movement.
- iv. The Drive Link should swing freely and be aligned with the Lever Arm ensuring that all is true and straight.
- v. Fine Span adjustments are made by moving the Span Adjust Screw in or out along its length. Loosen the locknut and to increase span, wind the screw out longer to give more leverage. Conversely, to decrease span wind the screw in to shorten the leverage. Retighten locknut.

ZERO ADJUSTMENTS

- vi. Loosening the clamp at the pen shaft enables the Lever Arm to be set up or down to match the Span Adjust Screw height but also to slip the pen to a new position on the chart as a Coarse Zero adjustment.
- vii. Fine zero adjustments are made by the zero screw on the mechanism pen plate. There is a limit to how much fine adjustment is made typically $\pm 10\%$. For larger errors use the coarse adjust as described in step 6.
- k. When zero and span readings are correct apply 50% span and check mid span reading.
- l. If in error readjust the Drive Link length to correct the linearity angle and slip the pen back to read mid chart line. For one division of error the amount of correction is approx. 5 divisions in the opposing direction.
- m. Repeat steps for zero and span but be aware that Lever Arm and Pen Shaft must not contact below and above the zero and full span chart lines. If a measuring system is faulty it must be replaced in lieu of recalibration settings that do not follow standard angle setting between linkages.
- n. When calibration is complete so that zero, quarter span, half span, three quarter span and full span readings are correct with $\pm 1\%$ full scale deflection, re-check all set screws and nuts for tightness and all pivot connections for looseness.

HOW TO REPLACE A PRESSURE ELEMENT

To exchange a static PRESSURE ELEMENT for a different range or replace a damaged one, isolate and remove the recorder from the process.

Open the recorder door, operate the penlifter and remove the chart paper and chart plate.

Identify the static PRESSURE ELEMENT that is to be replaced and loosen the two Centre Post fixing screws using an Allen Key.

Remove the Centre Post from the output pin of the element and allow the linkage to hang loosely but without damage.

Undo the small gland nut using 11mm A/F open end Wrench at the PRESSURE ELEMENT connection.

Gently pull the capillary from the PRESSURE ELEMENT connection.

Remove the two element bracket screws from the baseplate using No.2 Pozidrive screwdriver and put aside for the replacement element.

Attach the replacement PRESSURE ELEMENT to the baseplate using the two screws.

Position the Centre Post onto the output pin of the element.

Position the Centre Post to align pen with zero line of chart and retighten fully the two Allen Key screws'.

Insert the capillary into the PRESSURE ELEMENT connection and retighten the gland nut using 11mm A/F wrench.

Calibrate the PRESSURE ELEMENT using the procedure [PRESSURE CALIBRATION](#)

MASTER PARTS LIST

ITEM#	DESCRIPTION	PART NUMBER	QTY/UNIT
1	RECORDER DOOR ASSEMBLY	DOOR ASSEMBLY	1
	M2.5 SHOULDER SCREW ST/ST	2994/251	1
	LINK WASHER ST/STL	2994/253	1
	CAM ROLLER ASSEMBLY	CR0047/F	1
	LOCK: B937 WING HANDLE BLACK	RTB002/B	1
	WINDOW: 4mm CLEAR ACRYLIC	RTB002/C	1
	DOOR STAY STAINLESS STEEL	RTB017/C	1
	DOOR:12 INCH SUB ASSEMBLY BLACK TEXTURE	RTB045/F	1
	LABEL:BLACK ROTOTHERM LOGO ON S/STEEL	RTB170/C	1
2	RECORDER CASE ASSEMBLY	CARCASE ASSEMBLY	1
	SCREW:M5 PAN/POZI 8mm A2	2314/230	6
	NUT:M4 FULL A2	40234	6
	SCREW:M8 x 10mm HEX HD A2	40328	2
	SCREW:M3.5 x 6 POZI PAN HEAD A2	40313	4
	BLOWOUT	B8041	1
	HINGE: STAINLESS STEEL	CR0173/C	1
	GASKET SEAL:BLACK EPDM 55 SHORE	RTB001/B	1.6m
	PILLAR:CHART PLATE FOR 12 INCH RECORDER	RTB009/C	5
	SPACER: DOOR STAY	RTB018/C	1

	DOOR LOCK LATCH BRACKET	RTB020/C	1
	BASEPLATE:12 INCH RECORDER UNIVERSAL	RTB210/C	1
	CASE:12 INCH RECORDER UNIVERSAL ZINTEC	RTB211/C	1
3	PEN LIFTER ASSEMBLY	N/A	1
3.1	PENLIFTER FOR CENTRE MECHANISM	RTB199-C	1
3.2	WASHER: M4 PLAIN A2	40233	1
3.3	SCREW:M3.5 x 8 SLOTTED CHEESE HEAD A2	40237	1
4	CHART PLATE ASSEMBLY	RTB212/C	1
4.1	MECHANICAL WIND UP KEY ASSEMBLY		
	1/4 INCH TOOL CLIP FOR WIND UP KEY	40319	1
	SCREW:M2 x 10 SL PAN HEAD A2 FOR CLIP	40248	1
	WASHER: M2 PLAIN A2 FOR CLIP	40245	1
	NUT:M2 FULL A2	FRMF160	1
4.2	31 DAY BATTERY HOLDER ASSEMBLY		
	BATTERY HOLDER: AA SIZE CELL PANEL MOUNT FOR 31DAY	RTB013/B	1
	MOLEX IN LINE CONNECTOR 2 WAY SOCKET	28683/11	1
	MOLEX IN LINE CONNECTOR 2 WAY PLUG	28684/11	1
	MOLEX IN LINE CONNECTOR MALE TERMINAL	28685/11	2
	MOLEX IN LINE CONNECTOR FEMALE TERMINAL	26868/11	2
5	RED PEN PACK:BUK10100 ROTOTHERM	RTB005/B	1
6	BLUE PEN PACK:BUK10100 ROTOTHERM	RTB006/B	1

7	M3 NYLOC NUT (DOOR STAY TO CASE)	20252/11	1
8	WASHER: M4 PLAIN A2(DOOR STAY TO CASE)	40121	1
9	WASHER: M4 PENNY A2 (DOOR STAY TO CASE)	40296	1
10	BEARING SLIDE WASHER (DOOR STAY TO CASE)	P105M/0136	2
11	TIME LABEL	RTB030/B	1
12	NUT:M4 FULL A2 (DOOR TO CASE HINGE)	40234	4
13	PORTABLE STAND ASSEMBLY	N/A	
13.1	PORTABLE LEG SET BLACK POWDER COATED	RTB049/F	1
	END TIP PORTABLE RECORDER STAND	25997/11	1
	STICK ON FEET	51353/11	4
	SCREW: M5 X 25 SLOTTED CHEESE HEAD A2	FAS05M025SS/SCH	1
	LEG FOR PORTABLE RECORDER	RTB222/C	2
	BLANK PLATE (LARGE)	RTB185/C	1
	MOULDED GRAB HANDLE ABS	27004/11	1
	SCREW:M5 x 10 POZI PAN HEAD A2	20349/01	2
	SCREW: M6 x 20 HEX HEAD A2	40239	4
	M4 BARBED PUSH FASTENER BLACK NYLON 6.6	40331	4
	M5/6 BARBED PUSH FASTENER BLACK NYLON 6.6	40332	3
	SCREW:M4 x 12 POZI CSK HEAD A2	40095	4
	CLIP WITH BACKPLATE TO GRIP 5/8" DIAMETER	40280	1
	CLIP WITH BACKPLATE TO GRIP 3/8" DIAMETER	40284	1

	SUPPORT PLATE: 3/8" STEM CLIP BLACK TEXTURE	RTB106/C	1
14	WALL/PANEL MOUNT ASSEMBLY	N/A	
	BLANK PLATE (LARGE)	RTB185/C	1
	MOUNTING BRACKET UNIVERSAL	RTB169/C	3
	WHITE WASHER	P105M/0136	3
	WASHER: M6 PLAIN A2	40235	3
	SCREW: M6 x 10 HEX HEAD A2	40237	3
	M4 BARBED PUSH FASTENER BLACK NYLON 6.6	40331	4
	M5/6 BARBED PUSH FASTENER BLACK NYLON 6.6	40332	6
15	2" PIPE/POST MOUNT ASSEMBLY	N/A	
	U BOLT: M8 C/W WASHERS & FIXING NUTS	RTB003/B	2
	2" PIPE MOUNTING BRACKET STAINLESS STEEL	RTB028/C	1
	SUPPORT PLATE:2" PIPE MTG BLACK TEXTURE	RTB216/C	2
	STANDOFF: PIPE MOUNTING	RTB184/C	8
	WASHER: M6 PLAIN A2	40235	8
	SCREW: M6 x 16 HEX HEAD A2	40238	4
	SCREW: M6 x 20 HEX HEAD A2	40239	4
	SCREW:M6 x 8 POZI PAN HEAD A2	40330	8
	M4 BARBED PUSH FASTENER BLACK NYLON 6.6	40331	4
	M5/6 BARBED PUSH FASTENER BLACK NYLON 6.6	40332	9
16	SINGLE PEN MECHANISM (PRESSURE)	RTB063/F	1
	SCREW:M4 x 8 REC CAP HD A2	40260	4

	BOTTOM PLATE CLEARSCAN MECHANISM	RTB164/C	1
	PILLAR CLEARSCAN MECHANISM	RTB166/C	2
	PIN (CLEARSCAN MECHANISM)	RTB173/C	1
	TOP PLATE CLEARSCAN MECHANISM	RTB175/C	1
16.1	SHAFT ASSEMBLY BLUE PEN	RTB096/F	1
	SCREW:M2 X 2 CHEESE HEAD A2	2313/101	1
	SCREW:M2 x 3 DIN 921 A2	40335	1
	COMPRESSION SPRING	40338	1
	SHAFT CLEARSCAN MECHANISM	RTB165/C	1
	ZERO PLATE CLEARSCAN MECHANISM	RTB174/C	1
	BLUE PEN PLATE CLEARSCAN MECHANISM	RTB176/C	1
	SHOULDER SCREW CLEARSCAN MECHANISM	RTB182/C	1
	ZERO SCREW CLEARSCAN MECHANISM	RTB186/C	1
16.2	PRESSURE STRAIGHT LEVER ASSEMBLY	RTB094/F	1
	WASHER: M2 PENNY A2	40336	1
	SCREW: M2 x 5 HEX SET SCREW A2	40337	1
	STRAIGHT SPAN ARM LEVER	RTB177/C	1
	CLAMP BLOCK	RTB181/C	1
17	TWO PEN MECHANISM (PRESSURE/TEMPERATURE)	RTB064/F	1
	SCREW:M4 x 8 REC CAP HD A2	40260	4
	BOTTOM PLATE CLEARSCAN MECHANISM	RTB164/C	1
	PILLAR CLEARSCAN MECHANISM	RTB166/C	2

	PIN (CLEARSCAN MECHANISM)	RTB173/C	1
	TOP PLATE CLEARSCAN MECHANISM	RTB175/C	1
17.1	SHAFT ASSEMBLY BLUE PEN	RTB096/F	1
	SCREW:M2 X 2 CHEESE HEAD A2	2313/101	1
	SCREW:M2 x 3 DIN 921 A2	40335	1
	COMPRESSION SPRING	40338	1
	SHAFT CLEARSCAN MECHANISM	RTB165/C	1
	ZERO PLATE CLEARSCAN MECHANISM	RTB174/C	1
	BLUE PEN PLATE CLEARSCAN MECHANISM	RTB176/C	1
	SHOULDER SCREW CLEARSCAN MECHANISM	RTB182/C	1
	ZERO SCREW CLEARSCAN MECHANISM	RTB186/C	1
17.2	SHAFT ASSEMBLY RED PEN	RTB098/F	1
	SCREW:M2 X 2 CHEESE HEAD A2	2313/101	1
	SCREW:M2 x 3 DIN 921 A2	40335	1
	COMPRESSION SPRING	40338	1
	SHAFT CLEARSCAN MECHANISM	RTB165/C	1
	ZERO PLATE CLEARSCAN MECHANISM	RTB174/C	1
	RED PEN PLATE CLEARSCAN MECHANISM	RTB180/C	1
	SHOULDER SCREW CLEARSCAN MECHANISM	RTB182/C	1
	ZERO SCREW CLEARSCAN MECHANISM	RTB186/C	1
	SHAFT CLEARSCAN MECHANISM	RTB165/C	1
17.3	PRESSURE STRAIGHT LEVER ASSEMBLY	RTB094/F	1

	WASHER: M2 PENNY A2	40336	1
	SCREW: M2 x 5 HEX SET SCREW A2	40337	1
	STRAIGHT SPAN ARM LEVER	RTB177/C	1
	CLAMP BLOCK	RTB181/C	1
17.4	TEMPERATURE CRANKED LEVER ASSEMBLY	RTB095/F	1
	WASHER: M2 PENNY A2	40336	1
	SCREW: M2 x 5 HEX SET SCREW A2	40337	1
	CRANKED SPAN ARM LEVER	RTB178/C	1
	CLAMP BLOCK	RTB181/C	1
18	SCREW: MECHANISM FIXING	RTB204/C	2
19	PEN ARM	RTB004/B	1 or 2
20	DRIVE LINK ASSEMBLY	RTB067/F	1 or 2
	ROD FOR LINKAGE	RTB190/C	1
	LINK FOR LINKAGE	RTB191/C	1
	WHEEL FOR LINKAGE	RTB192/C	1
	TRUNNION FOR LINKAGE	RTB200/C	1
	LINK FORK FOR LINKAGE	RTB201/C	1
	COLLAR FOR LINKAGE	RTB205/C	1
21	CENTRE POST & RANGE SCREW ASSEMBLY	RTB066/F	1 or 2
	COLLAR	16354/51	1
	NUT:M4 FULL A2	40234	1

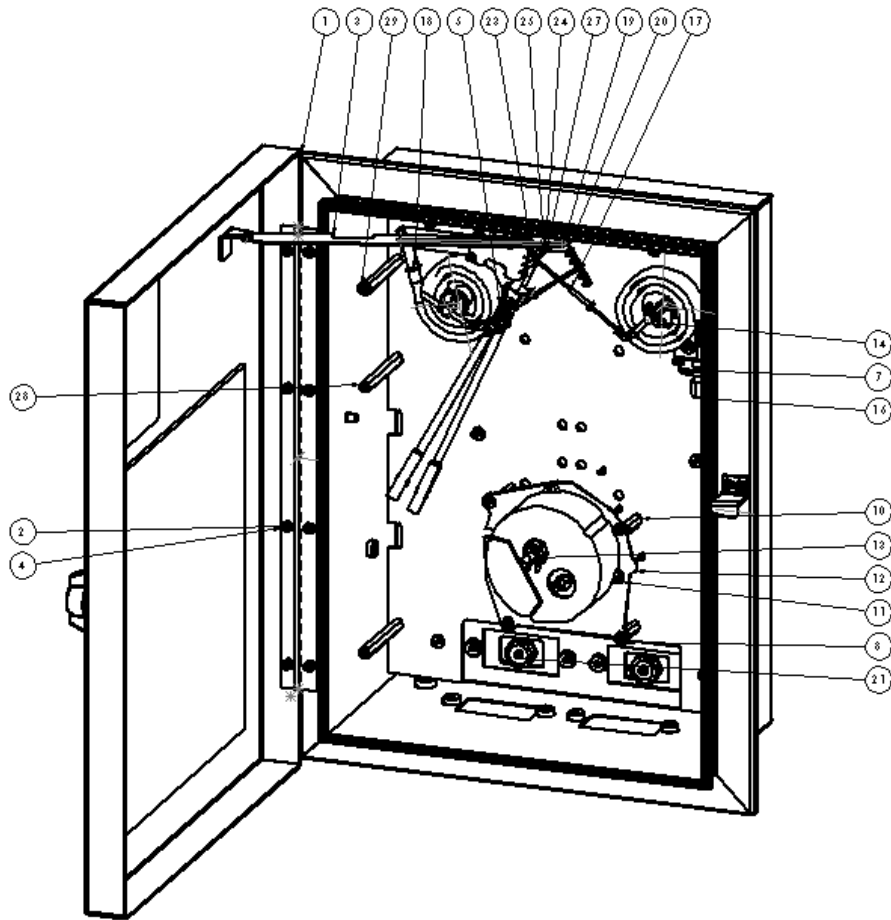
	SCREW: M3x6 SKT CAP HEAD A2	40242	2
	CENTRE POST	RTB188/C	1
	SPAN ADJUST SCREW	RTB189/C	1
	TRUNNION	RTB200/C	1
22	CHART DRIVE		1
22.1	MECHANICAL SINGLE ROTATION		
	MECHANICAL CLOCK 1 HOUR TYPE B	28938/11	1
	MECHANICAL CLOCK 2 HOUR TYPE B	30286/11	
	MECHANICAL CLOCK 3 HOUR TYPE B	24067/11	
	MECHANICAL CLOCK 4 HOUR TYPE B	30281/11	
	MECHANICAL CLOCK 8 HOUR TYPE B	28762/11	
	MECHANICAL CLOCK 12 HOUR TYPE B	24062/11	
	MECHANICAL CLOCK 24 HOUR TYPE B	24063/11	
	MECHANICAL CLOCK 7 DAY TYPE B	24065/11	
	PILLAR: MECHANICAL CLOCK 12" CLEARSCAN	RTB010/C	3
	SCREW: M4 x 6 POZI PAN HEAD A2	FASM04006S/SPAN	3
22.2	MECHANICAL DUAL ROTATION		
	MECHANICAL CLOCK 1 HR /4 HR DUAL SPEED	RTB025/B	1
	MECHANICAL CLOCK 2 HR /8 HR DUAL SPEED	RTB015/B	
	MECHANICAL CLOCK 8 HR /24 HR DUAL SPEED	RTB023/B	
	MECHANICAL CLOCK 24 HR/7 DAY DUAL SPEED	28937/11	
	PILLAR: DUAL SPEED MECHANICAL CLOCK	RTB035/C	3

	SCREW: M4 x 6 POZI PAN HEAD A2	FASM04006S/SPAN	3
22.3	CHART DRIVE 31 DAY BATTERY OPERATED	RTB010/B	1
	PILLAR:QUARTZ CHART DRIVE 12" CLEARSCAN	RTB022/C	3
	SCREW: M4 x 6 POZI PAN HEAD A2	FASM04006S/SPAN	3
22.4	MULTISPEED BATTERY		1
	CHART DRIVE MULTIPSEED BATTERY OPERATED (SLOW) 820R001	RTB019/B	1
	CHART DRIVE MULTIPSEED BATTERY OPERATED (FAST) 820R029	RTB038/B	
	CHART HUB SONCEBOZ® TYPE G 190	RTB037/B	1
	PILLAR: MECHANICAL CLOCK 12" CLEARSCAN	RTB035/C	4
	SCREW: M4 x 6 POZI PAN HEAD A2	FASM04006S/SPAN	4
33	STATIC PRESSURE SYSTEM		
	PRESSURE ELEMENT 60 PSI	RTB085/F	1
	PRESSURE ELEMENT 100 PSI	RTB086/F	
	PRESSURE ELEMENT 150 PSI	RTB087/F	
	PRESSURE ELEMENT 200 PSI	RTB088/F	
	PRESSURE ELEMENT 250 PSI	RTB089/F	
	PRESSURE ELEMENT 300 PSI	RTB090/F	
	PRESSURE ELEMENT 400 PSI	RTB091/F	
	PRESSURE ELEMENT 500 PSI	RTB092/F	
	PRESSURE ELEMENT 600 PSI	RTB093/F	
	PRESSURE ELEMENT 800-1000 psi (60 BAR)	RTB068/F	
	PRESSURE ELEMENT 1,500 psi (100 BAR)	RTB069/F	

	PRESSURE ELEMENT 2,000 psi (140 BAR)	RTB070/F	
	PRESSURE ELEMENT 2,500 psi (160 BAR)	RTB071/F	
	PRESSURE ELEMENT 3,000 psi (200 BAR)	RTB072/F	
	PRESSURE ELEMENT 4,000 psi (250 BAR)	RTB073/F	
	PRESSURE ELEMENT 5,000 psi (350 BAR)	RTB074/F	
	PRESSURE ELEMENT 6,000 psi (400 BAR)	RTB075/F	
	PRESSURE ELEMENT 7500 psi (550 BAR)	RTB076/F	
	PRESSURE ELEMENT 8,000 psi (600 BAR)	RTB077/F	
	PRESSURE ELEMENT 10,000 psi (700 BAR)	RTB078/F	
	SCREW: M5 x 8 POZI PAN HEAD A2	2314/230	2
	PRESSURE FERRULE	RTB156/C	1
	PRESSURE NUT	RTB157/C	1
	PREESSURE ASSEMBLY FULLY WELDED 15.000 PSI C/W 1/4"HP AUTOCLAVE CONNECTION	RTB109/F	1
	PREESSURE ASSEMBLY FULLY WELDED 20.000 PSI C/W 1/4"HP AUTOCLAVE CONNECTION	RTB110/F	1
	PREESSURE ASSEMBLY FULLY WELDED 25.000 PSI C/W 1/4"HP AUTOCLAVE CONNECTION	RTB111/F	1
	PREESSURE ASSEMBLY FULLY WELDED 30.000 PSI C/W 1/4"HP AUTOCLAVE CONNECTION	RTB112/F	1
34	PRESSURE CONNECTION ASSEMBLY		
	1/4"NPT FEMALE	RTB105/F	1
	1/2"NPT MALE	RTB106/F	
	1/4"HP AUTOCLAVE FEMALE	RTB107/F	

	1/2" BSP MALE	RTB108/F	
	OUTLET BLOCK	RTB213/C	1
	OUTLET GASKET	RTB214/C	1
	SCREW: M6 x 20 HEX HEAD A2	40329	2
	DISTANCE PIECE	RTB219/C	1
	LOCKNUT A2	RTB220/C	1
35	TEMPERATURE FILLED SYSTEM		
	CLEARSCAN 12 GAS TEMPERATURE SYSTEM	RTB062/F	1
	OUTLET GASKET	RTB214/C	1
	SCREW: M6 x 20 HEX HEAD A2	40329	2
	SCREW: M5 x 8 POZI PAN HEAD A2	2314/230	2
36	SCREW: M6 x 10 HEX HEAD A2 (OUTLET BLANK PLATE)	40327	4 or 6
38	OUTLET BLANKING PLATE	RTB215/C	2 or 4
39	CENTRE HEIGHT EXTENDER (IF REQUIRED)	RTB218/C	1
40	CHART PACK (0-100 LINEAR) 24 HOUR ROTATION	12/D/60/X	1

PRESSURE/TEMPERATURE RECORDER EXPLODED DIAGRAM



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Carcase Assembly	Carcase Assembly	1
2	Door Assembly	Door Assembly	1
3	RTB017-C	Door Stay	1
4	40234	M4 Full Nut A2	4
5	RTB064-F	Dual Mechanism	1
6	RTB204-C	Mechanism Fixing Screw	2
7	Static Pressure Element	Refer to Parts List	1
10	RTB035-C	Chart Drive Pillar	4
11	RTB019-B	MULTISPEED BATTERY CHART DRIVE	1
13	RTB037-B	Hub Assembly	1
14	RTB066-F	Centre Post Assembly	2
15	RTB156-C	CAPILLARY COLLAR	1
16	RTB157-C	CAPILLARY FIXING NUT	1
17	RTB067-F	Link Assembly	2
18	RTB062-F	Temperature Coil Assembly	1
19	RTB094-F	Straight Lever Assembly	1
20	RTB095-F	Cranked Lever Assembly	1
21	RTB106-F	1/4"HP 9/16"UNF	2
22	RTB215-C	Outlet Blank Plate	2
23	P105M-0136	BEARING SLIDE WASHER	2
24	40296	M4 Plain Washer	1
25	40121	M3 Plain Washer	2
28	40313	M3.5 x 6 Pozzi Pan Head Screw	4
29	40327	M3.5 x 8 Slotted Pan Head Screw A2	1

Figure 21

PORTABLE RECORDER DIMENSIONS

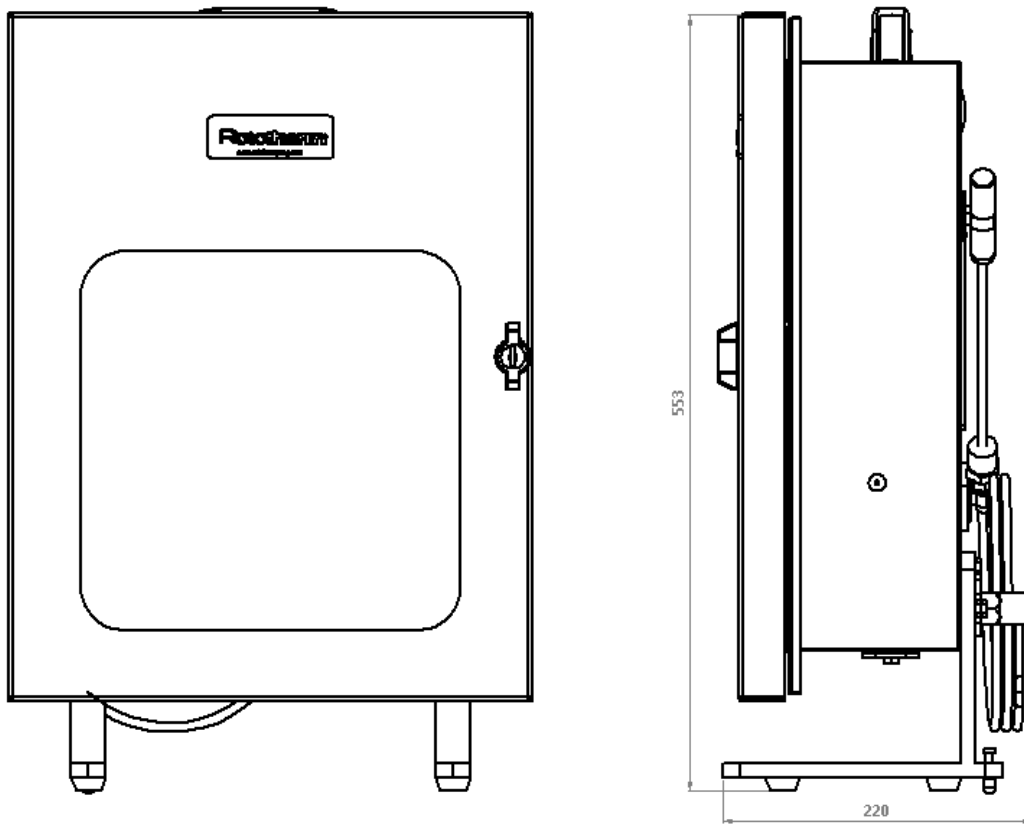


Figure 22

PORTABLE RECORDER ASSEMBLY

As supplied the handle and portable leg stands are packaged separately.

To assemble, carefully place the recorder with door facing downward on a protected flat surface.

Remove the two Pozidrive screws using a No.2 Pozidrive screwdriver.

Open the flaps of the handle if required and insert one screw into each of the handle slotted holes.

Offer the handle to the case and secure the handle by tightening the screws.

The leg stands are mounted using a pair of hex head screws either side of the rear face of the case as shown below.

Remove the screws using a 10mm a/f wrench, insert screws into the leg stand holes and attach the stands to the case.

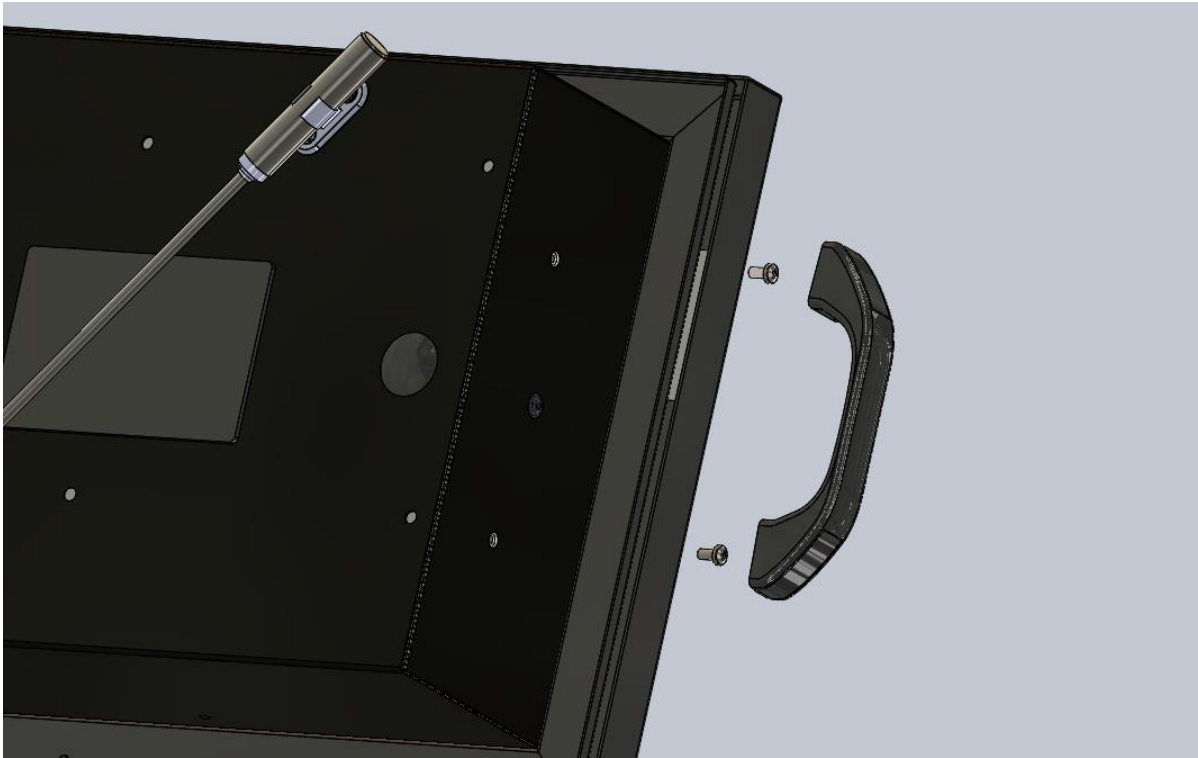


Figure 23

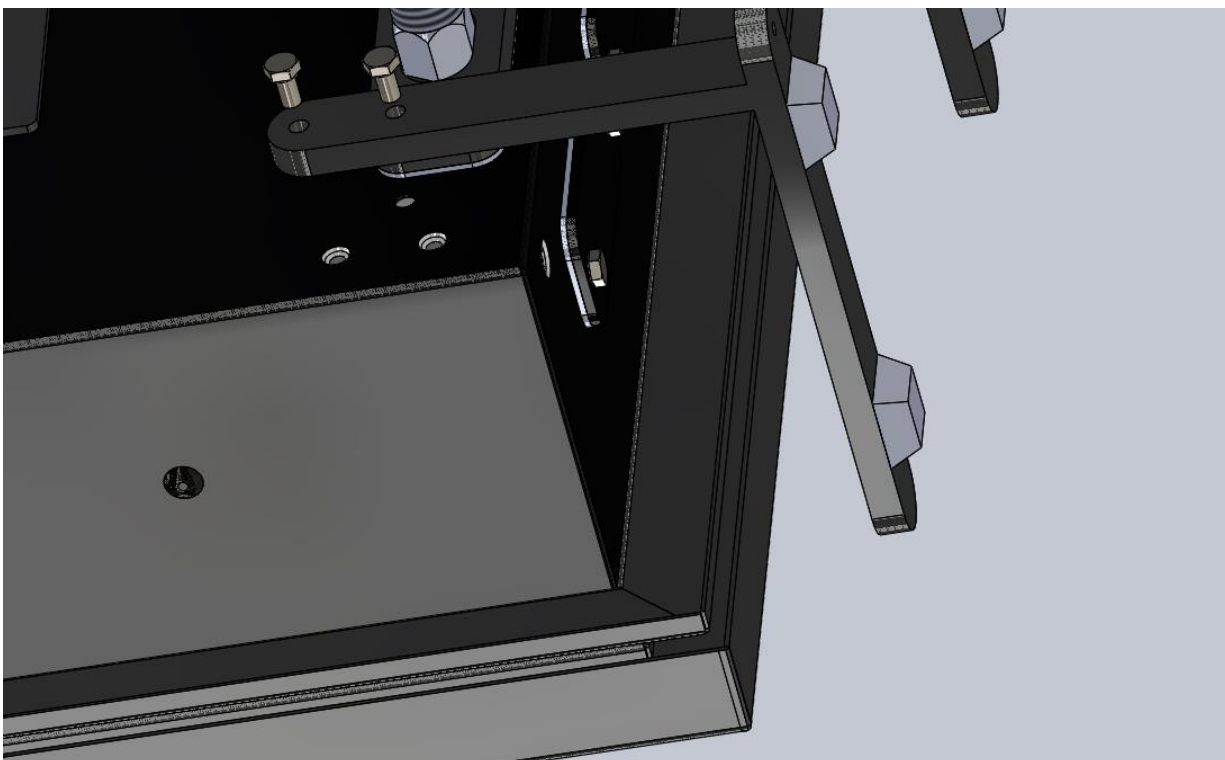


Figure 24

WALL MOUNTING

Drill 3 holes to dimensions shown in diagram and affix recorder to surface/wall using the three side brackets provided as shown in the illustration.

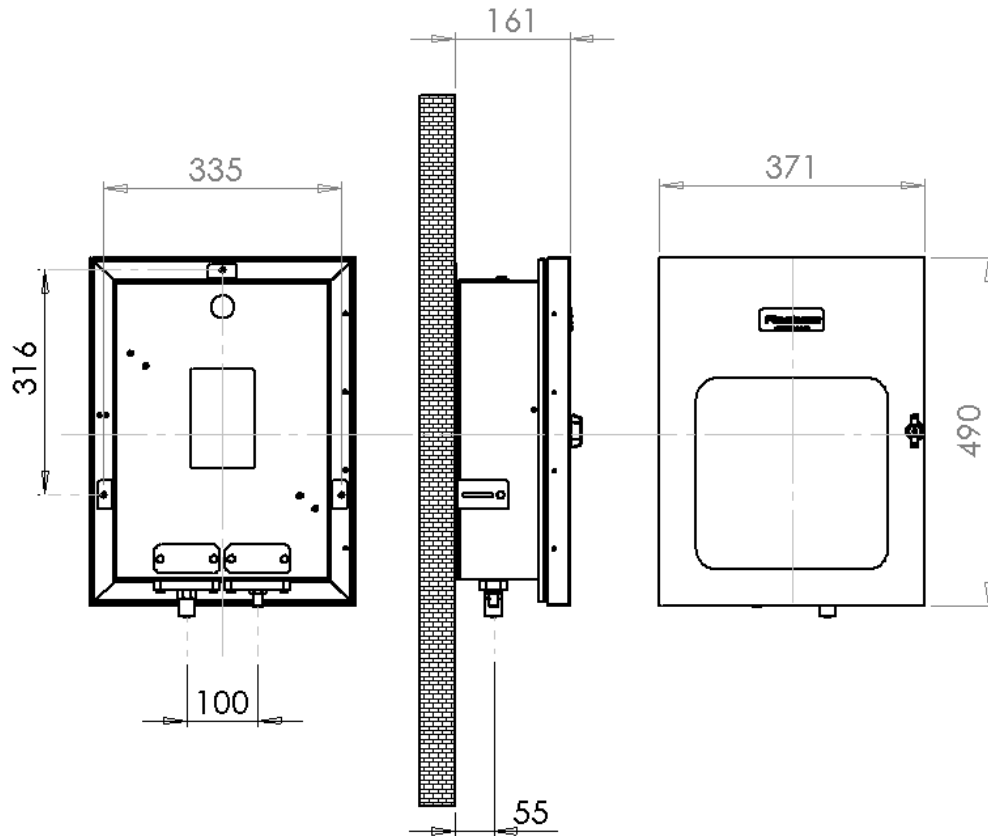


Figure 25

PANEL MOUNTING

Cut out the panel to dimension given in the diagram below.

Insert the recorder into the panel cut out as shown in the illustration and clamp it in place securely by adjusting the three brackets up to the inside face of the panel.

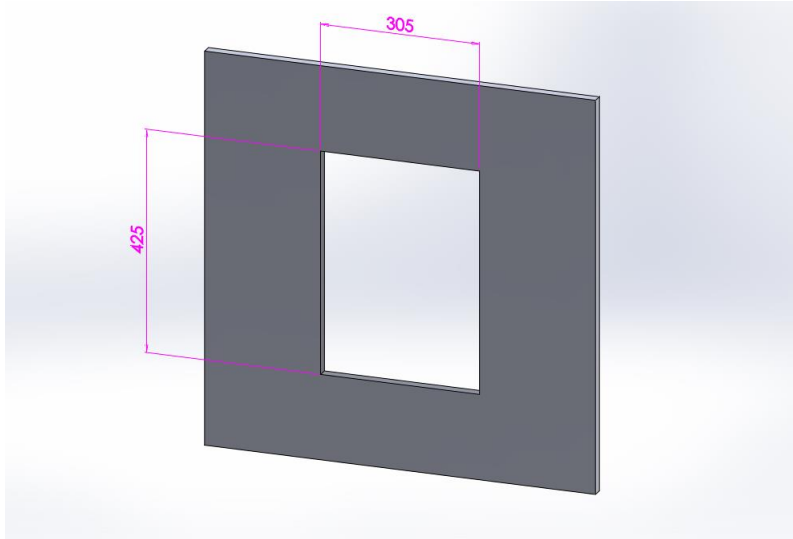


Figure 26

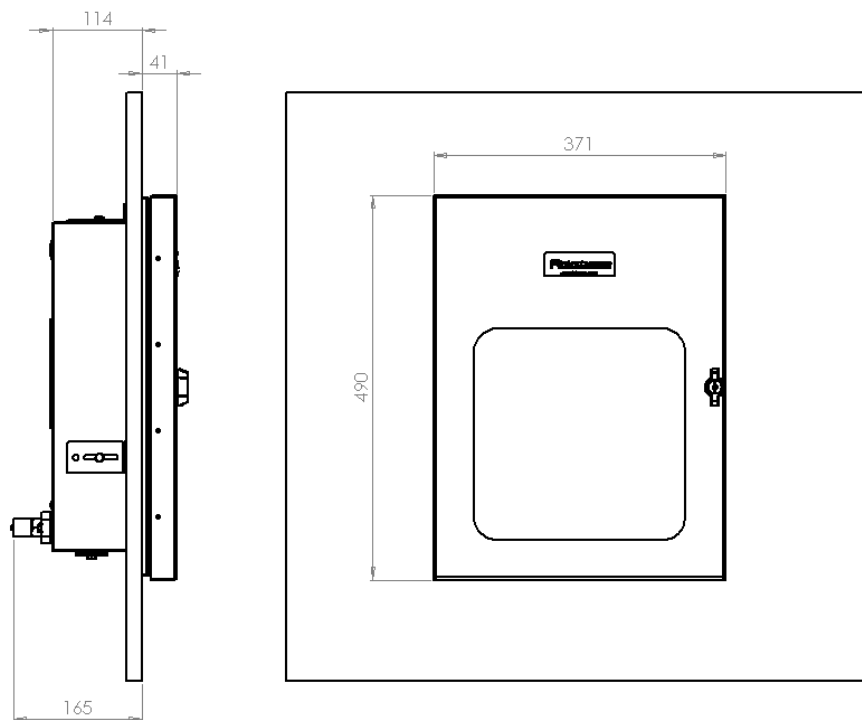


Figure 27



Figure 28

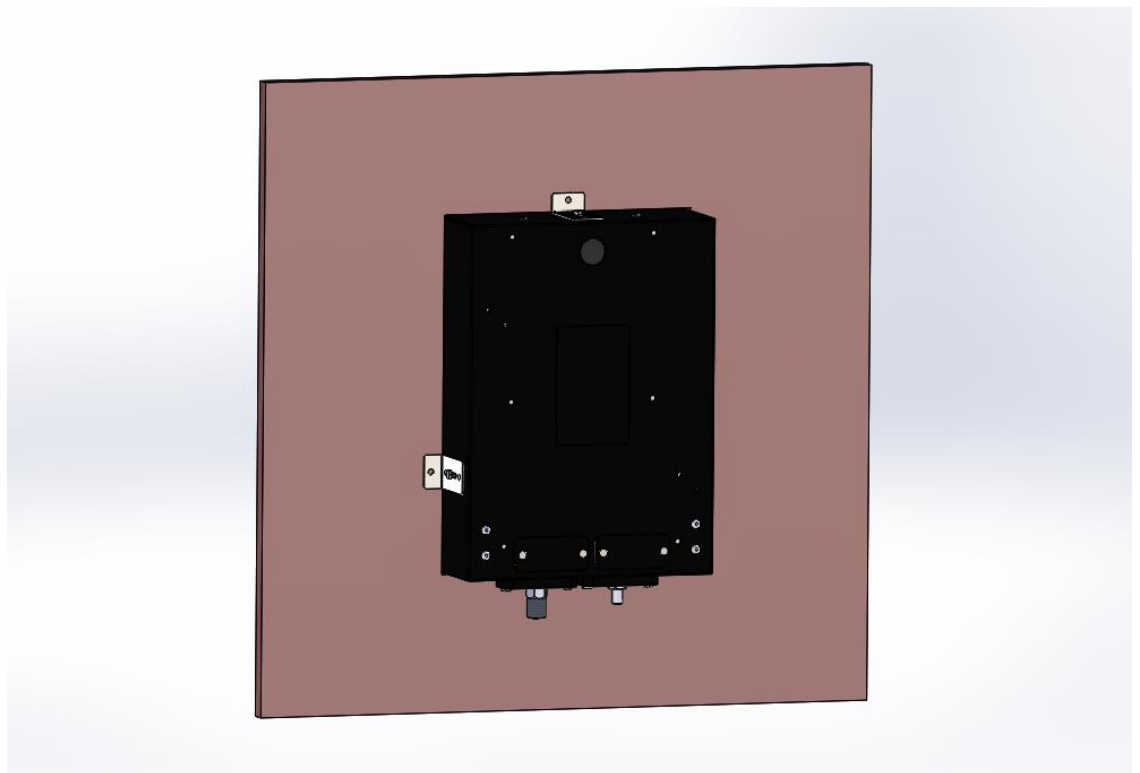


Figure 29

2" PIPE/POST MOUNTING

The recorder, if ordered, can be mounted to a vertical or horizontal 2" NB Pipe (60mm O/D).

Simply arrange the recorder to position and use the 'U' bolts and fixings provided separately with the recorder to securely mount it with the unit upright to ensure correct function.

